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THE
BRITISH NOCTUÆ
AND
THEIR VARIETIES.

VOL. 1.

TUTT.



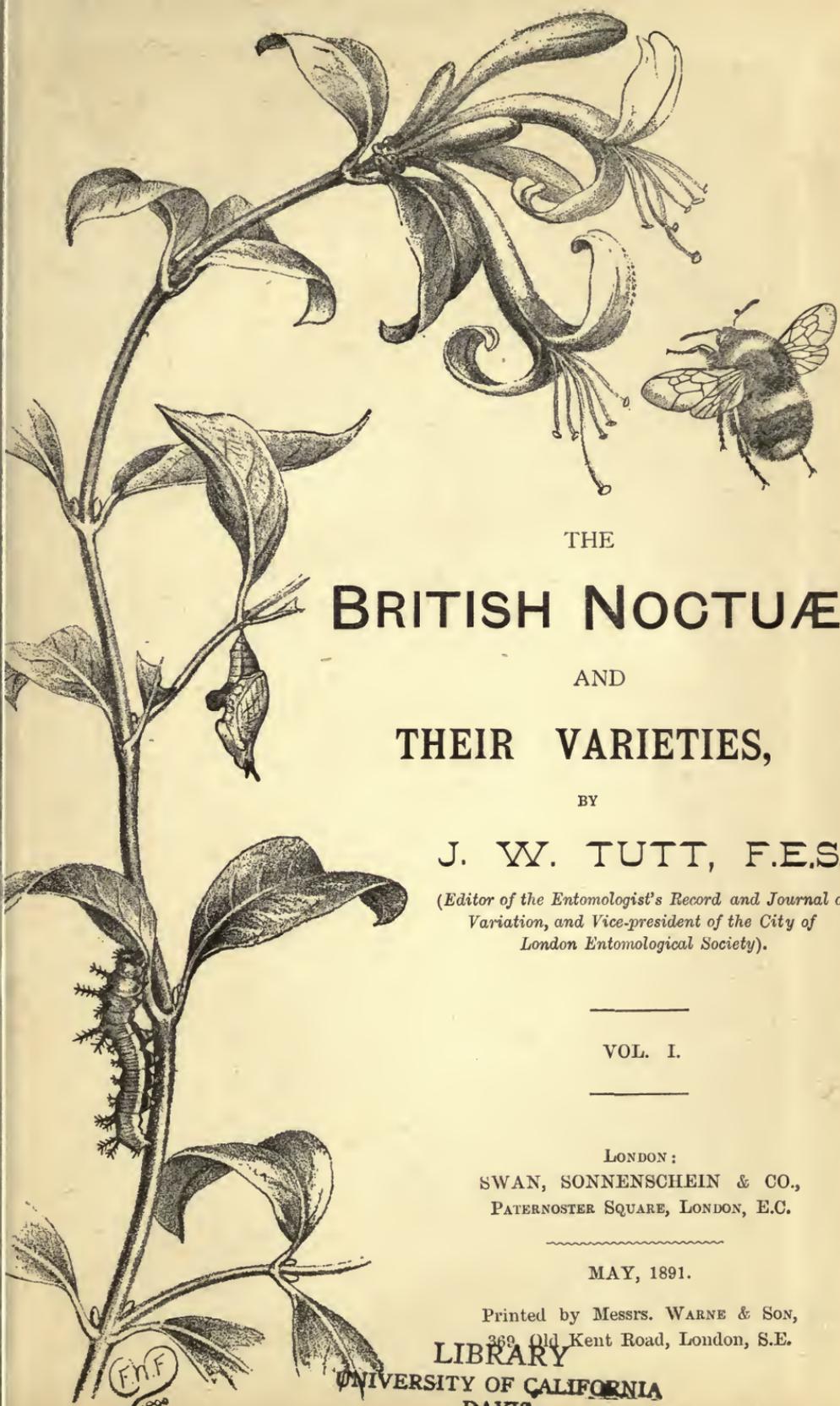
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THE
BRITISH NOCTUÆ
AND
THEIR VARIETIES,

BY

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PREFACE.

THE study of the causes of the variation of lepidoptera has now become such an acknowledged part of our work, that there appears to be but little need to explain the necessity for bringing out a systematic and descriptive volume of the varieties of a part of one of our most interesting groups of lepidoptera.

At present, the whole of the records of our varieties are scattered through numberless magazines and other works, published in different countries. Through these, one has to wade for the items of information required about any individual species, the search probably ending in failure, and thus involving waste of valuable time.

Causes of variation cannot be successfully worked out, without the widest and most general information concerning the species about which enquiries are made. It is with the view of extending the information at present available that the present volume is being published.

There was an outcry a short time since, in certain quarters, concerning the naming of varieties. Among our numbers there will always be a certain proportion of collectors, who are unable, from various causes to work up such a comprehensive subject as variation, and yet wish to be thought quite *au fait* with every branch and phase of it. The use of varietal names need not trouble such; the names are made for the use of those devotees in various countries who wish to carry on their work without the waste of time, and who cannot afford to make a long written description every time they wish to speak of a certain varietal form.

The matter in the book is principally new, that relating to the *Cymatophoridae*, *Bombycoidee*, *Apamidae*, and *Caradrinidae* almost entirely so. The skeleton of the material used in *Bryophilidae*, *Leucanidae* and *Apamidae* (in part) appeared in a series of papers I wrote in the 'Entomologist,' 1888—1889 under the title of 'Contributions towards a List of the Varieties of the British Noctuæ occurring in the British Islands.' These, however, were of such a fragmentary nature that it was thought best to write up the greater part of the general notes on the species *de novo*, and simply use the varietal descriptions.

It remains for me to most heartily thank (1) those gentlemen, who, on the withdrawal of the above-mentioned papers from the 'Entomologist,' kindly offered to subscribe to the present volume, and thus guaranteed that no pecuniary loss should fall on me; (2) Those friends who have given me most kindly help either in obtaining material from old entomological literature, in correcting the proofs and suggesting additions, &c., or in providing me with unusual forms of lepidoptera for description.

J. W. TUTT.

May, 1891.

may not vary, or we may not have sufficient material to form a correct opinion. My own experience tends frequently to the latter view, and I have repeatedly noticed that species, presenting the most fixed and constant characters in a certain locality, and which I have learned to look upon as most constant in character, offer a very considerable range of variation when obtained from another district, where a different environment, or abnormal conditions have tended to develop latent energies in the direction of variation. There are species, however, in which one rarely meets with the slightest divergence from what we have learned to look on as their normal forms—*Gonophora derasa* (in Britain), *Cymatophora fluctuosa*, *Cuspidia strigosa*, *Tapinostola elymi*, *Neuria saponariæ*, *Chortodes bondii*, *Toxocampa pastinum*, and *Xylophasia lithoxylea* are examples of this kind in different genera, in which the species are normally inclined to vary. *Leucania litoralis*, too, rarely, if ever, varies except in shape. It then varies in a most remarkable manner in the direction of the pointed wings of *Meliana flammea*.

In some species, we find a great amount of constancy in the individual specimens of each sex, but considerable variation between the sexes themselves. This sexual dimorphism is fairly common among the NOCTUÆ, although the sexes generally exhibit variation *inter se*, and at the same time show a remarkable tendency to meet in some particular form or forms. This tendency is exhibited in a very striking manner by *Agrotis cinerea*, *A. lunigera*, *A. valligera*, *A. suffusa*, *Nonagria geminipuncta*, *N. arundinis*, *N. neurica*, *Aporophyla australis*, and very many others. Of those species which are sexually dimorphic, and in which the sexes are more or less variable in themselves, but in which there is very little tendency for the forms of one sex to overlap those of the other, may be mentioned the following:—*Chortodes arcuosa*, *Cænobia rufa*, *Hydrilla palustris*, *Viminia myricæ*, *Neuronía popularis*, *Rusina tenebrosa*, and *Noctua umbrosa* among the more constant, and *Cuspidia tridens*, *C. psi*, *Nonagria cannæ*, and *Agrotis puta* among the rather less constant species.

We may now consider that most extreme form of variation, polymorphism, and mention some of those polymorphic species that show endless variation in both sexes, where the different forms are equally abundant in either sex, and where not only modifications of colour, but modification of the size, direction, and position of the stigmata and markings, give extreme forms which bear very little, if any, superficial resemblance to each other. Among the NOCTUÆ these polymorphic species are probably more abundant than in any other group. To judge how far these species do vary, a very large quantity of material is needful, and immense series of such species as *Apamea didyma*, *Agrotis tritici* and *Tæniocampa instabilis* are necessary to get the faintest idea of the very great range of variation which these insects present. Although these species are, perhaps, the most variable British NOCTUÆ we have, yet it must be confessed that *Miana bicoloria*, *M. strigilis*, *Crymodes exulis*, *Hydræcia micacea*, *Bryophila glandifera*, *Noctua festiva* (and *conflua*), *N. xanthographa*, *Pachnobia hyperborea*, *Tæniocampa gothica*, *Orthosia suspecta*, *Anchocelis pistacina*, *Dianthæcia carpophaga*, *Charæas graminis*, *Agrotis segetum*, *A. cursoria*, *A. corticea*, *Helotropa leucostigma*, *Xylophasia polyodon* and others offer a sufficient range of variation to satisfy the most exacting. These species exhibit

in most instances, not only great variation in markings, but a most extreme range of colour variation.

Probably, extreme colour variation in the same species is more strikingly exhibited among the NOCTUÆ than in any other group. *Bryophila perla* var. *pallida* is in its extreme forms almost white, var. *suffusa* is frequently almost black, whilst var. *flavescens* is often of a bright orange. *Miana bicoloria* varies from pure white to deep brownish or rusty-fuscous and bright red. *Xylophasia polyodon* from pale greyish-brown, with white markings, to the most intense black. The same range of colour extends through *Viminia rumicis*, *Nonagria arundinis*, *Luperina testacea*, *Apamea basilinea*, *A. didyma*, *Helotropha leucostigma*, *Miana strigilis*, *Grammesia trilinea*, *Agrotis corticea*, *A. cinerea*, *Noctua glareosa*, *Tæniocampa opima*, *Epunda viminalis*, *Aplecta nebulosa*, and others, although the extreme black forms may be tinged with reddish in some of these species; *Agrotis tritici* and *Tæniocampa instabilis* not only exhibit this range of variation (from the palest grey to deep black), but each has beautiful slate-coloured or bluish varieties as well. *Xylophasia rurea* var. *argentea* is pure silvery-white, var. *nigro-rubida* intense reddish-black; *Anchocelis pistacina* goes through a similar range. Most of the *Leucanidæ* vary from whitish (in some instances pure white) to the deepest red, in some species even to black. The group can hardly be left without casually referring to the wonderful colour variation which exists in our Scotch specimens of *Triphæna orbona* (comes as it is sometimes called), the specimens from Forres and Aberdeen, varying from the palest grey to brilliant red, and intense black. In fact, there is probably a larger proportion of species presenting extreme colour variation in this group than any other.

Size variation is frequently most marked. It may be due to sex, or to environment, or there may be no very clear reason by which such variation may be explained. Generally speaking, however, I believe, when variation in size is not sexual, that specimens which are above the normal size have had a bountiful supply of nutritious food, while those below the normal size have had an insufficient or innutritious diet. That this is so, when insects are artificially reared, is beyond question, and it is only reasonable to suppose that one food-plant, less nutritious than another, would, if it were the staple food in a district, produce specimens below the normal size. In insects, as a rule, females are larger than males, but this is not always so. Often among the NOCTUÆ, the opposite is the case, striking examples existing in *Chortodes arcuosa*, *Nonagria rufâ*, *Hydrilla palustris*, *Rusina tenebrosa*, *Agrotis cinerea*, *Acosmetia caliginosa*, *Stilbia anomala* and *Noctua umbrosa*. But, generally, the great mass of the NOCTUÆ follow out the ordinary rule, or there is very little to choose in size between the sexes. Certain localities often give us large or small races* of special insects. The normal size of *Agrotis velligera* and *A. tritici* from Sligo, is less than that of the specimens of the same species from Deal; *Asphalia flavicornis* from Scotland is normally larger than are those from Kent; *Luperina testacea* is very large at Freshwater in the Isle of Wight; *Noctua festiva* is normally smaller from Aberdeen than are those from Kent; the

*The most striking examples of variation in this direction exist among the GEOMETRÆ, e.g. *Aspilates strigillaria*, *Hypsipetes elutata*, and above all *Thera juniperata*, and its var. *scotica*.

small grey typical form of *Agrotis ripæ* appears to be almost confined to the Lincolnshire coast. Many other species might be mentioned varying in size according to locality and environment. But where any species abounds, many specimens may usually be taken both above and below the normal size. Such variation may then be due to heredity, or what appears to me more probable, to the partial failure of the food supply in the larval stage. I have very small specimens of *Leucania phragmitidis*, *Caradrina morpheus*, *Agrotis tritici*, *A. puta*, *A. velligera*, *A. suffusa*, *Calamia lutosa*, *Gortyna ochracea*, *Hydræcia micæa*, *Noctua rubi* and others.

In shape, some specimens exhibit considerable variation. I have a number of *Agrotis tritici* in my cabinet, with the fore and hind wings all remarkably broad compared with their length, giving these particular specimens quite a distinct facies. Strange to say, this abnormal condition is sometimes more marked on one side than another. I have specimens of *Agrotis suffusa* and *A. velligera* of a similar character. Specimens with wings much narrower than the normal width are common in very many species. Another strange abnormality frequently occurs in *Viminia albovenosa*, *Leucania litoralis*, and occasionally in other species. Normally the wings in these species are well developed, but appear always to have a slight tendency to a pointed apex. Frequently, this peculiarity is developed quite abnormally, and the wings become narrower and are drawn out in the same way as is normal in *Meliana flammea*. Often too, this peculiarity is more developed on one side than the other, and I have a specimen of *Caradrina taraxaci* (*blanda*) quite normal on one side, but exhibiting this same abnormality in a very marked manner on the opposite side. I feel satisfied that these, and similar variations in shape, if not, indeed all variations in shape, are due to disease, or to injury to the larva at the exact period of pupating. I remember seeing an abortive specimen of *Orthosia upsilon* belonging to Mr. A. Robinson, of Brettanby Manor, Darlington, and the abortion was so apparently due to disease, that I considered it a kind of corroboration of my previously formed ideas on this subject.

With regard to the markings, we come to an exceedingly wide path in our subject, and it is very rare indeed, that some particular species in a genus do not exhibit some characteristic variation in markings, although the genus as a whole, may not tend in that direction. On the other hand, we find certain genera where almost every species presents such a tendency to vary; but it is strange, how, in very closely allied species, one will vary indefinitely, while another will be most constant. *Apamea didyma* and *A. ophiogramma* offer a striking example, as also do *A. gemina* and *A. unanimitis* in the same genus. In the *Cymatophoridae*, there is a general tendency for variation to take place in the size of the stigmata and also in the width between the transverse lines near the centre of the wing. Perhaps this is better exhibited in *Asphalia flavicornis* than any other species in the group. Individual specimens also frequently show an asymmetrical character both in the stigmata and markings, and I have noticed that asymmetry is not at all an infrequent character in many genera. A strange peculiarity in the old genus *Acronycta*—the *Viminia*, *Cuspidia* and *Bisulcia* of Chapman—is the variation with regard to the position of the stigmata, the normally separate stigmata being frequently united. This same

peculiarity becomes common again in *Tæniocampa*. The development of dots in certain of the *Leucania* although not normally present in such species is noticeable. The claviform stigma is indefinitely modified in certain genera, being entirely absent and developed into a longitudinal black streak in different specimens even of the same species. This is particularly noticeable in certain species of the genera *Apamea* and *Miana* as well as parts of *Agrotis* and *Hadena*. When the claviform is thus developed into a black streak it unites the two transverse lines, immediately before and beyond the stigmata, and presents a remarkable banded form in its extreme character. Perhaps *Apamea gemina* var. *remissa* is one of the best examples we have, although some of the banded forms of *Apamea didyma* and *Miana strigilis* are almost as remarkable. The development of this claviform stigma also, by joining the transverse lines shows up another common line of variation in the same genera, viz. the difference in distance between these two lines as they reach the inner margin. The width of these varies indefinitely in *Apamea gemina*, *A. connexa*, *A. didyma*, *Miana strigilis*, *M. fasciuncula*, *M. literosa*, and many species in other genera, such as *Agrotis* and *Noctua*. The variation in the space between these lines has been previously referred to as existing in *Asphalia flavicornis* and other *Cymatophoridae*. Some species, such as *Charceas graminis*, *Heliophobus hispidus* and *Helotropha fibrosa*, offer very great variation in the amount of suppression or development of certain special markings, as also do certain species of *Tæniocampa* and *Dianthæcia*; but in this direction certain species of *Agrotis*, viz.:—*tritici* and *cursoria*, and to a lesser extent *ripæ* and *nigricans*—offer the most striking development. These species have each two well-developed forms, one of which has the whole of the wing of a certain ground colour, with the stigmata more or less well-developed and with a varying number, generally three or four, transverse lines crossing from the costa to the inner margin, but practically without the slightest trace of longitudinal markings. The second form has the same ground colour as the first, and the stigmata equally well-developed, but the transverse lines are reduced to a minimum, and a pale (variable in colour, from white to ochreous) streak, varying in width and intensity, runs along the costa from the base to the apex, while another pale streak runs along the central nervure and the bases of its branches. In my previous writings on these forms, I have always called the group of varieties which have this pale costa the pale-costa group, whilst the former which do not possess a pale costa, I have called the non-pale-costa group; but it is really remarkable, that in every gradation of colour from pale whitish-grey, ochreous, reddish and black to which these species attain, every colour variety has these two parallel forms distinctly developed. The relation of these to allied species is suggestive, the normally pale-costa part of the genus including *Agrotis valligera*, *A. obelisca* and *A. ravidæ*, whilst the normally non-pale-costa part of the genus includes *Agrotis segetum*, *A. lunigera*, *A. exclamationis*, *A. corticea*, and *A. cinerea*, although we frequently find traces of a pale costa in *exclamationis*, and there is a non-pale-costa form of *obelisca* (var. *ruris*) on the Continent of Europe. The presence or absence of the row of cuneiform spots which appear to be developed by the filling in of the spaces between the nervures in direct connection with the subterminal line, appears to give a great deal of

superficial difference in the appearance of the specimens, which possess or are devoid of such a row of spots. These spots are frequently very clearly developed in *Aplecta nebulosa*, *A. tincta*, *A. occulta*, *Hadena adusta*, *H. glauca*, *H. dentina*, *Agrotis cursoria*, *A. tritici*, *A. valligera*, *Charcæas graminis*, *Aporophyla australis*, *Agriopis aprilina*, *Polia chi*, *Dinithæcia albimacula*, *Xylophasia polyodon* and *Tæniocampa munda*, whilst many other species exhibit variation in this direction in a lesser degree. Sometimes these spots are incorporated, as it were, with the subterminal W-like line, and give this a special character, whilst at other times, but much more rarely, the cuneiform spots are carried out between the nervures to the outer margin, thus forming a series of long dashes. I notice that this occurs occasionally in specimens of *Aporophyla australis*, *Agrotis valligera* and *Charcæas graminis*. The line just outside the reniform, commonly known, from its shape, as the shouldered or elbowed line, is worthy of notice, being frequently composed, in its simplest form, of dots, and in its more complex forms of a series of lunular arches with almost all intermediate forms, in the same or in different species. The metallic markings in *Plusia* are worthy of extended notice, but I will simply remark that the two central spots of *Plusia festuæ*, when compared with the characteristic gamma (γ) marks of *P. iota* and *P. pulchrina*, give us a good idea of the superficial development of these marks into metallic spots or blotches.

The variation in the hind wings of NOCTUÆ is principally in the direction of colour, the markings being frequently limited to a dark shade and lunular mark, although these have really as much direct relation to colour as to markings. The colour of the hind wings is very often the outward sign of sexual dimorphism, the hind wings of the males being generally paler than those of the females, the hind wings of many species in the males being pure white whilst those of the females are dark grey with certain modifications. The markings of the hind wings of NOCTUÆ then must be looked upon as generally restricted to a lunular mark towards the centre of the wing and a dark shade roughly parallel to the outer margin. The amount of the development of this shade is frequently sexual, many species having, as has just been stated, perfectly white hind wings in the male, with this lunule and shade developed in the female as in *Agrotis segetum* and *A. lunigera*; in other species the hind wings, white in the male, have in the female, not only a dark band and lunule, but dark nervures, as in *Cuspidia tridens*, whilst in others, the white wings of the male are replaced by wholly grey ones in the female, as in *Agrotis puta*, *A. exclamationis*, *Viminia myricæ*, *Polia chi*, *Epunda lutulenta* and *E. nigra*, whilst in *A. cinerea*, the males only have the grey band developed, the hind wings of the females being entirely grey. In *A. valligera* and *A. ripæ* we get every intermediate form, the hind wings of some specimens, both in males and females, being white, others of both sexes having the band, others entirely grey. In some of the *Cuspidia*—*aceris*, *megacephala* and *alni*—and to a lesser extent—*tridens*, the outer margin has the nervures strongly black, with a series of black spots, sometimes very strongly developed instead of the band. In *Triphæna* where the yellow colour causes the lunule in some of the species as *T. orbona* (*comes*) to stand out conspicuously, its absence is very noticeable. It is, of course, in

these species which have brightly coloured or white hind wings, that the modifications of the typical markings are most distinct, but I believe that a large amount of variation exists in every species.

Either in markings or colour or both combined, I find it usual for species in the same genus to vary in the same direction and between the same extremes of colour and markings ; or in other words, for species in a genus to vary in the direction of normal forms of other species in the same genus whenever that genus is natural and consists essentially of closely allied species. I have already touched on this subject with regard to certain *Agrotidæ* in the paragraph on variation in markings, but the following examples will perhaps explain more fully. *Apamea unanimis* rarely varies, but has a fixed and constant appearance (transverse lines), so also have *A. ophiogramma* (dark costa) and *A. pabulatricula* (central band) in other directions. The polymorphic *Apamea didyma* varies in the direction of all these species and has well developed forms in each. *A. gemina* varies in the same directions, as also does *Miana strigilis* which has no apparent structural difference from *Apamea*. The genus *Acronycta* offers similar parallel varieties in its species, both in the markings of the fore and hind wings although perhaps, this parallelism of variation is better exhibited in the way *Agrotis tritici* and *A. cursoria* follow in their variations the other species of *Agrotis*, and the species of *Teniocampa* each other. The species of the latter genus are very striking in this particular, as they have not only parallel varieties in colour but in markings. Thus *T. instabilis* may be looked upon as the most polymorphic of the group and varies from the palest grey to black. *T. gracilis* has a parallel range, varying from greyish-white to black, some of the red and brown forms being most remarkable. In *T. opima* we find the same range in coloration, and dark varieties of this species and *instabilis* are sometimes very difficult to separate without careful examination. The typical grey coloration of *gracilis* is found not only in *opima* and *instabilis*, but also in *munda*, *stabilis* and *cruda*. The typical red colour of *stabilis* is found in *instabilis*, *gracilis*, *munda* and *cruda*. Some of the specimens of *T. instabilis* are of the peculiar slaty-grey of *populeti*, others red like typical *stabilis*, others grey like *gracilis*, and so on. In markings, the typical central band in *instabilis*, becomes developed in certain varieties of *stabilis*, *munda*, *gracilis*, *opima*, *cruda*, and *populeti*. The typical row of dots forming the elbowed line just outside the stigmata in *populeti*, finds parallel varieties in other species where such dots are abnormal. In fact there appears to be in all natural and closely allied genera a tendency for the species in such genera to be formed on parallel lines.

Different genera also frequently show parallel ranges of variation, but it is doubtful whether such genera are not very frequently closely allied. This is certainly the case between *Aplecta*, certain parts of *Hadena*, *Mamestra* and *Apamea*.

With regard to the probable causes of variation, it is almost impossible to speak of them in a few short paragraphs. So little is positively known about the matter, and the connection between cause and effect is frequently so indistinct and uncertain, that one appears to be dogmatising when one really does not mean it. Perhaps the subtlety in the working of Nature in this direction has led so many

to take interest in the subject since the publication of Darwin's theory of "natural selection," but whether this be so or not, it is beyond question that the study of variation has become the favourite hobby of a large percentage of entomologists.

First and foremost of the causes which tend to develop variation, my own observation places "natural selection." But "natural selection" is based on such a complex combination of circumstances that it is perhaps advisable to take some of these into consideration, isolating each particular factor as much as possible, but bearing in mind, that whilst each factor is working in its own particular groove towards a certain end, it is modified in every possible way by other factors, the sum total producing the final effect as seen in the varying character of our insects, and which we term "natural selection." Meteorological causes appear to be the most direct active factors in the production of variation, and in a series of papers entitled "Melanism and Melanochroism in British Lepidoptera" which I am contributing to the pages of 'The Entomologist's Record and Journal of Variation,' I am working out what appear to me to be the chief active agents in the production of this particular form of variation, and at the same time, I have attempted to correlate the different suggested causes with each other and with "natural selection." I have also freely criticised previously-formed theories and attempted to prove or disprove them by the material we now have at hand. Although meteorological causes appear to me to be the more or less active agents in producing variation; there can be but little doubt that heredity, disease, food, &c., each adds its share towards producing the sum total of variation. We will therefore, now look briefly at each of these probable causes.

That "natural selection" has a very great deal to do with variation, no one who has made observations on the subject can doubt. Among the species in the group that we are considering, some striking examples occur. Take for instance the imagines of the *Bryophilidæ*, clothed in various shades of green, grey and yellow, with black or reddish marks in the various species. These assimilate so closely to the lichens on which the larvæ feed, that only a trained eye detects them resting in their chosen habitation, on the stone walls where they occur. Different walls have variously coloured lichens growing on them, and it is found that the environment determines the prevailing colour of the species in a given locality. The greyer the lichens on the wall, the greyer will be *Bryophila glandifera*, and the greener the lichens, the greener will be the moth. Hence on the former walls, var. *par* will preponderate, on the latter, typical *glandifera*. Certain walls in Deal are covered with yellow lichens and there *Bryophila perla* var. *flavescens* occurs, whilst on the old dark granite walls, and on the dark damp walls of the west coast we find var. *suffusa*, and so on with the different varieties in this genus. But in such localities, other forms will, of course, occur with whatever may be the prevailing form; these other forms are due without doubt, to hereditary influence, but a large percentage will be of a characteristic form. The same facts hold good with the typical form, and with the vars. *suffusa* and *olivacea* of *Polia chi*. These different forms are found to be prevalent in different localities, each assimilating in its own particular direction with its own special surroundings, the white, dark, and greenish forms all respond-

ing most absolutely to their environment. *Polia flavicincta*, which also rests on lichen covered walls, offers parallel ranges of variation, and whilst the prevailing form of this species at Huddersfield is excessively dark with a large percentage of black markings and scarcely a trace of ochreous, those from Driffield in the same county are ochreous in colour, and it is of rare occurrence for a single specimen to be noticed so dark as the Huddersfield specimens. In Somersetshire, a tendency to a reddish tint prevails, whilst some splendid dark specimens, darker perhaps than the Huddersfield specimens, which were captured in Guernsey by Mr. A. J. Hodges, assimilated exactly to the rocks on which they rested. Again, whilst the specimens of *Epunda lichenea* from Plymouth are dark green in colour, mottled with red, and similar to the Lancashire specimens; those from Portland (a locality comparatively near to Plymouth), but obtained from the pale limestone rocks, are of a pale silvery-white colour with the red and green reduced to a minimum. Here we see that in distant localities, similar surroundings produce the same or similar phases of variation, whilst, given a different environment, a different phase of variation becomes apparent. The reason of these special forms in special districts is easily explained. Those specimens which assimilate most to their surroundings, escape their many enemies, and hence, year after year a gradually increasing number of specimens of that particular form, which most readily assimilates to its surroundings, is developed and a local race is formed. Turning from those species that rest normally on lichen-covered rocks and walls, we find among those species which normally rest on fences, trees, &c., that many, such as *Cucullia*, *Xylophasia*, *Axylia*, &c., assimilate exactly, to pieces of cut wood, &c., but the great mass of our NOCTUÆ rest on the ground, and hence the geological character of a district has much to do with colour. *Agrotis ripe* is white, ochreous, reddish, or greyish in ground colour, according to the sand on which it rests. *Agrotis valligera*, *A. cinerea*, *A. cursoria*, *A. tritici*, *A. nigricans*, &c., also go through various shades of colour, according to locality, as do various species in other genera. The genera *Leucania*, *Nonagria* and their allies offer a good illustration of structural variation responding to environment in another direction. The species of these families sit head downwards, with their wings closely appressed to the reed, &c., on which the particular species feeds, and there look exactly like nodes on the stem. Endless other instances might be cited, but sufficient appear to have been pointed out, bearing on the general subject of "natural selection," especially if we consider that all species exhibit some phase, or are modified by it in a greater or less degree.

Turning now to the causes which accompany or modify the all-important "natural selection." In all species there appears to be an inherent tendency to vary if placed under distinctly and decidedly abnormal conditions, whatever such conditions may be. The ordinary normal conditions of a locality tend to produce the normal forms found in that locality, whilst abnormal conditions develop latent tendencies, and variation is the result. It follows that if such abnormal conditions become gradually permanent in any locality and what were previously abnormal conditions become normal, a permanent change will take place in the character of the race inhabiting such a locality. That

such an inherent tendency to vary exists is certainly beyond question, for if it were not present, variation would apparently be an utter impossibility. This general hereditary tendency to vary will also be more or less influenced in any particular brood by the character of the parent moths; whilst in seasonally dimorphic species, which, however, are almost unknown in British NOCTUÆ, but which are common among the DIURNI, GEOMETRÆ, &c., the different seasonal forms appear to vary indefinitely *inter se*, and also to vary towards each other, such variation being undoubtedly due to heredity.

Of the abnormal conditions mentioned above as tending to produce variation, those connected with meteorological phenomena undoubtedly stand first, and of these, moistures appears to me to be by far the most important, and, in the production of melanic and melanochoic forms of variation it appears to be the all-important factor, in developing the inherent tendencies to vary in this direction. Our melanic or melanochoic varieties abound in the most humid districts and become generally less and less in number as the districts become drier and less humid. Whether the humidity accompanies a high or low latitude or high or low altitude, or whether it be produced by nearness to the sea, by ocean currents (as in the Gulf Stream and Black Current of Japan), or brought about by excessive condensation by mists, clouds and fogs, the result appears to be always the same,—the increase of melanic or melanochoic varieties accompanies in a more or less direct ratio, the areas of greatest humidity. This is not only so in the British Islands, but the general principle is proven by reference to the fauna of the Continents of Europe, Asia and North America and to that of New Zealand, and there is no doubt that the theory is of general application, subject only to local considerations and explicable disturbing causes. Among our own extreme melanic forms, some of the most striking are—*Xylophasia polyodon* vars. *infusca* and *nigra*, *Bisulcia ligustri* var. *nigra*, *Apamea didyma* vars. *nigra*, *lugens*, *leucostigma* and *albistigma*, *Miana strigilis* vars. *fasciata* and *æthiops*, whilst *Agrotis lunigera*, *A. cinerea*, *A. corticea*, *A. segetum*, *A. nigricans*, and *A. pyrophila*, have each an absolutely black form. *Epunda viminalis* var. *obscura* from Yorkshire is, in its extreme forms, perfectly black; *Dianthæcia conspersa* from the Shetlands, Hebrides and West Coast of Great Britain, *Epunda lutulenta* from the West Coast of Ireland and *Dianthæcia cæsia* from Ireland and the Isle of Man also offer striking examples of intense melanic variation, when compared with the normal European forms. These are all extreme in the development of their melanic tendencies, but a very large number of other species have similar melanochoic tendencies developed in a lesser degree. Although moisture appears to act so strongly in the development of these melanochoic tendencies, it undoubtedly obtains its greatest power by combination with the generally applicable and broad features of “natural selection.”

It may be well here to point out that Lord Walsingham in his Presidential Address to the Fellows of the Entomological Society of London, January 1891, pointed out that moist areas are frequently such as exclude a large proportion of the sun's rays, and that, therefore, the lessened number of chemical rays may tend to produce melanism. This phase of the subject is fully dealt with in the ‘Entomologist's Record and Journal of Variation,’ vol. ii., No. 1, pp. 4-7.

Next to moisture, heat, and cold, must be considered the most important factors in producing variation. All excessively cold areas, if not subjected to the primary influence of humidity, appear to produce pallid varieties with ill-developed and suffused markings. Lord Walsingham, in his Presidential address to the Yorkshire Naturalists' Union, 1885, referred to the melanic tendencies of high latitudes as of common occurrence. This was pointed out in 'The Entomologist's Record,' vol. i., pp. 232-233, as an error, and it was shown that insects from such latitudes did not produce insects which were generally melanic, but on the contrary more pallid varieties, and that melanism rarely occurred in high latitudes unless accompanied by excessive moisture. This was acknowledged by Lord Walsingham in his Presidential address to the Fellows of the Entomological Society of London, 1890, when he stated that he had in mind the general suffusion of markings which species from such latitudes undergo, rather than actual melanism. For a long time, cold was considered as the prevailing factor in the development of melanic forms, the idea probably originating in the fact that most of the known Alpine forms tended to be melanic; but there appears to be but little doubt now, that the melanism of high altitudes is due to moisture rather than cold, since cold apart from moisture, as I have already pointed out, appears totally unable to develop melanic forms, as the almost entire absence of this tendency in the lepidoptera of the cold icy plains of the Old and New Worlds abundantly testifies.

Whilst cold apparently tends to produce pallid ill-marked specimens, heat on the other hand tends to produce brilliantly coloured and well-marked ones, and we find that almost all our species, having a wide geographical range, become gradually brighter as we pass from high latitudes towards the tropics. Cold, too, by delaying larval and pupal existence is supposed to have an effect in the direction of darkening the colour of lepidoptera, whilst heat is assumed to have an opposite effect. In the present state of our knowledge, however, it is difficult to say that this is, or is not so, but Nature, in those polar districts, where larval and pupal existence is frequently delayed, produces as I have already pointed out, rather pallid than dark insects.

Cases are on record in which disease undoubtedly appears to have caused variation, and there is but little doubt that this is frequently the case. Every entomologist who has bred lepidoptera largely, knows that crippled specimens frequently vary in a remarkable manner from the type. One of the most remarkable examples of this kind that I have seen among the NOCTUÆ is a specimen (previously referred to) of *Orthosia upsilon*, belonging to Mr. A. Robinson of Brettanby Manor, Darlington. This example accompanying a deformity in shape, exhibits a complete variation in markings, the typical markings being practically absent, and the specimen being characterised by a series of longitudinal black marks. In connexion with disease, Dr. T. A. Chapman of Hereford records in "The Entomologist's Record," &c., vol. i., pp. 271-272, a brood of *Cuspidia alni*, which all varied more or less from the normal form, chiefly in the direction of losing their stigmata, and darkening of ground colour. This brood came from a race, which was interbred for some time, and during the time that they interbred freely, the specimens were normal, but the pro-

duction of these varieties was accompanied by a failure to produce fertile eggs. Dr. Chapman connected it with a change of constitution and did not consider it necessarily the result of disease.

Food is another factor in producing variation, but it is doubtful whether direct phytophagic varieties are ever anything but variations in size. With plenty of succulent and nutritious food, lepidoptera attain a large size and it is a common occurrence to find races of the same species, of different sizes, living in localities comparatively near to each other; one race, living on more succulent food, of large size, the other, living on less succulent or less nutritious food, of small size. This is especially noticeable in certain GEOMETRÆ as *Hypsipetes elutata*, *Cidaria testata*, *Eupithecia satyrata* and its var. *callunaria* and many others. Among the NOCTUÆ, I cannot point to a striking example in this direction, although undoubtedly such exist, and in confinement if larvæ be kept short of food, dwarfs are the natural result. Generally speaking, the larger races of such species as these, appear to be more clearly marked, but this I do not consider in any way due to food, but to the combined influences of "natural selection" and to the fact that the dark markings on the smaller moths, are, as it were, placed more closely together and thus obscure more completely the (generally) paler ground colour. As all the larger races of the species mentioned feed on bushes, shrubs, willow, &c., and the smaller ones on low-growing plants (*Vaccinium*), it can readily be seen that the surroundings of these races are very different, and the influence of "natural selection" would be correspondingly large.

In an introduction of this kind, anything like an exhaustive essay would undoubtedly be out of place, but I think sufficient has been written to show that the phases of variation in our British NOCTUÆ are many and striking, that the causes of these are as yet most imperfectly known and exceedingly complex in their character, and that a large field is open to scientific workers in this direction as the systematic classification of the material that we have continually coming to hand is worked into a more definite form.

THE BRITISH NOCTUÆ AND THEIR VARIETIES.

Class :—NOCTUÆ, Linn.

I. Sub-Class :—BOMBYCIFORMES, Gn.

1. Family :—*Cymatophoridae*, H.S., *Noctuo-Bombycidae*, Gn.

COMPARED with some of the families we shall have to consider later on in the NOCTUÆ, this family does not appear to be subject to a very great deal of variation, and, when it occurs, is generally produced by the transverse lines crossing the anterior wings, coalescing and forming continuous bands. In some cases, the ground colour is variable, and there is also a tendency in some species—*derasa*, *ocularis* and *flavicornis*—to suffusion with red colour. The difference in the size of the stigmata, and the difference in distance between the transverse lines before and beyond the stigmata, is very noticeable in some species. In this family, we rarely get striking examples of the melanic forms which are so commonly found in other families, although some of the species have a tendency in that direction, notably specimens of *duplaris* (both var. *obscura* and the type) and *diluta* var. *nubilata*. *Flavicornis* offers, perhaps, the widest range of variation, varying from a pale yellowish green to dark-grey in some specimens, while others are grandly tinged with rosy-purple.

Gonophora, Brd., *derasa*, L.

This beautiful species is very invariable in Britain. I have, indeed, never seen a British specimen worth alluding to as a variety. There are, however, distinct forms on the Continent, one of which is darker than the type, the other distinctly tinged with purple. The Linnæan description is as follows :—“*Noctua spirilinguis cristata* :—*alis deflexis supra antice decorticatis.*” “*Antennæ et lingua ferruginea. Alæ superiores griseo undulatæ sed ad marginem interiorem, antice, area per alam extenditur triangularis cinerea, ac si esset decorticata (tecta tamen est), qua ab omnibus distinguitur. Linea alba alam denudatam cingit; striga alba ad marginem posticum alæ; albido ad marginem inferiorem alæ. Inferiores alæ fuscæ; macula nulla obscura in paginis inferioribus. Abdomen densiori lana albida vestitum*” (“*Systema Naturæ*”, p. 851). Of this description Guenée says :—“Linné must have seen worn specimens of this species, when he said :—‘*Area per alam extenditur cinerea triangularis, perinde ac si esset decorticata (tecta tamen est) qua ab omnibus distinguitur.*’ We

only see the median space more denuded of scales than the rest of the wing" ('Noctuelles,' vol. v., p 12). In my opinion Linnæus is perfectly correct, and Guenée wrong; unless, indeed, the specimens under the notice of Guenée were different to our British specimens. The following varieties are I believe unknown in Britain:—

a. var. intermedia, Brem.—This variety is of an ashy grey colour ("cinerascens," Staudinger), and is only recorded, so far, from the eastern part of Dr. Staudinger's European fauna district, Amur and Armenia. Dr. Staudinger thinks this variety may be the *gloriosa* of Guenée's 'Noctuelles,' v., p. 12, which is considered by Guenée as a variety of *Thyatyra abrasa*, an American species.

β. var. derasoides, Dobrée.—Of this variety Mr. Dobrée writes me:—"A very distinct variety, of a purple shade of grey, and no trace of white. From the Amur district" (*in litt.*).

Thyatyra, Och., *batis*, L.

This pretty insect is another invariable species in Britain, the coalescence of the two rosy spots near the apex of the wing, which occasionally takes place, being the only noticeable feature. The Linnæan description is as follows:—"Noctua spirilinguis lævis, alis depressis: superioribus fuscis, maculis simul quinque albidis: inferioribus albis." "Maculæ orbiculares albide medio fusco, sparsæ, magnæ" ('Systema Naturæ', p. 836, No. 97). It seems very strange that the Linnæan description makes no note of the rosy colour of the spots which are so characteristic of this species, but I have an Irish specimen without a trace of this colour. I would draw attention, however, to some little variation in the development of the cell on the outer margin of the wing directly above the large spot in the anal angle, and also to the fact that, between the apical spot and spot at anal angle, an obsolete series of dots often shews some traces of development; I have specimens with none, one, two, and three of these dots. I should be pleased to learn of specimens with a complete series, as undoubtedly some such exist.

a. var. juncta, mihi.—The anterior wings with all the characteristics of the type, but with the two rosy spots at the upper part of the wing towards the costa joined together. The variety is taken with the type.

β. var. mexicana, Hy. Edw.—Mr. T. D. A. Cockerell ('Entomologist,' vol. xxii., pp. 306-307) thus writes:—"In looking over some vols. of 'Papilio,' I came across (vol. iv., Jan. 1884, pp. 16-17), the description of a new variety of *T. batis* named as above, which I quote, as it is omitted from Mr. Tutt's valuable paper (Entom. xxi., p. 46), and is presumably unknown to British lepidopterists. It differs from the European form by its larger size, much darker ground-colour of the wings, both primaries and secondaries, and by the pinkish spots having a larger and darker internal shade. The ground-colour of the primaries is rich dark olive-brown; the secondaries the same colour, with fainter median band, and a little lighter shade at the base. Exp. wings 44 mm. This moth was taken in Mexico by Mr. Wm. Schaus, Jr."

Cymatophora, Tr., *ocularis*, L.

The Linnæan description of this species is as follows:—*Noctua elinguis lævis, alis cinereis fascia pallidiore lineis nigris terminata ocelloque notata.* “Corpus mediæ magnitudinis, cinereum, non cristatum. Alæ superiores cinereæ, in medio fascia, in duas areas divisæ: Fascia albidior, antice posticeque linea nigra, terminata, versus latera exteriora dilatata, ibique ocello parvo albo, pupilla nigra notata; in area anteriore punctum nigrum; ad apicem alæ lineola atra; margo alæ posticus lineola nigra. Alæ inferiores, omnesque subtus albidæ absque area et puncto” (‘Systema Naturæ’, p. 837, No. 100). Guenée says:—“The name (*ocularis*) was suggested to Linnæus by the resemblance which the reniform stigma offers to a pair of spectacles” (‘Noctuelles,’ vol. v., p. 19). The above description agrees with our ordinary form very well except with regard to the stigmata which are usually joined and form a figure 80, the 8 being the reniform the 0, the orbicular. It is remarkable that Linnæus should name an insect on the peculiar character of the reniform, and then entirely leave it out of his description, as he seems to have done. This discrepancy has led to the use of Hübner’s name *octogesima* by almost all our Continental entomologists. I have kept the Linnæan name, but have added Hübner’s name below for our common form. This species, too, is one in which a beautiful rosy tinge is found in some specimens.

α var. *octogesima*, Hb. = *octogena*, Esp.—Hübner’s *octogesima* (fig. 209) is a good figure of the ordinary form captured on the Continent, although small. It has the anterior wings of a grey colour with a delicate rosy tinge, especially at the basal and costal areas of the wing, with two double abbreviated basal lines having a dot at the extremity of each; a complete line just before orbicular; stigmata pale, forming the mark 80, with their centres black, transverse shade between stigmata, another through reniform, whilst a third is found directly beyond reniform; hind margin a very little darker than ground colour. Hind wings dark grey, lunule distinct, base paler. Our specimens are somewhat darker in ground colour, but otherwise agree exactly with Hübner’s *octogesima*. Esper’s diagnosis of *octogena* also agrees with this variety:—“Alis superioribus cinereo-rufescentibus, strigis undatis, parallelis fuscis, macula in medio albido, signo or sed 80, subsimili; subtus flavescenti cinereis, fasciis tribus fuscis.”

β var. *rosea*, mihi.—This variety is marked like the type, but has the anterior wings entirely suffused with rich red colour. I am informed that this is not an uncommon form. A beautiful specimen in the Rev. G. H. Raynor’s collection, is the finest one I remember having seen. I have strongly suffused specimens, but none equals his beautiful specimen.

Cymatophora, Tr., or, F.

This species varies somewhat in the shade of the ground colour and the more or less banded form that the transverse lines assume, the transverse central band is also strikingly clear in some specimens. Our British (especially Scotch) specimens are beautifully tinged with

description of the type is:—"Alis superioribus cinereis, strigis tribus atris, antennis luteis" ('Systema Naturæ', p. 856). I would draw attention to the variation in distance between the transverse lines, and the striking dissimilarity in shape, position, &c. of the stigmata. This is a very common form of variation in many families.

a. var. galbanus, mihi.—Of a yellowish-green colour, with exceedingly pale transverse markings, the stigmata pale and indistinct, the costa at the base and above the stigmata yellow. Posterior wings very pale. Our southern specimens are altogether unlike the type, and are generally pale yellowish-green. The extreme difference between this pale form (*galbanus*) and the other varieties is very striking.

β. var. scotica, Staudinger.—The ground colour is of a very much darker grey than in the type, although the ordinary markings are very distinct. The costa, at the base and above the stigmata is whitish-grey, and the discoidal spots clear yellowish. It is the usual Rannoch and Perth form, hence its name. I have also received it from Yorkshire, where it is occasionally captured with the type.

γ. var. rosea, mihi.—Like var. *scotica*, brightly marked with distinct yellow stigmata, but the anterior wings richly suffused with reddish (or rather purplish) colour. My specimens came from Rannoch.

Asphalia, Hb., *ridens*, F.

The type of this species, with a dark green central band, and the pale markings before and beyond the band, white, is rare in Britain. A large proportion of our specimens belong to Hübner's *xanthoceros* which has the central area dark-green as in the type, but with the paler parts of the wing of a greenish-ochreous colour. Esper describes and figures a variety under the name of *erythrocephala* with the central band fuscous, the base paler fuscous, the transverse lines black and white; Esper, however, adds to his description "with two reddish spots on the disc." I notice that the claviform is sometimes slightly reddish, so that Esper probably had a specimen thus peculiarly marked. I have such fuscous specimens with scarcely a tinge of green. Some specimens have the outer area of the wing very pale, so that the outer strigæ become almost obsolete and the central banded area stands out very strongly. All my specimens of the type and many of my specimens of the other varieties came from the New Forest. The type is thus described by Fabricius:—"Noctua cristata alis deflexis viridi fusco alboque variis macula baseos strigisque duabus undatis albis, antennis flavescentibus." "Caput et thorax virescentia albo irrorata. Antennæ flavescentes. Abdomen pallidum. Alæ viridi fusco alboque variæ macula magna distincta alba baseos ad marginem exteriorem, quæ strigam, undatam albam attingit. Pone maculas ordinariis striga altera undata alba. Versus apicem strigæ lineolis albis lunulisque atris" ('Mantissa,' p. 180, No. 289). The type is figured in Newman's 'British Moths,' p. 243, and has a dark central band across the anterior wings.

a. var. xanthoceros, Hb.—This variety has the anterior wings, with a dark green band like the type, but with a pale ochreous basal line, orbicular and reniform pale ochreous, outlined in darker; the pale transverse lines beyond the reniform are also ochreous. Hind wings grey with an ochreous tinge, base paler, and a pale line parallel to hind margin. Most of our banded forms have the pale marks ochreous and would thus belong to this variety.

β. var. erythrocephala, Esp.—The diagnosis of Esper's variety is:—"Noctua spirilinguis cristata alis superioribus fuscis, albo nigroque nebulosis, maculis duabus disci rufescentibus, (feminæ albidis)" ('Die Schmet.,' p. 309). Esper figures (Pl. 128, figs, 1, 2 & 3) the larva with the imago so that there is no doubt about the determination.

γ. var. interrupta, mihi.—This is the variety with the central band broken. The base is pale, the dark, central, transverse band on the anterior wings is broken up by a pale patch extending through it from the costa to the inner margin, the dark band being represented by two dark lines on either side of this pale patch. I have specimens of *var. interrupta* from all localities whence I have obtained the type. When the pale transverse markings are ochreous, I would add *-ochrea* to the varietal name, when white,—*alba* to distinguish them.

2. Family:—*Bryophilidæ*, Gn.

This small family is subject to a great deal of variation, and its species are, practically, polymorphic. The polymorphism of this species is a striking illustration of the effect of environment on the colour of the species. They are almost all lichen-feeding species, and the colour of the imagines agrees most perfectly, in many instances, with the lichens on which they feed; thus, in certain localities, dependent on the character of the lichens, we find certain forms of the imago prevalent, *perla var. flavescens* is almost the only form obtainable on certain walls in certain districts, although in the same districts, on different walls, the other varieties are common; so it is with *var. suffusa*, with *var. pallida* of the same species, and the various varieties of *muralis*. This peculiarity extends to the varieties of the other species, *algæ*, &c. on the Continent. The different forms of variation are always in the direction of the extension or suppression of some or other of the typical coloration present, although under certain conditions, coloured scales which are not normally present, are developed to an extraordinary degree, as for example in *perla var. flavescens*. A difference of intensity in the colour and development of the typical markings also accounts for some of the most noticeable forms of variation. We have only two common British species, both of which are remarkably inconstant, while one reputed British species—*algæ*—is as variable on the Continent, as are our own species here.

Bryophila, Tr., *perla*, F.

The ordinary pale-grey form of this species, variegated with transverse lines, usually found in the South of England, is the type of this species. The description of Fabricius is:—"Noctua cristata alis deflexis cinereis nigro undatis: maculis duabus fuscis." "Alæ

anticæ supra obscure cinereæ strigis undatis nigris. In medio maculæ duæ magnæ fuscæ. Posticæ albidæ puncto centrali fusco" ('Mantissa,' p. 173, No. 251). Besides the type, we find in Britain three very distinct forms. One, white with the central area of the wing clear, except an ashy shade around the orbicular and another near the apex; a second is very dark; the third is much suffused with bright orange scales. There are, of course, intermediate forms, but the extremes are very characteristic.

a. var. flavescens, mihi.—In this variety the whole of the anterior wings are strongly suffused with ochreous or orange-coloured scales. I have taken a long series of this very pretty form at Deal, where, on some walls it is almost as common as the type. The walls are covered with orange-coloured lichens, and there seems little doubt that in this case the orange-colour of the variety is protective. This is, probably, the variety mentioned by Mr. Gregson, as occurring "at Warmton, where all are more or less tinged with ochreous" ('Entom.' iv., p. 50).

β. var. suffusa, mihi.—The grey reticulation and marbling, which are pale in the type, are in this form very dark bluish black, and suffuse the whole of the wing, absorbing all the usual markings; the discoidal spots are, however, very dark. The hind wings have the space between the two black parallel lines very much obscured, so as to form a broad dark band; the veins of the hind wings very dark. I have a fine series of this form from Strood and Deal. The few Yorkshire and Lancashire specimens I have of *perla*, are all of this form. There is no doubt that this form is Guenée's var. A., 'Noctuelles' vol. v., p. 28.

γ. var. distincta, mihi.—The ground colour is white, and the discoidal spots dark grey. A grey shade directly under the orbicular, four short dark dashes near the centre of the costa, a short basal streak and a grey shade on the costa near the tip of the wing, are the only markings. The form is almost entirely without the grey marbling of the type. I have several specimens in my own series, from Strood and Deal and have occasionally seen a specimen in other collections, but the form is by no means common.

Bryophila, Tr., *algæ*, Fab.

This doubtfully British species is not uncommon on the Continent of Europe. It is very variable, and appears to pass through different local phases of variation, according to the character of the lichens on which the larva feeds and the imago rests, in much the same way as *muralis* and *perla* do here. The description of the type is as follows:—"Noctua cristata alis deflexis: anticis fuscis; fasciis duabus viridibus." "Caput et thorax cinereo fusca. Alæ anticæ fuscæ fascia lata, viridi bascos et alia obsolete, repanda apicis. Posticæ, subtus puncto centrali, nigro" ('Entomologia Systematica, &c.,' p. 104, No. 313). The type, it will be noticed, has two distinct fasciæ, and thus agrees with the *spoliatricula* of Treitschke. The following varieties are found on the Continent:—

a. var. degener, Esper.—This variety is thus described by Staudinger:—"Al. ant. fere unicoloribus viridibus" ('Catalog,' p.

78). The description I made of Esper's figure (pl. 158, figs., 3-4) is:—"Anterior wings dark greyish-green, nervures darker, the pale basal line followed by a blackish transverse shade (broader under the orbicular) reaching almost to the inner margin, and stretching longitudinally almost to the base; the elbowed line pale, just beyond the grey reniform; a pale line parallel to hind margin edged internally with blackish; a short black longitudinal streak just above anal angle. Hind wings dark grey with two double transverse lines." Guenée writes of this variety:—"Comprises all those specimens in which the wings are more unicolorous green." "Same localities and as common as the type" ('Noctuelles,' vol. v., p. 28).

β. var. *mendacula*, Hb.—Of this variety Staudinger writes:—"minor, dilutior, grisescens." The description I have made of Hübner's fig. 520 is:—"Anterior wings green with a few ochreous marks, several blackish grey transverse lines and ochreous stigmata, with very confused markings. Hind wings dark grey with two dark bands, base pale." Guenée writes:—"Smaller of a more greyish green, paler, more unicolorous, median space concolorous." "Common in the South of France" ('Noctuelles,' vol. v., p. 28).

γ. var. *calligrapha*, Bkh., Hb.—Staudinger's diagnosis is:—"al. ant. flavo-(aurantiaco-) variegatis." My own short description of Hübner's fig. 520 is:—"bright green with the stigmata and transverse lines reddish ochreous, edged with black." Guenée writes:—"Of a more yellowish green; two large basal spots, one on the disc and a wavy line (adjacent to the subterminal) of a bright orange colour." "South of France, always rare" ('Noctuelles,' vol. v., p. 28).

Bryophila, Tr., *muralis*, Forst., (1771).

The type of this species is thus described in Forster's 'Novæ Species Insectorum,' p. 74, No. 74, where the habits of the larvæ are also given:—"Noctua spirilinguis subcristata, alis supra albidis; fascia undata, stigmatum in medio alæ, macula et fascia altera ad basin virescentibus nigro fimbriatis." "Alæ superiores supra albidæ, fascia virescente undata, nigro fimbria ad basin, connexa maculæ concolori interruptæ, marginem anteriorem non tangente. Stigma virens in medio alæ, paululum a margine anteriore remotum. Ad marginem posteriorem fascia lata virescens undata, lituris nigris inclusa. Margo exterior nigro punctatis, sic et inferior ciliis nigro punctatis. Alæ inferiores supra albidæ, fascia obscure fusca ad marginem posteriorem." It will be noted that the bright green form, with white edging to the black transverse lines, &c., is the type, the lines and shades being arranged as in the figure, in Newman's 'British Moths,' p. 244. The species, however, is exceedingly variable, the ground colour going through every intermediate phase from white (with a faint green tinge), to ochreous-brown and blackish-grey, the markings also undergoing every possible gradation from clear black and white to almost total absence. The *glandifera* of Hübner and *lichenes* of Fabricius both represent the typical form.

α. var. *par*, Hb.—Of this variety Dr. Staudinger writes:—"Dilutior, strigis al. ant. obsoletis." My own description of

Hübner's figure is:—"Anterior wings dull ochreous grey with the base brownish, then a pale band with a greyish patch around the orbicular; the reniform outlined in grey; two dark grey transverse bands outside reniform; several short black costal streaks. Hind wings ochreous grey with two transverse dark shades." This variety is without the dark markings which characterise the type; the green is practically obsolete and much mixed with grey, giving the insect a very mealy appearance. It is not so common as the type, but occurs occasionally in most (if not all) localities with it. I have this variety from Cardiff, and have captured it at Folkestone, Deal and Sandwich. Herr Hoffmann (Hanover) has specimens of this variety in his collection from the Simplon (Swiss Alps). Guenée writes of it:—"Of a pale greyish green with all the black markings faintly indicated in ferruginous grey and only remaining black on the costa" ('Noctuelles,' vol. v., p. 29).

β. var. *viridis*, mihi.—Like var. *par*, this has the black markings very indistinct, but there is in addition a total absence of the grey colour which gives var. *par* its mealy appearance. The whole of the forewings are of a very rich green colour. I have beautiful specimens from Folkestone, captured by Mr. Austin, and some exceedingly rich specimens captured at the same place by Mr. Wellman, are in the cabinet of Mr. Tugwell.

γ. var. *flavescens*, mihi.—Like the type but with the ground-colour of a yellowish shade instead of green. I used to think these were faded until I bred specimens from larvæ taken at Deal, which had no green in the ground-colour.

δ. var. *pallida*, mihi.—Marked like the type, but the ground colour of a pale whitish grey. I have this form from Deal and Folkestone.

ε. var. *obscura*, mihi.—The ground colour of a dull brownish grey, markings obscure, as in var. *par*, and a little darker than the ground colour. It is the darkest and most obscure form of the species I have seen, and has no trace of green. The type of this variety was captured by Mr. Austin at Folkestone. I took one specimen of the same form at Sandwich, in August, 1886. All the above varieties, I am informed by Mr. Kane, are obtained at Queenstown, in Ireland. I have seen specimens of var. *par* and var. *viridis* from that locality. An interesting account of the variation of this species at Queenstown, Ireland, by Mr. Kane, may be found in the 'Proceedings of the Royal Irish Academy,' vol. iv., p. 113. Guenée gives a description of another variety, which he calls var. B, and says of it that "the markings are still more obsolete than in var. *par*."

ξ. var. *impar*, Warren.—*Impar* must not be confounded with *B. muralis* var. *par*, Hb., as it is quite distinct from that variety. Many lepidopterists consider this a local form of *muralis*, and with this opinion I am now inclined to concur, as I have looked over a long series, and find no satisfactory point of distinction between this and *muralis* varieties. A full account of *impar* is given in the 'Entomologist,' vol. xiii., pp. 225-6, under the name of *Bryophila par*, Hb., also in the 'Ent. Mo. Mag.,' vol. xxi., p. 22.

3. Family :—*Bombycoïdæ*, Bdv.

This family is chiefly composed of the old genus *Acronycta*, now subdivided by Dr. T. A. Chapman into *Viminia*, *Cuspidia* and *Bisulcia*. There is, in this family, a tendency to darkening of the ground-colour in most of the species. The species have generally, in their paler forms, a white or whitish-grey ground colour, the grey becoming more and more intense until we get definitely suffused specimens as the var. *suffusa* of *psi*, var. *bradyporina* of *leporina*, var. *candelisequa* of *aceris* and var. *myricæ* of *euphorbiæ*. We get, however, a few cases of almost extreme melanism, notably var. *nigra* of *ligustri*, var. *salicis* (?) of *menyanthidis* and var. *salicis* of *rumicis*. Besides this general variation, we find many species which have the darker colouring collected into banded form, as in *tridens* var. *virga*, *psi* var. *bivirgæ*, *leporina* var. *semivirga*. The beautiful rosy tint, noticed in some species of the CYMATOPHORIDÆ, is, in some species of this group, very marked. Of this Guenée writes ('Noctuelles,' vol. v., p. 47):—"Almost all the species of this genus have now and again isolated individuals distinctly suffused with rose colour." Mr. N. F. Dobrée writes me with reference to this rose coloured suffusion:—"A lot of larvæ of *A. megacephala* were sent me in 1875 by a person living at Forest Gate, and the resulting insects retain, even at the present day, a distinctly rosy tinge." Hübner figures two specimens of *megacephala*:—one, fig. 10, is the ordinary continental type, the other, fig. 11, is decidedly suffused with red. Some specimens of *Moma orion* have all the white markings suffused with rose colour. Dr. Chapman of Hereford, who has paid particular attention to this group, sent me some beautiful rosy specimens of *tridens* and *psi*. He also sent me specimens of a remarkable local race of *psi* which he calls *bidens*. This form has structural characters by which it can be definitely distinguished from *psi*, much more readily than can the latter species from *tridens*. I would also call attention to the development of the fringe markings in this group. The double fringe line at the anal angle occurs, I think, in all the *Acronycta* also in *cæruleocephala*, but there are few other NOCTUÆ that have the fringe markings so well developed as the members of this genus."

Moma, Hb., *orion*, Esp.

This beautiful species offers a little variation in the depth of the ground colour and a little in the development of the markings, while the peculiar orbicular and reniform appear to vary endlessly; occasionally also there is some variation in the amount of fuscous shading outside the exterior transverse line. In some specimens, the central and exterior transverse black lines are more or less double, giving such examples a darker appearance, which led our early British authors to suppose that we had two species. Newman figures both. Esper's type has two longitudinal white lines, both starting from the base, one passing under the median nervure to the anal angle, the other through the stigmata. Many of our specimens are without the upper one. Esper's type (represented by fig. 4, Plate 118), may be described as having the anterior wings of a beautiful green ground colour with

two longitudinal streaks of white; a black basal mark, and a black double, zigzag, transverse line passing through the stigmata; a black trifurcate costal mark near the apex is developed into a double transverse line; a double row of black dots at hind margin. Hind wings dark grey, base paler." This is represented by fig. 2, p. 247 of Newman's 'British Moths,' the less strongly marked fig. 1 being var. *runica*. I have specimens with the ordinary white marks of a delicate pink colour. Guenée described the French specimens as having the inner margin and two longitudinal bands of a whitish-rose colour.

a. var. runica, Haw.—In a long series, I have only one specimen that represents the type, all the others having single transverse lines and thus representing var. *runica*. The variety being less strongly marked than the type, has, of course, a much lighter appearance; Mr. Newman figures this in his 'British Moths,' p. 257 (top figure), and on the next page suggests the probability of *orion* and *runica* being distinct species, but I see no reason for supposing this possible. The type is rarely found in Britain, with the more common variety.

β. var. rosea, mihi.—Like the type but with longitudinal white markings of a delicate rosy tint. Guenée writes of the French specimens:—"Superior wings green with the costa, the inner margin and two longitudinal bands of a rosy white A subterminal row of triangular black dots surrounded with rosy white, &c." ('Noctuelles,' vol. v., p. 36).

Diloba, St., *cæruleocephala*, L.

This species is most remarkable for the endless variation exhibited by the stigmata. These are generally pale yellowish-white in colour, the claviform being united to the orbicular; the central areas of both these confluent stigmata being darker, they bear a close resemblance to the figure 8. The reniform is attached to this and varies in shape, sometimes forming another 8-shaped mark, sometimes a large irregular blotch extending to the costa. The Linnæan description is "*Bombyx elinguis cristata, alis deflexis griseis: stigmatis albidis coodunatis*" ('Fauna Suecicæ,' No. 117). *Alæ stigmata duo, reniformia, magna, quasi didyma connexa; margo posticus striga nigra undulata*" ('Systema Naturæ,' p. 826, No. 59). Our specimens are not strictly typical being tinged with reddish or purplish.

a. var. armena, Stdgr.—Staudinger describes a variety from Armenia as:—"pallidor, al. ant. cinereis" ('Catalog,' p. 76). I know nothing of it.

Acronycta, Och. (*Bisulcia*, Chapman), *ligustri*, Fab.

The type is described by Fabricius as follows:—"Alis deflexis fusco virescentique variis nigro subundatis: macula magna postica albida. Thorax albo nigroque variis. Alæ anticæ obscuræ, variegatæ. In medio macula ordinaria annula albo cincta. Versus apicem macula magna alba. Margo ipse albo variegatus, nigro punctatus" ('Mantissa,' p. 172, No. 244). It will be thus seen that the type has a greenish-fuscous ground colour, with a white patch near apex, stigma surrounded with white, and thorax speckled with white. Many of our specimens have the apical spot fuscous, and others have the whole wing (pale parts included) of a deep green colour. I have also a perfectly melanic example from Mr. Hall, captured near Sheffield.

a. var. coronula, Haw.—This variety has the typical pale whitish markings near the apex of the anterior wings of a pale greyish brown colour, the white colour being reduced to a lunule on the inner part of the mark. “*Alis fuscis, annulo maculaque postica coronæformi fuscescentibus*,” is Haworth’s diagnosis (‘*Lepidoptera Britannica*,’ p. 179). I have received this form from South Wales, and have frequently captured it with the type at Strood, Cuxton and other places in North Kent.

β. var. olivacea, Dobrée, in *litt.*—Like *var. coronula*, this has no white markings, the white portions being suffused. The suffusion, however, is in this form of a dark olive-green colour. In some places this form is equally common with the type, often more so, as is the case in Yorkshire. In ‘*Entom*’ x., p. 124, the late Mr. Prest writes:—“The form of *A. ligustri*, we (in the neighbourhood of York) find, is suffused with dark olive-green; we rarely see the white-crested form. I took thirteen of this species at sugar one season, some years ago, and of these, ten were olive-green with no white markings.” Mr. Dobrée says that “In the East Riding of Yorkshire *A. ligustri* is not a common insect, but a variety in which the white is totally wanting, and replaced by olive-green is equally common with the type.” Herr A. Hoffmann (Hanover) writes me:—“I have got *ligustri* from Vienna, of a greenish-brown colour, with no white markings,—the places where the white markings ought to be, are only a little lighter than the other part of the anterior wings.” The occurrence of this variety, in such widely different localities as Yorkshire and Vienna, is very interesting. It will be noticed that this is an extreme form, in which the green with which the type is tinged in its darker parts, suffuses the whole area of the anterior wings.

γ. var. nigra, mihi.—The whole of the anterior wings uniformly black, with all the transverse markings which characterise the type of a still more intense black. There is no trace whatever of pale spots or markings, and no trace of green. I have only seen this form from Wadworth Wood, near Doncaster, where it was captured by Mr. A. E. Hall. I published the original description of this variety in ‘*The Entomologist’s Record*,’ &c., vol. 1., p. 34.

Acronycta, Och. (*Cuspidia*, Chapman), *aceris*, L.

This species shows a very considerable amount of difference in the ground colour of the anterior wings, some of the paler tinted specimens being of a pure whitish-grey, while others are much suffused with ochreous and black. The hind wings exhibit considerable variation and the nervures are very strongly marked, those of the females being darker than the males. The fringes, too, are strongly marked, the black markings being very conspicuous. The Linnæan description is as follows:—“*Alis deflexis canis: superioribus lineolis undatis annuloque ovali nigris*.” “*Alæ superioris basis lineola fusca et margo posticus nigro punctatus*” (‘*Systema Naturæ*,’ pp. 846, 847). The *infuscata* of Haworth is a suffused brown form, the *candelisequa* of Esper, a suffused grey form (not ochreous or brown). Almost all our specimens have a tinge of ochreous in them, and therefore differ both from the type and the extreme *infuscata*. Most lepidopterists consider

that Esper's *candelisequa* = *infuscata*, Haw., but this is an error. Haworth's *aceris* is our ordinary British form (tinged with ochreous). Taking the pale grey form as the type, we have the following varieties:—

a. var. *candelisequa*, Esp.—Esper's diagnosis (p. 39) of this variety is:—"Alis deflexis cinereis, stigmatibus orbiculari, striis maculisque oblitteratis nigris, margine antico albo punctato, stria media angulari marginique postico albidis; venis nigris subtus, puncto in medio et fascia nigricante." Although this is so distinct, both Guenée and Staudinger refer it to var. *infuscata*, Haw., and Guenée writes "more yellow" which is undoubtedly incorrect of this variety. Staudinger simply writes—"obscurior." I have fallen into the same error as Guenée in the 'Entomologist,' vol. xxi., p. 52, where the description, &c., belong to Haworth's *infuscata*.

β. var. *infuscata*, Haw.—This is described by Haworth as:—"Abdomine alisque anticis fuscis, striga postica dentata albicante." "Præcedentis (*aceris*) forte varietas, at constans: differt thorace uniformiter perfusco, nec pallide cinereo: abdomine fusco, pube longâ albâ, numquam pallidè cinereo. Alæ anticæ omnino fuscæ, strigis, lineolis, punctisque præcedentis: alæ posticæ ut in illâ." He then describes a variety of this as:—"Alæ longe saturatoribus striga postica cinerea vix dentata, sed quasi ex maculis conjunctis rhombeis composita. Forte propria species." I would include under this varietal name all those suffused forms, in which the suffusion consists of brown or ochreous scales. This was considered a distinct species by our early lepidopterists. Newman figured it in 'British Moths,' p. 251 (2nd figure).

γ. var. *intermedia*, mihi. = *candelisequa*, Gn.—This is our common British form of which Guenée says:—"Superior wings dark, of a more yellow (or ochreous) tint, with the lines and stigmata more distinct" ('Noctuelles,' vol. v., p. 48). Like so many other species, this is, in its palest British forms, darker than the majority of Continental specimens.

Acronycta, Och. (*Cuspidia*, Chapman), *leporina*, L.

The diagnosis of Linnaeus points to the white form as the type of this species. It is:—"Noctua spirilinguis lævis, alis deflexis albis; punctis nigris ramosis" ('Fauna Suecicæ,' No. 1176). A large proportion of our British specimens are the *bradyporina* of Treitschke, a grey form, which I have received from York, Essex, and also from Dr. Buckell, who bred his specimens from New Forest larvæ, although the Rev. Bernard Smith writing to me from Marlow, Bucks, said:—"All our specimens are quite white, veritable millers," so that these forms appear to become local races in different localities. A beautiful rosy tint is present in some specimens; occasionally the outer part of the wing assumes a banded appearance, being, as it were, an intermediate form between the type and *bradyporina*.

a. var. *bradyporina*, Tr.—Treitschke's diagnosis of this variety is:—"Acronycta alis albidis anticis fusco irroratis, punctis nigris ramosis" ('Die Schmet,' &c., p. 91). This variety was treated by our early lepidopterists as a distinct species. It is very much suffused, and has scarcely any trace of the white colour which characterises the type, the colour of the anterior wings being of a dark uniform grey.

the black markings are of necessity less pronounced, and blend with the general ground colour. This variety is represented in the second figure in Newman's 'British Moths,' p. 251. The type of this species, *leporina*, has the ground colour of a pure white. Most of our specimens would be referred by Continental lepidopterists to var. *bradyporina*. Nearly all my series are of the grey form. In 'Entom.' x., 129, the late Mr. Prest writes, "I have taken *A. leporina* for nearly twenty years, but never took the pale form near here (York); ours are all the variety *bradyporina*." Mr. Dobrée of Beverley, also tells me that this is so throughout the E. Riding of Yorkshire. In 'Entom.' x., 93, the late Mr. Nicholas Cooke writes:—"In this neighbourhood (Liscard) we take *leporina* of a tolerably deep grey colour; at Loch Logan it is beautifully white, with the characteristic marks dark."

β. var. semivirga, mihi.—The same ground colour as in the type, but the space, between the undulated transverse line parallel to the hind margin and the hind margin, is suffused with black scales, especially towards the line. This gives the variety the appearance of an exterior band, although not so broadly developed as in the almost parallel varieties of *psi* and *tridens*. This variety is represented in Newman's 'British Moths,' fig. 3, p. 251. It may be worthy of remark that *tridens* has only a banded variety, *psi* and *leporina* both banded and suffused varieties, while the remainder of the genus have only, so far as we at present know, suffused varieties.

γ. var. rosea, Engr.—Guenée describes a variety under Engraille's name "La Rose," as having "the superior wings and abdominal incisions of a bright rose," and says of it, "This charming variety is very rare."

Acronycta, Och. (Cuspidia, Chapman), megacephala, Fab.

There is some variation in the ground colour of this species, but by far the commonest form is the grey. Some specimens incline to ochreous, others are rosy. Dr. Chapman, writing to me of this species, says:—"I have them of three tints, (1) black and white, (2) ochreous, (3) tending to pink." The specimens from the south of Europe are all much paler than our palest forms. One pale Asiatic variety appears to have been named *turanica*, under the impression that it was a distinct species." The description of the type is as follows:—"Alis deflexis cinereis nigro undatis: macula unica orbiculata albida." "Rustica media affinis *N. euphorbiæ*. Antennæ nigræ. Caput et thorax hirta, cinerea. Abdomen albidum. Alæ anticæ obscure cinereæ strigis variis undatis nigris. In medio macula ordinaria unica. Margo fusco punctatus. Posticæ albæ subtus puncto centrali fusco" ('Mantissa,' p. 175, No. 261). This is a very good description of our form. The following are the principal varieties:—

a. var. turanica, Stdgr.—A species of this name is found in Staudinger's list between *euphrasiæ* and *rumicis*. The locality given is Turkestan. Mr. Dobrée writes me that this so-called species "is nothing more than a light-coloured form of *megacephalo* from Turkestan." All our British specimens of this species are darker than those from the south of Europe and Asia.

β. var. rosea, Engr.—Guenée describes this variety as follows:—"Superior wings of a pale (whitish) rose, with all the markings very distinct." He also says, "this variety is frequently reproduced. I have seen several examples" ('Noctuelles,' vol. v., p. 50). I have previously noted the rosy tinge on specimens bred by Mr. Dobrée, and I have specimens from different correspondents, tinged in the same manner. Hübner's fig. 11 is of this variety.

γ. var. ochrea, mihi.—Like the type, but with the ground colour of the anterior wings decidedly suffused with ochreous. This is not at all a common form, but occurs occasionally with the type.

Acronycta, Och. (*Cuspidia*, Chapman), *strigosa*, Fab.

This species seems very invariable, and I have seen but few minor variations in the species. Strange to say, Fabricius in his description of the type, mentions nothing of the yellow basal mark or yellow reniform, which are so characteristic. Esper named the species *favillacea*, probably on these characters. The Fabrician description is:—"Noctua lævis alis deflexis fusco cinereoque variis: lineolis tribus atris ante marginem interiorem." "Parva. Corpus cinereum. Alæ anticæ variegatæ striga apicis undata. Margo interior fuscescens lineolis tribus longitudinalibus atris. Posticæ cinereæ" ('Mantissa,' p. 142, No. 61).

Acronycta, Och. (*Cuspidia*, Chapman), *alni*, Linn.

This species is thus described by Linnæus:—"Noctua spirilinguis cristata, alis deflexis fuliginosis: areis duabus cinerascentibus: priore puncto marginali nigro." Alæ superiores supra fuliginosa-nigricantes: areis 2 versus marginem exteriorem priore cinereo-albida, oblonga puncta marginali nigro; posteriore subrotunda, albo cinerascente. Margo posticus cinereus punctis 8 atris, in area fusca et linea, longitudinali atra. Subtus grisescente-nebulosæ. Inferiores supra albida, subtus albæ puncto nigro" ('Systema Naturæ,' p. 846). This species is undoubtedly very closely allied in the imago state to *A. tridens* and *psi*, and is the only British species that has, like them, the fine longitudinal line, proceeding from the third fringe mark (counting from the apex) which crosses the outer transverse line and forms, in those species, a second ψ -like mark. There are two very distinct forms, one with the two patches described above pale ashy-grey in colour, the other with the patches but a little paler than the ground colour. Mr. Dale wrote me some time since that he had a specimen in which these patches were almost unicolorous with the rest of the wing. The hind wings of this species are very variable. Some males have pure white hind wings, others, a small grey patch at the outer angle; some specimens of both sexes have a grey band round the outer margin, others, in addition have a row of transverse spots on the nervures; the lunule is traceable in most of the females and occasionally there is a tendency for the nervures to become black at their extremities. Some of the fringes are strongly marked, others pure white.

It would appear, from a brood that Dr. Chapman reared during the summer of 1890, that the dark forms of this species are probably connected with a change of constitution (disease?), for in the "Entomologist's Record," vol. 1., pp. 271-272, he writes as follows:—"I have bred *A. alni* for several years, have always found it rather shy as to breeding, and, each year, have observed several instances of useless pairing. But this year (1890), though many pairings occurred, none settled down in the normal manner, and no fertile eggs were laid. I have called this the result of a change of constitution, not necessarily disease, partly because precisely the same procedure has always occurred in my hands with *strigosa*, and this, with moths from captured larvæ. The curious point, however, in the case of *alni* is, that in previous years, hardly a specimen departed, even in a slight degree, from the normal type, whilst this year, about a third of the specimens differ, more or less, either in the suffusion of the pale areas with darker scales, or in variation in the stigmata, generally in the direction of disappearance of the orbicular one. The variation and the failure to breed may be fortuitous coincidences, or there may be a causal connection between them. That the latter is the case is probable, from the record of other instances of a similar character." Dr. Chapman has since sent me the specimens, and they are really a most interesting lot. I exhibited the specimens at the City of London Entomological Society, and referred to the suffused form as var. *suffusa* ('Entomologist's Record,' vol. 1., p. 190). But the variation in the character of the orbicular (some totally absent); and the degree of development of dark shading, and of the transverse row of dots on the nervures of the hind wings, are very striking. Of the 48 specimens sent, not one is really typical.

a. var. suffusa, mihi.—With the two pale patches which are generally pale ashy in colour, much suffused with dark blackish-grey, and closely resembling the darker parts of the wing, the specimens thus appearing darker and more unicolorous. Recorded in the "Entomologist's Record," vol. 1., p. 190.

β. var. obsoleta, mihi.—With the orbicular stigma entirely obliterated. I have never seen a specimen of this form except among those bred by Dr. Chapman.

Acronycta (Cuspidia) tridens and *psi*.

Before entering upon the consideration of these species separately, or attempting to form some comparison between them, I would remark that my information has been derived almost entirely from Dr. Chapman of Hereford, who has paid great attention to the genus, and bred large numbers of both these species from ova. He was kind enough to send me long series (79) of *tridens* and *psi* all bred from ova, so that no error of determination was possible. He also sent some most valuable remarks which were entirely new to me, and as they probably will be to most of my readers, I shall make free use of them. As is well known, typical *tridens* have the anterior wings darker than typical *psi*, the darkening being due to ochreous scales which are mixed with the ground colour; the hind wings, too, are generally purer white in *tridens* than in *psi*, and less shaded with grey

in the females. It is well known, however, that the markings of both are so similar that very few lepidopterists can separate them with any degree of satisfaction. The principal markings are a trident-shaped κ longitudinal black mark at the base of the wing, the ordinary stigmata, a very distinctly elbowed line beyond the reniform, and a short oblique, dark shade running from the costa to the stigmata. It is, therefore necessary for readers to bear these general facts in mind to understand the points of distinction mentioned. Dr. Chapman writing to me says:—"You will see that *tridens* is a very variable insect within limits, whilst *psi* is very uniform (*bidens*, apart). The general facies at once distinguishes *tridens* and *psi*; let anyone mix one of either set with the other, and you can pick it out at once. This is probably because I have only one type of *psi*. When you look for any marking apart from tint and tone, to separate *psi* from *tridens*, I must confess that I have been able to find none that is invariable, the shortness of the dagger handle at the anal angle, whiteness of hind wings of male, do not hold universally. Another mark, that is perhaps better than either of these, is the double mark in the fringe at the anal angle at the end of the dagger; exaggerating a little, it consists of two lines in *psi*, two blotches in *tridens*; but this fails sometimes, and is not distinct enough to depend on description, apart from comparison. It is curious how similar varieties affect these species; in both, the stigmata are usually united, but in both sometimes separate. Then the blotch on the costa above the stigmata is sometimes a line, sometimes a blotch, sometimes descends into the orbicular, sometimes into the reniform stigma, sometimes falls short between them, but equally so in both species." This is a most valuable summary and, backed up as it was with Dr. Chapman's insects, I am able to add under each species my own notes, which are really an extended form of those of Dr. Chapman. I would however call attention to one or two minor points. The dark shade from the costa between the stigmata is somewhat different in *tridens* and *psi* in my opinion. In *tridens* it does not appear usually, to go between the stigmata, but generally strikes the upper and inner edge of the reniform, while in *psi* it crosses, more generally, obliquely between the reniform and orbicular. Again, the transverse line parallel to the hind margin is distinctly double in *tridens*, but the inner edge is, to a great extent, lost in *psi*: in *tridens*, too, this line commences rather farther over than in *psi*, but the most remarkable point about this line is that in *psi*, the lower portion is generally nearly vertical or slightly turned back towards the anal angle, while in *tridens* it goes distinctly towards the centre of the wing, ending under the orbicular or quite at one third from the anal angle; this is fairly constant; occasionally one finds in a specimen of *tridens*, as it extends in this direction, a slight backward curve before it reaches the inner margin, but it is very characteristic in Dr. Chapman's magnificent series. The anterior wings are less distinctly marked in *psi* with black markings than in *tridens*. In both species there is a distinct line of demarcation passing straight through the anterior fringes from apex to anal angle. In *tridens*, the inner half is ochreous, the outer whitish; in *psi*, the inner half is darker grey than the outer and not ochreous; in the rosy specimens, the fringes are shaded with the same colour.

The posterior wings are darker, and all have, more or less, traces of the dark transverse line which is rarely (if ever) developed ever so slightly in male *tridens*. The females of *psi* have the hind wings more distinctly grey and much more mottled with black scales. The fringes of the two species vary, in the posterior wings, in colour, as in the anterior wings, but *psi* has the black lines running through the fringes better developed than in *tridens*, which has the posterior fringes, generally, very clear.

Acronycta, Och. (*Cuspidia*, Chapman), *tridens*, Fab.

As I have pointed out in the previous paragraph, the following notes were made principally from Dr. Chapman's series:—"A very large percentage of Dr. Chapman's *tridens* are strongly tinged with red in both males and females. Specimens of both sexes have the stigmata in contact, others have them separate; others have them joined by a short, fine, black line on the internal edge at about the centre or a little lower. The black basal line instead of being distinctly trifurcate at its point, is occasionally only bifurcate as in *psi* var. *bidens*. The bifurcations at the end of this basal line are really parts of the double transverse line, hence some have two bifurcations at the end, besides the central point. Some specimens are of a much darker grey than others, but all have an ochreous tint. Some have the abbreviated basal line distinct, some very indistinct, there is also a great deal of difference in the development of the second pair of basal lines. Occasionally specimens have distinct dark shades under the black basal longitudinal line. All have a short dark shade, more or less developed, from the costa to between the stigmata; all the specimens, too, have a pale wavy greyish line outside the reniform, much shouldered near the costa and edged internally with the ground colour, but outside with darker grey, the outer edge is sometimes developed into a distinct transverse shade or band. A fine black line from the third fringe gemination (counting from the apex) cuts this shade, sometimes extending to the fringe mark. The central line of the ψ -like mark at the anal angle is always well developed, the curved part of the mark depends for the development on the intensity of the external transverse shade; this central line originates in a double gemination at the anal angle, and generally ends at, or near the inner edge of the inner line bordering the pale transverse line *mentioned above. The 7 dark fringe lines are very distinctly marked in all specimens. The males have very clear white hind wings with faintly marked nervures and lunule. A very fine ochreous line borders the posterior margin, in which are placed about 8 dots between the ends of the nervures; a few males show traces of a transverse row of dots on the nervures and parallel to the hind margin where the transverse shade exists in the females. The hind wings of the females vary from white with slightly grey nervures (darker on the outer margin) and faint traces of a parallel shade and lunule, to wholly grey hind wings with very distinct darker grey nervures (blackish on the outer margin), a distinct transverse line

* In *psi* this central line generally passes through a considerable distance beyond the second line.

parallel to the hind margin, and a distinct lunule. The dots bordering the hind wings are the bases of the fringe geminations and are not nearly so distinct as in the fore wings. Some of the females, owing to the peculiar and extreme development of the dusky nervures on the hind margin of the posterior wings (between the hind margin and transverse shade), while the remainder of the wing is comparatively without such markings, have a peculiar striated looking band running round the hind margin." All the early descriptions of the species are unsatisfactory, the diagnosis of Fabricius in the 'Mantissa,' appears to be the best of a bad lot. He writes:—"Alis deflexis cinereis, macula atris trifidis; postico albidis," but this would do almost equally well for other allied species.

a. var. virga, mihi.—The ground colour rather darker than in the type; the space in the anterior wings between the hind margin and the transverse line containing the ψ -like mark much suffused with dark scales, giving it the appearance of a band, the space between the black basal streak and the inner margin much suffused. There is a figure of this variety in Newman's 'British Moths,' p. 248, second figure.

β. var. rosea, mihi.—Like the type but with the whole of the wings suffused with a beautiful rosy tinge. Same localities with the type.

γ. var. bidens, mihi.—With the basal mark characteristic of *tridens*, \leftarrow , not having the central longitudinal line produced beyond the bifurcation which proceeds along the transverse line, thus \leftarrow .

δ. var. quinquedentata, mihi.—With the basal mark produced through the ordinary bifurcation as in *tridens*, but with two bifurcations, thus making five points, $\leftarrow\leftarrow$.

ε. var. juncta, mihi.—With the orbicular and reniform united on their inner margins. A rather common form of variation.

Acronycta, Och. (Cuspidia, Chapman), psi, L.

This common British species undergoes a fair amount of variation, especially with regard to the ground colour, which varies from an almost pure whitish grey, to a very dark grey, much suffused with black. A considerable amount of variation also exists in the character of the markings, and it is particularly to be noticed how variable are the size, position, and arrangement of the stigmata. The very pale form is the type, for Linnæus writes:—"Noctua spirilinguis cristata, alis deflexis canis, superioribus characteribus ψ nigris" ('Fauna Suecicæ,' 1181; 'Systema Naturæ,' p. 846, No. 135). Dr. Chapman sent me a very long series for examination, and especially directed my attention to some of the minor points of variation apt to be overlooked:—First, with regard to the longitudinal basal line. It will be noticed on referring to this line, that the central stem extends, at its outer point, beyond the two transverse cross pieces to form a trident thus, \leftarrow , the side pieces being parts of the transverse basal line. In some specimens, however, that Dr. Chapman kindly gave me, this central part does not thus project, but forms a simple forked mark, thus, \leftarrow , and, for this variety, he proposes the name *bidens*. Secondly, that the characteristic ψ -like mark at the anal angle of the wing

varies much, the central stem sometimes being carried through very far, at others not at all, making a mark shaped thus, Ψ . Thirdly, a point to which I have previously drawn attention, the variation in position, and the frequent coalescing of the reniform and the orbicular. Lastly, I would draw attention to the following remarkable fact, that all those specimens which he selected to give me of the *bidens* variety, also had the area outside the elbowed line, and between that and the subterminal line shaded as in var. *virga* of *tridens*, but, I must add, this banded character was not confined to the *bidens* form in his own series, some specimens being banded, which possessed a normal basal mark. There is also another remarkable fact about *bidens*. The shoulder line in *bidens* passes directly to the costa, forming an oblique, almost straight line, and is not angulated, as in typical *psi*, towards its upper part, and bent back towards the base before reaching the costa. The hind wings, too, are paler than *psi*. It will be noticed (as Dr. Chapman pointed out to me) that *bidens* in all these respects resembles *menyanthidis* rather than *psi*. Returning now to *psi* (as apart from var. *bidens*), I would call attention to the fact that the black longitudinal basal line rarely has a double bifurcation in *psi* (although common in *tridens*), owing to the generally ill-developed condition of the outer striga of the double transverse basal line, of which the bifurcations are really a part. There never appears to be in *psi* a duplication of the short transverse line (situated towards the upper part of the elbowed line, above the ψ -like mark), which is of common occurrence in the allied species, *tridens*. A very large proportion of our specimens in the London district have a very dark grey ground colour, whilst in other districts the ground colour is very white, and in others particularly ashy, almost with a faint slaty hue.

a. var. virga, mihi.—With the area directly outside the transverse angulated (shoulder) line, of a darker shade than the ground colour, giving an appearance of a transverse band.

β. var. juncta, mihi.—With the orbicular and reniform joined on their inner margins as in var. *juncta* of the allied species *tridens*.

γ. var. bivirga, mihi.—The anterior wings darker than in the type, the space between the hind margin and the transverse line containing the ψ -like mark completely suffused with black scales; the basal part of the wing also completely suffused, so that the insect has the appearance of two bands crossing these wings. This beautiful variety was captured on the racecourse at York by Mr. J. T. Carrington, and is now in the collection of the late Mr. Sidebotham.

δ. var. suffusa, mihi.—The whole of the ground colour is much suffused with dark scales, giving the insect a very dark appearance. The posterior wings are also much darker than in the type in both sexes. This is the form generally, if not always, taken in the London district, and occasionally found in most of the woods within a few miles of the metropolis. I have never taken the pale type in my own district (Blackheath), although it is common enough in Darenth, Chattenden, and other woods only a few miles off, in which the var. *suffusa* is rarely seen.

ε. var. cuspis, Stephens (non Hb.).—There is a continental species of this name closely allied to *A. psi*, which species (*cuspis*, Hb.)

Stephens undoubtedly considered the variety of *psi* he described it to be. This proved not to be so. Stephens' name therefore has been retained as the varietal name to *psi*. His description is:—"Very similar to the last (*A. tridens*), but rather larger, cinereous, with a black lateral thoracic line; anterior wings greyish white, a little tinted with luteous, with a strongly ramose black lineola at the base, and a powerful black undulated posterior striga, in which are two black ψ -like marks; the stigmata are nearly as in the last (*tridens*), and the cilia whitish ash, spotted with black; posterior wings whitish, with a dusky central lunule; a transverse striga beyond the middle and posterior fimbria." I have specimens in my cabinet labelled Chattenden, July, 1885 and 1886, which answer exactly Stephens' description; also one taken on the Shooter's Hill Road in July, 1886. The specimens are all large and characteristic. This var. may have to be referred to *tridens*.

ξ. var. *bidens*, Chapman.—Dr. Chapman has suggested the name *bidens* for a remarkable local race which he has bred. The ground colour is ashy grey, and the black longitudinal basal line reaching the first of the streaks that make up the double transverse basal line divides into two branches, without passing through the second streak as it does in normal *psi*, thus resembling *A. menyanthidis*; the costal shade which passes between the stigmata starts from the upper edge of the transverse basal line, the elbowed line has two distinct angulations, and, outside is shaded with a transverse band rather darker than the ground colour, giving it a banded appearance; the fine longitudinal line starting from the third (from apex) dark fringe marking, reaches, but does not pass through the angulated line (as it does in *psi* and *tridens*); the ψ -like mark in one specimen does not have the central stem extending beyond the curved part, in the others it extends through, but less than in either *psi* or *tridens*. Hind wings of the males white with dark nervures; in the females grey with a darker transverse line and lunule. Dr. Chapman writes of this variety:—"They are pale and unicolorous and remarkable from the basal dagger having only two wings (whence var. *bidens*) and the outer line passing straight to costa instead of sloping towards base—in both respects resembling *menyanthidis*. Male *bidens* also has pale underwings, in some as pale as *tridens*. The larva is *psi* except that the lower pale lateral band is darker" (*in litt.* '88).

η. var. *rosea*, mihi.—The whole of the anterior wings suffused with rose colour. This is a much less common form of variation in this species than in *tridens*.

θ.—Guenée describes two varieties, his var. A as:—"Superior wings whiter, less powdered with black and without a violet tinge, with all the black streaks more strongly marked. The angulated line of a deep black throughout its length. Inferior wings generally paler." His var. B is described as:—"Superior wings a little squarer, clearer, less powdered with dark scales. The inferior wings of a blackish grey, almost unicolorous in both sexes. From North America" ('Noctuelles,' vol. v., p. 43).

Acronycta, Och. (*Viminia*, Chapman), *auricoma*, Fab.

The type of this species is thus described by Fabricius:—"Noctua *auricoma* (by error *auricornia*) cristata alis deflexis: anticis cinereo

fuscis: strigis characteribus nigris, pedibus, apice albo annulatis." "Nimis affinis *N. psi* at omnia obscuriora. Alæ posticæ albidioris. Pedes albidii apice fusci albo annulati" ('Mantissa,' p. 174, No. 256). The minor forms of variation noticeable in the allied species are also present in this. Haworth's varieties, *menyanthidis* and *similis* differ but little from the type; Hübner's *pepli* is darker and rather more unicolorous.

a. var. similis, Haw.—In this variety the wings are more ashy in colour, with a slightly waved line before the middle of the anterior wings; another short oblique line is in the centre of the wing, and a third pale one at the apex. Haworth's description is as follows:—"Noctua alis cinereis, striga subundata atra ante medium, alia fusca obliqua abbreviata medio, tertiaque cana submoniliformi, limbi postici: posticis albidis fimbria subfusca." Comparing it with the following, *var. menyanthidis*, he writes:—"Præcedenti (*var. menyanthidis*) nimis affinis, sed magis cinerea seu infuscata; striga ante medium anticarum simplex et longissime saturatio pone maculam cuneiformem obscuram fuscam cinereo-cinctam. Margo posticus distinctè notatus strigâ submoniliformi albidâ sive canâ. Striga postica anguste dentata, literâ ψ terminante prioris, fere omnino obliterated. Posticæ alæ magis distincte subfusco fimbriatæ" ('Lepidoptera Britannica,' p. 180, No. 57).

β. var. menyanthidis, Haw. (non Hb.).—This variety of *auricoma* must not be confounded with the northern species of the same name. The great character of this variety is the increased development of the ψ -like mark. I have taken this form with the type at Addlestone, in Surrey, and have no doubt it occurs everywhere where the type may be obtained. Haworth's description ('Lepidoptera Britannica,' p. 180) is as follows:—"alis cano-cinereis stigmatibus ordinariis distinctis, striga duplici fusca antica, alteraque postica anguste dentata cinerea literam ψ terminante." Comparing it with *auricoma* he writes:—"Auricomæ, simillima, at pallidior: alis posticis nec subfuscis sed fere albidis venis postice fuscis ciliis niveis. Linea nigra basi anticarum obsoletior, simplex, nec dentata."

γ. var. pepli, Hb., Gn.—Dr. Staudinger gives this as a probable variety of *auricoma*, with the description, "obscurior, magis unicolor." Guenée describes it without a mark of doubt, as follows:—"The ground colour of a more bluish grey, and at the same time more sprinkled with black dots, which make the marking less distinct. The inferior wings of the male are whitish in the middle. Fringe spotted." He gives as localities Germany and Normandy. It appears to me, after a careful consideration of Hübner's fig. 614, to belong here. The great character of the variety seems to me to be the complete absence of the ψ -like mark.

Acronycta, Och. (*Viminia*, Chapman), *menyanthidis*, Vw.

Vieweg's diagnosis of this species is as follows:—"Noctua *menyanthidis* alis deflexis canis fusco nebulosis, annulo medio caractere ψ referente anguli postici nigris" ('Tabellarisches Verzeichniss' &c., p. 50, No. 75). This species is very variable both in ground colour and markings. Some specimens are of a pale whitish-grey, scarcely clouded with darker, and with the transverse lines and stigmata almost obsolete, while others are much darker, sprinkled with black scales,

culminating probably in a perfectly melanic form. An extreme melanic form probably occurs on the Continent, for Herr A. Hoffmann of Hanover, writes:—"Dark melanic forms occur on the moors and at the sea-coast of North Germany," but I am inclined to think that these belong rather to my var. *suffusa* than any other form. There is a great deal of variation in the character of the stigmata, and I have specimens in which the reniform is absent; the dark costal shade in this species appears always to run directly through the reniform, whilst the black line bordering the pale elbowed line is frequently broken up into large black lunules.

a. var. obsoleta, mihi.—The ground colour of the anterior wings somewhat paler than in the type, the markings very faint and indistinct. Instead of the black markings of the type (*vide* Newman's 'British Moths,' p. 257), they are grey and but little deeper in shade than the ground colour. The discoidal spots are indistinct, the hind marginal and central areas very pale, the latter inclining to white. My specimens of this form were given me by my friend Mr. Butterfield, and were captured in the Bradford district. He also gave me a remarkable specimen with the right side of this obsolete form and the left side much more strongly marked and typical.

β. var. scotica, mihi.—Larger and brighter than the type, the markings very clear and distinct. All my Scotch specimens from the Glasgow and Dumbarton district are much larger, brighter, and more distinctly marked than Yorkshire specimens. The specimens from the east coast of Scotland are more like English than Scotch specimens from the west coast, or from the Rannoch and surrounding districts. It may be well to remark here, that the fauna of the east coast appears to be less alpine than that of the west coast of Scotland in a more southern latitude.

γ var. suffusa, mihi.—The anterior wings powdered with black scales, giving the insect a much darker appearance than the type. The hind wings are of a much deeper grey, especially towards the base and hind margin. Hübner's figure 7 represents this form fairly well. The variety figured in Newman's 'British Moths,' p. 257, fig. 4, appears identical with my specimen of this form, which also came from the Bradford district. Mr. Prest ('Entom.' x., p. 129) writes:—"Those (*menyanthidis*) we take near York are nearly black, and the light form is very rare."

Acronycta, Och. (*Viminia*, Chapman), *euphorbie*, Fab.

The type of this species does not occur in Britain. Our British form has become so completely modified that it was described as a distinct species under the name of *myricæ*. The Fabrician description is:—"Noctua cristata alis deflexis cinereis fusco undatis: maculis ordinariis; anteriore orbiculata posteriori reniformi albidis." "Caput et thorax hirta cinerea. Alæ cinereæ striga baseos brevissima, altera ante medium undata, tertia pone medium incurva. In medio pallidiores maculis ordinariis distinctis annulo fusco cinetis. Margo fuscus punctatus" ('Mantissa,' pp. 174, 175, No. 260). The hind wings of male *euphorbie* are white, of females, grey. Those of male *myricæ* are white, of the females dark blackish grey. The variety *montivaga*, Gn., is hardly

identical with *myricæ*, Gn., but is less dark in colour, and has the markings more obscure. It is, therefore, somewhat intermediate between *myricæ* and the type. The specimens of *montivaga* I have received from the Alps appear exactly intermediate between the pale type and Rannoch *myricæ*. It is, however, rather surprising that Guenée should describe two varieties so closely allied, as belonging to distinct species. Herr Hoffmann also informs me that the markings of *montivaga* from the Engadine are less distinct than those of *myricæ* from Rannoch, otherwise the forms are almost identical." Hübner's fig. 12 (*euphorbiæ*) is without doubt a large female *montivaga*. Dr. Staudinger writes of *montivaga* comparing it with *euphorbiæ*, "major, obscurior."

a. var. montivaga, Gn.—Guenée describes a variety of *euphorbiæ*, under the name of *montivaga*, as follows:—"The anterior wings of a deep slaty grey, with a slight tinge of bluish white, the markings almost absorbed in the ground colour; thorax grey. The inferior wings of the male a little powdered with black on the outer edge, the nervures and a distinct cellular lunule, darker; those of the female of a darker grey with the fringes white. The anterior wings of the female not differing from those of the male. The variety is constant; perhaps it is due to the influence of the mountains. Locality, Chamouni" ('Noctuelles,' vol. v., pp. 57, 58).

β. var. myricæ, Gn.—The type of this species (*euphorbiæ*) does not occur in Britain. The Continental specimens are very much paler and generally somewhat smaller than our specimens. *Myricæ* was long considered a distinct species, and was described as such by Guenée, but there is no doubt that it is only one of those highly specialised melanic forms for which the northern part of Britain and the western coast of Ireland are so remarkable. It is useless to redescribe a species which is in all our collections and has been so often described. It is abundant in many parts of Scotland; and was captured by Mr. Birchall in Killarney. Mr. Kane has also taken it at Galley Head in Ireland. It may be advisable, however, to draw attention to the extreme sexual dimorphism exhibited by this variety. The females are sometimes almost entirely black.

Acronycta, Och. (*Viminia*, Chapman), *rumicis*, L.

Before dealing with the varieties of *A. rumicis*, it is necessary to enter at some length on the consideration of associating the var. *salicis* of Curtis with this species or with *A. menyanthidis*. I have gone carefully through all the literature which I can find on the subject, the following being the summary:—Mr. Stainton, in the 'Manual,' vol. i., p. 183, treats it as a distinct species, and says that it closely resembles *rumicis*, but is smaller and darker. Newman figures it as a variety of *rumicis*, 'British Moths,' p. 255. Dr. Staudinger quotes it as an aberration of *menyanthidis*, with the following synonymy and description:—"ab. *salicis*, Curt., Gn? *euphorbiæ*, Wood, obscurior, alis anterioribus fere unicoloribus; locality Anglia." In Humphrey & Westwood's 'British Moths,' p. 197, we find:—"Varieties of *menyanthidis* occur in which the ordinary strigæ are much more distinct and brown, forming broad patches on the wings, the inner margin at the base of the third

striga being marked with a more distinct lunular patch. Such a variety constitutes the *A. salicis* of Curtis." Mr. South, in his 'Synonymic List,' quotes *salicis*, Curt., as a synonym of *rumicis*, and also directly after (on the same page) quotes it as a variety of *menyanthidis*. At p. 7 of the 'Substitute' (1856-57) the late Mr. Nicholas Cooke wrote:—"At p. 183 of the 'Manual' I see Mr. Stainton has copied an error from Guenée's great work, which the latter author was led into by Curtis. The larva figured along with the imago of *salicis* in the splendid work of Curtis is the larva of *menyanthidis*. I have had hundreds of them, but never reared *salicis* from them. Both myself and my friend Mr. Greening have, however, reared *salicis* from the larva of *rumicis* and are perfectly satisfied that it is nothing more than a dark variety of the latter species." At p. 213, however, Mr. Cooke modified this statement very considerably. He says:—"The statement ('The Substitute,' p. 7) brought me a reply from Mr. J. C. Dale, which induced me to send him my specimens for examination, and it turns out that the *salicis* of our northern collections is not the *salicis* of Curtis. . . . Mr. Dale says with good reason that if *salicis* is a variety at all, it is a variety of *menyanthidis*; that he was with Curtis at the time he found the larvæ from which they were bred; that he also found three larvæ, and reared one moth exactly like Curtis's figure of *salicis*. Curtis was more fortunate, and bred several, and one *menyanthidis* among them, which puzzled him. The larvæ were found on shallows in the Trossachs, . . . proving Guenée to be right in stating that the figure given by Curtis of the larvæ by the side of the imago is sufficient evidence that this *salicis* is only a variety of *menyanthidis*." Herr A. Hoffmann writes me:—"Rumicis does not vary with us (Germany). *Menyanthidis* varies greatly in colour, from a greyish white to dark melanic forms which occur on the moors or at the sea-coast of North Germany (probably your *salicis*, Curt.)." My friend Dr. Chapman, who is a specialist with this genus writes:—"It is 30 or 40 years since I made up my mind about *salicis*, Curtis. His figures are excellent as usual; larva of course, *menyanthidis*, moth *rumicis*. Both species of larvæ are common at the Trossachs and he got them mixed. The *rumicis* figured is the West of Scotland form. I have bred large numbers of *menyanthidis* from the West of Scotland, and never got a black var., nor, I fancy did, Curtis, but since there is a black var., and no one likes to say Curtis (travelling about at the time) made a mistake, the matter has been allowed to remain doubtful. I take it the black var. of *menyanthidis* is not like Curtis' figure" (*in litt.*). After reading these extracts I think most lepidopterists will agree with me in stating that both *menyanthidis* and *rumicis* have black vars., but in deference to Dr. Chapman's superior knowledge, and in opposition to the opinion expressed 'Entom.' xxi., p. 83, it would appear that *salicis*, Curtis = *salicis*, Sta. and that as an undoubted black var. of *menyanthidis* has never been described it is advisable to leave the matter open for future investigation.

The Linnæan description of the type is as follows:—"Alis deflexis cinereis bimaculatis; litura marginis tenuioris alba. Alæ stigma ordinarium annulo et puncto nigro. Macula dein alba medii marginis tenuioris" ('Systema Naturæ,' p. 852). It will be seen that the type

has a slender white striga parallel to the hind margin. *Euphorbie* Haw. differs in having an ashy instead of a white line; whilst Stephen's *euphrasie* is a pale greyish-ochreous form. The *salicis* of Stainton is a strongly melanic form. It would seem that in Britain our specimens of *rumicis* from the South-west are very pale; much suffused with brown in the South, South-east, and the Midlands; and much suffused with black in the North of England and Scotland. M. Guenée writes:—" *Rumicis* varies but little with us; I am not able to describe the individual varieties of Stephens, specially, as I have not seen types coming from England" (Guenée's 'Noctuelles,' vol. v., p. 53). It would appear, therefore, that *rumicis* does not vary either in France or Germany. So far as my experience goes, I find only the type with distinct white markings or var. *salicis* occurring in Scotland. In the South of England the paler markings are rarely white but generally dull ashy grey.

a. var. salicis, Curtis.—This melanic form was figured by Curtis ('Brit. Ent.,' pl. 136) with the larva of *menyanthidis*, the imago, from which the figure was obtained, is stated to have been bred by Curtis from a larva captured on sallow in the Trossachs" (*vide* 'Substitute,' p. 212). It is described in Stainton's 'Manual,' vol. 1., p. 183, as a distinct species. It is undoubtedly a melanic form of *rumicis*. It is the *A. nobilis* of Gregson ('Entom.' iv., p. 50). The anterior wings very much suffused with black scales; the orbicular is distinct, but the reniform generally inconspicuous; there is a pale lunular mark at the base of the third striga, and a row of white dots parallel to the hind margin. It is figured in Newman's 'British Moths,' p. 255, fig. 2, and occurs in the North of England and Scotland. My own specimens came from Mr. Finlay, Meldon Park, Morpeth; Mr. Henderson of Glasgow; Perth; &c. At 'Entom.' x., p. 129, we read "*A. rumicis* also occurs nearly black at times with us," *i.e.*, in the E. Riding of Yorkshire. It is not uncommon near Beverley (E. Yorks). Mr. Kane writes:—"I have specimens of this (*salicis*) variety in which neither the reniform nor orbicular stigmata are represented. The only pale markings are the white lunular one near the anal angle on the inner margin and the row of pale dots along the hind margin." This form with obsolete stigmata is not uncommon in the North of England and Scotland; but generally var. *salicis* has an orbicular, although the reniform is usually absent.

β. var. euphorbie, St. (non Hb.).—Under this name our early British lepidopterists figured and described a var. of *rumicis*, which they erroneously referred to Hübner's *euphorbie*, which is a very different species. There is a figure in Humphrey and Westwood's 'British Moths,' pl. xlii., fig. 13, and a description, vol. 1., p. 197. The figure does not agree with the description very well. The figure depicts a form which has the space between the stigmata pale, and suffused more than is usual with dark brown blotches. I have seen nothing answering to the figure, but the description represents a form fairly abundant in the S. E. district. The description, as copied from Humphrey and Westwood, is:—"Ashy brown coloured, with brown blotches; the stigmata whitish coloured, preceded by the two ordinary strigæ; the space between the stigmata is pale; the anterior stigma is

round, the outer one kidney-shaped, both having a brown margin; the third stigma is terminated on the inner margin by a pale mark, and the subapical striga is pale, the apex of the wings being dark, the cilia pale, spotted with brown; the hind wings and abdomen ashy coloured."

γ . var. *euphrasiæ*, St. (non Dup.).—A pale var. of *rumicis* is referred by Mr. Stephens to the Continental *euphrasiæ* of Treitschke and Duponchel. It is very different to that species, but is a well marked and uncommon variety of *rumicis*. The ground colour of a pale yellowish grey, with many black transverse lines, but no dark patches; the anterior stigma obsolete. A pale lunule is developed at the end of the elbowed line, and the last striga is pale, wavy and continuous. I have some fine specimens of this unusual pale form, which appear to agree exactly with the description of Stephens' specimen, except that they have the anterior stigma indistinct, not obsolete. My specimens were taken in Cornwall, by Mr. F. Norgate of Brandon. The true *euphrasiæ* is figured by Hübner: the male, fig. 529; the female, fig. 615, the latter under the name of *cyparissiæ*.

Viminia, Chapman (*Arsilonche*, Ld.), *albovenosa*, Göze (*venosa*, Bkh.).

The type of this species, as its name indicates, has white nervures which show distinctly on the pale wainscot ground colour. The depth of the ground colour varies from pure silvery white to deep (inclining to reddish) ochreous. A great deal of difference exists in the development of the dark shades under the base of, and above the outer half of the median nervure, and towards the apex. Mr. Warren, of Cambridge, informs me that "the specimens of the second (autumnal) brood are those which have the dark dashes more prominently marked, and the fore wings sometimes more thickly peppered." This form (with the dark shades clearly developed) is figured by Hübner (fig. 380) under the name of *degener*.

α . var. *centripuncta*, H.-S.—The anterior wings of this variety have a black spot in the centre of each wing. The description Dr. Staudinger gives is "alæ anteriores puncto nigro." This form has, I believe, at the present time only been recorded from Russia, but some of my specimens from Cambridge have this spot faintly indicated. I should not be surprised to learn that this variety exists in some of our collections.

β . var. *ochracea*, mihi.—The ground colour of this variety is reddish ochreous, and the wing-rays pale ochreous instead of white, as in the type. This variety occurs in both broods, some of the specimens being almost devoid of the dark shades very strongly marked. I have to thank Mr. W. Farren, of Cambridge, for a loan of fine series of this variety.

γ . var. *argentea*, mihi.—Ground colour silvery white, with no trace of ochreous. My specimen, which is probably of the autumnal brood, is much suffused with dark scales directly above and below the median nervure, also along the costa, and less strongly along the inner margin. Taken very rarely with the type.

II. Sub-class :—GENUINÆ, Gn.

1. Family :—*Leucanidæ*, Gn.

The *Leucanidæ* are, as a family, remarkable for their pale colour, nearly all of them being of some shade of yellowish or whitish ochreous in their palest forms. Even those which we are accustomed to consider as having the typical colour of some shade of red are found to be grey or ochreous in their paler forms, when long series from far-distant localities are obtained for comparison. In almost all the species of this group the variation in ground colour appears to go through a regular gradation from pale whitish ochreous to yellowish ochreous and reddish ochreous, generally culminating in a deep red. Not only are many of our species subject to these variations in ground colour, but nearly all the family are frequently in all these various forms more or less suffused with black scales. It is therefore in one of these two directions, or in both combined, that the variations of the *Leucanidæ* generally run. A less important type of variation is in the number of dots which form the transverse rows, found in many species, parallel to the hind margins of both the anterior and posterior wings. Frequently some specimens of a species have complete rows of these dots, while in other specimens of the same species they are entirely absent, others having a greater or less proportion of the total number suppressed. In most instances, however, two at least are developed on the anterior wings, one directly above, the other below, the median nervure.

Synia, Dup, *musculosa*, Hb.

It may be advisable to point out that Newman's figure, 'British Moths,' p. 273, is nothing like Hübner's type, and that his (Newman's) description is almost convincing that the specimen he described most probably did not belong to this species. Hübner's fig. 363 is of a bright sulphur-yellow ground colour, with grey nervures, the central area of the wing much suffused with dark grey scales; the orbicular area and reniform, of a very pale sulphur, stand out distinctly in the darker central area; the costa has a broad pale sulphur streak, the inner margin also clear; a pale sulphur wedge-shaped mark extends longitudinally from the outer edge of the reniform to the hind margin, at the point and where it meets the hind margin is a small grey blotch. Posterior wings pale sulphur, without any markings.

a. var. myodea, Rbr.—Mr. Dobrée informs me that the data for considering this a variety of *musculosa* rests upon a single imperfect specimen captured in Andalusia. Dr. Staudinger quotes it with a mark of doubt.

Leucania, Och., *vitellina*, Hb.

Hübner's type of this species (fig. 379) is a small, very strongly marked male, of a bright yellow ground colour, marbled with reddish, with transverse lines and stigmata red; his fig. 589 being a female, larger, dull unicolorous orange, with the transverse markings and stigmata indistinct. The specimens I have are all females, as large as Hübner's fig. 589, but intermediate in depth of markings and colour between his figs. 379 and 589. Guenée, in his 'Noctuelles,' p. 73,

says:—"It varies in ground colour from a pale yellow to a strong yellowish red, and the markings are more or less clear, following the intensity of the ground colour. I have specimens from Algeria which do not differ from French examples." A good many specimens occur in British collections, but the insect is a south European one, and rarely occurs even in the north of France and Germany. The species is, however, occasionally captured in the Isle of Wight, where many species, having a close connection with the Mediterranean littoral, are to be found.

Leucania, Och., *conigera*, F.

This species varies very much in ground colour from a bright yellowish-orange, through ferruginous red, to a deep dusky red much sprinkled with black scales. The continental forms appear to closely resemble our brighter specimens, but I have seen none approaching the more melanic forms which we occasionally obtain in England, and which are very frequent on the west coast of Ireland. There is a certain amount of variation in the size and shape of the central white dot. The diagnosis of Fabricius, taken from Borkhäusen, is:—"Cristata, alis, deflexis flavescens, strigis duabus fuscis, punctoque medio albo trigono." Hübner's figure (322) is a good one of the typical insect as far as the upper wings are concerned, but the posterior wings are coloured bluish, and have a dark margin.

a. var. intermedia, mihi.—Differs from the type in being of a redder ground colour, and is not suffused so much with black scales as the more melanic var. *suffusa*. This appears to be the most common form of the species, and to occur in the same localities as the type.

β. var. flavipunctum, mihi.—I have a specimen of this species taken at Strood, of a reddish ground colour, with the ordinary characteristic white spot ochreous.

γ. var. suffusa, mihi.—The ground colour of the anterior wings of a dusky ferruginous-red, without any trace of the brighter yellowish ground colour of the type, the whole being much suffused with darker scales; the markings exactly like those of the type, but of a deeper colour and more distinct, especially the stigmata; a very dark shade surrounds the reniform, extending to the orbicular; the costa shaded with dark scales, the wing-rays also dark. The hind wings of a very dark smoky-grey colour in both sexes, bearing more or less traces of a still darker transverse line. I have this melanic form from Morpeth, Hartlepool and Sligo. My *conigera* from Dundee are as bright as the specimens captured in Chattenden, Strood, Deal, and other Kentish localities. Brightly-coloured specimens are, however, captured at Sligo with the darker forms.

δ. A remarkable abortion of *L. conigera* is figured in the 'Entomologist,' vol. xi., and described at p. 171 as follows:—"This insect has the normal coloration of the upper wings, but the left lower wing is, both in colour and structure, partly like the upper wings, and also has one white spot in the centre."

Leucania, Och., *albipuncta*, Fab.

This rare British species is thus described by Fabricius:—"Noctua cristata alis deflexis cinereis lunula media alba, strigisque duabus lu-

nularum fuscaram.” “Corpus cinereum. Alæ anticæ cinereæ, interdum parum rufescentes strigis duabus e lunulis interruptis fuscis. Inter has striga lunula albida” (‘Mantissa,’ p. 178, No. 275). As in the closely allied *lithargyria*, there are two distinct shades of colour, one bright red, the other much greyer, sometimes slightly tinted with reddish (the type) but occasionally without (var. *grisea*). Of the few specimens I have captured on the south-east coast (Kent), most are of the type, and a form intermediate between the type and the brightest red form. There is practically no variation in the tiny round white dot at the base of the reniform.

a. var. rufa, mihi.—Of a much deeper red ground-colour than the type, the characteristic white mark in the reniform standing out very distinctly. There is considerable difference in the intensity of colour in these red forms. Appears to be a much rarer form than the type. I have only one extreme specimen in my collection, although three others are of a much brighter red than the type, and may be referred to this variety.

β. var. suffusa, mihi.—With the same markings as the type, but with the ground-colour much more suffused with dark scales.

γ. var. grisea, mihi.—Without the reddish tinge of the type, the anterior wings being of a uniform dull grey. The stigmata and transverse lines as in the type.

Leucania, Och., *lithargyria*, Esp.

This species varies much in ground colour, and its varieties are difficult to deal with on account of the difference existing between our specimens and Continental ones, and the fact that Haworth considered the different shades of the species sexual, the pale ones being males, the dark red ones females, whereas both forms occur in both sexes. The typical Continental *lithargyria*, is an intermediate pale greyish-red form, which is figured by Hübner (fig. 225) and by Esper (plate 124, fig. 6). Esper’s figure is of a pale reddish colour, with darker nervures, and reniform pale in lower half, with a row of dots parallel to the hind margin. This form is Haworth’s *grisea*. Our palest form (without red) is, in its most extreme form, var. *argyritis* of the ‘Rambur Catalogue’: our reddest forms are the *ferrago* of Fabricius (217). The transverse markings, too, vary a great deal. Some specimens have only a row of dots parallel to the hind margin, with no other marks. Haworth says, “Alæ fere unicolores.” Some have a transverse basal line, and some even two, or indications of them, between the reniform and base of the wings; whilst others have, in addition, a transverse line between the reniform and the row of dots; but this latter form is rarely met with. This line is an extreme development of the inner of the two rows of dots present in the type. Mr. Lawson, of Perth, sent me some with all these lines indicated, but the only specimen I have, with a distinct and complete basal line and a distinct and complete line between the reniform and row of dots, was captured by Mr. Oviden near Strood. Mr. Dobrée writes me:—“In some of the specimens taken here (Beverley, E. Yorkshire) the tendency to a darker shade on the hind margin of the upper wings is very pronounced.”

a. var. argyritis, Rbr. Cat.—The anterior wings of this variety are

pale grey, without the reddish colour of the type; the posterior wings paler than the type, with a row of black dots on the nervures, these dots being continuous with those on the anterior wings. This variety is described by Dr. Staudinger as:—"Alæ anteriores pallidiores, alæ posteriores punctorum linea exteriore." Staudinger gives as localities Sicily, France, Syria, and Dalmatia. This is undoubtedly the var. α of Guenée's 'Noctuelles,' vol. v., p. 75. His description is, "Of a greyish tint. Inferior wings whitish, with a row of dots more or less visible on the disc." Mr. Dobrée writes me, "It is almost a light wainscot, and our English specimens are never so light coloured." I have a specimen, however, of this variety most extreme in its coloration, captured by Mr. Young at Rotherham. It is without a trace of red.

β . var. *pallida*, mihi.—Closely allied to var. *argyritis*, of a delicate wainscot colour, with the slightest suspicion of a pinkish tinge; the characteristic markings not very strongly developed. I have specimens of this beautiful variety from Howth, Farnboro' (Kent), and Deal.

γ . var. *ferrago*, Fab.—This is our ordinary reddish type, with the anterior wings of a deep ferruginous-red colour, with more or less traces of one (or two) basal transverse lines between the reniform and base of the wings, and a row of dots parallel to the hind margin, a dark lunular mark sometimes being just within the base of the row of dots. The posterior wings of a dark grey, occasionally with traces of a row of dots on the disc. This is the female of Haworth's *grisea*, of which he says, "Alis feminae rufis." The description of Fabricius is:—"Noctua cristata alis deflexis furrugineis: macula media fusca; lunula alba." "Alæ anticæ ferrugineæ, in medio macula fusca et in hac lunula alba. Pone fasciam strigæ punctis vix conspicuis, nigris. Posticæ fuscæ" ("Entomologia Systematica,' &c., p. 76, No. 217). A very large proportion of our specimens are deep red; the finest specimens perhaps of this form that I have seen are some received from Mr. Lawson, of Perth.

δ . var. *extralinea*, mihi.—The anterior wings of a ferruginous-red or a greyish-red colour with all the ordinary markings, and in addition, a complete transverse line between the reniform and the row of dots parallel to the hind margin. This line is the complete development of the lunular mark mentioned above (*vide* var. *ferrago*). I have specimens from Perth and Strood.

ϵ . var. *fulvescens*, mihi.—A fine deep ochreous-brown, or rather fulvous variety, with scarcely a tinge of red in its coloration. The markings generally more or less obsolete. The type of this fine variety came from Perth, but I have specimens from Forres and Chattenden (Kent).

ξ . var. *marginata*, mihi.—In the 'Entomologist's Record and Journal of Variation,' vol. 1., p. 242, Mr. J. Collins, of Warrington, writes:—"I have bred a very strange specimen of *L. lithargyria*, the variation being connected with the hind wings. These are silvery grey in colour, bordered on the outer margin, by a broad, dark band. The specimen has an altogether "underwing" look about it. The larva was obtained in the Delamere district."

Leucania, Och., *turca*, L.

Until very recently I was of opinion that this species was a most constant one in colour. Thanks to the Rev. G. H. Raynor, of Brentwood, I find the species has several shades of colour. The ordinary red form is the type. The Linnæan description is:—"Spirilinguis cristata, alis cinereo-rufis; strigis duabus fuscis lunulaque alba; alæ superiores absque stigmatibus ordinariis, sed in medio lunula alba minuta" ("Systema Naturæ," p. 847, No. 140). Among our specimens, we find some with a distinctly orange or yellow tint; others of a dull, dead, coppery colour, much suffused with black scales, and with the dark transverse lines showing a tendency to become obsolete; in fact, the distinctness of these lines appears to be inversely proportional to the depth of the ground colour, the pale specimens (*lutescens*) have the lines very distinct, the darker ones, obscure. I am indebted to Mr. Dobrée for the following interesting information:—"Siberian specimens show the same variations of light and dark colour, but some of the former strongly incline to grey, and in others, the small dark shade which surrounds the white spot in our English specimens, is developed into a large and conspicuous cloud of dark grey. To this form Dr. Staudinger gives the name of *grandis* in his trade catalogue." The hind wings of some specimens are beautifully rosy, in all the forms of variation.

a. var. lutescens, mihi.—The ground colour of the anterior wings of a brighter and more yellowish tint than in the type, and but sparingly sprinkled with darker scales, the transverse lines very distinct, and the fringe of a pale shining yellowish-red colour, agreeing with the ground colour of the wings. The posterior wings much paler than in the type, with a darker shade in the centre. These pale forms occur very sparingly with the type. I have them from the New Forest, Brentwood, &c.

β. var. obscura, mihi.—The anterior wings of an obscure smoky-grey colour, with a dull reddish coppery tinge, much suffused with dark scales. The white spot in the centre very indistinct, and the transverse lines in some specimens much blurred. The Rev. G. H. Raynor has in his collection a fine series of graduated forms of this variety.

γ. var. lividus, mihi.—Closely allied to *var. obscura*, of which it is an extreme development; of a greyish-ground colour with a slightly yellowish tinge, altogether a much paler and characteristic variety than any other. I have specimens only from Brentwood in Essex.

δ. var. grandis, Btl.—"The small dark shade which surrounds the white spot in English specimens is in some Siberian specimens developed into a large and conspicuous cloud of dark grey. Such varieties form the *grandis* of Staudinger's last trade catalogues, by whom it is treated as a distinct species" (Dobrée, *in litt.*). The Rev. G. H. Raynor has a variety in his collection, captured at Brentwood, with this grey shade very distinctly developed.

Leucania, Och., *unipuncta*, Haw.

A few specimens of this cosmopolitan species have been recorded as taken in Britain at different times, spread over a great number of

years. The species undergoes a certain amount of variation, of which I am unable to write much from personal experience. Haworth's description is very distinct:—"Alis rufescentibus seu griseo atomosis, lineola obliqua fusca apicis punctoque minutissimo albo basi stigmatis postici. Stigmata ordinaria fere omnino obliterated" (Haworth's 'Lepidoptera Britannica,' p. 174, No. 37). Why this name (*unipuncta*) has been replaced, by some authors, by Guenée's *extranea* I cannot imagine, considering that Haworth's name is prior by more than half a century. The description of Guenée's *extranea* is almost identical with that of Haworth, but in addition, the former author lays stress on his specimens being more strongly powdered with black scales. Guenée writes of *extranea*:—"The superior wings very acute at the apex, of a grey colour, more or less reddish, sometimes whitish, strongly powdered with black scales. The two ordinary stigmata stand out in the discoidal cellule in a light, more or less reddish colour. Under the reniform is a white spot, lightly surrounded with black. No traces of transverse lines occur, but the series of black dots which represents the usual angulated line beyond the reniform is often very distinct; an oblique black streak starting from this line and carried almost to the apex, together with the shape of the wings, form the principal characteristics of this species. The inferior wings slightly transparent, grey, with the outer margin and the nervures blackish" (Guenée's 'Noctuelles,' vol. v., pp. 77, 78). Mr. Dobrée writes to me:—"Specimens which I have from South Australia agree with Guenée's type, but are decidedly greyer and more coarsely powdered with black atoms than my specimens from Canada, but as Guenée's var. B, which are less powdered, are from Australia, probably they vary there too." Taking Haworth's less powdered reddish specimens with the white dot on the anterior wings as the type, the following varieties have been noticed:—

a. var extranea, Gn.—Described in full above; more thickly powdered with black scales than the type. The Rev. G. H. Raynor has brought the following description to my notice:—"Fore wings light brownish-ochreous, with numerous scattered short fuscous strigulae and black scales; orbicular and reniform indistinct, roundish, more yellow-ochreous, dark centred; a white dot, sometimes very obscure, on lower margin of reniform, preceded and followed by dark scales; a curved posterior series of black dots; a straight oblique slender fuscous streak from apex to this series; a hind marginal series of black dots; cilia pale brownish-ochreous; apex whitish. Hind wings grey-whitish, towards hind-margin broadly suffused with dark grey, especially on upper half, veins dark grey; cilia whitish, sometimes with an indistinct grey line" ('Transactions of the New Zealand Institute,' vol. xix., 1886, by E. Meyrick, B.A., F.E.S.).

β. var. asticta, mihi.—This is Guenée's var. A, of which he says: "No white spot at the base of the reniform." This name would also include Guenée's var. B, of which he says:—"No white spot; superior wings less powdered, with the apical streak less marked. Inferior wings with a blackish border clearly marked, especially underneath." So that his var A is the variety *extranea* without the white spot; var. B is the paler type without the white spot.

γ. var. *saccharivora*, Butler, 'Trans. Ent. Soc. Lond.,' 1882, p. 115.—“Smaller than the typical form and of a brighter reddish colour; the white spot obsolete. From China, India, and New Zealand” ('Trans. Ent. Soc. Lond.,' 1890, p. 661).

δ. var. *antica*, Walker, 'Lep. Het.,' ix., p. 100, n. 52, 1852.—“About the same size as the preceding variety, but much paler, the primaries being pale testaceous, with ill-defined dusky markings, and the secondaries almost white, with more or less defined dusky border, darkest towards apex. The Indian examples show the dusky border distinctly as a broad subapical patch, varying in intensity in different individuals; one of the examples from Venezuela has a similar though less prominent patch. From the western coast of America, Venezuela, Darjiling” ('Trans. Ent. Soc. Lond.,' 1890, pp. 661-662).

ε. var. *trifolii*, Butler, 'Trans. Ent. Soc. Lond.,' 1882, p. 114.—“Altogether a greyer form, with prominent pale discoidal spots, well-defined dark oblique apical streak, and dusky secondaries. From Sao Paulo, Chili, Canada, Japan, Java, N.W. India, New Zealand and Flores” ('Trans. Ent. Soc. Lond.,' 1890, p. 662).

ζ. var. *convecta*, Walker, 'Lep., Het.,' xi., p. 711.—“The primaries almost uniformly greyish, with testaceous reflections; the white dot almost lost in a blackish spot at the end of the cell; the secondaries whitish, with dusky veins and border, somewhat as in the darkest form of var. *antica*. From Moreton Bay” ('Trans. Ent. Soc. Lond.,' 1890, 662).

η. var. *separata*, Walker, 'Lep. Het.,' Suppl. II., p. 626.—“Scarcely separable from the preceding; the specimens have a washed out, faded appearance; the primaries pale testaceous, with indistinct markings; secondaries greyish white, with dusky veins and borders. Japan, Shanghai, N.W. India, Goya, Chili, Kansas” ('Trans. Ent. Soc. Lond.,' 1890, pp. 662-663).

Of these last five vars. Mr. Butler writes:—“I have not the least doubt that the whole of the above forms are mere variations of one widely-distributed species; at the same time it is doubtful whether the whole of the forms occur together, as, in a long series, Mr. Edmonds only had the two varieties, *L. trifolii* and *saccharivora*, whilst the typical form, received subsequently from Talcahuano, is only like a duller, darker specimen of the latter variety. Most of the varieties occur in N. Western India, but I have not seen typical *L. unipuncta*, var. *antica*, or var. *convecta* from there” ('Trans. Ent. Soc. Lond.,' 1890, p. 663).

Leucania, Och., *loreyi*, Dup.

Of the variation in this widely-distributed species, Guenée writes:—“I find no essential difference between our European *loreyi* and those which I have received from M. Horsfield, who bred them in Java. On the other hand, I have a female specimen from Brazil slightly smaller and clearer. It varies in ground colour” ('Noctuelles,' vol. v., p. 84).

Leucania, Och., *impudens*, Hb.

Hübner's fig. 229 (by error 329) is the type of this species, which may be described as follows:—Anterior wings of a pale greyish colour,

with no trace of reddish, thickly sprinkled with black dots; a longitudinal shade, just darker than ground colour, runs just above the inner margin, another between the upper branches of the median nervure, and another near the apex, a black dot at the end of discoidal cell; hind wings very dark grey, no markings whatever. Guenée, comparing the type with *pudorina*, says of it:—"Larger, of a different colour and shape, at the extremity of the discoidal cell a large black dot, which is wanting in *pudorina*." This black dot is, however, nearly always present in *pudorina*; the females are, as a rule, greyer than the males (Mr. Farren has sent me some almost as grey as Hübner's type-figure); and Mr. Dobrée writes me that "*impudens* from various parts of France and Germany do not differ from English specimens." In this species there is great variation; some specimens are grey (as in the type), some are bright rosy, some are almost unicolorous ochreous; whilst others have the dark shades between the nervures developed to such an extent as to form bright and strongly-marked blackish stripes.

a. var. pudorina, Hb.—Hübner's figure 401—ochreous, sprinkled with reddish—represents our usual form of the male, but the form is not uncommon in the female. It has been treated as distinct by Guenée and all our later British authors. The greater number of specimens from Cambridge, the New Forest, Askham Bog and other British localities are of this form, the very grey form being rare.

β. var. striata, Dobrée, *in litt.*—"The colour of the anterior wings is a very glossy wainscot-brown rather than ochreous, coarsely powdered with black, the wing-rays, and the shading which is faintly perceptible in English specimens, showing out clearly in very dark grey. In size there is no difference. This is a handsome variety from the Amur district, with the colour and markings much intensified." I have never seen this variety, and have to thank Mr. Dobrée, who has specimens in his collection, for the above information. I have, however, a specimen lent me by Mr. W. Farren, of Cambridge, with all the spaces between the nervures as thickly powdered with black scales as possible, the wing-rays being dark grey. I should think this specimen is almost exactly like the Amur specimens.

γ. var. rufescens, mihi.—Ground colour of the anterior wings entirely bright rosy red, no trace of ochreous, with very pale grey wing-rays; the wings only very slightly suffused with black scales, except just above the median nervure, where they form a decidedly blackish longitudinal streak; a small but very distinct black spot at the end of the discoidal cell. Hind wings pale grey, with red fringes. I have again to thank Mr. Farren for the loan of the type of this variety, which is much more extreme than any I had previously seen. Some of the Askham Bog specimens have a tendency to bright rosy.

Leucania, Och., *putrescens*, Hb.

The types of this species are Hübner's (Geyer's) figs. 730 and 731. These, although presenting the general characteristic markings of *putrescens*, are so small compared with our British form that they are hardly recognisable. I have seen no Continental specimens, but, if Hübner's figures are a fair representation of the species as it occurs on the Continent, our form is well worthy of a distinct name. This

would hardly seem to be so from Guenée's remarks, 'Noctuelles,' p. 80, where he writes:—"Bad as is the figure of Geyer, I believe decidedly that it really is the type of this species, which it represents, and not, as I at first thought, a variety." I have dwelt on Hübner's figures of this species, because they represent the first described or figured types of the species.

Leucania, Och., *brevilinea*, Fenn.*

The type of this species is described in the Ent. Mo. Mag., vol. i., p. 107, by Mr. Fenn, and copied therefrom into Newman's 'British Moths,' p. 271. The chief character of the type (from which the name has been derived) is a short black line at the base of the anterior wings under the median nervure.

a. var. sinelinea, Farn.—In the 'Entomologist,' vol. xi., p. 103, Mr. Farn describes a variety of *brevilinea* under this name, calling it "the form in which the line at the base of the wing disappears." It is the var. *alinea* of 'The Entomologist Synonymic List.'

Leucania, Och., *comma*, L.

The type is described by Linnæus as:—"Spirilinguis cristata, alis cinereis deflexis; lineola nigra adjacente tenuiori albæ. Alæ sordido colore, lineola nigra baseos. Stigmata nulla" ('Systema Naturæ,' pp. 850, 851, No. 156). The essential points are—dirty ash-coloured, with a black lineola touching a slender one of white; no stigmata. Treitschke writes (vol. v., p. 302):—"Alis anticis pallide fuscis," &c. Hübner, fig. 228 (by error 328), figures the type as *turbida*; his figure is excellent. This species varies much in the depth of ground colour and markings, our British specimens rarely occurring as pale as those from the Continent, although Continental specimens are occasionally dark. Hübner figures this dark form, fig. 617, under the same name, *turbida*, which he applies to the type. Some of our specimens have a strong ochreous tint. It is worthy of remark that my Deal series includes the darkest, and at the same time the palest British specimens I have ever seen. There is a great deal of variation in the intensity and quantity of black markings between the nervures, towards the outer margins of the anterior wings. There are, also, frequent traces of asymmetry in the markings of this species. I have one with a black lineola at the base of the inner margin on the right anterior wing, but none on the left.

a. var. suffusa, mihi.—The ground colour of the anterior wings of a brownish colour, much darker than the type; the anterior wings, including the costal area, very much suffused with fuscous scales, the spaces between the wing-rays showing out as distinct, dark, longitudinal, wedge-shaped streaks on the outer margin. The black streak under the base of the pale median nervure intensely black. The hind wings of a deep blackish grey colour. Nearly the whole of my British series belong to this melanic form. The specimens which I have from the London and Deal districts are generally darker than specimens I have from Yorkshire, Morpeth, Brecon, and Scotch localities. As

* I have inserted this species in what seems to me its true position in our lists. It does not appear to me to be a *Nonagria*.

mentioned above, Hübner figures this form (fig. 617) under the name of *turbida*. Mr. Finlay, of Morpeth, gave me a specimen of this variety with a strongly-marked black lineola above the median nervure in the discoidal cell, and another short one quite at the base of the inner margin.

β. var. *ochracea*, mihi.—A bright brownish-ochreous form, with a tinge of reddish in the ground colour; the black lineola and streaks between the nervures standing out very conspicuously.

γ. var. *nigropuncta*, mihi.—There is also a constant form of variation, equally distributed through the paler type, vars. *suffusa* and *ochracea*, with a distinct small black dot at the end of the discoidal cell. Such a variety would constitute the var. *nigropuncta*.

Leucania, Och., *obsoleta*, Hb.

The type of this species is Hübner's fig. 233, which gives a very incorrect idea of the form we get, and an equally incorrect one of all Continental specimens I have seen. The anterior wings are of a different shape to those of our *obsoleta*, and it is highly coloured. The row of dots parallel to the hind margin is, however, distinctly marked. My first impression of the figure was that the fore wing represented the var. *punctilinea* of *impura*, but the hind wings are characteristic of *obsoleta*, which cannot be mistaken for those of any other species. Hübner's figure is of a "bright reddish wainscot colour, with a pale trifid longitudinal mark along the median nervure, a row of dots parallel to the hind margin." I have specimens of a dull red colour (the nearest approach to the type), but in a moderately long series of specimens, which I obtained in North Kent, there are no specimens so bright as Hübner's figure. In some specimens the reddish wainscot ground colour is longitudinally striated with black, and these form an almost parallel variety to *straminea* var. *nigrostriata*.

α. var. *nigrostriata*, mihi.—Anterior wings of a reddish wainscot colour, which shows distinctly along the pale nervures; a pale central longitudinal line under median nervure and a row of black dots parallel to hind margin; the space between the pale nervures filled up with numerous black scales giving the insect a dark, striated appearance. Hind wings dark grey, hind margin darker, nervures black.

β. var. *grisea*, mihi.—Somewhat like the preceding var. but with the ground colour pale grey and no trace of reddish. The spaces between the nervures less strongly dusted with black scales than in *nigrostriata*.

Leucania, Och., *straminea*, Tr.

The type of this species is described by Treitschke as:—"Alis anticis pallide stramineis, punctis tribus medio pluribus ad marginem in seriem dispositis nigris; posticis albis fusco venosis" (Treitschke, 'Die Schmet. von Europa,' vol. v., p. 297). This typical form with only "three dots on the anterior wings, besides the row of minute dots on the extreme hind margin, and with white hind wings and fuscous nervures," is not at all a common form with us. Generally there are slight traces of a more or less complete transverse row of dots on the nervures of the hind wings, besides which a dark longitudinal streak is found under the median nervure of the anterior wings. In 1883 and 1884, I took a large number of this species in North Kent, and I

found it one of the most variable species in its genus. In my long series, picked from a great number, I have four very distinct forms besides the type. Summarised, these are:—(1) A pale form, without any dots or markings. (2) The type, with three dots on anterior wings only. (3) A form with a transverse row of dots on anterior wings and another on nervure of posterior wings, with a faint shade under the median nervure. (4) A red form. (5) A form much suffused with black scales.

a. var. obsoleta, mihi.—This variety has the anterior wings of delicate wainscot or straw-colour, with the median nervure pure white, below which is a faint trace of the basal part of a longitudinal dark shade. The three dots on the anterior wings are entirely absent. Posterior wings pure white, no markings or dots. The crest on the thorax very distinct. I have only one specimen of this exceedingly rare and extreme form.

β. var. intermedia, mihi.—This variety most nearly approaches the type. The wings are of the same pale straw or creamy-white colour, with a central dot, and, like the type, have two of the dots, of those which form the transverse row so characteristic of the following varieties, very conspicuous, *viz.*, the one above and that below the median nervure; but, in addition, the others which form the series are more or less developed. A longitudinal ochreous dash, darker than the ground colour, extends under the base of the median nervure; a few ochreous scales scattered over the spaces between the nervures. Posterior wings pearly-white, with a faintly marked row of dots on the nervures parallel to the hind margin. This form, therefore, constitutes a link between the type and the following varieties.

γ. var. rufolinea, mihi.—Anterior wings bright reddish ochreous, all the wing-rays pale, so that the anterior wings appear to be made up of alternate fine lines of red and white; the central dot distinct, a complete row of black dots parallel to the hind margin; a well-developed dark reddish shade under the basal part of the central nervure. Posterior wings white, much shaded with grey (more so in males than in females), with a row of black dots on the nervures. Many specimens of this red variety have the anterior wings much suffused with black scales, as in var *nigrostriata*, but the latter never has a red ground colour.

δ. var. nigrostriata, mihi.—The anterior wings pale wainscot-brown, so thickly suffused with black scales as to obscure the ground colour; the wing-rays very pale, sometimes white, so that the wing has the appearance of being crossed with alternate striations of black and white lines; a very dark, almost black, shade runs under the median nervure, the central dot and row of dots present, as in the variety *rufolinea*, but more inconspicuous, owing to the suffusion. Posterior wings much irrorated with dark atoms, giving them a very dark appearance. Females of this variety are comparatively rare. My series of this form are chiefly males.

Leucania, Och., *impura*, Hb.

The type of this species is represented by Hübner's fig. 396. The species was previously figured by Albin, plate xxx.:—*g*, upper

side; *h*, under side. As, however, none of his figures are named, Hübner's name and description must stand. His fig. 396 may be described as follows:—Anterior wings of a pale wainscot-brown colour, with a dark longitudinal shade under the base of the median nervure, broad, but not reaching to the end of the discoidal cell; a black dot at the end of the discoidal cell, and four dots are developed of the transverse row parallel to the hind margin, *viz.*, two towards the apex, one just below the outer edge of the median nervure, and one just above the inner margin; nervures dusky. Posterior wings grey, nervures darker, extreme border spotted. It must be noticed that the peculiar development of the short longitudinal streak under the base of the median nervure is very unusual, and that the posterior wings are much paler than in our specimens.

a. var. fuligosina, Haw.—This is our ordinary form of *impura*, which, as I have pointed out above, differs from Hübner's type: "The anterior wings are ochreous, with or without a reddish tinge, with three minute, and often almost obliterated, black dots, placed as in a triangle; the extreme hind margin marked with very minute black dots; the nervures white towards the outer margin. The posterior wings fuscous or smoky, with pale cilia, and an indistinct lunule" (Haworth's 'Lepidoptera Britannica,' p. 174). It will be seen that the variety has not the double spot above the median nervure (only one being developed), nor the spot above the inner margin (just beyond the anal angle), which characterise the type, and the hind wings are darker. The Scotch specimens are smaller, with clearer fore wings and darker hind wings than our southern specimens.

β. var. punctina, Haw.—This is the red form of *impura*. "The anterior wings are entirely red, with nervures distinctly marked, the extreme hind margins with fuscous dots; the hind wings pale grey, with a broad cinereous patch at the anal angle" (Haworth's 'Lepidoptera Britannica,' p. 174). The hind margin is, in some of the red varieties, unspotted, and the posterior wings are often very dark. I have a fine series of this rufescent form, obtained from the marshes in this neighbourhood a few years ago. Haworth described *punctina* from only two specimens.

γ. var. punctilinea, mihi.—The anterior wings reddish-ochreous, much suffused with dark scales; the row of spots parallel to the hind margin well developed, forming an almost continuous row, commencing on the costa and ending on the inner margin; a dark shade under the pale median nervure. The posterior wings very much suffused, and very dark; in some specimens almost black. I have a few specimens of this variety, showing the extreme variation in the development of these dots, captured on Greenwich Marshes in 1883; but such forms are rare.

Leucania, Och., *pallens*, L.

The type of *L. pallens* has a pale ochreous ground colour, with paler wing-rays, and one or two black spots. There are generally three black dots—one in the centre of the wing at the end of the discoidal cell, the other two being beyond the centre, and situated one directly above the other, immediately below the median nervure, and being a portion of that row, parallel with the hind margin, which is

normal in the strongly marked varieties of *straminea*, occurs in var. *punctilinea* of *impura*, but does not seem ever to be developed in this species. Specimens, of all shades of colour obtaining in this species, are very inconstant as to the number of these three dots developed. Hübner's fig. 234 of *pallens* is typical, but has three dots. The Linnæan description of the type is as follows:—"Spirilinguis lævis, alis deflexis pallidis immaculatis: marginibus posticis subtus nigro punctatis." "Alæ superiores supra puncto 1, sed 2, nigro, minimo. Subtus alæ atomis nigris, imprimis margine postico nigropunctato" (*Systema Naturæ*'). The ground colour of the species varies from pale ochreous (nearly white) to bright ochreous-red. It rarely happens that the anterior wings are suffused with black scales to an appreciable extent. The hind wings are typically pure white in the male, with the hind margin slightly shaded with grey in the females.

a. var. *arcuata*, Stphs.—The colour of the anterior wings of this variety is pale wainscot, with two black dots on the disc. Posterior wings white, shaded with ashy-brown, and with an arched row of brown spots on the veins beyond the centre of the wing. Under this variety I would, therefore, include all the forms (whatever their colour) which have this arcuated row of dots. Such a development is very rare in this species, although normal in most of the varieties of *straminea*, and occasionally occurring in *impura*. I have several specimens with one or two dots developed, but the only specimen in my series that has any approach to a complete row was captured by Mr. Young at Rotherham, Yorks.

β. var. *ectypa*, Hb.—Hübner's fig. 231, which he names *ectypa*, is undoubtedly a fine red form of *pallens*. It has the anterior wings of a bright reddish ochreous with pale nervures, no central dot, two dots in outer row, one just below the third branch of the median nervure. Hind wings whitish grey, with a dark grey shade parallel to the hind margin. Dr. Staudinger describes it as:—"Alæ anteriores rufæ." I have many specimens in my long series almost like Hübner's figure. The development of the grey shade on the hind margin into a transverse band, is rarely very distinct in British examples. This is treated by Guenée as a distinct species in his 'Noctuelles,' p. 94. I have specimens from Howth, Deal, Aberdeen, Rotherham, Strood and Forres.

γ. var. *rufescens*, Haw.—This variety, treated as a distinct species by Haworth, is thus described by him:—"Rufescens, alis anticis venosis immaculatis, posticis (costa excepta) certo situ fuscescentibus;" "alis certo situ lineolis 3-4 obsoletis, fuscis, posticis fuliginosis venis fuscis." It is a very slight modification of *ectypa*, differing from that variety in having none of the three ordinary dots. Otherwise both are red, both have the wing-rays very pale, both have the hind-wings shaded on the outer margin, although in *ectypa* the shading of the hind margin takes a banded form. The anterior wings in *rufescens* have also three or four dusky streaks visible in certain positions. These streaks are very distinct in some red specimens I have. I believe that both this form and *ectypa* occur freely everywhere in Britain with the type. I have them from many Scotch and Irish localities. The variety *rufescens* is, without doubt, the *ectypa* of Boisduval.

δ. var. *suffusa*, St.—Another modification of var. *ectypa*, with a tendency to become melanic, having “the fore wings reddish, streaked with whitish ashy between the veins; with a single dusky dot at the apex of the discoidal cell; and two or three obsolete brownish streaks near the extremity; hind wings whitish, with a broad, sub-apical, dusky stripe; the apical margin paler” (Humphrey and Westwood’s ‘British Moths,’ p. 218). The variety is figured in the same volume, plate, xlvii., fig. 8. The figure represents the space below the median nervure and between the other nervures thickly sprinkled with minute black atoms. This figure is identical with a fine dark specimen I captured at Deal, in July, 1887.

ε. var. *ochracea*, St.—The type of this variety “measures only 13 lines in expanse; the fore wings are ‘pale ochreous, with a slight rufescent tinge in certain lights, immaculate, obscurely streaked with pale fuscous between the nervures; the striæ at the base and on the inner margin being the darkest, as in *L. comma*; hind wings whitish ash, with the margin slightly darker” (Humphrey and Westwood’s ‘British Moths,’ p. 218). This small specimen taken at Darent, in August, was supposed by the late Mr. Henry Doubleday to be a specimen of the second brood. I have, however, many large specimens of the summer brood from various localities answering this description, and I would propose that the name *ochracea* comprise all reddish ochreous forms, whatever the number of dots developed. Var. B of Guenée’s ‘Noctuelles,’ p. 93, would appear to belong to *ochracea*. It is described as having “a reddish shade under the median nervure, and similar streaks towards the outer margin. Inferior wings having the nervures sprinkled with black on the disc.”

Leucania, Och., *phragmitidis*, Hb.

Hübner’s fig. 230 (by error 330) represents the type, and is excellently drawn. It has the anterior wings clear whitish ochreous, with the outer half of the wings to the hind margin reddish; the hind wings grey, the upper (anal) angle paler. This is intermediate between two extreme forms, one, with the whole of the anterior wings without the slightest trace of reddish, the other, with the anterior wings entirely red. There is a great deal of difference also in the size of different specimens. I have some specimens exceedingly small of both the following varieties, as well as the type.

α. var. *rufescens*, mihi.—The anterior wings entirely suffused with rich deep red, the hind margin being slightly darker. The hind wings bright shiny grey, with paler nervures. In my opinion this is one of the finest varieties in the family, and I have a fine series in my collection, captured on the banks of the Thames in North Kent. The form is local and rare, and I have rarely taken it in localities even where the type is abundant, although Mr. Dobrée writes that it is “equally common at Beverley as the type.” It occurs sparingly at Wicken, whence I have received it from Mr. Farren. The type is rare on the Continent, and the variety, I believe, almost unknown. This variety is figured in Humphrey and Westwood’s ‘British Moths,’ pl., xlvii., fig. 16.

β. var. *pallida*, mihi.—Of a pale unicolorous, whitish ochreous colour, with a slightly greenish tinge, perfectly clear and unspotted,

and no trace of red. This is the commonest form of the species, being much more abundant than the type and var. *rufescens* in all localities where I have found the species. It is also the common form at Wicken.

Leucania, Och., *litoralis*, Curt.

The type of this species is thus described in Curtis' 'British Entomology,' vol. iv., p. 157 :—" *Litoralis*. Pale and dull ochraceous. Antennæ pale above, dark beneath. Abdomen darkest towards the apex. Superior wings fuscous in the middle with a white stripe down the centre, slightly produced midway at the nervure and furcate towards the extremity, three small white stripes upon the nervures near the apex, and six fuscous lines between the nervures at the posterior margin. Cilia fuscous. Inferior wings white, tinged with yellow; underside whitish, thorax and abdomen pale and dull ochraceous, with a tuft of black hair at the base of the latter." There is scarcely any variation in this species except in intensity of the dark longitudinal shades. I know no more constant species, although in Humphrey and Westwood's 'British Moths,' p. 217, we read :—" Varieties of a brownish tinge occur, and the dusky streaks between the nervures are variable in intensity."

Meliana, Curt., *flammea*, Curt.

The type of this species is thus described by Curtis :—"Fuscous, with a pale reddish tinge. Superior wings with a brown flame-like space along the centre (narrowed at the base), above which is a narrow ochraceous stripe, 5 or 6 minute brown spots forming a curved line near the posterior margin, upon which there are 7 minute black spots, alternating with the nervures, which are pale, inclining to white towards the costa, the internal margin sprinkled with dark spots. Inferior wings rather paler, their cilia whitish." This species seems to be most invariable. I have never seen a specimen that could in any way be referred to as a variety.

Tapinostola, Och., *elymi*, Tr.

Treitschke's original description of the type is as follows :—"alis anticis solito longioribus pallide flavis atomis fuscis adpersis serie externa striolarum fuscarum" ('Die Schmet. von Europa,' vol. v., p. 294). This species varies but little; the females are generally paler than the males, and the latter sex are in some specimens more strongly powdered with brownish or fuscous scales than in others.

Tapinostola, Ld., *hellmanni*, Evers.

Eversmann's description of the type of this species is as follows :—"Alæ anticæ sordide lithargyreæ, unicolores, strigis interna rectiuscula obliqua, foras et externa maxime flexuosa crenatis fusciscentibus obsoletis; posticæ sordide et pallide lutescentes, striga externa fusciscenti diluta." "Alæ anticæ una cum ciliis unicolores eodem colore lithargyreo ac *Leucania Lythargyrea*; linea crenata interna et externa solummodo in exemplaribus distinctis et recentibus reperiuntur, pariter et striga alarum posticarum plerumque deest. Subtus alæ omnes pallide lithargyreo-lutescentes, vel cum, vel sine striga externa fusciscente, plerumque autem adest.—Volat mense Julio in promontorium

Uralensium pratis" ('Fauna Volgo-Uralensis,' p. 270, No. 15). The type of this species is described by Staudinger as "pale, greyish or reddish straw-colour." Guenée's var. A. is undoubtedly the type, he describes it as "less red, more powdered with grey, reniform stigma more yellowish than red; inferior wings darker" ('Noctuelles,' vol. v., pp. 104, 105).

a. var. *saturata*, Stdgr.—This is a dark reddish variety. Staudinger says of it:—"Obscurior, alis anterioribus sæpius totis rufis." Newman, in his 'British Moths,' p. 275, has described apparently only the red form. Guenée also treats this form as his type. The two forms occur in the same localities and appear equally common.

Tapinostola, Ld., *fulva*, Hb.

The type of this species is represented by Hübner's fig. 496, which has the anterior wings and fringes of a bright red, with dark nervures, and a row of black dots, one on each ray, parallel to the hind margin. Hind wings dark grey with pale fringes, and no spots. Dr. Staudinger describes it as—"alis anterioribus totis fulvis." With regard to the vars. of *fulva* from Pitcaple, Aberdeenshire, Mr. Reid writes:—" (1). Pale yellowish-white, almost white, with no dark mark. (2). Colour as in 1, but with a dark dash from near the base almost to the outer margin, with many scattered dark scales. (3). Brown, with and without dash. (4). Dark brown, with and without longitudinal dashes. (5). Blackish-brown, unicolorous. I have also seen them with a reddish or pinkish tinge, but not the same as the beautiful red form near Glasgow." I have never seen these last forms (3, 4 and 5), and hence cannot deal with them, but they must be most interesting. The specimens I have in my collection prove that this is a most variable species, the ground colour going through every gradation, from bone-white, ochreous, reddish, to deep brick-red. I have received large, beautiful, and characteristic specimens of the type from only two localities, Ballycastle in Ireland and Warrington. The large Warrington specimens are perhaps slightly excelled in richness of colour by the Irish specimens. The type does not appear to occur in Scotland, unless some of those mentioned by Mr. Reid are to be referred to it, but I think not, although some of the Scotch specimens from Rannoch, somewhat approach it.

With regard to the row of dots paralalled to the hind margin, there is every form of development between a complete row and total absence. It is therefore useless as a character for subdivision. In every colour, too, there are specimens with and without dark longitudinal shades along the nervures. I have therefore added *suffusa* to the varietal names to represent these darker forms. The hind wings exhibit slight differences in shade, from pale grey in var. *concolor*, to blackish-grey in var. *fluxa*. The following appears to be the most complete summary I am able to make with the material at my disposal:—

- 1.—A whitish form, with or without transverse row of dots, with or without longitudinal shade = *concolor*, Tutt, Gn. (?).
- 2.—A bright yellow-ochreous form, without longitudinal shades = var. *ochracea*.
- 2A.—A bright yellow-ochreous form, with longitudinal shades = var. *ochracea-suffusa*.

- 3.—A pale pinkish-grey form, without longitudinal shades = var. *punicea*.
- 3A.—A pale pinkish-grey form, with longitudinal shades = var. *punicea-suffusa*.
- 4.—A pale ochreous form = var. *pallida*, St.
- 5.—A deep reddish (inclining to rose-coloured) form, without longitudinal shades = var. *pygmina*, Haw.
- 5A.—A deep reddish form, with longitudinal shades = var. *flava*, Tr.
- 6.—A deep brownish-red form, with more or less well-developed longitudinal shades = var. *neurica*, St.
- 7.—An extremely bright red (brick-red) form = var. *fulva*, Hb.

a. var. *concolor*, Tutt ('Ent.' xxi., 222).—Since what is termed the true *concolor* has been rediscovered, I am not at all satisfied that my notes on the species, 'Ent. Mo. Mag.' vol. xxv., pp. 52-55, apply to our Deal form. These latter, though taken so early, are true *fulva* vars., and therefore I call the pale var. of this species *concolor*, Tutt, Gn. (?). Guené's description of *concolor*, in every way agrees with our pale specimens, but acting on the advice of those who know more or less about *concolor*, *ab naturâ*, I have decided to leave the vexed question here. I have fine pale specimens not only from Deal, but from Droylesden and Warrington. In the latter locality, they are taken with other varieties, and are generally more shaded with dark longitudinal streaks. Both sexes of this variety occur.

β. var. *ochracea*, mihi.—Anterior wings of a rich ochreous-yellow colour, unicolorous, with only the faintest trace of the transverse row of dots. A sub-variety—*ochracea-suffusa*—of this beautiful variety has the spaces between the nervures powdered with dark scales, having the appearance of dark longitudinal shades. I am indebted especially to the Warrington collectors for this form, but I have a few specimens from York, Morpeth, Glasgow and the Trossachs.

γ. var. *punicea*, mihi.—Anterior wings pale grey in colour, with a faint pink tinge, the row of transverse dots more or less developed. *Punicea* has a sub-var. *punicea-suffusa*, with the dark longitudinal dashes developed in the same way as in *ochracea-suffusa*. My specimens have been taken at Warrington, York, Kirkby, Glasgow and the Trossachs.

δ. var. *pallida*, St.—Figured by Wood in his 'Index. Ent.', plate xv., fig. 371, and also in Humphrey and Westwood's 'British Moths,' plate xlvii., fig. 10. At p. 219 of the latter work, it is described as:—" $\frac{3}{4}$ of an inch in the expanse of the forewings, which are ochreous-whitish, and without any traces of spots or markings; the veins alone in the apical part of the wing irrorated with dusky scales, and the hind wings whitish." This pale ochreous form varies, as do the others, in the development of the transverse series of dots. This is not at all a common form. I have specimens from Longridge, York and Glasgow.

ε. var. *pygmina*, Haw.—This was treated as the type by all our British authors, the species being thus dealt with by Haworth, Stephens, Wood, and in Humphrey and Westwood's 'British Moths.' Haworth's description is "the thorax and anterior wings reddish and unspotted, the veins scarcely marked, the hind wings fuscous, the abdomen white ('Lepidoptera Britannica,' p. 176). This pretty red (almost rose colour) form is very different to the bright ferruginous²

red type, and is a more specialised form (in colour) of var. *punicea*. The following variety has the same ground colour, but the dark longitudinal shades which are in *fluxa* well-developed, give it a very different appearance. The specimens from the Trossachs and the Rannoch district are especially beautiful.

♂. var. *fluxa*, Tr.—Treitschke (vol. v., p. 313) gives the following description of the type of this variety:—"Alis anticis fusco rufescentibus, atomis venisque nigricantibus." Dr. Staudinger says of this form, "Paler, reddish, or greyish yellow." The "greyish yellow" forms are included on his own responsibility, and are of course incorrect, as also are "paler" forms, as this is a distinctly dark form and really only a sub-var. of *pygmina*; "nigricantibus" can hardly be suggested to mean "paler." I should say Dr. Staudinger did not note the original description. Certainly they are not included by any other writers under this name. In Humphrey and Westwood's 'British Moths,' vol. i., p. 219, there is a fuller description of *fluxa*, it is—"of a reddish brown colour, slightly irrorated with dusky scales; veins dusky; hind wings brown, with the base and costa ashy." There is no doubt that the greater number of our northern English and Scotch forms would be included under this varietal name. I have a long series from the Trossachs and Glasgow. The Trossach specimens are particularly beautiful in the shade of the red coloration (as in *pygmina* from the same locality) and throw up the characteristic, longitudinal dark shades very distinctly.

η. var. *neurica*, St. (non. Hb.).—Hübner's *neurica*, fig. 381, is another distinct British species. Stephens' and Wood's ('Ind. Ent.,' plate xv., p. 372) *neurica*, must not be confounded with Hübner's (*Nonagria*) *neurica*, as the former is only a var. of *fulva*. It is described as "about five-sixths of an inch in the expanse of the fore-wings, which are ochreous or brownish red, with a curved row of minute dusky dots beyond the middle of the wing; the apical veins slightly brownish, and the hind wings pale whitish ash. Taken but rarely at Lea Bridge and Whittlesea Mere" (Humphrey and Westwood's 'British Moths,' p. 219). This form appears to be intermediate between var. *ochracea* and var. *pygmina*, and in its extreme forms comes between var. *ochracea* and the type, having the ochreous colour of the former and the red colour of the latter combined. It appears to be not at all a common form. My specimens come from Glasgow, the Trossachs and Warrington. The Warrington specimens are especially large and very beautiful.

Tapinostola, Och., *concolor*, *Gn.

"Superior wings oblong, with the hinder margin straighter at first, then more curved than in *fulva*; of a bone-white colour in both sexes; lightly powdered with grey at the ends of the spaces between the nervures, and developed into indistinct dark streaks; a row of black spots always distinct, though faintly marked, in place of the transverse angulated line. Inferior wings of a darkish grey in both sexes, with the ends of the nervures and the fringes clearer" (Guenée's 'Noctuelles,' vol. v., pp. 103, 104). All authors have treated this as a

* My reasons for treating this as a variety of *fulva* are discussed fully in the 'Ent. Mo. Mag.,' vol. xxv., pp. 52—55.

distinct species, in my opinion altogether on insufficient data. Newman figures both sexes of it in his 'British Moths,' p. 274, where it is also treated as a distinct species. Staudinger treats it as synonymous with *extrema*, Hb., which seems to me impossible. This variety had not been taken in Britain for many years until quite recently. Mr. W. Warren writes:—"Some twelve years ago, Albert Houghton and myself each took a *concolor* on June 25th. Both were much worn. He threw his, a female, away; I kept mine, a male, and it was sold with the rest of my *Macros*" (*in litt.*).

Chortodes, St., *extrema*, Hb. (*bondii*, Knaggs).

That Hübner's fig. 412 (*extrema*) is the type of this species there appears but little doubt. It is not surprising that it was referred by the continental entomologists, Treitschke, Ochseneimer, Duponchel, &c., either to *fluxa* (a variety of *fulva*) as an aberration, or treated as a distinct but unknown species, as *bondii* was unknown to continental lepidopterists until a comparatively recent date, when the British specimens were sent over. Dr. Staudinger refers to Hübner's fig. 412 as an aberration of Guenée's *concolor*, which may itself have no claim as a species. Hübner's fig. 412 may be described as:—"Wings about the same shape as *bondii*. All the wings white, shaded to ochreous on the outer margins; nervures slightly darker on outer edge. Upper part of fringe to anterior wings black, remaining fringes grey." The black in the fringe is unknown in any species of the group *Leucanidæ*.

a. var. bondii, Knaggs.—First described in the 'Transactions of the Entomological Society of London,' 1861, p. 133. Also figured and described by Newman in his 'British Moths,' p. 276. Our British *bondii* have no trace of the black fringe mentioned above, but this is the only point of difference between *bondii* and Hübner's *extrema*. A sexual variation occurs, the males generally having a distinct transverse row of dots, the females with this row almost or entirely absent. *Bondii* is only taken, as far as is known, in England and Greece.

Chortodes, St., *arcuosa*, Haw.

The type of this species is described in Haworth's 'Lepidoptera Britannica,' p. 260, as:—"Alis sordide albo-lutescentibus strigis duabus punctorum minutissimorum fuscorum." "Corpus gracilius fere omnium hujus generis. Costa anticarum punctis ordinariis fuscis, ultimo horum majore juxta apicem. Striga prima recta ante, secunda arcuata pone medium, et inter has strigas in medio alæ punctum solitarium fuscum. Cilia pallida. Posticæ ciliaque fuscescentia." There is a great sexual difference, the female having been described by Haworth as a distinct species, under the name of *minima* ('Lepidoptera Britannica,' p. 215, No. 153) as follows:—"alis rufo-cinereis, maculis duabus ordinariis strigisque tribus pallidioribus"; "ciliis cinereis. Posticæ fuscae, ciliis albis." There seems to be but little variation in the specimens of the same sex, except that some males are whiter than others. Of *airæ*, Frr., ii., pl. 162, figs. 1—3, Dr. Staudinger says, "nimis variegata."

a. var. morrisii, St. (?).—All I know of this variety is contained in a note written by Mr. Dale ('Entomologist's Record,' &c., i., p. 34) and is as

follows:—" *Acosmetia morissii* is described in the 'Naturalist' for 1837, p. 88. It is a white var. of *Miana (Chortodes) arcuosa* and has occurred at Chermouth." Some of our specimens have very white fore wings.

Cænobia, St., rufa, Haw.

Haworth's *rufa* ('Lepidoptera Britannica,' p. 260) is the type of this species. Haworth's description is:—"Alis oblongis ciliisque rufis unicoloribus posticis ciliisque pallidis striga medio macularum obscurarum." "Caput inter antennis album." This last phrase is very significant and is clearly shown in some specimens. Geyer, in his supplement to Hübner's 'Schmett.,' gives a good figure of the type (fig. 751) under the name of *despecta*. This delicate little species is subject to a great deal of variation in ground colour. I took a very long series at Deal (1886-1890), and found every gradation in colour, from a very deep reddish, to an exceedingly pale greyish-white, the latter being in beautiful condition. There seems to be three distinct forms:—(1) a very red form = the type (*rufa*); (2) a grey form tinged with red = var. *lineola, St.*; (3) a pale grey form with no trace of red = var. *pallescens*. It may be advisable to add that the female has a very different appearance to the male. It is much narrower winged, and with scarcely a trace of dots on either the anterior or posterior wings. It is but rarely captured, and owing to its habit of remaining hidden in the herbage by the side of the ditches where it occurs, is generally worn.

a. var. lineola, St.—The type of this variety is described as having "the fore-wings shorter than in *rufa*; colour, reddish-grey, with a longitudinal brown line at the base, occasionally branching thus >; a row of dots parallel with the hind margins; fringe reddish: posterior wings with a row of dots parallel to the hind margin" (Humphrey and Westwood's 'British Moths,' vol. i., p. 245). This intermediate form does not vary in the length of the fore-wings, more than the specimens of the type, *i.e.*, they both vary slightly. The small basal branching line is as frequent in the reddest types as in the variety.

β. var. pallescens, mihi.—I have a series of a fine pale form of this species, varying from pale whitish grey to almost white, without a trace of rufous colouring; the spots as in the type. My specimens came from Deal. I have seen specimens of the type and var. *lineola* from Epping Forest, but do not know whether pale forms occur there.

Senta, St., maritima, Tausch.

The type of this species is of a silky grey colour, with the stigmata pale and scarcely discernible, a faint row of black dots in place of the angulated transverse line. Hind wings pure white, with a faint trace of a row of black dots on the nervures.

a. var. ulva, Hb.—All Hübner's figures are more or less reddish. As this is not at all usual, it is, perhaps, advisable to keep Hübner's as a varietal name. His figure 666 is the most marked form, and may be described as:—A male with anterior wings all reddish, except the costa which is dark grey; the stigmata lined in with white. A row of tiny black dots occurs just within the fringe, then a dark shade parallel

to the hind margin, then the usual transverse row of black dots between this and the reniform. Hind wings white, with a lunule and an indistinct row of dots on the nervures.

β. var. bipunctata, Haw.—Anterior wings with two black spots, one near the centre of the wing, the other beyond the centre. This variety is figured in Newman's 'British Moths,' p. 268, fig. 3. Guenée writes:—"The two ordinary stigmata and a small spot which precedes them of a deep black" ('Noctuelles,' vol. v., p. 99).

γ. var. wis mariensis, Schmidt.—Anterior wings with a broad black stripe running from the base to the hind margin. This is Guenée's var. A, which he describes as having "a broad black band traversing the middle of the wing from the base to the apex" (Guenée's 'Noctuelles,' v., p. 99).

δ. var. nigricostata, Stdgr.—This is described by Dr. Staudinger as having the anterior wings with the costa broadly black.

ε. var. nigrostriata, Stdgr.—Anterior wings with many black streaks running parallel to the veins. This is figured in Newman's 'British Moths,' p. 68, fig. 4.

All these varieties are obtainable in their British localities, the Fen district and Kent.

Nonagria, Och., *neurica*, Hb.*

The type of this species is represented by Hübner's fig. 381. It is a male of a dull clayey brown colour, with a row of five or six small longitudinal spots along the median nervure, at the end of which is a dark spot surrounded by a whitish ring. This is in reality the lower half of the reniform, the orbicular and upper part of the reniform being entirely absent. An angulated row of eight black dots runs parallel to the hind margin. Hind wings unicolorous blackish grey. Some of our Cambridge specimens are exactly of this form. I have two (♀'s apparently) which came from Mr. Warren, exceedingly characteristic, but a little redder brown in ground colour. Staudinger says of it, "species gracilior, subtus immaculata," but this seems simply a summary of Schmidt's distinction, 'Stett. Ent. Zeit.,' 1858, p. 367. Our specimens are generally of a greyish brown colour, tinged with reddish, with a dark, blackish, longitudinal line under the median nervure extending almost to the outer margin. In the black streak, more than half-way from the base, is a tiny black dot with a pale circumscription, which is sometimes joined to another similar but paler spot just above, but sometimes separate, the two together forming the reniform. The orbicular more or less indistinct, a faint trace of a row of tiny dots parallel to the hind margin. The nervures blackish. Hind wings dark grey, with a pale shade parallel to the hind margin; a slightly darker lunule is present. This form is *arundineta*, Schmidt. Treitschke, in his 'Die Schmet. von Europa,' vol. v., p. 319, well described this form under the name of *neurica*, as:—"alis anticis flavo vel fusco ferrugineis vena maculaque medio albicantibus, serie punctorum nigrorum ad marginem externum."

a. var. arundineta, Schmidt.—Dr. Staudinger says of this variety: "with the anterior wings pale, of a greyish straw-colour." The chief

* *Vide* 'Ent. Mo. Mag.,' vol. xxv., p. 56.

points of distinction, as given by Schmidt ('Stett. Ent. Zeit.' 1858, p. 367), are as follows:—"The difference between *neurica* and *arundineta* is less in the underside and in the markings than in the different structure of the body and the wings. *Neurica*, Hb., is the more slender, *arundineta* the more robust form. The colour of both forms varies in the same manner, but *arundineta* has a dark spot on the underside of each wing, which *neurica* never has." My good friend Herr Hoffmann (Hanover) also adds:—"Herrich Schäffer declared both forms, *neurica* and *arundineta*, to be different species, and so did Staudinger afterwards." A full description of this variety is given above in the comparison with the type.

β. var. rosea, mihi.—Like the variety *arundineta*, but with the whole of the anterior wings suffused with a rich rosy colour. The form is not common, but the Cambridge collectors get a few every year.

γ. var. dissoluta, Tr.—This variety was first figured by Hübner, 659—661, under the name of *neurica*, but since Treitschke first described this form under a distinct name, his name has been retained as the varietal name. Dr. Staudinger in his 'Catalogue' (p. 106), treats it as distinct, and writes of it:—"a more robust species, wings spotted underneath." Hübner's fig. 659 is a male, the anterior wings very dark brown, with no orbicular, the outer half of the reniform lined in with pale, a pale line beyond the reniform parallel to the hind margin. Posterior wings with the outer margin blackish grey, the base paler, with a distinct black lunule. Hübner's fig. 660 is an underside, and 661 is a female, which is marked like the male, but rather larger. A fair figure of this variety is in Newman's 'British Moths,' p. 271, fig. 2. Mr. Warren writes me:—"The dark *neurica* of old time came from Yaxley, Hunts." It is not obtained in any of the British localities for *neurica* at the present time.

Nonagria, Och., *geminipuncta*, Haw., Hatchette.

Next to *T. fulva*, this species is perhaps the most variable of the whole group. The coloration extends from a pale reddish ochreous, and a clear reddish-brown, through fuscous to black. In each colour the reniform may have two, one, or no white spot present; whilst, a series of longitudinal black dashes forms a more or less defined elbowed line outside the reniform in the paler specimens, thus producing some very pretty and striking sub-varieties. Haworth published the following description of the type:—"The wings reddish fuscous, with a broad red band along the inner margin, and two small white spots in the place of the posterior stigma" ('Lepidoptera Britannica,' p. 176). As the name signifies, the great character of the type is the presence of the reniform as two distinct white spots. This form Hübner figures (628 and 629) as *guttans*. Dr. Staudinger seems to lose sight of the fact that this is the type, for in his 'Catalogue,' p. 106, he writes:—"ab. *guttans*, Hb., reniform stigma in two separate spots." Guenée treats *paludicola* as the type and *guttans* as a variety. Both Haworth's description and Hübner's figure ignore the presence of a black dot between the double white spot and the base. The number of white spots varies, sometimes only one is present, sometimes neither. I have

all the above forms from Yorkshire, Isle of Wight, and Sussex localities. On September 9th. 1888, Mr. W. H. B. Fletcher, M.A. of Worthing, wrote to me as follows:—"With reference to your remarks on *Non. geminipuncta* ('Entom.' xxi., 225, 226), our Sussex specimens seem to run very dark. I bred one last year with the fore and hind wings almost uniformly smoky, the only marking being a slight paleness on the veins in the middle of the fore wings." There is a certain tendency in the darker specimens to become dusted with white scales on the nervures towards the outer margin. A special development in this way would produce the sub-var. *paludicola*, Hb.

The following is a classification of the varieties in this species:—

- 1.—Anterior wings, pale reddish ochreous, reniform forming 2 white dots = var. *pallida*.
- 1A.—Anterior wings, pale reddish-ochreous, reniform forming 1 white dot = subvar. *pallida-unipuncta*.
- 1B.—Anterior wings, pale reddish-ochreous, reniform without any white dot = subvar. *pallida-obsoleta*.
- 2.—Anterior wings, clear reddish-brown, reniform forming 2 white dots = var. *rufa*.
- 2A.—Anterior wings, clear reddish-brown, reniform forming 1 white dot = subvar. *rufa-unipuncta*.
- 2B.—Anterior wings, clear reddish-brown, reniform without any white dot = subvar. *rufa-obsoleta*.
- 2c.—For description *vide* below, subvar. *paludicola*, Hb.
- 3.—Anterior wings, fuscous, with reddish-brown inner margin, reniform forming 2 white dots = *geminipuncta*, Hatch.
- 3A.—Anterior wings, fuscous, with reddish-brown inner margin, reniform forming 1 white dot = subvar. *unipuncta*.
- 3B.—Anterior wings, fuscous, with reddish-brown inner margin, reniform without any white dot = subvar. *obsoleta*.
- 4.—Anterior wings, blackish-fuscous or sooty-black, reniform forming 2 white dots, = var. *fusca*.
- 4A.—Anterior wings, blackish-fuscous or sooty-black, reniform forming 1 white dot = subvar. *fusca-unipuncta*.
- 4B. Anterior wings, blackish-fuscous or sooty-black, reniform without any white dots = subvar. *nigricans*, Stdgr.

a. var. *pallida*, mihi.—Anterior wings pale reddish-ochreous, some specimens very pale, with the elbowed line frequently well developed; the reniform consisting of 2 white spots or one white spot (subvar. *pallida-unipuncta*), or without a white spot (subvar. *pallida-obsoleta*). The hind wings pale compared with those of the darker varieties. My specimens of this pale form came principally from Brighton and East Yorkshire. In the Isle of Wight this form is rare.

β. var. *rufa*, mihi.—Anterior wings of bright reddish-brown, sometimes with traces of the dashes forming the angulated line; the reniform consisting of 2 white spots (*rufa*), or one white spot (subvar. *rufa-unipuncta*), or without (subvar. *rufa-obsoleta*). I have the variety from Brighton, East Yorkshire and the Isle of Wight.

γ. var. *paludicola*, Hb.—Hübner figures (624) a fine variety, under this name. It is of a dark reddish-brown colour, with white median and basal nervures, a small black orbicular, the inner edge of the

reniform lined with white, so as to form a white lunule, the remainder of the reniform blackish, the outer part of all the nervures white on and towards the hind margin. Hind wings dark grey, base paler, with a distinct lunule. It will be thus seen that this is a well-developed sub-variety of var. *rufa*; I have no specimens so well marked on the margin as Hübner's, but I have Isle of Wight specimens which run it close.

δ. var. *unipuncta*, mihi.—Like the type, dark fuscous with the inner margin reddish-brown, but with only the lower half of reniform white. Hübner's fig. 637 depicts this form, but is rather dark in ground colour. This form occurs in Sussex and Yorkshire localities with the type, and in the Isle of Wight is more common than any other form.

ε. var. *obsoleta*, mihi.—Like the type, but with the white twin spots characteristic of the type altogether absent. This form also occurs in the same localities with the type, but unlike *unipuncta*, appears to be more rare than the type.

ζ. var. *fusca*, mihi.—Anterior wings unicolorous, of a blackish-fuscous or sooty-black, with the reniform forming two distinct white spots. Subvar. *fusca-unipuncta*, mihi. Like v. *fusca*, but with one white spot only. This is intermediate between vars. *fusca* and *nigricans*. My specimens are from the Isle of Wight and Sussex localities.

η. var. *nigricans*, Stdgr.—Staudinger described this variety as "the anterior wings wholly blackish, with the reniform indistinct." How Staudinger can refer Hübner's fig. 624 to this variety, and how he can reconcile the white nervures of Hübner's figure with his description of var. *nigricans* surprises me! A very large percentage of a long series, bred by Mr. A. J. Hodges, from larvæ taken in the Isle of Wight, are of an intense brownish-black colour, but specimens obtained from Mr. Nicholson from the Lewes district, are of a deep sooty black colour, these latter were bred in 1888. Some specimens have, as Staudinger says, "the reniform indistinct," but some are practically unicolorous, and have no markings whatever.

Nonagria, Och., *cannæ*, Och.

Treitschke first described this species under the name *cannæ* in 'Die Schmet. von Europa,' vol. v., p. 225, although Ochsenheimer, in the above work, vol. iv., p. 82, had named the species *cannæ* before this, with reference to previously published figures.* Treitschke's description is as follows:—"alis anticis flavo-rufescentibus, serie unica maculaque obsoleta in medio nigris." So far as I have been able to judge from continental specimens, the variation is chiefly sexual, the males being strongly reddish, the females yellowish ochreous, and this is borne out by Hübner's figs. 386, 387. His fig. 386 is a male; ground colour reddish ochreous; median and costal nervures grey; a transverse curved row of seven dots; hind wings unicolorous grey. Hübner's fig. 387 is probably a female of a pale yellow ochreous colour, with median and costal nervures darker; a transverse row of seven black dots on nervures, hind wings grey with a paler line parallel

* Ochsenheimer wrote the first four vols. of 'Die Schmet. von Europa,' Treitschke finished the remaining vols. after Ochsenheimer's death.

to hind margin. Both these are figured by Hübner under the name of *arundinis*. Guenée, in his 'Noctuelles,' vol. v., p. 108, writes:—"Varies extremely in colour." In the 'Ent. Mo. Mag.,' vol. xxii., p. 170, Mr. F. D. Wheeler, M.A., who has given especial attention to this rare British species, writes:—"Our Norfolk specimens are rather brown than red, some of them, indeed, are getting on for black, and the colour helps to make them inconspicuous."

Nonagria, Och., *sparganii*, Esp.

Esper's description of the type is as follows:—"Alis superioribus subrepandis, supra pallide griseis, lunula media, strigisque duabus punctatis nigris, subtus nigricantibus, limbo pallido nigro punctato; inferioribus pallidis fere concoloribus" ('Die Schmetterlinge,' &c., p. 481). This species is a most variable one and ranges from pale ochreous to deep red. Guenée, in his 'Noctuelles,' vol. v., p. 108, writes:—"The males vary from whitish grey and ochreous to reddish brown." Most of the specimens in my collection are fairly typical, in so far as they are pale yellowish dusted with fuscous scales, especially under the median nervure, with a median lunule (the character of this lunule is rather uncertain, but it would appear to consist of a series of dots placed around the lower part of the reniform stigma which is otherwise obsolete); an ill-developed transverse row of dots towards the base, of which only two or three (placed on the nervures) appear to be developed (in var. *bipunctata* the dot on the median nervure is developed into a distinct lineola), a transverse row of black dots parallel to the hind margin, and another within the fringes. Mr. Sydney Webb, who added this species to the British fauna, writes of the variation in this species:—"I may say that it is, without doubt, of all the family, most given to vary. The ground colour not only ranges from bone colour to reddish ochreous, but oftentimes these hues are both present (one covering the other in streaks from the base overlying and extending beyond the wing rays), whilst the dark scaling seems to vary in every individual" (*in litt.*). The specimen figured ('Entom.' xiii., p. 49), (the one to the left) is perhaps slightly darker than the type, but otherwise agrees well; the lunule referred to can be very distinctly seen.

a. var. obsoleta, mihi.—The anterior wings of the same pale ochreous colour as the type, but sparingly scattered with fuscous scales, the nervures simply a little more dusky than the ground colour, the black lunule and all the markings of the central part of the wing obsolete. The two transverse rows of dots fainter than in the type.

β. var. bipunctata, mihi.—Ground colour pale ochreous, with no trace of a dark shade under the median nervure, and no scattered fuscous scales. A short black lineola on the median nervure, just before the centre of the wing, above which (the lineola) can be traced the faintest possible outline of the orbicular, and the characteristic small black lunular mark (which seems to be the circumscription of the lower part of the obsolete reniform), stand out conspicuously. A transverse row of minute dots outside the lunule is followed by a more sharply defined row placed just within the pale fringe. Hind wings

white, with a slightly shaded base. This description is written from a specimen kindly lent me by Mr. Webb, and figured (not very satisfactorily) 'Entom.' xiii., p. 49, fig. 2 (to the right hand). Mr. Webb writes me with reference to this:—"The central specimen is perhaps more worthy of a varietal name than any of the *sparganii*. It occurs in both sexes, but more commonly in the female." As a matter of fact it is very little different from the type, except in the development to the lineola from the dot on the median nervure.

γ. var. rufescens, mihi.—The ground colour much suffused with reddish ochreous, the characteristic markings and the longitudinal fuscous shade under the median nervure generally strongly developed. These red varieties are exceedingly suffused—in some instances—with fuscous scales under all the nervures, and the hind wings, of the males especially, are sometimes very dark. Hübner figures this red form (549), and I have one or two very strongly coloured specimens from Germany. Mr. Sydney Webb has also sent me a red specimen captured in the south-east of England, where the form is, I believe, not at all frequent.

Nonagria, Och., *arundinis*, Fab.

The type of this species is thus described by Fabricius:—"Noctua lævis alis deflexis cinereis, punctis lunulisque marginalibus nigris, subtus macula centrali fusca." "Magna. Corpus cinereum, hirtum immaculatum. Alæ anticæ obscure cinereæ, nitidulæ punctis parvis nigris. In margine crassiori puncta tria pallida. Margo posticus lunulis octo atris. Posticæ pallidæ. Subtus anticæ obscuræ, posticæ pallidæ macula centrali fusca" ('Mantissa,' p. 141, No. 54). The type of both sexes in this species is of a pale greyish colour, the males being but very little darker than the females.

a. var. fraterna, Tr.—The anterior wings of this variety are suffused with deep reddish brown and black scales, in some specimens to such an extent that the insect is almost black in colour. The hind wings much darker than in the type, especially the females. This is Guenée's var. **A**, of which he says:—"Superior wings of a deep blackish or reddish brown, which absorbs almost all the markings and nervures; nervures of hind wings blackish." Under the name of *fraterna*, Tr., Guenée, somewhat erroneously, describes an intermediate form between *fraterna* and the type. Treitschke ('Die Schmet.' &c., vol. x., pt. 2, p. 99) writes:—"Under the name *fraterna* we include the beautiful dark brown or blackish variety," &c. There is no doubt that vars. *fraterna*, Tr., and *fraterna*, Gn. are respectively the females and males of the same variety, the extreme dark forms of his var. **A** being nearly always females, the dark form with paler hind wings being males. *Fraterna* occurs sparingly in all localities with the type. From 1881 to 1883, I bred a large number of *arundinis* from the neighbourhood of Higham, Kent; not more than one in thirty were *fraterna*, and these always females. In 1884, I collected a few pupæ on the marshes a few miles further down the river Thames, and out of some 30 insects bred, I got about twenty dark males, two very dark females, the remainder being typical. Hübner (fig. 437), under the name of *typhae*, figures a male of this variety. His figure is of an unicolorous reddish brown, with black nervures, hind wings ochreous with dark hind margin, dusky nervures, and distinct lunule.

Calamia, Hb., *lutosa*, Hb.

The type of this species is represented by Hübner's fig. 232, which may be described as having the anterior wings pale ochreous with whitish nervures, the posterior wings grey with dusky nervures. There are no traces of spots on any of the wings. The type is rare in England, though the varieties are abundant. The variation in colour of this species is very great. It varies from pale ochreous to deep red. Some specimens are much irrorated longitudinally with black scales, taking the form, so common in this and some of the species of the allied genera, of dark longitudinal dashes across the wings. From the type, with no transverse rows of dots, we find every gradation to a complete row extending across both the anterior and posterior wings. The variation in the size of the specimens is remarkable. I have specimens of var. *pilicornis* not larger than *pallens*; I have specimens of vars. *cannæ* and *crassicornis* larger than my largest *arundinis*. There is a solitary dot developed in some specimens at the end of the discoidal cell as in *Leucania comma* var. *nigropuncta* and *Viminia albovenosa* var. *centripuncta*. There is also a considerable amount of variation in the depth of colour and development of the row of dots on the hind wings. Mr. Dobrée writes:—"It is a common insect in some years near Beverley, both in the type and all the varieties of size and colour, including very handsome specimens (var. *crassicornis*) with the three dark longitudinal shades very sharply defined and quite black" (*in litt.*). There are two distinct shades in the ground-colour, pale whitish ochreous and reddish ochreous. The following is a rough classification of the varieties in this species:—

- 1.—Pale whitish-ochreous without dark longitudinal shades, and without a transverse row of dots = *lutosa* (type).
- 2.—Pale whitish-ochreous without well-developed longitudinal shades, but a complete transverse row of dots = var. *pilicornis*, Haw.
- 3.—Pale whitish-ochreous with strongly developed longitudinal fuscous shades, and a transverse row of dots = var. *crassicornis*, Haw.
- 4.—Reddish-ochreous without longitudinal shades, and without transverse row of dots = var. *rufescens*.
- 5.—Reddish-ochreous without well-developed longitudinal shades, but with transverse row of dots = var. *cannæ*, St.
- 6.—Reddish-ochreous with well-developed dark longitudinal shades and transverse row of dots = var. *rufescens-suffusa*.

a. var. *pilicornis*, Haw.—This name was given by our early British authors to those specimens which had the anterior wings pale greyish-ochreous, and but little irrorated with black or fuscous scales. This variety was first described by Haworth in the 'Trans. Ent. Soc.' (Old series), p. 336, as a distinct species. These paler specimens often have the transverse rows of dots very indistinct, and more nearly approach Hübner's spotless type. Some specimens of this variety are very small. I have some from East Yorkshire not larger than *pallens*. Mr. Mason (Clevedon) informs me that this is the most common form in his district. I have specimens also from Wicken and Warrington.

β. var. *crassicornis*, Haw.—Treated by our early British lepidopterists as a distinct species. Haworth's original description is:—"Alæ anticæ subfulvo alboque venosæ, atque cinerascetes ex punctulis

minutissimis numerosissimis fuscis, absque lente vix conspicuis, punctisque aliis circiter sex majoribus posticis, in strigam arcuatam dispositis. Alæ posticæ fuscæ, cillis lutescentibus" ('Insecta Britannica,' p. 173). This name is given to those greyish-ochreous or pale wainscot-coloured specimens which are thickly irrorated with fuscous scales, with a distinct transverse row of black dots on the anterior wings and continued on the posterior. The minute fuscous atoms form three very distinct dark longitudinal shades, one extending on either side of the median nervure, another extending from the base just under the costa, a third just above, but parallel with the inner margin. Hind wings dark grey, with a transverse row of dots. The spaces between the nervures of the anterior wings also much suffused. I have this variety from Clevedon (Somerset), Beverley (Yorks), Hull and Warrington.

γ. var. *rufescens*, mihi.—With the markings practically obsolete as in the type, but with the ground colour reddish or reddish-ochreous, the longitudinal shades and the transverse row of dots absent on the anterior wings. My specimens are from Warrington, Clevedon, &c. I find this variety and the type the two rarest forms of the species.

δ. var. *cannæ*, Steph. (non. Och.).—Red varieties of this species without the dark longitudinal shades, but with the transverse row of dots, were incorrectly referred by the early British authors to the *cannæ* of Ochseneimer, which is a totally distinct species. The anterior wings of this variety are reddish ochreous, sparingly irrorated with dusky atoms, with the transverse row of dots more or less distinctly marked. My specimens of this variety have come from Somerset, East Yorkshire, Warrington, &c., and vary much in size. For the splendid series of varieties of this species I have, I am largely indebted to Mr. Mason of Clevedon and Mr. Collins of Warrington, who have been exceedingly good to me, not only by giving me a large number of specimens, but also a great deal of information. "Stephens' description of var. *cannæ* is:—'Expanse, $1\frac{2}{3}$ inches. Head and thorax pale reddish or yellowish ash; anterior wings the same, with a few minute dusky atoms, with some larger spots at the base, and a row still more distinct towards the hinder margin, and forming an arcuated striga: in the middle of the disc is a single spot of similar hue; posterior wings reddish or yellowish ash'" —Humphrey & Westwood's 'British Moths,' vol. i., p. 215. It is advisable to remember that this description was written at a time when the species was almost unknown in Britain, isolated examples in one or two cabinets being all that the British collectors then had. This variety is therefore intermediate between var. *rufescens* and var. *rufescens-suffusa* and differs from *pilicornis* only in ground colour.

ε. var. *rufescens-suffusa*, mihi.—An extreme development of var. *cannæ*, of a reddish ochreous colour, with a transverse row of dots and strongly developed longitudinal shades as in var. *crassicornis*. I have this from all localities whence I have obtained the other varieties; my specimens (especially females) from Clevedon and Warrington are, however, much larger than those from other localities.

2. Family:—*APAMIDÆ*, Gn.

This extensive family contains some of our most variable and some of our most constant species of Noctuæ. It seems almost impossible to make any general remarks as to the tendency of variation in the family as a whole, as the different genera vary more or less in different directions. The variation in ground colour is in some instances very remarkable, whilst the markings vary exceedingly in many species. Such species as *didyma*, *bicoloria*, *strigilis*, may well be termed polymorphic. The colours of a very large number of species vary from a pale grey or yellowish ground colour, through various shades of brown or red, to black. There is probably no family in which more pronounced cases of melanism occur, or where it is more general; *micacea*, *rurea*, *monoglypha*, *testacea*, *leucostigma*, *didyma*, *strigilis*, *exulis*, *basilinea*, and *abstracta* are well-known examples, and all show a great and general tendency to the production of melanic forms. Even such comparatively constant species as *scolopacina* and *sublustris* occasionally show a tendency in this direction, the former being darker in Yorkshire than in the London district, the latter sometimes occurring very much suffused at Deal.

Gortyna, O., *ochracea*, Hb.

Hübner's *ochracea* ('Beiträge zur geschichte der Schmet.' pl. 2. m) is the type of this species as noticed by Guenée and accepted by Dr. Staudinger. Hübner's description (p. 19) is as follows:—"The head and thorax are yellow ochreous as also are the fore wings. Near the base is a grey brown band, and in the centre of the wing are two brown circular marks, with paler centres of a yellowish colour. Following these is a wide band of a dark grey brown colour." Esper notices (p. 217) the small size and pale colour of Hübner's type, and I have received from Mr. Baynes specimens quite as small and rather paler, which were bred from larvæ obtained near Ulverston. The typical form from Hull is somewhat larger. In his 'Sammlung Europaischer Schmet.', Hübner twice figures (186, 187) this species under the name of *flavago*, a name previously given by Fabricius to a *Xanthia*. Hübner's fig. 186 has "the ground colour of the anterior wings pale yellow, with two pale, double, basal lines, the space between filled in with blackish grey; the stigmata pale, a reddish brown shade passing between them, and extending from the costa to the inner margin; a double line, outside the reniform, is followed by a narrow blackish grey band, the outer margin being greyish. Hind wings pure white, without markings." Hübner's fig. 187 has the "anterior wings of an orange yellow ground colour, with dark red-brown transverse markings. The hind wings grey, with a broad, dark, marginal shade, followed by a dark transverse line and a dark lunule." Hübner's fig. 186 (with white hind wings) is very unusual, and Guenée seems to have had doubts whether it represented a variety of *ochracea* or was distinct, for he writes:—"Hübner figures a *flavago* with entirely white inferior wings," and then asks, "Is this a variety?" ('Noctuelles,' vol. v., p. 123). But besides this, there are, as mentioned above, two other distinct, and probably, if carefully noted, equally common forms; the first is of a pale ochreous yellow, with comparatively pale transverse markings (the type); the second is of a deep golden yellow, with bright

purplish-brown or reddish-brown markings. Sepp figures this pale form (i., pl. 3), and Guenée says of it ('Noctuelles,' vol. v., p. 123):—"Sepp's figure (No. 7) is a work of art. It is represented with folded wings, but the colour is too pale." It would seem, therefore, that Guenée was unaware that there was a paler form. Mr. G. T. Porritt, in his 'List of Yorkshire Lepidoptera,' published in the 'Transactions of the Yorkshire Naturalists' Union,' Part vi., p. 72, writes:—"Mr. N. F. Dobrée writes of this species:—"In all the specimens I have seen from the E. Riding, the size is not more than two thirds that of southern specimens, and the colouring is yellow instead of orange. The difference is so marked that I am surprised that it has not hitherto been noticed in print." Mr. Dobrée also writes me:—"All the *flavago* which I take here in October (when I look for *lutosa*) are much smaller than the handsome orange specimens, and of a yellow colour which may almost be called a lemon-yellow. Under wings similarly much paler. These I get accidentally at flight or at sugar, the orange always by breeding, considerably earlier. I hold it to be a distinct var., but have not sought general information, and am open to correction" (*in litt.*). With regard to this I may add that I have bred a considerable number of the orange form, var. *flavoauratum*, but do not remember breeding pale ones, although I have captured them late in September. Thus I have both forms from this neighbourhood (Greenwich), and my Hull specimens are of both forms. I have, however, received bred specimens of the typical form from Mr. Baynes of Ulverston. Taking therefore the pale form as the type, the darker form is:—

a. var. flavago, Esp. = *flavoauratum*, mihi ('Entom.' xxi., p. 271).—Esper thus describes this form:—"The upper wings strong citron-yellow much sprinkled with reddish yellow scales. The ordinary stigmata are dark and the broad bands blackish with a red tinge." Our specimens have the superior wings of a bright golden yellow, with the two ordinary transverse bands dark purplish brown, the nervures of a bright reddish colour. Inferior wings of a pale yellowish grey colour, with a blackish lunule and a blackish band parallel to the hind margin. This is described under the name of *flavago* by Guenée, 'Noctuelles,' vol. v., p. 122; by Newman, 'British Moths,' p. 279; by Stainton, 'Manual,' vol. i., p. 197; by Humphrey & Westwood, 'British Moths,' vol. i., p. 213; and by Haworth, under the name of *ochraceago*, 'Lepidoptera Britannica,' p. 234. In fact, Hübner and Sepp seem to be the only authors who figure and describe the pale type.

Hydræcia, Gn., *nictitans*, L.

After a great deal of careful study, I have come to the conclusion that we probably have, under the name of *nictitans*, L., two at least distinct species, one of which I at first thought was the *lucens* of Freyer; but this is not so, the latter being entirely different to the form which I call *paludis*. My opinion has been formed from the study of the imagines, both in their various phases of variation, and the natural conditions of their occurrence. In the absence, however, of any actual proof of their distinctness, I have treated the form that I consider distinct as a local race or subspecies of *nictitans* under the name

of *paludis* in the following notes on the species. With regard to the superficial differences between *nictitans* and *paludis* I have made the following notes:—*Paludis* is generally larger than *nictitans*, and in its different phases of variation is rarely, if ever, of the red coloration which is common, in some shade or other, to all the varieties of *nictitans*. The reniform of *paludis* is always more narrow, owing to the absence of the outside line on the inner edge of the reniform, which is present in that of *nictitans*; it is also less strongly marked, and always white or orange, never red. The posterior wings of *paludis* are more ample and more rounded on the hind margin, the anterior wings less arched on the costa. The typical colour of *paludis* is ochreous or ochreous-grey, and its variations in ground colour assume a greenish tint, until its extremes may be described as greenish grey; the typical colour of *nictitans* is red, and its extremes are reddish brown or black. Both are reticulated with faint transverse lines, but *nictitans* is generally more strongly marked in this respect than *paludis*; the faint transverse line parallel to the hind margin of the anterior wings is of a different shape in *paludis* to that in *nictitans*, being more completely hollowed just below its centre. With regard to the occurrence of these forms in a state of nature, the following facts are very striking:—On the marshes around Rochester, bordering the Medway, *paludis* in all its forms of variation occurs. In the woods around Rochester, not a *paludis* is to be found; all are *nictitans*. At Sligo Mr. Percy Russ, with one exception, has taken nothing* but *paludis*, some of which are exceedingly beautiful forms. Mr. Harrison of Barnsley, has sent me for inspection the pick of the Yorkshire forms,—all are *nictitans*, there is no sign of *paludis*. In London, *nictitans* is often common, but I have never seen *paludis*. At Shoeburyness most are *paludis*, whilst at Deal both forms occur. At the latter locality, I have frequently taken *nictitans* in copulâ, generally resting on the marram. I have as frequently taken *paludis* in copulâ, but never *nictitans* with *paludis*. In the ‘Entomologist’ for 1888, Plate i., figs. 1—6 are *paludis*; figs. 7—12 are *nictitans*. A comparison of these two rows of figures will, I trust, make the foregoing notes clear. Until very recently, I had always considered *lucens* as a large variety of *nictitans*, but a fairly long series, sent me by Messrs. Collins and Tunstall and captured near Warrington, together with specimens from other localities, have tended to alter my opinion, and I am not at all satisfied now of its specific identity with *nictitans*. In a fairly long series, *lucens* appears to undergo all the parallel variation found in *nictitans* and *paludis*, varying in the colour of the stigmata, shade of ground colour, &c. much in the same manner. At any rate the matter is worthy of further consideration, and whilst its large size and general tendency to have a narrower reniform, show it to be nearly allied to *paludis*, its colour, and more distinct transverse lines show its connection with *nictitans*. The type of this species (*nictitans*) is of a reddish grey colour, with a white reniform and pale yellowish orbicular (Plate I., fig. 7). The Linnæan description, ‘Systema Naturæ,’ p. 847, is as follows:—

* Mr. Russ in Oct. 1888, sent me a very strongly-marked specimen of *H. nictitans* var. *erythro stigma*, with a query as to its being *nictitans* at all, the form, with a red ground colour, being entirely new to him.

"*Noctua spirilinguis cristata*, alis ferrugineo-griseis, stigmatе reniformi, niveo, pupilla lunari lutea." The variation of this species lies chiefly in the depth of ground colour, and colour of the reniform stigma ('Entomologist,' xxi., Plate i., figs. 7-12). The ground colour varies from pale pinkish red through different shades of ferruginous red to almost black. The reniform stigma varies from white, through various shades of orange, to red. Mr. Porritt, in 'The Transactions of the Yorkshire Naturalists' Union,' Part vi., p. 73, writes of the Yorkshire specimens, "often very strongly coloured." Hübner figures (221) the type under the name of *chrysographa*.

The following is the best summary of varieties that I can devise:—

- 1.—Pale grey with reddish tinge, basal area much tinged with ochreous, reniform white, var. *pallida*; reniform yellow, subvar. *pallida-flavo*; reniform red, subvar. *pallida-rufо*.
- 2.—Bright clear red, basal area but little mottled, reniform white, var. *rosea*; reniform yellow, subvar. *rosea-flavo*; reniform red, subvar. *rosea-rufо*.
- 3.—Deep red, basal area slightly mottled, reniform white = *nictitans* (the type); with yellow reniform, *auricula*, Haw.; with red reniform, *erythrostigma*, Haw.
- 4.—Deep brownish-red, or blackish-red, reniform white. var. *obscura*; reniform yellow, subvar. *obscura-flavo*; reniform red, subvar. *obscura-rufо*.

α. var. *pallida*, mihi.—The ground colour of the anterior wings of a pale yellowish or greyish red colour. All the lines and markings very distinct, and the basal area much marbled with yellowish. Both stigmata are generally yellowish, but sometimes the reniform is whitish. The posterior wings, paler than in the type. Guenée's var. B., 'Noctuelles,' vol. v., p. 126, would appear to be this variety. His description is:—"Anterior wings a little more pointed at the apex, of a very pale, rosy, yellowish colour, which makes the lines more distinct. Locality, North America." The specimen from which this variety was figured ('Entom.' xxi., fig. 8) was captured at Deal. Subvar. *pallida-flavo*, has a yellow reniform; subvar. *pallida-rufо*, a red or reddish-orange reniform.

β. var. *rosea*, mihi.—A bright, clear red form ('Entom.' xxi., Plate I., fig. 9), with transverse lines very indistinct; the orange orbicular scarcely noticeable, being but little different to the ground colour; the reniform large and well-defined, white in colour as in the type; the fringes of the hind wings very rosy, a distinct red line bordering the hind wings, the red shade extending some distance within the outer margin. The form is rare, and more particularly northern, although I have occasionally taken specimens in the neighbourhood of Deal. Mr. Harrison captures it at Barnsley, and Mr. Lawson has sent me specimens from Perth. Fig. 9 ('Entom.' xxi.) is taken from a specimen captured by Mr. Lawson at Perth. Subvar. *rosea-flavo*, with yellow reniform, appears to be very rare, as I have only one or two specimens from Deal; whilst of subvar. *rosea-rufо*, with red or orange-red reniform, I have only one specimen from Perth.

γ. var. *auricula*, Haw.—Treated by Haworth as a distinct species.

His description ('Lepidoptera Britannica,' p. 240) is as follows:—"Alis fusco-ferrugineis obsolete auratis fusco strigatis, stigmati reniformi albo-aureo." Haworth undoubtedly treated this as distinct, because of the golden colour of the reniform. He says:—"From its reniform stigma being of the colour of pure gold, it has obtained appropriately enough, the appellation of the 'golden ear.'" This variety is intermediate between the type with white, and var. *erythrostigma* with red, reniform stigma. The specimen from which this variety, 'Entom.' xxi., Plate i., fig. 11, was taken, was captured at Deal.

δ. var. *erythrostigma*, Haw.—Haworth's description of this variety (also treated as a distinct species) is as follows:—"Alis griseo rufescentibus, strigis variis tenuissimis saturatoribus, stigmati rotundo reniformique rufis. Alæ posticæ subfuscæ ciliis rufescentibus. Stigma subinde fere oblitteratum est" ('Lepidoptera Britannica,' p. 240). This variety is of the same colour as the type, but the reniform stigma is red instead of white ('Entomologist,' xxi., Plate i., fig. 10). It occurs everywhere with the type. I have specimens from Rannoch and other Scotch localities, which differ in no way from others captured in London, Deal, and other southern localities. It is figured in Newman's 'British Moths,' p. 280, and some remarks of Newman on this variety are on the following page of the same work. Guenée says of it:—"Does not differ from ordinary specimens, except that the reniform is reddish instead of white" ('Noctuelles,' vol. v., p. 126). The specimen from which fig. 10 ('Entom.' xxi.) was taken was captured at Deal.

ε. var. *obscura*, mihi.—The ground colour of a very dark (inclining to blackish) brown colour, with very little trace of the ferruginous colour of the type; the reniform stigma is white as in the type. Hind wings darker than in the type, fringes paler. This melanic form occurs but rarely. I have only taken it occasionally at Deal, and I have a single specimen from Perth. This variety is figured 'Entom.' xxi., Plate i., fig. 12, from a specimen captured at Deal. Subvar. *obscura-flavo*, with a yellow reniform, and subvar. *obscura-rufo* with a red or orange-red reniform, are, like the subvars. of *pallida* and *rosea*, very rare. I have only seen one specimen of *obscura-rufo* which came from Mr. Wylie of Perth.

ζ. var. *albicosta*, mihi.—A beautiful variety of this species with the anterior wings and stigmata of the colour and appearance of the type, but with a clear white longitudinal mark along the costa from the base to the apex, was captured by Mr. Hope Alderson, at Farnboro' in 1888, and has since been added to my collection.

Hydræcia, Gn., *lucens*, Frr.

Before I had examined a long series of specimens of this beautiful form, I felt quite certain from the study of Freyer's and Herrich-Schäffer's figures that *lucens* was only a large form of *nictitans*, and stated so, 'Entom.' xxi., pp. 310-311. A considerable amount of material has come to hand during the last two years, and my previously formed opinion has been very much shaken, and, although not quite prepared to follow Freyer and Herrich-Schäffer in definitely

considering it distinct, I think it very probable that this is so. If *lucens* and *paludis* are really only extreme forms of *nictitans*, the three offer an almost exceptionally unique condition of three easily distinguishable forms, all going through parallel ranges of variation, and yet distinct in all. From my point of view, in considering their varieties, it appears advisable for me to treat *lucens* and *paludis* as distinct sub-species, and leave it for further enquiry to determine their real specific identity or otherwise. *Lucens* is treated as a distinct species by Freyer and Herrich-Schäffer, but by Guenée, as a variety of *nictitans*. In this he is followed by Newman ('British Moths,' p. 281), and Staudinger, in his 'Catalogue,' adopts the same view. Dr. Staudinger says of it (comparing it with *nictitans*):—"major, mac. renif. alba aut rufa."

The type of *lucens* is figured by Freyer, pl. 468, figs. 3-4, both of which are females, of which, I presume, fig. 3, must be looked upon as the type. I have made the following notes of Freyer's figures:—"Fig. 3. ♀. Anterior wings reddish ochreous, with two red stigmata; a dark shade passing from the costa, between the stigmata, to the inner margin; a double abbreviated black line at the base, followed by three very fine black lines before the orbicular; two fine black lines just beyond the reniform, with a slaty grey band at some distance from, but parallel to, the hind margin." "Fig. 4. ♀. Strongly red specimen, with white reniform." Herrich-Schäffer's figs. 285-288 (by error 85-88), are very strongly-marked specimens, with a large amount of variability in the colour of the reniform, and very strongly reticulated, and therefore showing up all the main characteristics of *lucens* as exhibited in our British specimens. By far the finest specimens that have as yet come under my notice, are those captured by Messrs. Collins and Tunstall on Rixton Moss; I also have specimens from Shoeburyness, Deal, and Lostock (Bolton), Freshwater (Isle of Wight) and the east coast of Ireland, but only very few specimens, except from Rixton Moss, where all the so-called *nictitans* appear to be *lucens*. The principal sub-varieties, so far as my series exhibits the variation, run somewhat parallel to those of *nictitans*, although some specimens are very strange in appearance. These are:—

a. var. pallida, mihi.—Of a pale greyish coloration with a faint suspicion of reddish in the ground colour, with white reniform (*pallida-albo*). Sub-var. *pallida-flavo*, with yellow reniform. My specimens have come from Rixton Moss.

β. var. grisea, mihi.—Of a greyish-ochreous coloration, strongly irrorated at the base, slightly reddish in central area, the reniform with the inner line, and therefore broad as in *nictitans*, otherwise more like *paludis* var. *grisea*; the reniform white (*grisea-albo*). Subvar. with reniform yellow *griseo-flavo*. My specimens came from Rixton Moss, Lostock and Wicklow.

γ. var. rufa, mihi.—Of a clear, bright red colour, reticulated as in the former, with white reniform = *rufa-albo*; with yellow reniform *rufa-flavo*. I have no specimens of vars. *pallida*, *grisea*, or *rufa*, with deep red reniform as in the type. My specimens have come from Shoeburyness, Deal, and Freshwater (Isle of Wight).

♂. sub-vars. *lucens-albo* and *lucens-flavo*, mihi.—My series consists more especially of deep ferruginous red (typically coloured) specimens, varying somewhat in brightness. As may be seen from Freyer's description above, the deep red form with two deep red stigmata is the type. This form I have from Rixton Moss; a subvar. with white reniform-*lucens-albo*-from Rixton Moss and Wicklow; a subvar. with yellow reniform, *lucens-flavo*, from Wicklow.

Hydræcia, Gn., *paludis*, Tutt.

Before describing this species (?) (*paludis*) I would make the following remarks:—For reasons that I have just given under my notes on *nictitans*, I am almost satisfied that this is a species distinct from, but closely allied to, *nictitans*. Its different phases of variation are shown, 'Entom.' xxi., Plate i., figs. 1—6. The varieties of this local race or species (whichever it may be) vary in colour from yellow-ochreous to brownish-ochreous, deep brown, and grey with a slight greenish tinge. The orbicular is yellow in all varieties, the reniform is always white or orange-yellow, never distinctly red as in *nictitans* var. *erythrostigma*. The form is not figured by any British or Continental author; as far as I can find, the nearest approach to it is Espers' fig. v., pl. 125; although in Humphrey and Westwood's 'British Moths,' vol. ii., pl. xxxvii., fig. 4, there is a poor figure of what might possibly be its var. *grisea*. *Paludis* and its vars. seem particularly marsh or coast forms. The palest I have ever seen were captured by Mr. Russ, at Sligo, in Ireland; but others captured by Mr. Ovenden and myself at Strood, by Mr. Coverdale at Shoeburyness, and by myself at Deal, are but little darker than the Irish specimens. In 'Entom.,' xxi., Plate i., figs. 1 & 2 are the ochreous form (*paludis*); figs. 4, 5, 6 are the dark grey form with slight greenish tinge (*grisea*); fig. 3 is intermediate (*intermedia*) between the two former, whilst the dark brown form (var. *brunnea*) is not figured. It must be noted that each of these figures has a form with both white and yellow reniform stigmata, although a yellow form of *intermedia* is not figured. I have therefore divided each of the three forms into *-albo* and *-flavo* according to the colour of the reniform. With regard to *paludis*, Mr. W. H. B. Fletcher, M.A., of Worthing, writes:—"I have bred a considerable number of so-called *nictitans* from larvæ found on the south coast near Worthing, and they are all, without exception, the form *paludis*" (*in litt.*).

Type:—*paludis*, mihi.—(1) *paludis-albo*.—The anterior wing of a pale ochreous-yellow ground colour, with a white reniform and yellow orbicular; an abbreviated double basal line, followed by two single fuscous transverse lines; a dark fuscous shade, extending from the inner edge of the reniform to the inner margin; two fuscous transverse elbowed lines just beyond the reniform, extending across the wing; a costal shade slightly darker than the ground colour near the apex, the reniform being situated in a similarly-coloured shade; the hind margin from the apex to the anal angle also darker; the reniform is exceedingly narrow, compared with that of *nictitans*, owing to the absence of the outside ring present in the reniform of the latter species. The hind wings dark grey, the males with the base much

paler, darker nervures and indistinct lunule. This variety is figured, 'Entom.,' xxi., Plate i., fig. 1. I have specimens from Sligo, Strood, Freshwater and Deal. (2) *paludis-flavo*.—Figured, 'Entom.,' xxi., Plate i., fig. 2. Like *paludis-albo*, but with a yellow reniform instead of white. I have specimens from Sligo, Strood, Shoeburyness, Freshwater and Deal.

α. var. *intermedia*, mihi.—(1) *intermedia-albo*.—This variety has the ground colour darker ochreous than in *paludis*, a more distinct dark shade around the reniform, and the ground colour with a slight greenish tint. It is figured, 'Entom.,' xxi., Plate i., fig. 3. I have specimens of this var. and *intermedia-flavo*, from Shoeburyness, Sligo, Strood, Freshwater (Isle of Wight), and Deal. (2) *intermedia-flavo*.—Like the above, *intermedia-albo*, but with the reniform yellow instead of white.

β. var. *brunnea*, mihi.—(1) *brunnea-albo*.—Anterior wings of a deep brownish ground colour, the dark shade, which in *intermedia* surrounds the reniform, spreading all over the anterior wings, making them almost unicolorous; the reniform white. (2) var. *brunnea-flavo*.—Like *brunnea-albo*, but with yellow instead of white reniform. My specimens came from Strood and Freshwater (Isle of Wight).

γ. var. *grisea*, mihi.—(1) *grisea-albo*.—The ground colour greyish, darker than *paludis* and *intermedia*, with a slight greenish tinge, a pale yellow orbicular and a white reniform, a darker shade enveloping the lower part of the reniform. The pale transverse lines as in *paludis* and *intermedia*. The posterior wings darker than in either of these last two varieties. This form is figured, 'Entom.,' xxi., Plate i., fig. 4, and I have specimens from Deal and Strood. This and the following are more common in Kent than either var. *paludis* or var. *intermedia*. (2) *grisea-flavo*.—Like *grisea-albo*, but with yellow reniform stigmata instead of white. This form is figured, 'Entom.,' xxi., Plate i., figs. 6 & 7, the latter of these two figures having the transverse lines especially strongly marked. My specimens came from Strood, Freshwater and Deal.

Hydræcia, Gn., *micæa*, Esp.

This is a most variable species, both in colour and size. The ground colour varies from a pale whitish grey and yellowish red, through bright red and purplish red, to deep brown, with no trace of the typical red colour. In size, some specimens are almost twice the expanse of others. In the autumn of 1883 I bred some four hundred specimens from roots of dock. Previous to this, I had looked on this as a most constant species, and its variation surprised me much. Guenée seems surprised that Sepp figured two different varieties, one of which (figs. 6 and 7) he says is the ordinary French form, the other of "an ashy green colour" ('Noctuelles,' vol. v., p. 128). I have never seen one with a green tint. This species has a peculiar shining lustre, hence its name. The type is represented by Esper, Pl. 145, fig. 6, which I have described as follows:—"A dull red ground colour, with two single, fuscous, basal lines, dark greyish or fuscous nervures and costa; stigmata the same shade as the ground colour, surrounded by a narrow purplish ring, and this again surrounded by black; between the two basal lines there is a purple shade, and a strong whitish line

beyond the reniform is internally margined with blackish, a greenish grey shade at the base of this black line; the outer part of the wing beyond this white line is also grey, with the exception of an apical streak and a bright reddish hind margin. Hind wings grey, with a marginal shade, followed by a dark transverse line and lunule, base reddish." Haworth describes this species under the name of *cypriaca*, as:—"Alis roseis vel subfuscis fusco-strigatis, medio saturatoribus." Hübner also figures (224) the species under the same name. Haworth's var. β . would appear to be the same as Esper's duller-coloured type, for he writes:—"alis magis fuscis et fere absque tincturâ roseâ: posticis cinerascensibus lunulâ mediâ strigisque pone medium fuscis" ('Lepidoptera Britannica,' p. 228, No. 197). I have received this form (type) from Sligo and Aberdeen, have frequently captured it near Strood, and have bred it from Greenwich larvæ, although I have none with the greenish* shades mentioned in my description of Esper's figure. I consider the following a summary of the principal phases of variation:—

- 1.—A whitish-grey form, with slight pink tinge = var. *grisea*.
- 2.—A yellowish red form = var. *lutea*.
- 3.—A rosy form (the more common one in Kent) = var. *cypriaca*, Haw.
- 4.—A deep red (tinged with purplish) form = var. *rubida*.
- 5.—A dull red form suffused with fuscous = *micacea* (the type).
- 6.—A brown form = var. *brunnea*.

I cannot help remarking here the superficial resemblance of this last variety to *petasitis*.

a. var. lutea, mihi.—The anterior wings of a very pale yellowish-red ground colour, very shiny, the transverse lines also paler than in the type. The hind wings, which are pale yellowish, have faint traces of the lunule and transverse line, but not of the transverse shade noticeable in the darker forms. Some specimens of this form are very small. I have only Greenwich specimens of this variety, but Mr. Russ occasionally takes it at Sligo.

β . var. cypriaca, Haw.—I am uncertain whether Hübner's fig. 224, ought to be referred to this variety, which I would have include all the bright red rosy forms from which it has derived its English name "*rosy rustic*"; I base this opinion on Haworth's description, "*alis roseis, fusco strigatis*," but I believe such forms as are represented by Hübner's figure should be included. These rosy forms are the more general in the South of England, but apparently rare in the North, where the darker and greyer forms are more abundant.

γ . var. rubida, mihi.—The anterior wings of a rich red colour, with a tendency to a purplish tinge. The posterior wings strongly marked with a dark lunule, transverse line and shade. I consider this the finest variety of the species, and have never seen specimens except those I have bred from this neighbourhood.

δ . var. brunnea, mihi.—An extreme development of var. *rubida* where the dark red is entirely replaced by a deep, shiny, brown colour. The hind wings are very much suffused with fuscous, the ground colour being of a dull grey; the lunule, transverse line and shade

* I believe this is chiefly due to the artist trying to represent the peculiar shiny lustre of this species.

being darker than the ground colour. This extreme melanic form is rare here in the south: I have only obtained one in this (Greenwich) neighbourhood, but I have received it from Mr. Percy Russ of Sligo, and Mr. Reid of Pitcaple. In these localities it seems not uncommon.

ε. var. *grisea*, mihi.—Anterior wings of a pale, shiny, greyish white, the transverse markings having the slightest possible trace of reddish colour; the stigmata very indistinct. The posterior wings greyish white, with a dusky lunule, and transverse line, while some of these grey forms have, and others have not, the ordinary transverse shade. This form is the one more generally obtained in the marshes on the banks of the Medway; I have bred it from Greenwich, and have received it from Mr. Percy Russ (Sligo).

Hydræcia, Gn., *petasitis*, Doubleday.

Guenée, in his 'Noctuelles,' vol. v., pp. 127, 128, treats this as a variety of *H. vindelicia* of Freyer and Herrich-Schäffer, but this latter is sunk as a synonym by all modern authors. A full description of the type is given by Newman in his 'British Moths,' p. 281; and on p. 282 of the same work, Newman points out that, if *vindelicia* is a less obscure form, as mentioned by Guenée, *petasitis* is the prior name to *vindelicia*, and the former therefore would become the type and the latter be retained simply as a varietal name. Comparing *petasitis* with *vindelicia*, Guenée writes:—"Much smaller, the markings of the superior wings very confused, and all the wings are more shining and more thickly scaled" ('Noctuelles,' vol. v., p. 128). Our specimens of *petasitis* present a slight sexual variation, the females being larger and darker than the males.

α. var. *vindelicia*, Frey.—Guenée's description of *vindelicia* ('Noctuelles,' vol. v., p. 127) is as follows:—"Superior wings greyish brown with a slight violet tinge, and all the exterior part of the median space, the outer margin, and a streak from the apex of a deeper brown. Nervures sprinkled with whitish. The two stigmata large, and of the same hue as the ground colour. Inferior wings of a clearer grey, with a darker lunule, median line and subterminal shade." This is therefore only a larger, brighter form than ours. Mr. Dobrée writes:—"Guenée separated *petasitis* from England and *vindelicia* from Bavaria, because in those early days it was not understood that British insects are generally smaller, less distinctly marked, and less brilliantly coloured than Continental specimens, especially as you approach Southern Europe" (*in litt.*). I have received some exceptionally large dark specimens from Mr. Collins, bred from larvæ, captured near Warrington, with the central band well developed. These are much larger and brighter than specimens I bred myself from pupæ taken at Sheffield.

β. var. *amurensis*, Stdgr.—Dr. Staudinger, in his trade list (1887) included a variety of this species, from the Amur district, under the name *amurensis*. Of this variety I know nothing, but Mr. Dobrée has kindly given me the following information:—"I have v. *amurensis*, and if the three or four I have illustrate them all, the markings are possibly a little more distinct than ours, and the violet gloss very decidedly more noticeable, but otherwise they do not differ from our specimens" (*in litt.*).

Helotropha, Ld., *leucostigma*, Hb.

Hübner twice figured this species,—first under the name of *leucostigma* (fig. 375), and then a very marked variegated variety, of a bright red colour, under the name of *fibrosa* (fig. 385). The latter name has been in general use in Britain for this species. Our specimens are very variable, but most of them are of a dark umber-brown ground colour, although some are much brighter than others in this respect, and I have specimens from Wicken with quite a ruddy appearance. In the character of the markings there are two very distinct forms occurring in Britain,—one, variegated with paler transverse basal lines, and a broad pale band extending from the apex to the inner margin, just beyond the anal angle, and extending along the inner margin; the median nervures whitish, and branching under the reniform, and with either white or ochreous reniform stigmata = var. *lunina*;—the other, more unicolorous, with the transverse markings comparatively obsolete, the reniform either white = var. *albipuncta*, or ochreous = the type. We get nothing in Britain so extreme as Hübner's *fibrosa*; and Guenée, in the 'Noctuelles,' vol. v., p. 210, makes the same remark about the French specimens. I am inclined to think that Hübner's *fibrosa* is a rather over-coloured specimen, and that the ruddy specimens mentioned above are really the form that Hübner intended to represent. There is no proof that this is so, but no knowledge appears to exist of very bright, red specimens. Guenée writes:—"I have never seen this Noctuelle as bright in colour as Hübner's figure. That of Duponchel is much more natural." He also adds that "specimens are found intermediate between *fibrosa*, Hb., and the unicolorous type." Hübner's type may be described as:—"The anterior wings dark purplish brown, with blackish transverse lines; reniform yellowish. Hind wings purplish grey, with a darker margin." Mr. Dobrée writes of the Canadian type:—"Leucostigma, so far as my specimens permit me to judge, is rather of a bistre- than an umber-brown, and mottled rather than unicolorous" (*in litt.*). Of the type, Dr. Staudinger writes:—"Al. ant. unicolor. nigricant. flavo- vel albo-maculatis." Hübner's type certainly is not "*albo-maculatis*," but "*flavo-maculatis*." Mr. Dobrée writes:—"Both forms occur on the Amur, but apparently *fibrosa*, Hb., the less commonly (Graeser, 'Berl. Ent. Zeits.,' 1888). My specimen of *leucostigma* from there agrees with Hübner's type. I have specimens, also from Canada, of both varieties" (*in litt.*). The principal varieties are:—

a. var. *albipuncta*, mihi.—Unicolorous purplish brown (like the type), umber-brown or blackish, with faint traces of transverse markings, but with reniform white instead of ochreous. I have taken this form at Greenwich, and have a long series of it taken by the Rev. G. H. Raynor in Wicken Fen; Mr. Percy Russ has captured a considerable number of this variety, with var. *lunina* and the type, in the neighbourhood of Sligo. Mr. Collins, of Warrington, takes this form a few miles from that town, together with the type and var. *lunina*. Mr. Reid writes:—"This species is very scarce and local here (Pitcaple, Aberdeen); all those I have taken are referable to var. *albipuncta*. I have not seen any other forms here" (*in litt.*).

β. var. *lunina*, Haw. = var. *intermedia*, Tutt.—(1) *albo-lunina*.—

Anterior wings of a deep umber-brown, with two pale (slightly ochreous) transverse basal lines, and a paler orbicular; reniform white (sometimes reticulated), and standing on a white geminated line (part of median nervure); a pale oblique transverse streak from apex to inner margin, and a pale wavy line parallel to hind margin. In the 'Entomologist,' vol. xxiii., p. 13, I described this var. as *intermedia*, but it is referable to Haworth's *lunina*. His description is:—"Noctua. Alæ anticæ pallide castaneæ margine postico fusco. Stigmata ordinaria in superiore parte maculæ fasciæ formis, quæ macula margines non attingit. Anterior stigma, rotundum margine pallescente solum conspicuum, subinde oblitteratum; exterius lunatum, album vel medio griseum. Margo posticus fasciâ tenui ustulato-fuscâ. Alæ posticæ fuscæscentes" ('Lepidoptera Britannica,' p. 209). (2) *flavo-lunina*.—The same as *albo-lunina*, but reniform ochreous. I have var. *lunina* from Wicken and Sligo; Mr. Collins also takes this variety in the neighbourhood of Warrington. The Irish specimens are particularly bright, but not red, like Hübner's *fibrosa*.

γ. var. *fibrosa*, Hb.—Hübner's figure 385, *fibrosa*, may be described as:—"Anterior wings bright red, with dark greyish outer margin, and darker red round the stigmata; reniform very pale. Hind wings as in *leucostigma*." This form may occur in Britain, but I have never seen specimens nor heard of any captures at all resembling it. The nearest approach I have are some clearly marked, ruddy-looking specimens from Wicken, which I label as "var. *fibrosa* (?)." Mr. Dobrée writes:—"The *fibrosa* from Canada, are of a more generally sombre colouring, but otherwise similarly marked to the European ones" (*in litt*).

Axylia, Hb., *putris*, L.

The type of this species is described by Linnæus as:—"Noctua spirilinguis cristata, alis deflexis obsoletis subpunctatis, margine exteriore fusco adjecta macula subocellari." "Color ligni putride, ut in exsoleta s. verbasci, sed brevis" ('Systema Naturæ,' p. 850, No. 152). Haworth describes the species as:—"Alæ pallidæ sive flavicantes costâ late fuscâ," &c. ('Lepidoptera Britannica,' p. 172, No. 34); whilst Guenée describes it as:—"Superior wings of a very clear, pale yellow, with the costa broadly brown," &c. ('Noctuelles,' vol. v., p. 134). Hübner figures the species under the name of *lignosa*, and his figure (245, by error 215) is not quite typical, the anterior wings being "yellowish ochreous with black markings." Newman, in his 'British Moths,' p. 282, describes the species as "pale wainscot-brown, with dark umber-brown markings." These seem to be the chief points of variation, *viz.*, the ground colour varying from whitish or pale yellowish to dark ochreous or wainscot-brown, and the markings from brown to black. I have both forms in my cabinet. Those with typical pale yellow wings and black markings would appear to be the *sicca* of Guenée. Mr. Russ has sent me a specimen from Sligo with a distinct dark shade, reaching from the base of the reniform to the inner margin.

α. var. *lignosa*, Hb.—Ground colour yellowish-ochreous instead of pale yellow or whitish; the ordinary markings black instead of brown, much irrorated with fuscous dots. A full description of Hübner's

lignosa would be, "Anterior wings with the ground colour of a yellow ochreous shade, with a black basal streak, the orbicular and reniform outlined in black; a double transverse line of dots beyond the reniform; the median nervure continued through the wings as a dusky shade; a broad black costal streak runs along from the base of the costa to the apex where it ends; two short dusky shades are placed in the upper part of the outer margin. Hind wings grey, with the outer margin slightly ochreous." Newman's figure, 'British Moths,' p. 282, is much too dark for the type, and apparently belongs to this variety.

(?) *β. var. sicca*, Gn.—Guenée describes a species under the name of *sicca* as follows:—"A little smaller than *putris*, the superior wings of which species those of *sicca* much resemble, if it were not that the costal streak is more black than brown, above all between the two *stigmata*, where they form a distinct black spot. Inferior wings entirely pure white. Head, thorax and palpi, pale yellow. I have only a single male of which I am ignorant of its locality" ('Noctuelles,' vol. v., p. 135). The pure white hind wings leave me in doubt as to the specimen being a variety of this species.

Xylomiges, Gn., *conspicillaris*, L.

Linnæus' *conspicillaris* ('Systema Naturæ,' Edition 10, p. 515, No. 102) is the type, and is described as:—"Noctua spirilinguis cristata, alis incumbenti planis: pallide griseis, oculorum operculis orbiculatis." "Alæ inferiores subtus albidæ, pone punctum fascia obsoleta e punctis distinctis, præter illa quæ alas terminant." Haworth, in the 'Lepidoptera Britannica,' p. 171, describes this species as:—"alis striatis, fusco cinereoque variis, marginem tenuiorem versus albicantibus." "Alter sexus (♀) saturator." Guenée, in his 'Noctuelles,' vol. v., p. 150, writes:—"This is not the *conspicillaris* of Linnæus," but I fail to see anything in his argument which would convince anyone that it is not so. Newman, in his 'British Moths,' p. 288, figures three varieties, and on the same page, after describing the pale Linnæan type, writes:—"Although this description will do very well for the more usual form of the species, it seems desirable to say that the distribution of colour in the fore-wings is excessively various. Three marked varieties occur in the series of continental specimens kindly lent me by Mr. Doubleday." He then describes the three varieties. The first is the var. *melaleuca* (top figure in Newman); the second var. *intermedia* (2nd fig. in Newman); the third is the type (bottom figure in Newman). Staudinger writes in his 'Catalog.':—"type—al. ant. brunneis-griseis." Guenée describes var. *melaleuca* as the type; his *melaleuca* is var. *intermedia*; while his var. B is the Linnæan type, which he says is the least common form in France, (*vide* 'Noctuelles,' vol. v., pp. 150—151). Hübner figures (237) a brown form as well as var. *melaleuca* (236) under the name of *conspicillaris*. Taking therefore the pale form as the type we have the following varieties:—

a. var. *melaleuca*, View.—The type of this variety is obtained from Vieweg's 'Tabellarisches Verzeichniss,' &c., p. 68, and according to Guenée, No. 105, pl. 1, fig. 5. Of this variety Staudinger says:—"al. ant. nigricant.; dorso et margino post. albedo." Vieweg's own description, p. 69, No. 105, is as follows:—"Noctua cristata alis deflexis anticis nigris, margine tenuiore lituraque postica albis: thorace albo

nigroque vario." His figure, Plate i., fig. 5 of the same work, shows that Staudinger's summary is exact, and that Guenée is wrong in treating var. *intermedia* as *melaleuca*. Newman's description is more like Staudinger's, and his figure (No. 1, p. 288) makes his description clear. Hübner figures (226) this variety under the type name (*conspicillaris*). The description of his figure is as follows:—"Costal margin blackish grey, stigmata outlined in reddish, inner margin pale with a pale streak from the costa (near apex) to meet the pale inner margin. Hind wings white with distinct nervures." Guenée's type of this species (*conspicillaris*) is var. *melaleuca*; he writes, 'Noctuelles,' vol. v., p. 150:—"Superior wings of a greyish-black, with the inner margin and subterminal area of a greyish-white tinted with yellow ochreous; the first widens after the claviform stigma, which is only indicated as far as the two median stigmata; the second spotted and interrupted in the middle. Inferior wings white with blackish nervures, the inner angle shaded with grey and a blackish lunule better marked below." If this be compared with Newman's fig. 1 (p. 288) it will be seen that they agree. Guenée gives Europe as its habitat. In Robson & Gardner's list we find:—"var. *melaleuca*, costal and hind margins pale coloured," which is evidently incorrect, as the costa is dark.

β. var. *intermedia*, mihi.—This is a form intermediate between the pale grey-brown type, and the dark var. *melaleuca*. It is figured by Newman, 'British Moths,' p. 288, 2nd figure, and described on the same page as:—"The dark colour of the anterior wings much more limited (than in *melaleuca*); it occupies the middle of the wing, and leaving a large oblong space at the tip, ascends to the costa between the discoidal spots." It is described by Guenée as *melaleuca*, 'Noctuelles,' vol. v., p. 150, who, comparing it with the dark variety says:—"The black colour much less extensive and leaving a large ochreous space, from the reniform almost to the apex. The subterminal line absent in the clear parts. Stigmata clearly visible and strongly outlined in black." This will be found to agree exactly with Newman's 2nd figure. Guenée says that "although this variety has a very different appearance to the type, it is the same species. One obtains it as abundantly from larvæ as the dark form."

γ. var. *medio-linea*, mihi.—Hübner's figure 237 differs from the type in being browner and having a very distinct dark line extending from the costa to the inner margin passing between the orbicular and reniform stigmata. The description I have made is as follows:—"Anterior wings pale brown, with many longitudinal streaks; orbicular outlined in black; under the orbicular there is a trace of a basal streak; a dark transverse line passes between stigmata from costa to inner margin; reniform absent, several black streaks on outer margin as in var. *intermedia*; a slaty shade along the inner margin. Hind wings white with distinct lunule."

Generalising on these varieties Newman says:—"In all three (*i.e.* the type, var. *intermedia* and var. *melaleuca*) varieties, there is a radiated appearance more or less conspicuous on the fore wings, arising from the blackness of the wing rays: the fringe seems always to be dark, and there is a small linear tuft of pale scales at the extremity of each wing-ray: the hind wings are white or whitish, with a pale brown

discoidal spot, margin, and wing-rays; the fringe is white; the head and thorax are grey, the latter decorated with a dark discoidal blotch and darker borders, especially on the sides; the body is obese, crested at the base, and squarely truncate at the extremity: its colour is greyish brown" ('British Moths,' p. 288).

Xylophasia, St., *zollikoferi*, Frey.

I have been reminded by Mr. Dobrée that I ought scarcely to pass this rare species which has been twice captured in Britain; one in the beginning of October, 1867, by Mr. Harding of Deal, the other by Mr. Tait, at Inverurie, a few miles from Aberdeen, in September, 1871. The former specimen is in the Doubleday collection at the Bethnal Green Museum, the other is, I believe, still in the possession of Mr. Tait. The notice of the first capture, as recorded in the 'Entomologist,' vol. v., pp. 29, 30, is by Mr. Doubleday, and is as follows:—"The beginning of October, 1867, Mr. Harding took a large NOCTUA at Deal, which was unknown to me, but which I thought might be *X. zollikoferi*, from M. Guenée's remark that some authors had placed this insect in the genus *Nonagria*, and Mr. Harding's moth certainly resembles a female *N. typhæ* in colour and markings. A short time since I sent it to Dr. Staudinger, and he says it is *X. zollikoferi* var. This species is principally found in Hungary and Russia, but is not common anywhere." The notice of the second capture may be found in the 'Scottish Naturalist,' vol. i., pp. 267, 268, with a very full description by Dr. F. Buchanan White. The type of this species is represented by Freyer in his 'Neuere Beiträge,' &c., pl. 184, figs. 1 & 2. Fig. 1 is a male, the "anterior wings of a dull smoky brown colour, with the basal part of the inner margin paler, the nervures of the same dark colour as the other part of the wing; a short, black, longitudinal, basal line just under the median nervure; the claviform distinctly outlined in black, but only the slightest traces of the other stigmata; a row (8) of longitudinal black dots on the nervures just beyond the reniform area; a faint greyish line parallel to hind margin just outside the dots. Hind wings pale grey, with darker outer margin, dusky nervures, and dusky lunule." Fig. 2 is a female. It is like fig. 1, but "the basal and median areas pale greyish brown, extending from the inner margin to costa, followed by the dull, dark smoky brown colour of the male on the outer area (beyond the reniform); basal streak, row of black dots and grey line as in male, but no stigmata. Hind wings much darker than in male, dark smoky brown as in anterior wings, base a little paler." Herrich-Schäffer's two figures, 'Schmet. von Europa,' &c., figs. 103 and 104, also represent dark specimens; fig. 103 approaching more nearly to the British specimens. Strange to say, both the British specimens are strikingly pale, the Inverurie specimen being paler than the specimen captured at Deal. Of this variation Dr. White, quoting Mr. H. Doubleday, writes:—"This (the Inverurie specimen) is a very pale variety. My specimen (the Deal one) is thickly irrorated with black along the nervures, and very closely resembles in appearance a female *N. typhæ*. I sent my specimen to Dr. Staudinger, and he said it agreed exactly with a specimen in his cabinet which was captured in Hungary. He added that it was one of the rarest of the European

NOCTUÆ, and he only knew of the existence of a few specimens, two of which were taken near Berlin, and the others in Hungary and Russia'” ('Scottish Naturalist,' vol. 1., p. 267). As our two British specimens are so much paler than the type, I propose to call them var. *pallida*.

a. var. *pallida*, mihi.—The following is Dr. White's description of the Aberdeenshire specimen:—"Front wings shining greyish ochreous, more grey beyond the subterminal line, and the nervures faintly marked out in grey. The only markings are the orbicular stigma, the edges of which are pale ochreous but very indistinct; the claviform stigma also edged with ochreous but almost imperceptible; the reniform stigmata which are more apparent, outlined with ochreous, and the lower end filled in with pale grey; the elbowed line, which consists of a row (in some places double) of small blackish spots on the nervures, and a faint ochreous line near the inner margin; and the subterminal line, which is pale ochreous and serrated, especially in the middle where it is like a W, the serrations looking towards the base are tipped with grey. The hind margin is undulated, and between the tips of the nervures is a grey line: the fringes are ochreous, intersected by a darker line; the inner margin is narrowly greyish black. The hind wings are ochreous white with the nervures and the hind margin irregularly ochreous grey. The expansion of the wing is about $2\frac{1}{4}$ inches." Dr. White then adds:—"Herrich-Schäffer ('Schmet. von Europa,' &c.) gives two figures of this species. Fig. 103 is most like the Inverurie specimen; but differs in being much darker in colour, in having no trace of the claviform and orbicular stigmata, the elbowed line distinctly formed of two rows of dots and no ochreous line on the inner margin, the subterminal line more distinctly marked with grey. The hind wings are much darker, and the expanse of the wings barely 2 inches. Fig. 104 is very different, and looks almost like a different species" ('Scottish Naturalist,' vol. i., pp. 267, 268). The Doubleday specimen is so much paler than the type, that I think it may be very well included under this varietal name.

Xylophasia, St., *polyodon*, L. (*monoglypha*, Hufn.).

This is another most variable species, ranging from specimens of a pale whitish grey ground colour, through almost every intermediate shade to deep unicolorous brown and black. The melanism on our southern coasts tends more to the production of dark, more or less unicolorous, brown forms; that in the North of England, Scotland, and the west coast of Ireland to the production more especially of intense black forms, although occasionally more or less black forms are taken in the south, and beautiful rich brown forms occur in North Britain and on the west coast of Ireland. I would also draw attention to the great variation in the direction, shape and size of the orbicular stigma; sometimes this is quite linear, sometimes oval, and sometimes round; sometimes large and sometimes comparatively small. Of this species Mr. Hill, of Derby, writes:—"Nearly every season I meet with dark varieties of this insect almost as dark as the Scotch forms, but they are very rare" ('Ent. Mo. Mag.,' vol. xxiii., p. 6). This species seems to vary but little on the Continent, so far as it is at present known, and scarcely any continental authors appear to have figured or described any varieties except Staudinger, who has recently named one intensely

black form *æthiops*. Hübner figures the type, with a pale patch along the inner margin and near the anal angle, as *radicea*. The Linnæan description ('Systema Naturæ,' p. 853, No. 170), is as follows:—" *Noctua spirilinguis cristata, cinereo-nebulosa; margine postico multidentato.*" " *Alæ superioris margo posticus circiter, 8 dentibus terminatus.*" Guenée in his 'Noctuelles' mentions nothing about the species being variable, although he says, "common everywhere." Haworth describes the pale variegated form, which is generally looked upon as the type, as:—" *Noctua cristata, alis deflexis dentatis variegatis: striga postica dentatis albis, thoracis crista elevata bifida.*" " *Corpus pergrossum. Alæ anticæ ex fusco parum fulvicantes, nebulis variis nigris pallidisque. Stigma anticum oblongum, et valde obliquum sive sub-supinum. Juxta marginem posticum, striga profundissime et acutissime dentata albo nigro interne adnata. Posticæ alæ cinereo-fuscæ, fimbria fusca, ciliis fulvicantibus*" ('Lepidoptera Britannica,' pp. 186, 187). He also adds:—" *Variat alis minus variegatis.*" Thanks to my friend, Herr Hoffmann (Hanover), I have been able to get a translation of Hufnägel's original description, which is as follows:—"With a bluish tinge, partly light and partly dark grey, with a Latin W in the hind margin," certainly a most comprehensive one, and worthy of consideration. Treating therefore as the type the variegated form, which has the whitish blotch on the inner margin near the anal angle, we have four striking varieties, joined of course by intermediate forms. These are:—

1.—A suffused brown or greyish brown form, with the markings distinctly traceable, though obscured, var. *obscura*.

2.—A deep, intensely brown form, with the markings scarcely traceable, var. *brunnea*.

3.—A black form with moderately distinct markings, var. *infuscata*.

4.—An intensely black form with the markings almost entirely obliterated, var. *æthiops*.

a. var. obscura, mihi.—A suffused brown or greyish brown form with all the pale markings of the type brownish or dull greyish instead of whitish. The whole of the markings of the anterior wings clearly traceable, although obscured. The brownish transverse lines (pale in the type) margined with darker brown. My specimens have come from Strood, Greenwich, Deal,* Sligo, Barnsley and many North of England and Scotch localities. It also occurs at Portland.

β. var. brunnea, mihi.—The anterior wings a deep, rich brown, with the discoidal spots and transverse lines traceable. This is almost the same form as *infuscata*, with the ground colour deep brown instead of black. My specimens have come from Mr. Percy Russ of Sligo, Mr. Henderson of Glasgow, and Mr. Harrison of Barnsley. I have also received it from a few other localities, but all northern. Some of my Deal varieties of var. *obscura* approach this form closely. Mr. J. Jenner Weir ('Entom.,' xiv., 220), writing of the Hebridean *polyodon* remarks:—"The parallel variety to *combusta (rurea)* is of the richest

* During the summer of 1888 scarcely a pale *polyodon* occurred on the Deal sandhills; almost all were *obscura*. I even captured one specimen of var. *infuscata*. I have no doubt this was due to the excessively wet season. I also captured a specimen of var. *infuscata* in 1890 at the same place.

dark chestnut colour, very glossy, and, as in the case of *X. rurea*, the intermediate varieties are numerous."

γ. var. *infuscata*, White.—This variety was named by Dr. F. Buchanan White ('Fauna Perthensis,' Part i.). It was given to those very dark specimens, with the ground colour black, which are abundant in Scotland, the North of England and the West of Ireland, but which are so rare in the South of England. The distinctness of the typical pale markings varies exceedingly, but generally they are distinctly marked in greyish. Mr. G. T. Porritt, in his 'List of Yorkshire Lepidoptera,' p. 74, says:—"The black form, var. *infuscata*, White, is of frequent occurrence, both in the east and west of the county." I have captured it myself at Deal, and have received it from Barnsley, Fleetwood, Hartlepool, Glasgow, Aberdeen, Sligo, and many other localities, chiefly northern. A record of the occurrence of this variety at Tenby is made in the 'Entomologist,' xxii., p. 15, and also one of its occurrences at Sheerness by Mr. J. J. Walker, ('Ent. Mo. Mag.,' vol. ix., p. 163). The variety also occurs freely in the Orkneys, Shetlands and Hebrides. Mr. C. G. Barrett ('Ent. Mo. Mag.,' vol. xxii., p. 125) reports it as "occurring near Dublin," and in the same magazine, vol. xxv., p. 259, the Rev. W. F. Johnson writes from Armagh:—"I took some very dark (almost black) specimens of *Xylophasia monoglypha*."

δ. var. *æthiops*, Stdgr.—This is an extreme development of the var. *infuscata*, White, the whole of the anterior wings intensely black, with no paler markings, and scarcely the slightest trace of any markings whatever; some specimens are perfectly unicolorous. The most perfectly unicolorous specimens I have are from Mr. Percy Russ of Sligo, although specimens from the Lancashire coast, Glasgow and Aberdeen, are but little behind them in intensity.

Xylophasia, St., *lithoxylea*, F.

So much uncertainty prevails with regard to the *lithoxylea* of the 'Vienna Catalogue,' which gives no description, that the *lithoxylea* of Fabricius ('Mantissa,' p. 182) is generally accepted as the type of the species. This description is as follows:—"Noctua cristata alis deflexis dentatis, cinereis fusco maculatis; margine postico fusco." "Corpus cinereum. Thorax dorsali brunnea. Alæ anticæ dentatæ cinereæ maculis punctisque obsoleteis fuscis. Margo posticus tenuissime fuscus. Subtus cinereæ margine tenuiori nitido. Posticæ cinereæ margine postico fusco, subtus immaculatæ." Hübner figures the very red form of *sublustris* as *lithoxylea*. It is a species which varies but little, so far as I know; some specimens appear to be a little more suffused with dark scales than others, but generally the paler specimens show undoubted traces of wear. The specimens which I have from Greenwich, Strood, Deal, Sligo, and northern British localities, show no variation worth mentioning. Haworth in his 'Lepidoptera Britannica,' p. 169, gives a good description of this species; but he accepts Hübner's fig. 240 as this species, with the remark "at magis ferruginea," although it is undoubtedly *sublustris*. Guenée also states in his 'Noctuelles,' vol. v., p. 139, that "some lepidopterists have supposed *lithoxylea* a variety of *polyodon*." This will give some idea of the closely-allied character of this group when studied through their varieties.

Xylophasia, St., *sublustris*, Esp.

This species has been much mixed up with *lithoxylea*, many of our early authors treating them as the same species. Hübner figures (240) a red variety of *sublustris*, which he calls *lithoxylea*; and Haworth, in his 'Lepidoptera Britannica,' p. 169, No. 25, writes with reference to this figure, comparing it with *lithoxylea*:—"at magis ferruginea;" but as he does not attempt to separate it from *lithoxylea*, British *sublustris* may not have been known to him. Guenée, in his 'Noctuelles,' vol. v., p. 139, states that "Treitschke has confounded the two species, and has cited their synonymy very indistinctly." On p. 140, Guenée also writes:—"Is this a separate species, or only a variety of *lithoxylea*? . . . It is constant in markings and character." He then writes:—"Its colour is always more red, and the discoidal spots much better marked; the inferior wings have a very distinct brown discoidal line between the lunule and the hind margin." These characters are distinct, and I think the difference in the hind wings of *lithoxylea* and *sublustris* well worthy of notice. This interesting species is very variable on the coast of Kent, and specimens exhibit much difference both in the ground colour and the depth of the markings. Most of the specimens have the anterior wings of a pale ochreous-grey ground colour; others are decidedly yellowish ochreous, and these lead up to a very distinct form with the ground colour decidedly tinged with red. With respect to the markings, there is also a very great difference. Some specimens have the characteristic markings in the central part of the wing and on the outer margin very faint, and merging into the ground colour; others have them distinctly marked in dark greyish brown; others have them marked in deep brown; while the form mentioned above, with the red ground colour, has them in a clear reddish brown or rust-red, shaded off into the paler ground colour. The specimens also vary with regard to the transverse row of spots parallel to the hind margin; some specimens have these spots absent, some well developed, and some have them joined by curved arches, making a wavy line exactly of the same character and shape as the second transverse line in the allied species *polyodon*, L. (*monoglypha*, Hufn.). But the most remarkable specimen I have is one with the whitish ground colour of *lithoxylea*, with all the markings of *sublustris* most clearly developed, even to the wavy line mentioned above. There is a great amount of difference also in the quantity of dark scales with which the anterior wings are sprinkled. This makes some specimens look quite melanic compared with others. But dark as some of our specimens are, we do not appear to obtain (after making all due allowance for the artistic demerit) any specimens so dark as Esper's type. Esper's fig. 1 ('Die Schmetterlinge,' &c., pl. cxxxiii) is the type, and, although bad enough, is recognisable at once as an exceedingly suffused form of this species. I have made the following description of his figure:—"Probably a female (Esper calls it a male). Anterior wings dark ochreous, entirely suffused for two-thirds of the wing from the base with dark fuscous, except along the inner margin, where the ground colour is more noticeable; the outer one-third of the wing, from the apex to the inner margin, paler; this paler area with a double transverse row of dots parallel to the hind margin, and

also a pair of dots near the edge of the inner margin at about one-third from the base;* the nervures with a slight purplish tinge; the hind margin dark fuscous. The hind wings dark grey, the base a little paler, with a slight purplish tinge." It will at once strike those who have a short series from our south coast how unlike this description is to our usual forms; and yet when one looks at Esper's figure one recognises at once that it is *sublustris*, although I must say that I have seen no British specimens so dark as Esper's figure. The Irish specimens that I have seen are all uniformly redder than my reddest vars. (*lithoxylea*, Hb.) from Deal, and I have a very red specimen from Portland. Besides an approach to Esper's very dark type and the very red form mentioned, we appear to get two very distinct forms in Britain, one, which is comparatively rare, whitish in ground colour, the other greyish or yellowish-ochreous, sometimes with the faintest suspicion of a green tinge; these extremes being joined by intermediate specimens, which vary much, *inter se*, both in the depth of the ground colour and markings, although of a general greyish ochreous hue. These forms I shall call:—

a. var. pallida, mihi.—Ground colour whitish-ochreous, inclining to the pale colour of *lithoxylea*, the dark shades very distinct and standing out clearly in the pale ground colour; the transverse markings also very distinct, a transverse wavy line being formed by the union of the transverse row of dots parallel to the hind margin, with lunular arches. Hind wings dark grey, with a distinct lunule, a pale transverse line outside the lunule, then a dark transverse shade followed by another pale marginal line. I have only occasionally captured specimens of this variety at Deal.

β. var. intermedia, mihi.—Intermediate between var. *pallida* and the red var. *lithoxylea* of Hübner. Ground colour yellowish-ochreous, with a dark grey tinge, the typical shades variable in depth of colour, and the transverse lines also variable in the extent of their development. This is the ordinary form on the south-east coast of England.

γ. var. lithoxylea, Hb.—This must not be confounded with the *lithoxylea* of Fab., which is a distinct species. Hübner's fig. 240 may be described as follows:—"Anterior wings bright ochreous with a reddish tinge, a bright red shade between the stigmata, and another bright red shade along the hind margin; a series of black dots on the pale nervures beyond the reniform area. Hind margin of the hind wings dark ochreous, with a dark transverse shade and lunule." This is a very distinct form, with the ground colour redder than the type, and the ordinary dark shades of the type of a distinctly bright rust-red colour. I have looked over and captured a large number of this species at Deal, but this form must be considered comparatively rare there, as I have taken but few of them. I have seen odd specimens amongst those taken by the Folkestone collectors, but I dare say a larger number would occur there if specially looked for, as the species is very abundant. The specimens from Sligo and one specimen that I have from Portland, are extreme forms of this variety.

Xylophasia, St., *rurea*, F.

Fabricius' description of the type is follows:—"Noctua cristata,

* These two dots are very unusual in *sublustris*, although common in *lithoxylea*. I have one specimen of *sublustris* with both developed, many with one, but the greater number of my long series have neither.

alis deflexis, griseo fuscoque variis, posticis fuscis; margine crassiori albo." "Caput fulvum, oculis atris. Palpi fusci apice albicantes. Thorax et abdomen cinerea. Alæ anticæ griseæ basi ad marginem, crassiorem macula magna fusca, in qua maculæ ordinariæ. Pone hanc puncta tria parva alba marginis crassioris et aliquot fusca sparsa in disco. Margo denique et macula ad angulum ani fusca. Posticæ supra fusca margine exteriori et postico albidis. Subtus pallidæ puncto arcuque fuscis" ('Entomologia Systematica,' p. 618). This is an exceedingly variable species, and the gradation and different phases of development as shown in its variation are very interesting. The variation strikes off in two distinct directions, both resulting in the production of distinct, almost unicolorous forms. The first group has the prevailing colours yellowish-ochreous and bright red, the second group has the prevailing colour brown. The first group appears to run from the type, with whitish-grey ground colour, to the var. *ochrea*, an ochreous yellow form with distinct red markings, through the var. *intermedia*, with red ground colour and distinct darker red markings, to *flavo-rufa*, an unicolorous form of a yellowish-red ground colour. The second group commences with the var. *putris*, of Hübner, of a dark ochreous ground colour, with deep red-brown markings, leading up to the *combusta* of Haw., a fuscous-brown form, much clouded with darker, through the *alopecurus* of Esper, a deep reddish-brown form, with black costal streaks, and only the reniform marked, culminating in var. *nigro-rubida*, a deep reddish-black form, with no markings. The type (grey form) is, perhaps, the rarest, except the beautiful var. *argentea*, of all the different forms occurring in Britain. I have only specimens in my cabinet from Mr. Percy Russ of Sligo, and from Rannoch, although Mr. Tugwell has informed me that it occurs in the Isle of Man. There is no doubt that this and var. *argentea* are the most beautiful of all the *rurea* varieties, some of the grey specimens of the type having a peculiar glaucous tinge. This form is the *hepatica* of Haworth, and possibly the *hepatica* of Linnæus, although the latter is doubtful. Mr. T. Salvage writes:—"I took two very beautiful silvery varieties of this species (*rurea*) in Rannoch ten years ago, but have never seen the like before or since" (*in litt.*, '88). Mr. Kenneth Dingwall sent me a fine white variety of this species captured in Scotland in 1888. This is described below as var. *argentea*. We thus have the following groups:—

- I. 1.—*argentea*—white, with the faintest trace of markings.
- 2.—*rurea*—the greyish-white type.
- 3.—*ochrea*—yellowish ground colour, with typical markings.
- 4.—*intermedia*—reddish ground colour, with typical markings.
- 5.—*flavo-rufa*—unicolorous, yellowish-red specimens.
- II. 1.—*putris*, Hb.—pale brownish-grey ground colour, with a dark brown central band.
- 2.—*combusta*, Haw.—dark fuscous brown, with reniform outlined in white.
- 3.—*alopecurus*, Esper—dark reddish-brown, with black costal streaks, and the reniform with black circumscription.
4. *nigro-rubida*—a deep, reddish-black, unicolorous form.

Of the varieties of this species from the Hebrides, Mr. J. Jenner Weir writes:—"A very fine series was taken, showing a number of

intermediate varieties between the type and the variety *combusta*.* It would be impossible to describe the rich chestnut colour of some of these most beautiful specimens, and in many instances the ground colour is in strong contrast to the dark markings" ('Entom.,' xiv., p. 220).

a. var. *argentea*, Tutt.—This variety is described in the 'Entomologist's Record and Journal of Variation,' vol. i., pp. 12-13, as follows:—"Anterior wings shiny silvery white with faint traces of the typical costal streaks in pale brownish. The typical darker area on outer margin very faintly marked in pale, and the typical dark longitudinal basal marks brownish; no trace of orbicular, transverse lines, or central shades; the reniform faintly outlined; hind wings grey, whiter at the anal angle. This remarkable specimen, of *rurea*, which appears to agree with the specimens mentioned in the 'Entom.,' vol. xxii., p. 39, as captured in Scotland, by Mr. Salvage, was taken by Mr. K. Dingwall, who kindly gave it to me. Mr. Dingwall writes:—"The white specimen of *rurea* I took in a web in Scotland, at Ballachulish, in the Pass of Glencoe. When I took it, it was a perfect specimen not rubbed, but very dry and brittle. I thought I had got something new, as it was in a shed under cover, and well protected from damp and weather; so I pinned it and put it by for identification. When I unpacked at Inverness, the box was loose and the specimen somewhat injured; however, I set it, and the result is the specimen I am sending you. I cannot imagine whether the atmosphere or the turpentine emanating from the saw-mill where I took it had bleached it, or whether it is a natural variety. The weather could not have done it, as it was so well protected' (*in litt.*). The specimen is, I should say, without doubt, a perfectly natural variety, showing a great tendency towards almost perfect albinism. At present the scales are but little injured, and it is such a variety as one might expect to find in this species, and its colour is undoubtedly due to the spread of the white colour found along the inner margin of the wing in typical specimens, coupled with the suppression of the dark markings. Surely some of our Scotch lepidopterists will soon tell us something more about such a striking form."

β. var. *ochrea*, mihi.—The ground colour of the anterior wings of a clear yellowish-ochreous, the darker markings found in the type are all present, but much paler, and of a more distinctly red colour; a white dash on the inner margin near the anal angle, another on the inner margin just under the dark dash at the base of the wing. Thorax the same colour as the darker markings on the wings. Posterior wings pale grey, with dusky nervures; the lunule and base of the pale transverse line faintly discernible. This variety would include most of the pale forms captured in Britain and probably on the Continent. I have captured it in many localities in Kent, and have received it from almost all parts of Britain, including the Orkneys, Hebrides, and the West Coast of Ireland.

γ. var. *intermedia*, mihi.—The ground colour of a clear reddish-ochreous, the dark markings of the type being clearly developed in a darker shade than the ground colour. The stigmata rather indistinct, owing to the deeper ground colour. The pale transverse line on the posterior wings is more distinct than in the type. This is a form dis-

* The extreme Hebridean form is var. *nigro-rubida*.

tinctly intermediate between var. *ochrea*, and var. *flavorufa*. It has all the distinct markings of *ochrea*, but the reddish ground colour of *flavorufa*. This form occurs with the type, but appears to be rare. I have seen but few specimens, and am indebted for those I have to Messrs. Rose and Harrison of Barnsley, and Mr. Boulton of Hull. It is recorded from Derby by Mr. Hill, in the 'Entomologist's Monthly Magazine,' vol. xxiii., p. 6. This is the var. **B** of Guenée's 'Noctuelles,' vol. v., p. 138, but it is uncertain whether it is the La Bigarrée, of Engramelle. Guenée says of his var. **B**:—"All the markings reappear, even the ordinary lines which are obliterated in the type. The ground colour is reddish-brown, mixed with yellow-ochreous and whitish." In Humphrey and Westwood's 'British Moths,' vol. i., p. 159, we find:—"Varieties occur, with the ground colour of the fore wings bright ochre-red, with the stigmata distinct."

δ. var. *flavorufa*, mihi.—The ground colour of a dull yellowish-red tint, and so far resembling var. *intermedia*, but the typical markings almost entirely obsolete and lost in the ground colour. Both stigmata very distinct and outlined in yellow; some short yellow dashes along the costa (the remaining parts of the obsolete line); a yellow patch at the costal base, and a few yellow scales on the outer part of the otherwise dusky nervures, are the only markings on the anterior wings of this otherwise unicolorous variety. My specimens have come from Rannoch, Barnsley, Glasgow and Ripon.

ε. var. *putris*, Hb.—The *putris* of Hb., fig. 241, is without doubt a var. of *rurea*. It may be described as, "Anterior wings of a pale brownish grey, base paler, with a much waved, transverse, basal line; a longitudinal pale orbicular, and a reniform outlined in pale; a distinct transverse black wavy line beyond the reniform. Between this and the basal line the colour is dark brown, a black line passing through this darker part between the stigmata, from costa to inner margin. A row of dots parallel to the hind margin; extreme hind margin dotted; hind wings dark grey, base paler, dark transverse line and dark lunule." This description of Hübner's figure satisfies precisely the description of some of the beautiful forms brought by Mr. Salvage from the Isle of Lewis in 1887. From a figure kindly lent me by Mr. Mosley, of Huddersfield, this would appear to be the var. *borealis* mentioned by Mr. Porritt in his 'List of Yorkshire Lepidoptera,' p. 73, where he says:—"Mr. S. L. Mosley says the varieties *alopecurus*, Esp., and *borealis*, also occasionally occur at Huddersfield." With reference to this var. *borealis*, Mr. Mosley, in September '88, wrote:—"I only know the variety *borealis*, by Mr. Bond having pointed out one in his cabinet with the remark, 'That is var. *borealis*!' I took one like his specimen here, of which I send you a drawing." This drawing represented without doubt Hübner's *putris*. In Humphrey and Westwood's 'British Moths,' vol. i., p. 159, there is a remark about *borealis* as follows:—"As Mr. Curtis gives the *putris* of Hübner as probably identical with his *Xylina borealis*, and as Boisduval gives *putris* as a variety of *rurea*, Mr. Curtis's insect is, probably a variety of this species." Of this, I think, there is now no doubt. I have only seen British specimens of this var. from Lewis, but Mr. Mosley's figure proves it to occur at Huddersfield.

ξ. var. *combusta*, Haw.—Haworth's description of this variety is as

follows:—"Alis fusco-brunneis obsolete nebulosis, figura 3 vel 5 medio notatis." "In medio anticarum alarum stigmata ordinaria obsoleta, albido marginata, anticum ovale antrorsum valde inclinante; exterius auriforme margine albo interrupto et inde representat figuram 3 vel 5. Posticæ alæ fuscæ ciliis subflavicantibus." This variety is generally considered as synonymous with *alopecurus*, Esper, by Continental authors; but Newman, in his 'British Moths,' p. 283, points out the following phrase in Haworth's description, "fusco-brunneis et stigmata ordinaria albido marginata," which he says is not applicable to var. *alopecurus*. I quite agree with this, and hence have separated them. I have no dark specimen with the stigmata outlined in white, but I do not doubt but that specimens occur in some cabinets.

η. var. *combusta* of Hübner (fig. 366) is different to the above. It has the anterior wings, with an almost typical, reddish-brown costa, with pale costal streaks and distinct stigmata, outlined in paler, but with the lower half of the wings unicolorous, dark, reddish-brown. Hübner's *combusta* seems a combined form of var. *intermedia* (costal half of wings), and var. *alopecurus* (inner marginal half of the wing). This appears to be the nearest approach to the dark forms generally obtained in Britain. Guenée refers *combusta*, Hb., to *alopecurus*, Esp., an evident error. His description, too, of *alopecurus*, Esp., 'Noctuelles,' vol. v., p. 138, is more like Hübner's *combusta* than Esper's *alopecurus*. Guenée writes:—"The ground colour of the anterior wings entirely of a deep, red-brown colour, with some bright marks on the costa, and the outside of the reniform surrounded by yellow. Fringe of the four wings equally brown, with some yellow streaks on the superiors, and a reddish line in the inferiors. Females still darker."

θ. var. *alopecurus*, Esp.—From the *alopecurus* of Esper, plate cxlvii., fig. 3, I made the following description:—"The anterior wings of a dark reddish brown, with five strong, black costal streaks, no orbicular, large reniform of the ground colour, with black centre and black circumscription, three white dots on costa near apex, three parallel to hind margin near apex, three tiny white dots at anal angle, nervures black. Hind wings dark grey, with blackish nervures and lunule." Very few British specimens, I believe, will answer to this description of *alopecurus*. Guenée says of *alopecurus*, Esp.:—"the exterior outline of the reniform yellowish." This is evidently incorrect of Esper's figure. Newman says:—"uniform red-brown, the reniform spot being indicated by a pale line, and a few other darker and paler dots scattered over the wing" ('British Moths,' p. 283). Dr. Staudinger in his 'Catalog' says of this variety:—"al. ant. unicolor, brunneis."

i. var. *nigro-rubida*, mihi.—The most extreme melanic form of the species, of a most intensely blackish-red or blackish-brown colour; no pale streaks on the costa, and perfectly unicolorous, with the exception of a faint trace of the outline of the orbicular and the outer edge of the reniform. Hind wings dark grey, nervures more dusky. Thorax of the same dark colour as the anterior wings. The type of this variety was captured in Lewis in 1887. I have only seen specimens of this variety from the Hebrides.

Xylophasia, St., *hepatica*, L.

The type of this species is described by Linnæus, 'Systema

Naturæ,' p. 853, No. 169, as:—"Noctua spirilinguis cristata, alis glaucescentibus; fascia ferruginea abbreviata terminalique plicata." "Dorsum pluribus exasperatum. Alarum color hepaticus: fascia ferruginea vix latus interius appropinquante." Guenée, in his 'Noctuelles,' vol. v., p. 144, says:—"Linnæus has badly described it as 'wings glaucous;' and Clerck has figured it with bluish wings, which made Hübner believe that it was *tincta*." Hübner figures *Aplecta tincta* under the name *hepatica*. I am inclined to think that Guenée, who was undoubtedly not well up in the varieties of this group, did Linnæus an injustice. My own impression is, that the Linnæan type was a glaucous one, and that our forms are different to the Linnæan type. There is a constant glaucous variety of *rurea* (closely allied to the type). I have a glaucous variety of *scolopacina*. Why should there not be a glaucous form of *hepatica*? It must be noticed that in the 'Lepidoptera Britannica,' p. 169, Haworth copies the Linnæan description of *hepatica*, which he applies afterwards apparently to *rurea*. It must be confessed there is considerable doubt about the types of this species and *rurea*. The British specimens appear to be of two distinct forms, one clear dull brown, with typical markings, as in Newman's 'British Moths,' p. 285, but with no transverse markings, var. *epomidion*, Haw., the other of a redder colour, and much marbled with transverse ochreous markings. This latter marbled form is the *characteræa* of Hübner.

a. var. *characteræa*, Hb.—Hübner's fig. 133 may be described as having the anterior wings brown, with a reddish tinge, with the ordinary dark markings, but a number of transverse lines, ochreous outlined with black, gives the variety a very mottled appearance. The darker ground colour shows up very distinctly between the pale line near the hind margin, and the pale line just beyond the reniform. I believe this variety occurs in most British localities. I have taken it in various localities in Kent, and have received it from the neighbourhood of Barnsley (Yorkshire), the New Forest, &c.

β. var. *epomidion*, Haw.—This is the ordinary form which we get, "brown, without the ochreous transverse markings which occur in *characteræa*." Haworth, in his 'Lepidoptera Britannica,' p. 170, thus describes it:—"Alis griseo fuscoque variis strigis tribus pallidioribus obsoletis dentatis." "Lineola basi anticarum alarum sæpe geminata; striga antica undulata (subinde omnino oblitterata), altera pone medium denticulata extus arcuata, et subinde quasi geminata; tertiaque juxta marginem posticum altè et irregulariter dentata, et nebulis fuscis adnata. Margo ipse posticus fusco punctatus. Alæ posticæ ut in præcedentibus (*rurea*)."

Xylophasia, St., *scolopacina*, Esp.

The type is represented by Esper's fig. 1, plate 130. The figure is bad, but certainly recognisable as this species. The following is the description I made of it:—"Anterior wings dark ochreous, with a decided brown tinge, a dark dash at the base of the inner margin. A dark red basal streak, paler (ochreous) orbicular, and reniform dark-centred; a dark line from costa to inner margin between stigmata; a reddish lunule on the inner edge of the reniform; a number of dark longitudinal streaks outside the reniform, and a pale wavy line parallel to the hind margin. Hind wings brownish, with a reddish tinge, upper mar-

gin dark reddish." Hübner figures (460) *scolopacina*, a small male, with ground colour pale ochreous, the middle of the wing (between the stigmata) and the outer margin reddish, orbicular indistinct, reniform white, with a small white spot beyond the reniform. Guenée says of *scolopacina*:—"It varies much in size and intensity of colour, but the lines are always more distinct than in any other *Xylophasia*" ('Noctuelles,' vol. v., p. 145). Of Freyer's, Plate lxiv., fig. 1—*scolopacina*, I made the following notes:—"Yellow ochreous with a reddish tint, a dark red lineola at base of inner margin, orbicular outlined in blackish, reniform red outlined in whitish; four dark costal streaks above stigmata, a double basal line, a waved line outside reniform, forming almost linear dots on nervures, dark reddish line parallel to hind margin." It will be thus seen that Esper's type and Hübner's figure are much darker than the generality of specimens taken in Britain, while Freyer's is very much like them. I have a specimen captured by Mr. Harrison, near Barnsley, slightly glaucous, but otherwise dark like the type. All my others are much paler. The dark type is also described in Humphrey and Westwood's 'British Moths,' vol. i., p. 160, but the pale form is figured in the same work, Plate xxxii., fig. 8. The paler form is described by Haworth as follows:—

a. var. *abbreviata*, Haw.—"Alæ ex hepatico-lutescentes, vel subinde saturatiores varie nebulosæ; basi ad latus interius lineola nigra, fascia subfusca in medio costæ valde abbreviata; pone stigmata ordinaria obsoleta, striga tenuis nigra, regulariter et concinnè dentata: tunc striga altera crassior fusco-brunnea juxta marginem posticum, parum undulata; margine ipso ustulato, punctis circiter quinque pallidis; ciliis itidem ustulatis" ('Lepidoptera Britannica,' p. 170). As these pale specimens vary a little *inter se*, I think Haworth's name should include all our paler ochreous forms.

? β . var. *nux*, Frey.—Guenée, in his 'Noctuelles,' vol. v., p. 145, gives this as a probable variety of *scolopacina*. He says of it:—"I have not seen it, and I do not know whether it constitutes a distinct species, which is very possible. After the figure of Freyer, it is of a larger size, the crest and the thorax are of a deeper brown, and other less important characters." My own note on this is:—"Freyer, Plate cclxx., fig. 3. Like *scolopacina*, but as large as *rurea*." The figure is very poorly done, and I should not be at all surprised if it really referred to *X. hepatica*.

Dipterygia, St., *scabriuscula*, L.

The type of this species is the *scabriuscula* of the 'Systema Naturæ,' 10th edition, p. 516, No. 108, where it is described as follows:—"Noctua spirilinguis cristata, alis deflexis fuscis: margine dorsali posticoque pallidis." "Cristæ in dorso ipsius abdominis 4 pone thoracem gibbum." The same author, in the 12th edition of the same work, appears to describe the same species under the name of *pinastri*, but in the description of *pinastri* he uses the word "nigris" instead of "fuscis," otherwise the descriptions are identical. There is a difference in the ground colour, some being much better described by the term "fuscous" than "black." It is described by Haworth (p. 172) under the same name *pinastri*, as:—"Alis nigris, maculâ striatâ cinereâ aquillæ alam simulante ad angulum ani." "Cristata, niger vel ater, antennis subferrugineis,

thoracis dorso abdomineque cinereis. Alæ superiores posticè undulatum et striatum plus minus cinereæ. Margo tenuior etiam cinerascit. Posticæ alæ fuscæ, ciliis cinereis." Hübner also figures (246) *pinastris* with normal anterior but bluish posterior wings. This latter is, without doubt due to overcolouring. Newman, in his 'British Moths,' p. 287, says:—"This is one of those moths which are constant in the arrangement and tint of their colours. I am unable to select from among the numerous specimens which have reached my hands, a single individual to which I can possibly allude as a variety." I have seen no good varieties; but some specimens have the dark portions of the anterior wings much more intense than others. Possibly the greatest amount of variation exists in the quantity of pale longitudinal markings near the hind margin, some having a large number of short longitudinal streaks, especially near the apex, others being almost without them; while some have the pale marking (from which it gets its English name "the bird's wing") near the anal angle, and its continuation along the inner margin of a much clearer grey than others; in fact, I have some where this marking is almost absent, and others where it is quite whitish grey with scarcely any darker shading. I have one specimen much below the average size. Guenée in his 'Noctuelles,' vol. v., p. 146, writes:—"Superior wings brown-black, with the inner margin and a large bilobed spot at the anal angle, of a testaceous grey marked with brown streaks."

a. var. pinastris, L.—The Linnæan description 'Systema Naturæ,' 12th edition, p. 851, No. 160, is as follows:—"Noctua spirilinguis cristata, alis deflexis nigris: margine dorsali posticoque pallidis." "Cristæ in dorso ipsius abdominis 4 pone thoracem gibbum; characteres in alis atris." That is to say the ground colour is black instead of uscou.

Apamea, Och.

The interesting genus *Apamea* brings directly to our notice the very great difficulty of dealing with the varieties of some of our species of NOCTUÆ, for in this genus we have some of those protean species, where the ground colour varies through several shades, and where the markings are so excessively variable, and yet recurring with such frequency in the same forms in different species, that it is not surprising, that our early lepidopterists considered they had many distinct species. Taking the species, *basilinea* and *pabulatricula*, we have two of the most constant species in the genus, so far as markings are concerned, *basilinea* being ordinarily characterised by no specially developed markings, except the ordinary waved transverse lines, while *pabulatricula* is characterised by a strongly-developed black longitudinal mark directly under the stigmata developing insensibly into a central band. *Basilinea*, however, varies in colour somewhat according to geographical range. The two forms of markings—typically represented by these species—give a basis on which the development of the variation in the other species appears to proceed, viz., (1) an unicolorous form with transverse lines, and (2) a more variegated form with a dark longitudinal streak under the stigmata. The species of this genus may be looked upon as having the anterior wings divided

into three parts,—the basal area, the median area, and the outer area. The first and last of these have transverse lines crossing them, the second contains the stigmata, and under this, in some species, is a very dark longitudinal — -shaped mark (a modification of the claviform). These may be looked upon as the great characters of the variable members of the genus, the variation consisting principally of the development (in some cases to a very high degree) or non-development of this particular mark. Thus, in the variable species *gemina*, we find all the different phases of variation to consist of two types: one, in which the transverse lines are developed, and the species has a particularly reticulated appearance; the other, in which the — -shaped mark is highly developed, the transverse lines more or less suppressed, and the median space more or less intensified in its upper half in colour. But just as *basilinea* and *pabulatricula* exhibit single forms of a different type, and *gemina*, on the other hand, exhibits these types blended into one with intermediate forms, so we have in *unanymis* an almost purely dimorphic species, where one form is reticulated and the other with the — -shaped mark, and yet there is no extreme development of either form, as in *gemina*. We now come to another constant member of the group,—*ophiogramma*,—with its characteristic dark costal mark, and of this species I have never noticed a variety. Lastly comes *didyma (oculea)*, one of the most protean species in the whole of the Noctuæ, and it is almost impossible in this species either to classify or tabulate the numerous forms, for not only have we every possible variety that can be compounded of the *basilinea*- and *pabulatricula*-like forms, but these are combined with *ophiogramma*-like forms with a result that defies classification: we have in grey, ochreous, and red colour the transverse lined or reticulated form; we have in each colour the — -marked form; we have in each colour an *ophiogramma*-marked form (dark costa), blended with the other forms of variation into every possible intermediate form; and, lastly, we have the unicolorous *leucostigma**-like forms in grey, red and black.

Apamea, Och., *basilinea*, Fab.

This species is very constant in its markings for a member of such a variable genus, but the ground colour varies from a pale whitish ochreous, with transverse lines and stigmata still paler, to a deep, almost unicolorous, reddish brown form, some specimens being of the pale or a darker ground colour, with the median area reddish, the other parts of the wing being also suffused. This intermediate form would appear to be the type from the description of Fabricius, which is as follows:—“*Noctua cristata alis deflexis fuscis griseis undatis, lineola baseos atra, thoracis crista bifida.*” “Color variat ferrugineis griseisque, distincta lineola parva flexuosa atra baseos. Antennæ albidae” (‘*Mantissa*,’ &c., p. 183, No. 305). Guenée (‘*Noctuelles*,’ vol. v., p. 206) mentions an allied species under the name of *finitima*, which Mr. Dobrée assures me is only a climatic variety of *basilinea*. It would appear that this species is subject to a good deal of colour variation, according to its geographical range, as the Huddersfield and Hartlepool specimens are generally somewhat different in ground colour to the South of England forms.

* Referred in these papers to the genus *Helotropha*, Ld.

a. var. pallida, mihi.—Ground colour of the anterior wings pale ochreous grey, not “fuscous,” with still paler transverse lines, and no ferruginous or reddish clouds, otherwise like the type. The palest form I have seen of this species came from Mr. Russ, and was captured at Sligo.

β. var. unicolor, mihi.—The ground colour of a dark reddish brown, with a slight purplish tint; the orbicular scarcely traceable; the reniform indistinct, but outlined in a slightly paler hue than the ground colour; the subterminal line just traceable. Hind wings very dark grey, nervures dusky, lunule indistinct. Captured in Westcombe Park, June, 1886. Mr. Porritt writes:—“Reddish brown forms occur not uncommonly at Huddersfield, quite different to the southern clay-coloured specimens” (*in litt.*); and again he writes (‘Transactions of Yorkshire Naturalists’ Union,’ Part vi., p. 76), “I have taken some very beautiful strongly-coloured specimens at Huddersfield;” so that what would appear to be a very unusual form in the London district may be closely allied to the ordinary one at Huddersfield.

γ. var. nebulosa, Vieweg.—Vieweg, in his ‘Tabellarisches Verzeichniss,’ &c., pl. i., fig. 6, figures a variety under this name. It has “The anterior wings pale ochreous grey, with the costal area reddish, the red colour extending half-way across the wing from the base to the reniform, and then going off to a point at the costa; the characteristic basal streak of *basilinea* is present, and there is a double black basal line; claviform and reniform outlined in black, but orbicular indistinct; lower half of reniform dark. Hind wings dark grey, with paler base and darker nervures.” Vieweg’s diagnosis, p. 55, No. 84, is:—“Cristata, alis deflexis cano fuscoque variis, litura baseos marginisque tenuioris nigris.” In his further description in German we find:—“The lower part of the outer reniform filled up with blackish shading. Besides the black streak on the fold, there stands close to the inner margin, about the middle of the wing, a small narrow spot of the same colour, which forms a chief mark by which this moth may be recognised.”

δ. var. cinerascens, mihi.—Anterior wings of a dull ashy grey, with no trace of the ferruginous markings of the type; the subterminal line of a paler shade of the ground colour; the double basal lines and stigmata of the ground colour, outlined in brown; the reniform internally edged with paler. Hind wings of the same dull colour as the anterior. I have seen no specimens like these, except from Hartlepool. Mr. Robson sent me six specimens, of which three were typical, and three of this dull, almost unicolorous, form. Probably this variety is widely distributed in the most northern parts of Britain.

ε. finitima, Gn.—Guenée (as mentioned above) considers this a distinct species, and writes:—“This replaces, in the United States, our *basilinea*, which it closely resembles. It is of the same size; the ground colour of the superior wings less reddish, and more white; the median space is, on the contrary, more strongly marked with reddish brown, especially on the upper part; the median lines are more strongly marked in black, as well as the claviform, which is very distinct.” Mr. Dobrée to whom I am greatly indebted for information, writes:—“The *Hadena finitima* of North America is only a climatic

variety of *basilinea*. The chief differences are that the general colour is of a pronounced vinous tinge; in some the space between the median lines is darker, so as to make a distinct band across the wing, which includes the stigmata; in others, the dusky line, from the stigmata to the inner margin, is more pronounced than in the generality of English specimens. In support of my belief, I have collected numerous specimens from English localities, and in some few of them, especially from Yorkshire and Newcastle, both the vinous tinge, as well as the distinct band of the North American insect, are quite perceptible" (*in litt.*). Grote ('Check List of N. American Noctuidæ,' 1890) considers it distinct.

Apamea, Och., *pabulatricula*, Brahm (*connexa*, Bork.).

The type of this species is described by Brahm, 'Insektenkalender für Sammler und Ökonomen,' as:—"Grey *Noctua*, with orange-coloured crests." "Head and palpi grey; antennæ ash-coloured; eyes black-brown; crest grey, and has in front a faint brown transverse line, on each side a black brown streak, in the middle an erect orange-coloured crest; body grey, with a few ash-coloured ridges (comb-shaped) on the back. Fore wings grey, with a short brownish black line at the base of the wing. The orbicular and reniform stand in a light brown ground; before the stigmata is an undulating transverse line and beyond them another, which come so near together that they almost join and form the apex of an almost right-angled triangle, but instead of really joining they separate suddenly and turn back arch-like; the space to the inner margin filled out with blackish brown, crossed by a pale grey longitudinal line, which also passes through both transverse lines; on the inner margin stand a few pale brownish tooth-shaped markings turned towards the inside, and close to the edge a row of blackish brown triangular spots. Hind wings ashy grey." This description agrees almost precisely with the specimens captured in Yorkshire, and sent out by Messrs. Harrison and Young in considerable numbers; but Mr. Young writes:—"In fresh specimens the crest is rosy. The hind wings, too, are dark smoke colour, nearly black, but both the rosy crest and dark hind wings soon fade" (*in litt.*). There appears to be no variation worth speaking of; occasionally the shading on the costa is stronger, and hence makes the central area (enclosing the orbicular) more band-like; the length of the black  - mark varies, and thus causes a difference in the width of this central band in its lower part; the pale line (really on the nervure), mentioned above as crossing the lower part of the band, is often indistinct; and the row of black triangular spots (really the teeth of the wavy subterminal line) is very poorly developed in British specimens. Hübner figures this species under the name of *elota*, with the central band and base of wings ochreous. Our specimens possess the slightest possible ochreous tinge in the centre of the banded area, but I have never seen any real characteristic development in this direction.

a. var. *elota*, Hb.—Hübner, as mentioned above, figures in his 'Schmetterlinge,' &c., a form of this species with the markings much as in the figure of Newman's 'British Moths,' but with the central and basal areas of the anterior wings ochreous, and the costal and outer margins white.

Apamea, Och., *ophiogramma*, Esp.

The type of this species is represented by Esper's plate 182, fig. 2, 'Die Schmetterlinge,' &c., and may be described as having "The anterior wings yellowish ochreous, with a large dark red, somewhat triangular-shaped, costal patch, enclosing the yellowish reniform, and then extending narrowly along the costa to the base; the orbicular obsolete; below this and forming an outline to its lower edge is a yellowish, followed by a slaty line extending from centre of base to anal angle; below this line the colour is yellow ochreous, as is also the outer margin to apex; several dark marks on outer margin. Hind wings grey, with greenish tinge." Hübner's figure 355 is "a pale grey-brown ground colour, with a large black costal patch extending from the base, so as to include the dark stigmata; this patch is outlined in whitish; a pale line parallel to hind margin, a dark patch in the middle of the hind margin, and dark forked (>) mark at the anal angle. Hind wings dark grey, with lunule." Haworth describes the species under the name of *biloba* ('Insecta Britannica,' p. 209). His description is:—"Alis griseis fascia abbreviata marginis crassioris subdolabriformi nigra, in qua stigma reniforme griseum."

Apamea, Och., *gemina*, Hb.

The type of this species is represented by Hübner's fig. 482, of which I made the following description:—"Anterior wings blackish grey, with a pale basal line; stigmata faintly outlined; and followed by a pale transverse line, a row of white dots, and a pale toothed line. Posterior wings dark grey, with paler base and dark lunule." Dr. Staudinger writes of the type:—"forma obscura magis." This particular form is the one represented in Newman's 'British Moths,' fig. 2, p. 304. It will be seen that very few of our British specimens would answer to the above description, which represents quite a melanic form of the more mottled type. Our specimens of this latter form are generally brownish grey or brown, although I have specimens, taken by the Aberdeen collectors, and others taken by Mr. Percy Russ of Sligo and Mr. Newman of Darlington, which are either altogether greyish black or otherwise very dark, and closely resemble the type. The species is variable within certain limits, and extends from the more unicolorous type in blackish grey and brownish, through specimens of the same coloration, but with a distinct line under the stigmata, to an extreme variety with all the median space and costal area very dark, and the outer and inner margins pale grey, and bearing a strong superficial resemblance to *Hadena genistæ* in some specimens. The first (mottled) form follows the group,* of which I consider *basilinea* the type, having the short longitudinal basal line and paler transverse lines; the latter (dark central area) forms an extreme development, which I consider typical* in *pabulatricula*, having the development of the dark \dashv -like mark under the stigmata, and the central area banded, although there is a complete gradation of intermediate forms. There would thus appear to be two varieties in the unicolorous form,—(1) grey, inclining to blackish, with no brown or very little brown; (2) grey, much suffused with brown, and sometimes entirely reddish brown. In both of these, differences in intensity of colour, and in the

* *Vide* introductory notes to genus *Apamea*.

development of the transverse lines, occur. The form most closely allied to these is that in which the dark \blacksquare -like mark* is developed under the stigmata (var. *intermedia*), and as the space above is generally shaded it gives the specimens a rather banded appearance, as in Newman's 'British Moths,' p. 304, fig. 1, although generally more strongly marked. Of this variety there are two shades of colour, grey and reddish brown. Var. *intermedia* is distinctly intermediate between the type and the next var. (*remissa*, Hb.), where the black \blacksquare -like mark is extended into a large blackish or brownish patch, extending upwards to the costa between the reniform and orbicular, and connected with another dark patch developed between the two short, longitudinal basal streaks, and with the space outside the subterminal line of the same dark shade, especially in its central area and at the anal angle; the inner margin of the wing very clear, and almost immaculate. This extreme form is apparently the *remissa* of Hübner and of Treitschke. Of this variety Staudinger writes, "dilutior, variegata." Var. *remissa*, Tr., and var. *intermedia* appear to be united by Guenée to form his var. A, "*La Brouillée*" of Engramelle ('Noctuelles, vol. v., p. 208), of the general variation of which Guenée writes:—"It is possible that this may be distinct from *gemina*." "This *Apamea* differs from *didyma* by its generally darker colour, its anterior wings generally a little narrower, and above all by the black streak which unites the two transverse lines below the submedian nervure, leaving between this line and the inner margin a space generally paler than the ground colour. Certain subvarieties have all the subterminal space equally clear, and thus somewhat resemble *Hadena genistæ*. These are known in collections as *submissa*." This latter is a very rare development, and appears to be the *remissa* of Hübner, a slightly more extreme development of the *remissa* of Treitschke. The only very extreme specimen I have, in a very long series, came from Mr. Finlay, of Morpeth. The *remissa* of Haworth ('Lepidoptera Britannica,' p. 189, No. 79) is apparently the same as *remissa*, Tr., to which many of our British specimens are referable, while the var. β of his *remissa* appears to refer to Hübner's rather more extreme form. The *oblonga* of Haworth is simply a slight modification of var. *intermedia*, being a grey form with the costal area, containing the grey stigmata, brownish, the \blacksquare -mark developed, the subterminal line whitish; the dark fuscous type Haworth calls *obscura*. Mr. Porritt writes, concerning the general variation of this species:—"The pale variegated variety, as well as the dark forms, occur at Huddersfield" (*in litt.*); and Mr. Gregson, 'Entomologist,' vol. iv., p. 52, writes:—"This does not vary so much here (Liverpool) as in the South (of England). My best varieties of it were given to me by Mr. Doubleday. One is a very *genistæ*-like specimen." Mr. W. Reid of Pitcaple (Aberdeen), writing of the Scotch specimens, says:—"The type, together with var. *rufescens* and var. *intermedia* (both *-grisea* and *-rufa*), are all to be obtained in more or less abundance in this district. I once captured a very fine var. *remissa*, which agreed well with Guenée's description. It had a very light ground colour, with distinct, dark—almost black—markings. It bore a very strong superficial resemblance to *H. genistæ*" (*in litt.*). Tabulating the principal varieties we get:—

* *Vide* introductory notes to genus *Apamea*.

1.—A dark greyish black mottled form, without the \blacktriangleleft -like mark = *gemina*, Hb.

2.—A reddish or brownish grey mottled form, without the \blacktriangleleft -like mark = var. *rufescens*.

3.—A grey form, with an \blacktriangleleft -like mark under stigmata = var. *intermedia-grisea*.

4.—A reddish or brownish grey form, with an \blacktriangleleft -like mark under stigmata = var. *intermedia-rufa*.

5.—A grey form, with dark blotch between stigmata from \blacktriangleleft -like mark to costa, dark outer margin = var. *remissa*, Hb.

a. var. *rufescens*, mihi.—Ground colour reddish or brownish grey, with the transverse lines as in the darker type. As in the type, there is no special development of the claviform, or of the darker central area, which becomes so noticeable in the following varieties. Many of the specimens belonging to the mottled form, taken in the South of England, have a more or less reddish or brownish ground colour. I believe this variety occurs in most localities in all parts of the British Islands where var. *intermedia* and var. *remissa* occur.

β . var. *intermedia*, mihi.—Under the head of *intermedia* we get two subvarieties; one grey in colour, the other reddish brown. These I have called:—(1) *intermedia-grisea*.—Ground colour grey or greyish brown, with the claviform developed into an \blacktriangleleft -like mark, which joins the median transverse lines, the space between the stigmata being darker than the ground colour, and thus having a somewhat banded appearance. (2) *intermedia-rufa*.—This is like *intermedia-grisea*, but has the ground-colour brownish or reddish grey, with the same characteristic markings as in that variety. This would appear to be the "*La Brouillée*" of Engramelle. Guenée writes of it:—"It is distinguished above all by a black mark, which unites the two median transverse lines above the submedian nervure, leaving between it and the internal border (*i.e.*, below the \blacktriangleleft -like mark) a space generally paler than the ground colour" ('*Noctuelles*,' vol. v., p. 208). These varieties appear to occur in almost all parts of the British Isles. I have them from Sligo, from Aberdeen, and many other Scotch and English localities.

γ . var. *oblonga*, Haw.—Haworth describes a variety of *gemina* under the name of *oblonga*, treating it as a distinct species. He writes:—"Alis cinereis nebulosis, costa maculâquæ oblongâ fuscis, strigâque albâ posticâ undulatissimâ." "Alæ anticæ longitudinaliter semifuscæ, in quâ parte puncta costalia, apex, et stigmata ordinaria, cinerascientia. Altera pars alæ etiam cinerascit, maculâ majusculâ posticâ cuneiformi fuscâ, et alia in medio oblongâ marginem tenuiorem versus. Alæ posticæ albicantes, fimbriâ fuscâ; cætera ut in variis sequentibus (*remissa*)" ('*Lepidoptera Britannica*,' pp. 188, 189). This is very little different to some forms of *intermedia*, but seems to have a darker costal area, in which are situated the paler stigmata.

δ . var. *remissa*, Hb.—About the synonymy of this variety there seems to have been some doubt, although Hübner, Haworth, and Treitschke appear to have described rather more or less extreme forms of the same variety under the same name. Dr. Staudinger, however, calls the variety *remissa*, Tr. (why Treitschke I do not know, except that Hübner's rather more extreme form is more rarely obtained), and says

of it, "dilutior, variegata." Hübner's figure 423 may be described as having "a pale basal patch, with two short black basal streaks, while the transverse basal line is followed by a large blackish patch extending from the costa, not quite to the inner margin, in which is placed the pale orbicular and the inner half of the pale reniform; the inner margin and space beyond the reniform are pale, with a paler line parallel to the hind margin. Hind wings grey, with base paler." Haworth's *remissa* is described much in the same way. He writes:—"Alis pallide fuscescentibus nebulosis, lineolis duabus basi, arcuque medio, crassissimo nigricantibus." "Præcedenti (*oblonga*) affinis costâ pallidior strigâque posticâ minus dentatâ, et fere evanescente; maculâ oblongâ nigrâ superne altè fusco adnatâ et inde stigmata subcinerea arcuatim includente. Posticæ alæ fuscescentes." He also adds that there is a form of this variety, "characteribus pallidioribus, at magis distinctis" ('Lepidoptera Britannica,' p. 189, No. 79). Guenée writes of Hübner's *remissa*:—"Superior wings a little more rounded, having the subterminal space, the two ordinary stigmata, a part of the basal space, the inner margin, and an apical patch of a pale greyish ochreous colour, which contrasts very strongly with the almost black colour of the median space." Guenée only gives "North America" as a locality for this variety, but adds directly after:—"I have not seen an example agreeing exactly with Hübner's figure; our European specimens agree more or less with the var. A (i.e., var. *intermedia*), of which this variety is only an extreme form. It is, therefore, very possible that it occurs with us, and very probably the specimen which served as Hübner's type was not exotic" ('Noctuelles,' vol. v., p. 208). This variety in its extreme form is not common in Britain, but at the same time it is not very rare, and I should most certainly consider Hübner's type an European one. The greater number of our specimens are referable either to the type, var. *rufescens* or var. *intermedia*.

Apamea, Och., *unanimis*, Hb.

This is an almost constant dimorphic species, one of the forms resembling somewhat the reddish variety, *rufescens*, of *gemina*, the other having the same ground colour, but having the peculiar claviform — -like development seen in the var. *intermedia* of *gemina*; but the smaller size of this species, the well-developed, white-outlined reniform, narrower wings, and other minor characters serve at once to distinguish it; the dark transverse shade from the costa to the inner margin, extending between the stigmata, and so noticeable in some other genera, is very distinct in some specimens. Why Newman wrote that this species was larger than *gemina* ('British Moths,' p. 305), I cannot understand, as his description would not lead one to suppose that he was in doubt about the species. I have one very dark specimen labelled "Shoeburyness," and two others from Cambridge, with the central area inclining to a banded character (as in *pabulatricula*). There is a certain amount of sexual variation, the females being, as a rule, somewhat smaller and darker than the males. Guenée says of this species:—"It varies rarely, and is, in this respect, very different to its congeners" ('Noctuelles,' vol. v., p. 209). Hübner's figure 556 (which is a very poor one) represents the type, and is of a dull brownish colour with typical transverse markings. The figure represents a small

female. It has "the anterior wings dull brown, with an abbreviated, followed by a complete basal line; the orbicular small and faintly outlined; reniform outlined in white; a pale angulated line directly beyond reniform; another pale line parallel to hind margin; extreme hind margin slaty grey. Hind wings dark grey, base paler, lunule darker." Freyer, in his 'Neuere Beitræge,' &c., vol. iv., pl. 371, figures both sexes of this species. His fig. 1 represents a "male, of a pale greyish brown ground colour, quite grey at base, with a short dark basal streak under the base of the median nervure, a fine double black basal transverse line, followed by a distinct orbicular and large reniform, both outlined in pale; the claviform is distinct and dark brown; a double line runs from base of reniform to inner margin; a transverse row of small white dots, followed by a wavy line near hind margin; median area mottled with brown, outer area very dark grey. Hind wings pale grey, with a distinct lunule and darker hind margin." His fig. 2 is a female, "marked like fig. 1, but a little darker in ground colour. Hind wings darker grey." Haworth's *secalina*, var. β ('Lepidoptera Britannica,' p. 210) would appear to be the darker form of this species, his *a* representing the type, his β representing the form with the \blacktriangle -like mark under the stigmata. We have, therefore, only to deal with two forms:—1. Without an \blacktriangle -like mark and without a partially-developed central band, = *unanimis*. 2. With an \blacktriangle -like mark and darker central area, = var. *secalina*, Haw.

a var. *secalina*, Haw.—Ground colour of anterior wings dark umber-brown, with the transverse lines as in the type. The claviform developed into an \blacktriangle -like mark, which reaches from the transverse line, before almost, or quite to that beyond, the stigmata; the central area between these transverse lines, and above and below this dark mark, darker than the ground colour, forming an incomplete band from the costa to the inner margin. Hind wings grey-brown (as in type), with a distinct discoidal spot. The description of Haworth's *secalina*, var. β , is as follows:—"Alis anticis lineola longa nigra in medio fasciæ ut in sequente, stigmatæ antico oblongo magis antrorsum inclinante; posticis fuscis, ciliis rufo-cinereis" ('Lepidoptera Britannica' pp. 210, 211).

Apamea, Och., *didyma*, Esp.

We now arrive at probably the most protean lepidopteron (with the exception perhaps of *Agrotis tritici*) found in Britain, *Apamea didyma*, Esp. There exists in different specimens every intermediate shade of ground colour, from pale whitish grey to intense black; but probably the different shades of ground colour may be roughly grouped into grey, reddish brown, and black. The grey colour, however, is mixed in many specimens with a very pale yellow-ochreous tint, and this is especially noticeable in some of those specimens which form (1) the dark costa group and (2) the banded group, where the outer area and inner margin are conspicuously paler than the rest of the wing. In each of the two first of these ground colours (grey and red) we find three very distinct varieties (in their extreme forms), and one less distinct one, but yet sufficiently so to be separately mentioned. This latter is an unicolorous form with the reniform faintly developed, but with the transverse lines obsolete, and the whole wing area,

otherwise, almost unicolorous, except the longitudinal wing-rays which are somewhat darker than the ground colour; the reniform of this form may be outlined either in ochreous or white. Next to this we get the most common form, *viz.*, the area of the wing almost unicolorous, but with the ordinary transverse markings of the group (the *basilinea*-like forms), with the reniform more or less clearly marked in ochreous or white, and with the orbicular sometimes developed and sometimes not developed into an — -like mark. The next group is the banded one, generally with the — -like mark, but occasionally without, with the transverse lines before and beyond the stigmata well developed, and the contained median area somewhat darker than the rest of the wing; the reniform, again, either ochreous or whitish. We have now come to the most extreme form, *viz.*, the dark costal area form, where the ground colour stands out conspicuously pale, leaving a large dark costal blotch extending from just before the apex to the base of the wing and enclosing the stigmata, while the pale ground colour covers the whole of the outer and inner margins of the wing; the reniform may be ochreous or whitish, but the — -like mark is undeveloped; a dark costal specimen with the — -like mark developed would, almost of necessity, pass into the banded form. As I have previously remarked, the dark costal group shows up the ground colour most distinctly, and the grey form has some specimens quite whitish grey, others dull grey, others inclined to yellowish grey. So among those with a red ground colour, some are quite ferruginous red, others reddish brown, while others have a decidedly purplish tinge. We now reach the "black" group. I have a specimen with no transverse lines, agreeing thus with the "unicolorous" group of the previous sections. Generally, however, the black specimens have the ordinary transverse lines, characteristic of the "reticulated" form; these lines are generally tinted with ochreous; the reniform may be either white or yellowish, and occasionally a specimen is obtained with the — -like mark developed distinctly in intense black. A peculiar development of the subterminal line takes place in many of these black specimens, *viz.*, its being broken up into ochreous dots, and recalling the same character in *Mamestra persicaria*. I have also in my series (some 200 picked specimens) one grey specimen presenting this same peculiar characteristic, but I never saw a specimen with red ground colour exhibiting it, although it is very probable such exist. It is, of course, impossible to expect any development of the "dark costal" or "banded" varieties in the "black" group. The ground colour obscures any tendency in this direction, although in "black" specimens there is a good deal of difference in the intensity of the black ground colour. I have, therefore, in dealing with these varieties, proceeded on distinct lines, which I think will commend themselves, and enable those without any previous knowledge to follow out the lines of classification laid down. Thus there is:—

- 1.—The unicolorous form, with no transverse markings.
- 2.—The reticulated form, with transverse markings.
- 3.—The banded form, with darker central area.
- 4.—The dark costal form, with a dark costal mark.

Intermediates of almost every grade occur, and I have one peculiar reddish specimen, the left side with an — -like mark, and well-developed

band, and the right side without the \blacktriangleleft -like mark, but with an equally well-developed band.

To make the system of subdivision more intelligible, I have drawn out the following table:—

A.—Ground colour:—Whitish grey, grey, or yellowish grey.

I.—Unicolorous form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *grisea-albo.* } = v. *moderata*, Ev. ?
 { b. With ochreous reniform = *grisea-flavo.* }

II.—Reticulated form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *reticulata-albo.*
 { b. With ochreous reniform = *reticulata-flavo.*
 2. With \blacktriangleleft -like mark. { a. With whitish reniform = *secalina* (var. γ), Haw.
 { b. With ochreous reniform = *secalina-flavo.*

III.—Central-banded form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *virgata.*
 { b. With ochreous reniform = *virgata-flavo.*
 2. With \blacktriangleleft -like mark. { a. With whitish reniform = *I. niger-albo.*
 { b. With ochreous reniform = *I. niger*, Haw.

IV.—Dark costal form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *oculea*, Gn.
 { b. With ochreous reniform = *oculea-flavo.*

B.—Ground colour:—Ferruginous red, reddish brown, or purplish brown.

I.—Unicolorous form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *rufa-albo.*
 { b. With ochreous reniform = *rufa-flavo.*

II.—Reticulated form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *nictitans*, Esp., Hb.
 { b. With ochreous reniform = *secalina*, Hb.
 2. With \blacktriangleleft -like mark. { a. With whitish reniform = *nictitans-linea.*
 { b. With ochreous reniform = *secalina-linea.*

III.—Central-banded form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *rava*, Haw.
 { b. With ochreous reniform = *rava-flavo.*
 2. With \blacktriangleleft -like mark. { a. With whitish reniform = *didyma*, Esp.
 { b. With ochreous reniform = *didyma-flavo.*

IV.—Dark costal form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *furca*, Haw.
 { b. With ochreous reniform = *furca-flavo.*

C.—Ground colour:—Black.

I.—Unicolorous form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *nigra-albo.*
 { b. With ochreous reniform = *nigra-flavo.*

II.—Reticulated form.

1. Without \blacktriangleleft -like mark. { a. With whitish reniform = *lugens*, Haw.
 { b. With ochreous reniform = *lugens-flavo.*
 2. With \blacktriangleleft -like mark. { a. With whitish reniform = *albistigma.*
 { b. With ochreous reniform = *leucostigma*, Esp.

This is as complete a classification as I can make. Incidental varieties, especially of colour, will undoubtedly occur, but I do not feel justified in dealing with this species except in the most general way. Most of the varieties, fortunately, have been named in the first instance as distinct species. When a variety has forms with both "whitish" and "ochreous" reniform, I have simply affixed *-albo* or *-flavo* to the existent name. Esper's type of the species is the ochreous form, with a dark central band and \blacktriangle -like mark. The description I made from Esper's 'Die Schmetterlinge,' &c., Pl. 126, fig. 7, was as follows:—"Anterior wings with ground colour ochreous, nervures fuscous, ten short black costal streaks, orbicular small, reniform white; two longitudinal black basal streaks; basal line before orbicular and another transverse line beyond reniform, with a black \blacktriangle -like mark joining them, the whole space between these reddish, forming a central band; a double wavy line parallel to hind margin, outer margin dark grey. Hind wings grey, base tinged with reddish."

Guenée's *oculea* is referred by him to the Linnæan ('Fauna Suecicæ,' &c., p. 321, No. 1215) *oculea*, but this is an error. He says of his own:—"Superior wings ochreous grey, more or less clouded with reddish or brownish, with a large brownish blotch occupying the costa from the base almost to the angulated line, and often to the subterminal, widening out in the median space, of which it only occupies the upper half. Terminal space of a similar brown, ordinarily divided into two blotches. Reniform of the ground colour, or whitish. Inferior wings grey-brown, base paler" ('Noctuelles,' vol. v., p. 210). It will be seen from the above that Guenée includes in his description the var. *furca* of Haworth. Regarding its variation, Guenée writes:—"This Noctuelle varies exceedingly. I have only described the type here, which is most certainly the *oculea*,* both of Linnæus and Fabricius, and which has been, in all French and German collections, erroneously called *didyma*. Its varieties, which many (especially English) authors have described as distinct species, appear to belong to the groups, A = var. *nictitans*, Esp., and B = var. *secalina*, Hb." ('Noctuelles,' vol. v., pp. 210, 211). Haworth describes five sub-varieties of his type, but his *oculea* = the *didyma* of Esper. Mr. Robson, 'Young Naturalist,' vol. ii., pp. 101, 102), writes somewhat fully of the varieties of this species. As far as I know, none of the varieties are restricted to particular localities, although some are much rarer than others; this appears to be especially the case with the unicolorous varieties (*grisea*, *rufa*, and *nigra*). I would call attention to the development of the white colon (:) at the outer and lower corner of the reniform, thus resembling *Mamestra albicolon* and the allied species. There appears to be no sexual variation, the different varieties being distributed through both sexes. There is also very little variation in the depth of colour of the hind wings, the hind wings of all the varieties being dark grey, with rather paler base.

A.—With grey or whitish-ochreous ground colour.

a. var. *grisea*, mihi.—(1). *Grisea-albo*. The anterior wings pale

*This is undoubtedly an error. Linnæus refers his *nictitans* of the 'Systema Naturæ,' 141, to his *oculea* of the 'Fauna Suecicæ,' No. 1215, p. 321, and describes it in the same words. If, therefore, the *nictitans* of Linnæus stands, certain it is that his *oculea* of the 'Fauna Suecicæ' is the same species, and Linnæus' description of *oculea* undoubtedly refers to *nictitans*.

grey, with scarcely any trace of the ordinary transverse lines. There is the faintest possible trace of the subterminal line, which, however, is scarcely noticeable in the uniform pale colour, reniform whitish (scarcely distinct from ground colour), orbicular and reniform not traceable. (2). *Grisea-flavo*. Like *grisea-albo*, but with the reniform indistinctly ochreous. This is a rare variety. I have a specimen from Deal, and another from Shoeburyness. This may be var. *moderata*, Ev., which Staudinger describes as, "multo pallidior, cinerascens."

β . var. *reticulata*, mihi.—(1). *Reticulata-albo*. The anterior wings grey, in some specimens with a faint ochreous tinge; an abbreviated, followed by a complete, basal streak, orbicular outlined in darker, a pale transverse angulated line beyond the reniform, and a pale subterminal line nearer outer margin; the space outside the subterminal line rather darker than the ground colour; orbicular and claviform of the ground colour; reniform, more or less distinctly white (sometimes only the outer edge white, the remainder of the ground colour); no — -like mark under stigmata. (2). *Reticulata-flavo*. Like *reticulata-albo*, but with the reniform yellowish. This is probably the commonest form occurring in Britain.

γ . var. *secalina*, Haw.—The *secalina* of Haworth ('Lepidoptera Britannica,' pp. 210, 211) refers to *unanymis*, Hb., as also do his vars. α and β of *secalina*, but his *secalina* var. γ . appears to be a variety of *didyma*. His description is:—"Alis pallidioribus minus rufescentibus; stigmatibus majoribus albidioribus; lineola nigra medio validiore; posticis dilutioribus" ('Lepidoptera Britannica,' p. 211). This appears to me most decidedly to refer to *secalina-albo*, a not very common form of *didyma*, with grey ground colour, transverse lines as in var. *reticulata*, and with a blackish — -like mark, but not developed into banded form; reniform white. (2). *Secalina-flavo*. Like *secalina-albo*, but with reniform ochreous. The variety *secalina* is much rarer than *reticulata*.

δ . var. *I-niger*, Haw.—The type of this variety is *I-niger-flavo*. Haworth's description ('Lepidoptera Britannica,' p. 211) is as follows:—"Alis griseo fuscoque variis, litera I nigra in medio ramulum exerente." "Alæ griseæ, in medio fascia fracta nigro fusco cinereoque varia, in qua stigmata ordinaria, et lineola nigra ramulum antrorsum exerens, et literam I Romanorum simulans. Lineolæ duæ aliæ basi etiam nigre. Margo posticus maculis duabus semirotundatis subconfluentibus. Stigma reniforme ochraceum. Posticæ alæ fuscæ." His var. γ ., however, is *I-niger-albo*, being like var. *I-niger*, but with a whitish reniform. Haworth writes:—"Alis ravisatis stigmatibus reniformi niveo dorso strigae ejus ravis." This grey-banded form is not uncommon. I have specimens from many localities.

ϵ . var. *virgata*, mihi.—(1). *Virgata-albo*. This is a slight modification of the above, the central area being darker than the basal and outer areas, but without the — -like mark characteristic of *I-niger*; the ground colour is very pale in some specimens; the reniform white. (2). *Virgata-flavo*. Like *virgata-albo*, but reniform ochreous.

ξ . var. *oculea*, Gn.—Guenée's type of *oculea* is a much paler grey than either of the preceding varieties, many specimens being quite whitish ochreous, or whitish grey, the costa has a broad patch, almost black, extending along almost its whole area, the reniform whitish.

Oculea-flavo is pale like var. *oculea*, has the same dark costal patch, but has the reniform stigmata ochreous instead of white. Both vars. *oculea* and *oculea-flavo* are common forms.

B.—Ground colour ferruginous red, reddish brown or purplish brown.

a var. *rufa*, mihi.—(1). *Rufa-albo*. Anterior wings unicolorous reddish without transverse lines, the claviform and orbicular scarcely (if at all) traceable, the reniform whitish; the nervures rather dark longitudinally. (2). *Rufa-flavo*. Like *rufa-albo*, but with ochreous reniform.

β. var. *nictitans* Esp. Hb.—(1). var. *nictitans*. Ground colour of the anterior wings reddish brown, with the ordinary transverse lines; reniform stigma white; the orbicular and claviform of the ground colour; no — -like mark. (2). *Nictitans-linea*. Like var. *nictitans*, but with the — -like mark under the stigmata. Of var. *nictitans* Guenée writes:—"Comprises all the specimens which, in place of the equal division of the wing into brown and ochreous as in the type, are of an unicolorous brownish with the reniform ordinarily of a pure white, but often also tinted with ochreous.* This form presents to us fewer sub-varieties than the type" ('Noctuelles,' vol. v., p. 211). Of Hübner's *nictitans*, fig. 619, I wrote the following description:—"Anterior wings very dark reddish brown, with faintly marked transverse lines. Hind wings very dark grey." These forms are amongst the most common in Britain.

γ. var. *secalina*, Hb.—(1). var. *secalina* Hb.—This variety is also red or reddish brown in colour, but the type is without the — -like mark, and with yellowish reniform. Hubner's *secalina* ('Schmetterlinge,' &c., fig. 420) may be described as:—"Anterior wings dark brownish, two short, black, longitudinal basal streaks and basal transverse line, orbicular pale, reniform ochreous; a pale transverse line beyond reniform, and a pale subterminal line; the space between these lines paler brown. Hind wings dark grey, base paler." (2). *Secalina-linea*. Like var. *secalina*, but with — -like mark under stigmata. This variety, together with the last, is very common in Britain. Both types are without the — -like mark, but whilst *nictitans* has a white reniform, that of *secalina* is ochreous. It has been necessary therefore to name the subvarieties on the — -like mark, and not on the colour of the stigmata. Guenée treats *secalina*, Hb., as synonymous with *didyma*, Esper, but this is not so; *didyma* is a central-banded form, while *secalina* is without this special development.

δ. var. *rava*, Haw.—(1). var. *rava*. This variety has a reddish or reddish ochreous ground colour, with a dark fuscous costal area continued down the central area to form a central band, but without the — -like mark. It is described by Haworth ('Lepidoptera Britannica,' pp. 209, 210), as:—"Alis subrufis, margine crassiori posticoque irregulariter late fuscis; stigmatate reniformi niveo antice striga fusca." "Alæ anticæ strigâ undatâ pallescente ante fuscum marginis postici, magis conspicuâ quam in prioribus duabus, tamen valde obsoletâ. Alæ posticæ saturate fusæ. Margo anticus stigmatatis postici plus minus albo punctatus."

*Var. *nictitans* never has the reniform ochreous. This form, with yellowish reniform, is the *secalina* of Hubner.

(2). var. *rava-flavo*. Like var. *rava*, but reniform ochreous. The red-banded form, without the \dashv -like mark, is comparatively rare, the next form, *didyma*, being much more abundant.

ε. *didyma*, Esp.—This (the type) is the more common banded form in Britain, and is of a reddish ochreous ground colour, with dark reddish central area; black \dashv -like mark under stigmata; reniform white. Many specimens of this variety have a purplish tint. (2). *Didyma-flavo*. Like the type, *didyma*, but with yellowish stigmata. Of these varieties Guenée writes ('Noctuelles,' vol. v., p. 211):—"Comprises all those specimens in which the median space, or at least its lower part, forms a blackish band, descending almost to the inner margin and traversed generally* by a most intensely black streak below the submedian nervure. Although this variety is met with in both sexes, it is more common in the males. I have seen in Mr. Pierret's collection a very remarkable example,† where the basal and subterminal spaces are almost white, as in *connexa*."

ξ. var. *furca*, Haw.—This is a striking form, somewhat like the *oculea* of Guenée, but with the ground colour reddish ochreous instead of pale whitish grey or greyish ochreous; the costal area very dark reddish brown, almost blackish, and without the \dashv -like mark, which especially gives the former variety its banded appearance. Haworth writes of *furca*:—"Alis ochraceis margine costali posticoque irregulariter late fuscis; stigmatum reniformi niveo anticè, strigisque fusca." "Præcedenti (*ophiogramma* = *biloba*) simillima, at alia, fasciâ costæ pallidiore, magis indefinitâ atque fractâ. Alæ posticæ fuscæ" (Haworth's 'Insecta Britannica,' p. 209). (2). var. *furca-flavo*. Like *furca*, but without the white stigma. It is Haworth's *furca*, var. β., of which he writes:—"Stigmatum postico absque albo."

C.—Ground colour black.

α. var. *nigra*, mihi.—(1). *Nigra-albo*. Anterior wings unicolorous blackish, no transverse lines, no \dashv -like mark, no ochreous dots as in the following varieties. (2). *Nigra-flavo*. Like *nigra-albo*, but with ochreous reniform. This is a rare variety, nearly all the black forms agreeing with one of the following forms.

β. var. *lugens*, Haw.—This is a black form, with the ordinary transverse lines, &c., still more intense; a few scattered whitish or ochreous spots, and a more or less distinct row of pale dots forming the subterminal line. Haworth writes of this as a distinct species. His description is as follows:—"Alis nigris, sub-nebulosis, stigmatum reniformi niveo. Præcedentibus (*oculea*, Haw.) affinis at absolute niger nebulis atris; stigmatum reniformi niveo, punctulis paucis albis adjacentibus minutissimis. Juxta marginem posticum striga undata obsoletissima, punctorum pallidorum. Posticæ alæ fuscæ" ('Lepidoptera Britannica,' p. 212). (2). var. *lugens-flavo*. Like var. *lugens*, but reniform ochreous instead of white.

γ. *leucostigma*, Esper.—Like the preceding, but with an intense \dashv -like mark and yellow reniform. Dr. Staudinger writes:—"ab *leucostigma*. Esp., 159. Al ant. nigricantibus, albo-maculatis." "Albo-maculatis" is undoubtedly a mistake for "flavo maculatis."

*Always! if not, it forms var. *rava*, Haw.

†This would belong to Group A, possibly an extreme form of var. *I-niger*, or var. *virgata*.

δ. var. *albistigma*, mihi.—Like *leucostigma*, with the anterior wings black; —-like mark in more intense black; a broken subterminal line composed of dots; but the reniform “white,” not “ochreous.” This would meet Dr. Staudinger’s description, “albo-maculatis.” The last two varieties are much rarer in Britain than var. *lugens*. It is doubtful whether Guenée knew the intense black forms which we get, as he does not mention them. and moreover, refers the *lugens* of Haworth to *nictitans*, Esper and Hübner, an evident error. He also mentions the following as a surprising fact:—“I have seen a specimen from North America, which is larger than ours, of a brown almost black colour, with the subterminal line forming a series of irregular yellowish dots” (‘Noctuelles,’ vol. v., p. 211).

Miana, St.

This genus consists of a group of little moths, so closely allied to the genus *Apamea*, that it is very dubious whether any really distinctive characters, sufficient to separate it from *Apamea*, exist. In most of the different forms of *strigilis* and *fasciuncula*, the transverse lines are almost identical in shape and position with those in the species of *Apamea*. In certain mottled forms of *bicoloria*, this is also the case; but generally in this latter species, *literosa* and *captiuncula*, the upper half of the elbowed line is indistinct, and the lower half is continued upwards to the costa, inside the reniform, forming a line dividing the wing into two distinct halves. The —-like mark under the stigmata, which was noted as being much developed in some of the species of *Apamea*, becomes almost normal in *strigilis* and is frequently well-developed in certain forms of *bicoloria* and *literosa*. The anterior wings in this genus are normally divided into:—(1) a basal area, (2) a central (more or less banded) area, (3) a pale outer area. *Bicoloria* is by far the most variable species, *strigilis* also is very variable, and melanic forms are common throughout Britain, although in Central and Southern Europe such forms are apparently rare. Pretty mottled ochreous varieties of *bicoloria* occur on the flowers of *Centaurea scabiosa*, on the coast near Deal and Dover, reminding one much of small specimens of *Eremobia ochroleuca* as they sit by day on the flowers. In fact, *bicoloria* offers a great deal of response to environment in the development of certain local forms. It may be advisable to note here that French lepidopterists consider *fasciuncula* a variety of *strigilis*. German and British lepidopterists treat these as distinct species. Guenée says:—“All the European *Miana* are well known. They vary no less than certain species of the genus *Apamea* above all *strigilis* and *fasciuncula* (*bicoloria*)” (‘Noctuelles,’ vol. v., p. 214). I have specimens myself, which prove that *strigilis* and *fasciuncula* are connected by intermediates, so that there is no distinct line of demarcation between them, and a series of *strigilis-fasciuncula* sent to me by the Rev. W. F. Johnson, captured in 1890, near Armagh, are perfectly inseparable. This series, which extends from the brightest red *fasciuncula* to the blackest *strigilis*, led me to write a note in the ‘Entomologist’s Record,’ vol. i., pp. 242, 306, entitled “Is *Miana fasciuncula* a var. of *M. strigilis*?” and from these specimens I concluded that it was. Such rank heresy has led to a great deal of discussion, but, after exhibiting the specimens at the City of London

and South London Societies, and to many of our leading British lepidopterists privately, I obtained so many opinions that I was fairly well satisfied of the correctness of my view. Of course, *fasciuncula* and *strigilis* in their typical forms are very different, and appear to have a different facies, but this appears to be purely superficial, the apparent distinction being more striking, owing to the fact, that each has a range of variation of its own, but so have the different forms of *Xylophasia rurea*, *Apamea didyma (oculea)*, and probably *Hydræcia nictitans* and *H. lucens*. I am quite dissatisfied with my knowledge for and against the specific identity of the latter, and therefore have kept them distinct. On the same ground, I shall keep *fasciuncula* and *strigilis* distinct, trusting that future study of the early stages of these will clear up what is at present rather a puzzle, but satisfied in my own mind that my assumption, so far as the material I have allows me to judge, is correct.

Miana, St., *strigilis*, Clerck.

The type of this species is represented by Clerck's Plate ix., fig. 6, of the 'Icones Insectorum rariorum,' which may be described as follows:—"Anterior wings of a very pale grey, with a slightly reddish tinge, collar whitish; three black costal streaks near the base and an abbreviated basal line followed by a double complete one made of three curved arches, the two lower being white; the orbicular, reniform, and claviform of the ground colour, outlined in black; two short costal streaks just above the reniform with white between; three other costal streaks between these and the apex of the wing; an angulated white line edged with a wavy black line internally, starts from the costa (just outside the reniform) to the inner margin (at the anal angle), another white line starting from near the apex, joins the angulated line; between these lines and the outer margin the colour is bluish grey. Hind wings, the same colour as anteriors but a little paler, and a double line parallel to the hind margin." Like the rest of the genus this species is very variable, and the extremes of variation are very great. Besides the type—a pale reddish grey form, with the outer margin and the bases of the transverse lines white—we get a form with an ashy-grey ground colour, and another of a black ground colour, each with the same white markings as in the type. Another form has all the white markings of the type of a grey colour, and yet another has the ordinary white parts reddish, while another form is unicolorous. The most extreme form is intensely black. All these forms vary in themselves, and have, in some specimens, the dark longitudinal streak under the stigmata, whilst in others there is no trace of it. The following is an attempt to tabulate the various forms of variation:—

A.—Ground colour ashy-grey (rarely tinged with brownish).

- 1.—With whitish or whitish-grey outer fascia = *præduncula*, Haw.
- 2.—With reddish or reddish-grey outer fascia = *suffuruncula*, Freyer.
- 3.—With reddish median band = *virgata* (*La Bronzée*, Eng., Guenée).

B.—Ground colour reddish-grey or reddish-brown.

- 1.—With whitish or whitish-grey outer fascia = *strigilis*, Cl. (= *furuncula*, Bork).
- 2.—With pale reddish or reddish-grey outer fascia = *ærata*, Esp. (= *latruncula*, Hb.)
- 3.—Unicolorous = *latruncula*, Haw.

C.—Ground colour blackish-brown or reddish-black.

- 1.—With white or whitish-grey outer fascia = *nigro-rufa* (= *strigilis*, Bork., Gn.).
- 2.—With red or reddish-grey outer fascia = *rufa*, mihi.
- 3.—Unicolorous = *unicolor* (= *latruncula* (var. β .) Haw.).

D.—Ground colour black.

- 1.—With white or whitish-grey outer fascia = *fasciata*.
- 2.—Unicolorous = *æthiops*, Haw.

In making out this table, I have based the classification on the ground colour, and the character of the fascia which runs from the apex to the anal angle. In some specimens this is white, in others whitish-grey, in others reddish-grey, while in some it is unicolorous with the ground colour. The basal area is variable, there being two pale transverse lines, more or less well developed, and, in some specimens there is a white or grey line along the extreme basal part of the hind margin. The central area which contains the stigmata is generally darker than the basal area, while the outer area is the palest of all. The stigmata vary in size and intensity, and in colour vary with the ground colour. In some specimens they are outlined in white, in others, they are unicolorous grey, whilst in others, they are obsolete, being lost in the ground colour. The extreme outer margin beyond the fascia is generally dark. The hind wings vary a little, following the intensity of the anterior wings; the paler forms have the hind wings dark grey with paler base, the darker forms, unicolorous dark or blackish-grey hind wings.

A.—Ground colour ashy-grey (rarely tinged with brownish).

a. var. *præduncula*, Haw.—This variety is described as a distinct species by Haworth. He writes:—"Noctua (the marbled minor). Alis cinereo griseoque variis nebulosis, posticè strigisque tribus undatis albis, nigro adnatis." "Alæ anticæ strigâ basi nigrâ extus albâ; tunc aliâ albâ extus nigrâ. Tunc stigmata cinerea ordinaria, et pone hæc, striga tertia alba arcuata nigro quasi tenue pectinata, tandem fascia lata alba. Margo posticus fusco griseoque nebulosus, ciliis fusco-cinereis. Posticæ alæ fuscæ ciliis fuscescentibus" ('Lepidoptera Britannica,' pp. 213, 214). This is the *strigilis* of Linnæus but not of Clerck. Linnæus describes his species as:—"Alæ griseo-cinereæ tribus annulis ovalibus nigris; fascia alba alas terminans latior, intra quam area prior inferit 5 vel 6 strias nigras fere ad ejus medium" ('Systema Naturæ,' No. 161). This is not at all a common form in some districts but appears to be widely distributed.

β . var. *suffuruncula*, Freyer.—Freyer's plate 471, fig. 1, may be described as having "anterior wings grey with a reddish tinge between the reniform and orbicular, and a reddish band extending from the costa to the anal angle, parallel to hind margin." I have never seen a variety of this particular form, and should say it was uncommon to find specimens with an ashy grey ground colour, and reddish outer striga.

γ . var. *virgata*, mihi. (La Bronzée, Engr., Gn.).—This is another variety which has not come under my notice. Guenée thus describes it:—"It is notably larger than all the other varieties, and its superior

wings appear a little more rounded. The ground colour is grey tinged with reddish with all the median space redder, especially its lower part; the black mark sometimes lacking. The stigmata are outlined in clear reddish, and very distinct as also are all the transverse lines" ('Noctuelles,' vol. v., p. 216). This may be the extreme form referred to as exhibited at the South London Ent. Society, *vide* 'Entom. Record,' &c., vol. i., p. 315.

B.—Ground colour reddish-grey or reddish-brown.

a. var. ærata, Esp.—Esper's diagnosis of this species, which he figures on plate 146, fig. 5, is:—"Alis cupreo-micantibus, stigmatibus strigisque pallidioribus, maculis obscuris." This is a striking variety, the shiny reddish ground colour (coppery, Esper calls it) with the pale reddish fascia showing very distinctly. The *latruncula* of Hübner (fig. 94) which is "of a reddish ground colour with two pale basal lines, distinct stigmata and a small whitish lunule at the base of the pale streak parallel to hind margin," appears to be a sub-variety of *ærata*, Esp. Of this variety, Dr. Staudinger writes:—"ab *latruncula*, S. V. Lang. Verz. p. 159 (1789), = *ærata*, Esp., dilutior, sæpius rufescens, obsolete albo-fasciata." I have this variety from many localities.

β. var. latruncula, Haw.—Haworth thus describes this variety:—"Noctua (the tawny marbled minor). Alis rufo-cinereis nebulosis medio saturatoribus." "Statura *N. prædunculæ*, et nimis ei affinis: differt alis anticis undique subrufo-cinereis; posticis perfuscis ciliis rufescentibus fusco maculatis." He also describes a var. *β* of this as:—"Coloribus saturatoribus, alis magis nigro nebulosis; posticis perfuscis, ciliis pallidioribus" ('Lepidoptera Britannica,' pp. 214, 215). This var. *β* refers to var. *unicolor*. This is also an uncommon form but generally distributed.

C.—Ground colour reddish-black or blackish-brown.

a. var. nigro-rufa, mihi.—This is the *strigilis* both of Borkhausen and Guenée. Borkhausen in his 'Naturegeschichte der Europ. Schmet.,' 81, thus describes the species:—"Phalæna Noctua *strigilis*—Blackish-brown with a broad whitish band near the outer margin." Guenée describes his *strigilis* as having:—"Anterior wings brownish-black with all the subterminal space pale grey. All the lines distinct, the two median marked in white, especially the lower part of the elbowed line, generally wavy and toothed. A black streak unites them above the submedian nervure. All the stigmata well-marked, the two principal ones a little paler than the ground colour; the claviform black. The subterminal line partly absorbed in the grey of the subterminal space; outer margin brown. Hind wings of both sexes greyish-black" ('Noctuelles,' vol. v., pp. 214, 215). This variety of a reddish-black ground colour with a pale outer fascia is fairly common.

β. var. rufa, mihi.—With the basal area of the anterior wings reddish-black, and the paler outer area reddish grey. This is not a very rare variety and occurs in Ireland as well as most English localities.

γ. var. unicolor, mihi. (= *latruncula*, Haw. var. *β*).—This unicolorous blackish-red variety is very common in many districts especially in the neighbourhood of London. I have already given

Haworth's description of *latruncula*, var. β , when writing of *latruncula*, Haw. var. *a*.

D.—Ground colour black.

a. var. *fasciata*, mihi.—The basal area black with the ordinary transverse lines generally more or less obsolete, the fascia from apex to anal angle white or whitish-grey. This is one of the more common forms, I believe, on the Southern part of the Continent, but is not so common as the red-brown forms in Britain.

β . var. *æthiops*, Haw.—This is the most extreme variety, being unicolorous black. Haworth's description is as follows:—"Noctua (The Blackamoor) alis omnibus nigris, anticis atro nebulosis." But he describes two forms:—"a. Totus niger, alis anticis medio aliquot saturatoribus nebulis atris." " β . Alis fuscis, vel fuscescentibus medio saturatoribus nebulis nigris. Longe pallidior quam a." This variety is well distributed in Britain. It is common in London and Yorkshire, and I have received it from Sligo. I was quite astonished a short time ago, to learn from Mr. Anderson of Chichester, that this perfectly unicolorous black form was unknown in that district.

Miana, St., *fasciuncula*, Haw.

This species, which is generally treated as a variety of *M. strigilis* by the Continental authors, is so exactly like that species in shape and markings, that, besides colour there appears to be no distinguishing mark in the imago state by which it can be separated. There are two very distinct forms, one very red, the other pale reddish-grey. The type of the species is described in Haworth's 'Lepidoptera Britannica' pp. 215, 216 as follows:—"Noctua—alis rufis, in medio fascia lata saturatiore stigmatibus ordinariis pallidioribus interrupta." He then proceeds to give a full description of both forms. The type he describes as:—"Thorax, alæque anticæ saturate rufæ, fascia magna brunnea marginem tenuiorem versus, valde attenuata et albo obsolete marginata; margo posticus fascia tenuiore rufo-brunnea, ciliis rufo-fuscis. Posticæ alæ nigræ ciliis albis interdum cinereis." He then describes the ab. *cana* of Staudinger. There are intermediate forms between the type with a deeper central band and var. *cana*, some of which are very interesting. Guenée, in his 'Noctuelles,' vol. v., p. 217, treats *fasciuncula* as a variety of *strigilis* and writes:—"This differs from the var. *latruncula*, W. V. in the brown being replaced on all the wings by a bright ochreous-red. The lower part of the two median lines especially the angulated line, is well marked in white; the black streak is wanting. The fringe of the inferior wings is tinged with reddish."

a. var. *rubencula*, Freyer.—This is an almost unicolorous form, the ground colour less red than in the type, and the central band not developed. My note of Freyer's pl. 468, fig. 2 = *rubencula* is:—"This is a var. of *fasciuncula* with the ordinary deep red colour of the type much paler."

β . var. *cana*, Stdgr.—Staudinger thus describes this variety:—"Multo dilutior, al. ant. fere canescentibus, fascia media rufa." This is the var. β . of Haworth 'Lepidoptera Britannica,' p. 216, where he writes:—"Longe pallidior, alis cano-rufescentibus, fascia ut in *a* (= type, *vide* above), sed rufo-fusca; posticis nigris, ciliis cinereis." I have taken this pale var. in all the localities where I have found the type, but it is a rare occurrence to find the pale var. with a distinct red

band. Specimens in my cabinet from Paisley, Armagh and Deal, exhibit this form well. I would include all specimens of the pale var. with a distinct central fascia (reddish or dark fuscous) under the varietal name.

β. var. pallida, mihi.—An extreme form of var. *cana*, with the hoary grey ground colour spread all over the wings. The median fascia only present in its lower half, and then not red, but of a slightly darker shade of the ground colour. This is the most common form in all localities where I have collected. I have it from many English localities, also from Sligo in Ireland. Sub-var. *extrema*. Anterior wings entirely hoary-grey without a central fascia. I have one specimen of this extreme form from Deal.

γ. var. suffusa, mihi.—Of a dark greyish-black, with all the transverse markings obsolete or faintly indicated, merging insensibly into *M. strigilis* vars. *æthiops* and *latruncula*. I have never seen specimens of this variety except from Armagh, where they were captured by the Rev. W. F. Johnson, M.A.

Miana, St., *bicoloria*, Vill.

The type of this species is described in De Villers' 'Caroli Linnæi Entomologia Fauna Suecicæ,' p. 288, No. 393, as follows:—"Noctua (la 'bicolor') spirilinguis, alis deflexis, antice fuscis, postice griseis." "Parva. Caput et thorax grisea. Alæ superiores anticæ fusæ, posticæ griseæ. Inferiores fusæ. Subtus omnes pallide griseæ. Litura albida in parte fusca versus apicem." Of the type of this species Dr. Staudinger writes:—"al. ant. iisque ad medium fuscis, deinde albicantibus (griseis)." This is not an uncommon var. in England and is closely allied to the form represented by the first figure in Newman's 'British Moths,' p. 309, except that the fuscous colour should extend from the centre to the base of the wing. There is every variation in ground colour from almost unicolorous white to unicolorous brown and red. Guenée in his 'Noctuelles,' vol. v., pp. 216, 217, writes:—"This species varies no less than *strigilis*, but the most extreme varieties are easily separated by means of the straight line which bounds the dark part of the wing inside the reniform stigma. The type of the species is that in which the wing is half fuscous and half whitish." This is to me a most interesting species and there is no doubt that many of its phases of variation, as known to us, are almost unknown by Continental authors, and very many of its varieties appear to be unknown even to British collectors. Probably no *Miana* is sent more frequently in error for other species and I have been repeatedly asked to name different varieties. There are four very distinct ground colours, white, fuscous-grey, pale reddish-ochreous, and a dark reddish-brown, and of each of these there are three very distinct forms:—(1) an unicolorous form of this colour; (2) a mottled form of the same colour (the whole of the wing being mottled with a large number of whitish transverse lines); (3) a form with the basal half dark (sometimes unicolorous, sometimes mottled) and the outer half pale greyish or white. Specimens of the mottled form are those which are the least generally distributed, and I know of no good figures of any of them. The dark unicolorous forms, too, are neither figured nor described, although the pale red form *rufuncula* has been both figured and described frequently. Besides the darker forms mentioned above, there is, on our chalk downs of Kent, a white

form with almost obsolete markings. It is remarkable that in the marshes in this neighbourhood (Greenwich) the greater number of specimens are dark reddish-brown or reddish-grey, while at Deal a large percentage are mottled-grey or reddish forms. Those at Kings-down have a *penchant* for settling on the flowers of *Centaurea scabiosa*, and look like a small *Eremobia ochroleuca*, being of a pale ochreous colour with a reddish tinge and almost always of the brown form. The reticulated or mottled form I have termed *reticulata*, and have added *fusca*, *brunnea*, and *rufa* to distinguish the different forms. The \perp -like mark which is characteristic of so many allied species is found generally in the group with the darker base, but the mark is scarcely ever traceable in the mottled forms. The var. *vinctuncula* of Hübner shows a strange development of the central transverse line separating the basal from the outer area. The stigmata vary considerably; in the unicolorous form they are scarcely noticeable, being generally of the same shade as the ground colour, while in the mottled variety they generally (the reniform more especially) stand out strikingly pale. Of the general variation of this species we read in Humphrey & Westwood's 'British Moths,' p. 180:—"This is another extremely variable species which in the typical variety has the basal half brown-coloured or blackish, with clouded markings, whilst the apical portion is ashy-white with the apical margin brown." "In other varieties the general colour of the wing is more uniform, and either pale reddish-brown or dull straw-coloured with the central portion darker and bearing the characteristic markings; others, again, have the wings reddish and the apical margin blackish and undulated." "The hind wings vary in tint according to that of the fore wings, but have the margin dusky."

The following is a classified list of the principal varieties of *bicoloria*. Other incidental varieties may occur as var. *vinctuncula* of Hübner, also intermediate forms, but the former must be treated separately, and the latter will generally be found allied very closely to one or other of the varieties mentioned in the following table:—

A.—Ground colour whitish-grey.

- 1.—With outer half paler than basal half = var. *pallida*.
- 2.—Mottled, distinct transverse lines and stigmata = var. *insulicola*, Stdgr.
- 3.—Unicolorous = var. *albicans*.

B.—Ground colour greyish-fuscous.

- 1.—With outer half paler than basal half = *bicoloria*, Vill. (= *humeralis*, Haw.).
- 2.—Mottled, distinct transverse lines and stigmata = var. *reticulata*.
- 3.—Unicolorous = *humeralis*, var. γ ., Haw.

C.—Ground colour ochreous- or reddish-brown.

- 1.—Outer half pale whitish grey = var. *furuncula*, Haw.
- 2.—Mottled = var. *brunnea-reticulata*.
- 3.—Unicolorous = var. *terminalis*, α . and β ., Haw.

D.—Ground colour pale reddish-ochreous.

- 1.—Outer half paler reddish-grey = var. *pulmonariæ*, Dup., Gn.
- 2.—Mottled = var. *rufa-reticulata*.
- 3.—Unicolorous = var. *rufuncula*, Haw.

A.—Ground colour whitish-grey.

a. var. pallida, mihi.—The basal area pale grey, the outer area almost white, the line of demarcation crossing from the costa to the inner margin between the reniform and orbicular, the extreme margin a little darker with a pale line parallel to hind margin, stigmata quite white; hind wings almost white, greyish on outer margin.

β. var. insulicola, Stdgr.—Dr. Staudinger describes in his 'Catalog,' p. 103, a variety under this name, as:—"Al. ant. griseis, albido nigroque strigulosus." This is the only described variety mottled with transverse lines that I have been able to trace.

γ. var. albicans, mihi.—This variety has the anterior wings unicolorous white, with a little grey shading in the centre of the wing around the orbicular; the stigmata are distinguishable owing to this grey colour, the extreme outer area a little shaded with grey. This is an exceedingly rare variety.

B.—Ground colour fuscous-grey.

The type—*bicoloria*, Villers—has the basal half greyish fuscous, the outer half whitish or pale whitish grey.

a. var. reticulata, mihi.—The anterior wings pale grey with the whole area covered with transverse fuscous lines, the stigmata generally distinct, no trace of the division of the wing into two halves, the basal and outer areas, the stigmata (especially the reniform) generally very distinct.

β. var. humeralis, Haw.—This is Haworth's *humeralis*, var. *γ.*, his *humeralis a* and *β* being more or less referable to the type, his *a* is equally divided into a fuscous or blackish basal part and pale outer part, his *β* has the blackish basal part broken up with whitish, whilst his *γ* has the blackish colour absent, the whole area being ashy or fuscous grey. Haworth writes:—"Nigredine anticarum pene evanescente, cæteris ut in ultimâ (var. *β*)" ('Lepidoptera Britannica,' p. 215).

C.—Ground colour ochreous- or reddish-brown.

a. var. furuncula, Hb.—This is one of the most striking of all the varieties of this species. Hübner's fig. 545 represents the type of this variety and has "the anterior wings of a dark reddish-brown colour extending from the base to an almost straight transverse line between the orbicular and reniform; the outer area of the wing stands out conspicuously pale, ashy-grey in colour, the part near the boundary of the darker basal area being more ochreous in colour. The hind wings are pale grey with darker outer margin."

β. var. brunnea-reticulata, mihi.—Like var. *reticulata*, but the ground colour reddish or ochreous-brown, instead of fuscous.

γ. var. terminalis, Haw.—This is an unicolorous reddish-brown variety, with the slightest possible traces of a darker clouding on the outer margin and around the stigmata. Haworth's diagnosis is:—"N. alis fusco-rufescentibus margine postico undatim nigricante." He also adds:—"Variat." Haworth then divides his *terminalis* into two groups *a* and *β*. Of the former he writes:—"Alæ anticæ medio vix nebulosæ, sed uniformiter rufescentes, posticæ perfusæ, ciliis cinereis;" and of the latter—"alis anticis fusco rufescentibus absque albedine, in medio solum paulo saturatioribus, vel potius nigro pulverulentibus;

posticis cinereis fimbriâ latissimâ fuscâ" ('Lepidoptera Britannica, p. 215).

D.—Ground colour pale reddish-ochreous.

a. var. pulmonariæ, Dup., Gn. (non. Hb.).—This variety has the basal area reddish-ochreous, the outer area very pale ochreous or pale grey. Guenée writes of it:—"The ground colour is of a yellow-ochreous tint, approaching brownish; the separation of the wing into two colours is less distinct than in *terminalis*, Haw. (*i.e.* var. *a.*), and the two stigmata are ordinarily outlined in pale" ('Noctuelles,' vol. v., p. 217). Guenée's var. D appears intermediate between this and the var. *furuncula* of Hübner, being paler in the basal area (more mixed with yellow) than var. *furuncula*, and darker than var. *pulmonariæ*. The presence of the yellow would almost lead one to class it as a sub-variety of the latter.

β. var. rufa-reticulata, mihi.—Like *fusca*- and *grisea-reticulata* but with the ground colour reddish-ochreous with a yellow tinge.

γ. var. rufuncula, Haw.—This pretty unicolorous red variety is treated by Haworth as a distinct species. His description is:—"Alis totis rufis, strigis tribus obsoletissimis pallidioribus." "Thorax, abdominis barba, alæque anticæ rufa, strigis duabus rectis medio, alterâque undatâ juxta marginem posticum pallidioribus, at nisi lente vix conspicuis, et interdum plus minus oblitteratis. Posticæ rufo-fuscæ, ciliis rufis. In ipso margine postico anticarum, lente, ordo punctorum nigrorum lunato-triangulorum" ('Lepidoptera Britannica,' p. 216). Haworth's type was captured in Norfolk. Of this variety Guenée writes:—"In this variety the whole of the wing is of a unicolorous tint; only the central line, the basal, and traces of a blackish colour in the terminal space can be faintly traced" ('Noctuelles,' vol. v., p. 216). In the 'Entomologist's Monthly Magazine,' vol. iii., p. 74, Mr. E. Birchall writes:—"The variety *rufuncula* of Haworth occurs commonly at Howth. The wings are uniformly clay-coloured without lines or spots. The insect has a strong superficial resemblance to *Nonagria concolor*." Dr. Staudinger in his 'Catalog,' p. 103, writes:—"al. ant. fere unicolor, rufescenti-griseis."

δ. var. vinctuncula, Hb.—This is a striking form with the anterior wings unicolorous, except a fine black transverse line crossing the wing between the reniform and orbicular, really the boundary-line when the wing is divided into two distinct shades of colour. Hübner's fig. 96 may be described as of a "dark greyish (tinged with red) colour, with scarcely discernible stigmata; greyish hind margin, with a white line bordering it; a fine black line crosses the wing from costa to inner margin between the stigmata; there is also a small black (longitudinal) basal streak." I have never seen a specimen of this description. Guenée says of it:—"This is only a modification of Haworth's *rufuncula*, where the centre line is of a very pronounced black. I have never seen it in nature" ('Noctuelles,' vol. v., p. 217). Dr. Staudinger says of it in his 'Catalog,' p. 103:—"ut *rufuncula*, sed fascia media tenui nigra margineque exteriore grisea."

Miana, St., *literosa*, Haw.

The type of this species is described by Haworth in his 'Lepidoptera Britannica,' p. 213, as:—"Alis glaucis striga postica flexuosa

rosea, lineolis literæformibus in medio, nigris." "Stigmata in medio ut in ultima (marginibus nigris interruptis solum conspicua), at longe obsoletiora, margine nigro fracto solum conspicua; qui margo format lineolas literæformes nigras." This species has always been included by Continental lepidopterists with *erraticula*, Hb., which appears to me simply a variety of *bicoloria*. The specimens captured by the Messrs. Salvage, at Forres, in the summer of 1888, were rather paler than those we obtain in the South of England. There is some variation in the width of the median band, also in its intensity and the development of the longitudinal — mark under the stigmata. Guenéé also refers *erraticula*, Hb. to this species, but this, I think, is decidedly an error. It is the most constant of all the British species of *Miana*.

Phothedes, Ld., *captiuncula*, Tr.

Treitschke's diagnosis of the type of this species 'Die Schmetterlinge,' &c., II., p. 96, is as follows:—"Alis anticis fuscis, fascia media obscuriore, stigmatate reniformi fasciaque externa albides." Our British specimens differ from the Continental specimens, being, as a rule, greyer and more unicolorous, so that Staudinger treats our form as a variety. Newman, in his 'British Moths,' p. 309, referring to Herich-Schäffer's figures 173 and 174, which are very variegated, says:—"They resemble the Irish rather than the English specimens, but are more variegated than any I possess." The English variety is first noticed in Stainton's 'Annual' for 1855, where we find Doubleday given as the nomenclator, and a comparison is drawn between this species, *M. fasciuncula* and *M. strigilis*. Mr. E. Birchall thus writes of the Irish specimens:—"Common near Galway. The Irish specimens are smaller, and much more richly coloured than any English ones I have seen" ('Entomologist's Monthly Magazine,' vol. iii., p. 74).

a. var. expolita, Dbdy.—In Stainton's 'Annual' for 1855, p. 41, we find:—"Taken near Darlington." "The species may be readily known, being much smaller and darker than *fasciuncula*, and extremely glossy, the posterior wings are unicolorous grey, with pale grey cilia; the shape of the anterior wings being also very distinctive, the hinder margin not being elbowed as in *fasciuncula* and *strigilis*." Staudinger writes of var. *expolita*:—"fere unicolor grisescens," while Newman ('British Moths,' p. 309) figures both the variegated type and the more unicolorous *expolita*.

Celena, St., *haworthii*, Curt.

This species, closely allied to the members of the genera *Helotropa* and *Hydræcia*, varies considerably both in ground colour and in the markings. The colour varies from yellowish brown through deep red and purplish brown to blackish grey. The orbicular varies from complete absence to a clear white or ochreous spot and the reniform, besides being very variable in shape and size, is in some specimens indistinctly marked, in others ochreous, and in others white. There is also a considerable amount of variation in the number of white nervures, some specimens having no trace of them. The type, is described in Curtis' 'British Entomology,' 260, as follows:—"Yellowish brown, variegated with rosy scales. Superior wings with a few scattered white scales, the costa with three yellowish spots, and three

minute ones near the apex; an obscure black line near the base, and a lanceolate one at the interior margin; two waved, narrow, whitish transverse lines, one before, the other beyond the middle, the nervure in the centre cream-coloured and furcate; above is a small ocellated spot, and below a black hook; beyond it is a cream-coloured ear-shaped spot with a dark line on the inside; near to the posterior margin runs a yellowish dentated striga with three blackish short rays on the inside; cilia ochreous with a fuscous line down the middle, and a black chain at the base. Body and inferior wings yellowish fuscous, the former rosy-ochre at the apex, the latter with a fuscous undefined fimbria and a lunular line towards the middle; the cilia ochreous with a fuscous line. Underside pale ochreous and fuscous, the inferior wings with a distinct blackish spot near the middle." A good figure of the type is found in Humphrey and Westwood's 'British Moths,' pl. xxxviii., fig. 14. Herr Hoffmann, writing of the Shetland specimens in the 'Stettiner Zeitung,' says:—"They have a reddish ground colour and are more distinctly marked than the ordinary form. They agree more with the specimens from the Upper Harz." There are five named varieties:—

a. var. hibernica, St.—The *hibernica* of Stephens is described in Humphrey and Westwood's 'British Moths,' vol. i., p. 182, as follows:—"The fore wings are reddish-brown, without any black lines at the base: the strigæ on each side of the characteristic portion of the wing are present, followed by a whitish fascia, on which is a paler dentate striga, the anterior stigma generally obsolete; on the hinder margin is an interrupted black line; the pale colour of the central vein does not extend so far as in the preceding (type), from which this accordingly differs in the more uniform colours, and the want of the black markings. Found near Dublin." Guenée, in his 'Noctuelles,' vol. v., p. 220, says of this variety:—"Of a more ferruginous tint, less marked with white. Orbicular concolorous and indistinct." Staudinger says of it:—"Al. ant. ferrugineo-fuscescentibus minus variegatis." I have some very strong red forms from Ballycastle, Ireland.

β. var. lancea, St.—The description of this variety from Humphrey and Westwood's 'British Moths,' p. 182, is as follows:—"Differs from the foregoing (*hibernica*), chiefly in its smaller size (measuring only half an inch in expanse) nearly uniformly coloured fore wings, with the scarcely waved posterior strigæ and paler hind wings. Taken near Whittlesea—mere, &c." This variety is figured by Humphrey and Westwood, pl. xxxviii., fig. 16. I have two specimens nearly approaching this variety, one from Ballycastle, the other from the Norfolk Broads. Some specimens, not only of this, but also of the other varieties are very small.

γ. var. tripuncta, Curtis ('Brit. Ent.,' 260b, without description).—First described in Humphrey and Westwood's 'British Moths,' p. 182, as "having both the stigmata distinct and pale, as well as a patch resting upon the subapical striga near the costa of the fore wings. Taken at Horning in Norfolk." I have the same variety from the Norfolk Broads. There is a good figure of this variety, pl. xxxviii., fig. 15 of Westwood's work.

δ. var. morio, Ev. ('Evers. Bull. Mos.,' 1842, No. 3.—'Faun. Ural.,' p. 272).—Guenée, in his 'Noctuelles,' vol. v., p. 220, thus

describes this variety :—"Of a deep blackish brown, with the subterminal wedgeshaped spots of an intense black, the stigmata and the geminated nervure dull white." "Locality, Casan." This seems to run Freyer's *erupta* closely. Eversmann's description of *morio* is:—"Antennæ maris crenatæ et vix ciliatæ; abdomen griseo-nigricans; thorax nigro-fuscus;—alæ anticæ atro-fuscæ, fascia submarginali pallidiore, striga interna et externa obsoletis,—striga submarginali albida adjacentibus maculis triquetris atro-fuscus notata,—nævo minuto, macula media furculaque sub ea nervi tertii albidis;—posticæ nigricantes, externa obscuriores" ('Fauna Volgo-Ural.,' p. 272, No. 2.).

ε. var. *erupta*, Frey.—Freyer in his 'Neure Beiträge,' &c., plate 472, figs. 1 and 2, represents a variety of *haworthii* under this name. His fig. 1 may be described as :—"♂. Anterior wings blackish-grey with a short transverse basal streak, followed by another near the orbicular edged internally with slaty. Orbicular and reniform ochreous-white, with a geminated line extending from base of reniform to outer edge of wing; two transverse lines directly beyond reniform, upper part dark, lower part very pale ochreous followed by another pale ochreous transverse line; hind wings dark grey, base paler, nervures distinct. Fig. 2 is a ♀ and like fig. 1, but there is an ochreous patch between reniform and apex, and the outer pale line is double."

Mamestra, Och.

With regard to the genus *Mamestra*, most of the species have two extreme forms of variation,—one, pale brownish grey; the other, black, with almost all intermediate forms. *Sordida* (*anceps*) in its palest forms seems to be the extreme ochreous type of the genus, *persicariæ* the extreme black one. Based on variation, the position of *furva* seems somewhat anomalous, and it seems to me that this species should hardly be placed in this restricted genus at all. With regard to the other species, *abjecta* has two extreme forms, so has *albicolon* (Guenée's 'Noctuelles,' vol. v., pp. 194 and 196), but we do not apparently get the darkest forms of the latter species in Britain, though there is a great deal of variation in our specimens, and *brassicæ* has also two extreme forms. With regard to another phase of variation in this genus, a careful selection of varieties shows that the *albicolon* mark, supposed to be characteristic of one species, is really well-developed in aberrant members of all the other species, the only species in which it is not traceable being in *persicariæ*, but my series of the latter does not contain specimens of those varieties in which the reniform is more or less obsolete, and it is in such I should expect to find it. This genus is of course closely allied to *Hadena*, although so far removed from each other in our British lists. *Abjecta* comes especially near to *Hadena adusta*.

Mamestra, Och., *abjecta*, Hb.

The type of this species is represented by Hübner's fig. 539, 'Sammlung Europäischer Schmet.,' &c., which may be described as having—"Anterior wings of deep, but clear, brownish (almost reddish) grey, an abbreviated basal transverse line and a complete one in contact with the inner edge of orbicular, both double; a short dark longitudinal streak under base of median nervure; orbicular distinct, reniform outlined in white; an oblique line from costa to median nervure between

stigmata; a wavy transverse line just beyond reniform, followed by four short longitudinal wedge-shaped spots. The dark longitudinal mark under the stigmata in Newman's figure ('British Moths,' p. 298) is absent. The hind wings dark grey on outer edge, with pale base and distinct lunule." Staudinger says:—"forma, al. ant. fere unicolor magis nigris." I rather fail to follow how Staudinger can call Hübner's figure "almost unicolorous"; it certainly is much more variegated than many specimens we get, as the above description clearly shows, but apparently much less so than the ordinary continental form which he has named *variegata*. The most unicolorous forms that I have seen are:—(1) a fine steely grey form from the coast of Lancashire, var. *frivolus*; (2) a fine black form from North Kent, var. *nigro-distincta*; and (3) an ochreous grey form, var. *unicolor*. Some of my specimens much resemble Hübner's type (although I have never seen a British specimen exactly like it), others are like Newman's figure, besides the unicolorous forms. There is really very little doubt that this species is in reality polymorphic, closely resembling its near allies, the members of the genus *Apamea*, in this respect. It would be impossible to classify the different forms except in a most general way. Guenée does so by classifying them into those with ground colour "grey-brown," and those with ground colour "grey black." He writes:—"This species offers, like *albicolon*, two varieties: one of a grey-brown and one of a grey-black. The first is the type of Hübner. The markings are rarely so well marked as in the figure of that author." Guenée then divides the form with a black ground colour into two varieties, the *frivolus* of Boisduval, an almost unicolorous blackish form, and var. *B*, a black form with the markings more distinct. The *lunulina* of Haworth agrees pretty correctly with Hübner's type. His summarised description is:—"Noctua alis fuscis strigis lunularum pallidarum" ('Lepidoptera Britannica,' p. 192, No. 92). We thus get the following forms:—

- 1.—Anterior wings much variegated with black and white markings = var. *variegata*, Stdgr.
- 2.—Brownish-grey ground colour, with distinct markings = *abjecta*, Hb.
- 3.—Ochreous or brownish-grey, with no markings = var. *unicolor*.
- 4.—Blackish-grey, with distinct markings = var. *nigro-distincta*.
- 5.—Deep greyish-black, with indistinct markings = var. *frivolus*, Bdv., = *nigricans*, Freyer.

a. var. *variegata*, Stdgr.—Staudinger's description of this variety is as follows:—"Al. ant. thoraceque albido nigroque variis." I do not think many of our specimens have much white about them. The most variegated British specimen I have seen belongs to Mr. Robson, and was captured near Hartlepool. This is much irrorated with whitish scales, and variegated with black; I have one from Shoeburyness less strongly marked. I would include all grey or brown, irrorated and variegated specimens under this name.

β. var. *unicolor*, mihi.—Anterior wings of a brownish-grey colour, with an ochreous tinge, and with no distinct markings. This is our more general unicolorous form, and is much more frequent than the blackish grey unicolorous variety. On the east coast of Britain it is the form more often met with than any other. I have it from Strood, the

neighbourhood of Hull, and Shoeburyness. A series that I have looked over, taken by Mr. Robson at Hartlepool, belong principally to this form.

γ. var. *nigro-distincta*, mihi.—This is Guenée's var. B., which he describes as follows:—"Similarly (to var. *fribolus*) of a greyish black. All the markings clearly written. Inferior wings with the outer margin more deeply marked, and a more distinct lunule" ('Noctuelles,' vol. v., p. 194). Guenée treats this only as a North American variety, giving the State of New York and Canada as localities. I have specimens of this form from Greenwich, and the neighbourhood of Cliffe (Kent); but although those from the latter locality are well marked, they scarcely appear so, owing to the intense depth of the ground colour. Mr. T. Baxter writes:—"I have specimens from Lytham and here (S. Anne's-on-the-Sea) that come under your description of var. *nigro-distincta*" (in litt.).

δ. var. *fribolus*, Bdv.—This is the *nigricans* of Freyer. Guenée's description is:—"Superior wings of a deep greyish black." Same localities as type. I would include all unicolorous, greyish black forms under this name. I have specimens from Shoeburyness, Deal, near Cliffe, and Fleetwood. There appears to be no doubt that the steel-grey Lancashire specimens must be included under this varietal name.

Mamestra, Och., *sordida*, Bork.

The type of this species is thus described in Borkhausen's 'Naturegeschichte der Europäischen Schmetterlinge,' p. 239:—"It is as large and nearly the shape of *Noctua brassicæ*. The fore wings mottled, with a mixture of earth-grey and pale dirty brown; markings extremely indistinct and pale. In some specimens three pale transverse lines can be distinguished: the one at the base is very pale; the second has particularly strong zigzag marks near the inner margin; the third forms a slight semicircle. They are all paler than the ground colour, but edged with darker. On the inner side of the third line is a row of brownish moonshaped spots, which turn their hollow sides inwards. Close to the hind margin is a pale zigzag line, which forms in the middle a small Latin W. The ordinary markings between the second and third transverse lines are very faintly marked; the claviform is indistinctly surrounded with whitish grey, and scarcely visible, the reniform is strongly marked with blackish grey, outlined with whitish, and with a grey centre; the orbicular is pale brownish; the costa has some dark spots, and near the apex are a few yellowish spots. Hind wings whitish grey, shaded with black at the outer margin; veins darker; transverse line sometimes traceable. This *NOCTUA* varies considerably in the amount of light and dark shading of the wings; in some specimens the colour of the wings is very dark, and frequently black is mixed with the ground colour."

This is another variable species, the ground colour extending from a pale unicolorous ochreous grey, with scarcely any markings (var. *renardii*), to a bright reddish ochreous (var. *ochracea*), through a dark grey form much suffused with red (var. *anceps*), to a form entirely made up of a dark, dirty-grey ground colour, much suffused with darker greyish brown (the type). The dark red suffused forms (var. *anceps*) and the dark earth-grey and brown (the type) forms are much more common

in Kent than any others, the pale ochreous and reddish ochreous forms being rare. The var. *renardii* of Boisduval is an extreme development of the pale ochreous form. Of the general variation of this species, Guenée writes:—"It varies much, but all its modifications are too unimportant and unstable to constitute distinct races" ('Noctuelles,' vol. v., p. 195). There would thus appear to be four fairly distinct forms:—

- 1.—A pale unicolorous grey form = var. *renardii*, Bdv.
- 2.—A reddish ochreous form = var. *ochracea*.
- 3.—A dark grey form, mottled with reddish ochreous = var. *anceps*, Hb.
- 4.—A grey form, mottled with dirty brown = var. *sordida*, Bork.

a. var. renardii, Bdv.—This is a very pale unicolorous variety of *sordida*, with the markings in its extreme forms almost entirely absent, but leading up by intermediate forms into the other varieties. Guenée, in his 'Noctuelles,' vol. v., p. 195, thus writes of this variety:—"This is certainly only a very pale variety of *anceps*. All the markings have disappeared, and the upper wings are entirely of a whitish ochreous colour, with the exception of the terminal space, where there remains traces of greyish colour. The lower wings and the underside are of a pale shining whitish, without markings. North of France." This variety apparently occurs but rarely in England. I have taken it at Sandwich, Deal, and Strood, but have never met with it in any other locality, although I have received it from Brighton. It occurs in both sexes, and the hind wings show a large amount of difference in the quantity of grey shading; some having a distinct dark marginal band, others agreeing with the above description, and being without any very definite trace of it.

β. var. ochracea, mihi.—This is a very pretty variety. It is of a very pale yellowish ochreous ground colour, strongly tinged with red (I have one specimen entirely reddish ochreous), with the stigmata and transverse lines very pale grey. As in var. *renardii* there is scarcely any of the dirty grey colour present in the type, except on the outer margin. The variety occurs in both sexes. I have captured it at Deal and Strood, and received it from Cambridge, but it is apparently a rare form.

γ. var. anceps, Hb.—The *anceps* of Hübner is an extreme development of the last variety, with the ground colour dark brown instead of pale ochreous, but much mottled with reddish, as in that form. Hübner figures it in his 'Schmetterlinge,' &c., 484, the following being the description made of it:—"Anterior wings ochreous brown, tinged with reddish; an abbreviated transverse line followed by a complete basal line; claviform outlined in blackish, the reniform and orbicular in whitish; directly beyond reniform, a double line internally edged with black; a pale wavy line close to hind margin, with a W-shaped mark in its centre. Hind wings dark grey, with pale base; two pale transverse lines pass through the dark grey margin." I would include under this varietal name all dark brownish forms mottled with red. This is the most abundant form occurring in Kent, being much more abundant than the type, which is of a greyish colour, marked with dirty brown. The *anceps* of Hübner is the usual form found near London.

Mamestra, Och., *furva*, Hb.

The type of this species is represented by Hübner's fig. 407, which I have described as follows:—"Anterior wings reddish brown, with an abbreviated, followed by a complete basal streak, both of which are ochreous and very pale in colour; stigmata outlined with yellowish, a dark transverse line passes between the stigmata from costa to inner margin, two pale wavy ochreous lines between the reniform and hind margin. Hind wings grey, dark on the outer edge, with a pale line running through the darker part." My own note is this:—"This is not a good figure of *furva* as we know it, and presents a strong superficial resemblance to *Luperina cespitis*, but the transverse lines are different to those of that species, and agree exactly with those of *furva*." Guenée mentions two varieties, both from Russia; and Freyer has figured another. Herr Hoffmann, in the 'Stettin Entomologische Zeitung,' 1884, p. 365, writes of the Shetland *furva*:—"Kleiner und dunkler als Stücke aus den Schweizer Alpen." Guenée's description (*vide* var. *ochracea*) of *furva* would answer very well for specimens I have from Ayton (Berwickshire) and Paisley, except that the ground colour is not yellowish brown; but those from Aberdeen, Pitcaple and Sligo are much darker. My Paisley specimens are of the ground colour of Hübner's type, whilst the German, Swiss, and French specimens are paler. Our Aberdeen and Sligo forms apparently belong to var. *infernalis* and var. *silvicola*, which only appear to be slight modifications of *freyeri*. Taking Hübner's brown form as the type,—Guenée's *furva* is a lighter, *freyeri* and *infernalis* darker, and *silvicola* an extreme melanic form.

a. var. *ochracea*, mihi.—Guenée, in his 'Noctuelles,' vol. v., p. 197, describes *furva* as:—"Anterior wings yellowish brown, with the three first lines very distinct, wavy, geminated, and outlined with yellowish in the middle; the angulated line composed of lunules in contact, a series of very small yellowish dots between it and the subterminal, which is very distinct, yellowish, wavy, broken in the centre and marked with an M, and preceded by three or four black wedge-shaped marks. The three stigmata clear, the outline of the reniform yellowish, the claviform short, black, often indistinct. Fringe spotted. Inferior wings greyish yellow, with a broad dark border, cut near the anal angle by a short clear line, and a large dark lunule." I do not think we get so pale a variety of *furva* as this in Britain. Mr. N. F. Dobrée writes:—"I have specimens from Turkestan, and these agree pretty closely with the var. *ochracea*" (*in litt.*).

β. var. *freyeri*, Frey.—The type of this variety is figured by Freyer in his 'Neuere Beiträge,' &c., pl. 159. It has the "anterior wings of a more blackish ground colour." But Guenée, in his 'Noctuelles,' vol. v., pp. 197, 198, writes:—"I have seen a specimen sent from Germany under this name, which does not differ in tint from the ordinary *furva*." My own description of *freyeri* is as follows:—"Anterior wings blackish grey, with seven short black costal streaks, with pale (almost white) transverse basal line; orbicular and reniform outlined in white, a pale wavy line directly beyond the reniform, followed by a transverse row of pale ochreous dots, and a pale wavy line (white), edged internally with blackish wedge-shaped marks (in

contact) parallel to the hind margin. Hind wings pale grey, outer margin dark grey, lunule and nervures still darker."

γ. var. *infernalis*, Ev.—"Eversmann, 'Bull Mosc.,' 1842, = *furva*, 'Fauna Ural.,' p. 247," is the reference given by Guenée for this variety. He also describes it as:—"Differs but little from *furva*. It is a little darker. The spaces in the stigmata are marked in brown. The discoidal line of the under sides of the inferior wings is a little more wavy, clearer, and appears a little on the upper side; but these differences are very slight, and perhaps not constant. Localities: Casan, Orembourg, and Ural" ('Noctuelles,' vol. v., p. 198). The specimens I have from Aberdeen would apparently belong to this variety.

δ. var. *silvicola*, Ev.—Guenée, also on p. 198, describes another Russian variety as:—"Superior wings still darker, almost black, with the stigmata and lines more or less absorbed by the ground colour. Inferior wings of a blacker shade. Thorax and anal tuft not mixed with yellow scales. Locality: Woods of the Ural." The specimens I have from Sligo would appear to belong to this variety.

Mamestra, Och., *albicolon*, Sepp.

The type of this species is figured by Sepp in his 'Beschouwing der Wonderen Gods,' &c., II., pl. 1, figs. 1-9; and is described by Guenée, in his 'Noctuelles,' vol. v., p. 196, as:—"Anterior wings of a blackish grey, on which stands out strongly the little white broken C, which borders the lower and outer edge of the reniform. None of the other markings are very distinct." Guenée also adds:—"I have never found the type in our country (France), where the following variety (*brunnea*) is found occasionally." I have taken this dark type at Deal, and have also received it from Mr. Baxter, where it was taken in the neighbourhood of Lytham; but generally our British specimens are the grey *albicolon* of Stephens. Mr. N. F. Dobrée, however, writes:—"I have taken *albicolon* through a series of years on the sandhills at the mouth of the Humber, and there the dark form predominates" (*in litt.*). Hübner also figures a dark brown form, which Guenée says "occurs occasionally in France." There is a little variation in the character of the pale line, which is parallel to the hind margin; in some the line is fairly complete, in others it forms a row of white dots, while in others they are distinctly yellow. There is also a considerable amount of variation in the colour of the hind wings, this variation not being sexual; in some specimens the hind wings are entirely dark grey, in some pale grey, and in others pale grey with a dark hind marginal band. One of my Deal specimens has a transverse row of white dots between the discoidal spot and the subterminal line, and it is dusted with white along the nervures.

α. var. *brunnea*, mihi.—This is Guenée's var. A, which he refers to Hübner's fig. 543. The note I made of Hübner's figure is as follows:—"Anterior wings dark brown, but all the markings very distinct." Guenée's description of the variety is as follows:—"Anterior wings yellowish brown, more or less pricked out in blackish, with the subterminal line of a yellowish white, broken up, but well marked, and the ordinary lines more distinct than in the type. Inferior wings paler, and tinged with the yellow of the upper wings" ('Noctuelles,' vol. v., p. 196).

β. var. cinerascens, mihi.—This is the English form, which is much greyer than the continental specimens. It is Guenée's second var., which he calls *albicolon*, St., and he takes as his type, Stephens' 'Illustrations,' &c., vol. ii., p. 184, and pl. xxiv., fig. 3. He describes it, 'Noctuelles,' vol. v., p. 196, as:—"Anterior wings ashy grey, strongly sprinkled with black atoms, with all the markings very distinct. The subterminal line as in var. A. The two stigmata paler and clearer. The reniform almost entirely surrounded with white. The black terminal points triangular, and well marked." The only locality Guenée gives is "England." As a rule, our English specimens have not the wedge-shaped spots so distinctly marked. Of this grey (British) variety, Mr. Robson has a strongly-marked specimen, which almost resembles Guenée's second var. *albicolon*, St. It is of a pale ochreous grey ground colour, with the black transverse basal lines very strongly marked, and the space between the strigæ directly before and beyond the reniform filled in with darker, so that it resembles a narrow band. I have seen no other specimens like it.

Mamestra, Och., *brassicæ*, L.

The type of this excessively abundant and widely distributed species is described by Linnæus, in the 'Systema Naturæ,' 10th edition, p. 516, No. 111, as follows:—"Noctua spirilinguis cristata alis depressis cinereo nebulosis: unco nigro supra maculam priorem." In the 12th edition, p. 852, No. 163, he adds:—"Stigmata alæ ordinaria punctis albis notata et margo inferior punctis 3 albis." It must be noted that no mention is made in the Linnæan description of a subterminal line, and mention is made of three white dots on inner margin. My specimens have one or two of these dots present, not three; and I have specimens in which the subterminal striga is practically obsolete; the "uncus" is well seen around the claviform, and there are traces in some specimens of another around the lower part of the orbicular. It would appear that we rarely get specimens in Britain satisfying the Linnæan description of the type, our specimens being principally referable to var. *albicolon*, St. Guenée, in his 'Noctuelles,' vol. v., pp. 198, 199, says of the variation of this species:—"It varies a little both in colour and markings, but I have never seen a distinct race. *Albidilinea* of Haworth has the reniform and subterminal line well marked in white; *albicolon* of Stephens is, on the contrary, of mixed colours, with the claviform obliterated; lastly, the figure *d* of Engramelle has a yellow ochreous tint. These last specimens are generally smaller than the type." Regarding this ochreous form, Mr. Dobrée has specimens, a description of which he has kindly given me (*vide var. ochracea*). In England we appear to get three fairly distinct forms:—(1) Ashy grey, mottled with darker on the costal margin and with ochreous on the inner (the ochreous often with a reddish tinge), with distinct stigmata and subterminal line = var. *albicolon*, St. (2) An almost unicolorous blackish grey form, with all markings and lines, except reniform, almost obsolete = var. *unicolor*. (3) An intensely black form, with very distinct white subterminal line and reniform = var. *albidilinea*. Hübner figures (88) the pale form under the name of *brassicæ*. Mr. Gregson ('Entomologist,' iv., p. 52) writes:—"Of this constant and abundant species I dare not say how many I have care-

fully secured, and the results are before me:—One very small perfect specimen; one of a smooth rich brown colour and without markings, a large specimen; and two large females having full white stigmata, and a rich, distinct, wavy, light striga near the outer edge. These are very striking insects." I have a very small specimen, but have never seen one that could be called really brown, so that Mr. Gregson's specimen must have been a very unusual form. Taking the mottled grey insect as the type, we have the following forms:—

- 1.—Ashy grey, mottled with darker, no ochreous colouring, white, reniform, subterminal line more or less obsolete = *brassicæ*.
- 2.—Grey, mottled with ochreous, distinct stigmata and subterminal line = var. *albicolon*, St.
- 3.—Ochreous grey, mottled with darker, white reniform, subterminal line present = var. *ochracea*.
- 4.—Unicolorous blackish grey, white reniform, obsolete subterminal line = var. *unicolor*.
- 5.—Very black, white reniform, white subterminal line = var. *albidilinea*, Haw.

a. var. ochracea, mihi.—This is the fig. *d* of Engramelle, 456. Hübner's figure (88) may be described as:—"Anterior wings pale ochreous, with darker fuscous shades; all the characteristic lines and markings of *brassicæ* of a pale whitish ochreous. Hind wings grey, margin darker than base, lunule distinct." None of our British specimens appear to be referable to this variety. Mr. Dobrée, however, writes:—"I have specimens from Amurland, where it is very common. These are of quite a pale, warm ochreous ground colour, with typical faint markings. Reniform white, and more compact than in British specimens, and outlined with black. Orbicular, the same as ground colour, with strong black outline, and beneath the orbicular a conspicuous semicircular black mark facing inwards; the subterminal line almost obsolete" (*in litt.*).

β. var. albicolon, St.—This would appear to be the more common form of *brassicæ* in the southern part of England, being mottled with ochreous and dark fuscous, and with distinct stigmata and transverse lines outlined in pale ochreous. Stephens' *albicolon* ('Illustrations,' &c., ii., p. 195), however, had an "obliterated claviform," which is not usually the case with the mottled variety.

γ. var. unicolor, mihi.—Anterior wings dull blackish grey, with the subterminal line almost obsolete, the markings, blending with the dark ground colour, give it a very unicolorous appearance. The outer edge of the reniform white, as in the type. My specimens are labelled Nottingham and Westcombe Park, but I dare say it is found occasionally wherever the type or var. *albicolon* is abundant.

δ. var. albidilinea, Haw.—Haworth's description of *albidilinea* is as follows:—"Alis anticis nigricantibus, striga postica alte bidentata albicante." "Statura et magnitudo fere *N. brassicæ*. Alæ anticæ stigmatibus ordinariis, strigâque alte dentatâ juxta marginem posticum albicante, exacte ut in Noctuis vulgo dictis 'Brocades.'" This extreme variety is, I believe, rare. I have only one of this intensely black form with distinct white markings. My specimen was bred from pupæ, sent me by Mr. Mottershaw, of Nottingham. Mr. Robson, in the 'Young Naturalist,' vol. ix., p. 103, referring to Mr. Gregson's

specimens, mentioned above, describes them, and I have very little doubt they belong to this variety. I have seen a specimen of Mr. Robson's belonging to this variety, but the subterminal line is more ochreous than white. I would include all black specimens with strongly-marked reniform and subterminal line under this varietal name.

ε. var. *andalusica*, Stdgr.—Dr. Staudinger has a variety in his 'Catalog' under this name, which he describes as:—"dilutior, magis unicolor." I thought that probably this variety might refer to my var. *ochracea*, as this short description is so vague that it is impossible to tell from it to what form Dr. Staudinger refers. Mr. Dobrée, however, in answer to a query, writes:—"Andalusica is certainly not the Amur type. It is merely the pale form so constantly occurring in all continental, as opposed to British, lepidoptera, the ground colour of the Amur type (*vide* above) is ochreous, but that of *andalusica* is grey" (*in litt.*).

Mamestra, Och., *persicariæ*, L.

This species, as far as my knowledge extends, appears to be very constant in Britain. I find a slight variation in the amount of ochreous colour in the white discoidal, some variation in the extent to which the orbicular is obsolete, and rather more in the character of the subterminal line. I have some in which this latter is obsolete, others in which it is represented by a more or less complete series of ochreous dots, and but few in which it is quite complete. On the Continent, however, it appears to be more variable, at any rate, so far as the discoidal is concerned; in some specimens it is ochreous, and in others only of the ground colour. The former is, according to Guenée, the *accipitrina* of Esper, the latter the *unicolor* of Staudinger, although, as mentioned below, Dr. Staudinger considers *accipitrina* a distinct species. The type of this species is described by Linnæus, 'Fauna Suecicæ,' pp. 319, 320, No. 1208, as:—"Noctua spirilinguis cristata, alis fusco-nebulosis: macula reniformi albo pupilla lunari flavescens." "Alæ superiores fusco nigricantes, venis nebulosæ, margine postico quasi dentato atomis albis. Inferiores antice pallidæ, postice fuscæ margine albido. Subtus omnes glaucescentes: fascia lata, obsoleta et puncto nigro. Anus ferrugineus"; and in the 'Systema Naturæ,' p. 847, we read:—"Alarum superiorum margo posticus albo-dentatus." Our specimens have an ochreous subterminal line, not "white."

α. var. *accipitrina*, Esp. (?)—Of this variety there are specimens in the Doubleday collection (continental), with "the reniform ochreous, and the whole insect much less strongly marked." Guenée says of it:—"Accipitrina, Esp., 'Die Schmet. in Abbildungen,' &c., pl. 129, fig. 4, appears, after what he himself states in his text, to be a purely accidental and very singular variety of *persicariæ*." Dr. Staudinger, in his 'Catalog' says:—"Accipitrina of Esper is another species, the var. *accipitrina* of collections is not Esper's *accipitrina*." He then suggests for the *accipitrina* of continental cabinets the varietal name of *unicolor*.

β. var. *unicolor*, Stdgr.—Of this variety, Staudinger says in his 'Catalog':—"Al. ant. absque macula alba." Mr. Dobrée writes:—"I have specimens of this variety in my collection. It seems to be a common continental variety" (*in litt.*).

Crymodes, Gn., *exulis*, Lef.

This most interesting and excessively variable species occurs but rarely on the mainland of the British Isles, but in the extreme northern islands it is sometimes fairly abundant, becoming in Iceland, Greenland and Labrador one of the most common NOCTUÆ. It is also one of the most variable species, and large numbers of different forms have been described by different authors, more especially by Dr. Staudinger in his papers on the Entomology of Iceland. In 1889 and 1890 a very considerable number were captured by the Rev. Dr. Walker, and Dr. P. B. Mason, and exhibited at the meetings of the Entomological Society of London. In 'Entom.' xxii., p. 300, we read that *Crymodes exulis* was common at Reykjavik and Thingvellir, and that one specimen of a very dark type was taken at Triusvik. Of the variation in the species Dr. Staudinger says:—"species incredibiliter aberrans; an præcedentis (*maillardi*) sp. Darw.?" ('Catalog,' p. 100). This species is comparatively rare in Britain, and my series is too short to attempt a classification of the different forms, although some of those that I have seen are very striking. I shall therefore only deal with those varieties which have been described by other authors. The type is described by Lefebvre in the 'Ann. Soc. Fr.,' 1836, p. 392, and figured Plate 10, 2. His description is:—"♂. Alis anticis fusco-cinereo variis, fasciâ mediâ rufescente, maculis ordinariis cinereis, reniformi dilutori, strigâ posticâ dentatâ fulvâ; fimbriâ fulvo fusco intersectâ; posticis fulvo cinereis ciliis flavidis." He then remarks:—"This Noctuelle is near *Hadena adusta*. Its fore wings are variegated above with grey and brown, and traversed by a broad reddish-brown band, bordered on each side by a black dentate line. In this band are the two ordinary stigmata, grey in colour, the orbicular oblong and very oblique, the reniform much clearer and edged exteriorly with white. Parallel to the hind margin is a dentate line, of a clear fawn colour, and bordered internally with a row of cuneiform spots of a deep brown. Fringes reddish-brown with clear fawn-coloured markings. Posterior wings greyish fawn-colour; fringes yellowish-white." The specimen came from "Labrador." Guenée writes of this type:—"It is near to *groenlandica*, but its facies is different, and it resembles equally a *Hadena* or a *Luperina*. Its superior wings are a little squarer, more dentate, with the last tooth of the inner margin deeper. The median space is deeper than the ground colour, the edging of the transverse lines less black. The subterminal is more wavy, more continuous, and its lighter portion forms a letter M. The two ordinary stigmata are larger, the reniform longer. The fringe is more spotted. The inferior wings also have the fringes of a very clear ochreous-white" ('Noctuelles,' vol. v., pp. 186—187). Guenée adds that his description was made from the specimen that served as the type of *M. Lefebvre*. In Newman's 'British Moths,' p. 411, there is a description of *C. exulis* taken from Continental specimens, in the collection of Mr. H. Doubleday, together with figures of two different forms. On the same page, a comparison is also drawn between *exulis* and var. *assimilis*. We read:—"It seems desirable here to say a few words concerning *Crymodes exulis*, a species to which the perfect insect, *Hadena assimilis*, has been referred by Dr. Staudinger. In the first place I would remark that, supposing *Crymodes exulis* and *Hadena assimilis* to be identical, it is a remarkable

instance of one genus assuming the character of another, for I can in no respect distinguish generically the two insects under consideration, and yet the caterpillar of *C. exulis*, as described and figured by Millière, seems to have little or no resemblance to the caterpillar of an *Hadena*. Seeing that the name of *Crymodes exulis* (should it not rather be *Crymodes exul*) has been introduced into our list, it seems desirable to give figures and a description of authentic continental specimens of that insect kindly lent me by Mr. Doubleday, and quote, from Millière's inestimable works, a description of the caterpillar." In the 'Entomologist,' vol. xvii., pp. 2—3, Mr. J. Jenner Weir, writes of the capture of this species in the Shetland Isles by Mr. McArthur in 1883:—"Of this insect, so rare in Britain, few were taken, but they are fine and large, and vary exceedingly; the yellow markings in some are very well-defined bands; a reference to the plate, Nos. 5, 6, 7, will show this peculiarity better than the most elaborate description. This may be regarded as the most valuable species taken. The Rannoch form of the insect is also figured (No. 4) for comparison." In the same volume, three different forms of the variegated varieties from Shetland are figured, all more or less with well-defined yellow or ochreous bands and lines (figs. 5, 6 and 7) whilst side by side the dark Rannoch var. *assimilis* is figured for comparison. I have seen a great number of figures of this species but scarcely two appear to be alike, although roughly they may be classified as those which are practically unicolorous, those with pale longitudinal markings and those with distinct ochreous transverse markings, but there is such apparent endless variation that an attempt at classification would be useless without a very long series for comparison.

a. var. gelata, Lef.—This variety is also figured and described by Lefebvre. He writes of it:—" *Hadena gelata*. Alis anticis fusco-cinereoque nebulosis, strigis tribus dentatis nigro-fuscis, maculis ordinariis distinctè albidis; posticis fulvo cinereis, margine fuscis ciliis flavidis." He also writes as follows:—"Superior wings grey-brown, a clear space in the centre, three dentate transverse lines of a brownish-black, one near the base, the two others a little distant from the outer margin. The last (or third) is bordered exteriorly with light yellowish and between the first and second lines the two ordinary stigmata are very distinctly outlined with white but their inner areas grey. These stigmata are separated by a blackish-brown patch which extends a little below the orbicular. The fringe grey washed with yellowish, is preceded by a row of small black lunules" ('Ann. Ent. Soc. France,' 1836, pp. 393-394). Of this variety Guenée writes:—"It is distinguished readily from the preceding (*gelida*, *exulis* and *groenlandica*) by the transverse lines being strongly marked in black on a ground colour of an uniform tint and almost without pale spaces, and by the line on the inferior wings which, above, limits a sort of terminal band separated from the fringe by a clear space, being more marked. The streaks which are placed on the subterminal line are longer and more pointed. The stigmata are bordered with black, which almost fills up the space between them. The claviform is as black as the rest of the markings" ('Noctuelles,' vol. v., p. 186).

β. var. groenlandica, Dup.—Of this form Guenée writes:—"Superior wings well-rounded at the apex, of a greyish-brown tinted

with yellowish ; powdered with white scales, the nervures concolourous ; the transverse lines distinct, black, slightly outlined with white ; the elbowed line dentate, followed by a series of clear, oblong marks, placed on the nervures ; the subterminal angulated, above all in the centre, each of the angles surmounted by a blackish chevron moré or less developed, and slightly preceded by a darker colour. The two stigmata, filled in with greyish white and surrounded with blackish ; the orbicular obliquely oval, the reniform large, and well hollowed out ; the claviform elongate, black, ill-developed exteriorly and tinted with yellowish in the centre. Inferior wings of a greyish-yellow, fringe whitish-yellow preceded by blackish streaks ; underneath, with the lunule and transverse line blackish. ♀ a little more powdered with white and with more distinct transverse lines" ('Noctuelles,' vol. v., p. 185).

γ. var. *marmorata*, H.S.—This is another variety figured by Herrich-Schäffer in his 'Systematische Bearbeitung der Schmetterlinge von Europa' (fig. 451). This figure represents a small specimen (not much larger than *Agrotis tritici*) which may be described as having the "anterior wings rich purplish-brown, with distinct white nervures ; an incomplete, is followed by a complete ochreous basal line ; orbicular and reniform outlined in pale ochreous ; elbowed line and line parallel to outer margin also ochreous. Posterior wings grey, outer margin darker, with a dark central line and lunule." Of this variety Guenée writes:—"My *poli* is probably the species Herrich-Schäffer published at first under the name of *marmorata*, which he recognised as incorrect, and replaced in the text by the name *cervina*, which has not improved matters, since another Noctuelle exists of that name" ('Noctuelles,' vol. v., p. 187). The *marmorata* of Herrich-Schäffer does not appear to agree with Guenée's *poli*, and since these are sunk as species, and only exist as varietal names, *marmorata* takes precedence.

δ. var. *assimilis*, Dbdy.—This variety was described by Doubleday as a distinct species in the 'Zoologist,' p. 1914, and the description copied into Newman's 'British Moths,' pp. 410, 411, where we read:—"The palpi are porrected, distant at the base, extremely sharp-pointed, and rather incurved, or approximating towards the tips ; the antennæ are perfectly simple in both sexes: the forewings are ample and densely clothed with scales ; their colour is the richest umber-brown, almost black, and glossed with purple ; the discoidal spots are distinctly outlined in ochreous-white, but there is a solution of continuity, or almost so, on the inner side of each ; at the base of the wing is a pale spot, and the disk of the wing is traversed by two transverse zigzag pale brown lines, one within the orbicular, the other without the reniform ; the hind marginal area between this second transverse line, and the hind margin itself is traversed by eight pale parallel wing-rays, and each joins a slender pale marginal line ; a minute white spot appearing at each junction ; the hind wings are smoky towards the hind margin, but paler at the base, and have a distinct crescentic discoidal spot ; the fringe is rather paler than the disk of the wing, and there is a delicate pale line on the hind margin itself, similar to that on the fore wings : the head and thorax are exactly of the same colour as the fore wings ; the thorax is very stout and densely clothed with scales ; the body has more the colour of the hind wings." Since Newman's book

was written, considerable numbers of this dark form have been captured in the Rannoch district, although on no occasion has it been found commonly. But Newman only records four specimens, two taken by Mr. H. Doubleday, and one each by Messrs. Stainton and Weaver.

ε. var. *gelida*, Gn.—This variety is described by Guenée as follows:—"It is certainly very near to *groenlandica*, but is much smaller (37 mm). The superior wings are of a pale greyish-blond, with the costa, lines and stigmata, whitish and less covered with black scales. The orbicular is more rounded at least in the ♂. The fringes of all four wings are of a yellowish-white. The subterminal line is lost posteriorly in the terminal space which is clearer. The ♀ is of the same shade as the ♂, only the lines are bordered a little more conspicuously with black and the reniform is more lengthened. The thorax is mixed with ashy scales." Guenée then adds:—"Having only two specimens, I cannot assert that the species is distinct. It has, however, a peculiar appearance" ('Noctuelles,' vol. v., p. 186).

ξ. var. *poli*, Gn.—This variety is thus described by Guenée:—"Smaller than *borea*. The superior wings, less square, of a brownish-black mixed with white on the costa, the nervures lightly sprinkled with white, the two stigmata clearly outlined in white, separated by a black patch; the reniform often of a reddish tint. A series of white dots, very distinct on the nervures, is placed before the subterminal line, which has on it a series of large cuneiform black spots, the lighter part of the subterminal line being almost obsolete. Some black lunules are situated just within the fringe, which is brown marked with fine black lines. Inferior wings of a greyish-black, much clearer at the base" ('Noctuelles,' vol. v., p. 187).

η. var. *borea*, H. S.—Herrich-Schäffer figures this variety in his 'Systematische Bearbeitung der Schmetterlinge von Europa' (figs. 566 and 567). This figure 566 may be described as:—"♂. Not larger than *Agrotis tritici*, of a dull purplish-brown colour, an abbreviated basal followed by a complete basal line; the spaces just inside this line and between the bases of the nervures being filled in with black; orbicular and reniform pale (whitish); the black elbowed line comes well over the reniform at costa; the line parallel to hind margin whitish, with a complete row of black wedge-shaped spots on it; nervures whitish; hind wings grey with a larger margin, central line and lunule. Figure 567 represents a ♀, which is similar to the ♂ (567) but duller, and hind wings greyer. This is hardly the *borea* of Guenée which he describes as:—"Superior wings of a brownish-black, more or less mixed with whitish or yellowish on the disc, with all the nervures whitish and very distinct; the median lines whitish and composed of small lunules; the ordinary stigmata of a yellowish-white separated by black; fringes of an ochreous-white tint; hind wings as in *groenlandica*. Female more uniformly black than the male and having the outer transverse line as distinct as the elbowed line" ('Noctuelles,' vol. v., pp. 186-187). It will be seen by these descriptions that the *borea* of Herrich-Schäffer and the *borea* of Guenée represent two rather different forms.

Pachetra, Gn., *leucophæa*, View.

Vieweg, in his 'Tabellarisches Verzeichniss,' &c., p. 23, No. 28, thus describes the type of this species:—"Noctua *leucophæa* alis in-

cumbentibus dentatis griseo fuscoque variegatis, maculis ordinariis albidis." This short Latin diagnosis he follows up with a much fuller description in German, as follows:—"The antennæ of the males are pectinated. The toothed fore wings are whitish grey, with darker shades. In the middle of the wing are the orbicular and reniform stigmata, both of a whitish colour. Beneath the orbicular stigma is a black mark, like a Greek *v*. Near the hind margin runs a whitish transverse line, with a row of black triangular spots, pointing to the base of the wing. The hind margin is black and white-spotted. The hind wings are grey. Under side of fore and hind wings with a dark spot and a transverse line." This species is very rare in Britain, although most cabinets contain specimens, which their possessors believe are British. On the Continent, however, the species is in many places common. Hübner, under the name of *leucophæa*, figures (fig. 80) a specimen of a pale grey ground colour, with a much darker central band, having a purplish tinge. The darker markings, however, are much as in the figure in Newman's 'British Moths,' p. 295, but there are only two of the black wedge-shaped spots parallel to the hind margin. The specimen is a large female. Geyer, in his Supplement to Hübner's 'Sammlung europäischer Schmetterlinge' &c., figures (817) another female, of bad shape, but purplish in colour. Regarding these purplish specimens, Mr. Dobrée, writes:—"From Asia Minor I have a pair, of which the female is a splendidly richly-marked example of the purplish-tinged form; the male is a lighter pale grey." Fabricius describes this species under the name of *fulminea*, his description of the species agreeing almost precisely with that of Vieweg. It is as follows:—"Bombyx alis incumbentibus dentatis griseo fuscoque variegatis, thorace antice albo; striga nigra" ('Entomologia Systematica,' &c., p. 484, No. 241). Newman, in his 'British Moths,' p. 295, says, "tinged with ochreous," which has been the case with several specimens I have seen. These "ochreous-tinged" specimens would appear to be Hübner's *vestigialis* (described below), whilst a peculiar slaty form, with dark red central band, is figured by the same author under the name of *ravida*. It is also the ochreous form which is the *leucophæa* of 'Guenée's 'Noctuelles,' vol. v., p. 177, where he writes:—"Superior wings of a greyish white, tinged in places with yellowish, and shaded with brownish black," &c., and Mr. Dobrée writes me that the "ochreous-tinged form is apparently the prevailing one on the Continent, for, of the many I have received, all are of this form" (*in litt.*). There is also a great deal of sexual difference, the males being not more than two-thirds the size of the females. Taking the white and fuscous form as the type, there seem to be the following varieties noted by other authors:—

- 1.—Speckled with ochreous = *vestigialis*, Esp.
- 2.—With the central area red = *ravida*, Esp.
- 3.—Smaller than type = *bombycina*, Ev.

a. var. *vestigialis*, Esp.—Esper ('Die Schmet. in Abbildungen,' &c., vol. iii., pl. liii., (fig. 5) figures a form of *leucophæa* under this name, of which I made the following description:—"Male. Pectinated antennæ; ground colour greyish brown, with yellowish nervures; a white patch at base of wing directly under costa, followed by a double whitish basal line, edged

interiorly with black. Claviform of ground colour outlined in black and then with white; orbicular reaching to costa, outlined in white and then with black; reniform also outlined in white and then with black; a black wavy line from base of reniform to the inner margin; six short black costal streaks above the reniform and towards the apex; a series of black wedge-shaped spots parallel to hind margin; fringes alternately dark and pale grey. Hind wings grey, paler in centre and towards the upper margin; lunule in this paler space, dark hind margin, extreme outer edge whitish." His figure 4 on the same plate is a female, "much more brightly marked, more variegated, orbicular not reaching costa; ground colour deeper, and with a slight reddish tinge, a wavy transverse line parallel to hind margin." This variety is, as mentioned above, the *leucophæa* of Guenée. Under this name I would include all specimens speckled with ochreous.

β. var. ravidā, Esp.—Esp. ('Die Schmetz.,' &c., vol. iv., p. 145, fig. 1) figures another variety of *leucophæa* under this name. The description I have made is as follows:—"Female. Anterior wings grey, with a slaty shade along the costa, in which there are four short black costal streaks; there are also two black transverse basal streaks; the claviform brown, edged with black; reniform and orbicular slaty, outlined in pale. Directly beyond reniform is a white transverse wavy line, edged internally with black; all the wing, between this transverse line and the base, tinged with reddish brown, except the costa and inner margin, which are of a slaty colour; a wavy W line parallel to the hind margin, pale, but internally edged with black. The space outside this waved line, and between it and the hind margin, deep reddish brown. Hind wings dark grey, central area, which contains a dark lunule, paler; immediately beyond the lunule is a dark transverse line, extreme hind margin paler." Guenée, in his 'Noctuelles,' vol. v., p. 178, writes of this variety:—"all the median space reddish, lines and stigmata well marked. Between the lunule and the subterminal shade of the inferior wings is a median line. Locality, Bavaria."

γ. var. bombycina, Ev.—Staudinger mentions in his 'Catalog' a variety under this name, which is there described as "minor." I know nothing of it.

Cerigo, St., *matura*, Hufn.

Thanks to Herr Hoffmann, of Hanover, I have been able to get Hufnägel's description of this species from 'Berlinisches Magazin,' iii., p. 414. The description is as follows:—" *Phalæna matura* (Die Glanzmotte). Anterior wings brownish grey, with white and light yellow markings, which are generally surrounded with brown. Hind wings light yellow, with a broad brown margin." It will at once be seen on looking through a long series of this species, that there are two well-marked extreme forms—one much marbled with white and red, and with distinct transverse lines and stigmata; the other with these lines and markings very obscured, and the marbling, due to the white and red scales, almost entirely absent, although these are joined by intermediate forms. Newman in his 'British Moths,' pp. 295, 296, writes:—"Their colour is various, most commonly bistre-brown of several shades, yet sometimes tinged with brick-dust red, and always having

four transverse lines and the two discoidal spots mapped out, or, at least, indicated in pale brown, grey or white." Guenée, in his 'Noctuelles,' vol. v., p. 179, describes the variegated form under the name of *cytherea*, as also does Fabricius in his 'Entomologia Systematica,' &c., p. 57, No. 157, where he writes:—"Noctua cristata alis incumbentibus variegatis, striga alba; posticis flavis, margine fusco." Hübner figures a striking form in his 'Schmetterlinge,' &c., under the name of *connexa*, with the red colour greatly predominating, while Esper's *texta* (pl. 108, fig. 5) represents the most obscure forms of this species. Guenée, in his 'Noctuelles,' vol. v., p. 179, also remarks:—"One must breed this species if one wishes to have fine specimens, for so fleeting is the colour, that, even on emergence, it appears as if faded." Taking, therefore, the variegated form as the type, I think it advisable to refer simply to the two forms named by Hübner and Esper.

a. connexa, Hb.—Anterior wings with the base reddish brown to the first transverse basal line; between the first and second basal lines a broad black line from the costa to the inner margin. A pale grey line beyond the reniform, beyond which to the hind margin the colour is blackish grey; a wavy, red transverse line runs from costa to inner margin. Hind wings pale yellow, with brown margin and distinct nervures (Hübner's 'Schmetterlinge,' &c., fig. 548).

β. texta, Esp.—Esp., 'Die Schmet. in Abbildungen,' &c., pl. 108, fig. 5, figures a variety of *matura* under this name, of which the following is the description:—"Male. Anterior wings almost unicolorous, dull purplish brown, with a dark streak parallel to the costa from base to reniform, and two dull basal lines; no orbicular, but distinct reniform; a dull wavy line parallel to hind margin. Hind wings yellowish, with a dull purplish grey hind margin." Although this description would scarcely apply to any of our specimens of *matura*, there is no doubt that Esper had before him an obscurely marked specimen of this species. I think this name should therefore, stand for all specimens of the obscure form.

Neuronia, Hb., *popularis*, Fab.

This species was described more than once by Fabricius. His description, taken from the 'Entomologia Systematica emendata et aucta,' &c., p. 484, No. 240, is as follows:—"Bombyx* alis incumbentibus fuscis albo venosis posticis albidis. Statura præcedentis (*graminis*). Antennæ pectinatæ, fuscæ. Alæ anticæ fuscæ venis albis. In medio maculæ ordinariæ pupilla obscuriore. Versus apicem strigæ maculis parvis, sagittatis, atris. Posticæ albidæ margine obscuriore subtusque puncto centrali, fusco." Haworth, in the 'Lepidoptera Britannica,' p. 117, describes the species under the name of *popularis*; whilst Hübner figures a form tinged with pink under the name of *graminis*. The variation of this species appears to be confined within very narrow limits. In some specimens the orbicular is large, and formed of a dark centre surrounded by white or ochreous, in others it is a pale spot, while in others it is almost obsolete; the reniform also varies in colour and size. The transverse lines are sometimes white, sometimes ochreous, sometimes tinged with pink, as in Hübner's

* It must be borne in mind that the early lepidopterists classed all our NOCTUÆ with pectinated antennæ as BOMBYCES.

graminis. There is also a considerable amount of difference in the intensity of the dark grey border to the hind wings of the males. In some it may be described as black, so intense is it; while in other specimens there is every grade of intensity to an almost total absence. In both sexes there is a great deal of difference in the development of the dark wedge-shaped marks parallel to the hind margin, but the males vary most in this respect. There is a great deal of sexual difference, the males being, as a rule, much smaller than the females. Mr. Dobrée writes:—"In a male I have from Central Russia, the ground colour is slate-grey" (*in litt.*).

α. var. graminis, Hb.—Hübner's fig. 59 has "all the pale longitudinal and transverse markings with a distinct pinkish tinge, hind wings also pinkish." The markings are as in our British specimens, the only difference being that of colour, although our British specimens often have the nervures tinged with pink.

Neuriā, Gn., *reticulata*, Vill.

The type of this species is described in De Villers' 'Caroli Linnæi Entomologia Fauna Suecicæ,' &c., ii., p. 254, as follows:—"Phalæna Noctua (le réticulée) spirilinguis, thorace cristato-angularie, alis deflexis fuscis, rivulis reticulatis griseis. Alæ superiores brunneæ, lineis strigisque griseis quasi reticulatæ; in medio prope marginem exteriorem, macula grisea ovaliformi duplicique circulo. Alæ inferiores infra et supra griseæ." This is one of our most constant species in Britain. In the series I have, the only noticeable point of variation is in the shape and direction of the stigmata (orbicular and reniform); but it does not appear to be so invariable, in the ground colour at least, on the Continent. Hübner, under the name of *typica*, figures a rich purple-brown variety; while Guenée says of the French specimens:—"The two median lines geminated, tinted with rose colour" ('Noctuelles,' vol. v., p. 167). Probably these brightly-coloured forms exist in collections in Britain. Mr. N. F. Dobrée writes:—"N. *reticulata* is so scarce in this part of the E. Riding (Beverley) that I have never taken more than two; but these still retain a decided vinous tinge, though taken five years ago" (*in litt.*). Our ordinary British form was described by Haworth under the name of *marginosa* ('Lepidoptera Britannica,' p. 195, No. 101).

α. var. typica, Hb.—Hübner figures (58) the type of this variety, of which I made the following description:—"Anterior wings of a rich purplish brown, with the longitudinal nervures nearly absent, otherwise much like our own specimens; the three pale transverse lines and stigmata outlined in pinkish grey. Hind wings grey, hind margin darker, with three white dots in centre of extreme outer margin; a distinct transverse line and lunule."

β. var. unicolor, Stdgr.—This variety is mentioned by Staudinger in his trade list, and in answer to a query Mr. Dobrée has written:—"The var. *unicolor* derives its name from being a uniform brown-grey, the nervures and markings being pricked out in a lighter shade of the ground colour. My specimens are from Kaschgar, in Russian Turkestan" (*in litt.*).

Heliophobus, Bdv., *hispida*, Hb.-Gey.

Geyer's figures 784-86, in his Supplement to Hübner's 'Schmet-

terlinge,' &c., represent the type of this species. His figure 784 may be described as:—"Anterior wings purplish-brown, with all the pale markings of a delicate violet, except along the inner margin, where they are yellow. Antennæ pectinated. Hind wings grey, darker on the hind margin, with a dark line parallel to the hind margin." His figure 785, is the under side of the male represented in fig. 784; while figure 786 is a female, having "the anterior wings dark reddish brown, with all the pale transverse lines ochreous, and nervures white." I believe the *oditis* of Hübner (fig. 694) is only a small *hispida* ♀. It would appear that the continental specimens of this species are, in general, more violet than our British specimens, for in the 'Noctuelles,' vol. v., p. 172, Guenée, describing his var. **A**, says, "less violet," thus leaving us to assume that their type, which he refers to Hübner's fig. 784 is violet-coloured. For this type he gives as a locality "Provence." Regarding these violet-tinged *hispida* in England, in answer to a query from me, Mr. Nelson M. Richardson, B.A., writing from Weymouth, says:—"I cannot see anything worth calling a violet tinge on any of my specimens: there is an approach to a violet tinge on the transverse line just beyond the reniform, but I should not mention it in a description as such, as it is scarcely violet, but rather steel-grey." I have received specimens from Mr. Richardson, and Colonel Partridge, captured at Portland in 1888, and I have a number of specimens from Torquay, but none of these show the typical violet coloration. I have also bred several from Portland pupæ and these show no trace of it. It is remarkable that the specimens from Portland have a much clearer white ground colour* than those from Torquay,—the hind margin of the anterior wings with a broad silvery band; while those from the latter place have only a fine line, and the hind wings of the former are so white that they present a very different appearance to Torquay specimens. The latter, indeed, appear to be very close to Hübner's *oditis*. Among our ordinary British specimens, we appear to have four (at least) distinct forms:—

- 1.—A dark brown form, with deep ochreous stigmata, and dark ochreous grey hind wings in both sexes = var. *suffusa*.
- 2.—A dark brown form, with silvery white markings, white band on hind margin, hind wings comparatively pale = var. *argentea*.
- 3.—A pale brownish grey form, with white markings and white hind wings = var. *pallida*.
- 4.—An obsolete form, with no markings whatever between the reniform and outer margin = var. *obsoleta*.

a. var. *intermedia*, mihi.—An intermediate form, described by Guenée as var. **A**, which serves to connect Hübner's violet type with our British specimens which are without such a tint. It is described in his 'Noctuelles,' vol. v., p. 172, as:—"Generally paler, more yellow, less violet, with the lines and stigmata more decided, of a clearer white. The inferior wings clearer. Locality, West of France." If Guenée did not leave us to suppose that this variety was violet-tinged, I should certainly suppose it was the same as the ordinary Portland specimens.

* This is worthy of notice, as the same difference exists in specimens of *Epunda lichenea* from these localities.

β. var. suffusa, mihi.—Ground colour dark brown, with the stigmata of a deep ochreous colour, the transverse lines and nervures of a whitish ochreous in the males, yellow ochreous in the females, a fine line bordering the hind margin; fringes grey. Hind wings grey in both sexes, with a very dark outer margin, and a dark transverse line; fringes grey. This is by far the most suffused form I have seen. My specimens came from Torquay.

γ. var. argentea, mihi.—Ground colour dark brown, with longitudinal nervures and basal transverse lines white; orbicular and reniform white, with a faint yellow tinge; a transverse grey (almost steel-grey) band beyond the reniform, and a broad white line parallel to the hind margin. Hind wings white, with a broken grey hind marginal band, and a grey transverse line; fringes white. The ground colour of the females is darker. My specimens came from Portland.

δ. var. pallida, mihi.—Ground colour grey, very pale, with a slight brownish tinge; costa very pale, whitish ochreous; a broad white line at hind margin; fringes white. Hind wings white, with scarcely a trace of the grey marginal border, and only the basal part of the grey transverse line; fringes white. This is an extreme form of *var. argentea*. Of this variety, Mr. Nelson Richardson writes:—"This is a more common var., and very pretty, . . . I think the pale *hispidus* is the prettiest form of the species" (*in litt.*). My specimens came from Portland.

ε. var. obsoleta, mihi.—A very peculiar form of the insect. Ground colour dull grey, with very few pale markings; a pale abbreviated transverse basal line, a complete one just before the orbicular, a bifurcate transverse median line, extending under the orbicular to the reniform, and the central part of the basal nervures, are the only pale markings, besides the orbicular, reniform, and a line parallel to hind margin. There is scarcely a trace of the ordinary pale markings between the reniform area and hind margin. Hind wings as in *var. argentea*. This appears to be a rare variety, for Mr. Richardson writes:—"This does not seem to be a common var., as I have only seen one or two others with so little in the way of light markings" (*in litt.*). I have only Portland specimens.

ξ. var. oditis, Hb. ?—I am not certain that Hübner's figs. 694, and 695, *oditis*, really represent a variety of *hispidus*, but I firmly believe it is the same as my *var. suffusa*. If Hübner's *oditis* really is this species, the name would take priority of Geyer's *hispidus*. My description of *oditis* is as follows:—"♀. Looks like a small *hispidus*. Anterior wings brown, all nervures, transverse lines and stigmata yellow-ochreous. Hind wings grey, darker on margin, a dark line parallel to hind margin, and dark lunule." Fig. 695 is the under side of fig. 694. Guenée, referring to *oditis*, says ('Noctuelles,' vol. v., p. 172):—"I have not seen it, and know no one who possesses it."

Charæas, St., *graminis*, L.

The type of this destructive, and occasionally superabundant species is described by Linnæus in his 'Systema Naturæ' (10th edition), p. 506, No. 50, as:—" *Bombyx spirilinguis alis depressis griseis; linea ramosa lunulaque glaucis.*" It is a most variable species, not only in ground colour, which varies from a dull grey through different shades

of brown to a ferruginous red, but in the character and quantity of the pale markings. The type has the branched central line and reniform glaucous; most British specimens have them white; whilst others have only the forked end of the central line and reniform white, the base of the line and branches being almost of the ground colour, whilst, on the other hand, I have specimens in which the white median nervure develops into a broad band, with many branches, running longitudinally through the centre of the wing from the base to beyond the reniform. As in all this family, there is great variation in the size and shape of the stigmata, and the females are, as a rule, much larger, and less liable to variation than the males. Mr. Porritt writes me that "red and grey forms in both sexes occur in the Huddersfield district." There are numbers of intermediate forms, but the following are some of the most striking forms that have been described:—

- 1.—Grey, with branched central line and stigmata glaucous = *graminis*, L.
- 2.—Grey, with white three-branched central line, stigmata yellowish = *gramineus*, Haw.
- 3.—Red-brown, with ochreous ramose central line, ochreous stigmata = *tricuspis*, Esp., ♂.
- 4.—Red-brown, with white ramose central line, whitish stigmata = var. *rufa* (= *tricuspis*, Hb.).
- 5.—Grey, with red costa, with ochreous ramose central line, ochreous stigmata = var. *rufo-costa* (= *graminis*, Hb.).
- 6.—Dull yellowish brown, with ochreous ramose central line, ochreous stigmata = *hiburnicus*, Curt.
- 7.—Pale ochreous yellow, with dark nervures, white orbicular and reniform with a bifid line joining base of reniform = var. *ochrea* (= *tricuspis*, Esp. ♀).

The first five make the only reasonable method of arrangement of the varieties which can be readily adopted, and include most of the general forms. It will be seen from Herr Sven's paper, which follows, that the description of his var. *brunnea* would include not only Nos. 3, 4, and 5, but also his own *albipuncta* and Boisduval's *albineura*; *megala* apparently belongs to the same group as 6 and 7, but I know nothing of it beyond the information kindly given by Mr. Dobrée. From Curtis's figure, pl. 451, it can be seen that No. 6 is only an extreme modification of No. 3, and I have never seen an extreme form like No. 7, although Mr. Dobrée has it from Southern Germany. Two other marked forms occur; one (var. *obsoleta*), of an unicolorous dull grey-brown, with all the ordinary pale transverse lines of the same colour as the rest of the wings, but slightly paler, the whitish reniform and a white blotch at its base alone being distinct of all the original markings; another form (var. *pallida*), has the central ramose line developed into a large white blotch. In Humphrey and Westwood's 'British Moths,' p. 113, we find:—"Varieties occur with the fore wings of an uniform colour, except the pale yellow marks and stigmata; and others have the latter markings edged with black on a plain ground." Thanks to Mr. Dobrée, I am able to append a translation of the following extract, written by Herr Sven, and published in the Scandinavian 'Entomologisk Tidskrift,' 1884, pp. 160-1:—"As supplement of the foregoing (an article 'On the abundance of and damage done by

Charæas graminis') by Lektor Holmgren; on the 'Grasmasken,' Mr. Sven has added the following more precise description of the varying forms under which *graminis* appears with us* :—It varies very much in size and colour, and although no precise definition of either can be given, they may be placed in two groups:—I. *Graminis*, Linn. 'Sys. Nat.,' x., 506; Esp., 68, fig. 1.—Fore wings, ground colour brownish or reddish grey. II. Var. *brunnea*.—Fore wings, ground colour red-brown (*graminis* Hb. 480 (?), 481; Bd., pl. lxxiv., fig. 5). As regards the markings of the fore wings, these are also subject to much variation; of the many specimens collected by Lektor Holmgren, the following are the most marked variations:—Ab. *tricuspis*, Esp. (Hübner's fig. 143 varies but little from the type)—Fore wings have no other markings than the usual spots, with the white nervures which are connected with the outside bottom corner of the reniform. This form seems to occur in our northern latitudes. Ab. *albipuncta*.—Fore wings reddish-brown with blackish nervures, with a white spot at the bottom corner of the reniform. Ab. *albineura*, Bdv. 'Ic.,' 74, 4.—The same points as the former, but the cells are black at the base and between the median nervures, and also at the outer edge." These descriptions are not very precise or clear, and the references seem incorrectly given in some instances. The paper is useful, however, as being one of the few attempts to classify the varieties of one of the species of the *Noctuæ* by a continental lepidopterist.

a. var. gramineus, Haw.—No. 2, above. This is described by Haworth as:—"Alis ferricis linea trifurca alba, stigmatibus pallidis, lineolisque acutis ad apicem atris." "Affinis præcedentibus (*popularis*) at duplo minor; antennis ferrugineis minus pectinatis et absque strigis moniliformibus. Maris alæ anticæ griseæ linea media trifurca albida a basi post medium ducta; supra lineam maculis tribus nigris difformibus parvis et stigmata ordinaria lutescentia circulo pallidiore: subtus lineam macula altera nigra trigona, et stigma tertium teliforme lutescente nigro cinctum sed aliquo interruptum; subtus hoc stigma lineola nigra ad marginem tenuiorem prope basin. Ordo transversus punctorum nigrorum cuspidatorum versus marginem posticum. Alæ posticæ fuscæ, ciliis flavicantibus" ('Lepidoptera Britannica,' pp. 117, 118). This is probably the most common form occurring in Britain. I have it from Glasgow, Sligo, Yorks, and many other localities, north and south.

β. var. tricuspis, Esp.—No. 3, above. Esper's *tricuspis*, ('Die Schmet. in Abbildungen,' &c., plate lxviii., figs. 2 and 3), may be described as follows:—Fig. 2, ♂. "Anterior wings deep reddish brown, with a short, two-forked, longitudinal, basal mark starting from centre of thorax; between this and the base, and extending along the median nervure, is an ochreous longitudinal blotch, which is in contact with the orbicular and reniform, the blotch branching beyond the reniform. All the markings dull ochreous grey." Esper's fig. 3 is a pale ochreous form, which he calls a ♀, but from the tufted anal segment it would appear to be a ♂. Of *tricuspis*, Esp., Guenée writes:—"The ordinary stigmata and the bidentate spot confluent, also the claviform, and prolonged in bright yellow almost to the base of the wing" ('Noctuelles,' vol. v., p. 176).

* In Scandinavia.

This should include all reddish forms with ochreous markings. I have this variety from Sligo, Glasgow, Morpeth, &c. Continental lepidopterists often send out as *tricuspis*, Esp., varieties which differ very much from Esper's figure; many of the specimens have a white central line instead of ochreous, and others are more like Haworth's *gramineus*.

γ. var. *rufa*, mihi.—No. 4, above. This is Hübner's *tricuspis*, fig. 143, which may be described as:—"Anterior wings dark reddish, with a pale streak below the costa; orbicular indistinct; the pale median nervure, touching the base of the orbicular and reniform, makes at the base of the reniform two distinct white branches; the wedge-shaped spots parallel to the hind margin are preceded by a pale band." Of this variety Guenée says:—"Hübner's fig. 143 is a strongly-marked variety, but entirely accidental" ('Noctuelles,' vol. v., p. 176). Herr Sven, on the other hand, as may be noted in the extract from his paper just quoted, says:—"Hübner's fig. 143 varies but little from the type." I quite agree with Guenée that it is a strongly marked form. Staudinger's description of *tricuspis*, Esp., does not apply so well to that form as to var. *rufa*. He says:—"Al. ant. unicolor rufescentibus, mac. magna trifida alba" ('Catalog,' p. 89). This name should include all red forms with white markings. I have this variety from Sligo, Glasgow, Yorkshire, &c.

δ. var. *rufo-costa*, mihi.—No. 5, above. This is Hübner's *graminis*, fig. 480, which may be described as:—"Anterior wings grey, with bright red costa from base to apex; stigmata ochreous, median nervure branched, ochreous; that part of the wing just around the stigmata dark reddish brown; beyond the reniform a broad red patch extends from the costa to the inner margin; the ordinary row of wedge-shaped spots parallel to the hind margin." I would include all forms with a red costa under this name. I have only specimens from the Hebrides of this variety, but it undoubtedly occurs elsewhere.

ε. var. *hibernicus*, Curt.—Curtis' description ('British Entomology,' p. 451) is as follows:—"Dull yellowish brown; superior wings with an elongated pale ochreous spot at the base above the central nervure, and another subelliptical one more towards the middle, with a lemon-shaped one above it; beyond the middle is a trapezoid spot resting on a trifid character all of the same pale colour, some of them being partially relieved by a dark brown; between the nervures, at the posterior margin, are obscure, elongate-trigonal brown marks; abdomen and inferior wings fuscous, cilia pale ochreous." He then adds:—"I am fully aware that *C. graminis* is a most variable species; but as I have never seen one similar to the specimen figured, I consider it may be a distinct species. It was captured last September, in the county of Mayo, Ireland." I have this variety from Mr. Russ, of Sligo; and Mr. Gregson ('Entom. iv., 51) records it from Staleybridge Brushes.

ζ. var. *ochrea*, mihi.—No. 7, above. Anterior wings of a pale ochreous yellow, with dark nervures, with whitish or ochreous reniform and orbicular, the former joined with a bifid line, the extension of the pale central line. It is figured by Esper (pl. lxviii., fig. 3), as a ♀ of var. *tricuspis*. I have never seen specimens of this variety. The nearest approach that I have to this form came from Mr. Russ of Sligo.

η. var. obsoleta, mihi.—Anterior wings unicolorous dark grey, with no pale markings whatever, except the trifold mark made up of the reniform, and a bifid patch joined below it. I have this variety from Mr. Finlay of Morpeth, Mr. Russ of Sligo, and it is obtained by Mr. Harrison of Barnsley.

θ. var. pallida, mihi.—Anterior wings dark grey, but the white central median line developed into a broad white band, including the claviform, orbicular and reniform, and extending over the whole of the centre of the wing. This is an extreme development of Haworth's var. *gramineus*. I have this variety from Sligo and also from Yorkshire localities.

ι. var. megala, Alph.—In 1883, Dr. Staudinger had in his trade list a doubtful variety of this species from Turkestan. The name I find is also retained (as a distinct species, however) in the last trade catalogue of Herr Heyne, Leipzig. Of this variety Mr. Dobrée writes:—"I obtained a male, which is small, and closely resembles *tricuspis*, Esp., differing only in that the ground colour, blotch, and markings are all fainter, giving the insect a more generally unicolorous look." This would appear to be closely allied to our var. *obsoleta*.

κ. var. albineura, Bdv.—Boisduval, in his 'Icones' &c., pl. 74, fig. 4, figures a variety of *graminis*, which I have been unable to refer to. In his 'Noctuelles,' vol. v., p. 176, Guenée writes:—"I have not seen in nature Boisduval's *albineura*, which appears to be simply a variety of *graminis*;" and in the 'Entomologisk Tidskrift,' 1884, p. 161, referring to this variety, Herr Sven writes:—"Liknar hufvudformen (var. *albipuncta*, Sven), men cellerna äro svarta uti framvingarnes basal-och mellanfält, samt nära utkanten," so that it would apparently be closely allied to Esper's *tricuspis*, although from Herr Sven treating them as distinct it could hardly be a synonym of this variety.

λ. var. albipuncta, Sven.—Herr Sven, 'Entomologisk Tidskrift,' 1884, p. 161, describes a variety as:—"framvingarne rödbruna, med svartaktiga ribbor, samt en hvit punkt i njurfläckens bakkant, ♀, Sällsynt;" i.e., fore wings red-brown with blackish nervures, and with a white spot at the lower corner of the reniform.

μ. var. brunnea, Sven.—Sven, 'Entomologisk Tidskrift,' 1884, p. 161, describes his var. *brunnea* as:—"framvingarnes grundfärg rödbrun;" i.e. fore wings with the ground colour red-brown, but this is so general a description that it would not only include vars. *rufa* and *rufo-costa*, but his own var. *albipuncta* as well as the *albineura* of Boisduval and the *tricuspis* of Esper, so that the name is useless as a varietal one.

Aporophyla, Gn., *australis*, Bdv.

This is an exceedingly variable species, and the type from Southern Europe differs a great deal from most of our British forms. Our British specimens generally have the markings sharper, more clearly defined, and black instead of brown, but our specimens vary very much in intensity *inter se*, and the Continental specimens even more perhaps than our own. Some of our specimens are pale and almost devoid of markings, others are very dark, but we do not in England appear to get the very dark variety *orientalis* referred by some authors to this species. There is running through the different varieties, Continental and

British, a sexual variation, the females being always darker, both in the anterior and posterior wings, than the males, and the markings are, as a rule, rather more distinct in the ♀'s; in British males there is also a little variation in the hind wings, some having them pure white, while others have a distinct grey hind margin. The hind wings of the females are always wholly grey. The type of this species is described by Guenée as:—"Superior wings with the fringe alternately marked with brown and ashy; of a clear ashy-grey colour, with the costa, a part of the stigma, the inner margin and a series of longitudinal sub-terminal spots, and the nervures of a carmelite-brown. The two transverse median lines very fine, black, more or less distinct, very much bent, zigzag and then uniting to form a long rhomboidal ring, which traverses the submedian nervure. The three stigmata more or less visible, brown, finely ringed with black. All these markings a little obliterated in the male, more distinct in the female. Inferior wings of a pure white in the ♂, shaded with brown in the ♀, with the nervures more or less tinted with brown. A black line on the top of the collar" (Guenée's 'Noctuelles,' vol. v., pp. 151, 152). The two transverse median lines mentioned in this description, are the one before and the one beyond the stigmata, which join in our British specimens to form, sometimes a ring, sometimes a dark dash under the reniform and orbicular. The English form is known under the varietal name of *pascuea*, while the *scriptura* of Freyer and Herrich-Schäffer and also the *orientalis* of the latter are referred to this species, as is also Freyer's *ingenua* by Staudinger. Freyer's *australis*, vol. iii., pl. 209, is dark grey with a brownish tinge on the costa, the reniform outlined in brown, the orbicular oval and rather narrow and outlined in black, nervures dark grey, the inner margin and centre of wing (below stigmata) pale with a slight ochreous tinge; a series of wedge-shaped spots from the costa to just beyond the anal angle, parallel with, and at a short distance from the hind margin; two V-shaped marks arranged thus >< under the stigmata; fringe dark ochreous. Hind wings grey with the base paler and dark nervures." Herrich-Schäffer's plate 32, fig. 159, is a male, 'pale ochreous-grey, with a reddish costa, reniform ochreous outlined in grey, the orbicular almost lost in the dark shade on costa; two transverse lines, one before, and one beyond the stigmata, and traces of the ordinary wedge-shaped spots. Hind wings white with faint nervures and traces of lunule. His fig. 160 is a ♀ 'slightly darker and less distinct markings than in the male. Hind wings dark grey, base paler.' Guenée gives as localities for the type "Provence, Corsica."

a. var. pascuea, Curt.—A full description of this variety is given with plates of both sexes in Newman's 'British Moths,' p. 289. All our ordinary British specimens would be included under this name, as they differ so much from Continental specimens. Dr. Staudinger says of this variety:—"Magis variegata, cinerascens, distincte nigro-signata. Locality, Anglia" ('Catalog,' p. 96). Guenée in his 'Noctuelles,' vol. v., p. 152, gives a very complete description of a specimen then in the Doubleday collection. Staudinger's summary contains the pith of Guenée's description. It is useless to further describe a variety that is well represented now in all our cabinets.

β. var. scriptura, Freyer.—The type of this variety is Freyer's vol.

iii., pl. 55, fig. 2. of which I made the following description:—"Rather larger than our British *australis*, colour slaty-grey, with the base and outer margin dark grey, the wedge-shaped spots developed into lines reaching the outer margin, the stigmata as in *australis*, the reniform not ochreous; a waved transverse line beyond the reniform from the costa to the inner margin. Hind wings dark grey, nervures darker." Probably this figure represents a female. Herrich-Schäffer's figs. 504 and 505 which are also referred to *scriptura* represents a ♂ and ♀. Fig. 504 (♂) is "rather large for *australis*, of a slaty-grey ground colour, completely marbled with ochreous-grey. The markings are very indistinct and confused, but a basal transverse line, with the orbicular and reniform outlined in slaty, and a much waved slaty transverse line just outside the reniform, are distinct; traces of two or three wedge-shaped markings. Hind wings white with dark nervures." His fig. 505 is a ♀ and "is much like 504 but darker grey, and looking still more suffused. Hind wings dark grey, with pale almost white base and distinct dark nervures." It will be seen that although Herrich-Schäffer's insects are referred to Freyer's *scriptura*, they accord but little with them. Staudinger simply says of the variety "obscurior." Guenée says it appears closely allied to *australis* and gives Turkey as its locality, but following Herrich-Schäffer, treats it as a distinct species.

γ. var. *ingenua*, Frey.—This form of Freyer's plate, 508, fig. 1, appears to be intermediate between var. *scriptura* and var. *orientalis*. It has the dark colour of *orientalis* but has the longitudinal dark markings of *australis* and *scriptura*. The following is the description I made of Freyer's figure:—"Anterior wings dark blackish-grey with the ordinary black, longitudinal and transverse markings of *australis* visible; the reniform outlined in grey and the external edge of the wedge-shaped markings, parallel with the hind margin, with pale dots externally; these dots the only pale markings; fringes alternately dark and pale. Hind wings pale grey." The specimen is a ♀. Staudinger says of it:—"al. ant. unicolor obscuris" ('Catalog,' p. 96).

δ. var. *orientalis*, H. S. (?)—Whether this is an extreme variety of *australis* or not is open to question. It is figured by Herrich-Schäffer in his 'Schmetterlinge von Europa,' figs. 502, 503. 'Fig. 502 is a male, unicolorous dark grey with a slight slaty tinge, and no trace of the numerous longitudinal markings characteristic in all other forms of *australis*. All three stigmata are distinctly outlined in black, whilst the characteristic transverse row of marks parallel with the hind margin are white but edged internally with black; there are 3 or 4 short, black, costal streaks; fringes alternately light and dark. Hind wings white with distinct nervures.' 'Fig. 503 is a ♀, marked like 502, but the ground colour of the anterior wings still darker; the hind wings dark grey with a very pale base.' Staudinger does not treat this as a variety. Guenée says:—"It appears allied to *scriptura* but still deeper in colour." He also gives as its locality 'Turkey' as in the case of *scriptura*. There is a distinct narrow black linear edge to the hind wings of Herrich-Schäffer's figs. 502 and 503 (*orientalis*) and in figs. 504, 505 (*scriptura*) just within the fringe. This is clearly distinct in specimens of *australis* from Sussex and Kent localities.

Luperina, Bdv.

This interesting genus contains a species, *luteago*, a variety of which named *barrettii*, was long placed as a distinct species in the genus *Dianthæcia*. Of the other species *testacea* is exceedingly variable both in colour and markings, the ground colour extending from pale silvery-grey to intense black, and dark brown, the markings in many cases being almost obsolete. There appears to be but little doubt that *guenéei*, so far as is at present known, is a var. of *testacea*, but there is no proof yet that *nickerlii*, Freyer, should be similarly sunk. This matter was fully discussed at a meeting of the City of London Entomological Society as reported in the 'Entomologist's Record,' &c., for April 1891. The silvery-grey variety captured by Mr. Baxter at St. Anne's-on-Sea, differs entirely from *guenéei*, inasmuch that it is without the wedge-shaped marks of that variety. It differs most essentially from the *nickerlii* of Freyer and Herrich-Schäffer both in colour and markings; *nickerlii* being ochreous, more like some fine forms Mr. A. J. Hodges has taken in the Isle of Wight, so far as the markings are concerned. In the present state of our knowledge, Freyer's *nickerlii* must be looked upon as distinct.

Luperina, Bdv., *luteago*, Hb.

The type of this species does not occur in Britain, but a melanic form from the Irish coast was described as a distinct species by Mr. Doubleday, under the name of *barrettii*, and has been generally placed in the genus *Dianthæcia*. Hübner's fig. 184 represents the type of this species, and may be described as:—"Anterior wings of a pale yellowish colour, median nervures reddish, a reddish transverse basal line with another just within the orbicular; the stigmata very pale; a double transverse line just beyond the reniform, and a wavy reddish line parallel to the hind margin; a dark reddish blotch between the second and third transverse lines (under the stigmata), continued up narrowly outside the reniform, and making another blotch on the costa just outside the reniform; hind margin dotted. Hind wings very pale grey, slightly darker on the hind margin." Hübner's *argillacea* is, according to Dr. Staudinger, a var. of this species, whilst Guenée refers Hb.-Geyer's *olbiena* to this species, and Esper figures another form under the name of "*brunneago*." Of the general variation Guenée writes ('Noctuelles,' vol. v., p. 181):—"It varies in colour from a more or less pure and a more or less intense yellow to greyish in some specimens." Of the varieties, the British *barrettii* is by far the most striking, and this peculiar form is, I believe, unknown on the Continent. *Barrettii* seems first to have been referred to this species by the late Mr. Buckler, who ('Ent. Mo. Mag.,' vol. xvi., p. 55) writes:—"I am constrained to believe *barrettii* to be an isolated and melanic variety of *luteago*." On the same page Mr. McLachlan, in a footnote, writes:—"When last in London, Dr. Staudinger stated to me that, in his opinion, *D. barrettii* is a form of *D. luteago*," and Mr. Dobrée writes:—"My continental specimens of the full-fed larvæ of *luteago* correspond exactly with Mr. Buckler's description of *barrettii* ('Ent. Mo. Mag.,' August, 1879), and anyone who has seen them will recognise that this species has been quite misplaced among the *Dianthæciæ*" (*in litt.*). *D. luteago* occurs very rarely in Mecklenburgh, Pomerania,

and elsewhere in Central Europe, in Sardinia, and Corsica, and is one of the rarest French moths" ('Proceedings of the Royal Irish Academy,' 1884, p. 107).

a. var. barrettii, Dbdy.—This variety was first described by Mr. Doubleday, at p. 124, of the 'Entomologist's Annual' for 1864. It is also fully re-described and figured in Newman's 'British Moths,' pp. 390, 391. There seems to have been a great deal of confusion attending these early specimens, the dark varieties of *conspersa*, since added in tolerably large numbers to our cabinets, having been discovered about the same time, and frequently mistaken for them. The following remarks on the occurrence of this variety in Ireland are interesting:—" *D. barrettii* is now considered to be a remarkable variety of *D. luteago*, a species which occurs rarely in Central Europe. One object I proposed to myself this summer (1884) was the further investigation of this group, *Dianthæcia*. The occurrence of *D. barrettii* only in one very restricted locality at Howth, while its food-plant flourishes luxuriantly everywhere on the littoral, seemed a remarkable anomaly. I was successful in taking it on the coast of Waterford, and, I believe, the larvæ on the Wicklow shores, but unfortunately an accident killed the pupæ before they hatched out. I have no doubt that the insect occurs elsewhere, but its habits are such as to render it very difficult to capture. The divergence of this insect from its original type is so great as to lead to the inference that a vast period must have elapsed since its isolation from the parent stock" (W. F. de V. Kane, in the 'Proceedings of the Royal Irish Academy,' 1884, p. 107).

β. var. brunneago, Esp.—Esper ('Die Schmet. in Abbildungen,' vol iv., pl. 196, fig. 3), represents the type of this variety. This figure may be described as having:—"Anterior wings dull yellow, with several (eight) short, dark red costal streaks; nervures at base dark reddish, with a single arched basal line of the same colour; directly beyond reniform another transverse waved line, at its centre in contact with lower part of reniform; a narrow streak of dull brownish orange colour along the costâ, continued a short distance from the apex down the outer margin; median space (between two transverse lines mentioned) extending from costa to inner margin, also dull brownish orange; stigmata dull grey; a small yellowish patch between and under orbicular and reniform; outer margin below apical patch dull yellow; hind margin with a darker line. Hind wings grey, with dark hind margin." His fig. 3, on the same plate, represents a female which has "more orange tint in the ground colour, and two transverse orange bands,—one nearer base than orbicular, one just beyond reniform; a curved series of arches of the same colour parallel to hind margin. Hind wings grey, distinct lunule and transverse line, hind margin orange."

γ. olbiena, Hb.-Gey.—Geyer's figure 829 is considered by Guenée to represent a form of this species. It may be described as:—"Anterior wings of a deep orange colour, with an abbreviated and complete double basal transverse line outlined in reddish; stigmata also outlined in reddish; two double transverse lines beyond the reniform, the outer one wavy." Geyer's fig. 830 is the under side of 829.

δ. var. argillacea, Hb.—According to Dr. Staudinger, Hübner's *argillacea* is a variety of *luteago*. This variety, represented by Hüb-

ner's fig. 590, may be described as:—“♂. Anterior wings having the ground colour bright yellow, tinted slightly with orange, and much clouded with grey atoms; the two transverse basal lines stand out distinctly in the clear ground colour; stigmata clear yellow; a broad shade of the same colour from near the apex to the inner margin; the central area above, below and around the stigmata grey with a greenish tinge, the outer margin of wing also greenish-grey with a fine wavy line passing through it parallel to hind margin. Hind wings very dark grey, base paler.”

Luperina, Bdv., *dumerilii*, Dup.

Of this very distinct *Luperina* six specimens are supposed to have been captured in Britain; see ‘Entomologist,’ vol. xviii., pp. 73, 74, and Newman’s ‘British Moths,’* pp. 296, 297. I have seen none of the British specimens, but amongst the continental ones I have looked through, there appears to be a great deal of difference in the intensity of the markings. The type form has distinct markings and pale stigmata in both males and females, but the females are rather darker than the males. Some specimens are, however, almost unicolorous, although the markings are traceable. Dr. Staudinger treats these dark specimens as Boisduval’s *desyllesi*. The following note I made some time ago of the specimens in the continental Doubleday collection at the Bethnal Green Museum:—“*Dumerilii* is very distinct from any other species. The females are darker than the males; the males have whitish stigmata, and so has one female; the other two females are more unicolorous, and have the stigmata indistinct.”

a. var. desyllesi, Bdv.—This is treated by Guenée as a distinct species, but Dr. Staudinger treats it as a var. of *dumerilii*, a view I believe now to be accepted by most continental lepidopterists. Staudinger says of it:—“Al. ant. fere unicolor.” Guenée, in his ‘Noctuelles,’ vol. v., p. 183, gives a very complete description. He writes:—“Superior wings of a grey-brown, with the two median lines slender, blackish, margined exteriorly with a fine yellowish line. No claviform stigma (at least in the one I describe from). Ordinary stigmata distinct, of a yellowish white, with a grey-brown centre. Subterminal line of a yellowish white, *straight*, but continued so as to touch the two edges of the wing. Terminal space not much darker than the ground colour. Inferior wings white in both sexes, with a greyish margin; all four wings white beneath, with an angulated grey line near the outer margin.” Guenée mentions, too, only “two examples.”

β. var. diversa, Heyne?—A variety is found in Herr Heyne’s trade catalogue under this name, but I know nothing of it.

Luperina, Bdv., *cespitis*, Fab.

The type of this species is described by Fabricius in his ‘Mantissa,’ p. 156, No. 148, as:—“*Noctua cristata*, alis incumbentibus fuscis: strigis tribus undatis albidis nigræ innatis, posticis albis.” “Media. Caput et thorax fusca, immaculata. Alæ anticæ fuscæ nitidulæ strigis tribus undatis pallidis, unica ante medium, duabus pone

* This latter record is not quite correct in its particulars; vide ‘Entom.,’ xviii., p. 74.

medium, quæ interne terminantur striga atra. In medio maculæ ordinariæ annulo albo. Posticæ albæ margine interdum fuscescente." Hübner figures (428) *cespitis* as "brown with a reddish tinge; a pale abbreviated, followed by a complete, basal streak, outlined in black; stigmata outlined in yellowish; a pale wavy line beyond the reniform, edged externally with black; another pale transverse line parallel to hind margin. Hind wings dark grey, base paler, a pale line parallel to hind margin." There appears to be a little variation in size. I have some specimens from South Wales much larger than others from Lancashire and Sussex. There is also a slight sexual variation, the hind wings of the female being darker than those of the male. The hind wings of the male vary in colour, as noticed by Newman in his 'British Moths,' pp. 297, 298:—"The hind wings of the male are very pale, almost white, sometimes with one, sometimes with two darker bars, parallel with the hind margin: in some specimens I find scarcely any trace of these bars."

a. var. confinis, St. ?—In Humphrey and Westwood's 'British Moths' (vol. i., p. 111) we read:—"Mr. Stephens in his 'Catalogue' regarded as a doubtful variety of this species a unique specimen obtained from the Marshamian collection, which in his 'Illustrations' he described as distinct, under the name of *Charæas confinis*, which differs from the foregoing (*cespitis*) in the paler colour and narrowness of the fore wings, nearly uniformly coloured hind wings, and slightly pectinated antennæ."

Luperina, Bdv., *testacea*, Hb.

The type of this most variable species is figured by Hübner in his 'Schmetterlinge, &c.,' fig. 139. It has the "anterior wings of a very deep (for this species) brown, with a dark outer margin, and clouded with darker around and under the stigmata. The mark, on which Haworth named his varieties, not complete. Hind wings white, lunule clearly marked, with a clouded hind margin." Hübner's type has a central band almost as in Newman's 'British Moths,' p. 296, fig. 1, but has the outer margin darker, and a shade on the outer margin of the inferior wings. This common species varies very much throughout Britain. I have specimens of a clear whitish-grey colour, with scarcely a trace of typical markings (var. *obsoleta*), and other extreme forms almost black (var. *nigrescens*.) The specimens from the coast districts of Lancashire, and the neighbourhood of Deal and Sligo, sometimes show a great tendency to melanism. The markings also are very variable. Some specimens have a distinct, dark, central band, others have no trace of it. On the hind wings, too, our specimens rarely have the lunule well-marked. In Britain, the specimens are not generally brown, although a certain percentage are; grey is the prevailing colour, differing greatly, however, in intensity in different specimens. The Hartlepool specimens are, as a rule, much browner than those I have from any other British locality. One specimen from this locality, captured by Mr. Robson, has the nervures of the anterior wings much dusted with white, giving it a peculiar appearance. I have also seen very brown specimens from Barnsley. Haworth named three forms of this species, and Guenée described two others besides the type. There is but little doubt that the *guenéei* of Newman's

'British Moths,' p. 297, is only an extreme variety of this species. Haworth's three varieties are all based on the character of the mark, which joins the transverse lines, and which is situated directly under the stigmata. The form in which this mark is absent he calls *lunatostrigata*, from the lunar mark in connection with the outer striga being the principal character; the form in which this mark is a simple hook he calls *unca*, and that in which it forms an χ -like mark, he calls χ -*notata*. A pale silvery-grey form with distinct undulating transverse lines, but without any of the characteristic longitudinal marks and dashes, was captured at S. Anne's-on-Sea. It differs from the var. *guenéei*, in not having the longitudinal marks and dashes of that var., and from most of the other vars. in the absence of the central band, —-like mark under the stigmata, and in colour. The Continental *nickerlû*, Freyer, H.-S., which it was supposed to resemble is a somewhat ochreous species with a fairly dark central area. The hind wings of *testacea* vary from pure white to grey, those of the ♀'s generally being darker. The dots on the extreme hind margin also vary, and are frequently absent. The following is an attempt to tabulate the named varieties:—

- 1.—Pale greyish-white, with no darker markings whatever = var. *obsoleta*.
- 2.—Pale greyish-white, some of the markings indistinct = var. *guenéei*.
- 3.—Ashy-grey, with distinct markings = var. *cinerea*.
- 4.—Blackish-grey, with indistinct markings = var. *nigrescens*.
- 5.—Brownish or brownish grey, with well-developed central band = the type.
- 6.—Greyish, tinged with reddish, or brown; striga beyond reniform composed of lunules, but no mark under stigmata = var. *lunatostrigata*.
- 7.—Greyish, tinged with red or brown; longitudinal hook-shaped mark under stigmata = var. *unca*.
- 8.—Like *unca*, but the longitudinal mark χ -shaped = var. χ -*notata*.

a. var. *obsoleta*, mihi.—Of a pale ochreous-grey colour, with all the lines, markings and stigmata still paler. This is an extreme pale unicolorous form, and seems excessively rare. I have specimens taken in Deal, and Mr. Percy Russ has sent it to me from Sligo; I have also a specimen closely resembling this obsolete form from Mr. Robson, at Hartlepool; and Mr. Porritt, writing to me some time since, states:—"A pale yellowish form occurs near Huddersfield" (*in litt.*).

β . var. *guenéei*, Dbdy.—There does not seem to be the slightest doubt that this is anything but a variety of *testacea* of an extremely pale ground colour, as in var. *obsoleta*, but differing from that variety in having most of the characteristic markings of *testacea* rather more distinctly marked, owing to the paler ground colour; otherwise there appears to be no difference—certainly no specific difference—between the variety and *testacea*. The original description of Mr. Doubleday is transcribed *verbatim* into Newman's 'British Moths,' (p. 297), together with notes on its occurrence. Mr. Doubleday writes that Guenée stated it to be his var. A ('Noctuelles,' vol. v., p. 182). If properly worked, I believe *testacea* would in many districts furnish a fair proportion of *guenéei*. Staudinger, in his 'Catalog' says of it:—"Al. ant. unicolor, nigro alboque irroratis." Mr. Vine of Brighton,

sent me a specimen of the genus *Luperina* to look at, a short time since, about which he wrote:—"I beat out a *Luperina* from a blackthorn bush in Abbott's Wood, which I think is *guenéei*." It is, I think, undoubtedly this variety, but it is exceedingly small* (scarcely larger than *Miana strigilis*), very pale grey, with a few very indistinct black costal markings, all the markings of *testacea* faintly marked, the three stigmata traceable although indistinct. Hind wings pale grey. The history of the original *guenéei* may be found in the 'Entomologist,' vol. xviii., p. 54.

γ. var. *cinerea*, mihi.—I have given this name to Guenée's var. B., a not uncommon form in Britain. Guenée thus describes it:—"Superior wings of an ashy grey, with a slight reddish tinge. The transverse lines indistinct, the basal one having the points at the lower part very pointed. The terminal space edged by a series of blackish streaks, which are placed between the nervures. Inferior wings of very pure white, with an indistinct shade. Locality, the Eastern Pyrenees." "This is very different to our *testacea*, but M. de Graslin, who has reared it from the larva, and who is better able to recognize any variation in all its stages than myself, considers it a simple variety" ('Noctuelles,' vol. v., p. 283). This grey form is probably the most common one in Britain; I have it from Sligo, Lancashire, Hartlepool, Aberdeen, Strood, Deal, London, and other localities.

δ. var. *nigrescens*, mihi.—Anterior wings blackish-grey, varying in intensity. The markings too, vary, some having them darker than the ground colour, while others have them so nearly of the same hue as to make the specimens look almost unicolorous. I have specimens in my cabinet from Sligo, Aberdeen, St. Anne's-on-Sea (Preston), Lytham, and Strood. A black specimen is also recorded ('Entom.,' vol. iv., p. 305) as being captured at St. Ives, Hunts; and Mr. Robson informs me that it occurs at Hartlepool. Mr. C. G. Barrett, 'Ent. Mo. Mag.,' vol. xxii., p. 124, writing of this species at Belfast, says:—"Several of the *L. testacea* were nearly black;" whilst at p. 188 of the same volume, we read that Mr. Porritt exhibited at the London Society's meeting a melanic specimen from Glasgow.

ε. var. *lunato-strigata*, Haw.—Haworth's type of this variety is described by him as follows:—"Noctua. Alis rufescentibus nigro nebulosis, strigis duabus fasciaque marginali fuscis." "Præcedenti vix differt nisi magnitudine minore, et coloribus saturatoribus, sed rarissime variat" ('Lepidoptera Britannica,' p. 194, No. 97). This form, without the mark under the stigmata, is not uncommon in most localities.

ξ. var. *unca*, Haw.—Haworth's type of this variety is described by him as follows:—"Alis pallide rufescentibus strigis duabus fasciaque marginali fuscis." "Alæ anticæ subnebulosæ, strigâ undatâ fractâ ante medium: tunc stigmata ordinaria fusco pallidoque imperfecte marginata; tunc striga secunda extus arcuata, ex lunulis confertis nigris pallido extus adnatis composita; et priore fascia connexa per lineolam nigram unciferam. Margo posticus undatim sub-

* It is worthy of note that Mr. Gregson, 'Entomologist,' vol. iv., p. 51, writes of this species:—"I possess specimens from less than 1 inch to 1 inch 4 lines in expansion."

fuscus apice pallido. Ciliâ rufo-cinerea maculis cinereo-fuscis. Posticæ albæ strigâ in ipso margine subinterruptâ fuscâ, ciliis rufescentibus" ('Lepidoptera Britannica,' p. 194, No. 96). This form, with a simple curved or hooked lineola, joining the transverse lines and extending under the stigmata, is one of our most common varieties.

η. var. *χ-notata*, Haw.—Haworth's description of this variety is:—"Alis rufescentibus macula oblonga nigra utrinque emarginata in medio, strigâque arcuata pone medium ex lunulis nigris." "Præcedenti valde affinis (*lunato-strigata*), at magis rufescens. Antennæ hirtoplectinatæ ut in illâ, at macula media nigra diversa est. Alæ posticæ allæ, apice strigâque in ipso margine fulvis" ('Lepidoptera Britannica,' p. 194). Another not uncommon form, with the mark under the stigmata somewhat *χ*-shaped; this is due to the nearness with which the two transverse strigæ approach each other under the stigmata.

θ. var. *incerta*, mihi.—Anterior wings greyish-fuscous, with a slightly ochreous tinge, a short basal longitudinal line under median nervure; an abbreviated basal line (with a distinctly pale costal spot) is followed by a complete transverse double line before the orbicular, also paler on the costa; another double transverse line beyond the reniform, bends under the reniform until it nearly touches the previous line; a pale wavy line near hind margin. The orbicular is oval, pale, outer line darker; centre of reniform also of ground colour, surrounded by paler. The claviform shows a tendency to form a line under the orbicular and reniform; a row of dots on the extreme hind margin. Fringes alternately pale (like transverse lines) and darker (like ground colour). Hind wings pure white. This is the variety captured by Mr. T. Baxter, at St. Anne's-on-Sea, and referred to in the 'Entomologist's Record,' vol. ii., pp. 21—22, where the reasons for considering it as a simple var. of *testacea*, and not in any way linked with *nickerlii* Freyer are fully discussed.

Caradrinidæ, Bdv.

We now reach a small group of NOCTUÆ, distinct in themselves as a family, but with some of the species very closely allied. Guenée says of this group:—"The family is composed almost entirely of European species, of which the greater part have been very long, I should say, *too* long, known, for there exists such a confusion that their synonymy is almost inextricable. The English authors have increased this difficulty by creating a crowd of species, so badly characterised that I have not been able to classify them even as constant varieties" ('Noctuelles,' vol. v., p. 235). One of the species, *Hydrilla palustris*, in this family is very rare in Britain. *Grammesia trigrammica* (*trilinea*) is subject to a fairly wide range of variation, but the genus *Caradrina* itself, has, as Guenée remarks, been overnamed, and even now it is not at all an easy matter to follow out what the different authors have meant by their descriptions.

Grammesia, Stphs., *trigrammica*, Hufn.

This is a variable species, and strange to say, in Britain more so in some years than others. The usual colour is whitish-grey, but ochreous specimens (sometimes with a reddish tinge) are moderately common; occasionally, however, the wings are dark fuscous. Huf-

nägel's diagnosis of the type is "*N. trigrammica*. Colour of anterior wings pale yellowish-grey, with three transverse brown lines" ('Berl. Magazin,' No. 86). Esper's diagnosis is:—" *Noctua spirilinguis subcristata*, alis incumbentibus lutescenti griseis, strigis flexuosis fuscis, quarta baseos vix conspicua." Haworth made no less than four species out of this, two being based on the character of the transverse lines, in which there is considerable variation, both as to intensity, position and direction. It is advisable to note that this species has practically no stigmata, the reniform being rarely traceable, the others, I believe, never. The ochreous (reddish) forms are sometimes very striking. The *bilinea* of Hübner, and that of Haworth are very different, but Treitschke's *bilinea*, is very little different from Haworth's. The *trilinea* of Guenée ('Noctuelles,' vol. v., p. 235) is intermediate between the grey type and the reddish-ochreous *evidens*, for he writes of it:—"Clear testaceous tinted with reddish on the outer margin." On the next page Guenée writes of the general variation:—"All the principal varieties and a crowd of intermediate forms are found in England, and occasionally in Austria and France. They are evidently only modifications of the typical *trilinea* and can hardly be classed as races, their variation is so inconstant." Taking therefore, the grey form as the type, we have the following varieties:—

a. var. evidens, Borg.—This is the ochreous variety of the species; the wings being entirely ochreous instead of grey, but with the ordinary transverse lines as in the type. From Esper, 333, we get the following:—" *N. evidens*. Magnitudine *N. trapezinae* grisea, fere flavescens, punctis minutissimis vix conspicuis nigris adpersa, oculis nigris." "Alæ anticæ incumbentes, supra fasciis quatuor, tenuibus nigris, prima in ipsa basi vix observanda, secunda ante medium obliqua tertia in medio recta, quarta pone medium extus curvata. Puncta nulla ordinaria. Subtus fascia unica et punctum nigrum, uti in posticis" ('Borgstroem's Insecta Seucica'). I would include all unicolorous yellow-ochreous or reddish-ochreous forms under this name. I have taken it freely in most of our Kent woods and on the seacoast at Deal.

β. var. approximans, Haw.—This scarcely merits mention, as it is reddish-ochreous like the var. *evidens* with the exception that the 2nd and 3rd transverse lines approach at their lower edges. Haworth's description is:—" *Noctua* (The unequal Treble-lines). Alis rufo-griseis, strigis tribus sesquialterâ saturatoribus inæquidistantibus." "Præcedenti simillima (*trilinea*). Differt. Alæ anticæ minus canæ strigâ abbreviatâ basi evanescente. Tertia striga oblique approximatur usque ad secundam in margine tenuiore. Margo posticus non saturator. Alæ posticæ fuscæ ciliis rufescentibus." He also adds:—"An varietas feminæ præcedentis?" ('Lepidoptera Britannica,' p. 249, No. 263). This form of variation is frequently found, not only in the ochreous varieties but in the grey type.

γ. var. semifuscans, Haw.—This is another reddish variety, with the outer margin of the wing dark reddish-fuscous, and the strigæ more intense. Haworth writes:—" *Noctua* (The clouded Treble-lines). Alis rufo-griseis postice saturatoribus strigis tribus sesquialterâ æquidistantibus fuscis." "Penultimâ vix differt nisi in colore, qui pone strigam secundam perfectam usque ad marginem longe saturator; et.

fusco-rufus est. *Striga ipsa secunda cæteris triplo validior est, et fusca. Alæ posticæ ut in ultima*" ('Lepidoptera Britannica,' p. 249, No. 264). This variety is much rarer than either of the preceding as far as my knowledge extends. It sometimes has the basal area to the median transverse shade of the ordinary greyish colour, the whole of the outer area beyond being smoky-fuscous rather than reddish-fuscous. The Rev. G. H. Raynor has such a variety taken at Brentwood in Essex.

δ. var. *bilinea*, Hb.—Of the variety *bilinea*, Guenée writes:—"Under this name each author has given a very different variety of *trilinea* which is modified infinitely" ('Noctuelles,' vol. v., p. 236). This is unfortunately the case, the *bilinea* of Hübner differing greatly from that of either Treitschke or Haworth. It is necessary to retain the name for the *bilinea* of Hübner. This is represented by his fig. 216, of which I made the following description:—"Anterior wings reddish-grey, with the space between the median shade (between the stigmata) and the complete basal transverse line, of a blackish-grey," so that the variety is really distinctly banded. I am unable to say whether the variety occurs in Britain, as I have never seen one.

ε. var. *obscura*, mihi. = *bilinea*, Haw.—This is the most unicolorous and obscure form of the species, being of a very dark smoky-grey or brown colour, generally with only two transverse lines clearly marked, although the others are somewhat faintly traceable. Haworth's description is:—"Noctua (The dark Treble-lines). Alis griseo-fuliginosis strigis duabus rectis, stigmatibus obsoletissimo interjecto." Prioribus maxime affinis est, at longe saturatior et quasi fuliginosa, hinc illinc tincturâ griseâ. *Striga abbreviata præcedentium deest, at tertia certo situ paululum appareat fuliginosior quam alæ, et transit stigma reniforme evanescens. Stigma anticum nullum. Antennæ testaceæ validæ, lente pectinatæ sunt. Posticæ fuscæ ciliis rufis*" ('Lepidoptera Britannica,' pp. 249, 250). This is not by any means a common variety, but it is widely distributed and occasionally taken in almost all the localities where the type is common. Guenée very rightly remarks:—"In the specimens of *bilinea* which I have seen, I have sometimes noticed traces of the reniform" ('Noctuelles,' vol. v., p. 236).

ξ. var. *pallida-linea*, mihi. = *bilinea*, Tr.—Treitschke, 'Die Schmetterlinge,' &c., vol. v., p. 275, thus describes *bilinea*:—"Caradrina. Alis anticis fusco griseis, strigis duabus pallidioribus." In the German description following he adds:—"It is the size of *trilinea*. The colour of the anterior wings dark ashy-grey; the first transverse line is wanting. There are two pale transverse lines, between which is a broad band with a dark brown shade in the middle. The hind wings are light brown with a light fringe and a dark lunule." Guenée writes ('Noctuelles,' p. 236) of Treitschke's *bilinea*:—"The *bilinea* of Treitschke is entirely reddish* with the two ordinary transverse lines, each placed on a paler band; and the median band incomplete or wanting," but this is an error. I have a fine example of this dark fuscous variety with the 2nd and 3rd transverse lines clearly edged with pale, thus making the form

* It is not reddish but greyish-fuscous according to the description of that author.

very striking; mine, however, is a slight modification of Treitschke's, having the abbreviated basal line, which is generally absent, marked in the same striking manner.

Hydrilla, Bdv., *palustris*, Hb.

This species, which is excessively rare in Britain, and far from uncommon upon the Continent of Europe, presents very marked sexual variation. Regarding this Guenée writes:—"The genus *Hydrilla*, as now understood, is one of the most abnormal in this or neighbouring families. The most remarkable fact which is presented is the difference in the sexes. One can say, without exaggeration, that it is in the Noctuelles, analogous to *Chemerina* in the *Geometrina*, and to the genus *Diurnæa* in the *Tineina*, so much is the female disproportionate to the male in shape and form. One might take the former for an abortive specimen" ('Noctuelles,' vol. v., p. 237). The type of this species is represented in Hübner's fig. 367, which is "a male of a greyish-brown ground colour, with one irregular transverse basal line, traces of the reniform, and two transverse lines (roughly parallel to the hind margin) outside the reniform." This figure is nearly twice the size of the small female figured in Newman's 'British Moths,' p. 311, which has two dots instead of the first transverse line (before the stigmata). The description in this work is a direct translation of that in Guenée's 'Noctuelles,' vol. v., pp. 237, 238. The *Caradrina exilis* of Eversmann's 'Bull. de la Soc. de Mos.,' 1842, iii., p. 548, is the ♀ of this species and the same author's diagnosis of *exilis* from the 'Fauna Lep. Vol.-Ural,' p. 261, is as follows:—"C. *exilis*. Alis anticis augustis subparallelis obtusis, saepe obscuratis brunneo-fuscis unicoloribus posticis griseis."

Acosmetia, Stphs., *caliginosa*, Hb.

This species is not very variable in Britain, although the type, represented by Hübner's fig. 474, is somewhat different to our specimens. The colour of the anterior wings is grey-brown, with a transverse basal line, then the ordinary stigmata, then a transverse row of dots outside the reniform, and lastly a double transverse line parallel to the hind margin; there is also a dark shade from the base of the reniform to the inner margin. The hind wings are darker on the margin than at the base. Haworth's *lutescens* is simply a redder form of this species, the same form that Guenée describes as *caliginosa*. There are sometimes traces of the basal line being double, and, instead of the shade from the reniform to the inner margin, there is usually an angulated line directly outside the reniform; the outer line, too, is very pale in our specimens; the reniform is also very pale, and there is rarely any trace of the orbicular. Guenée describes another *Acosmetia* as *aquatilis*, Bdv., but Staudinger treats this as a variety of *caliginosa*, simply adding in his 'Catalog' "dilutior." The female of this species is strikingly smaller than the male. It is therefore only needful to notice the following forms:—

a. var. *lutescens*, Haw.—Haworth thus describes this variety which he treats as a distinct species:—"Phytometra (the reddish Buff). Alis subunicoloribus sordide rufo-lutescentibus ad marginem crassiorem rufis; posticis subfuscis." "Cilia omnia rufescentia, anticarum saturatiora" ('Lepidoptera Britannica,' p. 260). This reddish form is gene-

rally much more clearly marked than the greyer type, but there is considerable difference in the intensity of the markings.

β. var. aquatilis, Bdv., Gn.—On the authority of Dr. Staudinger, I add this as a variety of *caliginosa*. Guenée writes of it:—"Shape and size of *caliginosa*, of which it is very probably only a variety. It differs from the latter in colour, which is of a whitish-grey tinged with ochreous, very clear and unicolorous; the markings are scarcely visible; the interior wings are white, lightly powdered here and there with grey. There is, under the superior wings a black cellular shade, which extends along the commencement of the nervures; body and palpi greyish white. Locality:—Borders of the Ural" ('Noctuelles,' vol. v., p. 240). Guenée described a single specimen in Boisduval's collection.

Laphygma, Gn., *exigua*, Hb.

This species is very rare in Britain, and from our specimens we have very little chance of determining its range of variation. Hübner's fig. 362 ('Sammlung europäischer Schmetterlinge,' &c.) is the type and may be described as having:—"Anterior wings dull grey-brown with three costal basal streaks, and double basal line; stigmata pale, with a dark patch between and beyond them; a double angulated line beyond the reniform and another broken line parallel to the hind margin. Hind wings grey with distinct nervures." A variety is figured by Hübner under the name of *fulgens*, and Rambur's *pygmæa*, treated by Guenée as a distinct species, is also considered as a variety by Dr. Staudinger. Guenée's description of the type is as follows:—"Superior wings, of a clear testaceous grey, lightly tinged with brownish, with the median lines distinct, concolorous, geminated and almost parallel. The two stigmata very distinct, the orbicular very round, of a yellowish colour more or less ferruginous; the reniform interiorly of the same colour, the subterminal line pale, wavy, bordered posteriorly with greyish red, and interiorly with fine black streaks; inferior wings of a transparent white, with the nervures strongly brownish, and the margins shaded with deep grey brown" ('Noctuelles,' vol. v., p. 158).

a. var. fulgens, Hb.-Gey.—In Geyer's supplement to Hübner's "Sammlung europäischer Schmet.' &c., fig. 796, *fulgens* is figured with the anterior wings of a "dull grey brown (as in fig. 362), with double basal lines, the orbicular outlined in yellow; a dark transverse line running between the stigmata from the costa to the inner margin; reniform yellow, a double angulated line beyond the reniform, and a row of white dots parallel to the hind margin. Hind wings grey, paler at base, lunule darker. Guenée writes of Geyer's *fulgens*:—"I have not seen it in nature, but I believe it belongs here (*i.e.* as a var. of *exigua*); perhaps, even it is only the type of our *exigua* from the south, which appears to differ slightly from those of Dalmatia, if we may judge from Hübner's figure" ('Noctuelles,' vol. v., p. 158).

β. var. pygmæa, Ramb.—This is treated by Guenée as a distinct species. He writes:—"I have not seen it, but place it here on the testimony of M. Rambur, who says it comes near *exigua*, and of Mr. Boisduval, who simply considers it as an accidental variety" ('Noctuelles,' vol. v., p. 158). Dr. Staudinger writes:—"minima, alæ anteriores fere unicolores, macula flava nigro-punctata" ('Catalog,' p. 110).

Caradrina, Och.

This genus contains but very few British species, yet their closely allied character causes the determination of some of them to be troublesome. *C. morpheus* and *C. quadripunctata* are the most distinct. *C. alsines* and *C. ambigua* are also fairly distinct, but specimens of *C. taraxaci* run both these latter very closely. There is a bright ochreous form of the latter species superficially resembling *C. alsines*, whilst a form obtained at Deal, much dusted with grey scales closely resembles *ambigua*. In fact, the coast form of *taraxaci* appears to have a different facies from the inland form, some of the extreme specimens, which I have been accustomed to call *taraxaci*, and which have white hind wings like *ambigua*, differ so much from the normal form of both these species that I feel satisfied they are the *superstes* of Treitschke. They are hardly ochreous enough for *taraxaci*, and the hind wings although white, are hardly so clear as those of *ambigua*. It is probable that the Sligo specimens, although much darker, are also a local form of *superstes*. Of these, I have two specimens captured by Mr. Russ (at Sligo), which appear to be named with equal propriety *ambigua* or *taraxaci*, including a very dark blackish-grey form from the same locality which is a great puzzle. *C. ambigua* is in Britain a great rarity, and several species closely allied to ours, common on the Continent, are unknown with us. How hopelessly the two species *alsines* and *taraxaci* were formerly muddled, the following note by Mr. Bentley, published in vol. i. of the 'Entomologist,' will show:—"*Caradrina ambigua*, *redacta*, *alsines*, *implexa*, *levis* and *sordida*. These varieties are taken in woods, about field-edges and gardens. *Var. 1.* Anterior wings fuscous, with two stigmata, a transverse row of black dots behind the posterior stigma, and a faint striga near the posterior margin; posterior wings ashy. *Var. 2.* Anterior wings deep fuscous, with one obsolete transverse striga near the posterior margin, stigmata distinct, posterior wings dusky. *Var. 3, ambigua.* Anterior wings ashy-brown, with three darker transverse strigæ, the first between the stigmata, the second behind the posterior stigma composed of black dots, the third undulated near the posterior margin; stigmata distinct with slender pale markings, posterior wings ashy with dusky margins. *Var. 4, redacta.* Similar to the last in colour but smaller, stigmata and markings more indistinct. *Var. 5, alsines.* Anterior wings fuscous with two transverse strigæ; posterior stigma large and distinctly margined with white. *Var. 6.* Anterior wings of a rusty yellowish hue, with five transverse fuscous strigæ, two before the anterior stigma, the third between the stigmata, the fourth composed of black dots, the fifth undulated; the posterior margin distinctly dotted with black; posterior wings ashy tinged with yellow. *Var. 7.* Similar to the last in colour, with two large fuscous spots in place of stigmata, with a strong fuscous line extending from the posterior spot to the inner margin. *Var. 8, implexa.* Anterior wings rusty or yellowish, with four fuscous transverse strigæ, the posterior striga rather more undulated. This and the two preceding varieties are in the collection of Geo. Robertson, Esq., who has kindly sent me a fine series of these insects for examination. *Var. 9, levis.* Similar to *var 5*, except in the stigma, which is scarcely visible. *Var. 10, sordida.* Rusty or reddish, with two transverse fuscous strigæ, approximating towards the inner mar-

gin; posterior margin dotted with black. I took this specimen many years since in a little wood at Highgate; it was examined and named by the late Mr. Haworth. These varieties do not differ in the least in any one essential specific character, either in antennæ, palpi, tibiæ or tarsi; their only difference is in the number of transverse strigæ, and the colour of the wings varying from deep fuscous to a rusty yellowish hue. They constitute but a single species." "*Caradrina sepii* and *morpheus*. The anterior wings of *sepii* are usually griseous clouded with fuscous, stigmata composed of fuscous spots, behind the posterior is a dusky fascia; some specimens are darker clouded and spotted with deep fuscous or black; these are generally called *morpheus*. I have lately examined two specimens in the British Museum named *morpheus*: these have the anterior wings flavescent ash, with the stigmata and posterior fascia of a deeper hue. Probably age has caused their flavescent appearance; they are only slight varieties of *sepii*." "*Caradrina cubicularis* and *superstes*. The large and dark varieties are generally named in British collections *superstes*; all that I have seen are mere varieties of *cubicularis*."

Caradrina, Och., *morpheus*, Vieweg.

The type of this species is thus described by Vieweg:—"Noctua *morpheus* cristata, alis planis anticis cinerascentibus, maculis ordinariis, fasciaque postica fuscis; posticis albis," whilst in a further German description he writes:—"Yellowish grey, with greyish double transverse lines, the ordinary stigmata dark grey. Hind wings white, with a blackish lunule" ('Tabellarisches Verzeichniss,' &c., p. 40). Treitschke quotes the 'Berl. Mag.,' 'Naturf.,' and Vieweg in his synonymy and then adds:—"Car. alis anticis cinereo ochraceis, maculis ordinariis fasciaque externa obscurioribus; posticis albidis" ('Die Schmet. von Europa,' p. 249). The species is not very prone to vary. Hübner figures a reddish-brown variety as *sepii*. A few of our specimens are of the ochreous grey tint of Vieweg and Treitschke's *morpheus*, and thus agree with the type, but most are of a deep ashy-grey or fuscous-grey colour, strongly tinged with reddish on the disc and around the stigmata, although occasional specimens have the ground colour of a fuscous, inclining almost to black. The females are generally rather smaller than the males. In vol. i. of the 'Entomologist,' Mr. Bentley, as mentioned above, writing of *morpheus* and *sepii* says:—"The anterior wings of *sepii* are usually griseous clouded with fuscous, stigmata composed of fuscous spots, behind the posterior is a dusky fascia; some specimens are darker, clouded, and spotted with deep fuscous or black; these are generally called *morpheus*. I have lately examined two specimens in the British Museum named *morpheus*. These have the anterior wings flavescent ash, with the stigmata and posterior fascia of a deeper hue. Probably, age has caused their flavescent appearance. They are only slight varieties of *sepii*." As a matter of fact, it is the other way about, the yellow or ochreous specimens constitute the type, and our greyish fuscous forms are the variety. The paler forms, *i.e.*, the type and var. *sepii* are generally distinctly marked, but some of our darker specimens have the markings very indistinct. There is no doubt that the yellow-tinged form is quite a natural one. The following are the only varieties I know of:—

a. var. sepii, Hb.—Hübner in his 'Sammlung europäischer Schmetterlinge' &c., figures a form of a pale reddish-brown ground colour, with all the ordinary markings of *morpheus*, and a very pale line parallel to the hind margin. Of this figure, we find in Humphrey and Westwood's 'British Moths,' p. 145:—"Sepii, Hb. given as a synonym, is probably a pale var. of *morpheus*." Our fuscous specimens are frequently tinged with reddish, especially round the stigmata, and have the markings very distinct, and would thus be probably referable to Hübner's *sepii*. It would appear to be advisable to refer all our ordinary specimens with a reddish tint round the stigmata to *sepii*.

β. var. obscura, mihi.—The ground colour of the anterior wings deep greyish-fuscous inclining to blackish, the darker stigmata and transverse lines being comparatively inconspicuous owing to their being but little deeper in shade than the ground colour. My darkest specimen of this variety came from Burton-on-Trent.

γ. var. minor, mihi.—I have in my collection a very small specimen, measuring only $\frac{7}{8}$ of an inch in expanse, captured at Deal in June, 1888. It is of the pale greyish (*sepii*) form with distinct markings.

Caradrina, Och., alsines, Brahm,* Bork.

The type is thus described by Borkhausen:—"This species is not so large as *N. stabilis*. The ground colour of the upper wings is a shiny light greyish brown, of which, sometimes the brown, sometimes the grey preponderates; three somewhat blackish transverse lines; the first at the base, then follow the two stigmata, the second of which is dark centred, while the second transverse line is situated under the third stigma (reniform) which is also darker than the light-yellowish ground colour; this is followed by a narrow band (spotted) whilst the ordinary transverse line at the hind margin is yellowish with the inner margin (of the line) darker. Hind wings whitish in the males, grey in the females, with a darker margin" ('Naturegeschichte,' &c., vol. iv., p. 607). This species, closely allied to, but abundantly distinct from *taraxaci*, exhibits some traces of sexual dimorphism, the females being, in the upper wings, darker and much more strongly marked than the males, especially with regard to the dark transverse shade passing through the reniform and the wavy line just beyond it. This is undoubtedly the *implexa* of Stephens, which is described in Humphrey and Westwood's 'British Moths,' p. 144, as:—"Anterior wings rusty or yellowish, with four fuscous transverse strigæ; the posterior striga rather more undulated." Mr. South in 'The Entomologist Synonymic List' erroneously calls this a var. of *taraxaci*; and *sordida*, Haw., which is really a var. of *taraxaci*, is treated as a synonym of *alsines*. Vars. 6 and 7 of Bentley, in the extract quoted under *Caradrina*, are also referable to *alsines*.

a. var. suffusa, mihi.—Guenée describes a suffused form which he calls var. **A** as follows:—"The costa, median space, subterminal line, and a line bordering the fringe strongly powdered with black scales. Comes from the same localities (as typical *alsines*)" ('Noctuelles,' vol. v., p. 245). It would appear that Bentley's var. 7 agrees somewhat with this variety.

*Brahm only described the early stages.

β. var. amurensis, Stdgr.—A variety of *alsines* appears under this name in the last trade lists of Dr. Staudinger and Herr Heyne of Leipzig.

Caradrina, Och., *ambigua*, Fab.

This species, common on the Continent of Europe, is very rare in Britain, but probably its rarity is due to the fact that it is so often overlooked. I have taken specimens at Deal and Yarmouth (Isle of Wight), Mr. Vine has captured it at Brighton, and Mr. A. J. Hodges at Freshwater (I. of W.). This species has a somewhat close resemblance to *taraxaci* in the fore wings, but these are much paler, and rather more ochreous; the distinguishing feature, however, is the pure, white hind wings of *ambigua*. The original Fabrician description is:—"Noctua. Lævis alis deflexis cinereis; atomis strigaeque pone medium nigris." "Rustica indistincta. Alæ cinereæ punctis aliquot baseos strigaeque pone medium nigris. Maculæ ordinariæ in medio. Posticæ albidæ subtus puncto medio, nigro" ('Entomologia Systematica,' &c., No. 131. p. 48). Guenée says of this species:—"It is easily distinguished from the preceding (*taraxaci*) by the inferior wings being bluish or pearly, pure in the male, a little tinted with grey on the outer edge in the female." I have a specimen which shows traces of a series of longitudinal blackish marks between the reniform and sub-terminal line. Guenée further writes:—"It is certainly the *ambigua* of Fabricius, who says:—'alis cinereis' and 'posticæ albidæ'" ('Noctuelles,' vol. v., p. 247). This typical form of *ambigua*, in which the dark transverse shade which runs from the lower part of reniform to the inner margin is well developed, forms the *plantaginis* of Hübner.

α. var. plantaginis, Dup.—In Duponchel and Godart's 'Histoire Naturelle des Lép.' &c., vol. vi., p. 59, we get a description of the ordinary form of this species. Taking as the type the form in which a median striga is developed, the pale form is described by Duponchel as:—"The body and the superior wings are of a pale ashy grey. One notices near the outer margin a transverse angulated yellowish shade, a little farther in a transverse row of small black points on an arcuated line, then the two ordinary stigmata of reddish-grey bordered with yellowish, and lastly a wavy line of interrupted black streaks; the inferior wings of a shiny white, tinged on the outer margin with reddish." Duponchel also figures the species in the same work, plate 76, fig. 2.

Caradrina, Och., *superstes*, Tr.

The *superstes* of Treitschke is treated as a distinct species by Dr. Staudinger ('Catalog,' p. 111), but as a var. of *blanda* by Guenée ('Noctuelles,' vol. v., p. 246). Treitschke ('Die Schmet. von Europa,' p. 260) describes *superstes* as:—"Car. alis anticis flavo-cinereis, nigro adpersis strigisque punctatis." Guenée writes:—"It partakes at the same time of *alsines*, of *blanda* and of *ambigua*, and may even prove to be a distinct species when the larva shall be discovered. The inferior wings are paler than in *blanda*, almost white, and not of the bluish tint as in *ambigua* but rather a little yellowish. The superior wings are paler and more whitish than *alsines* and less brown than *blanda*. The row of dots which borders the elbowed line is very strongly

developed, the outer line often equally so" ('Noctuelles,' vol. v., p. 246). Dr. Staudinger also refers Hübner's *blanda* (fig. 162) to this species. Of this figure I wrote:—"Fore wings pale ochreous-brown with two narrow fine wavy basal lines; the stigmata well-defined, and two lines between the reniform and outer margin, the outer one pale—edged internally with darker. Hind wings white, tinged with ochreous on the hind margins." Herrich-Schäffer writes of *superstes*:—"Griseotestacea, grossius nigro irrorata, punctis strigarum ambarum duplicium et lineæ limbalis nigerrimis, alis posterioribus albidis, limbum versus griseis" ('Systematische Bearbeitung der Schmet,' &c., p. 212). I have specimens which I can make to be no other species than this, received from Mr. Percy Russ, and captured at Sligo. I was inclined at first to consider these specimens as aberrant forms of our *ambigua*, but there is no doubt of their distinctness from this species. They were sent to me as *blanda*, and as such, remained until recently in my cabinet, but they are at once distinguished from that species by the white hind wings of the male, and the paler and more ochreous fore-wings. Of this form, Mr. Russ also sent me a specimen with the fore wings very dark (inclining to blackish), but with characteristic white hind wings. I have also specimens from Yarmouth (I. of Wight) and Deal, which have long stood in my cabinet as doubtfully *ambigua* or *taraxaci*, but which appear to be this species. These, however, are greyer than the Sligo specimens, and appear to agree with Herrich-Schäffer's *superstes* (*vide* description above), whilst the Sligo specimens agree almost exactly with the description of Treitschke.

a. var. suffusa, mihi.—Anterior wings deep fuscous, inclining to blackish, basal lines indistinct owing to depth of ground colour; orbicular and reniform dark internally, outlined with paler; elbowed line indistinct, edged internally with a row of black dots, a dark sub-terminal line near hind margin edged externally with paler. Hind wings white, nervures fuscous. Captured by Mr. Russ at Sligo.

Caradrina, Och., taraxaci, Hb.

This species, which appears to vary but little when superficially examined, offers, however, a considerable range of minor variation both in colour and markings, and thus became divided into numerous species by our early British authors. In the 'Entomologist,' vol. i., Mr. Bentley described ten varieties, and then suggested that they all formed one variable species. All his ten forms are undoubtedly referable to what we now know as *C. alsines* and *C. taraxaci (blanda)*, although we do not now know the same form as *C. alsines* which Mr. Bentley did, and the *C. ambigua* of Mr. Bentley in no way resembles the distinct species lately added to the British fauna under this name. The British specimens run from pale ochreous, closely resembling *C. alsines*, except that the transverse lines are so far obsolete in *taraxaci* as to give it a very smooth appearance, to a fuscous black form, which I have taken at Deal. Our coast specimens are rarely brown, but more of a fuscous ground colour with a purplish tinge, and very much powdered with greyish-white, and thus apparently differ from those obtained in more inland localities. Some of the specimens, however, are rather difficult to locate. The form obtained from Shetland and Forres is of a distinctly ochreous-brown colour, but without the well-developed characteristic

transverse markings of *alsines*. Some British specimens of *taraxaci* are brown, others, pale brownish-grey, powdered with white, others distinctly of a purplish hue. Hübner's type represented by fig. 575 (by error 175), may be described as follows:—"Anterior wings dark-brownish with the space between the two outer transverse lines darker, the lines themselves pale, orbicular and reniform outlined in pale, with a pale waved oblique line at base. Hind wings grey, nervures darker." Guenée writes of this species:—"English authors have made many species out of *blanda*, which varies very little, at least with us, but which is probably more variable in England, where the NOCTUÆ are modified very much according to locality. These are, the *N. redacta*, *lævis* and *sordida* of Haworth, and *C. ambigua*, *alsines* and *implexa* of Stephens; but it is impossible for me to classify and describe these varieties, which differ from the type only in characters as inconstant as they are slight" ('Noctuelles,' vol. v., p. 246). Of the similarity between *alsines* and *blanda*, Newman writes:—"Few entomologists distinguish accurately between this and the preceding, and therefore, the published localities for the two species are not trustworthy; they are exceedingly similar, the principal distinction being in the tint of colour, *alsines* having a tendency to ochreous, *blanda* to obscure purple and rosy; nevertheless, there can be no doubt as to their distinctness, the caterpillars being so different" ('British Moths,' p. 314). Guenée writes of Hübner's type:—"Taraxaci has the superior wings of a less rosy tint (than *blanda*, Gn.), more blackish, with a light reddish tint on the disc, the subterminal line a little less waved; the inferior wings of a more yellowish tint" ('Noctuelles,' vol. v., p. 246). Taking Hübner's dark brownish form without a purplish tinge, therefore, as the type, the following is a summarised list of the named varieties:—

- 1.—Reddish-brown, with distinct stigmata and transverse markings = *taraxaci*, Hb.
- 2.—Reddish-brown, with indistinct stigmata and transverse markings = *sordida*, Haw.
- 3.—Ashy-brown, with distinct stigmata and transverse markings = *ambigua*, St.
- 4.—Ashy-brown, with indistinct stigmata and transverse markings = *redacta*, Haw.
- 5.—Fuscous, distinctly tinged with purplish = *blanda*, Gn.
- 6.—Fuscous, with distinct stigmata and transverse markings = *egens*, Haw.
- 6A.—Fuscous, with indistinct stigmata and transverse markings and reniform outlined in white = *alsines*, Wood.
- 7.—Fuscous, with indistinct transverse lines and stigmata = *lævis*, Wood (*non* Haw.).

a. var. sordida, Haw.—This var. is dull reddish, with two indistinct strigæ, the stigmata also obliterated except the outer margin. It is, like the type, very closely allied to true *alsines*, approaching it very nearly in ground colour, but with the characteristic transverse lines of *alsines* obliterated. Haworth thus describes this form:—"Alæ superiores rufescentes; pone medium strigæ duæ fere obliterate. Stigmata ordinaria obsoletissima, margine solum vix conspicua; anterior orbiculare evanescente exterius reniforme et ad latus interius

fuscum. Ordo punctorum minutissimorum marginalis. Alæ inferiores pallidiores" ('Lepidoptera Britannica,' p. 208). From Haworth's large size 1". 4", I was inclined to think that this referred to a larger species, but Bentley in his article in the 'Entomologist,' vol. i., says that his variety of this species "was examined and named by the late Mr. Haworth." My most characteristic examples of this brownish obsolete form are from Forres and from Chattenden Wood in Kent. In Humphrey and Westwood's 'British Moths,' p. 144, we find:—"Sorrida is rusty or reddish, with two transverse fuscous strigæ approximating towards the inner margin; posterior margin clothed with black."

β. var. *ambigua*, St.—The *ambigua* of Stephens is described in Mr. Bentley's previously quoted paper ('Entom.,' vol. i.) as having "the anterior wings ashy-brown with three darker transverse strigæ, the first between the stigmata, the second behind the posterior stigma composed of black dots, the third undulated near the posterior margin, stigmata distinct with slender pale margins, posterior wings ashy with dusky margins." This, as will be seen, is one of those forms in which the markings and stigmata are distinctly developed.

γ. var. *redacta*, Haw.—Similar to var. *ambigua* but with the stigmata and markings more indistinct. Haworth's description of *redacta* is as follows:—"Alis griseis strigis tribus obsoletis fuscis, aliaque postica pallescente, stigmatibus albedo marginatis" ('Lepidoptera Britannica,' &c., p. 206). This is a simple sub-variety of the preceding and is of the more obsolete form. In Humphrey and Westwood's 'British Moths,' p. 144, we find:—"Smaller than the type, with the stigmata and markings more indistinct."

δ. var. *blānda*, Gn.—Of this Guenée writes:—"Superior wings less yellow than in *alsines*, dusted with reddish-grey, always powdered with white, the median transverse shade less distinct, the inferior wings slightly hyaline, with the nervures distinctly darker especially on the outer margin in both sexes" ('Noctuelles,' vol. v., p. 245). This reddish or purplish-grey form is called *taraxaci* by Herrich-Schäffer and described as:—"Violacea-fusca, alis posterioribus albidis limbum versus fuscis." He also adds:—"Chocolate-brown with violet tinge and sprinkled with grey dots, the males often much lighter than Hübner's fig. 575. Hind wings dull whitish-yellow, blackish-grey on the hind margin, paler at base" ('Systematische Bearbeitung,' &c., p. 211). This is an excellent description of our specimens from the coast of Kent, where the specimens are rarely brown, and often have a distinct purplish tinge, the basal area of the hind wings of the male also being of a very pale grey.

ε. var. *egens*, Haworth.—Another clearly marked form, which Haworth says is very similar to his *redacta*, but scarcely the same. His description is:—"Alæ anticæ uniformiter fuscescentes, stigmatibus ordinariis fuscis distinctis, strigæque postica fusca, angustiore quam in sequente (*sepiæ*). Posticæ maris ut in præcedente; feminæ, pallidiores ut in præcedente" ('Lepidoptera Britannica,' p. 206). This is one of our most common forms of the species.

ξ. var. *alsines*, Wood.—This is in reality only a slight sub-variety of the preceding with the reniform outlined in white. It is described as:—"The anterior wings fuscous with two transverse strigæ, the posterior stigma large and distinctly outlined in white."

η. var. lævis, Wood.—This is another obsolete form, resembling the *egens* of Haworth and *alsines* of Wood in ground colour, but without the distinct markings of those varieties. It is described as “resembling the var. *alsines* but the stigmata scarcely visible” (Humphrey and Westwood’s ‘British Moths,’ p. 144). Haworth’s *lævis* is now generally referred to *Noctua neglecta*.

Caradrina, Och., *quadripunctata*, Fab. (*cubicularis*, Bork.).

The type of this species is thus described by Fabricius:—“*Noctua lævis* alis incumbentibus griseis fusco undatis; punctis quatuor marginis exterioris nigris.” “*Alæ griseæ, strigis obsolete undulatæ. Stigmata ordinaria parva, obsoleta, posteriori albo punctata. Puncta quatuor nigra ad marginem crassiorem. Margo posticus obscurior. Posticæ striga marginali punctata fusca*” (‘*Entomologia Systematica*, &c., No. 46). Of the variation of this species Guenée writes:—“This varies much both in shape, intensity of colour, and clearness of markings, but it is difficult to classify the varieties as races, because there are so many intermediate forms. Those from the South are particularly large and strongly coloured. Others, generally smaller, appear to have the upper wings more rounded, their markings clearer; these come near *selini*. Lastly, others, generally larger, have the ground colour very pale almost without markings, but with the reniform well-developed and clearly surrounded by white spots” (‘*Noctuelles*,’ vol. v., p. 251). In our British specimens there is a great deal of difference in the intensity of the dark shade on the outer margin (which is occasionally red), and also in the ground colour, which varies from pale whitish and ochreous-grey in its paler forms to dark greyish fuscous. There is also a great deal of variation in the number of transverse lines, some specimens being quite irrorated with the number of lines, others again are quite clear and exhibit an almost complete absence of transverse markings, especially in the central area. This excess or absence of markings is perfectly independent of the colour. The reniform stigmata are occasionally of an orange colour, generally they are greyish surrounded with white dots; in some specimens, however, the white dots are absent and the stigmata are simply grey of a slightly darker shade than the general ground colour. The different varieties mentioned in Staudinger’s ‘*Catalog*,’ p. 111, are ill-defined, and it appears difficult to classify the varieties satisfactorily. Bentley writes of this species ‘*Entomologist*,’ vol. i:—“*Caradrina cubicularis* and *superstes*. The large and dark varieties are generally named in British collections *superstes*, all that I have seen are mere varieties of *cubicularis*.” The *blanda* of Haworth, and the *segetum* of Esper are apparently identical with the *quadripunctata* of Fabricius. Haworth’s diagnosis is:—“*Alis canescentibus fusco pulverulentibus, striga postica undulata rufo-fusca extus pallida*” (‘*Lepidoptera Britannica*,’ p. 208). The following is an attempt to classify the named forms:—

- 1.—Pale whitish-grey, with distinct transverse lines and stigmata = *cubicularis*, Haw.
- 2.—Pale whitish-grey, with indistinct transverse lines and stigmata = *grisea*, Ev.
- 2A.—Pale whitish-grey, with indistinct transverse lines and stigmata, but dark outer margin = *congesta*, Ld.

3.—Ashy-grey or greyish-fuscous, with distinct transverse lines and stigmata = *quadripunctata*, Fab.

4.—Ashy-grey or greyish-fuscous, with indistinct transverse lines and stigmata, = *menetriesii*, Kret.

5.—Dark fuscous, with indistinct transverse lines and stigmata = *superstes*, St.

6.—Ochreous, with distinct transverse lines and stigmata = *albina*, Ev.

a. var. cubicularis, Haw.—This is one of the palest forms of the species and has distinct transverse lines and stigmata. Haworth describes it as:—"Noctua. Alis canescentibus nebulosis, striga postica undulata ex punctis confertis triangulari-sagittatis rufis extus pallidis." "Margo posticus (ani angulo excepto) fuscus, ante ordinem punctorum fuscorum in ipso margine, ciliis cinereis" ('Lepidoptera Britannica,' p. 208). This would appear to be Treitschke's *cubicularis*, of which he says:—"Caradrina alis anticis griseis fusco undatis, punctis quatuor margine fuscis" ('Die Schmet. von Europa,' v., p. 251).

β. var. grisea, Ev.—This is described by Dr. Staudinger as:—"albidior, magis unicolor" ('Catalog,' p. 111). Guenée's var. A from the West Indies would appear to fit in here. He writes:—"Superior wings very pale, with the markings indistinct; the reniform red, surrounded by white dots, like the specimens I have just referred to; but the inferior wings are of a clear grey almost unicolorous, with the nervures darker and the fringe unicolorous." Guenée also adds:—"In spite of the marked difference in the inferior wings, I can only consider this *Caradrina* a simple variety of our *cubicularis*, from which it does not differ in any other respect. It exactly resembles Herrich-Schäffer's figure 425, which represents a specimen from Southern Russia" ('Noctuelles,' vol. v., p. 251). It would appear to be Haworth's *cubicularis* var. *β.*, of which he says:—"Alis anticis absque strigâ fuscâ in postico margine" ('Lep. Brit.,' p. 208).

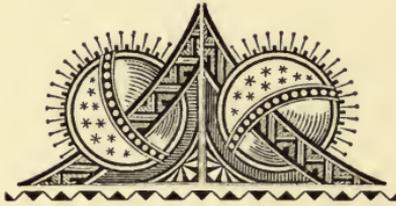
γ. var. congesta, Ld.—This is a sub-variety of the var. *cubicularis* of Haworth. It is almost unicolorous, except the outer margin, which is dark as in that variety. Staudinger says of it:—"Al. ant. albido-cinereis, exter. infuscatis, eadem cum præced. ? (*grisea* Ev.)" ('Catalog,' p. 111). This would appear to be very close to Haworth's *cubicularis* var. *γ.* of which he writes:—"Paulo minor. Stigma anticum minutissimum punctiforme, vel subinde deest: posticum tenue reniforme, margine fusco solum conspicuum. Strigæ posticæ rufæ pallidæ et fuscæ precedentium (*cubicularis*) omnino desunt, cæteris ut in illis" ('Lepidoptera Britannica,' p. 203).

δ. var. menetriesii, Kret.—This variety, recorded from Russia, is described in the 'Berliner Entomologische Zeitschrift,' 1863, p. 432, and Dr. Staudinger ('Catalog,' p. 111) writes of it:—"fere unicolor obscure cinerascens."

ε. var. superstes, Stephens.—This name was given by Stephens in his 'Illustrations' &c., p. 159, to those larger and darker specimens of *cubicularis*, generally with ill-developed markings, which occasionally occur in most localities. The largest and darkest specimens that I have in my collection came from Mr. Percy Russ and were captured near Sligo.

(?). *ζ. var. albina*, Ev.—Eversmann's *albina* from the Ural is treated by Dr. Staudinger as a probable variety of *quadripunctata*,

writing of it:—"Præc. (*quadripunctata*) ab. *lutescens*?" Guenée treats it as a distinct species, and it is so treated in most of the dealers' catalogues. There appears to be no difference whatever, except in the yellow ground colour, and our specimens occasionally vary in this way. I have such from Deal. Eversmann's description is:—"Alæ anticæ lutescenti-griseæ, punctis aliquot costalibus punctisque tribus lineæ internæ nigris, serie externa flexuosa punctorum fuscorum obsoleta, maculis ordinariis dilute fusciscentibus, rotunda minuta nigra, media reniformi, punctulis obsoletis albis terminata. Alæ posticæ candidæ" ('Bulletin de la Société de Moscou,' 1848, iii., 215).



ADDENDA.

Thyatira batis, L. var. *confluens*, Reuter.—In the ‘Entomologisk Tidskrift,’ 1890, pp. 201–202, Enzo Reuter describes a variety with the superior wings, having the base and centre dull reddish-white, the costal margin with an almost semi-oval, dull, brownish-olive spot before the middle; from thence to the hind margin dull, sparingly and very obsoletely subfasciate, dusted with fuscous; the third apical (exterior) portion distinctly dull brownish-olive, adorned with the typical spots, but these posterior spots much more obsolete than in the type; fringes unicolorous fuscous. Posterior wings as in the type but the median fascia paler. The abdomen whitish. He also gives a figure of the specimen. His description is as follows:—“Alis anticis superne basi medioque sordide rubido-albidis, margine costali ante medium macula fere semiovali sordide fusco-olivacea, ab ea usque in marginem posticum pulvere fuscescenti parce et valde obsolete subfasciatim sordidatis; parte tertia apicali (exteriore) sensim sordide fusco-olivacea, maculis typicis ornata, his posterioribus autem quam in typo multo obsoletioribus; ciliis fuscis unicoloribus; alis posticis ut in typo, sed fascia media pallida obsoletiore; abdomine albicanti (♀).”

Some varieties occur in the trade lists of Dr. Staudinger and Herr Heyne. As I cannot certainly trace their synonymy, nor as yet, find descriptions, I do not know whether they are actually described varieties or mere trade names. They are as follows:—

Asphalia flavicornis var. *finnmarchia*, Schöyen (Heyne’s list).

Viminia albovenosa var. *murina*, Späugsberg (Heyne’s list).

Nonagria geminipuncta var. *pallida*, Stdgr., (Heyne’s list).

Miana furuncula var. *pallidior*, Stdgr., (Staudinger’s list).

Crymodes exulis var. *obscura*, Stdgr., (Heyne & Staudinger’s lists).

Caradrina alsines var. *amurensis*, Stdgr., (Heyne & Staudinger’s lists).

Caradrina ambigua var. *dilucida*, Stdgr., (Staudinger’s list).

CORRIGENDA.

p. 45 (11 lines from top) delete “var.” before “*fulva*, Hb.”

p. 104 (7 lines from bottom of page) for “*furuncula*, Haw.” read “*furuncula*, Hb.”

p. 112 (11 lines from top of page) for “var. *sordida*, Bork.” read “*sordida*, Bork. (the type).”

p. 128 (line 26 from the top) for “*hiburnicus*, Curt.” read “*hibernicus*, Curt.”

p. 136 (line 8 from bottom of page) for “*diversa*, Heyne,” read “*diversa*, Stdgr.”

CATALOGUE

OF

THE SUB-CLASSES, FAMILIES, GENERA
SPECIES, VARIETIES, AND PRINCIPAL SUB-
VARIETIES

MENTIONED IN VOL. I. OF

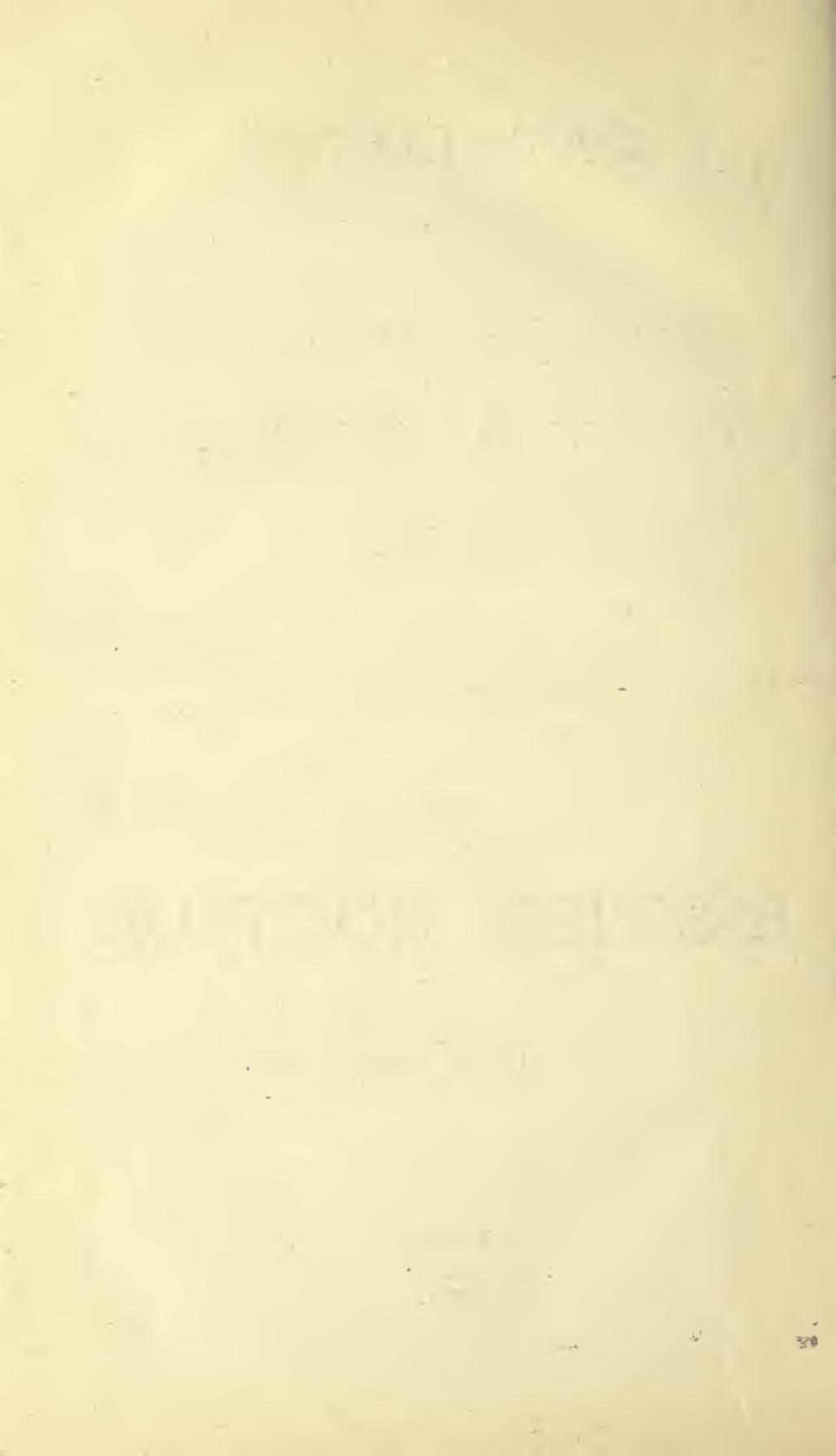
THE

BRITISH NOCTUÆ

AND THEIR VARIETIES.

London

1891.



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