



THE
LEPIDOPTERA
OF THE
BRITISH ISLANDS
VOL. IV.



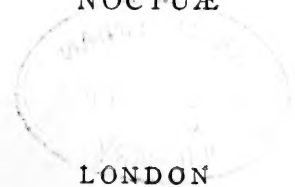
555
Q7B3
V.4
Ent.

THE
LEPIDOPTERA
OF THE
BRITISH ISLANDS

A DESCRIPTIVE ACCOUNT OF THE FAMILIES, GENERA, AND
SPECIES INDIGENOUS TO GREAT BRITAIN AND
IRELAND, THEIR PREPARATORY STATES,
HABITS, AND LOCALITIES

BY
CHARLES G. BARRETT, F.E.S.
ONE OF THE EDITORS OF THE "ENTOMOLOGIST'S MONTHLY MAGAZINE"

VOL. IV.
HETEROCERA
NOCTUÆ



LONDON
L. REEVE AND CO.
Publishers to the Home, Colonial, and Indian Governments
6 HENRIETTA STREET, COVENT GARDEN, W.C.
1897

348436



LEPIDOPTERA.

DIVISION II.—HETEROCERA.

Group 3. *NOCTUINA*.Family 2. **TRIFIDÆ**.Genus 5. **AXYLIA**.

Antennæ thread-like, almost naked; eyes naked; lashes prostrate and very faint; thorax square, minutely crested; fascicles small; abdomen smooth, short, and conical; fore wings narrow, oblong, with thickened costa, very blunt behind, laid parallel when at rest.

We have but one species.

1. **A. putris**, *L.*—Expanse $1\frac{1}{8}$ to $1\frac{3}{8}$ inch. Fore wings very narrow, whitey-brown, with longitudinal dark brown streaks, a dark brown stigma, and costa clouded with the same.

Antennæ of the male simple, very minutely ciliated, black-brown; palpi tufted, light brown clouded with umbreous; head whitish-brown, barred with dark chestnut and clouded with brown; collar whitish-brown faintly barred with bright brown, and broadly edged at the back with rich dark purple-brown; remainder of thorax purple-brown or dark umbreous mixed with whitish-brown; with small crests at the top and back, the tufts tipped and barred with dark brown; fascicles short and fugitive, whitish; abdomen very smooth, shining whitish-brown dusted with darker, lateral and

anal tufts inconspicuous. Fore wings very straight and narrow; costal and dorsal margins straight, and the former decidedly thickened; apex rounded or very bluntly angulated; hind margin short, full, curved slightly; colour soft whitish-brown or very pale buff; the whole costal region blackish-brown, broadly so above the stigmata, which are partly included, but tapering off to the apex of the wing; median nervure and discal cell tinged with deep brown; beyond this two straight lines of the same colour proceed to the hind margin; basal line a mere faint interruption of the dark costal stripe; first line brown, formed into long slender zig-zags; second line also brown but exceedingly faint, divided into a series of crescents, and followed by a parallel row of black dots, outside which is a second line of dots; near the hind margin and above the anal angle is a small deep brown elongated spot, and below it two black dots on the margin, these last being part of a series of marginal black dots, most of them smaller; orbicular stigma only indicated by an extension of the black-brown of the margin; reniform stigma more distinct, black-brown, enclosing an angulated whitish streak; cilia of the ground colour, with a dash of brown from each black dot, more especially at the points of contact with the longitudinal dark streaks. Hind wings short, rounded, pale grey with brownish nervures and a row of small black lunate streaks along the hind margin; cilia white. Female with the body stouter, otherwise quite similar.

Underside pale smoky-grey; paler, and streaked and spotted with yellowish, along the costal margin; shading off paler along the dorsal margin, and having the hind-marginal space broadly pale yellowish-brown, edged with black dots, which are repeated at the tips of the cilia; reniform stigma smoky-black. Hind wings white, broadly dusted with umbreous toward the costa; central spot large, triangular, black; beyond it is a slender transverse line of brown dashes on nervures; hind margin dotted with black. Body and legs whitish-brown.

Hardly ever variable, but Mr. S. Stevens possesses a specimen in which the whole fore wings are suffused with dark umbreous.

On the wing in June and July, and occasionally as a very partial second generation, in September.

LARVA stout, tapering off considerably in front from the fourth segment; fifth, sixth, seventh, and twelfth segments swollen, and the latter raised; head small, shining; anal segment almost truncate behind. Dull greyish-brown, mottled and dusted with blackish, especially so on the sides; dorsal line darker, indistinct, with a yellowish spot on each segment, those on the fourth and fifth large and prominent; subdorsal line whitish, passing beneath a row of large curved black dashes, the lower edges of which are shaded with ochreous, these dashes are most distinct on the fifth, sixth, seventh, tenth, and eleventh segments; spiracular line broad, dirty ochreous, generally inconspicuous, but much paler on the eleventh and twelfth segments. The twelfth segment is broadly edged with ochreous behind, and has a yellowish spot on the subdorsal line. Head dark brown; spiracles and raised dots blackish; three white spots on the front edge of the second segment. (C. Fenn.)

July to October on *Galium mollugo*, *Cynoglossum officinale*, *Chenopodium*, *Lamium album*, nettle, dock, plantain, lettuce, and herbaceous plants generally; feeding at night, hiding under the leaves or on the lower twigs of its food plant by day.

PUPA short, stout, rounded; anal extremity with two minute bristles; dull red with a grey dorsal shade. Subterranean; enclosed in a very brittle earthen cocoon, at the roots of low plants. (C. Fenn.) In this condition through the winter; very often at the roots of trees.

The moth hides itself among dead leaves, and on the ground among plants in the daytime, flying at dusk, and coming

readily to sugar and to flowers; also occasionally attracted by light. It appears to be most partial to cultivated land, and is not uncommon in gardens, though more plentiful in lanes, and at the edges of woods. Apparently found throughout England and Wales, often commonly, though not everywhere so—perhaps least so on heath and forest land. In Scotland it is found in the districts of the Solway, Clyde, Forth, Tay, and Dee, and even in West Ross, but does not seem to affect the hills or wilder districts; and appears not to have been observed in the Isles. In Ireland it is very widely distributed and often common. Abroad its range is wide—Central Europe, Southern Sweden, Northern Italy, Western Siberia, India, and Japan.

Genus 6. **TRIPHÆNA.**

Antennæ simple; eyes naked, with prostrate lashes; thorax smooth, fascicles small; abdomen rather flattened and with flattened anal tuft. Fore wings thick, of even breadth, oblong, blunt, laid flat upon the back in repose, and somewhat overlapping; hind wings broad and rather ample, vein 5 arising from the middle of the cross-bar, slender, sometimes hardly perceptible.

All our species in this genus have the hind wings yellow with a black submarginal band. The table below may be useful.

LARVÆ stout, smooth, rather smaller toward the head. Hiding either in or upon the ground in the daytime, feeding at night on low plants, or the young shoots of trees and bushes.

PUPÆ of ordinary form, subterranean.

A. Hind wings without a central lunule.

B. Hind wings dark orange with very broad black band.

T. fimbria.

B². Hind wings yellow with narrow black band.

T. pronuba.

B³. Hind wings yellow with black base and rather broad black band; fore wings purple-brown. *T. janthina.*

A². Hind wings yellow with black central lunule or spot.

C. Hind wings with very small lunule, broad black band and blackish base; fore wings red-brown.

T. interjecta.

C². Hind wings with large lunule, narrow black band; fore wings with a deep black spot before the apex.

T. subsequa.

C³. Hind wings with large lunule and narrow black band; fore wings without black subapical spot.

T. orbona.

1. **T. fimbria**, *L.*—Expanse 2 to 2½ inches. Fore wings broad, squared, yellow-brown, olive-brown, or red-brown clouded with darker; stigmata outlined with white; hind wings rich yellow with a very broad, deep black border.

Antennæ of the male simple, naked, olive-brown, whitish at the base; palpi short, thinly scaled, inconspicuous, with the third joint very short, whitish, by no means concealing the tongue. Head light brown above, with the face white; thorax very broad and robust, smooth; shoulder-lappets rather long; scales of the middle of the thorax produced at the back to a point; colour olive-brown or pale reddish-brown; fascicles rather short, deep orange; abdomen very broad, flattened; dull orange-yellow; anal segment with a large flattened and squared tuft of deeper orange scales, sometimes clouded on its upper surface with black; lateral tufts rather broad, extending down on each side, and often slightly curled up so as to show the white under-scales. Fore wings stout and strong, broad and very truncate, evenly and densely clothed with unusually large, straight, squared scales; costa a little arched at the base, then straight to near the apex, which is decidedly angulated; hind margin below it faintly hollowed, then almost

straight, but bent below the middle ; anal angle full ; dorsal margin very straight ; colour variable, rich yellowish-drab or yellow-brown, olive-brown, greenish-brown, or reddish-chocolate, the latter the least frequent ; in all more or less clouded or banded with a richer, deeper shade of the same colour ; basal line indistinct, abbreviated, faintly brown ; first line very obliquely placed, sloping back from the costa, and slightly curved before reaching the dorsal margin, richly darker brown, and usually forming the outer edge of one of the broad bands of rich colouring ; second line white, tending obliquely outwards from the costa, but elbowed above the middle, and thence straight to the dorsal margin, smooth and even throughout, and usually forming the outer edge of a second broad stripe of richer colour ; subterminal line reddish-white, slightly rippled but almost direct from near the apex to near the anal angle ; space between the last two lines pale, sometimes whitish, especially at the costa, where also, touching the subterminal line, is an oblique black wedge-shaped streak, edged inwardly by a cloud of the richer colouring, in which are two small costal whitish dots ; orbicular and reniform stigmata rather large, but each only indicated by a slender whitish margin, and often indistinct ; cilia concolorous but with a yellow line along the base. Hind wings broad and ample, with rather undulating hind margin ; rich orange-yellow from the base to near the middle ; remaining portion deep glossy black, forming a very broad regular band, curved within, and narrowing off to the anal angle ; extreme margin and cilia deep yellow. Female accurately similar, indeed difficult to distinguish, the apex of the body being so densely clothed with scales that the structure is scarcely perceptible.

Underside of the fore wings deep black, except the margins which are rather broadly yellow or orange, or the hind-marginal portion is broadly whitish, with yellow and olive shades ; along the nervures which border the discal cell are dense masses of long loose scales ; hind wings similar to the upper side ; body ashy white tinged with yellowish ; under surface of the lateral

tufts very white; anal tuft orange; legs olive-brown, barred with white, except the first pair, which are white beautifully barred in front with clouds of black atoms; leg tufts whitish.

There is considerable variation in colour in this species, but mainly in the directions above described. The yellow-brown or yellow-drab forms are by far the most common, some of these are almost unicolorous, others shaded and banded with warmer colour, as stated. The olive-green specimens vary much in intensity of colour, and some of them have the broad darker band before the second line very dark and rich, with a strongly contrasting whitish-green band beyond it. In the red-brown forms the same degrees in intensity of colour occur, and there are intermediates in which appear shades of green or drab along with the red-brown colour; and others with the whole space from the base to the second line very dark red-brown. Yorkshire examples in the collection of Mr. S. J. Capper have the fore wings of the deepest olive-green approaching olive-black, and with the dark shades still blacker; Mr. G. T. Porritt possesses one of a rich tawny or purple-red, having the reniform stigma black, and very dark red-brown bands; Mr. W. H. B. Fletcher has a specimen in which the yellow portion of the hind wings is shaded with black; and another having a slender black line in the yellow surface just inside, and parallel with, the inner edge of the broad black band of the same wings.

On the wing in June and July.

LARVA stout, cylindrical, slightly thickened behind; head of moderate size, rounded, shining, pale brown dotted with reddish-brown. Body orange-brown, or reddish, or brownish-ochreous, dusted with blackish; dorsal line thread-like, paler; spiracular stripe broad, pale orange-brown; spiracles white; from the fifth to the tenth segment each is followed by a conspicuous black spot; there is a subdorsal row of oblique pale dashes of the same tint as the dorsal line, and shaded internally with grey; undersurface and sides below the spirac-

cular line paler than the ground colour and dotted with black.

The young larva has a distinct grey dorsal diamond pattern, but is without the black spiracular spots. (C. Fenn.)

August to May, feeding at night only, before hybernation upon low plants—*Viola*, *Primula*, *Polygonum*, dock, and various others;—but in the spring almost totally neglecting these and devoting itself to the expanding leaves and buds of blackthorn, hawthorn, willow, birch, beech, hazel, and even dogwood; but at all times hiding itself during the day upon the surface of the ground under dead leaves or low-growing plants. It is not known to burrow beneath the surface. A well-grown larva is a conspicuous object under the light of a lantern, after dark, upon the twigs of a bush of birch or blackthorn.

PUPA very stout, shining, deep mahogany-red; dorsal shade, incisions of segments, and spiracles, blackish; anal extremity very blunt, with two parallel short spikes placed upon a triangular flattened projection. In a very brittle earthen cocoon, beneath the surface of the ground, or sometimes under moss.

The moth appears to hide by day mainly among dead leaves, where it is seldom observed; but occasionally it may be beaten out of a thick oak bush, when it darts a very short distance and hides on the ground. At night it flies strongly, but is rarely captured in flight, and not very commonly at sugar, to which it is not particularly partial. Moreover, it does not seem to be much attracted by flowers nor by light, and the majority of specimens in collections are obtained by rearing larvæ found in the spring. It mainly frequents woods and woody heaths, and in such situations is moderately common in most parts of the Southern, Eastern, Western, and Midland English counties; scarce in Cornwall, and apparently so in Dorset. Said also to be scarce in Lincolnshire, Lancashire, and Cheshire; more frequent in Yorkshire, Westmore-

land, and Cumberland. In Wales it has been found commonly in Carmarthenshire, and more rarely so far west as Saundersfoot and Canaston, in Pembrokeshire; it must therefore in all probability occur in woods throughout the Principality. In Scotland very widely distributed; found in Roxburghshire, Ayrshire, and elsewhere in the West, also in the districts of the Tweed, Forth, Tay—Kincardineshire, and Aberdeenshire—in West Ross, and even abundantly in Morayshire. In Ireland apparently in most of the wooded districts; common near Dublin, and recorded from Kerry to Londonderry. Abroad it is generally distributed in the Central and Southern portions of the Continent of Europe, and is found in Southern Sweden, and in Asia Minor.

2. **T. janthina**, *Esp.*—Expanse $1\frac{3}{8}$ to $1\frac{1}{2}$ inch. Fore wings rather truncate, dark purple-brown shaded with purplish-grey; hind wings yellow with the base blackish, and a deep black, rather excavated band along the hind margin.

Antennæ simple, naked, blackish at the back, whitish in front; palpi very small, closely scaled, yellowish-white; head pale purplish-brown; collar broadly ashy-white, faintly tinged with greenish; remainder of thorax deep purple-brown, smooth, but having small raised tufts or ridges at the back; fascicles rather long, pale grey; abdomen stout, rather flattened, smoky-black; anal tuft deep black edged with pale purple; lateral tufts purplish-white. Fore wings of even breadth, rather squared, costa very slightly curved; apex bluntly angulated; hind margin beneath it very faintly hollowed, then rounded but hardly oblique; anal angle full; dorsal margin faintly concave; colour rich dark purple-brown, faintly clouded along the costa with pale purplish-grey; markings very indistinct; no basal line; first line faintly browner, oblique from the costa to the middle, then perpendicular to the dorsal margin; second line almost parallel in shape, both very obscure; outside each is a broad, faintly paler space or stripe; subterminal line pale yellowish-grey, or ashy-

grey, sharply edged internally, but shaded off outwardly so as to form a faint, rather paler band before the hind margin; orbicular and reniform stigmata usually scarcely visible, merely indicated by a faint edging of whitish scales; but when more distinct the orbicular is oblique and not completely margined, while the reniform is almost divided, or shaped like a "cottage loaf"; cilia dark purple-brown. Hind wings blackish streaked with orange at the base, rich orange-yellow in the middle portion, beyond which is a broad deep black band along the hind margin, curved and excavated within; outside this the extreme margin and cilia are bright orange-yellow. Sexes quite similar.

Underside of the fore wings dull black in the middle, with a dash of long yellowish scales in the discal cell; costal and apical margins dull purple; hind margin purple and yellow; dorsal pale yellow; hind wings bright yellow with the costal region broadly purple; from the margin of this purple colouring arises a broad black band as on the upper side; body pale purplish; legs and leg-tufts pale drab; but the first pair more purplish and barred with black.

Not a very variable species, though in some individuals the fore wings lose the purple tinge and become reddish-brown or even reddish-drab, or on the other hand become very dark purple-brown; occasionally the two stigmata are much more distinctly marked with ashy-white. Mr. Sydney Webb has a specimen of which the hind wings are *pale* yellow, giving it a very different appearance.

On the wing in July and August.

LARVA cylindrical; second and anal segments slightly compressed; skin soft, not polished. Dark greyish-brown with a greenish tinge; dorsal line threadlike, white, distinct; a series of slightly curved, broad blackish or deep olive sub-dorsal dashes point backwards, and unite in the dorsal line, but on the posterior segments remain separate, and form broad blackish wedge-shaped markings; those on the twelfth

segment are united behind, at their bases, by an ochreous transverse dash; usual dorsal spots minute, whitish, each placed in a blackish shade; a small blackish blotch beside the dorsal line at each incision, is often produced backwards to the subdorsal dash, thus forming an indistinct diamond-shaped mark; spiracular stripe broad, pale brownish-grey or brownish-ochreous; above it is a dark olive-grey waved stripe; the spiracles are whitish, and are situated at the junction of these stripes, each placed in a curved blackish blotch. Undersurface ochreous reticulated with grey and dotted with black, as also are the sides and spiracular stripes. Head pale brown reticulated with black and having a black dash down the middle of each lobe; legs pale brown; anal flap and prolegs blackish. (C. Fenn.)

September to May, on *Arum*, *Atriplex*, *Matricaria*, chickweed, dock, and low plants generally, and in the spring on sallow, hawthorn, and the young shoots of elm; feeding at night; hidden among low plants and dead leaves on the ground in the daytime.

PUPA rather stout, very glossy, wing covers and segmental divisions well defined, antenna cases barred throughout with ridges, anal extremity bluntly rounded, and having a pair of slender spikes, curved at their tips; general colour dark chestnut, dorsal portion rather darker. In a fragile cocoon of earth, underground.

The moth hides in the daytime in hedges and dense foliage, or among herbage, and may occasionally be disturbed by beating thick bushes and masses of ivy. In very hot weather it sometimes flies vigorously along hedges toward sunset. Its normal time of flight, however, is at late dusk and after dark, and it is strongly attracted by the blossoms of ragwort, tansy, burdock, and in gardens by cultivated *Veronica*. Where no attractive flowers are within reach it will come to sugar, but seldom in any numbers. Of general occurrence in woods, lanes, fields, and even gardens, throughout the greater part

of England and Wales, but not very common in the northern counties. More local in Scotland, though found in various localities in the Eastern and Western counties, in Perthshire and northward to Moray and West Ross; but apparently not noticed in the Scottish islands. Apparently in all parts of Ireland, and often common. Abroad its range seems to be more toward the South, as it is common in most parts of Central and Southern Europe, and also in Asia Minor.

3. **T. interjecta**, *Hüb.*—Expanse, $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings short, squared, chestnut-brown with very obscure markings; hind wings yellow, with blackish base and longitudinal dash, and deep black marginal stripe.

Antennæ of the male simple, naked, light brown; palpi narrow but rather thickly scaled, light brown; head reddish-brown; thorax broad, smooth, unicolorous red-brown; fascicles pale grey; abdomen rather narrow and only moderately flattened, greyish-brown; lateral and anal tufts reddish-brown. Fore wings rather short; costa faintly curved; apex bluntly angulated; hind margin very little oblique and hardly rounded; anal angle full; dorsal margin straight; colour red-brown, almost chestnut; markings very faint; basal line only indicated at the costa; first line dark brown, very slender and usually indistinct, bent suddenly outward above the middle, and composed of a series of curves, sometimes followed by a partial parallel line; second line also indistinct, slender, dark brown, broadly elbowed in the middle and angulated near the dorsal margin; outside it is a parallel line of minute blackish dots, which are sometimes united by a fine dark line; between the first and second lines is a broad cloudy angulated transverse brownish shade, and beyond the second a narrower, straighter, similar shade, the outer edge of which is the subterminal line; orbicular and reniform stigmata only perceptible by faint perpendicular dark brown streaks which form partial margins; cilia dark brown. Hind wings rather small, rich yellow, with smoky-black cloudy

streaks from the base down the costal and dorsal margins, and below the middle; near the hind margin is a broad, shining, black band, tinged with a golden gloss, inwardly excavated in the middle, and rather roughly sinuous outwardly; extreme hind margin and cilia rich yellow. Female very closely similar.

Underside of the fore wings smoky-brown, paler and tinged with yellow toward the base and margins; hind wings as on the upper side, except that there is a patch of smoky-brown occupying the apex, below which the black band commences; body and legs whitish-brown.

Hardly variable, except in the depth of colour of the dark brown transverse shades, which sometimes are scarcely perceptible; and a little in intensity of the black longitudinal shades on the yellow portion of the hind wings. Mr. Robert Adkin has two specimens, taken at Folkestone, in which these have become conspicuous straight black bars.

On the wing in July and August.

LARVA stout, rather velvety in texture of the skin, stoutest at the twelfth segment, and rather narrowed toward the head, which is still narrower, rather flat, and extended; pale drab, with a dark streak down each lobe. General colour yellowish-drab, or very pale yellow-brown, dorsal line whitish, bordered on each side by a brownish or pale purplish-brown subdorsal stripe; below is a broad, sometimes divided, lateral brownish or purplish-brown stripe edged with whitish; usual raised spots deep black; those along the spiracular region rather larger and sometimes connected by a brownish line; under-surface yellowish-grey, legs and prolegs similar, semi-transparent and glossy, the latter having, above each, a curved black streak or a pair of dots.

September to May on grasses and low plants, or in the spring on young shoots of willow. Not very frequently observed.

PUPA undescribed.

The moth hides itself during the earlier part of the day in hedges, thick bushes, clumps of ivy, and among herbage, but in hot weather flies in an exceedingly lively manner along hedges in the afternoon sunshine, especially frequenting those in which bramble is abundantly in blossom. This day flight is voluntary and frequent, and several individuals may often be seen busily occupied along the same hedge; the result being that they very rapidly become worn. At night it again flies, and then is strongly attracted by blossoms of ragwort, and of rush, and also in some small degree by sugar.

Common in most parts of the South of England, but very local in Cornwall, yet found in the Scilly Isles; plentiful in the eastern counties and in the Cambridge fen district; very much scarcer in the Midland counties; indeed I have but a single record in Warwickshire, where one specimen has been taken at Knowle by Mr. R. C. Bradley, and in North Staffordshire, where Mr. Woodforde has taken a solitary individual. It is however found in Herefordshire, in Cheshire and Lancashire near the coast, in several places in Yorkshire, and rarely in Lincolnshire. This appears to be the extent of its range northward. In Wales I have found it, rarely, in Pembrokeshire, and it can hardly be absent from the other southern counties. In Ireland it is common near the coast, occurring at Howth, Dublin, Wicklow, Waterford, Cork, in Louth and Westmeath, and even so far north as Antrim. Abroad its range appears to be somewhat restricted—France, Belgium, Holland, Western Germany, Corsica, and Dalmatia.

1. **T. orbona**, *Fab.*, **comes**, *Staud. Cat.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings broad, yellow-drab to red-brown or black-brown, no black spot before the apex; hind wings yellow, with narrow black border and blackish central lunule.

Antennæ of the male simple, slender, pale brown; palpi pointed, thickly tufted, pale brown, with the tips darker; head and thorax rather smooth, pale yellowish-brown or drab; fascicles brown; abdomen rather long and a little flattened,

yellow-brown ; lateral and anal tufts dull orange. Fore wings rather broad ; costa gently curved ; apex bluntly angulated ; hind margin very slightly curved and hardly oblique ; dorsal margin straight ; colour drab, yellowish-drab, pale reddish, or drab-brown ; markings very faint ; basal line abbreviated, brownish ; first line a double series of irregular reddish-brown streaks or curves : second line blackish, nearly perpendicular, and very sinuous, followed by a parallel series of blackish dots ; subterminal line hardly perceptible, except by its forming the outer edge of a transverse cloudy stripe or series of cloudy, darker spots, which terminates in a triangular reddish-brown costal blotch before the apex ; orbicular and reniform stigmata of a rather redder-drab, faintly outlined with whitish ; but all these markings are obscure, and most of them hardly perceptible in many specimens, the darker reniform stigma, and the brown triangle before the apex, being the most reliable ; hind margin dotted with dark brown ; cilia concolorous. Hind wings rather ample, with sinuous hind margin ; yellow, shaded with pale grey along the front margin ; just below this grey shade is a large, ill-defined, dull black, central lunule, and along the hind margin is a rather narrow dull black band, broadest at the apex and gradually narrowing to before the anal angle, where it terminates ; outside this the extreme edge and cilia are dull yellow. Sexes quite similar.

Underside of the fore wings smoky-black in the middle ; costal margin and broad apical and hind marginal spaces orange-red ; dorsal margin shining yellow ; discal cell fluffy with abundant long yellow hair-scales ; hind wings as on the upper side, except that the black marginal band is abbreviated toward the apex, and its place occupied by a reddish stripe, which runs all along the costal margin. Body reddish-yellow ; anal tuft still redder ; thoracic portion and leg tufts reddish-grey ; legs brown.

Variation in this species appears to be local rather than climatal and somewhat arbitrary in its distribution. In the

southern districts it takes the range already described—ground colour yellow-drab, yellow-brown, reddish-drab, or greyish-drab; markings rather in the direction of their obliteration than otherwise, so that some individuals exhibit a lovely smooth creamy-brown appearance almost devoid of markings. This creamy colour seems to be rather restricted to the south, but the general range of colouring, as described, appears to prevail throughout the United Kingdom, the markings becoming a little more pronounced in the north; but more decidedly so in the Orkneys, where both orbicular and reniform stigmata are distinctly dark-brown, and the subterminal dark stripe of the fore wings very conspicuous. In North Wales there is a tendency in the direction of grey-brown colouring with the markings still indistinct; and in the North of Ireland to a warm reddish ground colour, as also is the case in Arran and in the Scilly Isles, but so far as the British Isles are concerned the most interesting forms are found in the North-east of Scotland, especially in Morayshire. These take a very different range of ground colour—though accompanied by plenty of typical specimens and intermediate forms—deep claret-red, red-black, brown-black, deep rich red-brown, rosy-brown, dark liver-colour, or purplish drab; the two stigmata sometimes of the same colour with slender yellow margins, often blacker with the margins yellow or white; in some of these the transverse lines are pale and there is a marbling of yellowish over the surface; in others every line and every incidental curved streak or dot is accentuated or duplicated, or on the other hand, the whole dark or red surface is smooth and glossy, with little indication of the transverse lines. With this there is often in the hind wings a suffusion over the yellow surface of smoky-black, till in some instances most of the yellow of the middle area is so beclouded as to become nearly black. This darkening extends only in a very small degree to the cilia. Among a large brood obtained from eggs of this strain Mr. J. A. Clark has reared specimens having one hind wing of a *whitish-*

yellow, the corresponding wing being of the usual rich yellow. These remarkable dark forms, though common in North-east Scotland, are not confined to that district; the specimen first noticed was taken early in the century, in the Isle of Bute, by Mr. John Curtis and recorded by him as *T. consequa*. This identification proving to be incorrect, the specimen was named (without description) *T. Curtisii*, by Mr. Edward Newman, and in the absence of a description this name has since been applied to all the red, red-brown, dark-brown, and blackish forms, which also are usually smaller in size than typical specimens. One equally small, and of a bright light red has been taken in Surrey, by Professor Meldola. A specimen in the collection of Mr. Sydney Webb has the black marginal band of the hind wings broken; another has the hind wings very pale yellow with the central black lunule obsolete; and a third is very similar. A larva which I picked up feeding on *Silene maritima* within a few yards of the sea, in South Wales, produced a most curious individual of the moth, the hind wings being pale straw colour with brown nervures and the usual black band very pale and almost colourless. Mr. R. Adkin possesses specimens from Orkney of a smooth unicolorous chocolate-black or intense red-black. Quite recently a long series, reared from larvæ obtained in the Hebrides by Mr. McArthur, was exhibited before the South London Entomological Society. These were very constant, the fore wings being of a rich black-brown with chocolate markings, but the hind wings of the usual bright yellow. Full-sized specimens of a rich red, almost brick-red, are found in the North of Ireland, in the Isle of Arran, and also in the Scilly Isles—in the latter case mottled with darker colouring; and it is doubtful whether we have even yet arrived at a full knowledge of the range of variation in this species.

On the wing in July and August.

LARVA stout, smooth, rounded, slightly thickened to the

twelfth segment; head small, rounded, shining; anal prolegs extended behind. Head pale brown with two dark brown facial dashes and a smaller, similar dash toward the outside of each lobe; body greenish-grey marbled with ochreous; dorsal line threadlike, ochreous, but only distinct on the anterior segments; an indistinct series of curved pale sub-dorsal dashes, these being broadly edged with black wedge-shaped markings on the eleventh and twelfth segments; spiracular stripe broad, ochreous, margined above with blackish which is produced into a black blotch round each of the white spiracles; dorsal spots whitish; lateral spots black; undersurface slightly paler than the ground colour, dusted with black; anal segment and prolegs shaded with grey (C. Fenn). Variation in colour also occurs in the larva, even almost to black; but such larvæ usually produce moths of ordinary colouring.

September to May on dock, plantain, clover, grasses, even nettle, foxglove, and doubtless very many low-growing plants; but after hybernation also upon the opening buds and leaves of willow, hawthorn, blackthorn, and other trees, feeding only at night, hiding during the day among dead leaves on the ground, or under the lower leaves of plants.

PUPA rounded, shining, anal extremity with a projecting double bristle; mahogany-red, incisions of segments tinged with grey (C. Fenn). Underground, in a brittle earthen chamber or cocoon.

The moth hides in the daytime among dead leaves on the ground, under herbage, in thick ivy, in thatch and under almost every imaginable shelter, and may sometimes be beaten out of thick overhanging banks on sandhills or elsewhere, when if the sun is shining warmly it will fly briskly away; otherwise it rolls down inert and then creeps into another shelter. At night it flies vigorously, comes freely to sugar, to composite flowers such as tansy, ragwort, and burdock, to honeydew and to flowing sap. Found most abun-

dantly in wooded districts, but also in fields, heaths, and even gardens throughout the United Kingdom, with only the apparent exception of the Shetland Isles; and is usually plentiful. Perhaps not quite so common in the West of Scotland as elsewhere. Curiously enough its range abroad does not appear to be northern, and it is recorded with doubt from Sweden, but is common throughout Central and Southern Europe, Northern Africa, the Canaries, and Asia Minor.

5. **T. subsequa**, *Hüb.*; **orbona**, *Staud. Cat.*—Expanse $1\frac{1}{2}$ inch. Fore wings rather narrow, blunt, reddish-drab or reddish-brown, reniform stigma darker, costal triangle before the apex *black*; hind wings yellow with a narrow black border and central lunule.

Antennæ simple, slender, naked, blackish brown; palpi thickly tufted but pointed, pale brown, darker at the tips; head and thorax smooth, pale olive brown; fascicles grey-brown, long and spreading; abdomen moderately stout, its hinder portion rather flattened, yellow-brown; lateral tufts barely perceptible, reddish; anal tuft flat, squared, orange-brown. Fore wings rather narrow—decidedly narrower than in *T. orbona*—costa gently curved; apex bluntly angulated; hind margin below it straight and almost perpendicular but curved off to the anal angle; dorsal margin straight; colour dull pale brown or drab-brown, faintly tinged with olive and reddish; lines exceedingly faint, the basal abbreviated, brownish; the first oblique, much scalloped and indented, originating in a black costal dot and touching another black dot on the subdorsal nervure, also faintly duplicated; second line also originating from a blackish costal dot, duplicated, angulated, but often hardly visible except by indistinct dots and streaks, or faint scallops; outside this second costal black spot is a white blotch, and beyond it, also on the costa but nearer to the apex a sharply marked deep black triangular or divided spot, from which a brownish cloudy stripe edges the paler subterminal line; at the extreme hind margin is a row

of minute dark brown lunules and a yellow-brown line ; orbicular and reniform stigmata both indicated by faintly whitish margins, and the latter in some instances darker in colour ; cilia olive-brown. Hind wings with a somewhat sinuous margin ; orange yellow, rather clouded with brownish at the base and along the costal region, and with an ill-defined, not very broad, submarginal black band, which is broadest at the apex of the wing, has an undulating inner edge and emits small black dashes from its outer margin ; the central spot is a thick lunule of a dull black ; extreme hind margin beyond the black band rich yellow ; cilia rather paler. Female quite similar.

Underside of the fore wings reddish along the costa and hind margin, yellowish from the base to beyond the middle and along the dorsal margin ; beyond the middle is a large smoky-black patch, sharply defined behind and enclosing a blackish reniform stigma ; hind wings deep yellow ; costal region purplish, darkest towards the apex, where it abbreviates the black marginal band, which otherwise is as on the upper side. Body pale reddish-drab ; legs brown ; leg tufts pale reddish.

Usually only very slightly variable, but in the North-east of Scotland sometimes of a darker brown or else tinged with reddish. A specimen in the collection of Mr. W. H. B. Fletcher has the hind wings pale yellow.

This insect bears considerable resemblance to the preceding, but may always be discriminated from it by its narrower fore wings and the *black* spot before the apex of the fore wings.

On the wing in July and August.

LARVA stout, cylindrical, of pretty uniform thickness, but tapering a little from the fifth segment to the head, which is the smallest ; thirteenth segment also rather tapering and rounded off behind ; skin smooth and velvety. Colour greyish-brown or pale drab ; on the back of each segment is a much darker and rather olive-tinted diamond-shaped mark,

with the points truncated; through the middle of this row of diamonds runs the very conspicuously wide dorsal stripe of bright ochreous-yellow, which at each end of the body becomes narrower, and is relieved throughout by a very fine black edging; sometimes a faint cloud of greyish appears in the middle of this dorsal stripe, but this is more frequently the case in the younger larvæ; the subdorsal stripe is nearly as wide as the dorsal, but is more of a greyish-yellow, clouded faintly with greyish along the middle, and edged above and below by a thin darker line; close along the upper edge, in contact with it, is a series of oblong, squared, black marks, each mark situated on the anterior portion of a segment, those on the third and fourth segments being narrower than the rest and rather wedge-shaped, that on the twelfth extending the whole length of the segment; there is another longitudinal stripe darker than the ground colour between the subdorsal and the spiracles, more strongly tinged with darker brown at the beginning of each segment; below the spiracles is a broad longitudinal stripe, pale ochreous at its upper and lower edges, rather greyish-ochreous along the middle, bearing a couple of brown freckles on most of the segments; the upper edge of this stripe is well defined by a very fine brown line, on which are the spiracles, small and white, either simply outlined with black, or placed in fusiform black blotches, which gradually increase in size to the twelfth segment; the dorsal raised spots are black and are joined together by narrow blackish bars; undersurface yellowish-brown, with a faint central paler longitudinal line, legs and prolegs similar, the latter bearing a couple of small brown dots and tipped with the same colour; head brownish-grey freckled with dark brown, with a black wedge-shaped spot down the middle of each lobe; on each side is also a black streak.

The young larva is at first of a semi-pellucid greenish-grey colour, with a brown head, and an internal brownish green vessel; all the usual raised dots very conspicuous and each

bearing a bristle. After ten days, of an opaque brownish-grey, having a stripe of cream colour above the legs; as it grows the dorsal and subdorsal lines become visible as faint slender lines edged with darker, and the sub-spiracular stripe still pale; after a time it is stouter and shows the dorsal white stripe running uninterruptedly through brownish grey ovals darker than the ground, and the pale stripe above the legs edged with white on its upper side; gradually the ovals become diamond-shaped, the subdorsal line is a little less white, with a series of oblong black dashes along its upper margin, and before the last moult the white stripes become ochreous-yellow. At all stages it is a more ornamental larva than those of the other species of the genus. (W. Buckler).

August or September to April on grasses and low-growing plants, especially *Dactylis glomerata*, *Triticum repens*, *Phalaris arundinacea*, *Ranunculus acris*, and *R. repens*, *Potentilla repens*, *Primula veris*, and *Stellaria media*, feeding mainly at night, and continuing to feed on mild nights throughout the winter. The Rev. H. Williams tells me that it may be swept up when feeding on grasses on warm evenings in January and February; also that when the grass is much sodden with moisture it will crawl up and stretch itself on a grass-blade in the afternoon as though to dry itself. It is full fed earlier than its allies and does not, like them, appear to attack the opening buds of trees and bushes.

PUPA rather short and stout, with the skin thin and moderately polished; wing and limb cases closely pressed down; abdomen regularly tapering to a point on which are the two parallel spikes, very close together; points of the palpi in a rather raised tubercle in front of the head, blackish, as are the edges of the wing covers, the spiracles, and the anal points, the general colour being bright red-brown. Underground, in a very weak, friable, earthen chamber.

The moth hides in the daytime among herbage on the ground, or under overhanging ledges on dry banks. If dis-

turbed it falls down, but if the weather is warm speedily flies to another shelter. The Rev. H. Williams has several times disturbed it from beds of *Teucrium scorodonia*. It flies at night, and comes readily to sugar. The first record of this species here seems to have been about the year 1843, and it was long considered to be a very rare species. Though now known to be widely distributed, it is local and far from common. In the South of England it is most frequent in the New Forest, but is found also in the Isle of Wight and other parts of Hants, and rarely in Sussex, Surrey, Dorset, Oxfordshire, and Gloucestershire. In the eastern counties it is especially attached to the Breck-sand district about Thetford and Brandon, where it is not scarce, and is found also at Yarmouth, Ipswich, and Bury St. Edmunds; in the west in Herefordshire; and in Wales in Pembrokeshire, where it is very rare. There is a single record in Yorkshire, at Redcar, and a solitary specimen has, this year (1896), been taken at Hesleden Dene, Durham, by Mr. J. Gardner. More generally distributed in Scotland—Roxburghshire, Ayrshire, Morayshire, commonly; Inverness, and elsewhere in the districts of the Solway, Clyde, Tweed, Tay, and Dee; also at Unst in Shetland. Very rare in Ireland; two specimens were taken in the County of Galway by Mr. E. Birchall in 1858, and it is said to have occurred since that date at Ardrahan and Clonbrock in the same district.

Abroad it is widely distributed in Central, Eastern, and Southern Europe; also found in Sweden, Norway, the North of Spain, Corsica and Livonia; and in Armenia and other parts of Asia Minor.

6. **T. pronuba**, L.—Expanse $1\frac{3}{4}$ to $2\frac{1}{4}$ inch. Fore wings long, not squared, broad behind; brown, red-brown, or yellow-brown, usually marbled with darker or black, and with a black costal spot before the apex; hind wings large, yellow, with a narrow black band, and devoid of a central spot.

Antennæ of the male long, simple, naked, red-brown or dark brown; palpi strongly tufted, dark purple or dark

brown at the sides, pale grey in front; head whitish or pale brown, dusted with grey, and often with one or two darker blotches on the forehead, front of the collar broadly and conspicuously ashy-brown, striped with brighter brown, dark purple, purple-brown, or umbreous; thorax broad and robust, of some shade of pale or dark brown, or dull purple-brown, agreeing with the colour of the fore wings; at the back is a small but well-marked tuft or minute crest; fascicles large, broad, and spreading, dirty white; abdomen broad and stout, decidedly flattened, dull yellow dusted with black, and covered with long loose smoky-grey or yellowish hair-scales; lateral and anal tufts similar, the latter sometimes with a black cloud in the middle. Fore wings stout and strong, elongated, broad beyond the middle, and more ovate than in the other species of the genus; costa rounded; apex very blunt, but hardly angulated; hind margin below it perpendicular, then rounded off to the anal angle, but full and almost protuberant; dorsal margin gently curved; colour dull pale brown, red-brown, umbreous, or dark purple brown, sometimes smooth and unicolorous, but usually mottled or clouded with darker brown or blackish; always and everywhere variable, and the variations taking, usually, similar lines. When visible the markings follow the general rule—basal line double, abbreviated, red-brown or black-brown; first line nearly perpendicular, double, blackish, enclosing a slender paler stripe; second line also rather perpendicular, slender, bent and bluntly angulated, much indented, brown or black, followed by one or two narrow pale brown stripes; on the costa before the apex is a sharply marked black triangle, from outside which runs the slender pale undulating subterminal line; orbicular stigma rather large, edged with dark brown, often conspicuously pale yellowish, light brown, or pale grey, but equally often of the ground colour, whatever that may be; reniform stigma large, edged with black or yellow, and often containing, or even filled up by, a blackish cloud, which, in some, otherwise almost unicolorous, specimens is very con-

spicuous; from the base of the wing in some individuals, especially those of umbreous tints, is a broad paler brown subcostal stripe, one half the length of the wing, and commonly uniting with the orbicular stigma; in such specimens the spaces in the discal cell before and between the stigmata are usually filled in with black, black-brown, or purple-brown, and very often a rather dark shade from the reniform stigma crosses the wing; extreme hind margin usually edged with brown or black lunules; cilia concolorous. Hind wings broad and ample, bright yellow, with a stripe of smoky-yellow along the front margin, and a rather sinuous black band of moderate width along the hind margin, outside which the extreme edge, and the cilia, are bright yellow. Female quite similar.

Underside of the fore wings yellow, glistening, deeply clouded beyond the middle with smoky-black, which is suddenly cut off by a purplish-red hind-marginal band; costa from the apex purplish-red, divided by a black streak; hind wings yellow, with the costal region dull red, invading the black stripe, which is thus shortened; no central spot; body dull pale reddish; legs brown or purplish, slightly barred with white; leg tufts grey or smoky-grey.

Variation in this species, as already stated, is constant everywhere, so that no single form can be admitted as the normal and typical, and it has thus been necessary to include all the usual forms in the above general description. The light brown specimens are often almost unicolorous, except that the reniform stigma is dark; the purple equally so, but with the orbicular stigma yellow; but often, in both, these markings are obscured or almost absent, and only the constant sharp black wedge near the apex of the costa remains. Occasional specimens are of a much blackened purple, or on the other hand of a curious hoary grey-brown, and one taken by Mr. W. Holland, in South Wales, and most liberally added by him to my collection, is of a most extraordinary whitened appearance, almost as though the thorax and the fore and

hind wings were obscured by a thin coat of flour. In this and in all cases the colour of the thorax agrees with that of the fore wings, but in the dark umbreous and purplish black forms there is usually an angulated black edging to the back of the collar. Rarely individuals no larger in expanse than *T. orbona* or *T. subsequa*, are met with, these have also rather pale hind wings, but are instantly recognisable by their shape, and the absence of the discal spot in the hind wings. A curious specimen taken in Derbyshire by Mr. F. C. Woodforde, has the fore wing on one side dark brown, and that on the other pale slate-grey, and what is more singular, its thorax is equally divided down the middle into the same two shades. Shetland examples are often of a bluish-grey or whitish-grey tint. A most interesting specimen, taken near Doncaster by Dr. H. H. Corbett, has a distinct row of black spots, some of them wedge-shaped, from the subapical black triangle to the dorsal margin.

On the wing in June and July; and casual specimens of a partial second generation have been captured in September and October. In confinement others have been reared in December.

LARVA stout, slightly thickened behind; head small, rounded, shining, reddish-brown, with a black dash on the face, and another on the inside edge of each lobe. General colour of the body some shade of dingy brown, purplish, ochreous, or pale or dull green, the back and sides shaded with darker; undersurface conspicuously paler; dorsal and subdorsal lines paler than the ground colour, sometimes ochreous, the former indistinct; a series of very conspicuous blackish longitudinal dashes, one on each segment from the third to the eleventh, margins the upper edge of the subdorsal line; spiracles black, situated at the termination of dark grey shades; no spiracular line, the colour of the undersurface extending to the spiracles, the sides below which are sometimes tinged with pink, green, or yellow; legs tinged

with reddish-brown. When young more yellowish-green with a faint yellowish spiracular shade in addition to the other markings. (C. Fenn.)

The infant larva is semi-transparent, pale grey with the head and dorsal plate dark brown, and the usual raised spots blackish. At this time it, like many other species, does not appear to use the first pair of prolegs, which are small and ill-developed, so that its method of progression resembles that of the group of *Noctue* in which these legs are aborted, and which are known as half-loopers. After the third moult this pair of legs has become developed and is used in walking.

August to May, on almost every description of low-growing plants as well as upon grasses. Moreover the very young larvæ eat the surface of the lower leaves of trees and shrubs and may be fed for some time on birch leaves; but the ordinary habit of the species, which is to hide underground by day and to crawl up at night to feed, is soon assumed. Apparently this species is but little attracted by the young shoots of shrubs in the spring but confines itself then to grass and low-plants.

PUPA stout, shining, anal extremity with the usual pair of small bristles; colour mahogany brown, wing and limb-cases darker; spiracles, divisions of the segments and anal segment black-brown. Under the surface of the ground in a very brittle earthen chamber, which is so readily broken that the pupa, if dug up, appears to have no cocoon.

This moth is one of the most familiar objects of the summer. No one who has ever been in a hayfield can have missed seeing the great buzzing yellow moths which start up every moment as the hay is moved, dash swiftly away to another shelter, and even then run through the grass in a most lively manner, and fly again at the least alarm. It hides during the day on the ground among grass, herbage, or any conceivable shelter, also in hedges and under thick bushes, and

is always and everywhere equally alert. At night it flies with great vigour and is strongly attracted by honeydew, flowers, sap of trees, and sugar, at which last it is a most abominable nuisance in some seasons, dashing down upon it and knocking off more desirable moths, crowding together shoulder to shoulder, or scrambling over its brethren in its eagerness to feed. In places and seasons where and when it is more than usually plentiful, sugaring is rendered almost useless, since nothing else can withstand the eager multitudes of this species which hover over and settle upon the tempting bait. As is usual in moths with simple antennæ it is not strongly attracted by light, though occasional specimens will fly to a gas lamp, or come into a window.

In meadows, pastures, woods, heaths, sea cliffs and sand-hills, lanes, and gardens—everywhere, probably in every field—throughout the United Kingdom; moderately common even in the Shetland Isles.

Abroad it is found even in Iceland, throughout Europe except the most extreme northern portions, abundant in Madeira, at Tangier, and throughout Northern Africa with Egypt, Northern Asia, and India.

Genus 7. **NOCTUA.**

Antennæ ciliated, sometimes with tufts of fine bristles; eyes naked; lashes prostrate, or nearly so; thorax smooth but usually with a small crest; fascicles long; abdomen without dorsal tufts; fore wings obtuse, broad behind, orbicular and reniform stigmata usually distinct; hind wings plain, dull coloured, with vein 5 arising from near the middle of the cross-bar, but exceedingly faint.

LARVÆ stout, rather more so behind; usually with rows of conspicuous black subdorsal markings and the longitudinal lines distinct. Hiding among dead leaves or herbage on the surface of the ground during the day.

PUPÆ subterranean.

This is a genus rather difficult of tabulation, yet as most of the species are moderately constant, an attempt is made :

- A. Fore wings broad.
- B. No basal line, markings indefinite, colour grey-brown.
N. augur.
- B.² No basal line, markings indistinct except a black or red-black central longitudinal streak ; colour rosy grey.
N. subrosca.
- B.³ Basal line black, slender ; colour dark velvety brown clouded with black, and with black markings.
N. rhomboidea.
- A.² Fore wings not very broad.
- C. Basal line edged inwardly with black spots.
- D. Fore wings pale slate-grey or pale purplish grey.
N. glareosa.
- D.² Fore wings light brown.
N. depuncta.
- C.² Basal line edged outwardly with a black blotch.
- E. Orbicular stigma broadly triangular, pale, spreading into the costal stripe.
N. e-nigrum.
- E.² Orbicular stigma oval, oblique, inner edge of reniform stigma curved ; colour of wings purple-brown.
N. ditrapezium.
- E.³ Orbicular stigma broad, squared, extended to the costa ; inner edge of reniform stigma straight ; general colour light brown.
N. triangulum.
- C.³ Basal line obscure, not black margined.
- F. A black, or very dark, squared spot between the stigmata.
- G. Colour dark purple brown, reniform stigma yellow.
N. brunnea.
- G.² Colour yellow-brown or reddish, usually clouded with red-brown ; both stigmata pale.
N. festiva.
- G.³ Colour pale rosy-brown ; transverse lines conspicuous, clouded.
N. rubi.

- F.² Fore wings usually without a distinct squared dark spot between stigmata.
- H. Fore wings short, dark red-brown or purple-brown; reniform stigma usually yellow. *N. dahlivi*.
- H.² Fore wings rather ovate; a black spot before the apex. *N. baja*.
- H.³ Fore wings rather squared behind.
- I. Colour pale purple-brown, nervures, lines, and central shade darker. *N. umbrosa*.
- I.² Colour deep dark purple brown, with a hoary gloss. *N. sobrina*.
- I.³ Colour pale drab to brick-red; lower half of reniform stigma grey, no other markings. *N. neglecta*.
- I.⁴ Colour variable, drab, red, brown, blackish; reniform stigma square, yellow; hind wings very pale. *N. xanthographa*.
- I.⁵ Colour very pale purple-brown, a black streak from base; collar black. *N. flammatra*.
- A.³ Fore wings narrow, bright purple, with a pale costal stripe. *N. plecta*.

1. **N. glareosa**, *Esp.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings very clear pale slate-grey, often with a lilac or pinkish flush; with three successive deep black markings not far from the costal margin; hind wings whitish.

Antennæ of the male faintly pectinated to beyond the middle with minute tufts of bristles, apical portion simple, rather downy; light brown. Palpi densely tufted with scales, so as almost to hide the terminal joint, dark brown at the sides, whitish-brown in front; head and thorax rather glossy, whitish-grey with a faint purplish tinge; collar faintly edged by a slender brownish line; sometimes the scales at the back of the thorax are drawn together into a faint crest, but often this is indistinguishable; fascicles white; abdomen very smooth, whitish-grey; lateral tufts minute, anal tuft narrow, both similar in colour. Fore wings rather narrow at

the base, broader behind; costal margin straight; apex sharply angulated; hind margin below it slightly hollowed, then faintly rounded, but very little oblique; dorsal margin nearly straight; colour very clear pale slate-grey, purplish-grey, or rosy-grey, smooth and shining, and dusted, especially along the costal region, with white; basal line only indicated by two deep black dots between nervures; first line also indicated by deep black dots or spots three in number, extending from the costa half way across the wing, the middle one expanded into a black or red-black triangular blotch in the discal cell; remainder of the first line whitish, but very faint; second line oblique, nearly straight, whitish, edged on each side with grey; subterminal line a very faint undulating whitish shade edged inwardly with grey; orbicular stigma large, rhomboidal, oblique, pale grey, almost extending to the costa and edged on one side by the black or red-black triangular blotch; reniform stigma also large and somewhat rhomboidal, pale grey; both are very indistinct, but are divided by a narrow deep-black or red-black angulated spot; this with the black spots attached to the first and basal lines are the only conspicuous markings; cilia pale grey with a yellowish basal line. Hind wings pure clear white, cilia similar. Antennæ of the female simple; nervures and costal half of the hind wings faintly tinged and dusted with pale brown; otherwise quite similar.

Underside of the fore wings pale smoky-grey, paler toward the hind margin, and with a slender pale costal line; discal cell filled with rather short downy raised scales; reniform stigma faintly visible, darker grey; beyond it is a straight, transverse, faint grey bar; hind wings white with light brown nervures; body pale purplish-grey, legs and leg-tufts reddish-grey.

Usually very constant in colour and markings, but subject to local or climatal variations in colour. Specimens from Ireland and from the West of England are frequently tinged with a bright rosy pink beyond and below the two stigmata

and especially so toward the costal margin before the apex. In Scotland the tendency is toward a deeper darker slate-grey, occasionally intensified to grey-black. This last form has been found in Perthshire, but is comparatively common in the Shetland Isles, where the species is more plentiful than in the south, and it is stated that the blackest specimens are found in those portions of the islands in which the rocks and soil are blackish, while in districts close at hand, in which the rock is of paler colour, ordinary grey examples are found. The blacker Shetland specimens are sometimes wholly of the slate-black colour, but often have the two stigmata and the transverse lines outlined, faintly or distinctly, with whitish or yellowish, while the usual black spots are somewhat inconspicuous, or else that between the stigmata is sharply and intensely black. In these dark forms the hind wings are tinged with smoky-grey, darker along the hind margin and at the apex. Intermediate specimens occur in all shades of slate-grey; the pink clouding seems to be here unknown. Along with these variations in colour, alterations in shape occur, some individuals having their fore wings conspicuously narrow. In Morayshire this peculiar form of the fore wings is found associated with a clear pale grey colouring. Very curious specimens are occasionally found in South Yorkshire. One described by Mr. G. T. Porritt has the fore wings of a rich chocolate-brown, the paler markings becoming very distinct; it has also dark hind wings; at Sheffield obscure dark slate-grey varieties occur along with those of ordinary colouring. In the collection of Mr. S. J. Capper are two individuals having the usual black spot which precedes the orbicular stigma produced into a sharp horizontal wedge, the point of which is toward the base of the wings.

On the wing in August and September.

LARVA smooth, cylindrical, or very slightly tapering toward the head, which is a little smaller than the second segment, and of a pale brownish-grey colour; general colour of the

body pale umbreous or yellow-brown; dorsal line of the ground colour or yellower, edged on each side by a blackish shaded line; subdorsal line similar, or merely dusky; below it is a broad lateral dark brown stripe, and below the spiracles another broad stripe of a pale yellowish; spiracles blackish; usual raised dots faintly blackish; legs and under surface pale brown. When young the whole dorsal area, to the spiracles, is of a purplish-chocolate, the spiracular stripe being bluish, edged broadly below with yellow; on the back is a series of prostrate V-shaped blackish markings, the base of the V being behind.

September or October to June, on dock, chickweed, grass, *Galium*, sallow, heather, heath, *Crepis taraxifolia*, and various other low-growing plants. Mr. Porritt found it feeding upon wild hyacinth. Hiding close to the ground in the daytime; feeding at night.

PUPA rather short, stoutest in the middle, very glossy, yet with a band of minute punctures on each abdominal segment; anal segment with two diverging spines mounted upon a blunt short protuberance; colour uniform deep chestnut brown. In a fragile chamber in the earth.

The moth is very rarely seen in the daytime; doubtless it hides among heather or herbage close to the ground. It flies at dusk, and is strongly attracted by flowers—heather bloom, ragwort, tansy, even garden flowers such as *Phlox*; the sap of a bleeding tree is also appreciated; and in default of its favourite flowers, sugar is not despised. This last taste seems, however, to be local with the insect, since it is only in Scotland that it is reported at sugar in any numbers, and in the South of England this bait is usually ineffective. Light is also occasionally found to attract it. Very widely distributed on heaths and the edges of woods, also on hills and open ground near the coast. Formerly to be found immediately around London, at Wimbledon and West Wickham. Still at Richmond Park, and commonly in Epping Forest, Essex, and

the New Forest, Hants ; less frequently in suitable places in all the southern counties, though apparently scarce in Dorset, Somerset, and Devon ; rare in the fen districts of Cambridgeshire and Norfolk, but found throughout the eastern counties ; also in the West in Herefordshire, Cheshire, Lancashire, and North Wales. In the Midlands in Warwickshire and South Staffordshire, and in some seasons plentiful in Sherwood Forest, Notts. In Yorkshire also common in heathy woods ; and found in Cumberland. In Scotland very much more generally distributed, from the East Coast to the Hebrides, and from the Tweed and Solway to the Orkneys and Shetland Isles. In Ireland it is usually found in districts near the coast—around Dublin, commonly at Howth ; Wicklow, Waterford, Galway, Monaghan, Sligo, Tyrone, Donegal, Derry ; and rather plentifully near Belfast, and in other parts of Antrim and Down. Abroad its range appears to be by no means wide ; it is recorded in France, Holland, Belgium, Western Germany, and Bavaria.

2. **N. augur**, *Fab.*—Expanse $1\frac{5}{8}$ to $1\frac{3}{4}$ inch. Fore wings very broad, with an arched costa ; dull brown with a reddish gloss, bordered behind with dark brown ; reniform stigma large, blackish ; hind wings dark grey-brown, with darker lunule.

Antennæ of the male simple, flattened in front, naked, reddish-brown ; palpi dark brown, strongly tufted, but with the apical joint slender ; head and thorax reddish-umbræous ; collar upraised and rather divided ; shoulder-lappets long ; a small neat crest at the back easily hidden by any disarrangement of the long loose scales ; fascicles rather short, smoky-white ; abdomen smoky-brown ; lateral and anal tufts spreading and conspicuous. Fore wings broad ; costa decidedly arched ; apex angulated ; hind margin beneath it almost perpendicular, then rounded off from the middle to the anal angle, which is rather full ; dorsal margin tolerably straight to very near the base ; colour reddish-umbræous or dark

brown, tinged with blackish and with a faint reddish gloss; basal line incomplete, curved, blackish, but often hardly perceptible; first line black, very slender, rather oblique, and formed into a series of curves; second line black, extremely slender, forming a series of faint crescents, broadly curved outside the reniform stigma, then with a sudden bend proceeding straight to the dorsal margin near its middle; both these lines arise from black costal spots; subterminal line only visible as a faint division of a smoky-brown shade, which occupies all the hind-marginal space; orbicular stigma of the ground colour, irregular, partially edged with black, often forming a long loop and joined to the first line; reniform stigma edged in front and behind, and partially divided or clouded, with black; claviform stigma short, indicated by its black edge; cilia brown, mixed with glistening yellowish and blackish scales. Hind wings ample, with the hind margin slightly hollowed below the apex; dull smoky-brown with darker nervures, and the costal margin tinged from the base with glistening golden-green; cilia whitish, clouded with grey. Female stouter, otherwise similar.

Underside of the fore wings smoke-colour, with the hind marginal space paler; reniform stigma indicated by a large cloudy black lunule; beyond it a perpendicular black streak from the costa is continued as a faintly blackish transverse line almost across the wing; nearer the hind margin is a pale yellowish transverse line, outside which the nervures are dashed with yellowish. Hind wings whitish, or pale grey, dusted with darker, and toward the costal margin with reddish; central lunule large, blackish, followed by a distinct, slender, waved, blackish transverse stripe; hind margin clouded with dark grey; cilia pale grey with a yellow basal line. The whole underside of the wings is also brilliant with a golden gloss. Body and legs smoky-brown.

Not very variable, but slightly so in the obscuration of the blackish markings; the edges of the orbicular and claviform stigmata being often fragmentary. In northern districts, and

especially in the North of Ireland, the ground colour is of a more dull smoky, or blackish-umbreous, with little or no indication of the reddish gloss; in the more southern portions of that country of a rather warm brown, and some individuals have the transverse lines beautifully clear; one such is in the Rev. W. F. Johnson's collection. Specimens from the North of Scotland are sometimes tinged with black. The Rev. C. T. Cruttwell has called my attention to the curious circumstance that in this species, as in some others, Suffolk specimens frequently present a greyer shade than is usual elsewhere. In Mr. S. J. Capper's collection are specimens having a black dash from the reniform stigma; in that of Mr. Sydney Webb is one having the stigmata large and conspicuous, with added black dashes; also another of a very pale brown colour with only two stigmata visible; and in that of Dr. H. H. Corbett, one having the two upper stigmata united by a black bar. By far the most extraordinary aberration of this species, however, which has come under my notice, is that which was formerly mistaken for *Agrotis Helvetina*. It is of a beautiful soft shining pinkish-brown, shading off very slightly paler behind, and with hardly the faintest indications of the usual markings. Its thorax is of the same colour, as also its head, and its hind wings whitish, tinged with grey behind. Its shape is accurately that of the present species, and I feel no doubt of its identity. The specimen before me is in the collection of Dr. P. B. Mason; a second (as previously stated) is in that of Mr. G. Baker, of Burton-on-Trent; both were captured, with another, in Derbyshire, but of the third I have no recent tidings.

On the wing in June and July, in the North to the beginning of August.

LARVA stout, nearly cylindrical, slightly enlarged behind to the twelfth segment; head rather small, rounded, shining, pale brown, much reticulated with dark brown, and with a broad blackish-brown stripe down the centre of each lobe;

body brown with a slight reddish tinge; subdorsal line represented by a series of conspicuous white dots; a row of indistinct grey dashes starting from the subdorsal region unites on the back at the incisions of the segments, forming a prostrate **V**, the apex of which is behind; a conspicuous transverse black dorsal dash on the twelfth segment is edged behind with ochreous; spiracular stripe purplish, the upper edge black, and joining the white spiracles; sides below the spiracular stripe paler than the ground colour, and much reticulated with dark grey; undersurface dull purplish with a greenish tinge; along the front edge of the second segment are three whitish dots. (C. Fenn.)

July to May on dock, hawthorn, blackthorn, oak, willow, birch, and doubtless on numerous herbaceous plants when young. It is said to hibernate early. On reappearing in the spring it attacks the opening buds of trees and bushes, feeding at night only; and concealing itself by day on or beneath the surface of the earth.

PUPA rather stout, antenna cases well marked and sculptured in ridges, wing covers also thickly and minutely sculptured in fine channels, the edges of the covers rather above the general surface; in front of the head there is a small tubercle; abdominal segments, and also the back, very glossy; anal segment with a triangular tubercle or cremaster, upon which are the two rather divergent bristles; colour rich mahogany-red, anal projection black-brown. In a brittle chamber close to the surface of the earth.

The moth hides in the daytime under any convenient shelter—herbage, dead leaves, thatch, in banks and hedges. It flies in the evening, coming very freely to sugar and also to flowers, such as tansy, and to honeydew on the leaves of trees and shrubs. It is most plentiful in damp woods, marshes, and fens, but is generally distributed in wooded districts throughout the southern and eastern counties of England, though apparently rare in Dorset and Devon, and not noticed

in Cornwall. It was formerly not rare in the London suburbs, and probably still occurs. In the Midlands it is found fairly commonly in Warwickshire, Leicestershire, Derbyshire, and Staffordshire; and in the west in Herefordshire, Cheshire, and Lancashire; northward it is common in Yorkshire, and found in Cumberland. It surely cannot be absent from Wales, yet I have no record, and feel satisfied that it does not occur in the Pembroke district. Very widely distributed in Scotland, occurring in Ayrshire and other parts of the Clyde district, and in those of the Solway, Tweed, Forth, Tay, Dee, Argyle, Moray, West Ross, and the Orkneys. Found throughout Ireland, and in many parts common. Abroad it inhabits all the temperate portions of Northern Europe, Central Europe, Northern Italy, and Western Siberia; also North America, occurring commonly in Canada, the Northern and Eastern United States, Colorado, Utah, and Montana, where the specimens are rather large, and are known as *N. haruspica*. Grote.

3. **N. plecta**, *L.*—Expanse $1\frac{1}{4}$ inch. Fore wings narrow, very obtuse, purple-red, stigmata whitish, united to a broad whitish stripe down the costa; hind wings white.

Antennæ rather short and thick, simple, minutely ciliated, dark purple-brown; palpi densely scaled, dark purple, paler in front, the terminal joint resembling a small nipple; head densely covered with pale purplish-brown scales, which form two small projecting tufts between the antennæ; thorax purple, the collar a little raised and edged with paler; scales drawn together slightly at the back so as to form a very faint back crest; fascicles whitish; abdomen shining whitish-brown dusted with darker, and with the lateral and anal tufts light purple. Fore wings narrow and blunt, costa straight, apex obtusely angulated; hind margin almost perpendicular, but slightly rounded off at the anal angle; dorsal margin slightly rounded; colour deep purple or pinkish-purple, faintly dusted with blackish; a broad yellowish-white stripe

from the base occupies the costal region and half the discal cell to beyond the middle of the wing, where it shades off to the ground colour; from the middle of the base of the wing this stripe is edged by a black shaded line, interrupted by the two upper stigmata, both of which are small and united to the pale stripe; the orbicular very small, round, yellowish-white, sometimes dark centred; the reniform larger, narrow, much bent, white or yellowish, sometimes enclosing a dark shade. Ordinarily no trace is apparent of the transverse lines, except in some individuals, of the subterminal, which is indicated by a row of faintly yellowish cloudy spots or dashes running inward between the nervures. In these the nervures are rather darkened, but in many examples neither the darkening of nervures nor the subterminal line is perceptible. Much more rarely the second transverse line shows itself as a faint curved row of blackish dots; toward the apex are two or three yellow costal dots edged with a blackish-purple cloud; cilia purple, with a yellowish basal line. Hind wings pure clear white except a faint dusting of purplish scales on the nervures and costal margin; cilia white, tinged at the apex with purplish. Female quite similar, except that the hind wings are tinged toward the front margin with grey.

Underside of the fore wings smoky-purplish, more purple along the costal and hind margins, whitish along the dorsal margin; reniform stigma indicated by a blackish streak, immediately beyond which is a faint smoky-grey transverse cloudy stripe; costa toward the apex spotted with yellow; hind wings white, brightly tinted along the costal margin with light purple, in which beyond the middle is the commencement of a fainter greyish transverse stripe; central spot small, dark grey. Body and legs, with the tufts, dark purple-brown.

Not very variable, beyond the presence or absence of the outer transverse lines as already described, but occasionally the collar is of the pale tint of the costal stripe of the fore wings, which thus becomes continuous. Specimens from the

North of England—Durham particularly—frequently have the costal stripe reddish and the stigmata obscured. A specimen taken by Mr. W. Holland near Reading has the fore wings and thorax of a brilliant deep purple, except the costal stripe, which is contracted and shaded with purple. Mr. Sydney Webb has another such. One in Mr. W. H. B. Fletcher's collection hardly shows a trace of the two stigmata.

On the wing at the end of May and in June, July, and even August; on the extreme south coast it has even been met with in April. Possibly a second generation may appear at the end of July, in August and the beginning of September; this, however, is irregular and uncertain—probably only partial. Mr. Fenn assures me that there is probably only one generation appearing over the whole season.

LARVA stout, slightly attenuated in front; head small, rounded, shining brown, shaded and reticulated with darker. General colour yellowish-brown irrorated with paler, sometimes with a reddish or greenish tinge; dorsal and subdorsal lines inconspicuous, threadlike, whitish, interrupted and shaded on each side with grey, a very broad and distinct yellowish-ochreous or whitish spiracular stripe, its upper edge bounded by a dark brown line joining the spiracles, which are whitish, surrounded with dark brown; usual spots distinct, black; undersurface paler than the ground colour. When young greyish-brown with a very broad, white, conspicuous spiracular line. (C. Fenn.) A variety of this larva figured by Mr. Buckler is pea-green, more yellow-green at the sides, dorsal line paler, edged on each side with light brown; subdorsal line slender, light brown; spiracles black. Another variety (younger) has a dorsal and subdorsal row of white dots, and the colour above the spiracular stripe purplish-brown.

June, and possibly as a partial second generation, in August, September and October. On low plants only, plantain, dock,

groundsel, chickweed, and many others, but not on trees; hiding itself in the day time at the roots of grass and herbage, and feeding at night. Full fed before the winter.

PUPA rather short and stout, shining, but with the wing covers minutely and abundantly sculptured with fine lines; anal extremity suddenly rounded off, and with a short, blunt projection, upon which are two parallel spikes diverging at the tips into two curled-out hooks; abdominal segments minutely pitted, but the first three each with a smooth pale rim, general colour dark purple-brown. Under ground in a rather flimsy cocoon of loose silk mixed with earth or rootlets. Sometimes in abundance at the roots of trees. In this condition through the winter.

The moth hides in the daytime among herbage, but flies at dusk and in the night, coming readily to sugar, to honey-dew on nettles and on trees; to blossoms of rhododendron and of ragwort; and in the fens fond of sitting at night on the broad blades of the common reed. Found abundantly in woods, meadows, and fens, and even in gardens; generally distributed and often plentiful throughout the United Kingdom except, apparently, the Scottish Isles.

Abroad it is very widely distributed, through Central Europe, the temperate portions of Northern Europe, Northern Italy, Corsica, Armenia, Northern Africa, Ceylon, India, Japan, Canada, and the United States.

4. **N. depuncta**, *L.*—Expanse $1\frac{1}{4}$ inch. Fore wings rather short, broad behind; drab-brown often tinged with reddish; from the costa arise four divided black spots; hind wings pale brown.

Antennæ of the male simple, finely ciliated, pale brown; palpi broadly tufted, dark brown at the sides, pale brown in front; head densely covered with scales, pale brown; collar broad, raised, very pale brown, distinctly dotted with black, and edged with light brown; shoulder lappets raised, pale

brown dotted with black; rest of thorax similar, with narrow but conspicuous front crest and small back crest; fascicles brownish-white; abdomen light brown, abundantly dusted with blackish-brown; lateral and anal tufts light brown. Fore wings very broad behind; costa gently rounded; apex bluntly angulated; hind margin perpendicular but rounded off toward the anal angle; dorsal margin nearly straight; colour drab-brown or very pale brown, shaded with brighter brown or reddish, and dusted, to the middle of the wing, with minute blackish dots; basal line indicated by two deep black spots; first line slightly oblique, pale brown, edged outwardly by three black-brown spots, the middle one pear-shaped, oblique, and lying in the discal cell before the orbicular stigma; rest of the line faintly edged on both sides with dark brown; second line, arising from a triangular black spot on the costa, forms a series of indistinct dark brown dashes between the nervures, and is closely followed by a parallel faint brownish line, and this by a row of minute blackish dots; subterminal line, arising from a black or black-brown costal wedge before the apex, is paler brown, sharply edged within by a broad irregular dark-brown line or stripe, and outside by a faint series of similar clouds; orbicular and reniform stigmata of the ground colour, dusted like the neighbouring surface, and indicated merely by their pale margins; the space between them rather narrow, black or brown-black, with a brown extension to the costa, and often a brown shade to the dorsal margin; nervures slenderly whitish; extreme hind margin edged with black lunules; cilia pale brown with two darker intersecting lines. Hind wings broad and much rounded; dark smoky-brown, rather pale toward the base, but the nervures darker, and with a dark marginal line; cilia yellowish white. Female quite similar, hind wings hardly darker.

Underside of the fore wings smoky-grey, costa and hind margin dusted with reddish; a blackish elongated spot indicates the reniform stigma, beyond it is a smoky-black trans-

verse stripe, and outside this another, fainter; cilia reddish. Hind wings whitish, dusted with grey, and also along the costal region with reddish; central spot small, blackish; beyond it is a blackish transverse stripe, most distinct in the costal region; along the hind margin is a faint blackish cloud; cilia reddish, shading off to white. Abdomen and leg tufts reddish-brown; legs brown.

Usually but slightly variable in the tone of colour of the fore wings and in the black or brown colour of the outer spots. Occasional specimens, however, are handsomer from increased richness in the tone of reddish-brown and greater size of the markings. A specimen from Scotland in the collection of Mr. Percy Bright is very remarkable for black clouding in the basal half of the fore wings. Mr. W. H. B. Fletcher has examples from North Wales of a greyer tone of brown colour; and Mr. S. Stevens possesses a specimen of a smooth grey-brown with hardly a trace of markings.

On the wing from July to the beginning of September.

LARVA smooth, nearly cylindrical, but a little the thickest at the twelfth segment, from which the thirteenth slopes off very suddenly; head rather small, greyish-brown or reddish-grey, with the face darker; dorsal region down to the spiracles reddish-brown or purplish-brown, with a dorsal series of outlines of diamond-shaped markings from the fourth to the eleventh segments, and one, more squared, on the twelfth; but when quite full-grown these outlines become sometimes imperfect; spiracles white, placed in a cloudy blackish, or dark brown, longitudinal line, below which is a broad yellow stripe, this in the younger larva is extended round the back of the anal segment; legs and undersurface faintly brownish or greyish.

September to May on cowslip, nettle, sorrel, and various other low-growing plants. Feeding whenever the weather is mild, so that the larva has been swept up from low plants in January.

PUPA red-brown, otherwise undescribed. Subterranean.

The moth usually conceals itself in the daytime, yet in those seasons in which it is common in its rather restricted localities, it may occasionally be found sitting about. It flies at dusk, and freely visits sugar and ragwort bloom. Extremely local in its distribution, apparently confined to woods and forests, and in the south very scarce. Two specimens were taken in 1888 and a few more in subsequent years at Newbury, Berks, by Mr. and Miss Kimber; one in 1887 near Marlborough, Wilts, several in 1892, and a larger number in 1893, the principal haunt being Savernake Forest; Mr. William Holland has found it rarely in beech woods in South Oxfordshire; in Devon it seems to have been long known, since there is the record of its capture, singly, near Exeter, in 1858; and it was taken near Bridestowe, Dartmoor, in 1888, and again in 1890 by Major Still. One was obtained near Swansea, South Wales, in 1893, and others have occurred at Mold, North Wales; one locality is on record in Cheshire; in Yorkshire it is more reliable though very local; and in Barron Wood, Cumberland, it is in some years abundant. Its principal home in these islands is in Scotland, though there it is local and apparently not known in the western districts, nor in any of the Isles; abundant in the woods of Forres, Morayshire, and of Aberdeenshire, also found in Perthshire, and probably in most of the large woods of the central and eastern districts. Dr. White gives its range as the districts of the Tay, Moray, and Solway.

Abroad it appears also to be somewhat local, being recorded from Central and Southern France, Germany, Livonia, and Southern and Eastern Russia.

5. **N. triangulum**, *Tr.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings broad, drab-brown with a reddish flush, three conspicuous squared black spots in the basal half, and another before the apex; hind wings light grey-brown.

Antennæ of the male simple, naked, light brown at the base, darker beyond; palpi chesnut-brown at the sides, pale brown in front; head light purplish-brown, with the face whitish-brown; collar upraised, very pale brown, edged with brighter brown, within which is a slender white bar; remainder of the thorax light purplish-brown, raised into a small crest close behind the collar and into another at the back; fascicles very short, smoky-white; abdomen whitish-brown, the basal segments covered with loose tufts of smoky-white scales; lateral and anal tufts reddish. Fore wings rather broad behind; costa very faintly curved; apex rounded; hind margin nearly perpendicular and but little curved; dorsal margin long and straight; colour pale purplish-brown or purplish-drab, often with a reddish flush, finely dusted or clouded with brown and a few black atoms; basal line composed of two deep black spots connected by a small black dot, followed by parallel brown shades, and the lower by a larger black-brown blotch below the median nervure; first line deep black, thick and deeply angulated near the costa, more slender, oblique, and again angulated above the dorsal margin, a slender brown parallel shade is divided from it by a pale edging; second line very perpendicular, and but slightly curved, formed of a series of slender black crescents followed by a parallel pale line, and then, usually, by one or two rows of minute black dots placed on nervures; subterminal line a slender waved umbreous shade, edged outwardly with pale yellowish, and originating on the costa in a conspicuous deep black wedge-shaped spot before the apex; midway between the basal and first lines is often a triangular black dot on the median nervure; between the first line and the orbicular stigma is a conspicuous dark chestnut blotch edged on each side with black; between the orbicular and reniform stigmata the whole space is occupied by another, squared, dark chestnut blotch, edged with black; above these two is, in each case, a black costal spot; orbicular stigma whitish-brown edged with whiter, except the upper portion which

merges into a whitish-brown stripe along the costa ; reniform stigma very indistinct, edged on each side with yellowish and with a black fine line, but not defined below or above ; claviform stigma yellowish, slenderly edged on the upper side with black ; from the reniform stigma a slender brownish central shade passes to the dorsal margin ; cilia concolorous. Hind wings very ample, apex much rounded, below it a very slight hollow ; colour grey-brown, darkest along the hind margin, with a golden gloss ; nervures darker ; cilia whitish. Female similar.

In this and some allied species the stigmata become scarcely noticeable, being obscured by the sharply defined and conspicuous dark spots in the intervals of the discal cell.

Underside of the fore wings smoky blackish in the middle, shading off to light purplish-red along the costal and hind margins and the apex, and to whitish along the dorsal margin ; beyond the middle is a distinct slender blackish transverse stripe ; hind wings whitish, broadly shaded with light purplish-red toward the costa, and dusted all over with smoky-brown atoms ; central spot small, lunate, blackish ; beyond it is a slender curved smoky-black transverse stripe ; body and leg-tufts bright purple-red ; legs purple-brown.

Usually very constant in colour and markings, but there is a little variation in the degree of reddish shading, which sometimes is almost absent or replaced by smoky-brown ; the dark markings in the discal cell also vary from light chocolate colour to deep black. In the collection of Mr. A. J. Hodges is a fine female specimen, in which the first and second lines are unusually black and the former rather broad and shaded into the central space, which is altogether clouded with blackish.

On the wing in June and July.

LARVA. Head small, retractile ; body obese, cylindrical, attenuated in front from the sixth segment, the second being manifestly narrower than the rest ; twelfth segment a little

elevated ; each segment wrinkled transversely and having a distinct lateral skinfold ; on the back of the second segment is a semicircular corneous plate. Colour of the head wainscot-brown, reticulated with black at the sides, umbre-brown in front, this latter colour bordered by two parallel lines, one on each side of the median suture. Dorsal surface dull ochreous or ochreous-brown, delicately reticulated with black ; on each segment from the fifth to the twelfth is a somewhat diamond-shaped mark, either dull reddish-brown, dull umbre-brown, or bistre-brown ; this is very indistinctly marked on the fifth and sixth segments, and on the twelfth is reduced to a triangle, the apex of which points forward ; through this series of marks passes the slender ochreous dorsal line, edged on each side by a fine dark line ; it is usually obliterated in the centre of each segment, reappearing for a short distance on each side of the segmental division ; at the division itself it forms a dark spot only visible when the larva is in motion ; subdorsal lines indistinct, ochreous, interrupted, only visible on the posterior segments ; they are bordered above by a fine brown line, which ends on each segment in a slight curve at the lateral angle of the dorsal diamond ; sometimes the pale lines are altogether absent, and their places only indicated by this fine curved line ; on the eleventh and twelfth segments the place of this fine line is occupied, in each, by a conspicuous black mark on each side of the dorsal line, on the eleventh as an elongated wedge, on the twelfth larger and more triangular, the apices of the triangles pointing forward, and the bases united by a dark brown line forming the anterior boundary of a transverse ochreous band across the back of that segment. Lateral surface of the colour of the dorsal diamonds, and, like the back, delicately reticulated with black. Ventral surface and claspers dingy ochreous-grey ; legs ochreous-brown ; usual raised dots small, black, each accompanied by an ochreous spot.

September to the beginning of May. In the autumn on dock, chickweed, wood spurge, and other low-growing plants ;

in the spring on the same and on bramble, sloe, hawthorn, and sallow, especially on the young shoots.

PUPA stout with rather full abdominal segments, the anterior edge of each of which is abundantly sculptured with fine punctures arranged in a band, rest of segments and the wing and limb-covers very glossy; anal segment tumid and having a blunt protuberance, on which is a double spike; colour rich red-brown. In a brittle earthen cocoon, underground.

The moth hides during the day among herbage and in very thick bushes; it flies at dusk and through the night, coming freely to sugar, lime blossoms, and honeydew, and less frequently to light. Almost confined to woods and wooded districts, and plentiful in the southern, south-eastern, and south-midland counties of England, apparently much scarcer in the west; said to be uncommon in the south-west of Dorset, in Somerset, Devon, and Cornwall, and only once taken in the Scilly Isles; probably found in all woods in South Wales, since in some seasons it is not scarce in Pembrokeshire; not uncommon in Gloucestershire, Herefordshire, Cheshire, Derbyshire, but scarce in North Staffordshire, Yorkshire and Lancashire, and in Norfolk and Suffolk apparently confined to the large woods; also found in Cumberland; and rarely, in many localities in Scotland—Ayrshire, Argyleshire, and elsewhere in the district of the Solway and Clyde; more extensively on the east side, through the districts of the Tweed, Forth, Tay, and Dee to Moray and Ross-shire, but not in the Islands. In Ireland it is said to be rather widely distributed, plentiful in Kerry, and probably in woods in other parts of the south and west, and even abundant at Armagh; there is a single record at Londonderry.

Abroad it is common throughout Central Europe, in Northern Italy, Southern Sweden, Livonia, Dalmatia, and Southern and Eastern Russia. In North America a form known as *Normaniana*, *Grote*, has the transverse lines of the

fore wings more distinct, and slight and variable differences in the central ornamentation; but it is in all probability the present species. It is widely distributed in the eastern, northern, and middle United States, and in Canada.

6. **N. flammatra**, *Fab.*—Expanse $1\frac{5}{8}$ to $1\frac{3}{4}$ inch. Collar black; fore wings long, pale ashy-brown, costa whiter to the middle; a slender black streak from the middle of the base is followed by another extending to the pale orbicular stigma; costa spotted with black; hind wings brownish-white.

Antennæ of the male simple, but ciliated with rather long scanty bristles, light brown; palpi short, densely tufted, black-brown at the sides, drab in front; head tufted, especially so between the antennæ, drab dusted with light brown; collar raised, whitish-drab at the base, with a broad dark chocolate triangle occupying the upper portion; remainder of thorax drab dusted with brown, crested at the top and slightly so at the back; shoulder-lappets long; fascicles long, brownish-white; abdomen long, smooth, pale brown or drab; lateral tufts very small, anal tuft narrow, glossy pale brown. Fore wings long, narrow at the base; costa very faintly rounded; apex bluntly angulated; hind margin oblique, gently curved below the middle; dorsal margin straight to near the base, then curved in; colour pale brown or ashy-brown, with a broad, paler brown or whitish stripe occupying the subcostal region to the middle, at least; commencement of all the lines indicated by blackish spots on the extreme edge of the costa; basal line only so indicated; first line abbreviated, obscure, faintly blackish and double, the enclosed space rather paler than the ground colour; second line equally obscure, double, brownish, and enclosing a series of pale crescents, the tips of which are dotted with black; subterminal line faintly paler, edged inwardly sometimes by obscure wedge-shaped dots or by a faint brownish cloud, and outwardly by a faintly darker shade of the ground colour; from the middle of the base an undulating black streak almost

attains the first line, on which arises another black longitudinal streak, which unites with the lower margin of the orbicular stigma—these two black streaks, which are sometimes thickened, being the only distinct markings on the wings—orbicular stigma broad, ashy-brown, partially margined below with black, but coalescing above with the whitish subcostal stripe; reniform stigma very obscure, faintly edged with blackish, and inside with ashy-brown; claviform stigma either absent, or only indicated by a blackish crescent at its tip; hind margin edged with minute blackish crescents and with a yellow line at the base of the cilia, which otherwise are ashy-brown dusted with darker. Hind wings having the hind margin slightly hollowed below the apex, otherwise rounded; very pale grey-brown, with browner nervures and whitish cilia. Female similar except that the antennæ are naked or only faintly ciliated, and the hind wings darker and more glossy.

Underside of all the wings extremely glossy; fore wings ashy-white; reniform stigma, or else the whole costal region, clouded with brownish; nervures grey-brown; hind wings white, dusted with grey, and with reddish along the costa; nervures greyish-brown; a faint brownish central spot, and beyond it the commencement of a slender curved transverse stripe. Hind margin in the female clouded with grey-brown; body and legs pale ashy-brown.

On the wing in June and July.

LARVA. According to Treitschke it is of a uniform green colour with paler lateral stripes. Feeding from the Autumn to April on *Taraxacum* and *Fragaria*. It has not been observed in these islands.

PUPA undescribed.

This species is one of the rarest of our most casual immigrants, and appears to have no claim to the title of a resident. The first recorded British specimen is stated to have been

taken by Mr. Rogers, a collector for sale, at Freshwater, Isle of Wight. Mr. W. D. Crotch, who was collecting with the captor, recorded the specimen in the *Entomologist's Weekly Intelligencer*, 1859, stating that he was present and saw the specimen before it was killed, and made a drawing of it, whereby he obtained its name at the British Museum. This specimen was exhibited at a meeting of the Entomological Society of London, in October of the same year, by the late Mr. F. Bond, in whose collection, now in the possession of Mr. Sydney Webb, it still is. In the year 1876 another specimen captured by the same person was seen, while still fresh, on the setting-board, by Mr. J. B. Blackburn and recorded by him. In 1875 a specimen was secured, at light, at the lighthouse at Cromer, by Mr. R. Comben, and sent on with other insects to Mr. W. H. Thornthwaite, for whom the captor was then collecting. The specimen, when received, was still fresh and quite limp. It, like the rest of the insects taken, was quite unknown to the captors—the inmates of the lighthouse; it was submitted to me for identification by Mr. Thornthwaite soon after, and I have no doubt of the genuineness of the capture. I am not aware of any other occurrences of the species in these islands. It may readily be recognised by the chocolate-black triangle on the front of its collar. It is evidently a wandering species, for, though rare in Europe, it is recorded from France, Spain, Germany, Hungary, Switzerland, and Corsica, as well as Southern and Western Russia, Asia Minor, various parts of India, and South America.

7. **N. c-nigrum**, *L.*—Expansion $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings narrow, dark rosy-grey or blackish-grey; before the middle of the costa is a yellow triangular blotch, lying in a prostrate deep black **C**-mark; hind wings whitish.

Antennæ of the male slender, very finely ciliated, dark brown; palpi dark purple-brown at the sides, yellowish-brown in front; head light brown dusted with darker; collar

whitish-brown, faintly barred twice with darker brown; shoulder-lappets purplish-brown shaded with blackish, which forms a submarginal line on the upper side; remainder of the thorax purplish-brown, with narrow top and back crests, which are shaded with orange-brown; fascicles small, whitish, shaded to brownish at the tips; abdomen glossy, pale ashy-brown with a greyer tinge behind, lateral and anal tufts browner. Fore wings rather narrow, with the costa very gently rounded; apex bluntly angulated; hind margin slightly oblique and rounded off below the middle, though the anal angle is rather full; dorsal margin faintly hollowed and gracefully curved; colour shining dark slate-grey or purple-grey; basal line limited to two deep black streaks, which are closely followed by the parallel edges of two cloudy black blotches; first line black, duplicated, formed into three double scallops; second line very slender, scalloped throughout, curved at the costa, then straight to the middle, bent in and curved to the dorsal margin, and followed throughout by a very clear parallel black shade, outside which is a row of black dots; beyond this line on the costa is a deep black triangle, sometimes faintly divided, from it arises a slender, cloudy, blackish shade, which edges the yellow subterminal line, beyond this the hind marginal region is clouded with darker purplish-grey; orbicular stigma altered into a broad yellow triangle extending along the middle of the subcostal region; below and on each side of it the discal cell is filled up with deep black, which is shaded off below the median nervure, almost concealing a very small black-edged claviform stigma—this large black mark being the one conspicuous marking of the wing; reniform stigma rather obscure, reddish-yellow clouded with blackish lines and edged on each side with black; hind margin dotted with minute lunules, and edged with yellowish; cilia purple-grey. Hind wings broad and ample; hind margin undulating; colour shining whitish, with brown nervures, and clouded along the costal and hind margins with grey-brown, the hind marginal clouding, how-

ever, being divided by a whitish shade; cilia white. Female quite similar, except that the grey clouding of the hind wings is without the whitish interval.

Underside of the fore wings smooth, shining grey-brown, with a whitish transverse line before the hind margin; costal region tinged with reddish, which is crossed by a black streak beyond the middle, and with a yellowish triangle toward the apex; hind wings shining white, with the costal margin thickly dusted with dark grey; body and legs grey-brown.

Irregular in size and expanse of wings; also variable in the colour of the fore wings, from rich reddish-grey through pale reddish-grey to purplish-grey and slate-grey—darker or paler—and with the subcostal triangle varying from yellowish to white, or almost to orange.

On the wing principally in August, September, and October, but in some seasons, and in smaller numbers, in May, June, or July, and there is a record of the capture of a specimen at the end of March. Whether two generations occur, partially or occasionally, in the year in this country, is not clearly established. This is stated to be the case on the Continent, but here the earlier emergence is so seldom found in any abundance that pupæ have been supposed occasionally to lie over from the previous year.

LARVA plump, nearly cylindrical, but tapering a little in front, and also sloping off suddenly from the twelfth segment behind; head small, rounded, yellowish-brown or grey-brown, with a darker streak down each lobe; body down to the spiracles pale olive-brown or pale brownish-grey; dorsal line indicated by its faintly darker margins; the subdorsal line, from the fourth segment, is a series of black streaks, one on each segment, commencing just past the incision and thickening to near the next incision, where it is abruptly terminated; anal segment without the subdorsal black streaks, but having a pair of slender streaks terminating the *dorsal* line; spiracles white, ringed with black; spiracular line slender, undulating,

black; immediately below it is a broad stripe of orange-yellow or greenish-yellow extending the whole length of the larva; undersurface and legs pale greyish-brown, or pale grey. In some instances the spiracles are yellowish or pale orange, and the subspiracular stripe is whitish. When young this larva is of a bright green, and shows little trace of the markings.

September to April or May. Stated to have, on the Continent, a second generation of the larva in June and July, but no confirmation of this appears to have been observed here. On dock, chickweed, plaintain, groundsel, burdock, *Verbascum*, *Epilobium*, and herbaceous plants generally.

PUPA apparently undescribed.

The moth hides in the daytime, like its congeners, among herbage close to the ground, or under any convenient shelter. It flies vigorously at dusk, coming freely to sugar, honeydew, ivy-bloom, and the blossoms of nettle and ragwort, and is very strongly attracted by light, flying commonly round street lamps, or coming into windows, and sometimes most abundantly around an electric light, also settling down to rest on a lamp or any neighbouring object. It frequents woods, meadows, waysides, and gardens, more particularly in low-lying and damp districts. Formerly it was plentiful in the suburbs of London, but it has there become very much scarcer; otherwise it is pretty common throughout the south, east, and west of England, including the Scilly Isles, and in many parts plentiful; also found more locally in the midland counties, becoming scarce in North Staffordshire; commoner in Cheshire, Lancashire, Yorkshire, and Durham, and found in Cumberland. In Wales it is not scarce in Pembrokeshire, and probably occurs in all suitable localities; also apparently throughout Scotland, though not very common in the western districts, and rare in Shetland. In Ireland, though widely distributed, it appears to be far less common, but is recorded from Dublin, King's County, Monaghan, West Meath, Kerry,

Sligo, Tyrone, Antrim, Armagh, Fermanagh, and Londonderry.

Abroad its range is immense—Northern Europe, the greater portion of Central Europe, Eastern and Western Siberia, Bombay, Ceylon, the North-Western Himalayas, the Nilgiris, and other mountainous regions of India; Japan; throughout the United States, and in abundance, and large in size, in Canada.

8. **N. ditrapezium**, *Bkh.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings long, with the dorsal margin slightly hollowed; dark or bright purple-brown; near the costa are three paler spots separated by squared black spaces; before the apex is a small black wedge; hind wings pale yellowish-grey.

Antennæ of the male threadlike, most minutely ciliated, brown; palpi strongly tufted, purple-brown; head and thorax pale purple-brown; collar paler, barred toward its upper edge with a slender yellow line edged with reddish-brown; top and back crests present, but small and inconspicuous; fascicles small, whitish; abdomen glistening whitish-drab, barred with series of long white scales; lateral and anal tufts tinged with reddish. Fore wings rather narrow, particularly at the base; costa decidedly curved, especially so toward the apex, which is rounded, as also is the hind margin; dorsal margin faintly hollowed; colour purple-brown with a rich glow of purplish-chocolate; the basal line consists of two deep black spots, the lower of which is edged outwardly by a white streak followed by a deep purple-black cloud; first line unusually straight, oblique, double, blackish; second line curved, scalloped throughout, purple-brown; followed by a nearly duplicate but less distinct, cloudy blackish line of crescents, each of which is tipped with a black dot, beyond which is another similar dot; on the costa are several black dots or cloudy spots, and before the apex a triangular or wedge-shaped black spot, from which arises a dusky transverse shade edging the subterminal line, which is yellowish; orbi-

cular stigma oblique, incomplete, rather paler than the ground colour, broadly open above, edged on the sides and beneath with black; reniform stigma also rather pale, but clouded and edged with black; whole discal cell before and between them, filled up with deep black or chocolate-black, forming two conspicuous rhomboid spots; below these is usually a shading off of cloudy-black, and sometimes another outside the reniform stigma; claviform stigma almost obsolete, or indicated by a black dot; beyond the second line the nervures are streaked with pale grey, and along the extreme hind margin is a yellowish line; cilia reddish dusted with grey. Hind wings rather broad and ample; pale brownish-grey, more whitish at the base; nervures brownish, hind margin a little darker; cilia whitish. Female very closely similar, but with the dorsal margin of the fore wings straight.

Underside of the fore wings smoky-grey edged with reddish along the costa and hind margin, and with whitish along the dorsal margin; beyond the middle is a slender blackish transverse stripe hardly extending across the wing, and beyond it the grey area is suddenly terminated by reddish-white; hind wings shining white, dusted with purple-red along the costa, and having two transverse cloudy greyish lines beyond the middle; central spot lunate, blackish or dusky-brown.

Rather variable in the ground colour, from bright rosy-brown to dark purple-brown, but otherwise very constant. Two specimens in the collection of Mr. W. H. B. Fletcher are rather strikingly marked, the surface of the fore wings is not so glossy as usual, there is a broad darker purplish-brown transverse stripe at the base, and another beyond the central space, which is itself rather pale, but has the stigmata and spots very conspicuous.

On the wing in July.

LARVA. Length about an inch and a quarter and tolerably stout in proportion. Head polished; it has the lobes rounded and is narrower than the second segment. Body cylindrical

and of nearly uniform width throughout, only tapering slightly towards the head; segmental divisions distinct, but not deeply divided; skin soft and smooth, having very few, almost imperceptible, short hairs. Ground colour various shades of ochreous-brown, in some almost yellowish, in others of a strong purplish tinge; in all cases on the centre of the dorsal area the ground colour is almost obliterated by a series of large, lozenge-shaped, dark brown blotches, one on each segment; this dark brown colour is also suffused along the sides, a series of still darker oblique marks, one extending upwards and forwards from each spiracle, being very noticeable. Head yellowish-brown with a very dark brown stripe extending from the summit of each lobe to the mandibles. A very fine pale grey line, passing through the lozenge-shaped marks, forms the dorsal stripe; along the subdorsal region is a series of short black stripes, becoming more conspicuous towards the posterior extremity, and forming on the twelfth segment two distinct attenuated triangular marks, the apex of each pointed forward and joined at their bases by a transverse black bar edged outwardly with bright yellow; spiracles conspicuous, oblong, yellowish-white; ventral surface dull pale ochreous or purplish in accordance with the general shade of colour. (G. T. Porritt.)

Varieties of this larva, figured by Mr. W. Buckler, range from pale brown to reddish-brown and to pale purple or liver-brown, and in some the subdorsal lines are distinctly white.

September to May on dock, sallow, bramble, chickweed, primrose, and doubtless other low-growing plants; but in the spring especially fond of the young shoots and opening leaves of birch; feeding at night; hiding among dead leaves and herbage on the ground in the daytime.

PUPA of ordinary form, smooth and shining, rather blunt in front; abdominal segments rather rapidly tapering; anal segment with two projecting bristles lying closely side by

side; colour bright red-brown. In a very brittle earthen cocoon under the surface of the ground.

The moth doubtless hides in the daytime among dead leaves and herbage on the ground; but it is very rarely, if ever, captured by daylight. At dusk it flies actively and is readily attracted by sugar, yet restless under observation and very apt to fly off or dart to the ground and hide itself. It may also be taken occasionally at blossoms of wood-sage, ragwort, and rushes in damp woods; and occasionally at light. It is a local and far from common species, almost wholly confined to woods, especially those in which birch is plentiful. In such situations it is not rare in Surrey, occurring even so near to London as Richmond Park, also in Kent, Sussex, Hants, and Dorset, and found in several localities in Devon; at Cromer and Foxley Wood, Norfolk; and in South Wales, near Swansea. I have no record of English or Welsh localities further north except that a few are said to have been obtained this year, as larvæ, at Rotherham, Yorks, yet in Scotland it is found, not uncommonly, at Moncrieff Hill, Perthshire; and in Ireland two specimens were taken in the year 1857, near Kilcolgan, Galway, by the late Mr. E. Birchall. It has been known as a British species only from the year 1844, when a larva was obtained at Weybridge, Surrey, by Mr. Samuel Stevens. It does not seem to inhabit any other portion of Northern Europe, but is found in Central Europe, Northern Italy, Siberia, Japan, and the North-west Himalayas.

9. **N. rhomboidea**, *Tr. stigmatica*, *Staud. Cat.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings very broad, rather truncate; dark brown with a purplish flush and blackish clouds; two large black spots near the costa; hind wings dark grey-brown.

Antennæ of the male rather stout, ciliated with rows of perceptible bristles, dark brown; palpi densely tufted, blackish-brown; head and thorax umbre-brown, the collar

faintly edged with white ; top and back crests distinct, edged with pale purplish ; fascicles smoky-brown ; abdomen smoky-brown, the basal portion rather covered with long similar scales ; lateral and anal tufts brighter brown. Fore wings broad, especially so behind ; costa rounded, apex very bluntly angulated, almost rounded ; hind margin very full, rather perpendicular but rounded off to the anal angle ; dorsal margin very faintly rounded ; colour smoky-umbreous with a distinct purplish or reddish gloss ; basal line limited to two short black streaks ; first line black, thickened into a black spot on the costa and again below the median nervure, very indistinct toward the dorsal margin ; second line slender, obscurely blackish, slightly curved but very direct, almost immediately followed by a similar parallel line, the intermediate space being rather pale but divided by dark lines on the nervures ; half way between this second line and the hind margin is a smoky-black transverse shade, abruptly and very irregularly cut off behind by a much angulated and undulated subterminal line, beyond which the hind marginal space is of the general colour ; orbicular and reniform stigmata of the ground colour, rendered visible by two large rhomboidal black blotches, which occupy the remaining spaces in the discal cell before and between them ; below these is a smoky-black central shade crossing the wing ; between the first and second lines are two more black spots in the costa, and beyond them four yellow costal dots, followed toward the apex of the wing by a yellowish streak ; extreme hind margin edged by an undulating blackish line and outside it a very faint yellowish thread ; cilia dark brown. Hind wings unicolorous dark smoky-brown ; cilia hardly paler. Female rather stouter, with simple antennæ ; otherwise hardly to be distinguished.

Underside of the fore wings dark grey-brown with a golden or reddish gloss ; costal region paler, with a black bar beyond the middle ; hind margin abruptly tinged with reddish ; hind wings whitish dusted with grey, and toward the costa strongly sprinkled with purplish-red ; beyond the middle is

a cloudy blackish transverse stripe, followed by another, less distinct, toward the hind margin ; cilia whitish dusted with smoky grey or reddish.

Rather variable in the ground colour from dark smoky-brown, almost smoky-black, to rather light reddish-brown ; the darkest specimens often showing the pale colour along the second line ; otherwise very constant.

On the wing from the middle of July through August.

LARVA thick, cylindrical, the first four segments very slightly tapering ; skin smooth, soft, not shining ; head of moderate size, rounded, very highly polished ; ground colour umbre-brown, sometimes with an olive or reddish tinge, the space between the subdorsal lines dull ochreous on the posterior segments ; dorsal line white, threadlike, distinct on the second to fourth segments, afterwards inconspicuous, whitish-ochreous, interrupted with dark grey or brownish at each incision ; a series of dark grey or brownish wedge-shaped subdorsal dashes, the apex in front, and increasing in intensity of colour to the eleventh and twelfth segments, where they are most prominent and often black ; the bases of these wedge-shaped markings usually project a shade to the dorsal line, thus forming a series of broad **V**-shaped grey or brownish dorsal markings, the apex behind. A pale ochreous thread borders the lower edge of each of the subdorsal wedges, uniting obliquely with the similarly coloured faint and threadlike subdorsal line. Spiracular stripe broad, ochreous or reddish-ochreous, edged above with white, conspicuously so on the anterior segments ; usual spots and spiracles dark greyish-brown, distinct ; undersurface and sides below the spiracular stripe pale greenish-brown, dusted with grey or dark brown ; two black dots are obliquely placed above, and two on each side, of each proleg. Head reddish-brown, reticulated with dark brown, and with a blackish blotch in the centre of each lobe ; legs pale brown.

When young the dorsal and subdorsal markings are less

TRIFIDÆ.

distinct, but the spiracular stripe is white and very conspicuous. (C. Fenn.)

September to May on sallow, dock, chickweed, primrose, plantain, and other low-growing plants; feeding at night and hiding among dead leaves on the ground in the daytime. In confinement it will eat slices of potato and carrot, and if kept sufficiently warm will feed on through the winter, and assume the imago state before the spring.

PUPA apparently undescribed.

The moth is rarely seen by day. It doubtless hides among dead leaves and herbage on the ground. It flies at dusk and comes to sugar, also to blossoms of the wood-sage, ragwort, and even sunflower, and late at night will come occasionally to a strong light. Apparently confined to woods, and more particularly to those which are rather free from undergrowth, except bramble which it appears to favour. Very local, but found commonly in some of the beech woods of Berks and Oxfordshire and in the New Forest, Hants; less frequently in Kent, Sussex, Dorset, Devon, and Bucks, and widely distributed though scarce in Cambs, Norfolk, Suffolk, and Essex; extremely local in Yorkshire, recorded once only in Lancashire, and Mr. Gregson has taken a single specimen at Llangollen in North Wales. In Scotland rather widely distributed, though not common, found in the districts of the Solway, Clyde, Tweed, Forth, at Moncrieff Hill and elsewhere in Perthshire, and in the extensive woods of Moray. Abroad it seems also to be somewhat local in its distribution, being found in Central Europe, Northern Italy, and Livonia.

10. **N. brunnea**, *Fab.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings moderately broad, rather truncate, purple-brown; reniform stigma yellow preceded by a blackish blotch; hind wings shining brownish-grey with reddish cilia.

Antennæ of the male simple, ciliated to the tip with minute

bristles, purplish brown; palpi deep purple-brown, apex light brown; head and thorax purple-brown, collar a little raised; a crest at the back of the thorax is faintly perceptible; fascicles short, loose, whitish; abdomen glistening smoky-grey, lateral and anal tufts bright light purple-red. Fore wings moderately broad, costa gently curved near the base and again beyond the middle; apex very bluntly angulated; hind margin full, perpendicular below the apex to the middle, then bent and curved off suddenly; dorsal margin very straight; colour deep rich purple-brown, rather greyer toward the dorsal and hind margins; basal line partial and very indistinct, reddish-brown or blackish, edged outside with yellowish; first line very indistinct, often hardly perceptible, consisting when visible of two or three blackish streaks; second line very faint, curved, not scalloped, but broken below the costa—it is no more than the inner edge of a broad purple transverse stripe, at the outer edge of which is a much indented, faintly yellowish, subterminal line; orbicular stigma of the ground colour, faintly edged with yellow, and outside this with black; reniform stigma yellow, clouded with brownish or purplish and usually cut off below, edged on each side with black, and preceded by a large rhomboid spot of a blackish or deep chocolate colour; the space on the outer side of the reniform stigma is often of a bright light chocolate; claviform stigma indicated by a black dot; costa spotted with yellow and black; extreme hind margin edged with dark brown lunules; cilia purple-red. Hind wings shining grey-brown, rather paler at the base; nervures dark brown; central lunule long, indistinct, smoky-brown; cilia purple-red. Female stouter, extremely similar.

Underside of the fore wings glossy grey-brown, tinged with bright purple-red along the costa and hind margin, and sometimes brilliantly so at the apex; beyond the middle is a blackish transverse stripe hardly visible except near the costa; hind wings whitish dusted with grey-brown, and very broadly with purple-red along the costal region; central spot large,

lunate, smoky-black, followed by a slender, curved, blackish transverse stripe, not always perceptible.

Variable in the tone of the ground colour of the fore wings, from dark purple-brown to light purplish-red or brownish-red; and in the colour of the reniform stigma, which is sometimes obscured and almost hidden by dark scales. The greyish suffusion is also sometimes tinged with violet. All the shades of colour in this species are so fully connected by every shade of intermediate that no distinguishing line of variation can be drawn. Specimens from Ireland are often very rich in dark purple or purple-red colouring, and noticeable from the rich yellow of the reniform stigma, or its extreme obscuration.

On the wing in June and July.

LARVA stout, thickened behind and tapering toward the head, which is small, rounded, and shining; pale chocolate-brown with a yellowish tinge, especially on the back; minutely reticulated with grey; dorsal line paler, indistinct; subdorsal line threadlike, ochreous, emitting a series of oblique ochreous dashes pointing backwards, one on each segment; a conspicuous, ochreous, transverse dorsal marking on the twelfth segment; usual raised spots black; head dark brown with an ochreous dash on the outside of each lobe; under-surface rather pale, dusted with blackish. (C. Fenn.)

August to April or May, on dock and other low-growing plants, bramble, willow, hornbeam, whortleberry, wood-rush (*Luzula sylvatica*), fern (*Pteris aquilina*), and birch. Sir Thomas Moncrieff found it commonly feeding upon *Scrophularia vernalis* in Perthshire. Like some of its congeners, very fond of the opening buds of trees and bushes in the spring; feeding only at night, hiding itself in the earth, or among dead leaves and herbage on the ground in the daytime.

PUPA rather elongate, extremely glossy, anal bristles minute; deep dark-red, wing covers outlined with dark grey,

incisions of segments darkened. In a brittle cocoon of earth, and a very little silk, beneath the surface of the ground.

The moth conceals itself among dead leaves and dense herbage in the daytime, but flies at dusk and is very strongly attracted by sugar, but apparently very little so by flowers or light. It is almost confined to woods and usually plentiful in such situations throughout the south of England to Cornwall, in the Eastern counties, the Southern Midlands, and the Western counties to Lancashire; also in Staffordshire, Derbyshire, and Yorkshire, and to be found in Cumberland. In Wales it surely occurs in all wooded districts, for I have found it in Pembrokeshire. In Scotland it is common in Ross-shire, and found in the districts of the Tweed, Solway, Forth, Clyde, in Perthshire, Aberdeenshire, Moray, Argyle, probably throughout the mainland, and certainly in the Hebrides and the Orkneys, sometimes producing very dark forms. In Ireland also it is widely distributed, and rather variable, occurring near Dublin, in Wicklow, Waterford, Kerry, Galway, Sligo, Westmeath, Monaghan, Tyrone, Armagh, Antrim, and Londonderry. Abroad it is found generally through Central Europe, all Northern Europe except the coldest portions, Western Siberia, the Ural Mountain district, China, and Japan.

11. **N. dahlii**, *Hüb.*—Expansion $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings short and broad with rounded costa and truncate hind margin; male dull umbreous or reddish-brown with stigmata and lines faintly paler; female more purple-brown with yellowish markings; hind wings in both sexes dark grey-brown.

Antennæ of the male regularly notched like a saw, each notch surmounted by a tuft of fine bristles giving the appearance of faint pectinations, pale brown; palpi strongly tufted, the tufts produced in front to a dense point as prominent as the third joint, chocolate-brown at the sides, pale brown in front; third joint blackish; head and thorax

reddish-brown or dull pale brown, often tinged with smoky-brown; base of the collar dotted with darker brown; at the back of the thorax is a small obscure crest or tuft of drawn-together scales, usually tipped with chestnut; fascicles pale smoky-grey or smoky-white; abdomen glossy, smoky-grey; lateral tufts small, anal tuft very large, all pale chocolate-red. Fore wings rather short and truncate, broad behind; costa regularly curved; apex bluntly angulated; hind margin faintly hollowed below it, but bent in the middle and then curved off round the anal angle; dorsal margin slightly rounded; colour dull umbreous or pale bistre-brown; basal line abbreviated, double, blackish; first line also blackish, duplicated, and formed into a double series of short curves; second line curved, blackish, formed into a slender series of minute crescents; immediately following it is a slender, blackish, almost parallel cloudy line, sometimes also dotted with black, and beyond this a partial parallel series of blackish dots; subterminal line very irregular, much angulated, but complete, yellowish-brown; immediately before it on the costa is a rather obscure blackish-brown triangle, and outside it the hind margin is clouded with dark brown; orbicular and reniform stigmata of the ground colour, or tinged with yellowish, rather large, obscurely margined with dark brown; the spaces before and between them not darkened except that between them passes a central shade or cloud, rather narrow but angulated, complete to the dorsal margin, and often partly obscuring the reniform; claviform stigma only visible as a black dot—all the markings indeed are obscure—dorsal margin clouded with smoky-black; hind margin finished off by a row of slender, minute black lunules and following them by a yellowish line; cilia reddish-brown clouded with darker. Hind wings rounded, shining, dark grey-brown with rather darker nervures; cilia yellowish tinged with red.

Female usually with the fore wings more glossy and smooth-looking, and more regular in colour; purple-brown

with the reniform stigma more yellow, often bright yellow; other markings more obscure and the dark brown or blackish shades absent or replaced by purple-red; hind wings hardly darker, but the cilia light yellow.

Underside of the fore wings smoky-blackish in the middle; costal and hind margins reddish; dorsal margin whitish; beyond the middle is a smoky-black transverse stripe; hind wings white dusted with brown and with the whole costal region broadly dusted with purple-red, which also tinges the cilia; central spot distinct, blackish; beyond it is a slender blackish undulated and curved transverse stripe. Body shining greyish-brown, tufts and also leg-tufts purple-red; legs dark brown.

The male is variable in the depth of brown colouring, and still more so in shading of umbreous or bistre-brown, and also in some instances takes a tinge of the purple-brown of the female; its markings are sometimes distinct, at others altogether obscured. In the female the principal variation is in the shade of purple-brown or purple-red. But in Ireland these colours are intensified, the female more particularly being of a very deep dark purple-red, sometimes even purple-black, the male following in the same direction and both being of rather large size. Similar variations, though hardly so extreme, are found in Scotland, some with the yellow stigma conspicuous, others in which it is obscure, while pale ochreous and pale brown forms, some of them with all the markings distinct, are obtained in that country.

On the wing at the end of July and in August.

LARVA tolerably cylindrical, but tapering a little from the sixth segment to the head, which is narrower than the second segment; the thirteenth also tapers and slopes down to the anal extremity; head rather pale brown; on the back of the second segment is a darker brown velvety patch or plate, rounded behind, and margined in front with still darker brown; raised spots small, black; spiracles also black;

general colour of the back down to the 'subdorsal' region bright ochreous, delicately freckled with darker ochreous-brown; on each segment, from the third to the twelfth, appears a more or less distinct ochreous-brown diamond, its edges gently vanishing into the ground colour; dorsal line ochreous edged with dark brown lines, often visible only at the beginning of each segment; subdorsal lines thin, rather paler than the ground colour, edged above, at the beginning of each segment, with a thin black streak, which is generally slightly curved at the lateral point of the dorsal diamond; on the twelfth segment these unite by crossing transversely. Ground colour of the sides grey or brownish-grey tinged in front with bluish-grey, the space between the subdorsal line and the spiracles very thickly freckled with dark grey-brown; sub-spiracular stripe pale greyish, as also is the central surface. The great feature in the colouring of this larva is the contrast of the back with the rest of the body; and though the pattern is very much the same throughout, the colour varies from whitish-ochreous through greyish-ochreous, ochreous-yellow, cinnamon-brown, rich orange-brown, to the deepest tint of mahogany, on the back.

The young larvæ are at first brownish-grey with black heads; after the first moult paler brown, with their minute tubercular blackish dots and hairs distinct; after the second moult brown on the back, with faintly paler dorsal and subdorsal lines, the sides down to the spiracles of a rather darker brown than the back, the sub-spiracular stripe and ventral surface paler brownish-grey tinged with bluish-grey in front. When about one-third grown handsomer than at any other period, its colours being then deeper and brighter. (W. Buckler).

September to May on dock (*Rumex crispus* and *R. pulcher*), and probably on other low-growing plants, also in the spring upon the opening leaves of willow. It appears to keep itself very closely concealed, and is reported to be extremely difficult to find. Mr. Buckler found that of the larvæ from a large

number of eggs, the season being mild, a considerable number continued to feed in the winter, becoming full fed from the middle of November to the end of December. The remainder hibernated, and fed up in the spring, producing finer specimens of the moth than the earlier examples which emerged at a more unseasonable time.

PUPA quite of the ordinary *Noctua* form ; at first of a pale greenish colour, changes in a couple of days to brown, and finally to a dark brown ; very slightly attached by the tail to a thread in its cocoon. Spun up between dock leaves in confinement, or in moss, and apparently disinclined to enter the earth. (W. Buckler).

The moth apparently is never seen in the daytime, it doubtless hides among herbage or heather close to the ground. It flies at dusk, but from the dark colour of its hind wings is very inconspicuous. It is strongly attracted by heather-bloom, and in Scotland by the blossoms of ragwort and tansy ; sometimes in the south by those of the wood-sage ; it also comes occasionally to sugar. Scarce in the Southern and Eastern counties, occurring principally upon heaths and woods, but apparently absent from the fen districts ; much more plentiful locally in the Midlands, as in Sherwood Forest, where it is sometimes abundant, and in Shropshire and North Staffordshire ; found also locally in Herefordshire, Cheshire, Lancashire, Yorkshire, and Cumberland ; probably in suitable places in Wales, since Mr. Blandford has found it in Pembrokeshire ; widely distributed in Scotland, occurring too, high up on the hills, in the Tweed, Forth, Solway, Clyde, Tay, and Dee districts, abundantly in Moray, and extending to Arran and the Orkneys. In Ireland rather local, but sometimes abundant, occurring near Dublin, in Wexford, Kerry, Galway, Sligo, Roscommon, Tyrone, Donegal, and Londonderry.

Abroad it is widely distributed in Central Europe, and was found at Gibraltar by Mr. J. J. Walker, R.N., at ivy in November. Also found in Southern and Eastern Russia,

Western Siberia, and China; and in a larger variation known as *N. canescens*, in North-West India.

12. **N. festiva**, *Hüb.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings yellowish-drab or yellowish-brown, usually clouded or banded with purplish or reddish; stigmata pale, often separated and bounded by squared red-brown or black spots; hind wings pale grey-brown with darker nervures; extraordinarily variable.

Antennæ of the male regularly notched for three-fourths of their length, like a saw, each notch surmounted by a bristle, and the whole densely clothed with finer cilia, which extend beyond the notches; pale brown or purplish-brown; palpi densely tufted, bright chestnut at the sides, pale yellow in front; head and thorax also densely covered with scales, yellowish dusted with light brown, upper portion almost wholly light brown; collar raised and faintly edged with purplish; shoulder-lappets long and loose; at the back of the thorax a sort of flattened crest is formed of long converging scales; fascicles short, reddish-white; basal segments of the abdomen covered with long, prostrate, whitish hair-scales; remainder pale brown; lateral and anal tufts bright brown or purple-brown. Fore wings short and rather blunt; costa faintly rounded; apex angulated; hind margin hardly oblique, but a little more rounded off below the middle; dorsal margin nearly straight; colour pale creamy-brown, or pale drab clouded with tawny or fulvous, or red-brown, or even purple-brown, but ordinarily with light reddish-brown; basal line hardly perceptible, whitish-brown faintly edged with darker; first line double, but exceedingly faint, consisting of a parallel series of faint purple-brown curves and crescents enclosing a whitish-brown thread; second line also double, broadly elbowed above the middle, then tolerably direct to the dorsal margin, very faintly purple-brown with a pale enclosed stripe; before it is, usually, a broad reddish central shade or band, and after it a narrower but more definite reddish or purplish

transverse band, uniting on the costa with a deeper red or purple-red triangle before the apex of the wing; beyond this band is a very faint yellowish-brown subterminal line, outside which the hind marginal space is usually paler; costal margin spotted or clouded with reddish; orbicular stigma large, round, unmarginated, yellow-brown or pale yellow; the space before and beyond it in the discal cell occupied in each case by a conspicuous chocolate-coloured triangular, or rather squared, spot; reniform stigma less distinct, yellowish-brown, hardly margined except with a red-brown line on the outer edge, and clouded in its lower portion with reddish; claviform stigma only represented by a black dot; extreme hind margin edged with minute dark chocolate crescents; cilia or the ground colour. Hind wings rounded, except that the margin is hollowed below the apex, rather uniform pale grey-brown, with a faint golden gloss; base rather paler, nervures brown; cilia very pale reddish. Female equally variable, stouter, antennæ simple, fore wings rather narrower behind; more inclined to purplish shading or purple-red transverse bands; hind wings a little darker.

Underside pale smoky-brown or smoky-reddish, with the costal and hind margins abruptly light red, and the dorsal margin shading to whitish; hind wings white, dusted with reddish on the nervures, and especially along the costal region; central spot rather large, reddish-grey, not very distinct. Body greyish-drab with the tufts red; legs brown; leg tufts light red.

Unusually variable in the colour and markings of the fore wings. The description above is from fairly well-marked Southern specimens, selecting those which show the markings, which in the majority of specimens, even here, are less complete. Often the stigmata are obscure, and this occurs more particularly when the lines and the transverse shades or stripes are distinct; or the latter are obscure or absent, and the yellowish-drab wings are only faintly shaded with reddish or purplish; or the lines and stigmata are almost

obliterated, and the stripes distinct ; or the ground colour is wholly fulvous, or red-brown, or purple-brown, with the same range of markings ; or the two large angulated spots in the discal cell are black, and the costa spotted with black ; or the dark spots are obliterated, and the whole surface is unicolorous or nearly so. Rarely the entire surface is yellowish-drab, except the two chocolate-coloured angulated spots ; occasionally the basal half of the wings being normal, the outer half is abruptly and intensely purple-red ; or is so from the middle to the subterminal line. Every possible intermediate variation occurs, and to enumerate all the phases of colour and markings in these Southern forms is practically hopeless. In the hind wings the colour varies from white to dark grey-brown. The thorax usually follows the colour of the fore wings.

In the hill districts of the north of England and in most parts of Scotland is a local or climatal range of forms, decidedly smaller in size, with the fore wings a little narrower and more blunt at the apex ; usually also of more uniform colouring, the tendency of the ground colour being to reddish-brown or fulvous ; the markings identical, though rarely distinct, and having a range of variation in colour and in markings, which, though usually less pronounced, is practically the same as that already detailed, but a shading of purple-grey is much more general, while the angulated spots in the discal cell are almost always purple-brown, very rarely black. In these forms the hind wings have, in some instances, a pale shade across the middle, or a dark cloud along the hind margin, but usually are as in the larger forms. Both occur mixed together where the bases of the hills are wooded, and with them all possible intermediates. This smaller hill-frequenting form is known on the Continent under the name of *N. conflua*, and has been considered a distinct species.

Another, and very different form, has been discovered within the last few years, accompanying those already described, in the Shetland Isles, having decidedly more pointed and narrower fore wings, their costal and dorsal margins

straighter, and the hind margin even slightly concave below the apex. The usual range of colour in this local race is from dark red-brown or dark chocolate to black-brown and purple-brown, though occasional specimens are of a much paler purplish-brown or even pale greyish-brown; the stigmata and intermediate black spots are in these often distinct, the former being usually either tinged with reddish or clouded with grey, the latter black or extremely dark chocolate-brown; the purple-brown transverse stripe beyond the second line is usually also very distinct; but the usual double transverse lines are generally absent or indicated only by the enclosed paler narrow stripes, so that the clouded or mottled tint usual in Southern specimens is here replaced by more regular deep and sombre colouring and a more uniform pattern of markings; nevertheless there is a good deal of variation in ground colour and in the presence or absence of the more restricted markings, while the aberration in form of the fore wings is quite extraordinary, some of the females of this race captured in the Island of Unst by Mr. F. J. Hanbury, measuring in breadth of these wings hardly more than one-third of their length, while their costal and dorsal margins are almost parallel—certainly their fore wings are hardly more than one-half the width of those of a normal Southern female specimen. In a series carefully selected and forwarded by Mr. J. J. F. X. King, of specimens taken by him in Unst, is a perfectly graduated range from this extreme narrow form through the intermediate variations to fairly normal southern types. In Mr. W. H. B. Fletcher's collection are some of these narrow and pointed forms with the fore wings chestnut-brown, the stigmata very pale and the dark markings extremely sharp; others pale purplish, pale grey, and some having the transverse lines and stigmata yellow. Perhaps, however, the most wonderful range of variation is exhibited in the long series captured by Mr. F. J. Hanbury, from which a selection is made for figuring in this work.

In the Orkneys specimens are found approaching the peculiar

Shetland varieties, mingled with those of the smaller hill-frequenting form previously described, ordinary Southern types, and intermediates. To some extent the same tendencies seem to be observed in all the Scottish Isles. Elsewhere rather curious subsidiary occurrences have been noticed. The small hill form has been taken in the New Forest, Hants, as a *second* generation of ordinary *N. festiva*; near Dublin the same has happened, with the remarkable addition of an example of the narrow-winged Shetland form. This specimen was secured at Howth by Mr. G. V. Hart and forwarded to me. It is also interesting to know that the higher moors and hills of Devonshire produce the small form found on the Northern hills, and that this mingles with the ordinary Southern forms in the woods at their bases; that the narrow-winged form has been found in Kincardineshire in the east of Scotland; and that intermediates, some of them nearly approaching the latter, are found even so far south in Scotland as the hills of Lanark.

Turning to more casual aberrations, a specimen in the cabinet of the late Mr. H. Doubleday in Bethnal Green Museum, is especially worthy of attention. Its fore wings are buff, mottled with red in a not unusual manner, but its hind wings also are reddish-buff, with two slender, dark-grey, curved transverse lines, giving it an appearance far more approximating to that of the fore wings than is at all usual. Mr. F. J. Hanbury has one taken by himself in Essex, of a lovely cream colour with a dark smoky-brown central shade, and the spot between the stigmata intensely black, also with sharply accentuated markings toward the hind margin. A specimen in Mr. S. J. Capper's collection has a distinct black streak in the place of the usual dot representing the claviform stigma; another in the same collection has a long jet-black streak before the orbicular stigma, and another, still longer, beyond the reniform. Mr. W. H. B. Fletcher has one in which the first and second lines are distinctly marked, placed near together, and so altered as to resemble those in *Cosmia*

(*Calymnia trapezina* ; and Mr. H. J. Turner possesses one in which the fore wings are so broadened in shape that it bears a curious resemblance to *Noctua baja*.

On the wing in June, more northward in July. An occasional but rare and very partial second generation in August or September, or even reared in October.

LARVA. Head very small, less than the second segment and retractile ; antennal papillæ conspicuous ; body obese, cylindrical, attenuated in front ; each segment full and rounded ; skin transversely wrinkled and with a fold beneath the spiracles ; the head and body are furnished with slender whitish bristles. Head wainscot-brown with two parallel dark-brown marks, one on each side of the median suture. The colour of the body varies slightly. The more usual type is ferruginous or olivaceous-brown delicately reticulated with darker, the segmental divisions usually distinctly tinged with rosy. The dark reticulations on the back form a series of somewhat indistinct lozenge-shaped marks, one on each segment from the fifth to the twelfth, their edges shading off into the ground colour. Through the centre of this series of lozenges runs the threadlike and indistinct dorsal line, which is ochreous, finely bordered on each side with brown ; it is almost obliterated in the centre of each segment by the dark lozenge. On the twelfth segment the lozenge is reduced to a triangle, which is usually more clearly defined than the marks on the other segments ; its apex points forward. Subdorsal line ochreous, visible from the second to the twelfth segment but most distinct and broadest on the hinder segments ; bordered on each side by a fine brown line, and surmounted on each from the fifth to the twelfth segments by a conspicuous, velvety, dark, almost black spot of somewhat triangular form, the apex of the triangle pointing forward ; that on the fifth, however, is indistinct and almost linear ; the others increase gradually in size, those on the eleventh and twelfth segment being the largest ; on the posterior edge of

the twelfth segment the subdorsal lines are united by an ochreous transverse band on which the bases of the dark triangles rest. Occasionally there is also a transverse ochreous line on the anal segment. Sub-spiracular stripe paler than the ground colour, not very distinct, bordered above by an obscure brown line; spiracles black, ringed with ochreous; just behind each spiracle on the fifth to twelfth segments is an oblique dark blotch slanting toward the subdorsal line and varying in intensity, its lower part often forming a darker spot behind the spiracle; the obliquity of these stripes is toward the head of the larva. Ventral surface and claspers pale greyish-ochreous, the latter almost colourless; legs pale wainscot-brown; ordinary spots small, black, and indistinct; each of those on the dorsal surface is accompanied by a tolerably distinct whitish or ochreous spot; dorsal plate brownish, with the three lines very indistinctly marked.

Another variety is umbre-brown, altogether more dingy in appearance, segmental divisions not tinged with rosy.

Another is pale brown on the back, minutely reticulated with darker; the dorsal lozenges more clearly defined, and the triangular spots on the twelfth segment much paler; sides purplish-brown, sub-spiracular stripe tinged with rosy; thirteenth segment pale ochreous-brown with a distinct dark dorsal line.

When very young, short, stout, and cylindrical, with but three pairs of prolegs developed; head black; body dull grey with the tubercular spots distinct, black, each producing a slender bristle. (B. Lockyer.)

Buckler figures various forms of this larva from bright light brown to greenish-brown, with various degrees of development of the markings. Also under the name of *conflua* a further series, even more variable, and in some cases having the dorsal markings intensified and joined across the back into a series of black blotches, in others having the same series of markings separate, very pale, and inconspicuous.

August to April or May, on primrose, knotgrass, violet,

dock, and other herbaceous plants; also on willow, bramble, hawthorn, blackthorn, honeysuckle, and whortleberry, attacking the young shoots in the spring.

PUPA of the ordinary form, very glossy, red-brown. In a loose cocoon of earth, with a little silk, beneath the surface of the ground.

The moth hides, like its congeners, in the daytime, among dead leaves and herbage close to the ground, and is rarely observed by daylight. In the evening it flies vigorously, and comes in plenty to sugar on tree-trunks in woods. It is also attracted by honeydew, the sweet secretions of aphides on nettles, the blossoms of tansy, and almost anything of a sweet nature. It is also occasionally taken at light.

In its more ordinary forms it seems to inhabit the whole of the United Kingdom, even to the Orkney and Shetland Isles, but is mainly confined to woods and well-wooded districts, and in them usually abundant. In agricultural districts it is less common, and scarce in some parts of the Eastern counties, especially so in the fen districts. On the hills from Staffordshire northward, and also on heaths and moors throughout Scotland and the Isles, the smaller, more purplish, blunt-winged form occurs often abundantly; it is also common on Dartmoor, Devon, but I have no record of it in Wales. As already stated, the narrow-winged form, found more especially in the Shetland Isles, also occurs casually in other parts of Scotland, and even rarely in Ireland. In the northern parts of the latter country bright pinkish-red forms with very bright markings are usual.

So much obscurity hangs over the variations of this species, with especial reference to the question of the possible distinctness of the form or forms known as *N. conflua*, and there is so much debate as to which form is entitled to the latter name, that a little space may perhaps be given to the subject. Treitschke originally described *conflua*: "Thorax reddish-leather colour, thickly covered with scales; abdomen paler,

with a reddish anal tuft; antennæ in the male strongly pectinated, in the female long and filiform. Fore wings liver colour, more or less mixed with yellow or brownish-red, the yellow usually more distinct in the stigmata and on the costa; transverse lines only visible as a few black dots; orbicular and reniform stigmata large, the former pale; claviform stigma a black dot; before the two upper are usually two dark red-brown, rather triangular spots; subterminal line yellowish; margin with blackish-brown dashes. Hind wings yellowish, dusted with blackish-brown, cilia yellow. All vary extremely in distinctness of markings; in many, females especially, all the markings run together, and consequently some might easily be taken for another species. Some specimens are but little larger than *Miana strigilis*." These were obtained on the Riesengeburge, a range of mountains in Silesia, and some of them were taken flying in the daytime or sitting upon flowers. The description seems to me undoubtedly to refer to the small blunt-winged, hill-frequenting forms, except that the antennæ cannot be said to be strongly pectinated. This view is confirmed by Freyer's figure, also by that of Duponchel, and by Heinemann's description of *conflua*, each of which obviously agrees with the hill form, while the specimens in the National Collection, from Silesia, are all of the same variety. There are in the same collection, under the same name—*conflua*—two specimens which agree well in shape with the peculiar Shetland specimens, but are of a much paler colour. These were obtained more than forty years ago from Herr Becker, and although provided with a number which establishes this, have no label indicating the locality whence received nor the captor, but it may be safely assumed that they were obtained on the Continent, and that other localities for this variety exist, and only require searching out. Iceland has been suggested as the home of this form as well as Norway, but all the Icelandic specimens of which I have any knowledge, whether taken by Dr. Staudinger or Dr. P. B. Mason, are clearly of the more typical *conflua* form, as

found on the hills; and the same may be said of the few available Norwegian specimens. Staudinger says that it is abundant in Iceland, that it may sometimes be found in the daytime on the blossoms of thyme and other plants, that it flies strongly in the evening, and that it is variable in size—down to one inch expanse in the female—and more than in Silesia in colour, some specimens being even greenish-yellow, and one female nearly black. Of this form, as found in the original Silesian locality, Speyer says that it is now recognised as merely a small race of *N. festiva*, and this statement is confirmed by Drs. Staudfuss, Wocke, and Rössler. With their view one cannot but concur. On the other hand, Zetterstedt's description of the variety *borealis*, from Lapland, strongly suggests the presence in that country of the Shetland form. The race, in spite of its own considerable variation, is so well marked that a varietal name is perhaps desirable and convenient. If so, *borealis*, Zett. is suitable. In its various forms—*festiva*, *conflua*, *borealis*, and many more (but less necessary) names, this species is found throughout Northern and Central Europe, North Italy, Livonia, the Ural Mountain district, Western Siberia, Labrador, and Canada, and probably in the more northern portions of the United States, since the type of *Agrotis perconflua*, Grote, in the British Museum, appears to be a variety of the present species with a stronger purple tinge than usual.

For unwearied assistance in working out the localities and history of the forms of this species, I am deeply indebted to Mr. W. F. Kirby; and indeed this gives me an opportunity of acknowledging his unvarying kindness, and that of other officers of the British Museum—Dr. A. G. Butler, Sir G. F. Hampson, and Mr. Charles Waterhouse.

13. **N. sobrina**, *Gn.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings short, rather broad, with truncate hind margin; unicolorous, deep purple-brown, with a faint hoary bloom; hind wings brownish-grey.

Antennæ of the male threadlike, faintly ciliated, reddish; palpi densely tufted, and, with the head, rich purple-red; collar paler purple-red; rest of the thorax reddish mixed with ashy-grey, the long scales drawn together at the back to points of a brighter red, which indicate a flattened crest; fascicles smoky-white; abdomen smoky-grey; the basal segments covered with long, loose, smoky-white hair-scales; lateral and anal tufts purplish-red. Fore wings short, broad behind, the costa gently rounded; apex bluntly angulated; hind margin below it nearly perpendicular, but slightly rounded off at the anal angle; dorsal margin faintly rounded; colour glossy deep purple-brown, suffused from the base with ashy-grey, under which the very faint markings are rendered so obscure as only to be visible in certain lights, indeed they are hardly more than lines of ground colour in the ashy-grey bloom or frosting; when visible—basal line slender, angulated, abbreviated, dark-red brown; first line of the same colour, slender, curved, and indented; second line brown, much curved from its origin on the costal margin, then becoming more direct, but indented throughout into long dark points on the nervures; subterminal line a slender, faintly-yellowish cloud; orbicular stigma large, reniform normal, but with a blackish cloudy spot in its lower portion, both indicated mainly by their reddish, incomplete margins; cilia purple-red. Hind wings rather ample, having a slight hollow in the hind margin below the apex; shining brownish-grey with browner nervures; cilia pale purplish red, brighter at the apex. Female very similar.

Underside of the fore wings smoky-grey, with the apical and hind marginal spaces purple-red and the costal margin very narrowly of the same colour; beyond the middle is a blackish dash from the costa, indicating a transverse stripe. Hind wings glossy white, dusted with grey, and broadly clouded along the costal margin and cilia with purple-pink; central spot small, blackish; beyond it a slender, cloudy, blackish, transverse stripe, curved and indented. Body and legs purplish-brown.

Extremely constant in colour and (absence of) markings.
On the wing in July and August.

LARVA plump and cylindrical, much rounded behind, tapering at the anal segment, and from the second to the head, which is small, shining brownish-ochreous, with two black dots in front of each lobe; ocelli black; body soft and velvety, reddish or red-brown, slightly mottled with grey; dorsal markings almost linear, widening a little, but narrowly lozenge-shaped near the end of each segment, and having on this widest part a round pale spot of dirty ochreous; a slight indication of the usual transverse marking is faintly visible on the twelfth segment, and more faintly still on some of the others; sides of the body much mottled with grey atoms, more especially along the spiracular region; on the hinder portion of each segment is a round, pale spot, though less noticeable than that on the dorsal marking; subspiracular stripe and ventral surface pale pinkish ochreous-brown, the latter paler; usual raised dots most minute, black; spiracles black. Another variety is of a deep brownish ochreous-pink, freckled and mottled with grey and pale flesh colour.

When very young the head is shining blackish-brown; body purplish-brown, darkest on the back, and with a plate of darker brown on the second segment; as it grows it becomes of a brownish-olive colour, and gradually assumes the adult colouring, taking shades of crimson-brown and chestnut as it progresses. (Condensed from W. Buckler).

August or September to June, on heather, birch, bilberry, knot-grass, grass, and other low plants; hibernating when very small; feeding at night.

PUPA undescribed—subterranean.

The moth comes readily to sugar at night in its very restricted localities; also to heather-bloom, the flowers of grasses, and occasionally to tansy-blossom. Excessively local, and restricted mainly to mountain districts, from 700 feet

above sea-level upwards, in the Rannoch, Breadalbane, Glen Artney, and other mountainous districts of Perthshire, and also in those of Aberdeenshire, where within the last few years, and notably in 1889 and 1890, it seems to have become more widely distributed and common. So far as I can ascertain it has, as yet, only been found in these two Scottish counties, but it is difficult to believe it absent from other mountainous parts of Scotland. It was first discovered in Perthshire, about the year 1853, by that pioneer of travelling collectors, Richard Weaver. There is no sufficient reason to believe that it has ever been met with in England, Wales, or Ireland. Abroad it is found in mountainous districts in Central Germany, Switzerland, and Central Russia; and—in a larger, rather greyer local variety—in the Pyrenees, Lapland, Finland, and the Altai Mountains.

14. **N. subrosea**, *Steph.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings broad, ample, truncate, pale brownish-purple; a darker stripe before the hind margin; orbicular stigma oblique, imperfect, indistinct, preceded and followed by a dark spot hind wings whitish with a submarginal grey band.

Antennæ of the male decidedly pectinated with slender, solid, ciliated teeth, which diminish to mere notches toward the tip; light brown. Palpi tufted, dark brown, the third joint long, pale at the tip; head strongly tufted, dark chestnut but between the antennæ pale pinkish-brown; collar similar, dusted along the edge with light brown; remainder of thorax pale pinkish-brown; the long scales drawn together at the back into faint crest-like knobs tipped with chestnut; fascicles extremely pale purplish-brown; abdomen shining, whitish-brown dusted with browner; lateral and anal tufts reddish. Fore wings broad; costa distinctly rounded; apex angulated; hind margin nearly perpendicular, slightly rounded; dorsal margin nearly straight; colour pale purplish-brown or brownish-pink; basal line limited to two small chocolate streaks; first line very indistinct, direct, slightly

oblique, faintly curved and indented, purple-brown edged with whitish; second line rather oblique but broadly curved back to the costa, purple-brown edged with whitish, but completely composed of scallops with rather long points on the nervures; at the origin of each of these lines, on the costa, is a blackish spot, and beyond these four yellow costal dots; subterminal line hardly perceptible but parallel with the second line, and defined by an internal edging of purple-grey clouds which usually form a band darker than the remainder of the wing; orbicular stigma narrowly ovate and oblique, purplish, obscurely edged with chocolate except toward the costa, where it unites with a broad faintly paler sub-costal stripe; reniform stigma hardly perceptible, clouded with white and edged faintly with brown; no claviform stigma; space in the discal cell before the orbicular, occupied by a wedge-shaped chocolate or purple-brown spot; between the bases of the orbicular and reniform is a short straight dark purple-brown streak or dash; these two markings being the most distinct on the wing; space from the subterminal line to the hind margin dusted with pinkish-grey or purple-brown, forming a faint cloudy band along the margin; cilia purple-brown. Hind wings rather long and ample, white dusted with pinkish-grey, especially along the hind margin, where is a faint greyish cloudy band; central spot smoky-grey; cilia dirty white clouded with grey.

Antennæ of the female simple; fore wings scarcely so broad, rather frosted with hoary-grey; hind wings hardly so long as in the male, central spot more distinct; otherwise similar.

Underside of the fore wings very glossy, pale brownish-pink, tinged in the middle with smoky-brown, and having a faint indication of a darker transverse band beyond; hind wings shining white, nervures and costal margin dusted with pink; body and legs dull reddish.

Slightly variable in the intensity of the ground colour and in the consequent distinctness of the markings. A specimen

in Dr. Mason's collection is of unusually large size; its fore wings deep rosy-purple tinged with brown and grey, the clouding before the hind margin forms a conspicuous dark purple band, and the stigmata are both distinctly pale; its hind wings are also strongly clouded with grey-brown before the hind margin.

The rosy-purple or purple-brown colour seems to be a characteristic of British specimens; those obtained from Livonia and Finland, where the species still occurs, being of a pale lilac-grey or purplish-grey, sometimes almost tinged with bluish, hence the varietal name *sub-cærulea*, Staud.

Formerly on the wing at the end of July and in August.

LARVA very pretty; greyish flesh-colour, striated and marbled with brown, with the vascular (dorsal) and subdorsal lines somewhat large, clearly defined, continuous, straight, and of a citron yellow speckled with brown, the latter speckled on the lower part with reddish-yellow; the stigmatal (spiracular) line is very large, of a pale sulphur-yellow, and surmounts a deep brown ventral band; stigmata (spiracles) brown; head concolorous, with two dark marks. (Guenée.)

By great good fortune this description was noted down by M. Guenée from larvæ sent to him about fifty years ago, by the late Mr. H. Doubleday, otherwise it is doubtful whether any record of their appearance would have been preserved. Mr. Doubleday added that this larva very closely resembled that of *Hadena pisi*. A full description has been given by Herr Carl Berg of the larva of the variety of this species which is found in Finland, from examples found by himself near Riga. His diagnosis is "grey-brown with a tinge of violet; three pale violet-grey dorsal lines, and one sub-dorsal line of the same colour; spiracular line sulphur-coloured; head chestnut-brown; second segment ferruginous; anal segment violet-grey; legs cinnamon coloured." His full description is too long for transcription here.

May, June, but doubtless from September, and hibernating

young. On *Myrica gale*, sallow, and willow. Carl Berg discovered larvæ on *Andromeda polifolia*; and found that they would eat various species of willow—*Salix fragilis*, *S. alba*, and *S. rosmarinifolia*. The late Mr. F. Bond informed Dr. F. D. Wheeler that the larvæ which he found at Yaxley were feeding not only upon *Myrica gale*, but also upon dwarf sallow, and willow; and he particularly remarked that he took many upon the pollard willow trees bordering the roads through the fen.

PUPA rather compressed; pale brown. (Carl Berg).

The moth is not now known to occur anywhere in these islands. About 1837 it was discovered at Yaxley Fen, Huntingdonshire, by Richard Weaver, and was taken in plenty. Specimens in Dr. Mason's collection are labelled "Taken by Weaver in 1838." No further record appeared of it for some years, but about 1846 Mr. Doubleday sent Mr. English to Whittlesea Mere, Cambs., and Yaxley Fen, where he found it commonly. The next year Mr. Bond visited the spot, and found the insect in profusion, taking it at both sugar and flowers; and in the following spring he obtained larvæ in plenty, as also did Mr. Doubleday. I find no subsequent record of its capture there. Apparently the numbers captured and reared were sufficient. Certainly all those which represent the species in our collections appear to have been secured at that time, including magnificent series in Mr. Doubleday's cabinet at Bethnal Green Museum, and in Mr. Bond's collection, now in the possession of Mr. Sydney Webb. In 1851 these fens were finally drained, but no suspicion seems to have been felt of the destruction of the moth, which must have died out either immediately or gradually, but quite unnoticed. When more recently search was again made, it had quite disappeared. There is no record that it has ever been seen in the other Cambridgeshire fens, nor in those of Norfolk. Hopes have long been cherished—but hitherto disappointed—that it may still exist in some secluded spot.

Abroad, as already stated, it is only known to occur, in the variety *subcærulea*, in Finland and Livonia.

15. **N. baja**, *Fab.*—Expanse $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings broad with arched costa, not truncate, dull brown with a reddish flush, a dark central transverse cloud, and before the apex a triangular black costal spot. Hind wings grey-brown with reddish cilia.

Antennæ of the male simple, thickly but minutely ciliated, light brown; palpi broadly tufted, chestnut-brown, pale brown in front, apical joint short; head and collar pale ashy-brown, the latter edged with grey which is divided by a paler line; remainder of thorax red-brown or purplish-brown, with small crests at the top and back; fascicles smoky-reddish-grey; abdomen thickly covered with dull smoky-brown scales; lateral tufts small, anal tuft large, all purplish-chocolate. Fore wings broad, especially so behind; costa rounded; apex squarely angulated; hind margin below it perpendicular but curved off below the middle; anal angle full; dorsal margin straight; colour purple-brown or red-brown or pale purplish-brown, much dusted in the basal half with ashy-grey; basal line double, curved, abbreviated, reddish-brown; first line also double, but very faint, composed of a double series of obscure curves or dashes; second line curved broadly outward, and very indistinct, composed of faint dark brown streaks; outside it is a faint, parallel, cloudy line, running through a series of black dots situated on nervures, each dot followed by a second, smaller and more obscure; subterminal line undulating, faintly yellowish-brown; costa spotted with dark brown at the origin of the transverse lines, having a black dot over the reniform stigma, some yellow dots beyond; and a conspicuous black triangular spot before the apex, which last is the most noticeable marking on the wings; orbicular stigma indicated by a yellowish ring; reniform similarly edged, filled in with dark brown which shades into black in the lower portion; between the stigmata is a cloudy

brown shade crossing the wing; cilia concolorous. Hind wings broad and ample, smoky-brown; nervures darker; cilia purplish. Female quite similar.

Underside of the fore wings smoky-black, shading to purple at the costal and hind margins; reniform stigma visible as a black spot, and beyond it a blackish transverse line most visible on the purple costa. Hind wings whitish, dusted with grey, with the front margin broadly purplish-red; central spot large, lunate; beyond it a blackish, curved, and re-curved stripe, and the nervures dusted with blackish; legs dark brown; leg tufts and abdomen dull brown tinged with purplish; anal tuft bright purple-red.

Variation very slight, except the general range of ground colour, already mentioned, from reddish-brown to purple-brown, or even purplish-drab; but occasional specimens are very pale in colour, or have pale transverse lines; in other instances the usually obscure markings are more distinct. In Mr. W. H. B. Fletcher's collection is a specimen in which the subapical black triangle is broken up into three black wedges, from which the wing is crossed by a row of black dots. Mr. P. M. Bright has a singular variety from Scotland, very dark red-brown with pale transverse lines.

On the wing in July and August.

LARVA rather plump; head slightly retractile, globular, and shining, rather narrower than the second, and very much narrower than the third segment; body cylindrical, rather obese; the segmental divisions distinct, and the skin soft and smooth. Ground colour dirty ochreous-brown tinged with red, in some specimens the red being much stronger than in others, especially on the dorsal surface; head pale brown, with a conspicuous dark brown mark on each lobe in front. A narrow yellowish line edged with smoke colour forms the dorsal line; subdorsal lines also yellowish; these and the dorsal are very much interrupted, and very conspicuous only on the second segment, where they are much broader and

nearly white; there are no perceptible spiracular lines; the subdorsal lines are surmounted, on each segment from the fourth to the twelfth, by a small yellow triangular mark, the apex of which points toward the head, and these yellow marks are bordered above with rather broad, smoky, oblique streaks, which appear to meet on the dorsal line, each pair forming a V-shaped mark, the apex pointing backwards; those on the eleventh and twelfth segments are, however, much larger and blacker than the rest, and take the character of distinct marks almost obliterating the yellow spots beneath them; a broad, dull reddish band extends along the spiracular region, and the space between this and the subdorsal line is variegated with smoke colour; spiracles and raised dots black; ventral surface and prolegs dirty greyish-ochreous and semi-transparent; legs shining pale pinkish-brown. (G. T. Porritt). Very variable; Mr. Buckler's figures are red-brown, grey-brown, greenish-grey, dark chocolate, and light red-brown striped with yellow and lilac; markings also variable.

September to April or May, on rose, bramble, dock, primrose, and low plants generally in the autumn; in spring upon sallow, hornbeam, bramble, birdcherry, hawthorn, and blackthorn, feeding on the young shoots. Feeding whenever the weather is mild throughout the winter.

PUPA undescribed; subterranean.

The moth hides in the daytime, like its congeners, among dead leaves or herbage on the ground, under thatch, or in any sufficiently secluded corner. It flies at dusk, and comes freely to sugar on trees, less frequently to ragwort and tansy-blossom, and to light. Most plentiful in woods and well-wooded districts, and apparently common throughout England; probably less so in Wales, and I have not seen it in Pembrokeshire. In Scotland it seems to be found in every district to Moray and the Hebrides, but not in Orkney or Shetland. In Ireland it is generally distributed, and in many parts common. Abroad it is common throughout Central Europe,

the temperate portions of Northern Europe, Northern Italy, the Ural Mountain district, and Western Siberia; also in the Northern United States and Canada.

16. **N. rubi**, *Viewig*, **bella**, *Bkh.*—Expanse $1\frac{1}{4}$ to $1\frac{3}{8}$ inch. Fore wings short and rather oblong, truncate behind; purple-brown, with darker transverse stripes and yellowish stigmata; between them a square dark spot; hind wings whitish-grey.

Antennæ of the male rather notched, each notch surmounted by a minute tuft of bristles; apical portion threadlike; colour reddish-brown; palpi dark purple-brown at the sides, reddish in front; head and thorax purple-brown; collar rather raised and faintly edged with paler brown; at the back of the thorax is a very slight crest of drawn-together scales, often not perceptible; fascicles greyish-white; basal segments of the abdomen densely covered with long smoky-white scales, remainder glossy smoky-brown; lateral and anal tufts purple-red. Fore wings short and truncate, even somewhat rectangular; costa straight; apex bluntly angulated; hind margin straight and hardly oblique, but slightly rounded off at the anal angle; dorsal margin nearly straight; colour glossy purple-brown; basal line faintly perceptible, double, abbreviated, blackish; first line also faintly blackish, hardly perceptible, but duplicated and rather perpendicular; second line also double, blackish, very erect and but little curved, the outer duplicate line the more distinct, and often broadened into a dark stripe; subterminal line nearly parallel with it, undulating, very pale reddish, edged outwardly by a deeper purple-brown transverse stripe which occupies the hind marginal space; nervures beyond the middle faintly dashed with yellowish and smoky-black; orbicular and reniform stigmata rather conspicuous, pale yellow, partly filled up with reddish clouding; between them is a squared deep purple-brown spot, and from it in some cases a faint central transverse shade; claviform stigma indicated by an obscure yellowish spot tipped with black; cilia concolorous. Hind wings pale

grey-brown, streaked or clouded with whitish toward the base; cilia pale purple. Female similar, often having the transverse lines and stripes more accentuated; antennæ simple; abdomen pointed, hardly tufted.

Underside of fore wings dull smoky-black shading to pale purple along the costa and hind margin, with indications of two transverse smoky stripes beyond the middle; hind wings shining, whitish, dusted, especially on the nervures, with grey; costal margin broadly pale purple; central spot small, blackish; beyond it is a faint indication of a slender blackish transverse line; cilia purplish. Variation very slight, and mainly in the depth of the ground colour; but there is a slight dimorphism, the earlier brood being of a brighter purple-brown, the later smaller in size and usually darker in colour. There is also a tendency toward darker colouring in the northern and western portion of its range, and the spot between the stigmata becomes sometimes black.

On the wing in June, and as a second generation from the end of August through September, and occasionally into October.

LARVA rather stout; head somewhat flattened in front, but with the lobes rounded, slightly narrower than the second, and considerably narrower than the third segment; smooth and shining, of two shades of wainscot-brown; body cylindrical, but distinctly tapering towards the head; segmental folds distinct, but not very conspicuous; skin soft and smooth; ground colour pale olive-brown freckled with darker brown; a smoky-brown pulsating line intercepted through its centre by a distinct pale line, forms the dorsal stripe; sub-dorsal lines pale, edged above and below with smoky-brown; and a pale line extends along the spiracles, edged above with smoky-brown, and below with a broad pale yellowish-brown stripe; spiracles distinct, black; ventral surface, legs and prolegs semi-translucent, dingy yellowish-green, freckled with minute brown dots. (G. T. Porritt). Variable in ground

colour, Mr. Buckler's figures range from pale brown to dark grey-brown, almost slate colour.

September or October to March or April, and a second generation in July and the beginning of August; on dock, lettuce, chickweed, grass, heather, and probably low-growing plants generally.

PUPA smooth, shining red, in a slight cocoon among leaves or rubbish at the surface of the earth, or beneath it.

The moth hides itself in the daytime very closely at the roots of grass and low plants, but flies vigorously at dusk and is much addicted to composite flowers, especially ragwort and tansy; also to rush blossom, bramble blossom, and other flowers; and strongly attracted by sugar, honeydew, and by light, being sometimes plentiful at suburban gas-lamps. It has also a curious fancy for sitting at night upon the leaves of tall masses of reed, and is generally much addicted to fens, marshes, damp woods, and meadows. Abundant in such situations throughout the South, East, and West of England, including the Scilly Isles; also in many parts of the Midland counties, and occurring in smaller numbers throughout the Northern counties. Common in Wales—very so in Pembrokeshire. Found in almost every province of Scotland—even common in Ross-shire and extending to the Orkneys, but not recorded from the Hebrides and apparently absent from Shetland. In Perthshire it has been found to ascend the hills to 600 feet above the sea-level. In Ireland it is rather local, but plentiful where it occurs—found near Dublin, in Louth, Wicklow, Cavan, Monaghan, Galway, Sligo, Tyrone, Armagh, and Antrim. On the Continent it appears to be confined to more southern districts, since it is found throughout the greater part of Central Europe, and also in the Ural Mountain district. In North America—under the name of *N. rosaria*—it is recorded from British Columbia, California, and Colorado; and if, as seems probable, *N. rubifera*, Grote,

is merely a slight variety, it extends through Canada and the northern and eastern United States.

17. **N. umbrosa**, *Hüb.*—Expanse $1\frac{1}{2}$ inch. Fore wings rather oblong; purplish-brown with distinct, slender, darker transverse lines, and the nervures distinctly dark-brown; hind wings whitish, broadly margined with greyish-brown.

Antennæ of the male notched and very faintly pectinated with minute tufts of bristles arising from the notches, light-brown; palpi densely tufted, deep chocolate-brown at the sides, paler in front, apical joint very short; head and thorax rather pale umbreous with a decided purplish tinge; collar faintly barred with darker brown; scales at the back very slightly drawn together to a hardly perceptible crest; fascicles dusky white; abdomen pale reddish-brown, basal portion abundantly clothed with long reddish-white scales; lateral and anal tufts pale purplish. Fore wings oblong, rather broadened behind; costa very slightly rounded; apex bluntly angulated; hind margin almost perpendicular but very slightly rounded—more so toward the anal angle; dorsal margin almost straight or very faintly hollowed; colour pale purplish-umbreous; basal line abbreviated to a dark brown streak from the costa; first line distinct, slender, indented, dark brown; second line curved but not widely so, slender, single, distinct, dark brown; subterminal line hardly perceptible, yet forming a sharp boundary between an inner dark smoky-brown, indented and clouded transverse stripe, and an outer, paler smoky-brown marginal stripe; nervures distinctly dark brown throughout; orbicular stigma round, distinct, rather paler than the ground colour, ringed with dark brown; reniform stigma distinctly edged on both sides with dark brown, its inner edge obscured by a rather conspicuous, smoky-brown, cloudy central shade, which is once angulated, but completely crosses the wing; cilia concolorous. Hind wings smoky-white, more whitish toward the base, greyish-brown toward the hind margin, sometimes forming there a

dark cloudy band ; cilia whitish tinged with yellowish-purple. Female with threadlike antennæ, hind wings more uniformly smoky grey-brown, otherwise very accurately similar.

Underside of the fore wings smoky-black, shading into purple on the costa and hind marginal region ; beyond the middle are two blackish transverse stripes, the outer indistinct ; hind wings white, broadly dusted along the costal region with light purplish-pink, along the hind margin with the same and also blackish in small clouds ; before this is a slender blackish transverse undulating line ; body and legs reddish-brown, tufts brighter red.

But very slightly variable—the transverse lines are sometimes less distinct, and occasionally the central shade is obsolete.

On the wing in July and August.

LARVA moderately stout and cylindrical though tapering a little in front, the head being smallest, the last segment also sloping down on the back from the twelfth, and tapering a little to the extremity. Head very shining, pale brownish, freckled with darker brown and streaked with brown on the front of each lobe ; skin generally smooth and rather velvety, though a little shining on the back of the second segment ; dorsal line whitish-ochreous, edged with a dark brown line on each side, it is not quite a simple line, but commencing broad on the front of each segment, soon narrows, expands again just at the middle, again contracts, and widens again at the end ; the subdorsal line is of uniform thickness throughout its course, whitish-ochreous, edged on its lower side by a fine dark brown line, and on its upper side by a wider brown stripe bearing a black dash, sometimes rather of a wedge-shape, on the anterior half of each segment ; the ground colour of the back between these lines is ochreous or brownish, marked with fine, longitudinal, dark brown wavy streaks which are variously disposed in their aggregation, sometimes suffusing the ground colour in a narrow diamond form, in

other examples more suffused behind, but generally these streaks give more depth of colouring at the anterior part of each segment; on the sides filling the space down to the spiracles are two longitudinal broad stripes of equal width throughout, the upper pale ochreous, sometimes with a few scattered brown freckles, the lower dark brown, containing an oblique dash of darker brown atoms; spiracles small, dirty white, outlined with black; subspiracular stripe clear pale ochreous, a little attenuated at each end; undersurface and legs deeper ochreous, the latter dotted and tipped with dark brown.

Very like the larva of *N. xanthographa*. The colour varies in each brood, some of the larvæ being yellowish, some brownish, and others of a greyish-brown; but in the details of their markings they are very constant.

The young larva when hatched has a pale brown head and greenish-grey body, paler and pellucid at the segmental divisions. In a week it has a suffusion of opaque brown over the back and sides, giving it a velvety brownish-green look, and the lines appear somewhat paler except along the spiracles, where is a darker stripe of the ground colour. So long as this colouring continues, it is readily distinguishable from that of *N. xanthographa*; but as it grows the mature and more imitative colouring is assumed. (Condensed from Mr. Buckler.)

August to May, on dock, plantain, bramble, strawberry, wild hyacinth, *Scrophularia*, *Galium mollugo*, *Vinca major*, and herbaceous plants generally; feeding through the winter whenever the weather is mild.

PUPA half an inch long, stout, smooth, rather shining, dark brown. In moss or in the earth, with hardly any indication of a cocoon.

The moth conceals itself among herbage during the day like its allies, flies freely at dusk, is not very fond of sugar, but is strongly attracted by the flowers of rush, ragwort, and

tansy; indeed it is a constant companion of the second generation of *N. rubi* at the ragwort bloom, inland as often as on the coast; where the limes blossom late it also greatly affects their flowers, and in the fens loves to sit on the leaves of the tall reeds at night or to attend the honey-dew on the sallow bushes; also freely attracted by a strong light. It especially frequents damp meadows, damp woods, marshes, fens, and boggy hollows, and in such situations is common in most parts of England, though it is said to be scarce in Dorset, and I find no record of its occurrence in Cornwall. Moreover, it seems almost to have deserted the London suburbs, where formerly it was common; probably also common throughout Wales, since it is frequent in Pembroke-shire. Very frequent in the South of Scotland, and on the Eastern side extending northward to Morayshire, but apparently absent from Argyle and from the Scottish Isles. In Ireland common and widely distributed, extending to Donegal and Londonderry. Abroad it seems to be somewhat local, but is found in Central and Northern France, Holland, Belgium, great part of Germany, and the north of Italy.

18. *N. xanthographa*, *Fab.*—Expanse $1\frac{1}{4}$ to $1\frac{3}{8}$ inch. Fore wings oblong, rather broad behind; pale brown, drab, red-brown, or dark brown; stigmata usually yellowish; hind wings whitish bordered with grey-brown.

Antennæ of the male rather stout, simple but densely ciliated with minute hairs, dark brown; palpi broadly tufted, pale chocolate, paler in front, terminal joint short; head and thorax red-brown, grey-brown, purplish-brown, umbreous, or brownish-drab, always agreeing in colour with the fore wings; collar rather erect; at the back of the thorax is a small crest of long scales drawn together into tufts; fascicles dusky-white; abdomen dull smoky-brown, whitish-brown, or grey-brown; lateral and anal tufts similar. Fore wings short, rather oblong but broadened a little behind; costa very faintly rounded; apex and hind margin also rounded and the latter

so full as to project beyond the apex; dorsal margin nearly straight; colour red-brown—paler or darker,—umbreous, grey-brown, drab, blackish-brown, and all intermediate shades; basal line reduced to a short blackish streak close to the base of the costa; first line indistinct, blackish, hardly oblique, composed of three flattened curves; second line, when visible, slender, faintly blackish, gently curved, closely followed by a far more distinct line of black dots, which in some examples unite with the line upon the nervures and so form a succession of crescents; subterminal line indistinct and irregular—a mere series of cloudy yellowish dots, preceded by a more distinct dark brown transverse shade; on the costa is a black dot, or pair of dots, at the origin of each line; orbicular stigma rather small, round or ovate, yellowish when distinct, otherwise of the ground colour, faintly edged with black; reniform stigma much squared, yellow, or else of the ordinary shape and almost of the ground colour; the space between these stigmata is darker than the ground colour, and originates a cloudy darker central shade; cilia concolorous but clouded with more smoky colouring. Hind wings not very ample, rounded behind, white or greyish-white with a bright gloss, the nervures faintly brownish, and often a smoky-brown cloud along the apical and hind margins, which sometimes takes the form of a distinct submarginal band; cilia white. Female with antennæ threadlike, the thorax and fore wings taking similar variations in colour, but the central shade of the fore wings is usually darker, the stigmata more obscure, and the reniform seldom squared or filled up with yellow; hind wings darker, often dark smoky-brown with only the base white, not banded.

Underside of the fore wings reddish-grey shading to white along the dorsal margin, but suffused with a brilliant golden gloss; cilia very dark; hind wings greyish-white heavily dusted with reddish along the costa, more faintly with smoky-grey along the hind margin; body dull brown; legs reddish-brown or dull brown.

Always and everywhere variable, as already shown, the commoner forms in the south being some shade of red-brown, pale brown or drab; in some north-western districts, particularly the North of Ireland, deep dark brown, and in the Scottish Isles bright red-brown. In some specimens in all shades of colour the stigmata are both bright and distinct, in very many the reniform is so, but in other cases, even in the palest specimens, these are obscured or even imperceptible. When they are present the intermediate spot varies from red-brown to black, and where this is dark there is often a blackish cloud outside the reniform stigma, and a blackish-brown costal triangle before the apex. I have one specimen from the North of Ireland of a pale drab with very little trace of either stigma, but having the first and second lines and the attendant dots very prettily distinct. Others from the same district are of a light brick-red, and of the usual dark brown forms of that country many are almost devoid of markings of any kind, and are not always easy to recognise. Some examples from Durham are almost black; from Yorkshire they range from rich red to black-brown; some from Shetland are of very coarse texture of scales and of a deep black-brown with a gloss of reddish and distinctly yellow stigmata. Others from the East of Scotland uniform smooth black-brown, almost black, but scarcely showing the stigmata. Some of the red forms are totally devoid of the transverse lines, while in others they are very conspicuous; and every variety seems to be connected with the rest by all possible intermediate gradations. Mr. F. J. Hanbury has taken specimens at Shoeburyness, outside the mouth of the Thames, of a pale greyish-drab, almost greyish-white and with the hind wings pure white, a very unusual form, yet such another has been obtained in Perthshire. Mr. W. H. B. Fletcher has an example in which the orbicular stigma is elongated into a long wedge-shaped spot. The hind wings in the male vary from pure clear white to forms having a strong grey-brown hind marginal band.

On the wing in August and the beginning of September.

LARVA moderately stout, cylindrical, but tapering very slightly in front, and with the head smaller than the second segment; glossy pale brown, rather transparent, with two dark brown curved stripes down the lobes, and the outer sides slightly reticulated with the same; body smooth and velvety, pale brown or pale purplish-brown; dorsal stripe pale yellowish-brown, margined on both sides with a clouding of darker brown; subdorsal stripe yellowish-brown, longitudinally divided, and from the fourth segment inclusive containing on each segment a longitudinal black streak thickened in the middle, the portion of the subdorsal stripe bounding these streaks on the underside is sometimes pale grey, in other instances pale yellow; a yellowish stripe lies along the upper side of the spiracles, which are small and black; undersurface and legs rather pale purplish-brown. Very similar to the larva of *N. umbrosa*, and when full grown not to be distinguished from it.

September to April or May. On grasses, plantain, chickweed, dock, primrose and other low plants, and after hibernation also on the young shoots of sallow, oak and other trees; feeding at night; hiding by day at the roots of grass and herbage, and under stones. It feeds up rather rapidly in the spring, but is said to lie in cocoon for a month or even two months before assuming the pupa state.

PUPA of ordinary form, shining red-brown. In a cocoon just under the surface of the earth, often at the foot of a tree.

The moth hides in the daytime among grass, herbage, dense bushes, anywhere under sufficient shelter, but usually close to the ground; it flies at dusk and is very conspicuous from the paleness of its hind wings. It comes to sugar in woods in extraordinary multitudes, covering the patch of sugar on every tree with its numbers; over a hundred are

sometimes seen on a single tree, and thousands in the course of a night. Every kind of sweet is attractive to it, ragwort and tansy bloom, even blossoms of dock and burdock; also honeydew and the sap of a wounded tree, and its numbers at heather bloom are sometimes so great that scarcer species are hardly noticeable. Light also exerts its usual influence, and indeed, while this species is out nothing else is so constantly in evidence. Apparently it is common throughout the United Kingdom, except perhaps in some of the Scottish Isles, as the Orkneys and Shetlands, where, though present, it is not plentiful. Abroad it seems to be confined to the European Continent, and rather to the Central, Southern, and Western portions than to the North, so that its general abundance in these Islands appears to be somewhat remarkable.

19. **N. neglecta**, *Hüb.*; **castanea**, *Staud. Cat.*—Expansion, $1\frac{3}{8}$ to $1\frac{5}{8}$ inch. Fore wings smooth pale drab or brick-red, without markings except a blackish spot in the lower half of the reniform stigma; hind wings dark grey-brown.

Antennæ of the male very shortly pectinated with small pointed teeth like those of a saw, each surmounted by a tuft of minute bristles and between which is also dense minute ciliation, light brown; palpi broadly tufted, dark chocolate on each side, pale brown in front; head and thorax pale brownish-drab or reddish-drab; collar faintly edged with light brown, crest at the back very faintly indicated; fascicles brownish-white; abdomen pale greyish-brown; lateral and anal tufts purplish. Fore wings oblong, rather broadened behind; costa gently rounded, but more so near the base and apex, which last is very bluntly angulated, almost rounded; hind margin also rounded and rather full, curved off a little toward the anal angle; dorsal margin faintly hollowed; colour pale drab faintly tinged with purple or red and almost devoid of distinct markings, but showing faint indications of an abbreviated red-brown basal line, a blackish dot on the costa

and one or two isolated reddish-brown streaks in the position of the first line, edged outwardly by a faint parallel shade; a faint succession of dusky black curves with dots at their points arising from another costal dot and indicating the second line; and a faintly yellow subterminal line, edged inwardly with a tinge of red or purple. The orbicular stigma is large but only indicated by its partially purple margin; the reniform rather more distinctly edged on both sides with purple and having in its lower portion a cloudy blackish blotch, which is really the only marking noticeable upon the wing without the aid of a lens; apex and hind margin faintly tinged with purple; cilia pale purple divided by a dark grey line, and more purple at the tips. Hind wings broad, with a sinuous hind margin which is twice hollowed toward the anal angle; dark grey-brown with a golden gloss; cilia light purple. Female with simple antennæ, otherwise accurately similar.

Underside of forewings glossy dark smoky-grey, costa narrowly, apex and hind margin broadly, pale purple; from the costa beyond the middle arises a slender, black, cloudy transverse stripe which quickly merges into the general dark colour. Hind wings dusky white, dashed with grey, and broadly toward the costal and apical regions with purple, the whole having a light golden gloss; central spot large, blackish, followed by a faint, slender, smoky-black transverse stripe; cilia pale purple. Body light purplish-brown, legs and leg-tufts darker purplish-brown.

Not very variable, except that a recurrent form is of a rich deep red or purplish-red, with the same paucity of marking. This form appears to accompany the type, rarely in the Southern counties, rather more frequently in the Eastern, and of a peculiarly deep rich colour in the Breck-sand district; very much more commonly in the North, where indeed it becomes predominant. It is this variety which has been named *castanea*. It is connected with the type by intermediate gradations—pale drab at the base, toning gradually

to purple-red at the apex and hind margin; browner drab with the whole surface tinged with red; or grey-brown with a reddish tinge, most strongly expressed at the margins—a curious colour. A local tendency toward creamy colouring is noticed in Salop, and Mr. F. C. Woodforde has specimens taken by himself near Market Drayton, which are of a most exquisite, smooth, creamy-ochreous. In Mr. W. H. B. Fletcher's collection is a specimen having the right wing purple-red and the left buff, it was obtained in Perthshire; another taken in the New Forest, Hants, of a pale reddish-grey, has the subterminal line sharply edged inside with dark brown; and specimens from Stornoway are of a very deep dark red. In Mr. R. Adkin's collection is an example from Scotland of the pale drab colour, but with the costa red, almost rosy, and a shading of the same over the costal region.

On the wing in August.

LARVA stout, rounded, compressed at the incisions of the segments and slightly tapering in front; head rounded and shining, reddish-brown with a darker brown streak on the inside of each lobe; body almost unicolorous, pale dull reddish or cinnamon-brown minutely dusted with grey, usual raised dorsal spots very small, whitish and inconspicuous; spiracular stripe broad, whitish, containing a pink shade; lateral spots blackish; under surface paler than the ground colour, with a greenish tinge; legs shining reddish-brown. When young, dull pale green dusted with grey; spiracular stripe white; head pale reddish-brown (C. Fenn).

A variety figured by Mr. Buckler is of a paler brown with double slender dorsal and subdorsal lines and the raised dots all black; another, full-grown, is of a rich green with a paler dorsal line.

September to May on heather and sallow, feeding at night, concealing itself by day.

PUPA smooth and extremely glossy, red-brown, edges of

wing-covers swollen, divisions of segments rather distinct, a rough edge of sculpture along the extreme front of each; hinder segments rather swollen, and the last suddenly rounded off; anal points very slender and straight, blackish, outside them two very minute points; subterranean.

The moth appears never to be taken in the daytime; doubtless it conceals itself effectually close to the ground. It flies at rather late dusk, but from the dark colour of its hind wings is not at all conspicuous on the wing. It is, however, strongly attracted by heather-bloom, and where that is not attainable, by ragwort blossoms, and may sometimes be taken at sugar and at light. More especially found on extensive heaths, and open woods bordering them. Very local in Kent, Surrey and Sussex, more frequent in Hants, scarce in Dorset, more frequent, though local, in Devon and Cornwall, but common in some seasons on Dartmoor; still local and more scarce in Somerset, Berks, and Oxfordshire, and also in the Eastern counties; commoner on the hills of the Midland counties and sometimes plentiful in North Staffordshire and Salop. Apparently found throughout Wales, and in the South of Carmarthenshire commonly, though in Pembrokeshire it is scarce. Local in Yorkshire, Lancashire, and Cumberland; but very much more plentiful on the mountain heaths of Scotland, where it is generally distributed at least to Morayshire, and found in the Hebrides and Orkneys. Much more uncommon in Ireland, but recorded from Kerry, Galway and Sligo. Abroad its range seems to be rather restricted, but it is found in Western Europe, Switzerland, Central and Southern Germany and other parts of Central Europe, and in North Italy.

Genus 8. **EUROIS.**

ANTENNÆ of the male threadlike or finely notched, naked or faintly ciliated; eyes naked, having stiff half-erect back lashes; thorax crested at top and back; abdomen with one

or more dorsal crests, often partially prostrate; fore wings rather ample, broadest behind and with the hind margin slightly crenulated; hind wings broad, dull coloured, vein 5 very faint, arising near the middle of the cross-bar.

LARVÆ cylindrical, smooth, rather stout; active. Feeding at night on low growing plants or shrubs.

PUPÆ subterranean.

A table of the four species may be useful:

A. Fore wings marbled, black and green. *E. herbida*.

A². Fore wings marbled, grey or black, and dusky-white.

E. occulta.

A³. Fore wings marbled, black and red-brown.

B. Basal half black-brown; reniform stigma large, tinged with red.

E. saturata.

B². Central band darkest; reniform stigma edged with white.

E. adusta.

1. ***E. herbida***, *Hüb.*; ***prasina***, *Staud. Cat.*—Expanse $1\frac{3}{4}$ to 2 inches. Fore wings green, with the base, hind margin, and central band marbled with black; transverse lines, costal spots, and twin spots near the apex and middle of the subterminal line, all black; hind wings dark smoky-brown.

Antennæ of the male simple, almost naked, dark brown; palpi tufted, black-brown at the sides, white in front, apical joint white tipped with black; face white, top of head more greyish; collar pale green or greenish-white, upper portion barred and margined with black-brown, shoulder lappets green, streaked or dashed with black; remainder of thorax crested on top and back, marbled brown and green, but the tips of the crests brighter brown, sometimes tawny; fascicles rather short, smoky-white; abdomen smoky-brown, basal portion covered with long smoky-white scales, among which on the basal segment is a short, fugitive dorsal crest or tuft, usually tipped with black; lateral and anal tufts small, smoky-brown. Fore wings elongated, broad behind; costa

well rounded, apex bluntly rounded, almost angulated; hind margin full, curved, not very oblique; dorsal margin nearly straight; colour bright light green, much marbled with black toward the base, the centre, and the hind margin; basal line short, forming two curves, black; space in the curves greenish-white; immediately beyond it is a duplicate line, the intermediate space also greenish-white; first line oblique, much indented, deep black, preceded by a fainter parallel line, the enclosed space greenish-white; second line not very oblique, black, much indented, followed by a more obscure partly parallel line with the greenish-white enclosed stripe, which expands above the middle, outside the reniform stigma, into a large greenish-white ovate blotch; subterminal line a series of irregular yellowish-green clouds edged inwardly with dusky-black, and just above the middle by a pair of deep black dots, at the costa terminating in a double deep black streak or spot before the apex; orbicular and reniform stigmata both large, greenish, edged with black and clouded with blackish or purplish-grey; claviform stigma broad, green margined with black, but frequently obscure or even obsolete; the space around these stigmata more marbled with black than elsewhere; on the costa, from the first to the second line, are five black spots; beyond these three pale green dots in a blacker edging, and the costa is otherwise much clouded with blackish-green; the nervures through the middle of the wing and in the hind marginal space are blackened, the latter broadly so; extreme hind margin edged with black lunules; cilia green, dashed with dusky-black. Hind wings broad, with the hind margin rather sinuous, smoky-brown, paler toward the base; cilia white. Female slightly stouter but quite similar.

Underside of the fore wings pale smoky-grey with a reddish tinge; reniform stigma large, smoky-black; from it a dark cloud runs through the discal cell; touching the stigma—bending in for that purpose—is a transverse blackish stripe; nearer the hind margin is another, similar

but straighter; hind wings whitish-grey tinged and dusted with red and black toward the costal margin and on the nervures; central spot small, blackish; beyond it is an undulating, slender, smoky-black transverse stripe, and before the hind margin a smoky-black cloud; cilia pale reddish-grey. Body whitish-brown dusted with red-brown, leg tufts paler, legs dark brown barred with dull yellow.

Not very variable, though the broad spaces of dark clouding toward the base, in the central area, and behind, are sometimes more or less pale and the surface consequently greener, till in some instances the green wing is only rippled with dark lines. But it is often difficult to decide the original shade of colour in a specimen which has been more than a few months in the cabinet, since fading commences very soon after death, first to paler green, then to yellowish, until at times the whole of the green surface has become yellow, or even in some parts pale orange. In South Yorkshire a handsome local race has the black marbling greatly intensified, the broad central band becoming especially black and nearly obliterating the stigmata. In the New Forest, Hants, the tendency seems to be towards exceptional paleness, and Mr. S. J. Capper possesses a specimen from that locality which, except the central band, is almost greenish-white. Among the Yorkshire forms are singular aberrations; one in the collection of Mr. G. T. Porritt has the costal half of the forewings green, the dorsal half reddish-yellow with the usual dark markings. Dr. H. H. Corbett has one with a large white blotch on the reniform stigma; another with a similar white blotch on the orbicular.

On the wing in June, in the Southern counties quite in the beginning of the month in forward seasons. In confinement a second generation is sometimes obtained in October, November, and December.

LARVA stout, rounded, slightly attenuated in front and thickened behind; head small, rounded and shining, reddish-

brown with a blackish dash in the middle of each lobe. Body dull earth-brown, much dusted with dark grey or black and with a very ill-defined series of darker grey, or dull black, dorsal diamonds; dorsal line threadlike, dull white; usual spots dark grey; subdorsal line white, very indistinct; spiracles conspicuous, white, each placed in a triangular blackish blotch; below them is a very pale brownish-ochreous spiracular stripe dusted with brown; undersurface and sides below the spiracular stripe of a slightly greener tint than the stripe itself, and dusted with brown; legs pale reddish-brown. (C. Fenn.)

July or August to April; though in confinement, with warmth, more rapid feeding up sometimes takes place, the larva becoming full fed in September or October. So far as I know, no attempt has been made to obtain eggs from moths produced from such untimely specimens. This larva feeds, at night only, upon knotgrass, dock, and other low plants, also on bramble, and in the spring upon the opening shoots of sallow. In the daytime it hides on the ground under fallen leaves or moss.

PUPA rather elongated, shining, anal extremity with a long, double hooked spike, bright mahogany-red; incisions of segments, dorsal shade, and anal spike dark grey or blackish. Subterranean, in a very fragile, silk-lined cocoon.

The moth appears to hide, in the daytime, among dead leaves on the ground; it is very rarely seen at that time. At dusk it flies vigorously and comes freely to sugar, settling down quietly, so that its capture is perfectly easy. At this time, when freshly out, it is an exquisitely beautiful insect. Almost wholly confined to woods and their near neighbourhood; and in such situations common throughout the South and East of England; less common in the West, being local in Devon, occurring mostly in the South of that county, and only recorded from one locality in Cornwall. Local in the other Western counties and in the Midlands; still more so

as it advances northwards, and in most years scarce in Cheshire, Lancashire, Yorkshire and Cumberland, though it has its abundant seasons. Probably the same is the case in Wales, since it was noticed in one season only while I was in Pembrokeshire, but was then fairly common. Very scarce in Scotland, but recorded from Roxburghshire, Ayrshire and Perthshire. In Ireland it seems to occur in all wooded districts and is recorded from Howth near Dublin, Wicklow, Cork, Kerry, Galway, Sligo, Westmeath, Cavan, Monaghan, Louth, Down rarely, and commonly at Enniskillen and in Tyrone. Abroad it has a wide range through Central Europe, North Italy, Southern Sweden, Livonia, the Ural Mountain district, Siberia, Eastern Asia, Canada and the United States.

2. ***E. occulta*, L.**—Expanse 2 to 2 $\frac{3}{8}$ inches. Fore wings slate-grey or black in various degrees, clouded with white; transverse lines broadly edged with paler; orbicular stigma large, conspicuous, oblique, greyish-white; hind wings smoky-black with white cilia.

Antennæ of the male very finely notched, and ciliated with minute tufts of tiny bristles, blackish-brown; palpi broadly tufted, dark smoky-grey mixed with white; head similar; thorax densely tufted, pale grey abundantly dotted with smoky-black; collar raised and distinct, shoulder-lappets much uplifted; top crest rather small, barred with black and tipped with white; back crest more conspicuous, mottled with white; fascicles small, dull greyish-white; abdomen dull pale smoky-brown, the basal segments covered thickly with pale mouse-coloured hair-scales, in which is sometimes a faint imitation of a dorsal crest; lateral tufts obscure; anal tuft rather long, tinged with light brown. Fore wings long and ample, costa gently curved throughout; apex angulated; hind margin rather oblique, elbowed slightly in the middle but hardly rounded; dorsal margin straight to near the base; colour pale grey marbled with black and with white; basal

line only indicated by double black streaks on the costa and median nervure, but enclosing a whitish line; first line double, nearly perpendicular, black, disposed in rows of crescents, the intermediate line or stripe dusky-white; second line more oblique but bent strongly back toward the costa, double, blackish, but obscure, the contained stripe, which is dusky-white, being far more conspicuous, the duplicate lines merely showing as crescents along its margins; subterminal line obscure, merely an irregular cloudy-white stripe, between which and the second line the broad space is darkened and ornamented with a series of long black ridges or forks; orbicular stigma large, oblique, white, open above and widening until it attains the costal margin, otherwise edged with a black line, reniform stigma large but obscure, edged with white but enclosed by a black marginal line; claviform stigma merely an indistinct black angulated streak; costa spotted with black; space between the stigmata also dull black, hind margin edged with black lunules; cilia grey, dusted with black. Hind wings ample, dark smoky-brown; nervures darker brown; central spot small, blackish; cilia pure white. Female stouter, otherwise quite similar.

Underside of the fore wings rather shining smoky-grey, paler at the margins; nervures a little blacker; discal cell occupied by long, mouse-coloured, rather prostrate hairs; reniform stigma visible as a blackish lunule; outside it is a curved, dusky, transverse stripe. Hind wings whitish-grey, with the nervures darker; costal region dusted with smoky-brown; central spot large, lunate, dusky-black, followed by a curved, blackish transverse stripe; hind margin clouded with dark smoky-grey.

In freshly emerged specimens, especially those of the typical grey colouring, there is sometimes a beautiful tinge of faint purplish-red disposed in large clouds in the paler spaces of the fore wings, especially beyond the reniform and claviform stigmata. This fades rapidly while the insect is still

alive, and indeed, so far as I know, has only been observed in those reared in confinement; in a series reared by Mr. Robert Adkin in the autumn and winter of 1894, this colouring was especially noticeable. In specimens which are now emerging in his cages (October 1896) no such tendency seems to be observable, but these are of a brilliant black, with the transverse stripes broadly and conspicuously white. These last are from eggs laid by a black Scottish example, and in woods in the mountain districts of that country variation towards blackness of marbling, with grey or white lines and shades is very general, every conceivable gradation from the typical grey to deep black being found, but in almost all, the whitish colour of the transverse stripes, of the orbicular stigma, and the edging of the reniform stigma is maintained. This black variety seems to occur very rarely in the North of England, but one specimen has been taken by Mr. J. Gardner near Hartlepool, Durham. On the other hand, normal grey forms are found, in company with the darker varieties, at Cromarty and elsewhere in the North of Scotland, and the only specimen which has been found in Shetland is precisely like an English example. The only one taken in Ireland which I have seen is of a curious chalky-white colour with grey clouding. It was secured near Londonderry by Mr. F. V. Campbell.

On the wing at the end of June, and in July and August. In the year 1869 several were captured in the South of England, from the end of August to the middle of September. By feeding larvæ in a warm room a second generation can, without difficulty, be obtained, the moths emerging from September to December.

LARVA stout, cylindrical, but slightly enlarged behind, and tapering a little toward the head; on the second segment is a dull horny plate; head rounded; skin soft and shining. Colour purple with a greyish tinge, irrorated with greyish-white; dorsal and subdorsal lines white, interrupted, appearing

as dashes on each segment; spiracular line very broad, white reticulated with purple, and having a reddish blotch surrounded with orange or yellowish below each spiracle; a conspicuous row of black wedge-shaped dashes, one on each segment above the subdorsal line, is most distinct on the hinder segments, especially the tenth and eleventh; and there is a marginal row of wavy black blotches, one on each segment, above the spiracular line; the apex of the subdorsal dashes is toward the head. Usual dorsal raised dots white or whitish, large, well defined, surrounded with dark grey; plate on the second segment dull orange-brown, with two blackish spots on its front edge. Head shining, yellowish or reddish-brown, much dusted with black, especially on the inside edges of the lobes. Anal segment tinged with orange; undersurface paler than the ground colour, greyish-purple, dusted with black; legs pale brown.

When very young deep chocolate-brown with broad white spiracular lines, which afterwards become pinkish broadly edged with white; the black dorsal and spiracular markings are only assumed at the last moult. (C. Fenn.)

Variable in colour and distinctness of markings; one figured by Mr. W. Buckler has the dorsal region down to the spiracles almost uniformly dark purple-brown approaching liver-colour, with the spiracular stripe dashed with orange-yellow; others have the ground colour slate-grey, one of them with oblique darker dorsal shades uniting on the dorsal line.

August to May, feeding in the autumn on dock, primrose, dandelion, knotgrass, plantain and other low plants, and after hibernation on bramble, willow, bilberry, heather, birch, bog-myrtle and blackthorn; eating principally at night. But as already stated, a little care, with a constantly warm temperature, will cause it to feed on, without hibernation, upon dock or other low plants, and reach full growth in September, October, or even later, even to January; while other larvæ from the same batch of eggs, if kept out of doors, hibernate when comparatively small.

PUPA stout, broadest in the middle, pitchy rather than glossy; wing- and limb-covers coarsely sculptured with irregular short incised lines across the raised surfaces and nervures; abdominal segments rather more glossy, but finely sculptured in a broad band in each segment; anal segment suddenly rounded off, but having a knob or cremaster projecting backward, upon which is a pair of short thick spikes or bristles; general colour extremely dark purple-brown, almost black-brown. (Examples furnished by Messrs. Gregson and Adkin.) In a very friable earthen cocoon at or beneath the surface of the ground. In this condition only a very few weeks, even when fed up in the winter.³

The moth in all probability hides itself among dead leaves on the ground, but very rarely may be found sitting on the trunk of a tree squeezed into a corner of the rough bark, to which it bears a great resemblance. It is chiefly, though not wholly, confined to woods; flies at dusk and comes eagerly to sugar, settling down quietly and allowing itself readily to be captured, but is sometimes restless when boxed.

Very widely distributed in England and perhaps most frequently found in the Eastern counties, but usually only taken singly and at long intervals. Such records exist from Kent, Sussex, Berks, Essex, Middlesex, Suffolk, various parts of Norfolk, Cambridgeshire, Northamptonshire, Notts, Derbyshire, Staffordshire, Cheshire, Lancashire, and Cumberland; more generally distributed in Yorkshire, and in 1880 found rather commonly in various parts of that county. In Wales only recorded from Neath, Glamorganshire. In Scotland very much more plentiful, and apparently found in all, or nearly all wooded parts of that country, to the Hebrides, Orkneys and Shetland Isles. In Ireland excessively rare, the only specimens recorded being that already mentioned as taken at Londonderry by Mr. Campbell, and one at Sligo by Mr. P. Russ.

Abroad its range is very wide—Central and Eastern Europe, Holland, Belgium, South Sweden, Finland, Lapland, Northern Italy, Southern Russia, Eastern Asia, Greenland, Labrador, British Columbia, Canada, Northern and Eastern United States, and Colorado. It has even been captured on the Atlantic, more than 200 miles from the American coast. Of the variations already mentioned black forms are obtained from Silesia and the Hartz Mountains, pale grey from Hungary, very well marked grey from Russia.

3. **E. satura**, *Hüb.*; **porphyrea**, *Staud. Cat.*—Expanse $1\frac{5}{8}$ to $1\frac{3}{4}$ inch. Fore wings glossy rich purple-brown, marbled with black; two upper stigmata and a large blotch near the dorsal margin light purplish-red; hind wings golden brown.

Antennæ of the male finely serrated and ciliated, brown; palpi broadly tufted, rich purple-brown, apical joint very small; head purple-brown; collar at the base paler, bounded by a doubly curved black bar, behind which the collar is deeper purple-brown and edged with hoary-grey; shoulder lappets raised, purple-black; remainder of thorax light purple-brown, the crests at the top and back faintly mottled with dusky-yellow, fascicles large, smoky-yellow; abdomen dull purplish-brown, the basal segments covered with long smoky-yellow scales, which include, or partly conceal, on the dorsal ridge, from three to five tufts or dorsal crests each tipped with purplish-black; lateral and anal tufts broad, tinged with red. Fore wings rather broad; costa regularly rounded; apex sharply angulated; hind margin below it straight to the middle, then broadly elbowed and rounded off to the anal angle; dorsal margin gracefully curved; colour purple-brown marbled with black; basal line obscure, black, bordered with light purple; much angulated, arising on the costa, but at the median nervure bending in to the base; beneath this is a black blotch on the dorsal margin; first line black, duplicated, formed of a double

series of short curves containing a line of pale purple-red; second line a series of obscure black crescents, some of them running to long points on the nervures, all bordered outwardly with light purple-red; subdorsal line irregular, purplish-red, partly formed of narrow crescent-like spots lying in black arrow-head shaped dashes, followed by black streaks; the broad band between the last named two lines is of a light purple-red, brighter than the remainder of the wing; orbicular stigma large, oblique, rather ovate; reniform stigma also large; both conspicuously light red; claviform stigma faintly perceptible, smoky-black, lying in a large glossy black blotch which occupies the space below the median nervure and between the first and second lines; hind marginal region dusted with black; cilia distinctly crenulated, purple-brown, barred and tipped, in regular scallops, with black. Hind wings smoky-brown with a bright golden gloss; nervures rather darker brown; along the hind margin is an obscure series of whitish clouds; cilia scalloped, concolorous, and dashed with white. Female rather larger, with simple antennæ; body much stouter; fore wings rather more dull in colour, suffused with a more smoky-purple; hind wings rather darker.

Underside of the fore wings glossy pale smoky-grey, paler at the base, broadly pale purple along the hind margin; costa streaked and dusted with the same; reniform stigma smoky-black, divided by a curved pale line; beyond it is a faint, transverse, smoky stripe, and half way to the hind margin another; hind wings brownish-white, costal half tinged with purple and dusted with brown; central spot large, blackish, beyond it is a distinct curved smoky-black transverse stripe. Body and legs purple-brown.

On the wing in June, July and August.

LARVA. Head, face, and true legs corneous, brown; spiracular line dull yellow-green as well as all the parts beneath it, the line itself very dimly marked below by being slightly

yellower than the rest; back and sides pink, rather darker at the centre of the back, growing almost into a brown-pink along the centre of the dorsal region; this pink portion of the body is indistinctly dusted with brown; the last segment, with the anal prolegs, is faintly green, and the last spiracle blackish; the dorsal line is faintly indicated by a row of very indistinct spots, one at the commencement of each segment, of a dusky pink; and the subdorsal by a row of sloping lines, from above backwards and downwards, so that in a strong light there is a faint lozenge-shaped pattern along the back. The shape is clumsy and cylindrical, with very little difference from the head to the tail except at the last segment. (From eggs sent from Germany, R. C. R. Jordan.)

Hofmann's description is shorter and does not appear quite to agree.—When young, green with three faint dorsal lines and the spots white. When full grown reddish-brown-grey bordered with short clouded lines, and with three light rippling dorsal stripes; between these on each segment are two white dots; and down the side a clear, dark-shaded longitudinal line above the feet; undersurface clear grey, head yellowish-brown.

Probably in July, August and September, on hop, honeysuckle, bramble and hemp-agrimony—but there is a conflict of testimony. Dr. Jordan's larvæ became full-fed in August 1884 and he reared the first moth in June 1885; but Hofmann says that the larva feeds in May and June, in shady woods, eating various low-growing plants, and assuming the moth state in July and August. Possibly there are two generations in the year where it is at home.

PUPA shining brown. (Hofmann.)

An excessively rare species in this country. I cannot put my hand upon the earliest record here, but in 1855 Mr. H. T. Stainton wrote, in the first volume of his "Annual," "A specimen is in the collection of the Rev. Mr. Bird, who attracted it by light in Oxfordshire; Mr. Doubleday has a

specimen from Cambridgeshire. It is nearly half as large again as *adusta*, dark varieties of which are continually being taken for *satura*." Mr. Doubleday's specimen, a great beauty, is still in his collection at the Bethnal Green Museum. Mr. George Balding states that it was captured at Yaxley. With respect to the Oxfordshire specimen, our veteran entomologist, Mr. S. Stevens, assures me that it was taken in the south of that county near Reading, and he believes that, in all, three or four specimens were taken. One, in the collection of Mr. Bird's brother-in-law, Mr. Hanson, passed into Mr. Stevens' collection at Mr. Hanson's sale. The ultimate fate of the Rev. Mr. Bird's collection appears to be unknown. Confirmation of the Reading locality is furnished by the capture, some years ago, of a female specimen near that town by Mr. W. Holland. Through his liberality it is now in my possession. The Cambridgeshire capture has also been confirmed by the capture at Wicken of two specimens, at sugar, by Mr. J. W. Tutt. These, which he has allowed me to examine, are full-sized and very handsome examples, while mine is somewhat small. Mr. Stainton's remark that varieties of *E. adusta* are mistaken for the present species, was probably illustrated by his own record of a specimen at Airthrey, near Stirling, in 1845; perhaps also by a supposed capture at Newcastle-on-Tyne in that year, of another on the Cotswolds in 1852, and by Mr. Birchall's record of a specimen at Wicklow, Ireland. Some comparatively recent records of the moth, or its larva, in the East of Scotland are so confused with those of another species, and so strongly indicative of error, that it is not necessary now to do more than advert to them—more especially as the locality of the supposed captures is altogether unsuitable and improbable. Abroad this species inhabits Central Europe, some parts of Northern Europe, North Italy, Dalmatia, Siberia, and the Ural Mountains.

4. *E. adusta*, *Esp.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings rather narrow and pointed, dusky red-brown marbled with

black; reniform stigma whitish; a large white W in the middle of the hind margin. Hind wings white clouded with grey-brown.

Antennæ of the male notched like a fine saw, faintly ciliated, brown; palpi broadly and loosely tufted, dark chocolate, apical joint distinct; head and thorax densely covered with chocolate-brown scales, the collar slenderly and faintly barred with a black line; top and back crests distinct, of the same colour; fascicles dusky white; abdomen greyish-brown with some dusky white hair-scales toward the base; along the dorsal ridge are three or four depressed crests or tufts of a chocolate-brown colour; lateral and anal tufts spreading, pale chocolate. Fore wings long and rather narrow; costal margin very gently curved; apex angulated, rather pointed; hind margin slightly rounded and very oblique; dorsal margin nearly straight; colour pale chocolate-brown or greyish-brown, much marbled with black; basal line limited to two oblique angulated black streaks, edged outwardly by a whitish-chocolate shade; first line deep black, broken into a series of curves, and faintly duplicated, the space enclosed thereby being paler than the ground colour; second line black, forming a complete series of small crescents, some of which are produced into black lines on the nervures; outside this second line is a closely parallel pale line; subterminal line pale yellow or white, slender, much indented, and in the middle forming a distinct **W**; before each angle of this is a long black dash; orbicular stigma faintly paler and ringed with a fine black line; reniform stigma conspicuous, whitish, edged behind and also divided with black; between these is a narrow but distinct black central shade arising in a large blackish cloud on the costa, and, with angles and projections on the way, attaining the dorsal margin, passing through a blackish bar or large squared blotch on its way; this bar or blotch is formed of the obscure black claviform stigma, and an extension thereof; costal margin beyond the middle dotted with pale yellow, extreme hind margin edged

with black lunules; cilia slightly crenulated, grey-brown, dashed with reddish-white. Hind wings white, clouded along the costal and hind margins with smoky-brown; nervures dark brown; central spot large but indistinct—a mere smoky-brown streak; beyond it is a faint transverse brown line, and some whitish clouding in the darker colour near the anal angle; cilia dirty white. The female has the antennæ quite simple, and the body rather stouter, but is otherwise extremely similar.

Underside of the fore wings shining smoky purplish-brown; reniform stigma and a slender transverse stripe beyond it darker; dorsal margin paler. Hind wings whitish, broadly dusted with purple-brown toward the costal and hind margins; central spot dark purple-brown, followed by a rather paler slender transverse stripe. Body and legs chocolate-brown.

The form described is that found in the South of England, and not by any means that which is most plentiful in these Islands. Variation appears to be somewhat climatal, or at any rate local. In Suffolk there seems to be a slight tendency to a greyer-brown; but it is more to the North that the most pronounced variation is found. In Scotland from the Southern border throughout the Midland, Eastern, and Western districts of that country, especially in the large woods, heaths, and mountain districts, forms are found, often in abundance, having the chocolate-brown colour enriched, or otherwise clouded and partially obliterated, with black in varying degrees, sometimes obscuring or concealing, wholly or partially, the transverse lines, and in some instances leaving no marking distinctly visible except the whitish streaks in the reniform stigma, which are exceedingly constant. Similar specimens are found in the Orkneys, and Mr. McArthur has brought one specimen thence which is almost entirely velvety-black. In Shetland there is an intermingling of forms, some being like those from the South of England, others black-brown, with pale stigmata, whitish transverse

lines, sometimes broadly so, and the nervures yellowish or whitish; others of a very rich red-brown, and some of pale brown ground colour with markings sharply red-brown and black. Another variation, noticed in the North of Scotland by the late Dr. F. Buchanan White, shows great instability in the orbicular stigma, which ranges from circular to an elongated pear-shape. A specimen in Mr. A. Horne's collection, and taken in Perthshire, is almost devoid of the red colouring, and is grey-brown, and very much like *Mamestra brassica*.

It is curious that in the south of Yorkshire, whence so many dark forms are obtained, and specimens of the present species occur quite as black as any of the ordinary Scottish, one captured near Huddersfield by Mr. G. T. Porritt, and in his collection, is of the Southern type, yet of a richer purple-brown, and having the subterminal line thickened and spread into a beautiful zig-zagged yellow stripe.

In Ireland the range of colour is from rich chocolate-brown to black-brown.

On the wing usually in June and July, but in forward seasons at the end of May, and in Scotland sometimes abundantly at that season.

LARVA velvety, rather elongate, tapering slightly toward the head, which is rounded and highly polished; twelfth segment a little raised. Head shining pale brown finely reticulated with darker; body pale sage-green strongly tinged with ochreous and dusted with greyish-brown; dorsal line threadlike, white, interrupted on each segment, and edged with greyish-brown; a series of outlines of greyish-brown dorsal diamonds reaching to the brown margin of the spiracular stripe, form a network on the back and sides; spiracular stripe whitish ochreous; spiracles whitish, indistinct; undersurface dull greenish; legs and prolegs greenish tipped with pink.

A variety is bright green, broadly and transversely barred

with dull crimson on the back and sides above the spiracles; dorsal and subdorsal lines very faint, minute and thread-like, white, the former shaded with darker, especially at the incisions; usual spots distinct, whitish, shaded with grey; spiracular line inconspicuous, whitish; spiracles white, edged with dark red; head highly polished, brownish-yellow; legs pale brown, prolegs tipped with ferruginous. (C. Fenn.)

Mr. Buckler describes other varieties. Ground colour brilliant yellow suffused on the upper surface with deep rose pink; dorsal stripe composed of two darker pink lines, confluent and forming a spot at the beginning of each segment; subdorsal stripe bright yellow, only visible on the anterior halves of the segments; tubercular spots and two transverse streaks near the end of each segment also of the bright yellow ground colour.

Another—dull pale yellowish-green; dorsal stripe faintly outlined with orange-red, with a spot at the segmental divisions; subdorsal line of the same colour, but interrupted on the hinder half of each segment; tubercular spots red, and situated on the faint reddish outlines of diamonds, which are very delicately freckled within; spiracles white ringed with black.

July to September on grass, lettuce, knotgrass, *Silene inflata* and various other low-growing plants, also on heather, sallow, sweet-gale, hawthorn, &c., concealed at the roots of grass and herbage by day, feeding at night; becoming full fed in September, and then hibernating as an adult larva under moss or in the ground, waking up in the spring, yet apparently feeding no more, but changing to pupa in April or May. Mr. McArthur tells me that it is by no means unusual when turning up a patch of moss, in the winter or spring, in Scotland, to find this larva in its slight cocoon.

PUPA apparently undescribed.

The moth conceals itself usually among dead leaves or

herbage upon the ground through the day; at dusk it flies and comes readily to sugar. It is principally confined to woods, though in the north, where it is abundant, it seems to occur equally upon heaths. Apparently found throughout England in woods, though seldom commonly in the South, in the North more plentifully, and Mr. Porritt records it as most abundant in South Yorkshire, also found in North Wales to Barmouth, and in South Wales to Pembroke. In Scotland more frequent and generally distributed, and in Perthshire, Aberdeenshire, Moray, Ross-shire and Sutherland most abundant, extending also to the Hebrides, Orkneys, and Shetland Isles. Widely distributed in Ireland but less common; most so in the North, but in many districts scarce.

Abroad it is common throughout the temperate portions of Northern Europe, Central Europe, Northern Italy, Livonia, Turkey, Southern Russia and Siberia.

Genus 9. **CRYMODES.**

Antennæ ciliated; eyes naked; eyelashes short, thick and rather erect at the back; thorax fully crested; abdomen crested with small tufts on the third to seventh segments; very hairy, and with large anal tuft; fore wings thick; cross-bar of hind wings angulated, vein 5 parallel with vein 6.

We have but one species.

1. **C. exulis**, *Dup.*; **assimilis**, *Dbl.*.—Expanse $1\frac{5}{8}$ to $1\frac{3}{4}$ inch. Thorax coarsely scaled. Fore wings black-brown with three yellow or reddish transverse lines; nervures dashed with white and black. Hind wings dark smoky-brown.

Antennæ of the male threadlike, finely ciliated, light brown; eyes naked; eyelashes at the back strong, half erect; palpi broadly tufted, black-brown at the sides, paler brown in front; head and front of thorax grey-brown with a faint tinge of yellow, shoulder-lappets blackish-brown dusted

with yellow; rest of thorax lighter brown, distinctly crested at the top and back, the back tufts barred with black; whole thorax densely and roughly covered with long raised scales; fascicles very small, grey-brown; basal portion of abdomen densely covered with long smoky-brown or smoky-white hair-scales which merge on the dorsal ridge into a series of obscure dark brown tufts or slight crests; rest of abdomen shining grey-brown; lateral tufts similar, small; anal tuft large, light reddish-brown. Fore wings stout; costa nearly straight, apex bluntly angulated; hind margin rather oblique, gently curved; dorsal margin straight; colour black-brown; basal line abbreviated to two short black curves close to the costa and edged outwardly with yellowish or dirty white; first line rather oblique, much angulated and indented, yellow, edged on each side with black; second line very oblique, pale yellow divided into a series of short curves by the nervures, which here are black, but just beyond are dashed with white; subterminal line yellow or white, very irregular and undulating, edged inwardly with short black crescents or open wedges; orbicular stigma rather obscure, oblique, ovate, whitish or yellowish, almost occupied by a darker cloud, darkest in the middle; reniform stigma very large, its outer edge usually sharply defined with yellowish-white, otherwise much clouded and obscured with blackish-brown; claviform stigma merely an obscure black dash, often imperceptible; on the costal margin beyond the second line are three small but sharply defined yellow or white dots; hind margin edged with black lunules; cilia blackish-brown with a yellow basal line. Hind wings pale greyish-brown, much darker toward the hind margin; nervures and a small central spot also perceptibly darker; cilia white with a yellow basal line. Female very similar but with the body stouter.

Underside of fore wings glistening yellowish-grey; discal cell fully occupied by long smoky-brown prostrate hairs; reniform stigma and a partial transverse line beyond it

blackish; outside this a faint band of smoky clouding. Hind wings pale yellowish-grey, broadly dusted with brown along the costal region; central spot large, smoky-black, followed by a sinuous grey-brown slender transverse stripe, a broader cloudy stripe lies along the hind margin. Body, legs, leg tufts, and anal tuft yellowish-brown.

This description is made from a form found in the Shetland Isles which shows considerable agreement with the prevailing type as found in Iceland—though the latter has the transverse lines more white with a black edging, the reniform stigma whitish, the nervures much streaked with white, and is decidedly smaller in size.

In this country the species has long been known by another, and apparently more rare, variety called (*Hadena*) *assimilis*, Dbld. Its fore wings are scarcely so wide, their ground colour more of a reddish-black; the transverse lines dull red, the second line broadly so; nervures less streaked with white; reniform stigma more obscured by the dark ground colour and with only its outer edge red-brown; orbicular stigma also obscured; thorax of the colour of the fore wings. This form very closely resembles *Eurois adusta* in its more reddish-black varieties, and this similarity has at times been the cause of sad disappointment. The present is, however, a more robust insect than *E. adusta*, having a broader thorax and the forewings more obtuse at the apex. It is found in Scotland ranging from black-brown or red-black with the markings obscure, to red-brown with yellow lines and crescent spots, pointing in the direction of the Shetland form first described. Some of these latter in the collection of Mr. W. H. B. Fletcher, with the transverse lines and nervures dull yellowish, have the interspaces filled in with black, or with black-brown; others are pale grey with whitish lines and nervures; others intermediate but much dusted and lined with yellow; and one is brownish-buff with very scanty black interspaces. Mr. Sydney Webb, along with some of these variations, has one, in the late Mr.

F. Bond's collection, of a singularly pale brown ground colour, but with all the markings distinct and complete. One taken in Shetland by Mr. F. J. Hanbury actually approaches very closely to the Scotch mainland specimens in appearance, but is not quite so red and has faint indications of the white nervures. A female specimen in Mr. Percy Bright's collection has the fore wings of extraordinary breadth, and is very deeply filled in with black.

The range of variation of this species abroad is extraordinary, so that it may be well to quote some of Dr. Staudinger's remarks translated for the *Zoologist*, 1859, by Mr. J. W. Douglas. After giving as synonyms *gelata*, Lefebv., Gn., &c.; *Grœnlandica*, Dup., Gn., H.S.; *borea*, Bdv., Gn., H.S.; *cervina*, Germ, H.S.; *difflua*, Hüb.; *arctica*, Thunb; *gelida*, Gn.; *poli*, Gn.; ? *marmorata*, Zett.; and ? *oleracea*, Mohr.; he goes on to furnish a table of variations:

- Var. *a*. Fore wings black, marbled with white, both sexes.
- „ *b*. Fore wings black, central band broadly paler; male.
- „ *c*. Fore wings variegated with black, yellow and white; both sexes.
- „ *d*. Fore wings yellowish, dusted with black; female.
- „ *e*. Fore wings yellowish, marbled with white.
- „ *f*. Fore wings unicolorous grey, with the lines black; both sexes.
- „ *g*. Fore wings unicolorous reddish; both sexes.
- „ *h*. Fore wings concolorous ochreous-yellow; male.
- „ *i*. Fore wings grey, subterminal line spotted with yellow; both sexes.
- „ *k*. Fore wings black, stigmata yellow; both sexes.
- „ *l*. Fore wings black, stigmata white; female.
- „ *m*. Fore wings wholly black; both sexes.

“No *Noctua* known to me varies more than the foregoing.” “I have about four hundred examples from Iceland,

and about twenty from Greenland before me, and scarcely one specimen is like another in its variations." The article is a long one (eight pages); to reproduce it would be outside the scope of this work; I have merely secured some slight indication of its drift. The variations described are not specially nor definitely indicated as belonging to the synonymic names quoted above.

Since the above was written a specimen has been brought under my notice which I believe to belong to the present species, which yet is not included among the variations specified, but is figured by Hübner, Herrich-Schäffer and Hofmann as a distinct species under the name of *Maillardi*. Its more important character of supposed distinction is the comparatively greater length and narrowness of the fore wings and their more pointed apex—but in this respect *C. exulis* is notoriously unstable. The specimen to which I refer was captured in August, 1896, by Mr. Percy M. Bright, at sugar, with other forms of *C. exulis* in the Island of Unst, Shetland. Its ground colour is drab-brown abundantly marbled with umbreous and dusted with black, and its only conspicuous marking is the reniform stigma, which is distinctly edged with white in such a manner as to give it a singular resemblance to *Mamestra brassica*; a row of white dots which is fairly distinct between the second and subterminal lines in the the figures of *Maillardi* is only faintly visible in this specimen, yet recognisable under a lens; it is moreover a little smaller than the figures quoted, and than a female type from the Continent in my possession.

Staudinger, while giving it (*Maillardi*) rank as a separate species in the genus *Hadena* in his list, adds a query as to its being what he calls a "Darwinian" form of *exulis*, with connecting variations. That it is a variety of this species I feel no doubt. It is recorded from the Alps, the Pyrenees and the mountains of Norway.

On the wing from the middle of June to the beginning of August.

LARVA. "The full grown larva is 42 to 46 mills. long" (about $1\frac{3}{4}$ inch). "It has no resemblance whatever to any larva of *Hadena* or *Polia* that I know. The hinder segments gradually but perceptibly diminish in breadth after the seventh or eighth. The colour is dirty-white with a shade of grey, the head chestnut-brown; the plates of the thoracic and anal segments and the anterior feet yellowish. The labrum and eye-marks are rather dark, and just where the hemispheres join are two dark spot-like depressions. The head is scarcely half as broad as the following segment which on the upper side is entirely overlaid by the exceedingly strong thoracic plate. The anal plate is very strong, in form a somewhat elongated semicircle and bears as usual eight hairs. The second and third segments bear on the upper side several very obscure dark spots which are scarcely distinguishable from the ground-colour. The slightly raised spots always bear a long reddish hair springing from a dark speck. The rudimentary stigmata are always very distinct on the twelfth segment, and mostly appear close under the fore part of the anal plate." "With the exception of the darker head and lighter anterior feet, the colour and position of the spots in the young larva, when it comes from the egg, are exactly like those of the full grown larva. The first pair of prolegs are not much shorter than the hinder ones." (Staudinger.)

August to May or the beginning of June, but, at least sometimes, to May of the succeeding year, or two years. On grasses. Dr. Staudinger's details are again of great interest. "By means of very zealous raking in the high moss, early in May near Reykjavik, we found in all about thirty larvæ of various sizes. Some appeared to be full grown, some were hardly half so large, and others still smaller. All were decidedly healthy and the smaller ones increased visibly in

size and cast their skins. The largest would, nevertheless, not assume the pupa state, and at our departure on the 15th August they were no larger than when we found them. When these larvæ ate for themselves ways and cavities in the moss, we at first thought that they fed on moss, but here we were mistaken, for their proper food consisted of the lower portions of the stems of grasses or the roots. They love when young to feed on the part of the stem which is just above the root, but they ate down into the root itself, and appeared only exceptionally to feed on the leaves."

"We had found in the latter half of July a number of worn females which laid eggs. They were put into a large airy case with flowers and grass therein, but we could not find any eggs. On July 25th, we saw during the hottest mid-day sunshine, a female sitting on the lower part of a stem of *Poa alpina*. Kalisch wished to take it off, but to our amazement it sat fast on the stem. The last segments of the body were moving about in a nearly perpendicular position and the ovipositer almost bored into the stem. By further observation we found several holes made by it into the narrow leaf-sheaths of the stem, between which and the stem were laid about one hundred eggs. I now examined the stems placed with the imprisoned moths and found a quantity of eggs deposited in a very similar manner. After two or three weeks the young larvæ appeared. About the middle of September we took out these caterpillars, at that time they were all 5 to 8 mills. in length ($\frac{1}{5}$ to $\frac{1}{3}$ inch). At the end of November I again examined them, and found, to my great astonishment, that about five were already nearly as large as the largest specimens found in Iceland; about nine were half grown, and some were scarcely larger than they were in September. These facts taken in connection with those observed in Iceland are sufficient proofs that *exulis* sometimes passes one, two, or even three winters in the larva state."

PUPA. "Chestnut brown and very lively; it has a dark, often conspicuous, cremaster, which is broadly obtuse at the end, leaving at each angle two strong sharp bristles. The skin thrown off the larva very often remains attached to the cremaster. The larvæ appear to assume the pupa state at the end of May or beginning of June, within a cavity eaten into the moss or turf, not far from the surface; the moth appears in from four to eight weeks and the empty pupa cases are then very fragile and of a pale yellow colour."

The moth with us appears to fly only at night, and comes very sparingly to sugar. Apparently it has not been found here in the daytime. Doubtless it hides among grass and herbage. In Iceland it may be found in the daytime sitting about upon the ground and on the rocks or the grass; its flight at night is very swift, and in July Dr. Staudinger found it flying in the day time in the hottest sunshine and settled on various flowers, giving the preference to those of *Thymus serpyllum*, *Silene maritima* and *Armeria maritima*. Dr. Mason also found it in that country in July, flying chiefly in the afternoon, making short flights, but he points out that at that season there is really *no* darkness.

The first specimen observed in Scotland appears to have been taken by Richard Weaver in 1846; it was recorded, and named *assimilis* by Mr. H. Doubleday in 1847. In the same year Mr. H. T. Stainton obtained a specimen, sitting on a rock, in the Isle of Arran. Apparently a few more were obtained by Weaver in subsequent years, and in 1869 three were taken in Inverness-shire by Mr. Nicholas Cooke; one at Strathglass in the same year, three more in 1871 and one in 1874. Doubtless others, unrecorded, were taken, and Dr. Buchanan White noticed it in Glen Tilt.

The first captures in Shetland were by Mr. McArthur, and appear to have been made in 1883, and although scarce, it was taken in decidedly larger numbers than appears ever to have been the case on the mainland; indeed there is reason

to believe that in a subsequent favourable year no less than sixty were secured. Last year (1895) Messrs. J. J. F. X. King, P. M. Bright, and W. Reid, working together took, with excessive labour, three dozen specimens.

So far as I know entirely confined, in these Islands, to Perthshire, Inverness-shire, Aberdeenshire, Moray, Arran and other mountain districts, and the Shetland Isles.

Abroad it is abundant in Iceland and is found in Greenland and Labrador; probably also, under other names, in Lapland and Norway; and again, with different designations, on the Alps and Pyrenees.

Genus 10. **CHARÆAS.**

Antennæ pectinated, eyes *hairy*, without lashes; thorax fluffy, with shoulder lappets raised and fascicles long; abdomen hairy, and with two or three slight crests; fore wings of thick texture, narrow and blunt; hind wings small, vein 5 extremely weak.

We have but one species.

1. **C. graminis**, *L.*—Expanse of male 1 to $1\frac{1}{4}$ inch, of female $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings dark olive-brown or reddish-brown, without transverse lines; nervures and stigmata sharply whitish, the portion along the discal cell closely resembling the antler of a stag; hind wings dark brown, pale at the base.

Antennæ of the male neatly pectinated with solid, slender, ciliated teeth to the tip, the rows standing well apart on nearly opposite sides of the shaft, colour light brown; eyes hairy; palpi broadly and rather loosely tufted, the apical joint very slender and distinct; pale greyish brown; head similar; thorax roughly clad with long raised scales, pale olive-brown; shoulder lappets long; the scales toward the back also long, often lying loosely, but sometimes drawn together into a slight tuft or false crest at the back; fascicles

long, smoky-white; abdomen hairy, grey-brown; lateral and anal tufts reddish. Fore wings rather narrow at the base; costa very straight; apex bluntly angulated; hind margin evenly rounded and oblique; dorsal margin straight, rather short; colour deep olive brown or red-brown; costal and dorsal margins broadly paler; nervures broadly white; the median and its branches especially so, and forming a curious miniature resemblance to an antler (whence the common name of the moth); no transverse lines; orbicular stigma much flattened, dirty white, almost spindle-shaped, lying prostrate in a black blotch in the discal cell; reniform stigma conspicuous, white, completely joined to the white subdorsal and median nervures; claviform stigma brownish-white, very long and narrow, almost reaching the base of the wing; beyond the reniform stigma is a clouding of very pale brown the nervures crossing which are more broadly white; extreme hind margin edged with a black line; cilia white shaded with brown, shining and sharply defined. Hind wings rather small, black-brown, except a portion of the middle area near the base which is nearly white; cilia sharply white. Female considerably larger, with simple antennæ, stouter body, longer fore wings—the costa rather more rounded; otherwise similar.

Underside of the fore wings dark smoky-brown, the basal and central portions fluffy with long loose yellowish-white scales; nervures white; reniform stigma indicated by a round black spot; hind wings whitish, with the costal and hind marginal regions broadly blackish-brown; nervures white; central spot small, rounded, black.

Variable in the ground colour as already stated, from olive-brown to red-brown, and more rarely to very pale olive-brown on the one hand and to rich, dark, chocolate-brown on the other; often also the smaller nervures are obscured by the ground colour in varying degrees, till sometimes the margins, and portions of the larger nervures, are also of the general colour, leaving the "antler" alone pale; more rarely

this also is curtailed, but the reniform stigma and the portion of the median nervure attached to it appear always to retain the pale colouring. Variations in this direction are usually of a reddish colour, and are very much more frequent in the female; they are also more abundant in Ireland. In the opposite direction the white colour of the nervures often spreads into whitish stripes, leaving the dark ground colour only in elongated blotches darkest around the stigmata; but on Dartmoor this variety has these blotches quite black. Mr. J. J. F. X. King has specimens taken by himself in Shetland of a pale olive-brown varying to olive-buff or pale yellowish-buff, some of them with the markings scarcely visible. In the collection of the Rev. J. Bristowe at Belfast is a large female example taken in the County Antrim, of a smooth pale reddish-brown devoid of dark clouding, and with the pale markings very obscure. Another Irish form with the antler mark strangely jagged on each side and quite extended beyond its usual shape was recorded by John Curtis in his *British Entomology* as a distinct species under the name of *Hibernicus*.

On the wing from the end of July, through August and September.

LARVA. Head brown, full and rounded; body stout and cylindrical, rather thickest in the middle and tapering very slightly toward each extremity; skin polished and very glossy, yet much wrinkled transversely and most smooth at the segmental divisions; colour of the dorsal region down to the spiracles deep greenish-brown or bronzy smoky-brown; on the second segment is a darker brown semi-circular dorsal plate on which the dorsal and subdorsal stripes are perceptible; these are pinkish-grey, ochreous-grey, or pale brown, widening a little in the middle of the body and gradually narrowing again, until they converge and meet at the tip of the anal flap, which is covered by a black plate; these stripes are edged with black and freckled with grey or brown

along their middle; below the subdorsal stripe, midway between it and the spiracles, is a longitudinal pale line, and upon each segment, above it, three transverse pale streaks, and two below it; spiracles black; immediately below them is a broad, pale spiracular stripe edged and freckled like those above it; the ventral surface paler than the general colour and with a pale golden-brown gloss, shining and translucent; legs and prolegs greyish-green or brown.

When young, pale olive-green with the lines whitish. Very much like the larvæ of *Heliophobus popularis* and *H. cespitis*.

March to June or July on grasses, preferring the harder and smoother species, feeding at night on the grass-leaves, hiding among the roots by day. The winter is passed in the egg state.

PUPA shining, blackish-brown, hardly described; in a neatly-formed chamber in the earth, or under moss, or among grass-roots and rubbish.

The moth has somewhat curious habits. Sometimes the males fly in multitudes from 8 A.M. for about half an hour, sometimes at 10 A.M., or indeed at any time between 8 and 11 o'clock in the morning. At this time they are extremely lively, and frequent the flowers of ragwort, thistle, *Stachys betonica* and other plants, some of them remaining for the day upon the thistle or ragwort blossom upon which they may have been seated when the day's activity suddenly ceased. Usually the females are totally quiescent at this time, sitting at the roots of the grass and herbage or among heather, but occasionally, under the influence of hot sunshine, they are roused into great activity. The experience of the late Major J. N. Still, on Dartmoor, Devon, in 1894, is of too great interest to be overlooked: "On August 30th, while walking over that portion of Dartmoor between Classenwell Pool and Princetown, a distance of four or five miles, *C. graminis* appeared in thousands. They were continually on the wing,

flying low over the grass and heather, and hardly a yard could be walked without putting one up, and they continued on the wing in the same numbers, flying in the hottest sunshine from 11.30 A.M. till I left the moor about 4 P.M. The next day, a very hot one, the insects were again on the wing the whole distance between Princetown and Siward's Cross and during a long detour back again, a round of nearly ten miles. The females outnumbered the males by twenty to one. I am inclined to think that no males were on the wing except those that our movements disturbed from their hiding-places amongst the heather." Thus it appears that while the ordinary day flight of the males never extends later than 11 A.M., that of the females only commences after that hour, and then only during very hot sunshine, an influence which is well known to render many species of *Noctua* exceedingly restless. Both sexes fly at late dusk and probably through the night, visiting ragwort and other flowers, from which they may be secured by means of a lantern. In Scotland, where sugar seems often to be more attractive than in the South, this species may sometimes be obtained at that bait, but I know of no such occurrence in England. The male is also strongly attracted by light.

More especially attached to hill pastures, heaths, and rough mountain land, but occurring in grass lands, apparently in all parts of the United Kingdom. Usually it is not very common in the South of England, and in some districts even scarce, though appearing at long intervals in abundance—for instance it has been seen in hundreds if not thousands by Major Ficklin in Richmond Park, which is now but just outside London—and is sometimes plentiful on the downs of Sussex. These outbursts of multitudes seem however to be more frequent in the hill districts of Devon, and the Midland Counties, the mountains of Wales—where it is common to the extreme end of Pembrokeshire—and in the moor districts of Yorkshire and Lancashire. In Scotland

it is everywhere pretty common, extending to the Hebrides, Orkneys, and Shetland Isles; and is abundant all over Ireland.

Abroad its range is extensive, all Northern Europe; Central Europe, especially in the Alpine regions; Eastern Siberia; Northern Asia, Labrador, and Greenland. In some of these countries it is noted for the destructiveness of its larvæ on grass land. Kollar says, "In the years 1816 and 1817 entire hills in the Hartz territory which were covered in the evening with the finest green were found bare the next morning, and the ruts in the roads leading to them filled with caterpillars, and sometimes the roads themselves partially covered with them so that they became slippery and filthy through the caterpillars being crushed." Another writer says, "On the 14th of June last the foresters informed me that in a certain district of the Obergehren Forest, caterpillars of which they sent some examples in spirit, had made great havoc in the pastures, and were so abundant that as one walked over the infested ground they crackled under foot. I was unable to visit the place in the Rennsteig, at about 2000 feet elevation, until the 28th of June. The locality most infected was a wood-clearing of about ninety acres; all the pasture had become entirely withered in consequence of the roots of the grass having been eaten by the caterpillars. At this time the greater part of the larvæ had become pupæ. In a square foot I counted from twenty-five to thirty larvæ and pupæ, which gave for the ninety square acres 69,984,000 individuals." There are similar records in our own country. The local papers described, in 1881, a visitation in North Lancashire and Yorkshire: "Great commotion prevails in Clitheroe and the district surrounding Pendle Hill in consequence of the arrival of a large quantity of caterpillars which occupy the land from Wisley to Mearley, near Pendle Hill, a distance of about three miles. They travel together in thousands at a good speed and devastate the land over which they pass to

an alarming extent. The inmates of a roadside inn are kept continually at work brushing them out of the house; the road is almost black with these larvæ." Similar visitations in Wales in 1884 were noticed in the local papers—sometimes in the most quaint and ludicrous terms. There even appears to be a record of a similar occurrence in that country so long ago as 1403. Such visitations are far from rare in Sweden; and this insect may safely be looked upon as the most destructive of lepidopterous pests in grass-lands. Kollar distinctly affirms that the immense multitudes noticed by him in the Hartz district were destroyed by continued rains at the time when they should have assumed the pupa state.

Genus 11. **HELIOPHOBUS.**

Antennæ of the male pectinated; eyes hairy; lashes hardly visible; thorax slightly tufted at the back; abdomen hairy and furnished with two or three small obscure crests; fore wings thick, broad behind; hind wings rather ample, vein 5 very faint.

LARVÆ extremely like that of the last species.

PUPÆ subterranean.

We have two species readily recognisable:

A. Fore wings dark brown, with whitish nervures and broadly pectinated antennæ. *H. popularis.*

B. Fore wings black-brown, with yellowish stigmata and antennæ narrowly pectinated. *H. cespitis.*

1. **H. popularis**, *Fab.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch; antennæ of the male broadly pectinated; of the female, simple. Fore wings umbreous spotted and mottled with black; nervures and edges of upper stigmata distinctly brownish-white; hind wings white, banded with cloudy brown.

Antennæ of the male very broadly and conspicuously

pectinated with long, solid, ciliated teeth of a yellowish-brown; the shaft whitish; eyes distinctly hairy but lashes scarcely noticeable; palpi short, densely tufted, brown, apical joint visible as a small round knob; head dark brown dusted with white; collar upraised and densely covered with long scales, mixed brown and white, edged at the back with white and faintly barred in front with black; shoulder-lappets raised, light brown with a whitish stripe down the middle, and another, longer, at the outer margin; remainder of thorax mixed brown and white, the scales long and loose but forming an irregular indistinct crest or knob toward the back, often hardly perceptible; fascicles dense, pure white; basal segments of the abdomen covered with very long white, or brownish-white, scales, among which on the dorsal ridge are three, more or less distinct, dark brown tufts simulating crests; rest of abdomen obscurely and transversely barred, brown at the base of each segment, whitish at the edge; lateral and anal tufts large, pale brown dusted with white. Fore wings decidedly broad behind; costa straight; apex rounded; hind margin rather long, gently curved but decidedly bent below the middle; dorsal margin rather short and nearly straight; colour rich umbreous; all the nervures distinctly and conspicuously whitish; basal line faintly indicated by pairs of small blackish clouds; first line very obscure, much angulated, bent, and duplicated, forming two series of black-brown cloudy spots or streaks not very close together; second line also very obscure, consisting of a double or even triple series of blackish cloudy streaks or spots between the pale nervures; subterminal line distinct, slender, yellowish-white, preceded by a row of rather obscure black wedges; orbicular stigma round, yellowish-white clouded with brown; reniform stigma large, curved, yellowish-white, clouded with brown, and its lower portion divided by the branching of the whitish median nervure; both stigmata united above and below with the pale nervures, and having before the orbicular a black

wedge, and between it and the reniform a black rhomboid spot; claviform stigma very obscure, but long and pointed, merely indicated by pale marginal lines, one of which runs back to the base of the wing; hind marginal region clouded with blackish-brown, and the extreme edge indicated by long, slender, black lunules; cilia pale yellowish-brown, strongly barred and dashed with dark brown; hind wings rounded, white dusted with brown and having an ill-defined and sometimes incomplete cloudy smoky-brown transverse band before the hind margin; cilia white. Female decidedly larger, with simple antennæ, very stout abdomen, and more ample fore wings, of which the colour is usually a more dull umbreous; hind wings smoky-brown, rather paler toward the base and with faintly whitish nervures.

Underside of the fore wings smoky-brown with paler nervures; reniform stigma dusky-white, containing two black streaks; dorsal margin dirty-white. Hind wings white broadly dusted with brown along the costal region and the apex, less so on the nervures and hind margin; body pale drab; legs umbreous.

Hardly ever variable except in the colour of the hind wings in the male, the smoky-brown transverse band near the margin being in some individuals dark but narrow, sharply but irregularly defined behind, and even broken up by the white ground; in others cloudy and extended so as to shade nearly one-half of the surface.

On the wing at the end of August and September.

LARVA stout, nearly cylindrical, thickest in the middle, tapering a little toward each end; head full and rounded, brown; body shining, even brilliantly glossy, deep greenish-brown or smoky-brown; a darker semicircular plate on the second segment, showing indications of the longitudinal stripes, five in number; dorsal and subdorsal stripes pale pinkish-grey, greyish-ochreous, or pale brown, widening a little in the middle of the body and then gradually

narrowing until they converge and meet at the tip of the anal flat, which is covered with a black plate; these stripes are edged with black and freckled with grey or brown along their middle; below the subdorsal stripe is a rather narrow pale line, edged with blackish, running midway between it and the subspiracular stripe, which last is of a colour and freckling similar to those above, all the stripes being uninterrupted, spiracles black; under surface paler brown than the upper, varying in tint, shining and semitranslucent; legs and prolegs greyish-green or brown, the prolegs ringed with darker brown or with a brown spot on the side. Very closely resembling the larvæ of the preceding and following species, but slightly more of a warm bronzy colour on the back and with the under surface more dusky. When young pale olive-green with whitish lines; when half grown there is a beautiful opalescent pinkish gleam about the prolegs and undersurface. (Adapted from Buckler.)

February to July, the winter being passed in the egg state; on grasses, preferring the hard smooth grasses, and much addicted to *Nardus stricta* and other fine-leaved species; feeding at night on the grass-leaves, apparently not on the roots, but hiding among the latter in the daytime. From the great similarity of the larvæ it is difficult to speak with certainty, but there is reason to suspect that in some seasons and localities (as in the Rhondda valley in 1884) this insect has done its full share in the mischief attributed to the last species. In 1894 the present is recorded as having appeared in the north of France in vast numbers, marching in columns and doing great damage. There is a probability that in this case also both species appeared together.

PUPA apparently undescribed, subterranean, in an earthen chamber.

The moth is scarcely ever seen in the daytime, and doubtless remains concealed on the ground at the roots of grass and herbage or among dead leaves. The male flies with

vivacity at dusk, and like so many species having broadly pectinated antennæ, is very strongly attracted by light. On the other hand it is never known to come to sugar or to flowers, or indeed to take nourishment in any way. The female is less active, its body is very heavy, larger in proportion than that of any other European *Noctua*, and apparently it flies but little; at night it may be found sitting on the large tufts of hard grasses in rough pastures, especially affecting *Nardus stricta*, and in such situations both sexes may readily be secured by the aid of a lantern. My own very fine examples were so obtained by Major A. Ficklin, in Surrey.

Apparently found all over England and Wales, often commonly, but more especially attached to rough pasture-land and open fields and parks. Much less common in Scotland, and in the west hardly known beyond the border, but not absent from Perthshire, and on the eastward extending to Aberdeenshire. In Ireland it is more generally distributed and sometimes abundant.

Abroad its range is not so northern as that of the last species, but it is common in Central Europe, South Sweden, Southern Russia, Livonia, Siberia, and Armenia.

2. **H. cespitis**, *Fab.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings black-brown with blacker nervures; subterminal line and edges of upper stigmata yellowish; hind wings white in the male, grey-brown in the female.

Antennæ of the male pectinated with short, sharp, solid, ciliated teeth of a light brown, the shaft blackish but whitish along the back; palpi short, broadly tufted, blackish-brown; apical joint small and slender; head and thorax densely tufted, glossy blackish-umbreous; collar and shoulder lappets rather raised, crest when visible a small ridge with two little knobs at the back, but often imperceptible, the scales lying loosely apart; fascicles brownish-white; basal segments of the abdomen covered with long pale smoky-brown scales,

the portions on the dorsal ridge darker brown, rather raised, and simulating dorsal crests; remainder of abdomen pale purplish-brown with large lateral and abdominal tufts. Fore wings rather broad behind; costa faintly arched at the base thence very straight or even almost hollowed; apex much rounded; hind margin also rounded, but elbowed below the middle and broadly curved off round the anal angle; dorsal margin straight to near the base, where is a tuft of whitish scales; colour very deep umbreous or black brown, rather glossy; nervures blacker but not distinctly so; basal line only indicated by two small faintly-brownish clouds; first line black, much indented, edged on the inner side with pale brown; second line not very oblique, wholly composed of small black crescents faintly edged on the outside with pale brown; subterminal line decidedly more visible, slender, waved, and much indented, white or pale yellow, edged internally by a row of small cloudy-black crescents; orbicular stigma faintly yellowish, surrounded by a slender black marginal line, and nearly filled up with a dark brown cloud; reniform stigma large, wide in its lower portion and with recurved margins, the inner margin yellowish-white, edged with black, the outer whiter and more distinct than any other marking on the wing; claviform stigma very obscure, edged with black; extreme hind margin bordered with black lunules; cilia dark brown with a faint pale brown line at their base. Hind wings broad, very fully rounded, softly white, with a transverse row of fine brown dashes on nervures beyond the middle, and a faint grey-brown marginal cloud beyond, darkest at the apex; cilia white, clouded with grey-brown.

Female with simple antennæ, decidedly stouter abdomen, rather longer fore wings, sometimes also of a browner colour, hind wings much clouded with grey-brown, sometimes wholly so; otherwise similar.

Underside of the fore wings glossy, smoky-brown, with a faint, narrow, blackish transverse stripe beyond the middle

and the cilia very dark; hind wings whitish, the costal region broadly dusted with brown; a slender smoky-brown transverse stripe near the hind margin, which also is a little clouded with the same colour; body and legs purplish-brown.

Very rarely variable, except in size: A very hot summer apparently having the effect of producing small specimens. This has been rather conclusively proved by Major A. Ficklin who has secured this autumn (1896) after two or three months of heat and drought, small specimens only, on a spot in which he usually finds them of very full size. A series of remarkably dwarf specimens is in the collection of Dr. P. B. Mason. In the cabinet of Mr. Sydney Webb is a specimen having the subterminal line of the fore wings broadened out into a white stripe.

On the wing in August and September.

LARVA stout, rounded, tapering to each extremity, but especially behind; head rounded, dull hazel-brown reticulated with black; skin shining, bronze-brown faintly mottled with pale brown; dorsal and subdorsal stripes very conspicuous, brownish or yellowish-white, edged with a dark shade of the ground colour; spiracular stripe broad, dull whitish, less distinct; undersurface pale brownish, the space between the prolegs darker, a black dash on the outer side of each proleg; spiracles black; plate on the second segment dull pale brown; anal segment similar. (C. Fenn.)

The Rev. J. Hellins says that the infant larva is very dingy, but after a moult or two puts on the gayest dress worn in the whole of its existence, becoming of a clear full green, with white dorsal, subdorsal, and broader spiracular lines; as it grows the green becomes tinged with olive, and the adult colouring is gradually assumed.

April to July on grasses. Mr. Hellins says all kinds of grasses, but showing a preference for *Aira cespitosa*. Also sometimes on *Aira flexuosa*, but Major Ficklin finds *Nardus*

stricta to be very greatly preferred. Hiding in the day at the roots of the grasses, feeding at night on the grass *leaves* and *stems*, where it may readily be collected by means of a light as it rests on the grass stems. I have rather emphasized the food since there is a common belief that the present and the allied species feed on the *roots* of grass. Of this I find no proof, though they are most certainly to be found among the roots in the daytime. The winter is passed in the egg state.

PUPA rounded, stoutest below the wing cases, tapering to the anal extremity, which is terminated by a stout projection armed with two short bristles; colour shining dark mahogany. (C. Fenn.) Underground, about half an inch from the surface, in a neat, smooth, oval chamber, sometimes placed obliquely at various angles, sometimes even perpendicularly, so that the pupa in such a case is upright.

The moth hides in the daytime squeezed closely into the tufts of grass near to the roots, but the male flies vigorously from, in some nights 9 P.M., in others 11 P.M., till about two o'clock in the morning, and comes very eagerly to a strong light. The female also may in rare instances be taken at the same attraction, but usually she sits at night on or in the tufts of the harder grasses, such as *Nardus stricta*, and is seldom taken flying. Her eggs, and those of the last two species, are dropped loosely among the grass and are not adhesive. So far as I know neither sex is ever obtained by any food attraction, such as sugar, flowers, or honeydew, and there is no reason to suppose that it partakes at all of food of any kind.

A widely distributed species, though not usually common. It has been taken in some plenty in certain seasons in Devon, Berkshire, near Kingston, Surrey, at Sherwood Forest, Notts, and in a few other localities; in smaller numbers throughout the Southern Counties, though rare in Kent and Dorset; apparently scarce in the Eastern Counties,

and rare in the Midlands, except Nottinghamshire; certainly not common in the Western counties (except occasionally and locally in Devon), yet recorded from Somerset, Gloucestershire, Worcestershire, Herefordshire, Cheshire, and Lancashire—in the last two counties more especially on the coast—Westmoreland, and Cumberland; and in Yorkshire in several districts. In Wales it has been found pretty commonly near Swansea and Neath, also in Carmarthen-shire, and, rarely, in Pembrokeshire; but I find no record in North Wales. Very local in Scotland but found in the extreme South, in Perthshire, and in the North-West. In Ireland scarce and almost confined to the coast; Wicklow, Dublin, Cork, Carlow, Galway, and Sligo. Not a northern species abroad, being found in Central Europe, North Italy, Southern and Eastern Russia, Dalmatia, and Livonia.

Genus 12. **XYLOMIGES.**

Antennæ tufted; eyes hairy, with indistinct lashes at the back; thorax rather flat and but faintly crested; abdomen with one dorsal tuft or crest; fore wings long and narrow, hind wings very short.

We have but one species.

1. **X. conspicillaris**, *L.*—Expanse $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings very narrow, faintly crenulated behind; costal region usually broadly black-brown; dorsal pale grey or yellowish-grey; hind wings white with dark nervures; thorax grey with the crested portion black.

Antennæ of the male brown, ciliated in minute tufts which give it a faintly pectinated appearance; palpi small, but densely tufted, pale purple-brown; eyes hairy; eyelashes prostrate, black; thorax pale grey with a purplish flush; collar rather peaked, crossed in front by a slender purple-brown line, edges of the shoulder lappets dotted with dark brown; the crests on both top and back very flat and obscure,

but strongly indicated by a black-brown or deep black blotch, enclosing paler spaces, which sometimes divides it from front

back, but in other cases is limited to the back portion, the tips of the crest-tufts being blacker; fascicles white; abdomen short, whitish-brown faintly barred with darker, the basal segments covered with long white scales, those on the dorsal ridge forming a horseshoe-shaped black crest; lateral tufts very faint; anal segment broad and blunt, with a broad short tuft. Fore wings long and unusually narrow; costa but very slightly curved; apex sharply rounded, and rather produced; hind margin oblique, very faintly hollowed toward the middle, then filled out and rounded toward the anal angle; dorsal margin very straight; ground colour whitish-grey, yellowish, or even bluish-grey, in most cases very much obscured by dark clouds and markings, but usually a stripe of the ground colour lies along the dorsal margin, sometimes extending to the anal angle; the rest of the wing either clouded with grey and brownish or more or less blackened. In the grey form, which alone shows satisfactory traces of the markings, the basal line is absent and the first line only indicated by a faint cloudy line uniting some dark streaks on the nervures; second line a faint series of whitish dots edged on each side with dark dots on the nervures; between these is a slender, squarely angulated, faint brownish central shade which at its angle touches an ovate blackish spot in the middle of the wing; subterminal line pale but excessively indistinct, broken by black dashes between the nervures; space outside it darker brownish-grey, but this is cut off below the apex by an oblique, similar but darker, streak; orbicular and reniform stigmata hardly perceptible or only showing small portions of brown marginal lines; claviform stigma forming a long narrow loop, bordered with dark grey, extreme hind margin edged with thick black lunules. But in a somewhat more frequent form a thick black streak from the middle of the base spreads into an extensive deep black cloud which envelops the stigmata

and attains the middle of the costal margin, passing thence with a bold curve, as a black stripe, to the hind margin below the apex. In this form the orbicular stigma is more complete, having an entire black margin faintly lined with paler and then filled with black; sometimes the inner edge of the reniform is also visible as a curved black line; the claviform also blackened, but, with the other markings, much obscured by the black clouds and stripe. In a third form, which on the whole is the most frequent with us, a broad deep-black stripe occupies more than the costal half of the wings, blotting out the markings, but broken into by an angle of the dorsal ground colour in the middle and also broken by a submarginal stripe of the yellowish-grey colour. Cilia crenulated, dusky black, dashed with pale grey. Hind wings short, rounded, white, with the nervures conspicuously dark grey-brown and a shade of the same along the apical margin; cilia white sometimes clouded with grey-brown. Female extremely similar.

Underside of the fore wings smoky-brown in the middle, costal region white dusted with purple; hind margin very broadly similar and with white nervures; discal cell furnished with abundant long hair-scales; hind wings white, costal region broadly dusted with purple-brown; a slender curved purple-brown transverse stripe beyond the middle; central spot black; body and legs purple-brown; leg tufts whitish.

It has been necessary to describe the principal variations in indicating the characters of the species. All three forms seem to be constant—at least, so far as known here; there is less disposition to intermediate variation than in almost any other variable species.

On the wing in April and May.

LARVA stout, rounded, incisions slightly compressed, head hemispherical, shining, rather flattened in front, reddish-ochreous or pinkish-brown, reticulated with dark brown,

a sepia coloured dash on the inner side of each lobe; body dull greenish-brown with an ochreous tinge, sides darker; all the markings but faintly indicated; usual spots white surrounded with grey; down the back an indistinct grey chain-pattern, each link enclosing a grey spot; spiracular stripe broad, reddish-ochreous, the sides above it broadly shaded with grey; spiracles white, edged with black; under-surface dull greenish, dusted at the sides with greyish-brown. C. Fenn. Mr. Buckler states that the newly-hatched larva has a very pale and transparent pinkish-grey body, a pale brown head, and a blackish-brown dorsal vessel, but after commencing to feed becomes of a light yellowish-watery-green with minute black dots. After the first moult the colour becomes a more opaque bluish-green, still with the black dots, and with broad paler dorsal and narrower sub-dorsal lines; the head yellowish-green sprinkled with black atoms; after the second moult a paler spiracular stripe appears, and after the third this stripe becomes greenish-yellow or ochreous-yellow, and the black dots are ringed with whitish-yellow. After the fourth moult the general colour, though deep and of sober richness for a time, gradually grows paler, and three varieties can be noticed—brownish-green, ochreous-green, and light brown, the markings as before. After another moult the adult colouring is assumed.

June to August, on *Lotus corniculatus*, *L. major*, and *Polygonum aviculare* (knot-grass), preferring the flowers of the first named plants to the leaves; feeding in the night and early morning, at other times stretched out on the stems of its food plants close to the ground, or half buried in the earth.

PUPA short and rather stout, head and thoracic portion thick and rounded, first three abdominal segments well separated, their anterior edges roughened; remaining segments well rounded; anal segment blunt, furnished with

four short diverging spines, the outer pair much the shorter; surface shining, general colour pale purplish-brown. In a chamber of earth under the surface of the ground. In this state through the winter, usually at the roots of trees.

The moth emerges from pupa in the morning, and sits through the day on the trunks of trees, more especially oak and hawthorn, or on a post near the ground, and bears a great resemblance to a narrow chip of dead wood. At dusk it flies swiftly, and is said to frequent lanes rather than woods. It is, however, hardly ever taken in flight, and very rarely indeed at sugar. There is no record of its occurrence at flowers, but with us it is so very scarce a species that its habits are almost unknown. The majority of the specimens in our collections have been reared from the egg, a female moth found by Dr. J. H. Wood, sitting upon a post near Tarrington, Herefordshire, being the progenitor of a considerable portion of them. Others have been reared from pupæ found—at the cost of enormous labour—by digging at the roots of trees. Of these nearly all have been obtained in Worcestershire, the country round Malvern appearing to be more especially the home of the species. It has also occurred in Herefordshire, Gloucestershire, and Somerset; and there are one or two records in Kent, Surrey, and Suffolk. There has been a notice of one specimen at Gower, South Wales, in 1875, but I know of no other localities in these Islands. Abroad it is found in Central Europe, North Italy, South Russia, and also in Central Asia.

Genus 13. **PACHETRA.**

ANTENNÆ of the male pectinated, eyes hairy, without lashes; thorax slightly crested at the back; abdomen short, furnished with two or three small crests, the third long and curled; fore wings broad, slightly dentate behind.

1. **P. leucophæa**, *Viewig*.—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings broad, whitish, with black marbling and mark-

ings; principal nervures and upper stigmata white; hind wings white with grey-brown central lunule and shading.

Antennæ of the male pectinated with very slender, solid, ciliated teeth, light brown, shaft whitish; palpi short, broadly tufted, but the apical joints projecting like tiny nipples, dark brown, mixed with white; head similar, with a strong tuft of scales between the antennæ; collar broad, whitish, tinged at the base with yellow, and twice faintly barred with purplish-brown; shoulder lappets dark brown dotted with black, and shaded and edged with white; remainder of thorax dirty white, clouded with grey-brown, crested at the back, the tips of the tufts being dark brown; fascicles spreading, white; basal segments of the abdomen covered with similar long white scales, remainder greyish-white; dorsal ridge ornamented with three, or sometimes four, slender crests, the third rather long and curled, all, however, are very fugitive; lateral and anal tufts spreading, smoky-white. Fore wings broad, especially so behind; costa somewhat curved; apex rounded; hind margin long, rather straight to the middle, then bent and again fairly straight to the anal angle, but not with an angular effect; slightly crenulated or dentate throughout; dorsal margin straight to near the base; colour white, faintly tinged with brown and clouded with pale grey; basal line broken into black streaks between the nervures, and followed at a short distance by a similar series, less distinct; first line deep black, broken at each nervure, fairly direct yet forming a crescent at the dorsal margin; second line less distinct, duplicated, broken at every nervure and forming crescents between them, also enclosing a white line, the portion from the costa to the middle indistinctly black, the remainder deep black; subterminal line only indicated by a broken row of attendant black wedges pointing inward; orbicular stigma round, white, clouded with brown, and edged with black; reniform stigma very large, white, edged with black and containing blackish lines parallel to its front and hind margins; claviform stigma

a broad rounded loop edged with deep black and clouded with blackish; it lies in a nearly rectangular blackish blotch which occupies the dorsal portion of the space between the first and second lines; the spaces between the white nervures and around the other two stigmata are also black, except the subcostal region which remains whitish with small grey costal clouds; before the apex is a blackish costal triangle containing one or more black streaks; hind margin partially clouded with grey and edged with small black lunules; cilia white faintly clouded with grey. Hind wings white dusted with brownish-grey, and with a similar cloudy band just before the hind margin; nervures also brownish, cilia white, female slightly larger, with simple antennæ, stouter body, and rather longer hind wings, of which the surface is more clouded and the nervures more decidedly darkened.

Underside of all the wings shining white, dusted with smoky-brown, especially toward the costal margins, nervures darker, reniform stigma and central spot of hind wings blackish; a faint smoky-brown transverse stripe near the hind margin crosses all the wings; legs brown dotted with white; leg tufts and body dirty white.

Usually not very variable, but in the collection of Mr. F. J. Hanbury is a specimen having the fore wings remarkably white, with the claviform stigma as usual large and dark, but the other markings only margined or faintly indicated. The white ground colour appears to be more especially visible in our native specimens, those from abroad having the ground colour much tinged with pale umbreous or smoky-brown.

On the wing in May, June, and July.

LARVA. "The full-grown larva has at first a very *Agrotid* appearance. It varies from a nearly uniform nankeen-yellow with the markings only indicated, to a handsome larva with distinct black stripes. There is a pale dorsal line, quite narrow; thence to the black spiracles is divided into three longi-

tudinal stripes, a dark dorsal, a dark (but less dark) lower one and a pale intermediate. In all these the ground colour is the same nankeen-yellow, and the darker areas depend on the greater or less darkness of fine black mottlings, generally in fine wavy streaks running more or less longitudinally. The dorsal dark stripe is darker on each of its margins, and each margin is darker toward the incisions; the pale stripe is somewhat darker centrally, whilst the lower stripe again is darker marginally and toward the incisions, but only in a degree which requires looking for, instead of being obvious as in the dorsal stripe. The spiracular region is paler, almost amounting to a pale spiracular stripe, and the undersurface is nankeen-yellow with a slight fuscous tendency. The second segment is of a more uniform tint and the pale dorsal line extends distinctly through it and on to the head, which is rather brown than yellow, mottled in a honeycomb pattern; there is also some black marking about the labrum and jaws. In some lights the whole larva has a pearly lustre, or perhaps a bloom like that on a plum would best express the effect. Each segment has four or five transverse incisions. The ordinary tubercles are marked by very fine nearly transparent brown bristles, of which there are also some on the head. The segments taper slightly toward the head, more rapidly toward the anal extremity." (Dr. T. A. Chapman.)

Mr. Buckler says that the head of the infant larva is brown marked with black, the body drab at intervals, with smoky dark grey on the anterior segments and some of the others, the raised dots shining black, each with a black hair. After a few days the general colour becomes green, the head much marked with brown on the lobes, and the second segment showing a divided brown plate. After the first moult green, with darker green subdorsal lines, and a lateral line closely followed by a whitish spiracular stripe; head and dorsal plate dotted with black. After the second moult the head is shining pale green with four rather large black dots

in front of the lobes, dorsal region greyish-green; sides greener and with a darker green line close to the broad whitish-green spiracular stripe; the narrow dorsal and subdorsal lines of the same whitish-green, but fainter; the dark raised dots very small; incisions whitish-green. After the fourth moult the dorsal line becomes distinctly buff-yellow with a black dot on each side of it and another lower down on each segment; the general colour is now brown or brownish-drab, finely sprinkled with dark brown atoms, black freckles appear above the spiracular stripe, and the head has a black streak in front of each lobe. When somewhat older a more brownish-ochreous colour is assumed, and it is only after hybernation that the adult colouring is attained.

July to March on grasses, *Poa nemoralis*, *P. annua*, *Brachypodium sylvaticum*, *Dactylis glomerata*, but apparently preferring the two species of *Poa*; hiding in the daytime in the thick tufts of grass, feeding at night, when very young only eating one surface of the leaf, when older devouring the grass-blades in the usual manner. When young very active and vigorous, but before the winter becoming torpid and sleepy, yet feeding a little in the evening. Very delicate and difficult to rear in this climate. Dr. Chapman succeeded by placing each larva in a separate glass jar with a tuft of grass (*Poa annua*) frequently changed. The bloom or lustre of the skin of this larva is remarked upon by Guenée as a curious velvety appearance which is appreciable to the touch and *feels* like very fine velvet.

PUPA smooth and polished, yet sculptured over the back of the thorax, the wing and limb-covers, with very fine impressed furrows. Dorsal region rounded, the segments having dorsal and subdorsal hollows as though dented in; anal segment with a wrinkled black projection rounded at the end and terminating in two almost parallel spines. General colour rich red-brown. In a slight silken cocoon

mixed with earth at the surface of the ground close to the roots of a tuft of grass or some other shelter.

The moth hides in the daytime on, or close to, the ground among grass on chalk hills and downs. On the Continent it is said also to inhabit woods. Rarely a specimen may be found sitting on the trunk of a tree, and two have been taken in such situations near Ashford, Kent, by Mr. W. R. Jeffrey, from the latter of which the eggs were obtained which furnished the larvæ described above. It flies at night, and may be taken at sugar and at the blossoms of privet.

Until quite recently an excessively rare species in this country. The earliest recorded specimens were said to have been taken near Bristol in the year 1816. One of these is now in the collection of Dr. P. B. Mason at Burton-on-Trent. Further specimens do not seem to have been found in that locality, and so far as any records show the species must have disappeared for forty years, at which time it was rediscovered by Mr. Samuel Stevens at Mickleham Downs, Surrey, and here it continued to be taken by him, rarely, for seven or eight years. Of these specimens he still possesses a fine series, and others are scattered through the older collections in this country. In 1868 a single specimen was secured at Redhill, Surrey; in 1876 one by Mr. W. R. Jeffrey, as already mentioned, in Kent, and in 1890 a second. From that time onwards the district beyond Ashford, on the slopes of the chalk downs toward Wye, Kent, has been the source from which some numbers have been obtained by Messrs. Jeffreys, Viggers, Hanbury and others, so that it has found its way into most of the larger collections, and shows no sign at present of becoming rare again. In the meantime a pair was secured at Boxhill, Surrey, by Mr. G. Elisha in 1879, another by Mr. B. A. Bower at the same place in 1882, Mr. R. Adkin disturbed one from among grass near Reigate in the same county in 1894, and others are recorded from Folkestone and Tunbridge, Kent. So far as is at present known, these are the only localities within the British Isles.

Abroad it is found all over the continent of Europe except the more northern countries, in the South of Sweden, in the Ural Mountain district, and in Central Asia.

Genus 14. **NEURIA.**

ANTENNÆ simple ; eyes hairy, with obscure lashes ; thorax rather strongly crested ; abdomen long, singly crested, the tuft depressed ; fore wings broad behind, nervures all pale ; hind wings rather elongated.

We have but one species.

1. **N. saponariæ**, *Blk.* ; **reticulata**, *Staud. Cat.*—Eggs, $1\frac{1}{4}$ to $1\frac{3}{4}$ inch. Antennæ simple ; fore wings light umbreous, with transverse lines, upper stigmata, and all the nervures sharply yellowish ; hind wings brownish-white.

Antennæ of the male simple, minutely ciliated, light brown ; palpi small, only moderately tufted, pale brown, apical joint minute ; head pale brown, rather strongly tufted between the antennæ ; collar erect, very pale brown ; gracefully barred with two pairs of slender arched purple-brown lines ; shoulder lappets of the same colour, with two similar lines ; rest of the thorax also pale brown, crested at top and back, the top crest being dotted with purple-brown ; fascicles yellowish-white ; abdomen pale brown, on the basal segment a single oblique, horseshoe-shaped crest, only visible in some specimens, most likely shaken off in flight ; when present it is prettily barred with brown and white ; lateral and anal tufts spreading, reddish brown, the latter paler at the tip. Fore wings rather triangular, broad behind ; the costa nearly straight ; apex rounded or bluntly angulated ; hind margin hardly oblique, nearly straight to below the middle, thence rounded off ; dorsal margin almost straight, colour rather pale umbreous, clouded with darker, all the nervures and other markings conspicuously whitish-brown ; basal line limited to two pale crescents edged inwardly with black, first line broad, angulated near the costa, thence rather direct, edged on each side with dark brown, but preceded by

a duplicate whitish line; second line also broad, and after curving back near to the costa almost straight, also very oblique, and edged on both sides with dark brown, and has a parallel pale line on the outside; subterminal line broad, repeatedly angulated, broken, and displaced below the apex, also forming an imperfect **W** above the anal angle; orbicular stigma ovate, oblique, brown, edged with brownish-white, and outside this with dark brown; reniform stigma large, yellowish-white edged with black, and divided into crescents by a perpendicular brown line; claviform stigma somewhat of a loop, visible from its black margin; costal region rather pale, but having a pair of brown spots at the origin of each transverse line; between the stigmata and crossing the wing is a slender, much rippled dark brown central shade; between the second and subterminal lines a band of dark brown dashes occupying the spaces between the pale nervures; extreme hind margin edged with minute black lunules; cilia very faintly crenulated, whitish-brown, clouded with darker. Hind wings brownish-white with the nervures faintly darker; central spot very long, pale brown; beyond it is a broad ill-defined brownish cloudy band which encloses a paler shade near the margin; in this band the nervures are darker brown; cilia whitish. Female decidedly stouter, otherwise similar.

Underside of the fore wings yellowish-grey, more yellow toward the costa, whiter toward the dorsal margin; reniform stigma narrow, dark brown; beyond it is a partial straight brownish transverse stripe, near the hind margin a more complete yellowish stripe, broken near the apex. Hind wings white, with the costal region broadly yellowish-grey; central spot large, dark brown; beyond it is a slender partial transverse brown line; hind margin clouded with pale brown; body and legs pale purplish-brown; leg tufts paler.

Very slightly variable in depth of ground colour; extremely constant in markings.

On the wing in June and July.

LARVA cylindrical, tapering very little at the posterior extremity, rather uniform in size and tint; the whole of the back and sides down to the spiracles greenish-drab or reddish-drab, delicately marbled with darker tints of the same; along the spiracles a faint whitish stripe and a very sinuous interrupted dark line running through it. Spiracles very small, of the ground colour, outlined with a darker drab. Dorsal line just visible, slightly paler and outlined with darker, more especially noticeable on the anterior segments; among the fine marbling can just be discerned a fine and rather sinuous pale sub-dorsal line, and below it another, more continuous. Under surface and legs of the ground colour, but paler and without markings; head and dorsal plate light brown; legs drab; prolegs tipped with brownish hooks. (W. Buckler.)

July and August on knotgrass (*Polygonum aviculare*), and doubtless other low plants. Abroad it is said to feed on *Silene inflata*, *Saponaria* and *Dianthus*, preferring the capsules; but Mr. Buckler was unable to induce his larvæ to eat *Silene*. The suggestion of these plants indicates either a confusion or a singular unanimity of taste between this species and the somewhat similar species of the genus *Diantheicia*. Unfortunately we know very little of this larva here.

PUPA shining reddish-brown, not more particularly described; in the earth. In this state through the winter.

The moth is very rarely found in the daytime, doubtless it hides among herbage on the ground. It flies briskly at early dusk and is strongly attracted by the blossoms of *Silene inflata*, *Echium vulgare*, *Lilium martagon*, and other flowers, and, the female more especially, by sugar; the male by light. Apparently never a plentiful species, but found throughout the southern and eastern counties, though in Cornwall and Dorsetshire it is said to be scarce, and hardly more frequent in Somerset and Gloucestershire, commoner in Oxfordshire and Cambridgeshire. Also found in Herefordshire, Worcestershire, Sherwood Forest, Nottinghamshire,

Lincolnshire, several localities in Yorkshire, and rarely in North Staffordshire, Derbyshire and Cheshire. I find no records further north, nor in Wales. In Ireland it appears to be very rare; a single specimen has been recorded at Kingstown, Dublin, another at Glandore in the same county, and three at Rorke's Point, Co. Cork. Abroad it is found in many parts of the temperate regions of Northern Europe, Central Europe, North Italy, Southern Russia, and the more mountainous districts of Central Asia.

Genus 15. **APLECTA.**

ANTENNÆ simple, ciliated; eyes hairy; eyelashes short and rather indistinct; thorax robust, crested at top and back; abdomen with four or five small crests; fore wings ample, elongate, broad behind and with very full hind margin; hind wings ample, plainly coloured, vein 5 extremely faint.

LARVÆ cylindrical, long and stout, feeding at night.

PUPÆ subterranean.

A table is unnecessary, the three species being very distinct.

1. **A. advena**, *Fab.*—Expanse, $1\frac{3}{4}$ to $2\frac{1}{4}$ inches. Fore wings smooth, shining pale purplish-brown, with a pair of darker brown spots at the anal angle; reniform stigma edged with white; hind wings soft smoky-brown.

Antennæ of the male finely notched, and ciliated with minute tufts of fine bristles, pale brown; tongue very long; palpi short, strongly tufted so as almost to conceal the apical joint, purplish-brown; head purple-brown, very strongly tufted between the antennæ; thorax rather paler brown, the collar barred with red-brown and still more faintly edged with whitish; top crest large and prominent, back crest also distinct, both tipped with purple-brown; fascicles small, white; abdomen glossy pale golden-brown, its dorsal ridge ornamented with two or three oblique raised tufts or crests of

a lighter brown; lateral and anal tufts spreading. Fore wings elongated, not very broad, costa very gently curved; apex bluntly angulated; hind margin oblique, very gracefully curved, and crenulated, especially towards the anal angle; dorsal margin rather straight; colour, shining pale purplish-brown shading off rather paler along the dorsal margin; basal line red-brown, duplicated, angulated close to the costa and bending into the middle of the base so as to form a basal streak; first line red-brown, rather obscure, oblique and nearly straight to near the dorsal margin, where it is angulated; second line a faint series of reddish-brown crescents, the long points from which run along the nervures in blackish dots (these two lines are nearer to each other than is usual in other species); subterminal line faintly whitish, edged inwardly with red-brown, indistinctly angulated into long arrow-heads towards the hind margin; nervures preceding it paler; orbicular stigma large, round, very indistinct, but faintly edged with whitish and ringed with red-brown; reniform stigma more distinctly edged with red-brown and inside this with white, the outer edge sharply white, and this is the only distinct marking upon the wing; claviform stigma very obscure—a broad loop edged with red-brown; close to the anal angle are two noticeable chocolate streaks, which are part of the edging of the subterminal line; extreme hind margin sharply edged with slender reddish-black or red-brown lunules; cilia very pale smoky-brown. Hind wings soft pale brown, with a light golden gloss, deepening into an ill-defined broad band of darker smoky-brown along the hind margin; nervures faintly darkened; cilia white, with a faint shading of brown. Female larger, with the fore wings decidedly broader, and the costa more arched; antennæ simple; hind wings more uniformly brown, body stouter.

Underside of fore wings silky pale umbreous, with a rather darker broad band toward the hind margin; hind wings more whitish-brown, dusted with brown along the costa, and broadly clouded along the hind margin, central spot brown;

just beyond is a very slender transverse brown stripe; nervures distinctly darkened; body and leg tufts pale yellowish-brown; legs darker.

An extremely constant species in colour and (absence of) markings.

On the wing in June and July; but a partial second generation has been reared late in the autumn.

LARVA thick, cylindrical, the head, second, and anal segments but a trifle smaller. Head shining olive-brown; on the second segment is a blackish-grey plate, rounded behind, through which pass the pale dorsal and subdorsal lines; ground colour of the back and sides very pale ochreous; a dark grey diamond-shaped mark mottled with olive on each segment, having on its edges the usual four tubercular dots, rather large, and whitish, ringed with blackish-grey; dorsal line whitish edged with blackish-grey, but more or less suffused with dark grey and olive as it passes through the middle of the diamond shapes, though distinct at the beginning of each segment; on the anterior portion of each segment is a very short blackish-grey linear mark on each side; subdorsal line whitish outlined with dark grey and in its course sometimes touching each posterior pair of dorsal dots; sides mottled with dark grey and olive, having oblique streaks and a pale line of ochreous above the legs; spiracles brownish-orange, edged with dark grey; undersurface and legs pale greenish-brown. When young pale greyish-ochreous on the back; brownish in the middle, through which runs a fine white dorsal line enclosed between two black outlines, which are thrice united across the white line at the beginning of each segment, and are suggestive of an irregular chain pattern; sides, legs, and undersurface of a darker dull olive-brown: above the legs is a slender whitish longitudinal line; the subdorsal line is brown, interrupted near the middle of each segment by a short oblique streak of pale ochreous from the back; midway along the side

is a rather obscure darker brown line; head ochreous. (W. Buckler.)

July to September, on knot grass (*Polygonum aviculare*), rest-harrow, broom, whortleberry, dandelion, and other low-growing plants.

PUPA dark brown; apparently not more fully described; subterranean.

The moth hides itself during the day, most likely among dead leaves and herbage upon the ground; it is very rarely captured during daylight, though a casual specimen may perhaps be found sitting on a wooden fence, at dusk it flies vigorously and is strongly attracted by the blossoms of *Silene inflata*, *Lilium martagon* and *Echium vulgare*. It also comes, not rarely, to sugar. Twenty or thirty years ago it was not uncommon in the outskirts of London, visiting the flowers in gardens, but seems here to have totally disappeared. Never very plentiful, but found in moderate numbers throughout the southern and eastern counties of England except Cornwall, where it has hitherto been recorded in only one locality. North of a curved line from Gloucestershire through Oxfordshire, Cambridgeshire and Norfolk it seems very rare, hardly occurring in the Midlands or western counties until we reach Yorkshire and Lancashire, in both of which it is rare. The same is the case in Wales, where it has been taken near Pembroke and at Barmouth. Strangely enough it becomes more frequent in Scotland, being recorded as rather common at Crieff, and very locally so in Perthshire and Ayrshire. Dr. Buchanan White gives its localities as restricted to the districts of the Forth, Clyde, Solway, and Tay. In Ireland it has been secured in several succeeding years at Castle Bellingham, but I know of no other locality for it in that country.

Abroad it is found throughout the temperate portions of Northern Europe, Central Europe, North Italy, the Ural Mountain districts, and the mountain regions of Central and

Eastern Asia. In Canada and the United States is a more purplish form, called *purpurissata*, which is most probably only a modification of the present species.

2. **A. tincta**, *Hüb.*—Expanse $1\frac{3}{4}$ to $2\frac{1}{8}$ inches. Fore wings silvery bluish-white, clouded broadly in the middle with purple-brown, and with two similar blotches before the hind margin; stigmata edged with purple-black; hind wings dark brown.

Antennæ of the male simple, minutely ciliated with tiny tufts of fine bristles, purple brown; palpi short, broadly tufted, black shaded off with grey; head dusky white, broadly barred in front and across the top with purplish-black; lower portion of the collar broadly white, edged above by a deep black bar, the portion above this light brown; shoulder lappets greyish-white, with a broad deep black stripe down the outer edge and black dots along the inner margin; remainder of the thorax reddish-brown, with top and back crests, which are tipped with black or dark purple-brown and barred with white, the bars at the back being broad and distinct; fascicles white; abdomen shining pale grey-brown, the basal portion covered with long glossy white hair-scales, and the dorsal ridge ornamented with four or five small dark purple-brown crests or tufts lying obliquely; lateral and anal tufts rather small. Fore wings long, broad behind; costa decidedly curved; apex angulated; hind margin very full, regularly crenulated, rounded and more oblique toward the anal angle, where is a slight concavity; dorsal margin faintly curved. Colour silvery greyish-white, or bluish-white, much marbled in the middle area with purplish-brown; basal line black, double, angulated, abbreviated; first line duplicated, blackish with the enclosed line very white, rather perpendicular and but little indented; before it is a transverse stripe of pale purplish-brown expanded on the costa; second line purple-brown, more faintly duplicated, scalloped throughout, the tips of the scallops in the middle of the wing running out to dots on the nervures; between the duplicate lines

is a whitish stripe; subterminal line slender, repeatedly indented, purple-brown, thickened on the costa, in the middle, and above the anal angle into, in each case a broad purple-brown streak or blotch; orbicular stigma large, irregular, extended at the upper edge, whitish margined with black; reniform stigma silvery-purple edged with black and containing two purplish lines; claviform stigma purplish, edged with black; space between the two upper stigmata purple-brown, and all the remaining space between the first and second lines clouded and shaded with the same; extreme hind margin edged with black lunules, the thickest of which are at the anal angle and are edged inside by two small purple-brown clouds within the large curved streak on the subterminal line; cilia silvery-white tinged with grey. Hind wings pale smoky-brown, with a large darker central lunule followed by a still darker slender transverse stripe; hind margin broadly dark smoky-brown; cilia white, and a whitish submarginal streak lies along within the anal angle. Female stouter, rather larger, with broader fore wings, but extremely similar. Underside of the fore wings pale smoky-brown, silvery-grey along the costa and hind margin, and with a silvery-white transverse line near the latter; a faintly white transverse band lies beyond the middle of the wing and before it a smoky-black costal spot; at the middle of the base is a raised tuft of pale orange scales. Hind wings shining whitish, much dusted with smoky-brown on the costal margin and the nervures; central spot large, ovate, blackish; beyond it is a slender blackish cloudy transverse stripe followed by a broader stripe of dusky atoms nearer the hind margin. Body smoky-brown thickly dusted with white; legs brown; leg tufts white.

Usually not variable except in a small degree in the extent of purple-brown clouding, which in some instances extends itself broadly over the fore wings, in others is restricted to only a portion of the central space; but there is also some local variation, specimens from Scotland having

the ground colour of the fore wings more tinged with grey or bluish, and the markings more purplish, while in North Staffordshire this tendency appears to be intensified, specimens forwarded from that district by Mr. F. C. Woodforde being decidedly bluish, with almost blackish-purple clouding. Examples from Scotland appear to be usually smaller than those from the south and middle of England.

On the wing in June, extending into July in the north.

LARVA active and energetic; stout, even in thickness, but each segment swollen, especially at the sides, and the divisions consequently rather deep; head rather smaller but broad and full, with smooth shining pale brown lobes which are sometimes clouded with darker brown, a good deal retracted into the second segment when at rest; body light purplish-brown with a dusted appearance from abundant purplish clouding; dorsal line on the four anterior segments very narrow, whitish, edged with dark brown, fading out in the middle of the fourth body-segment, and only indicated by a series of dark brown clouds at the junctions of the remainder; along the subdorsal region is a series of pale brown clouds; ordinary raised spots darker brown; spiracles dull black, placed at the apex of the swollen lateral portion of each segment; undersurface and legs very pale brown; prolegs semi-transparent brownish-grey with the claspers dark grey. (Described from larvæ furnished by Mr. Woodforde for this purpose.)

The young larva before hybernation is of a light orange-brown mottled with pinkish and darker brown; dorsal line whitish edged on each side by a blackish line, but the white line is much broken up into dots and streaks; subdorsal line similar but much obscured by a dusting of blackish which covers the sides; head cinnamon-brown, streaked and reticulated with dark brown; raised dots whitish, margined with blackish-brown on the upper side, each bearing a blackish hair; spiracles pinkish outlined with black; and the sides below them are freckled with pink. (W. Buckler.)

August to May, apparently feeding mainly on low plants, such as dock, plantain, and knotgrass, in the autumn; hibernating, and feeding in the spring, more especially on the opening buds of birch, but sometimes on those of hawthorn, sallow, and bramble. Feeding at night, and readily obtained in the spring on twigs and bushes of birch, on which it may sometimes be found in abundance till half grown; after this great numbers seem in this climate to die off. In the daytime it hides close to the ground and will often form itself quite a comfortable chamber in loose moss.

PUPA rather elongated, eye-covers prominent, smooth; wing and limb covers moderately glossy, but sculptured all over with fine striæ and pits, chocolate-red; abdomen very glossy, bright light chocolate-red, segments very mobile, deeply divided and strongly rounded, stout, but the last three tapering regularly off, the anal segment verging to a large triangular deeply striate black process, or cremaster, which is terminated by the usual pair of straight spikes, small and bent at the tips. In a chamber formed among moss on the ground or beneath the surface. Difficult to rear, a large proportion apparently being killed by a fungoid growth which quickly breaks up the whole substance. The time in pupa otherwise is short, hardly more than a fortnight.

The moth sits often in the daytime upon the trunks of birch and other trees, and on fences near them, doubtless also among dead leaves on the ground. It flies at dusk, and from its light colour is then rather conspicuous, especially when hovering about boggy ground among sweet gale and birch; but it comes readily to sugar, sits down pretty quietly, and is not difficult to secure. Blossoms of *Silene inflata* also attract it when growing at the edge of a wood. Almost confined to birch woods and heathy or boggy land in which are scattered birch bushes and trees. In such situations moderately common in Kent, Surrey, Sussex, Hants and Essex; very scarce in Dorset and Devon, though found near

Plymouth; found also in Berks, Huntingdon, and Oxfordshire, and a single specimen is on record as taken at Chatteris, Cambs. In large birch woods in North Staffordshire it is very much more plentiful, but scarce and local in Worcestershire, Herefordshire and North Lancashire, found in only one locality in Yorkshire, and again more frequently, in certain years, in Westmoreland. I can find no record in Wales, though it cannot well be absent from the birch woods around Llangollen. In Scotland locally and intermittently plentiful in some districts, as Rannoch and Moncrieffe Hill, Perthshire, Braemar, Sutherlandshire, Moray, and in smaller numbers in Argyleshire, Ayrshire and Dumbartonshire. It does not seem to have been observed in Ireland.

Abroad its range is wide—all the temperate portions of Northern Europe, Central Europe, Northern Italy, the Ural Mountain districts, and the mountain regions of Central Asia.

3. **A. nebulosa**, *Hufn.*—Expanse, 2 to $2\frac{1}{4}$ inches. Fore wings white or greyish-white, mottled all over with grey lines, clouds, and arrow-head markings; upper stigmata very large, white; hind wings pale brownish-grey.

Antennæ of the male rather stout, simple, ciliated with exceedingly minute tufts of bristles, dark brown with the back of the shaft white; palpi short, broadly tufted, white in front, blackish at the sides, the terminal joint rather slender; tongue long; head white, barred in front with black, and spotted on the top with the same; collar broad, white, barred with black and edged with purple-brown and black; shoulder lappets white, beautifully bordered with black clouds and dots; remainder of thorax white, crested at the top and back, the crests tipped and bordered with purplish-brown or black; fascicles spreading, white; abdomen whitish, dusted with brown, basal portion covered with long white hair-scales; dorsal ridge furnished with several long, almost prostrate, black tufts or crests; lateral and anal tufts spreading. Fore wings elongated, broad behind; costa gently and

very regularly curved, apex bluntly angulated; hind margin fully rounded and regularly crenulated; dorsal margin nearly straight; colour snowy-white or greyish-white, dusted with grey-brown, and abundantly rippled with black cross lines; basal line distinctly double, black, much angulated, and bending in to the base; first line black, broadly duplicated, repeatedly angulated and scalloped; second line broadly double, blackish, but less distinct and hardly complete, its outer parallel consists of a series of crescents, the points of which run out in black dots on the nervures; subterminal line black, deeply indented so as to form long points between the nervures; these points are thickened with black clouding above the middle, and there is a large black spot just above the anal angle; orbicular stigma large, white, centred and bordered on each side with black; reniform stigma very large, extending quite outside the discal cell, white, sharply edged before and behind with black and containing narrow grey clouds; claviform stigma also large, pale grey, sharply edged with black; the space between the two upper stigmata is clouded with grey, and cut by a black line arising on the costa, much angulated and proceeding more faintly across the middle of the wing; costal and hind margins spotted with black; cilia white, dotted with black and slightly scalloped or crenulated. Hind wings broad, with the hind margin rounded but slightly sinuous; greyish-white with the nervures greyish-brown, and a broad ill-defined grey-brown band along the hind margin; before this is a very faint parallel dark line; central spot obscure, grey-brown; cilia white. Female stouter, with the fore wings longer and more pointed, otherwise very similar.

Underside of the fore wings smoky-grey with a yellowish gloss, and the nervures browner; costal margin dusky white, interrupted beyond the middle by a smoky-black bar which proceeds as a less distinct stripe, followed by another, paler, across the wing; within the hind margin is a sharply defined whitish cloud, and at the extreme edge a row of black spots.

Hind wings greyish-white, faintly dusted toward the costa with pale brown; central spot dusky black; beyond it is a slender, indented, cloudy blackish transverse stripe, and before the hind margin a broad pale grey band interrupted by white nervures; extreme margin white, edged with a black line; cilia white, legs pale brown, barred in front with darker brown; leg tufts and body yellowish or greyish-white.

Variation in this species is very considerable—apparently local or in some degree climatal—and consists mainly in more or less suffusion of the ground colour with grey or smoky-black. In the South of England the ground colour is usually white, sometimes brilliantly so, occasionally with brownish clouding along the costa, in other instances rendered more extensively white by partial obliteration of the transverse lines and shades, in which case the large stigmata become conspicuous. Away from the extreme south a clouding of darker, or a darkening of the markings, or both, very soon become manifest; even in Berkshire one wood will produce white forms in abundance, and another, but a few miles distant, equally plentiful greyer variations. This becomes intensified in the Midland and Northern counties, while both forms are mingled in the Eastern and Western, and the extreme is reached in Cheshire, where in the Delamere Forest region specimens are frequently obtained wholly suffused with smooth smoky-black and hardly presenting a trace of the usual markings, the stigmata being only indicated by paler clouds; while the hind wings are also smoky-black, but with the cilia white. This singular melanic form was discovered only a few years ago by Mr. J. Collins, of Warrington, but has, I believe, been found every season since, and now is taken also in South Yorkshire. In the intermediate gradations of colour this obscuration of the markings is rarely visible; usually they are blacker than the grey or smoky ground colour. In a specimen taken near King's Lynn, Norfolk, the general dark colour and markings are relieved by slender white stripes in the places of the usual

first and second transverse lines. The intermediate grey tones of colour seem to prevail northward to a large extent, but a specimen from Sutherlandshire in Mr. W. H. B. Fletcher's collection is of quite the whitest type, and others from Argyleshire are also white, but almost devoid of markings.

On the wing in June and July, and in Scotland continuing into August.

LARVA stout, cylindrical, with the extremities very little smaller; head rounded, red-brown, with a black triangle in front; body yellowish-grey or brownish-grey; dorsal line paler, very slender, and enclosed in a necklace-like dorsal stripe which is narrow at the segmental divisions, swelling out on each segment so as to form an angle on each side in the middle of the segment; at the apex of each angle is a black spot representing the subdorsal line; this figure is not maintained on the three first body segments, where the stripe is more uniform, but on the third and fourth are two black spots on each side, one in a line with those already denoted, the other in that of the spiracles; from the fifth onward is an oblique, wedge-shaped, black streak very conspicuously placed in front of each spiracle, which also is black. Legs, prolegs, and undersurface pale grey. When younger, of a light brown or grey-brown colour, the dorsal stripe a series of diamond-shaped marks, the front edges of which are deep black; lateral oblique streaks black and strongly marked.

August to April, feeding in the autumn on low plants, such as dock, but after hybernation upon the young shoots of hawthorn, blackthorn, oak, birch, willow, wild cherry, bramble and other bushes. Feeding at night and hiding itself close to the ground in the daytime.

PUPA shining brown, with darker wing-covers. Not more particularly described. Subterranean.

The moth may sometimes be found in the daytime sitting

on a fence, post, or tree trunk, but doubtless hides more frequently among dead leaves on the ground. It flies freely and rather conspicuously at dusk, and comes readily to sugar in woods. In such situations it is moderately common throughout the greater part of England, and in large woods often plentiful. Apparently scarcer in the extreme west, being said to be uncommon in Devon and rare in Cornwall. In Wales I have found it, though not commonly, at Pembroke, and it doubtless occurs throughout the Principality. Rather local in Scotland, but found in Roxburghshire, the Clyde Valley, Argyleshire, and the districts of the Tweed, Tay, and Moray. In Ireland it is said to occur generally in woodlands, where such exist, but is in other situations rare or absent. Abroad it is found in Central Europe, Italy, Northern Turkey, Southern Russia, Livonia, Armenia, and in the mountain regions of Central Asia. In America it apparently exists in a race known under the name of *A. nimbose* Gn., in which the whitish ground colour is clouded with grey *in patches*, but which in other respects seems to be identical with the present species, and is widely spread over the Northern, Eastern, and Middle United States, Canada, British Columbia, and Colorado.

Genus 16. **Hadena.**

Antennæ ciliated, eyes hairy, eyelashes distinct at the back but prostrate; thorax strongly crested; abdomen also crested, usually with three or four tufts; fore wings stout, rather narrow, with a conspicuous **W** in the subterminal line; hind wings rather ample, with vein 5 very faint.

LARVÆ cylindrical, smooth, brightly coloured, often in broad longitudinal stripes.

PUPÆ subterranean.

Many of the species are handsome and strongly coloured, not easy to tabulate—but this is an attempt:

- A. Fore wings with a deep black streak from the base.
 B. Fore wings greyish, marbled with purple-brown.
 C. A broad, oblique, whitish stripe in the dark clouding.
contigua.
 C². The dark clouding cut off below by a straight black
 bar. *genivata.*
 B². Fore wings purple-red, a yellowish blotch above the
 basal streak. *thalassina.*
 B³. Fore wings purplish-brown, a paler stripe along costa
 from base. *suasa.*
 B⁴. Fore wings whitish clouded with pale brown.
peregrina.
 A². No basal black streak.
 D. Forewings purple-red or liver coloured.
 E. Subterminal line white with a long **W**. *oleracea.*
 E². Subterminal line yellow, expanded above anal angle.
pisi.
 D². Fore wings pale grey-brown, uniformly mottled with
 darker. *chenopodii.*
 D³. Fore wings slate-grey clouded with black.
 F. The three stigmata conspicuously whitish. *glauca.*
 F². An oblique, forked, white central blotch edged with
 black. *dentina.*

1. **H. contigua**, *Vill.*—Expanse $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings purplish-brown marbled with brownish-white and black; a broad pale stripe from the middle of the costa to the anal angle, and a distinct **W** in the hind margin; hind wings whitish-brown.

Antennæ of the male simple, densely ciliated, brown; palpi moderately tufted, dark brown, more whitish in front; head yellowish-white or yellowish-grey tinged with dark brown between the antennæ; collar yellowish-grey or whitish in its lower half, sharply barred above the middle with purple-brown or purplish-black, above this the edge is ashy-grey; remainder of the thorax dark brown mixed with ashy-grey;

crested at the top and back, the tips of the crests and the edges of the shoulder-lappets purple-brown or dusky black; fascicles small, white; abdomen whitish-brown, the basal segments sparsely covered with long white scales; dorsal ridge with two or three conspicuous but very fugitive crests, whitish tipped with dark brown; lateral and anal tufts pale purplish-brown. Fore wings rather narrow; costa nearly straight; apex almost pointed but suddenly rounded off; hind margin rather oblique, more so below the middle, where it is bent, otherwise very faintly rounded; dorsal margin straight. Colour ashy-white, much marbled with purplish-brown, blackish, and rosy-grey; basal line black, forming a small curve from the costa and uniting with a deep black line from the middle of the base, the enclosed space tinged with pale yellow; first line black, duplicated, not very distinct, placed perpendicularly and formed into three crescents; second line more oblique, black, and formed into three large crescents to the middle, thence to the costa very faint, double throughout, and with the lower portion of the enclosed stripe white; subterminal line white, sinuous, but in the middle forming a conspicuous **W**, from the points of which, inwards, run black arrow-heads having around them grey or smoky-black shades; orbicular stigma large, oval, white, containing a grey cloud and edged with black; reniform stigma large, open at the top, otherwise edged with black, pale red with a blackish cloud filling its lower half; claviform stigma edged with deep black; below the orbicular, and placed obliquely, is usually a large space of the pale ground colour, edged beneath with a black line; this pale space or blotch, with the pale orbicular stigma above, and a large similarly pale space at the anal angle, form an oblique pale stripe across the wing, and are in this respect very conspicuous; on the inner side of this stripe the space to the basal line is occupied by purple-black and smoky-black clouds, which include the claviform stigma; space between the two upper stigmata black, that outside the oblique stripe

much clouded and shaded with black, purplish, and ochreous, in which, toward the apex, is usually a large ovate, or more extended, pale space shaded with grey or reddish; costa spotted or clouded with black; hind margin beyond the subterminal line smoky-brown or shaded with black, in which is a marginal row of triangular black dots; cilia grey dusted with white. Hind wings rounded, not elongated, pale greyish-brown, almost white at the base, darker brown toward the hind margin; nervures also darker; cilia white. Female stouter, otherwise quite similar.

Underside of the fore wings shining pale grey or ashy-white, tinged toward the costal margin with brownish-purple; reniform stigma indicated by a darker streak; hind wings whitish, broadly dusted with brown along the costal region and on the nervures; central spot small, dusky black; legs dark brown barred with white; leg tufts and body whitish-brown.

Not very variable, but having fixed climatal races; specimens from the southern districts being of full size, with the clouding dark purple-brown and rather extended; those from northern hill districts, and especially from Scotland, of rather smaller size, with the costa of the fore wings straighter, and the clouding somewhat lighter and more tinged with red. In Ireland very rich, but evanescent, colouring seems to be assumed. Mr. W. F. de V. Kane records an example taken at Sligo which was wholly suffused with rose-colour; and Mr. C. A. Watts found one, freshly emerged, in the Mourne Mountain district, Down, which showed a strong suffusion of pink over the darker area, and of *green* over the basal area, anal angle, and reniform stigma. After death these colours gradually faded, and when it was forwarded to me they were only just traceable. In both northern and southern specimens the oblique pale stripe is occasionally interrupted in the middle by a dark cloud.

On the wing in June.

LARVA. Head rounded, shining whitish-green, mouth and a few dots surrounding it dark brown; body cylindrical, rather enlarged behind; sides puckered; colour greenish-yellow or yellowish-green; dorsal line indicated by a grey spot at each incision; subdorsal lines represented by double oblique reddish dashes, most conspicuous on the middle segments; spiracular line very faint, whitish or yellowish; spiracles white, edged with black; legs and prolegs tipped with reddish. (C. Fenn.)

Variable; Buckler figures one with rows of brown spots across the front of each segment of the yellow-green body; another of a bright red-brown with a yellowish subspiracular stripe and undersurface.

July to September on birch, oak, hazel, sweet gale, fern (*Pteris aquilina*) dock, knotgrass, and doubtless other low growing plants. Feeding at night and usually hiding on or near the ground in the daytime. A very active larva.

PUPA elongate, rounded, dark purplish-red, anal extremity dilated and furnished with two short bristles. Subterranean, in a very fragile and brittle silken cocoon. (C. Fenn.) In this state through the winter.

The moth may occasionally be found sitting on palings, or the trunks of trees, in the daytime, though doubtless the majority of specimens hide among dead leaves and herbage. At dusk it comes readily to sugar. Apparently confined almost entirely to woods and wooded heaths, and found in such situations, though not very commonly, in most of the Southern and Eastern Counties of England. Apparently much more rare in Dorset, Devon, and Gloucestershire, and also in the Fen districts; indeed, I know of no record of it in Norfolk or Lincolnshire. In the more wooded districts of the Midlands, as Northamptonshire, Cannock Chase, Staffordshire, and Sherwood Forest, Notts, it is more frequent; even common in some seasons. Less common in Worcestershire and Herefordshire, extremely rare in Cheshire and

Cumberland, and but once recorded in Yorkshire. In North Wales it has been taken near Barmouth, and in South Wales, rarely, in one wood in Pembrokeshire. Much more plentiful in Scotland, though local; found in Perthshire, Argyleshire, Ross-shire, Aberdeenshire, Moray, Inverness and Bute. In Ireland widely distributed though apparently never common, more particularly affecting hill districts; it is recorded from Wicklow, Waterford, Cork, Kerry, Galway, Sligo, Westmeath, and the Mourne Mountains in the county Down.

Abroad it seems to occur throughout Central Europe, the temperate portions of Northern Europe, North Italy, the Ural mountain district, and the mountain regions of Central Asia.

2. *H. thalassina*, *Rott.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings rich purple-brown marbled with darker; a yellowish-white blotch at the base; orbicular stigma and transverse lines whitish; a conspicuous **W** near the hind margin running into the cilia. Hind wings pale brown.

Antennæ of the male simple, very minutely ciliated, dark brown, shaft barred with pale yellow; palpi strongly tufted, purple-brown, paler in front, apical joint small; head pale yellow with a projecting brown transverse tuft between the antennæ; collar reddish-grey with an orange gloss, crossed by a slender yet distinct purple-black bar; shoulder lappets purple-brown, edged on both sides with black; remainder of thorax paler purplish-grey, very strongly crested on the top and back, the tufts tipped with deep purple-black and barred with red-brown; fascicles dirty white; abdomen pale smoky-brown with long paler hairs on the basal segments, and on the dorsal ridge a series of five raised crests or tufts tipped with purple-black, the third being by far the largest; lateral and anal tufts spreading, tinged with reddish. Fore wings somewhat ovate, costa very gently rounded; apex bluntly angulated; hind margin regularly curved; dorsal margin

also very slightly curved; colour rich glossy purple-brown marbled with shades of rich red and grey; at the base close to the costa is a rather squared yellowish-white blotch, edged below by a black line from the middle of the base; in this pale blotch are faint indications of the usual basal line; first line thick, white or pale yellow, edged outwardly with black, and formed into three or four crescents; second line also thick, white, sharply edged inwardly, in its lower half, with black curved lines, outside with a browner shade; subterminal line very near the hind margin, sharply white or yellow, slender, curved, and formed in the middle into a conspicuous **W**, the lower points of which run into the cilia, while the upper are tipped with long black streaks; orbicular stigma ovate, whitish, clouded with purplish-grey and edged on each side with deep black; reniform stigma large, open at the top, hardly paler than the ground colour but edged on each side with black and inside this with whitish-grey; claviform stigma rather long, black edged; costa clouded with white above the two stigmata; hind margin edged with purple-black lunules; cilia purple-brown dashed with yellowish-white. Hind wings not very ample, margin sinuous with a rather noticeable hollow below the apex; grey-brown with a golden gloss, more whitish toward the costa and sometimes having a whitish cloud within the anal angle, nervures faintly darker brown; cilia white partially clouded with smoky-brown. Female rather stouter, otherwise accurately similar.

Underside of the fore wings dark smoky-grey, flushed with purple, and dusted along the costal and hind margins with purple-red; a paler reddish stripe at the extreme hind margin; reniform stigma tinged with smoky-black; just beyond it is the purple-brown commencement of a transverse stripe which is only distinct near the costa. Hind wings pale smoky-grey broadly dusted with red on the anterior half; central lunule large, dusky black; beyond it is a sinuous blackish-brown transverse stripe, most distinct on the nervures.

As a rule only a little variable in the depth of colour of the central portion of the fore wings and still less so in the marbling of the remainder, but occasional specimens occur of a smoother, paler purple-brown with but little marbling, while others are darker, altogether more dull in colouring, with the pale shades and markings more or less suppressed, the subterminal line alone remaining distinct. A specimen reared by Mr. A. W. Mera, and exhibited to the South London Society in November 1896, is wholly of a dull dark rusty-brown, with hardly any trace of markings except the yellowish basal patch.

On the wing in June and the beginning of July; in very forward years at the end of May. Casual specimens, doubtless of a second generation, have been taken in August and the beginning of September.

LARVA cylindrical, slightly tapering toward each extremity; anal prolegs extended behind. Head yellowish-brown reticulated with darker; body dull earth-brown with a red tint, dorsal line faintly darker; subdorsal line represented by oblique blackish dashes, which are produced into a wedge with its apex behind; these dashes are transversely united on some of the posterior segments, particularly on the twelfth; spiracular line broad, yellowish brown; sides below the spiracles irrorated with white; spots conspicuously black. (Chas. Fenn.)

Mr. Buckler records three varieties, having the dorsal surface above the spiracles respectively reddish-brown, cinnamon-brown, and dull greyish-brown; the first having also darker brown, mottled diamond-shaped markings on the segments from the fifth to the twelfth, and a black line along the spiracles. The others approach more closely to that just described.

July, August, and September on willow, oak, hawthorn, apple, honeysuckle, broom and barberry, also on groundsel, lettuce, dock, and other low-growing plants. It certainly thrives on that valuable substitute plant, the knotgrass,

(*Polygonum aviculare*). Hiding in the daytime among dead leaves and herbage, and crawling up at night to feed.

PUPA stout, rather full at the shoulders, eye and antenna cases clearly marked; surface of wing-covers glossy but closely sculptured with very fine cross lines; abdomen rather rapidly tapering but anal segment swollen and suddenly rounded off below the cremaster, which is broad and thickened and finished off with a pair of long spikes so very brittle that one or both are usually broken off in the dead pupa, and the appearance is therefore as of one long, or short bent spike. General colour deep dark purple-brown; eye-cases and anal tip black. Subterranean, enclosed in a fragile cocoon of silk and earth.

The moth loves to sit, in the daytime, upon palings, and may sometimes be found on tree trunks, though doubtless the vast majority of specimens conceal themselves among dead leaves and herbage on the ground. Those which establish themselves on a fence or paling in the early morning will dash off in the wildest manner when the sun becomes hot, and then hide upon the ground. It flies freely at night, and especially in the evening and morning twilights, when it visits sugar most freely, and is attracted by honeydew; mainly confined to woods, and in large woods abundant throughout the greater part of England; perhaps less so in Dorset, Devon, and Cornwall, and in Norfolk and Suffolk. Found in similar situations in Wales to Pembrokeshire; common in some parts of Scotland, as Roxburghshire, Perthshire, the Clyde valley, Argyle, and Moray; also found in the Orkneys and Hebrides. In Ireland I have seen it from Wicklow in the South-east and from Armagh and Antrim in the North, and Mr. W. F. de V. Kane states that it is generally common in woods in that country. Abroad it is widely distributed, South Sweden, Finland, Central Europe generally, Northern Italy, Dalmatia, the Ural Mountain district, the mountains of Central Asia, and Tartary. Moreover in

a rather more dull and browner form, known under the name of *subjuncta*, Grote, it is found throughout the Northern and Middle United States, Canada, Ohio, Minnesota, Colorado, Nebraska, Oregon and New Mexico; being in at least some portion of this range double brooded. Another variety, from California and the Sierra Nevada, is known as *Nevadæ*.

3. **H. suasa**, *Bkh.*; **dissimilis**, *Staud. Cat.*—Expanse, $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings narrow, rather pointed, pale brown, more or less marbled with purple-brown; two upper stigmata obscurely paler; claviform stigma conspicuously long and black; subterminal line sharply pale yellow, forming a very complete **W**. Hind wings grey brown.

Antennæ of the male simple, minutely ciliated, light brown; palpi short, broadly tufted, brown mixed with black; head purplish-brown; collar erect, pale purplish-brown, sharply barred with black; rest of thorax pale purple-brown, strongly crested, the crests both at top and back barred with dark brown and tipped with white; fascicles spreading, dusky yellowish-white; abdomen profusely covered at the base with long pale hair-scales rather curled up; dorsal ridge ornamented with a series of small depressed dark-brown crests partially concealed by the pale scales; remainder purplish-brown; lateral and anal tufts more reddish. Fore wings narrow and rather pointed; costa nearly straight; apex rather pointed, but not sharply so; hind margin oblique, gently rounded; dorsal margin almost straight; colour very pale umbreous brown, with all the middle area shaded with purplish-brown; from the middle of the base is a long, distinct, black streak, and above it along the costa usually a stripe of rather pale ground colour in which a couple of cloudy dots represent the basal line; first line perpendicular, duplicated, formed into three or four crescents, the outer portion blackish, the inner faintly brown; second line placed but little beyond the middle, single or sometimes faintly duplicated, formed into a series of black crescents, but

usually visible only in part; the points of the crescents, however, run into long dark streaks on the nervures, and thus cut up a band of the ground colour which lies outside the second line; subterminal line shining whitish-yellow, formed into two broad crescents, and between these into a sharp **W**, the hinder points of which run into the cilia; on the inner side of this line are black clouds and wedge-shaped streaks; outside it the marginal space is dark purple-brown; orbicular stigma only indicated by a small curved black-brown streak on each side, otherwise open; the inner dark edge often joined to the first line and forming a black spot; reniform stigma edged at the back with black-brown but otherwise hardly indicated, its space often partially occupied by a reddish or purple-brown cloud which extends outside it; claviform stigma long, thick, conspicuously black, shaped like a dog's canine tooth; extreme hind margin dotted with black; cilia purple-brown dusted with white and having a yellowish line along their base. Hind wings rather large, pale smoky-brown with darker brown nervures; sometimes an irregular ill-defined whitish stripe arising at the anal angle lies across part of the hind marginal area; cilia white. Female extremely similar.

Underside shining smoky-brown, paler toward the dorsal margin, reniform stigma dusky black; beyond it is a faintly blackish transverse stripe arising from a blacker costal spot. Hind wings dusky white, dusted over the costal half with brown; central spot black; beyond it is a dark-brown transverse stripe; body and legs purple-brown.

Very subject to local variation. In some of its localities, as in Essex and also in South Wales, its fore wings are broadly suffused with smoky-brown or blackish-brown, more especially in the middle, though sometimes extending over whole area; elsewhere on the coast, as in Suffolk and South Devon, and more frequently in the mosses of Lancashire and Cheshire, it becomes of a singular, smooth, almost uniform purple-brown, paler or darker, and in many instances with all

the markings, except the subterminal line, greatly obscured; this peculiar variation ranges almost from red to grey, and these ground-colours are also found in the same localities associated with great distinctness and intensity of the usual markings. The Rev. W. W. Fleming has obtained extremely dark purple-brown specimens near Waterford, the subterminal line being rich yellow, but the other markings scarcely visible. A curious aberration reared by Mr. W. H. B. Fletcher has the fore wings quite abnormally broad and the transverse lines and stigmata extraordinarily conspicuous.

On the wing in June and July, and in forward seasons sometimes at the end of May; occasional specimens of a second generation have been taken in August and September.

LARVA cylindrical, tapering a little toward the head, which is brownish; on the second segment is a dull brownish plate; general colour green or yellowish-green, most minutely irrorated with yellowish atoms; dorsal line indistinct and slightly darker than the ground colour; subdorsal line sometimes absent; where present it appears as a fine black, rather oblique streak on each segment; usual raised dots black and arranged in the usual trapezoid form; spiracular line composed of black fusiform markings, one on each segment, with the white spiracles at their lower edges, brilliantly contrasted by a lateral stripe of bright yellow below; under-surface and feet green.

There is a variety in which the ground colour is brown or olive-brown, the dorsal line strongly marked as a double dark-brown line vanishing at the hind part of each segment in some, in others running continuously through a dark-brown triangle or diamond on each segment, individuals occurring with either form. The subdorsal line appears as a series of oblique dark brown streaks, each streak commencing a little on one side of the segment in advance, and abruptly terminating on the next; dots black and placed on small yellowish specks; along the side of each segment is a dark-

brown triangle, its base resting on the black spiracular streak ; below is the bright yellow subspiracular stripe, its lower edge gradually tinged with the brownish colour of the undersurface (W. Buckler).

June to August, on plantain, knotgrass, lettuce and other low-growing plants, usually near marshy places, feeding at night.

PUCHA of the ordinary *noctua* form, rather stout, surface glossy, except the wing-covers, which are dull, from an abundant but minute sculpture of irregular lines ; limb-covers close and compact ; abdominal segments rather short and close ; anal point rather broad and short, tapering to a blunt tip, which has the usual terminal spikes extremely short and but just appearing as a fork ; half way up the sides of this anal triangle are two subsidiary minute points. General colour dark red-brown or red-black, anal tip blackish. In a brittle cocoon in the earth.

In this state through the winter.

The moth is rarely seen in the daytime, hiding among herbage on the ground. It flies at dusk, sometimes early dusk, comes freely to sugar and occasionally to light. It more especially frequents marshy districts on the coasts, but is found locally in similar places inland, yet is not much addicted to fens. Usually scarce in the Southern Counties, yet recorded in Kent, Sussex, Isle of Wight, Dorset, Devon, Gloucester and Somerset, and once in Cornwall. More widely distributed in the Eastern Counties, and more frequent in the neighbourhood of salt marshes. Rare in Berks, Oxfordshire, Northamptonshire, Leicestershire, Derbyshire, Staffordshire, Herefordshire and Worcestershire ; locally rather common in Cheshire and Lancashire, and widely distributed in Yorkshire, being in these counties especially attached to the mosses. In South Wales it has been found, not rarely, in Glamorganshire, and rather commonly near Laugharne, on the coast of Carmarthenshire. Very rare in Scotland, but

recorded from Ayrshire and Kirkcudbright. Much more common and widely distributed in Ireland: Dublin coast, Wicklow, Waterford, Cork, Kerry, Galway and Louth. Abroad it ranges over Central Europe, the temperate portions of Northern Europe, Northern Italy, Northern Turkey, Southern Russia, Eastern Siberia, and the mountain regions of Central Asia. Also under the name of *Atlantica*, Grote, in Canada, through New England, the Atlantic States to Virginia; thence westward to Wisconsin.

4. **H. peregrina**, *Tr.*—Expanse $1\frac{1}{2}$ inch. Fore wings whitish-brown marbled with white; lines white, three stigmata edged with black; hind wings white with a few brown dashes.

Antennæ of the male simple, ciliated, pale brown; palpi broadly tufted, whitish-brown, apical joint very short; head and thorax whitish-brown abundantly dusted with white; across the front of the collar is a slender pale brown bar, along the upper edge of the shoulder lappets a line of black-brown dots; crests at the top and back tipped with blackish-brown; fascicles short, white; abdomen whitish-brown dusted with darker, and with four or five whitish dorsal crests, which are oblique and tipped with dark brown; lateral and anal tufts small. Fore wings rather elongated, especially so toward the apex; costa very slightly curved; apex bluntly angulated; hind margin rather oblique, straight below the apex, rounded off toward the anal angle; dorsal margin very straight; colour whitish-brown with a broad whiter stripe from the base along the costal area to beyond the middle; below this, arising from the base, is a slender curved short black streak; basal line indicated by two brown dots on the costa and a brown dash beneath the black streak; first line white, partially edged inside with black, much angulated and bent in the middle, so that both extremities lean toward the base; second line curved, white, edged inwardly by several dark brown crescents and streaks;

subterminal line white, a **W** in its centre and a decided curve above and beneath, inwardly it is partially edged by dark brown arrow-head or wedge shaped markings, and paler brown clouds; outwardly with pale umbreous-brown, which fills the hind marginal space; orbicular stigma white, ovate, oblique, slenderly margined with brown; reniform stigma whitish above and edged with brown, its lower half lying in, and tinged by, a pale umbreous cloud which extends to the second line, thus causing the appearance of a broad oblique whitish stripe or shade in the middle of the wing; claviform stigma brown and edged by a darker brown line which almost joins the tip of a dusky black wedge; costal margin dotted with brown; hind margin with minute black triangles edged with white; cilia umbreous, dashed with white. Hind wings white, with a faint, partial, brownish, cloudy stripe before the hind margin, most noticeable on the nervures; cilia white. Female similar.

Underside of the fore wings white, clouded with brown along the costal region; nervures tinged with brown; middle area dusted with grey scales; a blackish spot in the position of the reniform stigma. Hind wings white, thinly dusted with brown along the costal and hind marginal regions; central spot small, blackish; beyond it is a transverse row of brown dots. Body and legs whitish-brown.

On the wing in July, August, and September.

LARVA apparently not very fully described. Hofmann says, "Paler or darker yellow-brown, with two whitish spots on each segment on the back, and a whitish streak on each side; beneath which is a whitish longitudinal stripe rippled with reddish; on the upper edge of it are placed the white spiracles in black spots. Head brown; undersurface and feet grey."

"May and June on *Chenopodium*, *Salsola* and *Mesembreanthemum*."

PUPA undescribed.

Little or nothing is known of the habits of this moth in this country. The only reliable specimens appear to have been taken on the coast of the Isle of Wight. The first was recorded by the late Mr. H. Doubleday in the *Zoologist*, 1858, as having been captured in the previous summer by Mr. F. Bond at Freshwater, Isle of Wight. A second specimen was captured, within a few yards of the same spot, on August 23, 1859, by Mr. R. McLachlan. Both were secured at sugar. Another was reported in 1876 as seen in the possession of a collector at the same place. This is believed to be in the late Mr. Bond's collection, now at Dover. Two or three other specimens exist in one of our largest collections, but have no definite histories.

Abroad it is a Mediterranean species and attached to low-lying coasts. Found in Southern Germany, Southern France, North Italy, Dalmatia, Northern and Eastern Turkey, Southern Russia and Asia Minor.

5. **H. pisi**, *L.*—Expanse $1\frac{3}{8}$ to $1\frac{5}{8}$ inch. Fore wings purple-brown or purple-red, usually marbled with richer tones of the same; subterminal line bright yellow, expanding into a conspicuous blotch at the anal angle; hind wings smoky-white with a broad smoky-brown band.

Antennæ of the male finely notched, rather densely ciliated, reddish; palpi small, strongly tufted, purple-red; head similar; collar of the same colour with a double central bar, not very distinct, of paler and darker purple-red; thorax also rich purple-red, crested at the top and back, the crests and shoulder-lappets tipped with white; fascicles small, dirty white; abdomen glossy pale purple-red, its dorsal ridge ornamented with from three to five oblique blackish crests; lateral and anal tufts spreading, deeper rich purple-red mixed with paler. Fore wings rather narrow; costa gently curved; apex suddenly rounded; hind margin oblique and regularly curved but faintly crenulated; dorsal margin very slightly hollowed and gracefully curved in at the base;

colour rich bright purple-red, marbled with deeper and paler; basal line very obscure, abbreviated and notched, yellowish; first line nearly perpendicular, faintly curved, pale yellow, edged on each side with a deep shade of the ground colour; second line placed hardly beyond the middle of the wing, sometimes interrupted by the edge of the reniform stigma, less oblique than usual, obscurely yellow, edged with dark red, and, when clearly visible, seen to consist of a series of rather flat curves; subterminal line very distinct, bright yellow, irregular and disposed in curves of various breadth, but forming in the middle an extremely flat and rather inconspicuous **W**; above the anal angle, however, this line expands into a broad yellow spot edged inwardly with dark red-brown; this spot is the one conspicuous marking on the wing; orbicular and reniform stigmata of a pale shade of the ground colour, and edged with rich deep red; claviform stigma only occasionally visible as a curved or angulated streak; hind margin and cilia very glossy pale purple, dappled with darker. Hind wings rather small, whitish at the base with brown nervures, a broad cloudy smoky-brown band beyond the middle; hind margin clouded with the same; cilia pale purple or purplish-white. Female quite similar except that the body is stouter, and sometimes the hind wings are more uniformly smoky-brown. Under-side of the fore wings purple-red, shading off to pale grey at the base and dorsal margin; costa near the tip, and also the hind margin, dotted with paler; a faint, cloudy, darker or greyer, transverse stripe lies beyond the middle. Hind wings grey-brown with the costa broadly purple-red and the hind margin more purple-grey; central spot large, smoky-brown; beyond it is a transverse purple-grey stripe. Abdomen and legs bright purple-red.

Very variable in tone of colouring, from the brightest, richest purple-red, to dull clay colour and very much paler shades, or tinged with brown or yellow or even with dark grey; also quite uncertain in the degree of mottling, which

indeed sometimes wholly disappears, leaving the fore wings of a smooth even purple-brown or purple-red, darker or paler, when also all the markings are even less distinct, except the subterminal line which is nearly always conspicuous and usually of a lovely yellow. A series of such specimens of unusual richness is in the collection of Mr. W. H. B. Fletcher. In Mr. F. J. Hanbury's collection is a specimen of a dull dark purplish-red without a trace of any of the pale markings. In Ireland the range of colouring appears to be even greater than with us—red, red-brown, purple-red, even brown and ashy-brown in various tones, purple-grey or purple-slate; and Mr. Kane records one specimen from the Bog of Allan having the dark red-brown colour of *Eurois adusta*. In the West of Scotland many specimens are tinged with greyish-blue. Mr. P. M. Bright has one from the east of that country of a very pretty pale purple-grey mottled with brown and black markings; and two others of a bright clay-red totally devoid of markings, except the subterminal line, which is very broad and conspicuous.

On the wing in June and July.

LARVA elongate, cylindrical, but very slightly tapering to each end; head shining, greenish; ground colour velvety grass-green or dark green, sometimes almost black; subdorsal and spiracular stripes broad, yellow, edged with black, space between them irrorated with white or yellow, and the upper edges of these two lines white; below the spiracular stripe the sides are pale green; spiracles white edged with black; undersurface pale emerald green; prolegs green.

Or ground colour very dark chocolate-brown, or reddish-brown; head dull pink; subdorsal and spiracular stripes broad, yellow, their upper edges whitish margined with black; sides below the spiracular stripe pink; that between it and the subdorsal minutely irrorated with blackish or yellow; spiracles white, edged with black. (Chas. Fenn.) Another variety has the ground colour deep dark purple,

still with the yellow stripes; indeed, these stripes, which are extremely even and regular, render this larva most conspicuous, more especially as it loves to stretch itself on fern, scabious, or some other conspicuous plant in the daytime, as though enjoying the fresh air.

July to September, on heather, willow, clover, dock, scabious, foxglove, fern (*Pteris aquilina*), hawthorn, birch, alder, hazel, sweet gale, broom, bramble, knotgrass, and probably on most bushes and herbaceous plants; feeding principally at night, sometimes hiding in the daytime among herbage, but often to be found stretched upon plants in a conspicuous manner as already stated.

PUPA rather elongated, the abdominal segments very regularly tapering, except that the anal segment is rather suddenly rounded off below, the dorsal surface being produced into a broad triangular cremaster, at the tip of which are situated two strong, rather divergent spikes; general surface moderately glossy, but roughened by extremely small and close sculpture of minute pits which are most abundant on the wing and limb-covers; hinder-edge of the first three abdominal segments broadly banded with a dull, minutely roughened ring; general colour deep purplish-red; anal projection black. Subterranean, in a brittle earthen cocoon. In this state through the winter.

The moth may occasionally be seen sitting upon herbage or on a post in the daytime, but usually hides among herbage on the ground. At night it comes readily to sugar, though not abundantly. Its favourite haunts are not among trees so much as on commons, hillsides, downs, waste places, marshes, and fens, and in some of these it is abundant. Apparently found throughout England, Wales, and Ireland, and in many parts of Scotland, as Roxburghshire, the Clyde valley, Argyleshire, Perthshire, and the East of Scotland to Moray, Inverness, and West Ross; also found in the Orkneys. Abroad its range seems to be somewhat restricted, but

includes central Europe, the temperate portions of Northern Europe, and North Italy.

6. *H. oleracea*, *L.*—Expanse $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings dull purple-red with an orange spot in the reniform stigma, and a clear white subterminal line, in the middle of which is a long **W**; hind wings grey-brown.

Antennæ of the male simple, minutely ciliated, blackish-red, basal portion whitish in front; palpi broadly tufted, dark purple-brown; head and thorax deep dark purple-red or liver-colour, the latter strongly crested at the top and back, the tips of the crests and the extreme edge of the collar tinged with bluish-grey; fascicles dirty white; abdomen dusky whitish-brown with a purplish tinge, its dorsal ridge ornamented with four or five small oblique crests; lateral and anal tufts more tinged with purple. Fore wings of moderate breadth; costa gently curved; apex angulated; hind margin rather full, gently curved and not very oblique; dorsal margin straight to near the base, where it curves rather strongly in; colour brownish liver-red or purple-red; basal and first lines hardly perceptible or indicated by obscure whitish scales; similar whitish scales being scattered along the rather blacker nervures; second line just perceptible; double, darker purple-brown; subterminal line slender but sharply conspicuous, white, very straight from near the apex of the wing to the anal angle, except that in the middle it forms a sudden, long, slender **W**, of which the points invade the cilia; orbicular stigma faintly indicated by a slender white ring; reniform stigma obscure but containing a distinct roundish orange spot, above and below which is a small blackish cloud; claviform stigma an indistinct purple-black spot; costa beyond the middle dotted with white; cilia of the general colour but faintly tinged with yellow along the base. Hind wings grey-brown, whiter toward the base; nervures dark brown; central spot elongated, blackish; cilia white. Female quite similar.

Underside of the fore wings dark smoky-grey, tinged with purple, especially toward the hind margin, where is a broad pale purplish-red band having a scalloped and sharply defined inner edge; a black spot on the costa commences a cloudy blackish transverse stripe or shade. Hind wings white, broadly dusted with purple-red along the costal, apical, and one half the hind marginal regions; central spot blackish followed by a transverse row of dark brown streaks upon the nervures, and beyond this by a smoky-grey transverse stripe; but lying along the hind margin is a sharply pale space. Body and legs purple-brown.

Usually extremely constant in colour, though there is ordinarily a little variation in the general tone of purple-brown colour and in the distinctness of the orange spot, but Mr. Adkin states that specimens from the Scilly Isles are more mottled, while in Ireland, according to Mr. Kane, especially in the extreme West, the tone is dark brown with only a trace of the orange spot, and the subterminal line almost obsolete. In Dumbartonshire, Scotland, it is found by Mr. J. R. Malloch of a very dark purple-brown with hardly a tinge of the reddish colour remaining, but the orange spot quite distinct and the markings well defined. In the collection of Mr. H. J. Turner is an example having the **W** in the subterminal line broadly suffused so as to form a bright white blotch.

On the wing in June and July, and occasionally, in a second generation, at the end of August, or in September or October.

LARVA long, stout, smooth, cylindrical, rather tapering to each extremity; head rounded, shining, pale brownish-ochreous, or in the green forms pale bluish-green; mouth brown with a yellow projection on each side; colour very variable, pale brown, green, pink, ochreous, or pale brownish-green, distinctly irrorated with white and having the segmental incisions paler; dorsal and subdorsal lines ill-defined,

pale-grey; spiracular stripe conspicuous, yellow, shaded above with grey; all the usual raised dots distinct, black; spiracles white, each placed between two black dots. (Chas. Fenn).

July to September on low plants generally, especially partial to *Chenopodium*, nettle, dock, and sallow; but feeding also on shrubs and the shoots of trees, such as elm. Feeding at night, and in some degree in the daytime also; usually, however, hiding itself by day on the ground, under or among dense weeds, and extremely partial to roughly cultivated land where it can hide under masses of potato-haulm and goose-foot; yet may at other times be seen sunning itself, in the afternoon, on nettles and other plants.

An active, vigorous larva, yet with the habit so common in this group of rolling itself tightly up when touched or alarmed, then soon uncoiling and travelling swiftly to a place of safety.

PUPA glossy black, not very stout, its abdominal segments tapering rather gradually; its whole surface, and especially the anterior margins of the segments, roughened with a sculpture of minute depressions; leg, proboscis, and wing-cases of exactly equal length; anal segment terminated by a rather slender projection having a bifurcated bristle. Subterranean in a very brittle cocoon of earth and a little silk. In this state through the winter.

The moth may occasionally be seen sitting on a post, fence, or garden wall, or on plants, and may more frequently be kicked out from among herbage, in which it usually hides. It is not averse to a stone coping or any other convenient hiding place. At dusk it comes to sugar, flowers, honeydew and other sweets, and is one of the commonest of garden insects. Also abundant on farm land, waste places, the banks of rivers and canals, and the banks which shut off the sea in the vicinity of salt marshes. In a less degree common also in woods and meadows, but apparently not fond of heath-land or of hills or mountain sides. Apparently

to be found all over the United Kingdom to the Shetland Isles—except that I have no record from the Orkneys and Hebrides—and, in such places as it loves, extremely abundant; yet known to be very scarce in the hill districts of the south of Surrey, and local in some other of the Southern Counties. Abroad it is common all over the Continent of Europe except Greece and the polar regions, and is found also in Asia Minor. Mr. J. J. Walker has found it at Gibraltar at ivy-bloom in October—doubtless as a second generation.

7. **H. genistæ**, *Bkh.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings pale silvery-grey with a broad central purple-brown band, in which are the two paler stigmata; hind margin purple-brown with a large white **W**; hind wings brown, whiter in the middle.

Antennæ of the male simple, very minutely ciliated, dark purple-brown; palpi broadly tufted, outwardly purple-black, paler in front, the apical joint very small; head pale purplish-brown, barred in front with purplish-black; collar dusky white tinged toward the base with brown, above with purple, and sharply divided by a deep black or purple-black bar; shoulder lappets very pale purplish-brown, with a black stripe edged by a white tuft, over the bases of the wings; remainder of thorax ashy-white with a large purple-brown top crest, and the back crest barred with the same; fascicles dirty-white; basal portion of the abdomen covered with similar long hairs, remainder hoary-brown, the dorsal ridge ornamented with five oblique crests, each tipped with black; lateral and anal tufts spreading, purple-brown. Fore wings rather elongated; costa nearly straight, or very faintly curved at the base and toward the apex, which is very suddenly rounded; hind margin oblique, rounded and crenulated; dorsal margin rather gracefully curved; colour pale silvery-grey or ashy-white faintly dusted with purple; a large blotch of this pale ground colour at the base is bounded beneath by a rather long deep black basal streak,

which shades off to purple on its under side; no basal line; first line double toward the costa, black, formed into three curves, but sharply cut off by a stripe of the pale ground colour which passes from the base under the black line to the second transverse line; this last is single, partly black, partly purple-brown, arranged in a curved series of crescents; subterminal line white, bordered inwardly by a narrow purple-brown cloud and formed in the middle into a large white **W**, from which two black wedges run inward; orbicular stigma very large, white faintly clouded with yellow and sharply edged with black; reniform stigma also large, edged on the inner side with deep black, on the outer with purple-brown; its colour is pale purplish-brown with a large yellowish blotch in its upper half; claviform stigma deep purple-brown edged with black and touching the broad pale dorsal stripe; from it a black streak runs to the second line; the space above this streak and around the stigmata, bounded by the first and second lines, is bright purple-brown with darker shades, and forms a broad, conspicuous but incomplete, central bar; the space between the second and subterminal lines is conspicuously of the pale ground colour, shaded off faintly with purple, more strongly so toward the costa, where are three yellow dots; the black edges of the two upper stigmata also extend to the costa; hind margin beyond the subterminal line deep purple-brown shaded off to silvery-grey, and with a row of black streaks ending in minute crescents on the extreme margin; cilia dark brown dusted with ashy-white. Hind wings dull brown, greyish-white in the middle and toward the base, with the nervures dark brown; cilia white. Female rather stouter, otherwise quite similar.

Underside of fore wings purplish-brown dusted with black, and with white along the costa; central portion filled in with long loose brownish hair-scales; dorsal margin tinged with white; on the costa toward the apex are three white dots; at the apex a whitish blotch from which arises a darker

purple-brown transverse stripe. Hind wings white; costal region broadly dusted with purple-brown and black; nervures brownish; hind margin faintly dusted with brown; body and legs purple-brown.

Hardly variable except in the depth of colour of the central purple-brown band, which also sometimes becomes complete by suffusion of the usual pale dorsal stripe.

On the wing from the middle of May and in June.

LARVA active and rather sudden in its movements, even irritable and impatient of light; very plump, nearly cylindrical, but slightly thickest in the middle and tapering a little at each extremity; head small, rounded, very glossy, pale yellow-brown freckled with black, and having an ill-defined blackish bar down the front of each lobe; colour very pale olive-green, freckled and reticulated over the whole surface above the spiracles, with dusting and irregular moss-like markings of dark brown and dull black; dorsal line only indicated at each segmental division by a dark spot consisting of an aggregation of these markings; an obscure broad **V**-like mark on each segment is composed of similar aggregations in broad oblique lines, the apex of the **V** being behind; in these oblique lines is, in every case, a black dot indicating the position which should be held by a subdorsal line; spiracular line formed of similar series of longitudinal cloudy markings which are here terminated, leaving the whole undersurface, legs and prolegs, pale olive-green; spiracles white.

The general colour varies to olive-brown, purplish-brown, brownish-grey, and greenish-grey; and the oblique subdorsal stripes are in many examples united across the back into diamond-shapes.

July and August on broom, dyer's-greenweed, persicaria, knotgrass, chickweed, and other low-growing plants, feeding mainly at night, and hiding among the food plant during the day.

PUPA rather stout, the whole surface of the limb and wing-

covers, head, and dorsal region, closely covered with fine sculpture of prominences and pits, and similar sculpture over the anterior portion of each abdominal segment, but the hinder portion of each segment smooth and glossy and forming a hoop-like band; anal segment produced into a broad flattened black cremaster, underneath which the segment is hollowed out; its tip furnished with a double spike, the two points of which diverge widely and are slightly hooked beneath; general colour dark purple-brown. In a slight brittle cocoon of earth and silk, beneath the surface of the ground. In this condition through the winter. The larvæ and pupæ for these descriptions were furnished by Major A. Ficklin.

The moth sits in the daytime on fences, rails, posts, or the trunks of fir trees, appearing to like an exposed situation. It flies at dusk and comes willingly to sugar, but is not often captured by other attractions. Rather a widely distributed species, but rarely common; apparently most frequent in Northamptonshire and Worcestershire. Known to occur in Kent, Sussex, Surrey, Hants, Berks, and Oxfordshire; more rarely in Dorset, Devon, Somerset and Gloucestershire; perhaps a little more frequently in Essex, Suffolk, and Norfolk, but more rarely in Cambridgeshire; also found in Herefordshire, very rarely in Yorkshire, and recorded thirty years ago in Cheshire. I find no record in Wales; in Scotland it seems to have occurred near Paisley, at Troon, Ayrshire, and in Argyle. In Ireland Mr. E. Birchall recorded it as uncommon in Wicklow, but there is some doubt about the correctness of this record, and also about another in West Meath. Abroad it does not appear to have a northern range, but is found throughout Central Europe, Spain, Northern Italy, Livonia, Southern Russia, Eastern Siberia, and the Mountain regions of Central Asia.

8. **H. glauca**, *Hüb.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings narrow; slate-grey or dark grey-brown, with three

large pale stigmata, and a row of black wedges before the white subterminal line; hind wings dark brown.

Antennæ of the male simple, very finely ciliated, dark brown; palpi small, densely tufted, light brown; head and collar greyish-white, the latter with a broad central black or brown bar; shoulder lappets greyish-white, ornamented with a semicircular black or brown line; remainder of the thorax pale grey, crested at the top and back, the crests barred with brown; fascicles smoky-white; abdomen smoky-brown, much covered from the base with pale hair-scales; dorsal ridge furnished with four or five obliquely raised purple-brown or dull black crests; lateral and anal tufts spreading. Fore wings narrow, especially so at the base; costa very slightly curved; apex suddenly rounded; hind margin rounded and oblique; dorsal margin gracefully curved; ground colour whitish-grey, usually almost hidden by dark markings; basal line single, abbreviated, much toothed but nearly straight, deep black; first line thick, single, deep black, broken into a series of curves; second line black, divided into a series of crescents, followed by a cloudy brownish line, and in the interval by a row of white streaks or clouds; subterminal line composed of a series of small yellowish-white clouds, dislocated near the apex, each yellow cloud or spot edged inwardly by a hollowed black spot, those near the middle prolonged into wedges or arrow-heads of a deep black; orbicular and reniform stigmata large and conspicuous, white softly clouded with grey or brown and margined with black; claviform stigma white or brownish-white edged with black, rather conspicuous; whole space from the base of the wing to the first line dusted and clouded with black, especially the outer portion; from the first to the second line the central space enclosing the pale stigmata forms a black or brownish-black band; outside the second line is a broad stripe of the whitish ground colour softly shaded with grey or purplish-grey and containing the black wedges; hind marginal space similar; cilia very broad, grey dashed with dusky-white, the

dashes spreading at the outer edge so as to enclose a series of rounded grey spots. Hind wings nearly uniform smoky-brown, rather paler toward the base, but with the nervures and central spot a little darker; cilia white. Female stouter, sometimes with slightly broader fore wings, quite similar.

Underside of the fore wings smoky-grey dusted with white; reniform stigma faintly dark-brown; orbicular slightly visible, yellowish; just outside the former is a blackish cloudy transverse stripe; hind marginal space more dusted with white; cilia spotted as on the upper side. Hind wings white, much dusted with brown; central spot large, triangular, smoky-black; beyond it is a curved smoky-brown transverse stripe; margin edged with a black line. Body grey-brown; legs brown, barred in front with brownish white.

Variable in the ground colour from pale silvery-grey or dusky white to purple-grey or slate-grey; still more variable in the intensity and distinctness of the dark markings and cloudings, which frequently extend themselves over almost the whole fore wings; all three stigmata usually conspicuous, but the claviform is sometimes reduced to a mere white dot, and more rarely the orbicular is obscured by dark clouding; sometimes the yellow subterminal line becomes distinct and continuous throughout, in others reduced to three or four dots, and in some cases it is white; while in some individuals the nervures are dotted and streaked with white, and more rarely the dark markings are tinged with purple. Very dark forms are obtained from the North of Ireland and the West of Scotland, those from Arran being curiously dark, with the stigmata also suffused and indistinct, but the transverse lines conspicuously black.

On the wing in May and June, and in early seasons even at the end of April.

LARVA rather elongate, cylindrical, sides puckered; head rounded, shining, slightly bifid, pale reddish or yellowish

brown, freckled with darker. Body reddish chocolate with an ill-defined row of grey dashes on each side of the dorsal line, which is slender and white; spiracular line broad, slightly paler than the ground colour, but inconspicuous; spiracles white, edged with black; undersurface unicolorous, a paler shade of the ground colour. When young, green or brown with a conspicuous pure white spiracular stripe (Chas. Fenn).

June to August on *Myrica gale*, heather, willow, sallow, and doubtless on low plants. In confinement it will subsist upon lettuce; feeding at night. Mr. Fenn says that it rests during the day on the topmost twigs of its food plant.

PUPA glabrous brown, with a very broad rugose tip to the abdomen and two incurved spines, very distant, at the extremity; each abdominal segment has a ring of strong rough spines, somewhat similar to those of the goat moth (Edward Newman). This structure is somewhat remarkable, since it appears certain that, though the larva changes to pupa underground, it forms *no* cocoon.

The moth sits in the daytime upon palings or the trunks of trees, especially fir or birch trees, or where trees are absent is content to rest upon outcropping rocks and detached blocks of stone. Occasionally it is induced to fly in hot sunshine, and Mr. Kane has noticed it to frequent flowers at such a time. At night it is readily attracted to sugar and sallow-bloom. Comparatively a northern and certainly hill-frequenting species, the most southern localities of which I have any knowledge being the Black Mountain in Herefordshire; Sutton Park, near Birmingham, which seems to be the highest point in that district; and Cannock Chase, Staffordshire; northward of this it is more widely distributed on the hills of North Staffordshire, Cheshire, Lancashire, Yorkshire, Westmoreland and Cumberland; but strange to say I can find no record in Wales. This surely arises from absence of observation.

In Scotland it is very widely distributed and often common. Perthshire, Ayrshire, Argyle, Inverness, Aberdeenshire, Kincardineshire, Moray, Ross, the Orkneys and Hebrides.

In Ireland principally in the northern half, though it is taken occasionally on the Hill of Howth, near Dublin; other localities are Meath, Mayo, Sligo, Tyrone, King's County, Antrim, on hills commonly—and Londonderry.

Abroad it is also found in the more hilly and mountainous districts in Central and Northern Europe with Lapland, and in Southern and Eastern Russia.

9. **H. dentina**, *Esper.*—Expanse, $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings grey or brown-grey, marbled with black; in the blackish central area, beneath the two stigmata, is a large oblique forked pale blotch; hind wings brown.

Antennæ of the male simple but strongly ciliated with small tufts of bristles, brown; palpi very broadly and densely tufted, the long scales nearly concealing the apical joint, black-brown, pale grey in front; head pale grey, barred in front with black, strongly tufted between the antennæ; thorax squared; collar pale grey with a slender brown cross-bar; shoulder lappets whitish-grey, edged behind with a black bar, and tipped with white; rest of thorax brownish-grey, with crests at the top and back which are whitish, barred with black; fascicles long, yellowish-white; abdomen covered near the base with long whitish scales, remainder pale greyish-brown, dorsal crests varying in number from two to five, tipped with black; lateral and anal tufts spreading, yellowish-brown. Fore wings rather narrow; costa very gently curved; apex bluntly angulated; hind margin rounded, rather full above the anal angle; dorsal margin straight to near the base; colour pale grey, or pale greyish-brown, much marbled with brown and black; basal line abbreviated, angulated, white, edged on both sides by short black streaks or spots; first line oblique, but curved back near the dorsal

margin; whitish, bordered inwardly with brown, outwardly with deep black; second line curved, very oblique but bent back outwardly near the dorsal margin, slightly but repeatedly angulated, dusky white edged inside with black; subterminal line greyish-white, not reaching the apex, formed in the middle into a small blunt **W**; orbicular stigma round, white, clouded with brown, and margined slenderly with black; underneath, and joined to it, is a forked greyish-white angulated blotch in the middle of the wing; reniform stigma whitish, clouded with brown and edged with black; claviform stigma obscure, dark brown edged with black; space from the base to the first line filled up with grey marbling or clouding; that between the first and second lines, around the stigmata and oblique white blotch, nearly filled up with black or dark-brown and divided by the whitish-grey nervures; space between the second and subterminal lines pale brownish-grey, or bluish-grey with brown clouding, the palest colour running into the apex, just before which on the costa is a sharply-edged black-brown blotch; whole costal margin spotted alternately with dark-brown and greyish-white, except beyond the second line, where are three small white dots in a brown cloud; hind marginal space dark-brown edged with black dots; between these are white streaks running out through the dark grey cilia, which are thus so broadly dashed with white as to produce a strongly crenulated appearance. Hind wings smoky-brown, with the hind margin very broadly darker-brown, and before this a slender, faint, indented, brown transverse line; cilia white. Female very similar, hind wings more uniformly dark, body stouter.

Underside of the fore wings umbreous, shot with a yellowish gloss; reniform stigma indistinctly dull black; just beyond it is an angulated transverse dark brown stripe, blacker at the costal margin; dorsal margin silvery white; cilia chequered with white as on the upper side. Hind wings whitish-brown dusted with darker; central streak angulated, blackish; beyond it is a slender, indented and curved trans-

verse brown stripe; hind margin dark brown; cilia mixed, brown and white. Legs brown, body and leg tufts whitish-brown.

Variable in the ground colour through almost all shades of grey, greyish-white, grey-brown, and bluish-grey; and in the distinctness of the dark markings from black to brown of all shades of umbreous. The pale markings also are often clouded and sometimes almost obscured. In the collection of Mr. S. J. Capper are forms ranging from the palest grey-brown, almost devoid of markings, to the darkest smoky-grey, or to those which have all the darker markings black; and one specimen of a pale-grey has a broad dirty-white blotch where the dark markings are usually situated. Dr. Mason has one in which the reniform stigma and a large portion of the adjoining usually dark area are occupied by a large white blotch extending to the costa. Another form has a large ovate white blotch near the anal angle. One obtained at Ipswich, by the Rev. E. N. Bloomfield, is so filled up with black that the usually distinct central bar is obscured. Another taken at Armagh by the Rev. W. F. Johnson is so curiously mottled with grey as to bear a considerable resemblance to *H. glauca*.

On the wing from the end of May to July. Abroad a second generation is said to occur in August.

LARVA stout, rather flattened, transversely wrinkled, considerably attenuated to each end; head small, rounded, pale brown, with a black dash on the point of each lobe; on the second and anal segments are shining horny plates; body furnished with a few inconspicuous pale hairs, dull brown; a very faint threadlike white dorsal line is situated in a dark greyish-brown shade which forms a series of diamond shapes or pentagonal blotches along the back; subdorsal line white, threadlike, more distinct than the dorsal, edged above with a row of dark grey or blackish dashes; spiracular stripe greyish-ochreous, shaded above with dark greyish-brown; usual spots

paler than the ground colour, encircled with grey; spiracles black; undersurface dull ochreous (Chas. Fenn).

When very young this larva seems to bear a curious and perplexing resemblance to that of an *Agrotis*. Mr. Buckler says that at first it is greenish-grey, with the head and second segment ochreous-yellow, the body having conspicuous blackish tubercular dots and hairs; after the first moult green with blackish dots; after the second, whitey-brown, with a still paler dorsal line, and the dots warty and brown, surrounded by a paler ring; the pale dorsal line thickened towards the end of each segment; a paler subdorsal line edged above with darker and followed by a similar whitish line; the sides purplish-brown and a pale pinkish subspiracular stripe. After a third moult the colour becomes purplish-brown with dorsal and subdorsal lines still whitish, the latter margined above at the beginning of each segment by an oblong dash; the tubercular spots are still very brown and distinct and the general aspect continues like that of *Agrotis*; but after the next moult a sufficient resemblance to the adult larva is assumed to render its recognition easy.

Mr. Fenn found that larvæ from Scotland are of a very dull dirty bronze-brown or earth-brown, the markings more dull and indistinct, and the dorsal diamond markings often imperceptible.

July and August on dandelion, knotgrass, lettuce, chickweed, *Crepis*, *Hieracium*, *Medicago sativa*, and doubtless other low-growing plants. Extremely sluggish; feeding at night, hiding by day at the roots of its food plants, but there seems to be no evidence in support of the assertion that it feeds on the roots.

PUPA elongate, anal extremity flattened and terminated with two diverging spikes or bristles; each side of the last five abdominal segments is furnished with a thorn-like spine. Colour reddish-mahogany. In a slight silken cocoon spun among rubbish on the surface of the ground (Chas. Fenn).

The moth sits in the day time on palings, tree trunks, stone walls, rocks, post and rail fences, almost any conspicuous objects, yet must also very commonly hide at the roots of herbage. Bright sunshine will sometimes provoke it to swift and vigorous flight, when it will eagerly visit flowers such as those of *Lotus corniculatus*; indeed it is a very restless insect. At dusk it will come freely to sugar and to attractive flowers such as those of *Silene inflata* and *Rhododendron*. Very widely distributed and often common, frequenting open woodlands and woody heaths; but far more plentiful in rough pastures, hillsides, and open ground where flowers are abundant. Found apparently all over England, Wales, and Scotland, including the Hebrides, Orkneys, and Shetland Isles. Common all over Ireland, and there more especially variable. Abroad it inhabits almost the whole of Europe, Asia Minor, and the mountain districts of Central Asia.

10. **H. chenopodii**, *Fab.*; **trifolii**, *Staud. Cat.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings pale brown, minutely and abundantly rippled with darker brown and dull black; orbicular stigma usually pale; reniform clouded with black; an obscure pale **W** near the hind margin; hind wings greyish-white, with broad smoky-brown border.

Antennæ of the male simple, almost naked, the cilia being excessively minute, brown; palpi broadly tufted, greyish brown; apical joint not very short; head densely covered with scales, especially so between the antennæ, black-brown in front, pale brown above; thorax pale umbreous dotted all over with darker, and with an obscure stripe, composed of blackish dots, across the collar; faintly crested on the top, more distinctly so at the back, the tufts tipped with white; fascicles smoky-white; abdomen pale smoky-brown, with one or two small blackish crests on the dorsal ridge; lateral tufts spreading; anal tuft small. Fore wings rather broadened behind; costa very gently curved; apex suddenly rounded, almost angulated; hind margin curved,

and rather full in the middle; dorsal margin faintly hollowed and gracefully curved; colour pale brown, abundantly dusted and rippled with umbreous or dull black; basal line abbreviated, forming two curves, pale yellowish-brown, edged on both sides with black; first line an indistinct series of yellowish-brown lunules, edged outwardly with black crescents, inwardly with blackish clouds; second line also a curved series of yellowish-brown lunules, edged inwardly with black crescents, outwardly with a cloudy brown line; subterminal line obscurely pale yellow, broken below the apex, and formed in the middle into a broad **W**; space beyond it often darker brown; orbicular stigma nearly round, very obscure, yellowish brown clouded in the middle with darker brown; reniform stigma of the ground colour, rather large, slenderly edged with black, and broadly blackened in its lower half; claviform stigma hardly perceptible; costa spotted with dull black to the second line, beyond which are three pale yellow dots; extreme hind margin dotted with black; cilia brown, broadly dashed with pale yellow. None of these markings are very conspicuous. Hind wings white clouded with brown, nervures also brown; central spot smoky-brown; just beyond it is a slender brown transverse stripe, beyond which almost the hinder half of the wing is occupied by a broad ill-defined darker brown band, in which is a whitish cloud near the anal angle; cilia white. Female extremely similar or sometimes with the fore wings darker and less mottled.

Underside of the fore wings whitish-grey, white or ashy-grey along the costa and hind margin, reniform stigma marked by a large cloudy black spot, which is closely followed by a transverse smoky-brown stripe; beyond this is another, more obscure and spread abroad. Hind wings white dusted with brown, central spot black; beyond it is a curved transverse cloudy brown stripe in which are black streaks on the nervures; nearer the hind margin is a more cloudy and fainter stripe. Legs dark brown, barred with yellow; body and leg tufts pale greyish-brown.

Slightly variable in the tone of colour of the fore wings, from yellowish-brown to dull umbreous, and in the degree of dark marbling and marking; occasional specimens having them almost or quite suffused with dark umbreous till hardly any markings are visible and even the subterminal line is obscured. On the other hand those possessing the paler ground colour frequently have the reniform stigma very dark, or else there is a broad shaded darker central band, broad at the costa, tapering off to the middle of the wing, and thence to the dorsal margin very narrow. Dr. Mason has a specimen very curiously smeared with dark brown and having the markings almost obliterated; in the collection of Mr. Sydney Webb is one of the smooth rich yellowish-fawn colour seen in *Apamea basilinea*. But probably the most interesting form yet met with here is a specimen taken by Colonel Partridge, at the Isle of Portland, on the night of August 15, 1888. It was recognised as a form known in North America as *H. albifusa*, Grote, and was supposed to be a distinct species. Information received from Professor J. B. Smith, of Washington, and subsequent examination of long series in the National Collection, has dispelled this idea and proved the specimen in question to belong to the present species; but with the exception of this single specimen, this peculiar variety does not seem to have been observed in the eastern hemisphere. The orbicular stigma in it is large and whitish, the reniform also large, dark grey, with a perpendicular pale shade down its middle; the claviform very broad, almost lunate, grey edged with black; from the whitish orbicular stigma a pale oblique band meets, near the anal angle, another broad pale stripe from the apex of the wing. These pale bands give it a very singular appearance. In the United States this form appears to be common, becoming even more strongly marked than the Portland specimen, while all the intermediate shades of colour and marking between these and the ordinary typical examples are found. Since writing the above I have received from my

sister, captured by her at Annshaw, South Africa, examples of this species, having the middle area of the fore wings patched and clouded with *pale ochreous*, and with a blotch of the same outside the reniform stigma.

On the wing in May, June, and July, but in a very forward spring I have met with it at large as early as April 1st. A second generation appears at the end of July and in August.

LARVA elongate, cylindrical, head small, rounded, shining ochreous; mouth brown; on the second segment is a horny plate; body pale green, dorsal line slightly darker, pulsating; subdorsal line white, interrupted on each segment by a dark dash on its upper edge; spiracular line rather broad, pink, edged above and below with white; spiracles white, edged with black; on the undersurface is a black spot before and behind the penultimate pair of prolegs. (C. Fenn.)

A variable larva. Buckler figured one of a rich soft green without markings except the broad pink spiracular stripe; others showing the dashes on the subdorsal region very distinctly dark red; another wholly dull purplish-grey; another dull purple-brown with short darker dorsal and subdorsal streaks, and the spiracular stripe whitish edged above with dark purple-brown; and another with the colour and markings of a richer purple-brown and the spiracular stripe broadly pink; but the green forms appear to be the most frequent.

June, July, and August, and in a partial second brood in September and October, on *Chenopodium album*, *C. vulvaria*, *C. bonus-henricus*, *C. botryoides*, *Atriplex patula*, and doubtless other species of *Chenopodium* and *Atriplex*; feeding at night, hiding itself in the daytime under its food plant and adjacent weeds, upon the ground,

PUPA of ordinary form, extremely smooth and shining, skin very thin and devoid of sculpture, anal extremity suddenly rounded off and with only a very small rounded

swelling in the place of the usual broad projection; on it is a pair of minute, very divergent and hooked bristles flanked by a pair of thicker, straighter, but still hooked; around these are some still more minute, and not very perceptible. General colour yellowish-brown or pale orange-brown; anal tip dark brown. In a moderately tough though fragile cocoon of earth and strong silk in loose soil near walls or fences. In this state through the winter.

The moth hides in the daytime in chinks or under copings of walls, on fences, and among herbage, but may occasionally be found, in intensely hot sunshine, flying wildly by day, and feeding at flowers of *Knautia arvensis* or *Centaurea*. Its ordinary flight is however at dusk and through the night and it then also frequents flowers and comes occasionally to sugar, but more frequently to light, being strongly attracted by street-lamps. More particularly attached to gardens and waste ground near them, and to sandy districts, such as the Breck sands of Norfolk and Suffolk, where it is very abundant, and where I have more particularly noticed it on the wing in hot sunshine. Also everywhere along the sea coast where its more favourite species of *Chenopodium* are plentiful. Therefore rather a local species; common in the London suburbs, formerly more so than at present; more particularly attached to our Eastern and South-Eastern counties, but locally common so far inland as Cambridgeshire, Northamptonshire, Huntingdonshire, and Oxfordshire; less frequent in the west, though found in the Scilly Isles and Cornwall, Devon, and Dorset; not common in Somerset and Gloucestershire, and hardly recorded in other Western counties or in Wales, though it can scarcely be absent. Scarce and very local in Leicestershire and Staffordshire, still more so in Yorkshire, and in Cheshire there is but a single record. In Scotland it is not very uncommon in the Clyde Valley, and is found, though rarely, in Roxburghshire and Aberdeenshire. Its presence in Ireland is somewhat doubtful, though

it is difficult to imagine it absent from the coast. The Rev. Joseph Greene appears to have met with a specimen near Dublin many years ago, and there is a single record, not confirmed, in the North of Ireland.

Abroad its range is very wide—almost the whole of the Continent of Europe, a large portion of Northern and Eastern Asia, the mountains of India, and North and South Africa. Also apparently over the larger portion of North America in the typical form and intermediates, to the var. *albifusa*, which last appears to be found in the Eastern United States, Canada, and Nova Scotia; while more typical specimens from Oregon, Kansas, and elsewhere are known as *H. Oregonica*, Grote. Dr. Smith places under the present species what is known as *glaucovaria*, apparently from Canada; and some portions of South America must be included in its range if, as seems certain, *H. intermixta*, Walk. from Chili is the same species.

Genus 17. **MAMESTRA.**

ANTENNÆ simple, ciliated; eyes hairy, and having raised lashes at the back; thorax crested, but top tufts very small; abdomen with three to five crests; fore wings rather narrow at the base, broad behind, hind margin very faintly crenulated; hind wings rather short, vein 5 distinct but very slender, curved forward at its origin.

LARVÆ cylindrical, smooth, sometimes with the twelfth segment rather raised, dull coloured.

PUPÆ subterranean.

Our three species are readily distinguished.

A. Fore wings brown or grey-brown, mottled with darker brown or blackish.

B. A pair of white dots at lower corner of reniform stigma; subterminal line a series of yellowish dots.

M. albicolon.

B². Reniform stigma edged with white, subterminal line angulated. *M. brassicæ.*

A². Fore wings velvety black; reniform stigma conspicuously white. *M. persicariæ.*

1. **M. Albicolon**, *Hub.*—Expanse $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings pale brown, abundantly mottled and dusted with umbreous; reniform stigma very obscure but with a pair of white dots at its lower outer corner; subterminal line composed of yellow dots; hind wings dull white, broadly bordered with brown.

Antennæ of the male simple, finely ciliated, brown; eyes densely covered with minute reddish erect hairs; palpi broadly tufted, black-brown, paler in front; head dark smoky-brown; thorax smoky-brown, dusted with white; collar and shoulder lappets rather raised; on the top an exceedingly short minute crest; at the back a much larger one of three conspicuous tufts; fascicles yellowish-white; abdomen glossy pale brown; on the basal segment is a large and conspicuous tuft or crest, pale brown, barred with darker; behind this are sometimes one or two similar but smaller and rather fugitive crests; the basal segments also much covered with long pale hair-scales; lateral tufts small grey-brown; anal tuft large and spreading, light brown. Fore wings broad behind; the costa curved; apex very bluntly angulated, almost rounded; hind margin full and decidedly rounded; dorsal margin nearly straight; colour pale brown, dusted and rippled all over with dark umbreous atoms which obscure most of the markings; basal line indistinct, double, broken, dull black; first line rather erect, faintly yellowish-brown, edged inwardly by a series of indistinct brown clouds, outwardly by thick lunate blackish streaks; second line very obscure, pale brown, edged inwardly, especially toward the dorsal margin, with black; subterminal line irregular and broken up into a series of rounded or triangular yellow dots or small spots; orbicular

stigma hardly perceptible, only indicated by a partial pale brown ring edged at one side with black; reniform stigma also obscure, pale brown, broken up with dark brown and placed in a smoky cloud; at the outer corner of its base are placed the two white dots, arranged like a colon, from which the species takes its name; claviform stigma hardly indicated; costa spotted with yellowish-brown, hind margin with minute black lunules; cilia dark brown, divided by yellowish dashes. Hind wings brownish white; nervures brown; hinder portion of the wing occupied by an ill-defined, broad, smoky-brown band lying along the hind margin; cilia white. Female rather stouter, but otherwise accurately similar.

Underside of the fore wings white at the base, shading off to smoky brown toward the hind margin; nervures darker brown; a black spot in the reniform stigma; middle area of the wing downy with long scales. Hind wings white, broadly dusted with brown on the costal region and hind margin; nervures brownish; central spot a dark brown crescent with long points. Body and legs dusky brown.

This insect so nearly resembles two or three allied species that it is desirable to call attention to the characters by which it may always be distinguished—the white colon, and the dotted yellow subterminal line.

Usually very little variable except in the degree of umbreous rippling and dusting; occasionally this is so increased as to obliterate all the pale ground colour. There seems to be a slight local variation on the North-east coast, specimens from Durham being sometimes more prettily mottled, with the transverse lines usually more distinct. In Mr. S. J. Capper's collection is a specimen in which the yellow dots of the subterminal line run inwards in yellow dashes. Mr. P. M. Bright has examples from the east coast of Scotland which are nearly black.

On the wing at the end of May and in June, and as a partial second generation, at the end of July and in August.

LARVA cylindrical, plump, but with the anal segment

narrowed off obliquely behind; head rather narrower than the following segments, smooth, rather flattened and thrown forward, yellowish-brown or reddish-brown; second segment with a broad smooth dorsal-plate coloured as the head; body smooth and velvety, varying from green to slate colour or blue-grey, darkest on the back, and with faintly divergent paler dashes above the spiracles, which are white ringed with black; dorsal line edged on each side by more purplish, grey slender threads, otherwise almost devoid of markings; undersurface and prolegs rather paler; legs grey or brownish. The younger larva is more bluish in tint, with faint, slender, white dorsal and subdorsal lines, and a pale yellowish spiracular stripe.

June, July, and probably as a partial second generation in September, on plantain, dandelion, and other low plants growing in sand; probably also on *Atriplex*, *Chenopodium*, and *Crucifera*; but of secret habits and very little known. It has been found on *Sisymbrium Sophia*, which does not usually grow in its haunts, close to the sea margin. In confinement it will readily feed on knotgrass and lettuce. Hiding in the sand, under herbage, in the daytime, and feeding at night.

PUPA red-brown; not further described.

The moth hides by day among herbage on the ground, or more especially among the roots of herbage which are exposed in tangled confusion, where the wind has worked away the side of a coast sandhill, leaving an overhanging ledge. Here it hides very closely, but is easily shaken out, when it falls down on the loose sand and is readily secured. But if the sun is out and at all hot, there is no such sluggish behaviour, but the moth instantly on being shaken out gathers itself together, and dashes off with great swiftness of wing to another shelter. At such a time catching it is no easy task. At night it flies about the sandhills and their immediate surroundings, and may be attracted by sugar or even

light, or eagerly searches out flowers of *Silene inflata* and *Onobrychis sativa*. Usually confined to the sandhills, denes, dunes, or marrams, as they are variously called, which so broadly border the flatter parts of the sea-coast, more especially those of the East and West of England. Perhaps most plentiful, in such spots, in Lancashire, Cheshire, and near Barmouth, North Wales, sometimes very rare in Pembrokeshire but occasionally abundant; also common near Laugharne, Carmarthenshire. Said to be scarce in Cornwall, Devon, and Dorset, and in Somerset found only near Weston-super-Mare. On the Eastern coast found at Southwold, Suffolk; Yarmouth, and elsewhere in Norfolk; doubtless in Lincolnshire; and commonly at Spurn, Yorkshire. Also still fairly common in the district of the later post-glacial sea-sands, now far removed from the present coast, and known as the Breck Sands, at Brandon, Thetford, Wickham Market, Tuddenham, and elsewhere in Norfolk and Suffolk. The only other inland locality of which I have a record is of a specimen at light at Taplow, near Reading, by Mr. A. H. Clarke; but, as he very justly pointed out, this specimen was taken close to Taplow Station, where the Plymouth and Weymouth trains stopped on their way up, and the creature may have been brought from the coast by this means. In Scotland, Dr. F. B. White recorded it in the districts of the Tweed, Tay, Dee, and Clyde. Doubtless the Solway may be added. In Ireland it formerly occurred, though in small numbers, on the Dublin coast, but is stated by Mr. Kane now to have disappeared from that district; still found on the coast of Derry, and near Castle Bellingham. Abroad it has a wide range, and apparently is not, as with us, especially attached to the seaside, since it is found in many parts of Central Europe, in Northern Italy, Sweden, South Finland, Southern Russia, and even in the mountain regions of Central Asia.

2. **M. brassicæ**, *L.*—Expanse $1\frac{1}{2}$ to 2 inches. Fore wings

long, broad behind; pale grey-brown with a reddish gloss, and abundant mottling of blackish-umbreous; subterminal line irregular, white or yellowish, broken above the middle; reniform stigma edged with white; hind wings pale smoky-brown.

Antennæ of the male simple, finely ciliated, black-brown; palpi broadly tufted, blackish at the sides, grey-brown in front; apical joint rather conspicuous; head and thorax blackish-umbreous, dusted with pale brown and black, crested slightly at the top, more distinctly at the back, the tufts tipped with black; fascicles broad, smoky-white; base of the abdomen covered with similar long hair-scales, remainder smoky-brown; dorsal crests two to five in number, smoky-black, the second the largest; lateral and anal tufts spreading, smoky-brown. Fore wings elongated, broad behind; costa very gently curved; apex quite suddenly rounded, almost angulated; hind margin much rounded and faintly crenulated toward the anal angle; dorsal margin rather hollowed and gracefully curved; colour pale smoky-brown, almost wholly obscured by clouding and mottling of blackish and dark umbreous, the whole rather shining with a golden-reddish glow; basal line suggested by two pairs of widely separated black spots; first line a succession of very obscure lunate black clouds; second line more slender, an obscure series of black crescents; subterminal line distinct, white or yellowish, broken below the apex, in the middle forming a rather short and indistinct **W**, below this the line thickens as it approaches the anal angle; orbicular stigma indistinct, round, smoky-grey edged with black; reniform stigma sharply edged in front and behind with white, and having a pair of white dots at each end; middle portion smoky-grey; claviform stigma very broad, blackish, edged with deeper black; the entire costal half of the wing is clouded with dark smoky-brown or dull black to near the apex; but usually this shades off so as to leave large spaces of the pale ground colour in the dorsal portion, both toward

the base and beyond the second line, where is a broad pale band; costal margin spotted with black to the origin of the second line; beyond this are three white marginal dots in the dark clouding; extreme hind margin edged with small black lunules; cilia black-brown dashed with paler. Hind wings dark smoky-brown, shading gradually paler toward the middle and the base; central spot a large obscure smoky lunule; cilia pale brown, white at the tips. Female stouter and rather larger, with slightly broader fore wings, but very similar.

Under side of the fore wings dark smoky-brown, with a broad, slightly paler stripe along the hind margin, and the dorsal margin narrowly shining whitish-grey; reniform stigma indicated by a smoky-black spot. Hind wings greyish-white, dusted with dark brown, especially so toward the costal margin; central spot large, lunate, dusky-black; beyond it are two slender parallel transverse smoky-brown stripes. Body and legs dark smoky-brown.

Usually only variable in the depth and extent of the black or dark mottling, and this to no very great degree; also in the distinctness or obscurity of the subterminal line; but occasional specimens are extremely pale, while others have the dark mottling so increased as to render the entire fore wings black-brown, the reniform stigma and the subterminal line only remaining normal. Mr. Sydney Webb has a specimen in which the subterminal line is wholly obliterated; other specimens exist in which it is very broad and of a clear yellow.

On the wing in June and July, and occasionally, as a very partial second generation, in September.

LARVA rather elongate, slightly attenuated in front and enlarged behind; head rounded, shining, pale hazel-brown or green, either unicolorous or reticulated with dark brown, and having a dark brown dash or spot on each lobe. Body very variable in colour and markings—dull brown, dark grey,

dull green, or greenish-grey; dorsal line darker, and containing a few white specks; subdorsal line whitish, interrupted, sometimes very distinct, but often absent; shaded above, and with an ill-defined black dash on each segment; spiracular stripe broad, yellowish-green, greenish-white, black-brown or ochreous, very conspicuous; spiracles white, each in a black cloud. Legs very pale brown; prolegs and undersurface dull yellowish-green; raised dots grey or pale green.

Another form is dull bluish-green on the back and sides; undersurface paler; dorsal line an irregular string of exceedingly small whitish dots edged with black atoms; spiracular stripe broad, greenish-white, shaded above with a cloud of similar black atoms; subdorsal lines whitish; head yellowish-green; legs and prolegs tinged with reddish-brown. (Chas. Fenn.)

When just hatched dusky brown with a blackish head; after the first moult light green, with the head yellowish; after the second, deep green, with paler lines, and the head yellow; afterwards changing to various shades of olive-green, brownish-green, and dirty greenish-brown.

July to October; on almost every description of herbaceous plant, but especially attached to cabbage and other *Crucifera*, and quite sufficiently fond of garden flowers and other cultivated plants; not even always confining itself to low-growing plants, since it has been found feeding on oak; and in confinement hardly *any* green leaves are rejected. Feeding at night, and hiding in the daytime under herbage on the ground, or under dead leaves or any covering. Probably it is for this purpose of hiding from light that it very often eats its way into the middle of a solid head of cabbage, and there resides, to the woful damage of the vegetable, and with the result of its own appearance, now and then—cooked—where its presence is neither expected nor desired.

PUPA elongate, shining; anal extremity spiked; wing-cases somewhat semi-transparent; colour pale mahogany-red,

with a darker dorsal shade; anal segment and incisions shaded with grey. Subterranean, not in a cocoon. (C. Fenn.) In this condition through the winter, and one of the most familiar objects turned up by the spade when used for digging in a garden.

The moth sits in the daytime squeezed close into a cranny of a wall or under the coping, on posts, fences, railings, anywhere about gardens, and of course among herbage on the ground. It flies at night, comes freely—*too* freely—to flowers, also to sugar and anything else of a saccharine character. It is one of the most universally abundant of our native species, and is found in woods, heaths, meadows, lanes, everywhere; above all, in gardens and cultivated land, but is not very plentiful in fens and marshes. Found all over the United Kingdom, from the Scilly Isles to the Orkneys and Shetlands; but in some of the more mountainous portions of Scotland not very common. Abroad, it is abundant almost all over the Continent of Europe, Asia Minor, Armenia, Eastern Siberia, the mountainous regions of India, Japan, and some parts of North and South America, where also a more uniform dark variety is known as *M. ducta*.

3. *M. persicariæ*, *L.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings bluish-black; subterminal line faintly yellow; reniform stigma large, brightly white, with a faint brownish central cloud; hind wings dusky white, hind margin broadly black-brown.

Antennæ of the male simple, finely ciliated, dark-brown, blackish toward the base; palpi strongly tufted, deep black; head brownish-black; collar similar, rather more tinged with reddish, but edged above with deep black; remainder of thorax bluish-black, crested on the top and at the back, the space between the tufts of the crests being reddish chocolate; fascicles rather small, smoky-white; basal segments of the abdomen covered with long smoky-white hair-scales; the remainder smoky-black, dusted with

glistening white scales; a large bright chestnut-coloured crest on the back of the first segment, smaller ones on the three following segments, black; lateral and anal tufts reddish mixed with smoky-black; fore wings elongated, rather broadened behind; costa very slightly curved, but becoming more so toward the apex, which is bluntly rounded, almost angulated; hind margin curved, crenulated, and rather hollowed towards the anal angle; dorsal margin straight to near the base; colour blue-black with a purplish gloss; basal line indicated by two pairs of clouded deep black spots; first line deep black, disposed in a series of rough crescents; second line very neat and pretty, a series of short deep black crescents followed by a row of deep black dots on the nervures, also preceded by an angulated parallel black line from below the reniform stigma; sub-terminal line obscure, yellow, broken up into an irregular row of yellow dots, some of which are preceded by deep black wedges; orbicular stigma round but very obscure, of a slightly bluer shade of the ground colour; reniform stigma large, conspicuous, shining white, edged with deep black, and containing a uniform brownish cloud. (This stigma is the one conspicuous marking on the otherwise black fore wings.) Claviform stigma obscure, but edged with deep black; on the costa is a whitish spot just beyond the reniform stigma, and following it three white dots; cilia blue-black, very faintly dusted and divided with paler. Hind wings greyish-white with the nervures grey-brown, but the whole outer space, beyond the middle, occupied by a very broad, ill-defined black brown marginal band, the inner edge of which is hollowed; this band contains an obscure white dash within the anal angle; cilia white, clouded with dark brown. Female with the fore wings slightly broader, and the body stouter, otherwise quite similar.

Underside of the fore wings glossy, smoky black shaded with paler; reniform stigma indicated by a large yellowish

cloudy spot; hind wings greyish white, very broadly dusted with dark brown along the costal region, and having a broad imperfect smoky-brown marginal band; central spot rounded, black; legs blue-black in front, barred with yellowish; leg tufts and body smoky-brown.

Usually very constant in colour and marking; but in the collection of the late Mr. F. Bond is a very extraordinary specimen, having the fore wings suffused with hoary grey.

Abroad a recurrent variety is known, in which the reniform stigma, instead of being white, is suffused with black or yellowish black. This is found in Turkey and apparently also in some parts of Asia, and is known as var. *unicolor*. In Japan the subterminal line is often obliterated.

On the wing from the middle of June to August.

LARVA somewhat cylindrical, smooth; twelfth segment raised and sloping up to an oblique hump in the thirteenth, beyond which the anal prolegs project behind. Head small, smooth, rounded; a plate in the second segment. Head greenish, shaded and reticulated with pale brownish; on each side of the mouth is a whitish projection; body pale green reticulated with darker; dorsal and spiracular lines whitish, minutely edged with dark grey; subdorsal lines dark grey, threadlike; from the fifth to the twelfth segments the subdorsal lines are connected by semicircular dark green markings, bisected by the dorsal line; those on the fifth, sixth, and twelfth segments being very conspicuously velvety dark green. Plate on the second segment dark green, edged laterally with white. On the sides is a row of green dashes which include the white spiracles and interrupt the spiracular line on the fifth to the eleventh segments; the dorsal line is absent from the thirteenth, which is shaded on the sides with dark green.

Or, rosy-grey reticulated with greenish-grey; dorsal and subdorsal markings greenish-grey; those on the fifth, sixth, and twelfth segments dark velvety brownish-green, as also is

the plate on the second segment; dorsal and spiracular lines paler than the ground colour; spiracles white; other markings as before described. (Chas. Fenn.)

Other varieties are light brown, or purple-brown, with similar markings, except that the velvety blotches and streaks are of a deeper velvety brown. A remarkably handsome larva, and from its oblique lateral velvety markings, and the tubercle behind, very liable to be mistaken by a novice for the larva of a hawk-moth.

August, September, and October, on all kinds of low-growing plants, and sometimes very common in gardens; feeding at night; hiding in the daytime on the undersides of leaves, or squeezed into interstices of large flower-spikes, such as that of the hollyhock; or under herbage upon the ground, sometimes in plenty under potato-haulm. Besides herbaceous plants and all sorts of cultivated flowers in gardens—where also it performs a meritorious action by eating bindweed (*Convolvulus sepium*)—this larva is extremely fond of elder, and is sometimes known to eat leaves of plum, blackthorn, raspberry, oak, poplar, lilac, clematis, and even ivy.

PUPA rather stout, glossy, but sculptured with fine striæ on the back of the head-cover; wing and limb-cases not very prominent, shining dark claret-red; abdominal segments rather roughly sculptured on their anterior edges, dark claret-brown; anal segment suddenly rounded off and armed with a short forked spike. In a thick but rather brittle cocoon, of earth and silk, under the surface of the ground.

The moth may occasionally be found by day sitting on walls, posts, and palings, but is usually concealed among herbage close to the ground and may now and then be shaken out of bushy garden plants. It flies at dusk, comes readily to flowers, and is very fond of those of the ragwort; also warmly appreciative of sugar, and found occasionally attracted by a strong light. Principally a garden-frequenting

species, but also common in open woods, and in lanes, meadows, and cultivated land. Still common in gardens in the suburbs of London, from which so many other species have vanished, and moderately plentiful throughout most of the Southern, South-eastern, and Eastern Counties, and the southern portion of the Midlands; but apparently scarcer or more local in the South-west, since it is recorded as scarce in Dorset and South Devon, though common in North Devon; also scarce in Cornwall, very local in Somerset, and hardly noticed in Gloucestershire. Not common in the North Midlands, though occurring in every county, nor in Lincolnshire, Worcestershire, and Herefordshire; more so in Lancashire and Cheshire, and widely distributed in Yorkshire; also found in Cumberland, where it is said to frequent the hills and not to occur in the valleys, nor in gardens. Probably widely spread in Wales, since I have found it in Pembrokeshire, but not plentifully. In Scotland it is recorded, though with doubt, by Dr. F. B. White, in the districts of the Tweed, Solway, and Clyde. In Ireland very scarce, but recorded from Dublin, Waterford, Cork, Kerry, Galway, and Mayo; to the north of this extremely rare, but two specimens seem to have been captured at Rostrevor in the county Down, one at Sligo, and one at Enniskillen. Abroad it has a rather more southern range through Central Europe, South Sweden, Northern Italy, Dalmatia, Livonia, Northern Turkey, Southern Russia, and some other portions of Asia, certainly occurring in Japan.

Genus 18. **HECATERA.**

ANTENNÆ of the male ciliated, eyes hairy, eyelashes minute, thorax crested at the back, abdomen with one or two rather prostrate crests, and not pointed in the female; fore wings short and blunt.

LARVÆ smooth, feeding exposed on flowers of *Compositæ*.

PUPÆ subterranean.

We have two species, one having the ground colour of the fore wings grey, the other white.

1. **H. dysodea**, *Hüb.*; **chrysozona**, *Staud. Cat.*—Expanse $1\frac{1}{4}$ inch. Fore wings pale grey dusted with yellow, with a broad, rippled, yellowish-grey central band; hind wings greyish-white, with a broad grey-brown cloud toward the hind margin.

Antennæ of the male rather short, nearly cylindrical, very faintly ciliated, dark brown; palpi broadly tufted, pale grey in front, blackish brown at the sides; head brownish white with white tufts at the bases of the antennæ; collar and shoulder-lappets pale brownish-grey, the latter tipped with black; remainder of thorax whitish-grey, with a small back crest, the tufts of which are tipped with black; fascicles short, white; abdomen rather stout, whitish-brown, having on the basal segment a small, brown-tipped, white crest; lateral and anal tufts spreading, greyish-white, the latter barred with smoky-black. Fore wings short, rather broad behind; costa straight; apex suddenly rounded; hind margin rounded, but faintly excavated close above the anal angle; dorsal margin straight to near the base, where it is rather strongly tufted with scales; colour whitish-grey, dusted with darker grey, and faintly dusted or streaked with orange-yellow; basal line indicated by two black spots edged with yellow and white; first line obscure, perpendicular, composed of a series of black curves edged with orange-yellow, and having the hollow of every curve filled with white; second line a complete series of deep black crescents, each clasping a similar white spot; subterminal line a mere row of orange-yellow cloudy dots, edged inwardly with black; orbicular stigma very obscure, grey, faintly ringed with black; reniform stigma still more obscure, partially edged with black, and containing two small orange clouds; claviform stigma so large as to look like a blackish ring or loop; costal margin streaked and spotted

with black and white ; space between the basal and first lines marbled with dark grey ; that between the first and second lines clouded with blackish-grey, and forming a darker central band with a rather blacker central shade, containing near the dorsal margin a faint orange streak connecting the two lines ; hind marginal region dusted with dark grey, extreme margin dotted with black ; cilia very long, dark grey, prettily looped with greyish-white. Hind wings white, clouded with grey to the middle, beyond this broadly dark grey-brown ; cilia of the same colour, but dashed and tipped with white. Female rather stouter, but very similar.

Underside of the fore wings dark smoky-grey, shading off to white at the dorsal margin ; costa dusted with white and spotted beyond the middle with black ; cilia smoky-grey, with white dashes. Hind wings white, dusted with brown toward the costa ; central spot lunate, smoky-black ; some distance beyond it is a slender smoky-black transverse stripe, succeeded by a broad smoky-black marginal stripe dashed with white. Legs pale grey, the tibiæ barred in front with dark grey ; leg-tufts and abdomen dirty white.

Not very variable, but the ground colour ranges from a decided grey to nearly white, and in the darker specimens the white borders of the transverse lines are more conspicuous ; in some individuals, whether light or dark, the orange-yellow markings are extremely faint or even absent. In the collection of Mr. A. J. Hodges is a specimen of a pale smoky-grey, the central band darker, but the usually sharp markings all obscured, giving it an unusual appearance. It was reared from a larva found at Wicken, Cambs.

On the wing at the end of June and beginning of July.

LARVA.—Head rather small, shining, somewhat withdrawn into the second segments, light brown ; body plump, cylindrical, very slightly narrowed at each extremity, bright light chestnut, or pinkish-brown ; dorsal line double, each being slender, black, rather thickened on the hinder portion

of each segment; subdorsal lines also double, each even more slender, dusky black and rather waved; between the dorsal and subdorsal lines is a row of black dots, one or two on each segment; spiracles deep black; spiracular line threadlike, dusky-black; undersurface paler, pinkish-brown or yellow-brown, with the legs and prolegs similar.

Or otherwise dull olive-green, brownish-green, or yellowish-green, with similar markings, and the undersurface paler-green or almost greenish-white, and the head dark olive-green, marbled with darker.

July and August on the blossoms and seeds of the cultivated lettuce in gardens, also on the flowers of *Crepis*, *Lactuca sativa* (wild), *L. saligna* and *L. virosa*, resting in the daytime quite exposed on the flower stems of such lettuces as have been allowed to go to seed, feeding mainly at night and devouring buds as well as blossoms, so that when it is common the prospect of seed is sometimes quite destroyed. It is much protected by its close resemblance to the flower-stems on which it rests by day.

PUPA apparently undescribed; subterranean; in this state through the winter.

The moth seems rarely to be found in the daytime in this country. Mr. J. J. Walker noticed it sitting upon stones or rocks at Gibraltar. It flies at quite early dusk, and comes freely to flowers, especially delighting in those of the common red valerian (*Centranthus ruber*), but also visiting those of orange-lily, candytuft, and other garden plants. Its haunts seem to be almost entirely gardens, arable land, and weedy places; and thirty years ago it was one of the most reliable—and quite the most welcome—of visitors to the valerian flowers in London suburban gardens, its gentle though swift flight, and soft grey colouring, rendering it instantly recognisable, since it would visit the blossoms at one's very feet while the sunset colour was still glowing in the sky. In gardens at Norwich it was—and probably still is—equally

common, but no such attractive visitant now haunts our London gardens. Its headquarters in this country are in Cambridgeshire, where at times its larva is really mischievous; and it is also frequent throughout the Eastern counties; less so in the south, and apparently very rare in Sussex and Dorset; more frequent in Surrey, also in Hertfordshire, Huntingdonshire and Northamptonshire; scarce in Oxfordshire and Berks, also at Weston-super-Mare, Somerset, and in Herefordshire. Further north I find no records, and there appears to be no certainty that it has ever occurred in Ireland. Abroad its range is more southern—Central and Southern Europe, South Sweden, Syria, and through the north of Asia Minor. At Gibraltar Mr. J. J. Walker found it on the wing in April.

2. **H. serena**, *Fab.*—Expanse $1\frac{1}{8}$ to $1\frac{1}{4}$ inch. Fore wings snowy-white, with a few grey clouds, and a broad grey-black central band in which are the two white stigmata; hind wings white, bordered with smoky-grey.

Antennæ of the male short, simple, minutely ciliated, dark brown, barred at the back with white; palpi densely tufted, the apical joint almost concealed, brown at the sides, white in front; head and thorax white, lightly dusted with black; a slender grey-black stripe crosses the front of the collar, and another edges each shoulder-lappet; at the back is a small crest, the two points pure white, tipped with smoky-black; fascicles spreading, white; abdomen white, dusted with black, the basal segments covered with long white scales, which envelop and partially conceal two rather oblique dorsal crests, which are white, tipped with smoky-black; lateral and anal tufts spreading, white, the latter dusted across the base with black. Fore wings short and blunt; costal margin straight; apex bluntly angulated; hind margin nearly straight, rather oblique, but hardly more rounded at the anal angle, which is quite distinct; dorsal margin gracefully curved; colour snowy-white; basal line

black, abbreviated, broken; first line black, broken into spots and two large curves, and faintly preceded by a parallel smoky-brown shade; second line black—a regular curved series of crescents, followed by a similar parallel series of a more smoky-brown; subterminal line only indicated by a broken and interrupted series of grey or black streaks or lunules along its margin; orbicular stigma white, ringed with black, and containing a brown-black cloud; reniform stigma also white, edged with black, and containing an angulated smoky-brown cloud; claviform stigma indicated by a curved black streak; the space between the first and second lines, and enclosing the stigmata, is black-grey, much clouded with deep black, and forms a most conspicuous central band, the costa above it spotted with black; beyond this the costal margin is clouded with smoky-black, in which are three white marginal dots, but this smoky cloud is cut off abruptly before the apex; hind margin faintly clouded or dusted with grey, and edged with long black slender lunules; cilia pale grey, tipped with white. Hind wings greyish-white from the base, with the nervures blackish-brown; beyond the middle is a broad hind-marginal grey-brown cloudy band, in which are some dashes of white from the anal angle; cilia white. Female rather stouter, quite similar.

Under side of the fore wings pale smoky-brown, with the dorsal margin whiter, and some whitish dappling along the costa and hind margin; hind wings white, abundantly dusted with brown, and having the nervures brown; legs black-brown, barred with white; leg tufts and body white.

Usually very constant in colour and markings, but occasionally the pure white ground colour is tinged with grey, or the hind margin is mottled with darker grey. A large specimen in my own possession, taken in Pembrokeshire, has the central dark band much extended, and the apical and hind marginal region slate-grey. In the Scandinavian peninsula a variety is known under the name of *Obscura*, having the

white portions of the fore wings decidedly obscured with grey.

On the wing from the end of June to the beginning of August.

LARVA stout when contracted, but slender when elongated, velvety, slightly tapering at each extremity; head rounded, not highly polished, dull brown; body yellowish brown, much tinged with emerald-green; dorsal line threadlike, inconspicuous, of the ground colour, but placed in a greyish-brown shade; subdorsal line waved, threadlike, inconspicuous, greyish-brown; spiracular stripe dull yellow, sometimes much tinged with green, the sides above it shaded with grey; between the dorsal and subdorsal lines is a grey dot on each segment; spiracles prominent, black; undersurface bright emerald-green. When young the spiracular stripe is white; it afterwards turns yellow, sometimes tinged with green; when quite full-grown it merges in the colour of the undersurface (C. Fenn).

Evidently very variable. Buckler's figures are pale pink with the markings very faint; yellow-brown, with the dorsal shade dull-red, and the markings much thickened; pale slate-grey with a dark grey spiracular stripe, and the undersurface dull yellow; purplish-red, with the markings increased into transverse loops and the undersurface yellow; and full rich green, marbled on the back with black, or shaded with paler green on the back, while the spiracular stripe is broadly blue-green.

July and August, on the buds, blossoms, and seeds of garden lettuce, wild lettuce, *Sonchus arvensis* and *S. oleraceus*, *Picris hieracioides*, *Crepis virens*, *Hieracium*, and other *Compositæ*, resting during the day upon the stems.

PUPA of ordinary form, rather delicate, the skin thin; dull chestnut brown; wing and limb covers smooth, but not very glossy, anterior half of each abdominal segment abundantly sculptured with minute punctures; spiracles con-

spicuous, dark brown; cremaster conical, silvery grey, bearing two long, straight, parallel, black spikes. In a rather solid, rough cocoon of earth and silk, beneath the surface of the ground. In this condition through the winter.

The moth sits in the daytime on the trunks of trees such as pine and ash trees, sometimes at a height of ten or fifteen feet, but usually lower, and is most conspicuous in such situations; or on palings, posts, rails, old walls, and even rocks. It flies at early dusk, visiting flowers for the sake of their honey, though not so eagerly as the last species; but may often also be seen hovering about the blossoms of *Sonchus* and other *Compositæ*, doubtless to deposit eggs. It is also a rare and casual visitant at sugar. Widely distributed and moderately common over the southern half of England, though in some counties, as Sussex, Dorset, and Devon, very local or even scarce. Perhaps most plentiful in the Brecksand district of Norfolk and Suffolk. Rare in North Staffordshire and generally through the northern Midlands; not common in Lincolnshire; very local in Cheshire, Lancashire, and Yorkshire. Probably in most parts of South Wales, since I have found it in Pembrokeshire, where it frequented the limestone quarries. In North Wales it is recorded at Barmouth. Apparently very rare in Scotland; Mr. Adam Elliot has met with two specimens in Roxburghshire, and there is a record from Perthshire. Much more frequent in Ireland, though there local; rather plentiful in Kerry, and found on the Dublin coast, in Wicklow, Waterford, Cork, Galway, Westmeath, and even in Antrim. Abroad its range is through Central and Southern Europe, Asia Minor, Syria, Armenia, and the Ural Mountain district.

Genus 19. **DIANTHÆCIA.**

ANTENNÆ of the male ciliated, sometimes in small tufts; eyes hairy; lashes prostrate, or nearly so; thorax crested at

both top and back; abdomen furnished with from one to four rather depressed crests; in the female the abdomen is very much pointed at the tip; fore wings rather short and blunt; vein 5 of hind wings very faint, arising from the middle of the cross-bar.

LARVÆ smooth, plump, with the head small, usually feeding on or in the blossoms or seed-vessels of plants belonging to the *Caryophyllacæ*.

PUPÆ with a knob at the end of the wing-covers. Subterranean.

A table of the species will doubtless be useful:

A. Fore wings pale buff or yellowish-white.

B. Fore wings marbled with rich fulvous. *D. irregularis*.

B². Fore wings marbled with pale or dark umbreous.

D. carpophaga.

B³. Fore wings marbled with dark umbreous or black.

D. carpophaga var. *capsophila*.

A². Fore wings pale brown, marbled with black-brown; upper stigmata separate. *D. capsincola*.

A³. Fore wings pale purple, marbled with black-brown; upper stigmata united. *D. cucubali*.

A⁴. Fore wings very dark purple-brown, with a central white blotch. *D. albimacula*.

A⁵. Fore wings bluish-black, with pure white central and apical blotches. *D. conspersa*.

A⁶. Fore wings dull purplish-brown, with an oblique central bar of paler blotches.

D. luteago, var. *Barrettii*.

A⁷. Fore wings nearly unicolorous, dark slate-grey.

D. casia.

1. *D. irregularis*, *Hufn.*; *echii*, *Blk.*.—Expanse $1\frac{1}{4}$ inch. Fore wings pale yellowish-buff; transverse lines much rippled rich sienna-brown; between them rich red-brown marbling. Hind wings brownish-white, with a dark brown band.

Antennæ of the male rather stout, ciliated with minute tufts of bristles, light brown; palpi with rather closely appressed scales, yellowish-brown; head whitish-ochreous, strongly tufted between the antennæ, and having a white tuft at the base of each; thorax whitish-ochreous; collar erect, barred with pale brown, and edged with white; shoulder-lappets each with a curved bar of black and brown scales; preceded, followed, and especially edged, with white; top and back crests conspicuous, tipped with brown; at the back, below the latter, is a pair of *white* tufts; fascicles short, parallel, white; abdomen smooth, whitish-ochreous, or pale drab; on its basal segment is a broad, oblique, conspicuous dorsal crest, tipped with brown; lateral and anal tufts rather small. Fore wings narrow at the base; costa nearly straight; apex suddenly rounded; hind margin slightly curved, and rather elbowed below the middle; dorsal margin very straight, and tufted at the base with long scales; colour whitish-drab, faintly clouded with fulvous; basal line limited to two deep brown spots, followed by paler clouds; first line duplicated, but the two not quite parallel, the inner being pale brown, erect and straight, except one small angle, the other close to it, of a deep, rich sienna-brown, or sometimes deep black, being repeatedly angulated; second line curved, oblique, but strongly bent back to the costa, and composed of a series of rich sienna-brown or black crescents, those above the middle throwing inward wedge-shaped brown or black streaks; outside, this line has also a sort of duplicate, but much more direct, and of a fainter brown; subterminal line placed far from the hind margin, complete, much waved and rippled, and very distinct, deep fulvous, sienna-brown, or sometimes black, edged on the inner side by similar clouds and wedge-shaped brown or black dashes; orbicular stigma very large, creamy white, partially margined with brown, but open to the costa, and spreading upon the median nervure; reniform stigma less distinct, and clouded with pale fulvous, edged in front and behind with darker

brown, but open above and below; the space between these stigmata is very dark sienna-brown, and from its lower edge a rippled similar central shade passes to the dorsal margin; nervures from the first line nearly white, but the spaces between them in most cases clouded with pale sienna; costal margin doubly spotted with brown at each line to the second, beyond this are four white costal dots; hind marginal space very softly clouded with ochreous-brown; cilia white, with broad, regular, dark-brown dashes. Hind wings rather small, brownish-white, whiter in the middle, where also is a slender, much waved, brown transverse line; beyond this is a broad smoky-brown cloudy band, occupying the whole hind marginal area, except near the anal angle, where it is interrupted by white clouds; cilia white. Female quite similar, except that the abdomen is stouter, and rather pointed.

Underside of the fore wings pale smoky-brown, with the costa narrowly, and the hind margin broadly and sharply, whiter; cilia white, dashed with dark brown. Hind wings dusky white; central spot small, lunate, smoky-brown, followed by a slender, curved, yellowish-brown transverse stripe, and this by a broader similar cloudy band, which does not reach the hind margin, leaving the latter with its cilia white. Legs light brown, barred with white; leg tufts and body whitish-brown.

Only variable in the intensity of the rich brown markings and clouding. We have very few more neat, or more exquisitely beautiful species than this.

On the wing at the end of June and in July.

LARVA. Head considerably smaller than the second segment, and emits a few short hairs, wainscot-brown, sparingly dotted with black; body nearly uniformly cylindrical, but tapering very slightly in front; segmental divisions tolerably conspicuous; skin smooth and slightly glossy; usual dots rather indistinct. General colour pale yellowish-brown,

tinged with green; dorsal line composed of a series of narrow V-shaped smoke-coloured marks, one on each segment, the apex of each pointing backward; these V-shaped marks most conspicuous on the fifth to ninth segments; on the others they appear as an interrupted greyish line, bordered on each side with smoke-colour; subdorsal lines inconspicuous, dull white, margined very narrowly with brown; along the spiracles extends a smoke-coloured stripe, dark on the lower part, but shading gradually into the ground colour above. The ground colour between the dorsal and spiracular lines is faintly variegated with brown, and below the spiracles, which are black, is a yellowish-white stripe; under-surface semi-translucent and shining, greyish, tinged with green. (G. T. Porritt.)

End of July to beginning of September on *Silene otites*, feeding on the flowers and seeds; but in confinement will eat also the seeds and blossoms of *Lychnis flos-cuculi*. On the Continent, according to M. Guenée, it feeds upon *Gypsophila paniculata*. In some seasons it may be swept in numbers from plants of *Silene otites* in the very few localities in which that plant abounds, but, strangely enough, very nearly every larva so swept proves to be infested with a parasite in the form of an *Ichneumon* larva, which destroys it when little more than half-grown. From this cause, though eggs are laid in abundance, the yield is extremely small.

PUPA undescribed—subterranean.

The moth is very rarely captured in this country; of the specimens in cabinets, the large majority have been reared, notwithstanding the terrible mortality of larvæ from the ravages of their parasite. The first specimen of which we have any distinct record in this country was found in the daytime, sitting upon a plant of the Viper's bugloss (*Echium vulgare*), near Bury St. Edmunds, Suffolk, early in July 1868, by the late Rev. A. H. Wratishaw. Three years later he

recorded the capture, near Ipswich, of two more specimens, sheltering on pine trees, in crevices of the bark. More recently there is another record of a specimen found sitting upon Viper's bugloss, and it is probable that this plant is selected as being a particularly rough, strong, and conspicuous plant in the sandy tract which this species principally frequents. Possibly, moreover, it, like many other *Noctuæ*, is attracted at night by the blossoms of the *Echium*.

Apparently confined, with us, to that portion of Norfolk and Suffolk known as the Breck-sands—Bury St. Edmunds, Tuddenham, Thetford, Brandon, Eriswell, Elvedon, and Icklingham. I know of no record elsewhere in the United Kingdom. Abroad it is found over the greater part of Central Europe, the South of France, North of Italy, Dalmatia, Southern Russia, Eastern and Southern Siberia, and Asia Minor.

2. *D. carphoga*, *Bkh.*—Expanse $1\frac{1}{8}$ to $1\frac{3}{8}$ inch. Fore wings pale yellow-brown, faintly rippled with darker brown (but varying through various shades of yellow-umbreous to dark brown and black) stigmata, a spot on the dorsal margin, and a clouded hind marginal band, whitish-ochreous, but varying in the darker forms; hind wings yellowish-white, with a broad yellow-grey marginal band (also varying darker).

Antennæ of the male notched throughout like a saw, each notch bearing a tuft of minute bristles, reddish-brown in front, yellow-brown at the back; palpi very short, thickly tufted, yellow-brown; tongue conspicuously red-brown; head yellow-brown, densely tufted, having small cup-shaped tufts at the bases of the antennæ, and a prominent mass of scales between them; thorax yellow-brown much dusted with white and the collar faintly barred in front with richer brown; shoulder-lappets striped with the same; the crests on the top and back faintly tipped with dark brown; fascicles yellowish-white; abdomen smooth, pale yellow brown;

a brighter brown dorsal crest on the basal segment; lateral tufts small; anal tuft more conspicuous, pale ochreous. Fore wings narrow at the base, rather triangular; costa straight; apex suddenly rounded, almost angulated; hind margin very little oblique, nearly straight to below the middle where it is rounded off; dorsal margin straight; colour pale yellow-brown, often almost bone colour, mottled with deeper yellow-brown; basal line indicated by three black dots, beyond which is a shadowy brown parallel line; first line slender, perpendicular, black, divided by the nervures and only reaching the dorsal margin as a faint brown continuation; second line black, much curved, and consisting of a series of deep crescents, of which those below the middle of the wing are large; subterminal line pale yellow, edged on each side with pale brown, and in its middle portion preceded by three black wedges; orbicular stigma large, open above and below, yellowish-white, faintly edged in front and at the back with black or brown, and partly filled up by a yellow-brown cloud; reniform stigma also large, elongated, yellow-drab, edged in front and behind with fine black lines and containing a brown line parallel with the back margin; claviform stigma large and broad, brown faintly edged with black; middle area of the wing between the first and second lines and around the stigmata filled in with deeper yellow-brown, but outside this the portion lying toward the anal angle is usually very pale; cilia dull yellow looped with brown and tipped with white. Hind wings yellowish-white, dusted with brown; nervures darker brown; beyond the middle is a slender, partial, brown transverse line not reaching either margin, and beyond it a broad clouding of pale greyish-brown, the whole surface having a golden gloss; cilia white. Female quite similar, except that the body is stouter and much more pointed behind, with the anal tuft very small.

Underside of fore wings shining yellowish-white, dusted with brown; costal region and all the nervures ochreous;

reniform stigma faintly indicated by a brownish crescent; beyond it is a slender faint brown transverse line or shade. Hind wings shining yellowish-white, dusted over the costal region and nervures with ochreous, and having a slender curved brownish transverse line beyond the middle; central spot hardly perceptible; body and leg tufts ochreous; legs yellow-brown.

This description is taken from a well-marked typical Southern example—a central form around which there is much divergence. One phase of not infrequent variation consists in the obliteration of the usual markings, and in the South and East of England this is met with in varying degrees, until a form is reached in which the fore wings are of a smooth, uniform pale ochreous, totally devoid of markings, or in which there is only a faint row of brown dots along the subterminal line; but every possible intermediate seems to exist, in some specimens the edges of the stigmata, in others portions of the lines and central bar, faintly showing themselves, and the extreme—devoid of all markings—being rather rare. In some of these the submarginal cloud of the hind wings becomes quite a dark band. All these seem to be included in a form known on the Continent as *var. ochracea*.

Another development, apparently confined to the chalk districts and coast of Kent and Sussex, has the ground colour white, or creamy white, usually with only the central markings, the hind margin being absolutely immaculate, even to the cilia; but more rarely, with the chalky-white ground colour, all the markings are present, faintly grey-brown, and the hind marginal region clouded with the same, all the usual warm yellow-brown tones of colour being absent.

In the South of Scotland, where it has been carefully worked up by Mr. Adam Elliot, a form is found having a tone of colour different to all those hitherto mentioned, the ground colour very pale dull brown with all the darker markings and cloudings deep umbreous, and the cloudings

more extended; sometimes, indeed, the markings and centre of the band are almost blackened, and the costa often dotted with black-brown.

From this district southward, along the west coast more especially, various intermediate forms are found, having the ground colour sometimes ochreous, or yellow-brown, or pale brown, with all possible variations of shade of markings, which, however, are always more or less present, and usually very definite.

From larvæ found on the south coast of Pembrokeshire Mr. W. F. H. Blandford has reared, along with the last mentioned, specimens ranging darker in every degree until the warm colouring of the ground colour is lost in a dull pale umbreous or whitish brown, but the central dark band and the other cloudings and markings are deep rich brown, black-brown, and in one or two individuals nearly black, and so completely pervade the fore wings that the paler ground colour is limited in some to the upper stigmata, the subterminal line and the pale patch before the anal angle; but in others, as in the Scotch specimens, the pale brown of the last-named patch is continued up and bent inward, so that it unites with the two pale stigmata.

Some of these specimens of Mr. Blandford's completely cross the line of demarcation in colour which formerly separated the form found on the coasts of Ireland and the Isle of Man from the present, as a supposed distinct species, under the name of *capsophila*. These are so strikingly different from the ordinary *carpophaga* of the South of England that it is difficult to realise that all are but one species, and indeed this is not, even now, universally admitted. The difference in tone of colour and in sharpness and darkness of markings is so great as to give an *impression* of a different *shape of the wings*, which, however, does not exist. In this last range of forms—called *var. capsophila*—the ground colour, when visible, is usually white or greyish-white, more rarely pale greyish umbreous or brownish-white;

the upper stigmata are greyish-white; their margins, with the remainder of the central band, black-brown, dark grey or black, often deep black; the clouds on each side of the sub-terminal line and in the basal area spread, and become dark brown, or black, or cloudy-black, or grey; the pale patch above the anal angle is usually still conspicuous, but often divided by a black line, and the cilia are black or dark grey, prettily looped with pale grey. The thorax, as in all the other varieties, follows suit, of course, and the yellow tone and golden gloss of the hind wings have disappeared, being replaced by dark or pale smoky-grey or even smoky-white, with or without the darker hind-marginal band. To describe all the variations of merely this dark form would be wearisome, but Mr. W. F. de Vismes Kane, who has great and intimate knowledge of this form in all its local variations in Ireland, and still firmly adheres to the belief of its distinctness as a species, records specimens from one of the islands on the west coast of Ireland as being of a deep and sometimes almost unicolorous black. The opinion that all form but one species is confirmed by the circumstance that the structure of the anal appendices is identical. Moreover, a link between the two is furnished by the form already described as occurring rarely on the English South coast with the ground colour white and the markings and clouding, though not so extended as in the *var. capsophila*, dark grey or nearly black. One such was reared at Dover by Mr. Sydney Webb from a larva found on Sweet William in his garden. Other-wise darker forms, of the *var. capsophila*, appear very rarely to have been, as yet, found in Great Britain, except as it includes the Isle of Man; yet in all probability all that is necessary is to search the South-western coasts, since Major Still took an unmistakable *v. capsophila* hovering over a species of *Silene* in a garden at Tiverton, Devon, and some of the Pembrokeshire specimens are nearly as dark. On the other hand I know of but one ordinary *carpophaga* from Ireland. It was reared from a larva found at Howth in

1864 by Mr. E. Birchall, and described by him, "rich yellow-brown."

In the collection of Mr. W. H. B. Fletcher is a specimen having the fore wings short and singularly dilated, the white lines and dashes at the apex and hind margin being of double the usual width, and a series of prolonged white streaks arising from the costa. In a series from the Hebrides, in the cabinet of Mr. A. F. Griffiths, along with well-marked normal brown specimens, is one of a dark mottled brown, and another having the ground colour *white*, with a brown central bar. On the East coast of England there is sometimes a mixture of forms, as in Durham, where Mr. J. Gardner has obtained ordinary pale Southern specimens with others of full brown, and one of a yellowish-white almost devoid of markings.

On the wing in May and June, and in its more northern and western localities in July; also occasionally, as a partial second generation, at the end of July and in August.

LARVA very plump, moderately cylindrical but tapering a little towards the head, which is small, shining, pale brown, with a darker streak down each lobe, and slightly bristly; body pale purple-brown, second segment darker, sometimes blackened on the back, but divided by the longitudinal lines. Of these the dorsal is moderately broad and rather undulating, pale yellowish-brown; the subdorsal also broad but divided throughout by a slender line of the ground colour; spiracles grey; the purple-brown colouring ceases abruptly immediately above them, and the whole undersurface, with the legs and prolegs, is dull pale yellowish-brown. The larva of the *var. capsophila* sometimes is of a slightly brighter purple-brown, but otherwise agrees accurately.

June and July, and as a second generation in September, on the seeds of *Silene inflata* and *S. maritima*, also occasionally on *S. nutans*, *Lychnis vespertina* and *L. dioica*; sometimes even on garden species of *Silene* and *Dianthus*, including the

well-known Sweet William. When very young it enters the seed capsule and after devouring the seeds demolishes the capsule before proceeding to find another, feeding only at night. Its growth is rapid, and it soon learns that the capsule is too small for a habitation, so coils round it while appropriating the contents. It is a delicate larva and not very easy to rear, requiring constant supplies of perfectly fresh and unripe seed vessels. If such fail before the larvæ of the second generation are full grown, as they very naturally may in September, the larvæ, according to Mr. Kane, bury themselves in sand or soil and hibernate in that condition, to feed up in the spring upon buds, blossoms, or leaves if these only are available.

PUPA of the usual *Noctua* form, except that in front of the abdomen, at the end of the wing-covers, is a large rounded knob or protrusion containing the tip of the very long tongue; whole surface of the wing and limb-covers, which is smooth and level, covered with minute sculpture of fine incised and raised lines; spiracles very large and conspicuous, dark brown; anterior half of dorsal and abdominal segments sculptured more coarsely with abundant pits; cremaster thick and rather conical, furnished with two stout rather divergent spikes; general colour glossy chestnut-brown; cremaster and spikes dark brown. In a slight cocoon just beneath the surface of the ground; usually in this condition through the winter.

The moth is rarely taken in the daytime, hiding at that time among herbage; but at early dusk it flies actively, and is strongly attracted by the blossoms of *Silene*, *Echium*, *Lychnis*, and other plants. At the close of a very hot day it will sometimes fly in plenty immediately after sunset, and in the wildest manner, dashing from one clump of flowers to another. More rarely the intense heat will arouse it to rush wildly about in the sunshine, though even then it is not negligent of its favourite flowers. At night it may

occasionally be taken at light, but is never known to take any notice of sugar or any similar bait. On the coast it hides in the daytime among rocks and on stones, especially under the masses of *Silene maritima*, but is not often found. The dark *var. capsophila* is taken freely in its localities at dusk over the blossoms of the same plant, and later at night may sometimes be found around the lantern of a lighthouse. It was by this means that I had, personally, the pleasure of discovering this beautiful form at the Bailey Lighthouse, Hill of Howth, Dublin, in July 1860.

In its more ochreous variations, mainly in the form called *ochracea*, and paler and rather darker shades, it is found abundantly in the Breck-sand district of Norfolk and Suffolk, and in less numbers, but still not uncommonly, throughout those counties, Essex, Kent, Sussex, Surrey, Wilts, Bucks and Herts, particularly frequenting chalk or sand districts; also in less numbers throughout the rest of the southern half of England to Herefordshire, but becoming much more rare in Staffordshire, Derbyshire, and Salop; in Cheshire, Lancashire, Yorkshire, Durham, and Westmoreland it seems to be more attached to the coast, and there, in suitable places, not rare, but has assumed, as already shown, a deeper colouring. In Wales it is not scarce, in its darker varieties, in Pembrokeshire—indeed probably common on the ranges of cliffs of that coast, where *Silene maritima* grows in enormous, and often inaccessible, masses; in North Wales it is recorded in Flintshire, and certainly has been found on the rocky coasts. The forms found in the South of Scotland have been commented upon; they appear to be met with in Roxburghshire, the Clyde Valley, and Perthshire, but Dr. Buchanan White recorded it also on the East coast, in the districts of the Tweed and Forth. The dark form, *var. capsophila*, appears to inhabit all the rocky portions of the coast of Ireland, with its islands, and the Isle of Man, wherever *Silene maritima* is found, and in many parts to be plentiful. Abroad, this last form is apparently confined to

mountain districts, principally in France, Spain, Sardinia and Corsica.

The general range of the species is throughout great part of Central Europe, the more temperate portions of Northern Europe, and North Italy with Sardinia; also Asia Minor, Armenia, and the mountain regions of Central Asia.

3. **D. cucubali**, *Fuessl.*—Expanse $1\frac{1}{8}$ to $1\frac{1}{2}$ inch. Fore wings dark brown with a purple flush, the transverse lines purple and yellow, the upper stigmata edged with yellow, and united at their lower corners; hind wings greyish-brown.

Antennæ of the male stout, simple, but minutely ciliated with bristles which stand apart, brown; head and palpi dark purplish-brown; a small tuft of longer scales at the base of each antenna; collar nearly erect, dark purple-brown, triply barred, and also edged, with pale yellow; rest of thorax purple-brown; shoulder-lappets broadly margined with pale yellow; top and back crests rather conspicuous; fascicles very small, greyish-white; abdomen dull brown, having on the back of the basal segment a rather large, bright brown crest, followed on succeeding segments by four or five more, very small and nearly prostrate, and also extremely fugitive; lateral and anal tufts rather spreading. Fore wings moderately broad, with the costa very slightly arched at the base and apex, which last is obtusely angulated; hind margin gently rounded and rather full, but bent in and more oblique from the middle; dorsal margin slightly hollowed near the anal angle; colour pale purple, or purple-brown, marbled with dark brown or black; basal line indicated by several isolated black streaks edged with yellow; first line perpendicular, broken with black streaks, of which that nearest the dorsal margin is strongly angulated; second line a graceful curved series of small black lunules, followed by a slender brown line, both lying in a rather broad transverse stripe of the pale purple ground colour; subterminal line slender, bright yellow, excessively angulated

and waved, and at one point touching the purple stripe, but otherwise edged on both sides with small black or purple-brown clouds; orbicular stigma elongated into a short oblique stripe; reniform also oblique, but in the opposite direction, so that their extreme lower corners are united or very nearly so, both distinctly margined with bright yellow, and inside this with brown enclosing a purple central streak; claviform stigma large and conspicuous, broadly rounded, deep black or smoky black; space between the stigmata and the dorsal margin brightly of the purple colour; costa spotted alternately with black and purple to the reniform stigma, beyond which it is clouded with brown in which are three yellow marginal dots; along the hind margin is a row of black lunules edged inwardly with a clear purple line; cilia dark purple-brown prettily looped with paler dashes, and strongly crenulated. Hind wings not large, rounded, grey-brown, paler at the base; the nervures dark brown; cilia white with an intersecting brown line. Female similar, with the abdomen stouter, but rapidly tapering off to a long point.

The colour as described is that of a fresh and perfect specimen, and is quite constant in such when preserved; but it appears to fade very rapidly in the living insect, so that those which are taken on the wing have commonly no trace of the purple colouring, the ground colour having become pale brown, though the black clouds and markings and the yellow streaks remain the same. In this state it closely resembles the next species, but may be recognised by the connected stigmata.

Underside of the fore wings dusky pale brown, tinged along the costal margin with purple; a broad smoky-brown transverse band occupies most of the space beyond the middle; in it are three or four pale purple costal spots; cilia light brown with dark brown crescents in the hollows of the crenulations. Hind wings toward the base dusky white dusted with brown, and toward the costa strongly tinged with purple; central spot large, dark brown: beyond it is a

dark brown transverse band, occupying the hinder half of the wing, and darkest at its inner margin; cilia purplish white, intersected by a brown line; body and legs purple-brown.

Usually very little variable, except in the depth of the dark marbling. The liability to rapid fading of the purple colour during life has already been alluded to. In Mr. Percy Bright's collection is a curious aberration—a female with wings of extraordinary breadth.

On the wing in June and the beginning of July, and, as a partial second generation, in August.

LARVA plump, but tapering in front and with the head rather small; anal prolegs rather extended behind; head light brown, with a darker brown streak down the inner side of each lobe; body very pale green, or yellow green, tinged with orange-red toward the head; dorsal line pale grey and having proceeding from it an oblique orange-red or purplish-red streak on each side, forming a series of V's, of which the apices point backwards, one on each segment; subdorsal line hardly perceptible; spiracular line just traceable, and from it oblique orange-red streaks proceed toward the feet. When young bright green without any orange-red colouring.

July and August, and a partial second generation in September.

On the young seeds of *Silene inflata*, *S. maritima*, *Lychnis flos-cuculi*, and occasionally other species of the same genera, and of *Dianthus*. Not absolutely confined to the seeds, but when these become ripe and hard, feeding readily upon the leaves, and except when quite young, hiding itself in the daytime among the lower leaves, or in the *débris* under the plant; crawling up at night to feed.

PUPA of the usual *Noctua* form, except that the wing covers are swollen at their edges, and there is a somewhat compressed knob at their extremity, containing the tip of the long tongue; wing covers almost smooth, but very finely sculptured with minute lines and punctures; anterior portion

of each dorsal and abdominal segment much more coarsely sculptured with abundant small pits, forming almost thickened bands; general colour deep chestnut, abdominal bands darker; cremaster conical, stout, dark brown; anal spikes rather strong, slightly curved in at the tips, blackish brown.

In a slight earthen cocoon, just below the surface of the ground.

The moth appears to hide by day among herbage, but is seldom seen at that time; at dusk it flies vigorously, and is much attracted by blossoms of Ragged robin (*Lychnis flos-cuculi*), Silene, Red Valerian and sometimes Sweet William, Campion, and other flowers; moreover it does not utterly disdain sugar, but will occasionally hover and buzz up and down the patch upon a tree trunk, taking a sip of it, and has even been known to settle down to the feast; probably it is not wholly indifferent to honey-dew, and I have known it induced to sit upon the leaves of tall masses of reeds, in a fen ditch, with other *Noctuæ*.

Apparently found all over England and Wales, and in marshy districts and the fen country of Cambridge and Norfolk, rather plentifully. Very widely distributed in Scotland, and in the south of that country ascending the hills to 600 feet above sea level; recorded in Dumfries-shire, Roxburghshire, Renfrew, Dundonald and elsewhere in the Clyde valley; also in the eastern districts to Aberdeenshire and Morayshire, where it becomes rare; Perthshire, West Ross and the Orkneys. It appears to occur throughout Ireland, and on the coast plentifully.

Abroad its range is wide—Central and Northern Europe, North Italy, Eastern and Southern Russia, the mountain regions of Central Asia, Japan, and Chusan.

4. **D. capsincola**, *Hüb.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings brown, marbled with deep brown and streaked with white; edges of the upper stigmata and subterminal

line white; the stigmata separate; hind wings pale grey-brown, darker behind.

Antennæ of the male distinctly ciliated with fine bristles, brown, barred at the back with pale yellow; palpi dark brown, dusted with white; head dark umbreous, barred in front and on the top with pale yellow, and strongly tufted between the antennæ; collar yellowish-brown, mixed with white and barred with dark brown; shoulder-lappets light brown, very broadly bordered with white scales, in which is an irregular curved black streak; rest of thorax covered with similarly mixed long brown and white scales, strongly crested at the top and back, and the crests tipped with white; fascicles spreading, yellowish-white; basal segment of the abdomen covered with similar long white scales, the remainder with similar long brownish ones; a series of dark brown crests adorns the dorsal ridge; lateral and anal tufts spreading, brown, dusted with black. Fore wings broad behind; costa nearly straight till near the apex, where it becomes curved, the apex also being rounded; the hind margin forms a full bold curve, slightly crenulated, and hardly oblique; dorsal margin nearly straight; colour umbreous-brown, marbled with black; basal line black, double, broken into three streaks, and edged with white, below is a black basal cloudy spot close to the dorsal margin; first line thick, black, broken, but angulated throughout and faintly edged inwardly with white; second line curved into two large bends and composed of deep black crescents, of which one or two throw off black dashes behind; this line is followed by a more slender parallel dark brown line, and also faintly or partially edged with white; subterminal line conspicuously white or yellowish-white, forming a series of rough irregular curves and angles and in the middle a rather flat **W**; more or less edged inwardly with black wedges, outwardly with small black cloudy spots; orbicular and reniform stigmata both elongated and slightly oblique, margined with yellowish-white and outside this slenderly with black, their bases

placed a short distance apart; claviform stigma very broad, wholly deep black; costa spotted with black and yellowish-white; space between the upper stigmata often black, that below them clouded with white; extreme hind margin edged by a series of deep black crescents, each embraced by a yellowish-white crescent, from the junctions of which pale dashes run to the tips of the cilia, the spaces between these dashes brown, divided by a black line. Hind wings not large, rounded, dull greyish-brown, shading off to whitish-umbreous from the middle to the base; nervures darker central spot faintly perceptible as a streak; cilia pale yellow at the base, barred with a brown line and tipped with white. Female quite similar, except that its antennæ are wholly threadlike, and its abdomen is stouter and tapered off at the extremity to a long pointed sheath, which sometimes covers the ovipositor, though in other examples the latter is considerably protruded.

Underside of the fore wings dull greyish-brown, rather paler toward the dorsal margin; costa toward the apex dotted with pale yellow; reniform stigma indicated by a black streak and followed by a faint cloudy darker brown transverse stripe; hind wings pale smoky-brown, more whitish toward the base, but dusted with darker brown; central spot a small brown streak; beyond it are faint indications of two darker brown transverse bands. Body and legs dull brown, the tibiæ barred in front with yellowish-white.

Usually not variable, or only slightly so in the intensity of the dark clouding and markings, but in the collection of Mr. Sydney Webb is a specimen having the pale colouring below the stigmata increased into a sort of dusky-white central bar, and another, a most singular aberration, in which the margins of the stigmata and the subterminal line are broadened into yellow-white clouds, occupying a considerable portion of the fore wing. A specimen exhibited at a meeting of the South London Entomological Society, in September

1896, by Mr. Montgomery, had a very considerable broadening of the subterminal line, but the wavy lines at the extreme margin suppressed.

On the wing in May and June, and as a partial second brood in August, September, sometimes October, and indoors emerging even in December.

LARVA stout, slightly tapering at each end; sides puckered; a horny plate on the second segment. Head shining, pale reddish-brown, with two black dashes down the face; general colour greenish-grey; dorsal line paler, indistinct, threadlike, intersecting a series of broad, coarsely-indicated, dark grey V-shaped markings, one on each segment, but its apex projecting into the subsequent segment; subdorsal lines geminated, grey, inconspicuous; spiracular line broad, appearing as a dark grey shade, contrasting with the paler ground colour of the sides beneath; spiracles whitish; under-surface pale pinkish-ochreous, sparsely and minutely dusted with dark red.

When half-grown pale brown, with ochreous dorsal, subdorsal, and spiracular lines, and the dorsal markings slightly darker; head and plate on the second segment dark shining brown; usual spots black. (C. Fenn.)

In the adult larva the ground colour is often pale brown, with the markings deeper brown.

July, and a partial second generation in September, on *Lychnis dioica* and *L. vespertina*, and sometimes on *Silene inflata* and other species of *Silene*, *Lychnis*, and *Dianthus*, feeding on the seeds, and in the species of *Lychnis*, the capsules of which are large, entering, and so long as this is possible, hiding itself completely therein. Readily detected by the round hole through which it has entered, and which it uses to cast out its excrement. When the contents are exhausted removing to a fresh seed-vessel.

PUPA cylindrical to the tips of the wing covers, where is a projecting rounded knob or tubercle, quite raised above the

abdominal segment next it and separate, containing the tip of the very long tongue; wing and limb covers exceedingly smooth and shining; abdominal segment rather full, banded broadly with abundant sculpture in minute pits; cremaster rather short and broad, and furnished with a prong-like pair of spikes; colour bright red-brown; spiracles distinct, darker; sculptured bands of the anterior abdominal segments dark brown; spikes black. Subterranean, with hardly any cocoon. In this condition through the winter.

The moth is rarely seen in the day time, usually hiding itself among herbage. At dusk it flies vigorously, and is strongly attracted by blossoms of Red Valerian, Sweet William, and other flowers, as well as by those of *Dianthus* and *Silene*. Usually it sips from them while hovering, but late at night may be seen at rest with quivering wings upon the blossoms of *Lychnis*. It is, however, possible that this may only be in the case of the female when depositing an egg; certainly it is instantly on the alert and flies off. Apparently it rarely, if ever, takes any notice of sugar. Formerly it was common in the gardens of the London suburbs, but, like so many other species, appears now to have deserted them. Otherwise it seems to be more or less common over the greater portion of England, Wales, and Ireland, and in Scotland to Perthshire, Aberdeenshire, and Moray, and has been taken in the Orkneys. Abroad it is found over the whole of Europe, except the extreme north and south, and in the mountain regions of Central Asia.

5. **D. albimacula**, *Bkh.*—Expanse $1\frac{3}{8}$ inch. Fore wings dark purple-brown, marbled with black; a white spot at the base, and a large white blotch, including the stigmata, in the middle; hind wings dull brown, paler at the base.

Antennæ of the male simple, but ciliated with minute tufts of fine bristles to the tip, dark brown; palpi rather small, but broadly tufted, dark brown at the sides, purple-brown in front; head umbreous, broadly and doubly barred

across the face with white; collar pale umbreous, with a broad bar of white, edged with black, very near the base; thorax golden-brown, beautifully ornamented with black and white on the shoulder-lappets, and the top and back crests tipped with the same; fascicles yellowish-white; abdomen yellow-brown, covered toward the base with long yellower scales; on the dorsal ridge are three or four small dark brown crests; lateral tufts very conspicuous, anal tuft thick and spreading, both yellow-brown. Fore wings not very broad behind; costa nearly straight; apex rather acutely rounded; hind margin rather oblique, gently curved, very slightly crenulated; dorsal margin straight; colour rich purple-brown, almost violet-brown, marbled with black; at the base is a bright white blotch, divided and edged with curved black streaks, which form a broken, double, partial basal line; first line repeatedly angulated and formed into long crescents, deep black, faintly edged inwardly with white; second line oblique, curved, black, forming a series of crescents, and minutely edged outside with white; subterminal line white, broken up into a series of curves and angles, which are edged inwardly with deep black clouds; orbicular stigma large, white, centred with brown, edged in front and behind by black lines, but joined above to a white blotch on the costa, and below to an angulated large clear white spot in the centre of the wing; reniform stigma of the ground colour, slenderly edged with black, and inside this, partially with white, which joins a small white costal spot; claviform stigma indicated by a black curved streak, which adjoins the back of the central white blotch; costa beyond the stigmata dotted with white; extreme hind margin dotted on the nervures with black, these dots joined by slender white lines, from which white dashes run out to the tips of the purple-brown cilia, which thus appear looped. Hind wings very pale grey-brown at the base, shading to dark smoky-brown toward the hind margin, the whole with a golden gloss; nervures dark brown, as also is a slender central crescent; in the dark

border on the first branch of the median nervure is a white dot; cilia golden-brown, with the tips white. Female quite similar, except that the abdomen is long and conical, terminated by a long pointed ovipositor case, and devoid of the anal tuft.

Underside of the fore wings dull smoky-brown, paler in the middle and at the base; nervures darker; costa toward the apex dotted with white; cilia broadly dashed with white; hind wings smoky-white, broadly dusted toward the costal margin with ochreous, and broadly banded with dark smoky-brown before the hind margin; cilia edged with white. Body and legs yellowish-brown, the tibiæ dark brown, barred with yellowish-white.

Hardly variable, except that in some examples the sub-terminal line is almost obliterated, though its edging of black spots and wedges remains complete; in others it is complete and extended, so as to throw white streaks to the margin where they join those in the cilia. There is also a slight difference in general colour between the specimens found on the Kentish coast and those from the Portsmouth district, the latter being of a rather lighter purple-brown.

On the wing at the end of May and in June.

LARVA moderately stout, cylindrical, but tapering a little toward the head, and still less at the hinder extremity; ground colour pale ochreous, or pale brownish-ochreous; head delicately freckled and streaked with dark brown down the front of each lobe; the second segment has a dark brown or brownish-grey plate, through which the fine dorsal and broader subdorsal lines of ground colour are visible; on the rest the dorsal line can be discerned as a fine thread of ground colour running through the dorsal blackish spots and ill-defined pear-shapes that follow them on each segment and form a dorsal pattern; two pairs of black dots are equally distinct on the back of each segment, and a similar dot is placed just above each spiracle, which last is white, faintly

outlined with black; in front is a patch of dark grey or blackish freckles in the subdorsal region, and some broken patches of freckles, in lines of curves, extend to the spiracular region; undersurface of the same colour.

When young it is greenish-grey with paler dorsal and subdorsal lines, and a darker stripe along the spiracles, bounded above by a paler undulating line; some faint darker marks along the back indicate the future dorsal design; a pale stripe runs beneath the spiracles, and the undersurface is darker greenish-grey. At the next moult, when about three-eighths of an inch long, the ground colour is either pale drab or pale ochreous-yellow, with a tolerably distinct design of dark grey or blackish diamond shapes and spots on the back, and when it has attained the length of three-quarters of an inch the whole pattern is more clearly defined than at any other period, showing that it is composed of closely aggregated greyish or blackish atoms, which, as the larva grows, become more dispersed, with increasing intervals of the ground colour between them. In this clearly defined stage of marking, the ground colour is yellowish ochreous, and the dorsal pattern consists of a somewhat ovate blackish spot at the beginning, followed by a diamond or pear-shape, extending to the back of each segment; the front half of each of these shapes rather bare of freckles, the hinder half filled up so as to look blackish; the anterior pairs of black dots distinct, the hinder pairs often attached to the side-angles of the diamonds, and always touched by a blackish line of freckles which curves or festoons along from the hinder dot of one segment to the hinder dot of the next; then come two broad and irregularly thickened stripes of freckles which, about the middle of each segment, slope towards each other till they touch, then return to their previous level; below the point of dorsal contact is a cloud of freckles surrounding the spiracle. From this the markings gradually fade till the adult colouring is assumed. (Condensed from Buckler.)

July and August.

On *Silene nutans*, but in confinement will feed also on *S. maritima*, *S. inflata*, and *Lychnis dioica*, feeding on the seeds and not confining its attacks to the night-time, though it usually hides by day among the lower leaves when too large to remain in the capsule.

PUPA moderately stout, the wing cases thickened and fully joined to a large and conspicuous knob at their extremity, which contains the coiled tip of the long tongue; wing and limb covers very glossy and only partially and irregularly sculptured in lines and pits; dorsal region and dorsal and abdominal segments abundantly and coarsely pitted, except a narrow, smooth band at the hinder edge of each segment; colour deep red-brown with a purplish bloom; cremaster broad and short, with two short, widely separated spikes, black. Underground, in a slight earthen cocoon. In this state through the winter.

The moth doubtless hides by day among herbage; so far as I know it is very rarely taken at that time, indeed the only method of capture seems to be by watching the flowers of *Silene*, especially *S. nutans*, at dusk; but the great majority of specimens in collections are reared, the larva being very easily found in its extremely restricted haunts.

This species was included in the British fauna by Mr. Stainton in his most valuable "Manual" on the strength of a specimen recorded as having been taken near Birchwood, Kent, in the year 1816. This specimen was taken at rest by a Mr. Bydder. On June 8, 1865, another was captured while flying along a weedy bank a few miles from Portsmouth, and identified by Dr. H. G. Knaggs. Of these two specimens, Mr. Edward Newman most characteristically remarks, while including the species: "Its occurrence in these localities is very remarkable, from the entire absence of the food plant." However, in the last-named locality the

food plant proved, very fortunately, *not* to be absent, though it does not seem to have very speedily been found; but in 1873 larvæ were found in the same district by Mr. Moncreaff and forwarded to Mr. Buckler, from which his description and figures were made. In the following year it was discovered at Folkestone, Kent, in some plenty; and although the original locality has been, as I understand, destroyed in the course of erection of fortifications, the produce of the newer locality has been so satisfactory that few cabinets are without this exquisitely beautiful species. For my own series I am mainly indebted to Mr. J. W. Downing. It is now found along the chalk cliffs at Dover, St. Margaret's Bay, Lyddon, and elsewhere in Kent, and should certainly be met with in Sussex. The late Major J. N. Still had the good fortune to take three specimens, two of which are now before me, at light at Seaton, Devon, in 1889 and 1890, and one is recorded at Axminster in the same county. This appears to be the extent of its range, as at present known, in these islands. Abroad it seems to be found all over Europe, except the extreme North and South, also in Asia Minor, and the mountainous regions of Central Asia.

[**D. compta**, *Fab.*.—A very pretty species, smaller than the last, purplish-brown, abundantly marbled with fine black lines and white dots, and having the whole centre of the fore wings occupied by a broad, complete, white transverse band, in which the two upper stigmata are faintly outlined. Of this species the late Mr. E. Birchall wrote in 1866: "A pair of this species, taken in Ireland by Mr. Tardy, are in the collection of Trinity College, but I am unable to indicate the exact locality of their capture. The insect has long been a reputed British species, and I confidently anticipate its admission to our lists when Dublin collectors bestir themselves a little." Dublin collectors *did* bestir themselves, but so far as this species was concerned, without result; a few years later, however, specimens were duly *announced* as

having been taken near Dublin, and two of these found their way into the cabinet of the late Mr. F. Bond, and are still retained by its present possessor, but no general credence was obtained for the capture, and the results of many successive years' work have not tended to confirm it. In my opinion no reason at present exists for including this species in the fauna of the British Isles. Abroad its range is very wide—the greater part of the Continent of Europe, Asia Minor, Tartary, China, and Japan.]

6. **D. conspersa**, *Esp.*; **nana**, *Staud. Cat.*—Expanse $1\frac{1}{4}$ to $1\frac{3}{8}$ inch. Fore wings slate-black, marbled with deep black, and having large white blotches at the base, centre, and apex; hind wings grey-brown.

Antennæ of the male simple, finely ciliated, light brown; palpi rather small, black, shading to golden brown at the sides, tipped with white; head dusky white, obscurely barred and spotted with black, and strongly tufted between the antennæ; collar white, four times barred with black, sometimes rather obscured by dark scales; thorax white; the shoulder-lappets broadly bordered on the inner side with black; top and back crests also tipped with black; fascicles yellowish-white; abdomen glossy grey-brown, abundantly covered toward the base with long white scales; dorsal crests one to four, small, obscure, and extremely fugitive; lateral and anal tufts spreading, rather darker grey-brown. Fore wings rather pointed; costa nearly straight; apex bluntly angulated; hind margin oblique and very gently rounded; dorsal margin nearly straight; colour deep dark slate-grey or slate-black, marbled with black and also with bluish, and in a minute degree with olive-yellow; at the base is a white blotch divided and edged with thick black streaks which form a broken double basal line, attached to which, close to the dorsal margin, is a more longitudinal thick black streak, broadly edged toward the margin with white; first line obscure, double, a series of black curves; second line also

double, oblique, curved, and consisting wholly of short black crescents; subterminal line white, commencing as a broad, tapering, white costal blotch at the apex, narrowed, but still conspicuous in the middle, broken below, partially preceded by black triangular spots, and at the anal angle again spread and joining a broad white blotch on the dorsal margin, which is thus almost completely edged with white; from the middle of the costa a broad, clear white blotch extends to below the middle of the wing, completely absorbing the orbicular stigma, the position of which is only indicated by two slender, perpendicular black lines; this white blotch joins another which extends over the reniform stigma, leaving it also only indicated by black edges before and behind; costa before and beyond the central blotch spotted with white; extreme hind margin spotted with black, and very gracefully looped or festooned with white; cilia greyish-brown, dashed and dotted with white. Hind wings rather small and short, smoky-brown, a little paler at the base, but the nervures darker; on the hinder branch of the median nervure one, or sometimes two, white dots; cilia smoky-brown, tipped with white. Female quite similar, except that the abdomen is stouter, rather conical, pointed, and devoid of the anal tuft.

Underside of the fore wings smoky-brown, nervures paler; the middle area faintly tinged with yellow; dorsal margin shining, pearly-white, sometimes greenish-white; reniform stigma indicated by two smoky-black spots; costa beyond it dotted with white; cilia distinctly dashed with white. Hind wings white, obscured by an abundant dusting of grey-brown scales; central spot large, smoky-black, followed by a curved, transverse, dark brown stripe, outside which the marginal region is clouded with smoky brown; cilia mixed brown and white. Body yellowish-brown; legs black-brown, the tibiæ barred with white; leg tufts brownish white.

Usually rather constant in colour and markings in any one locality, but subject to wide local or climatal variation. The described form as above is pretty uniformly that found in

England, though occasional specimens from the South Coast have the ground colour intensified to blue-black, the markings remaining normal; and one from Brighton, in Mr. Sydney Webb's collection, has the pure white colour very greatly extended so that it becomes the ground colour of the fore wings, with the transverse lines black and the cloudings dark olive-grey. On the rocky coast of North Wales it becomes darker, the white markings very much reduced in size and more or less clouded with yellow, olive-yellow, or pale orange, and an olive or orange tinge over the dark portions in varying degrees until the white markings in some individuals wholly disappear, partially suffused by the olive-brown ground colour, partly becoming dingy olive-yellow. In the Isle of Man, on the contrary, the white markings are very pure, the dark ground almost blue-black, and there is a decided increase in size. Very fine specimens are also found in Devon, and there the tinge of orange or olive-yellow is often in some degree assumed. In Scotland the size seems to be very slightly reduced, the white markings are hardly so pure, or are tinged with pale yellow, and the dark ground not so intense, being in some degree tinged with olive; on the North East coast there is sometimes a general suffusion of olive-yellow; but it is in the Shetland Isles that the most extraordinary forms are found—the white markings utterly suppressed, or the stigmata alone white, or yellow, or pale ochreous, or black-brown and only indicated by blacker margins; the sub-terminal line only indicated by its attendant black clouds, and sometimes the whole surface of the fore wings smoky-black or olive-black, with but a faint dappling of blacker lines and crescents; on the other hand, some specimens in these Islands are of the form in which the ground colour is intensified, but the markings, though curtailed, sharply white. This last form is also found in the West of Ireland, and a specimen now before me from Sligo is singularly rich in its deep dark colour and snowy blotches. Specimens from the Hebrides are extremely beautiful, the

white markings variegated with yellow and greenish-yellow, or even orange-yellow. Those from Orkney are somewhat similar, or with the white markings small but clear. Although there are so many apparently local strains of variation, all are intimately connected by intermediates, so that, except in some degree in Shetland, it is impossible definitely to separate the species into varieties.

On the wing in June, in forward seasons sometimes at the end of May, in late ones lasting into July.

LARVA moderately stout, faintly increasing in size from the second to the tenth segment; head smooth, pale wainscot-brown, with four slender and rather darker lines down the face; body also wainscot-brown with a dorsal series of ten darker V-shaped markings, the apices of the V's pointing backward; a very narrow pale dorsal stripe passes through all these, intersecting each V at its apex; there is also a black dot on each side of each V near its apex; it has two lateral stripes rather darker than the ground colour, but still very pale; and below these a third stripe paler than the ground colour, indeed almost white, which contains the spiracles; these are pink encircled with black; undersurface pale flesh colour, tinged more or less with yellow; legs and prolegs pale pink. (Newman.)

July to September, on the seeds of *Silene inflata*, *S. maritima*, *S. nutans*, *Lychnis flos-cuculi* and allied plants; when young hiding in the capsule, but when too large for this, concealing itself by day on the ground or under the lower leaves of the plant, crawling up to feed and plunging its head, and its body as far as possible, into the capsule.

PUPA of usual form, the characteristic knob at the end of the wing cases conspicuously round and projecting; limb and antenna covers rather well marked, and, with the wing covers, sculptured in very fine lines; dorsal and abdominal segments very coarsely sculptured in rough pitting, the usual smooth band at the hinder edge of each rather narrow; anal segment

much rounded, especially below the cremaster, which is short, but broad and stout, and furnished with two stout tapering spikes of a black colour; general surface glossy red-brown. In a loose friable cocoon of earth and silk, underground. In this condition through the winter.

The moth doubtless hides during the day among herbage, but is very rarely found at rest; at dusk—sometimes at very early dusk—it flies with great swiftness, coming to blossoms of *Silene*, *Dianthus*, and *Lychnis*, but is timid and readily frightened away. It has been taken at flowers of the common garden rocket, and is said, where common, to pay an occasional visit to sugar. But from its rapid flight it so readily becomes worn, that for cabinet specimens rearing from the larva is commonly resorted to. A circumstance which appears to be definitely ascertained with regard to the curious dark varieties found in the Shetland Isles seems to be worthy of special notice: Mr. McArthur, who has collected very extensively in these islands, assures me that the darkest suffused and nearly unicolorous forms are found mainly on the East coasts, more particularly of the Island of Unst, where the rocks among which the food plant grows are of a very dark colour; while on the West coast, where the rocks are of a paler colour, the forms found are more nearly normal, with intermediate varieties. Also that in the Hebrides along with rocks ornamented with yellow lichens, he has found those varieties of the moth having an orange or olive-yellow tinge. This is the more remarkable in that the moth does not appear there to sit upon the rocks, or to give up its usual habit of hiding in the daytime among herbage.

A very widely distributed species in these Islands, but hardly ever found commonly, and inland usually scarce. I find records for all the South and East of England, from the Scilly Isles to Norfolk, and also in the West to Hereford, Cheshire, Lancashire, and Cumberland, but apparently

few or none in the Midland Counties. In Yorkshire it is very local. In Wales found in Carmarthenshire, Pembrokeshire, and on the North Wales coast—probably, indeed, all round the coast. In Scotland, in various forms, at Ardrrossan, Dunoon, and elsewhere in the Clyde Valley, in Kincardineshire, Perthshire, Aberdeenshire, Moray, and elsewhere in the provinces of the “Tweed, Forth, Tay, Dee, Moray, Solway and Clyde,” as indicated by Dr. Buchanan White; also in the Isle of Lewis (Hebrides), the Orkneys, and Shetlands—probably on all rocky coasts when looked for. In Ireland equally well distributed, Howth, near Dublin, Cork, Kerry, Galway, Sligo, Westmeath, Monaghan, Tyrone, Armagh, Donegal, Derry, and Antrim, and also on the small islets scattered along the west coast. Abroad it extends over the whole of the Continent of Europe, except the extreme north and south, Algeria, Asia Minor, and Tartary.

7. *D. cæsia*, *Bkh.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings rather pointed, dark slate-grey, with the markings very obscure; hind wings blackish-brown; thorax bluish-slate.

Antennæ of the male simple, very minutely ciliated, dark brown with whitish ciliations; palpi and head tufted, dark slate-grey; thorax densely covered with raised scales, dark slate-grey with a dusting of white, and at the base of the collar with whitish-grey; upper edge of the collar dusted with black; on the top and back are small crests, the latter duplicated, and all the tufts tipped with black-grey; fascicles greyish-white; abdomen pale slate-grey, very faintly barred with darker, and having upon the first two or three segments small slate-grey crests half obscured among the long similar scales; lateral tufts distinct, spreading; anal tuft dense, rather paler. Fore wings somewhat pointed, narrow at the base; costa straight; apex long and very sharply rounded off; hind margin oblique, straight from the apex but rounded off below the middle; dorsal margin slightly but gracefully curved; colour dark slate-grey or bluish-slate very faintly

and softly dusted and clouded with paler grey; markings so faint as often to be scarcely perceptible; basal line excessively obscure, limited to two small black spots in the costal half, and both edged externally with pale grey; first line rather perpendicular, broad, waved, but only faintly indicated in pale grey; second line rarely visible, when perceptible a curved pale grey thread, followed at some distance by a parallel row of whitish-grey dots placed on nervures, which here are blackish; subterminal line a faint series of irregular, undulating, pale grey clouds; stigmata hardly perceptible, but the space between the upper two is rather pale; cilia shining and changeable according to the light, dark grey dashed with blacker and tipped with a whiter shade. Hind wings rather narrow, rounded, dark smoky-grey, paler toward the base; nervures dark brown; cilia dusky white barred with cloudy black. Female quite similar, except that the abdomen is stouter and tapers off to a sharp elongated point.

Underside of the fore wings smoke-colour, the nervures thickened and dusted with black; a bluish sheen lies along the dorsal margin; cilia grey-black, with a paler line along their base. Hind wings also smoke colour, paler toward the dorsal margin; cilia as in the fore wings. Body and legs smoky-grey; front tibiæ darker and barred with yellowish-white; leg tufts of the colour of the body.

But very slightly variable here, though in some individuals there is a tendency to rather paler, more bluish-grey clouding over the base and middle area of the fore wings, a broad bar of the dark colouring remaining between and a roughly triangular dark spot near the middle of the costal margin; sometimes also a whitish-grey dash appears in the middle of the base. But it must be borne in mind that the form found in these islands, and which I have described, is not that which is typical of the species abroad, the latter being of a far brighter and lighter bluish-slate, mottled and clouded with darker, but having round the base and broadly

in the middle area large clouds of pale bluish-grey or yellowish-grey, with a large dark spot on each margin; also the subterminal line is more distinct and broader, whitish-grey; and the cilia are very prettily dashed and scalloped with dark and pale grey. Altogether it is a far more beautiful insect than our local form, but the latter is quite reliable *here*. Such variation as we have is usually in that direction, especially in Ireland, where, as Mr. Kane points out, there is sometimes a faint trace of the yellower colour of the central area, but nothing has been found approaching at all closely to the Continental type; and in the south-west of Ireland, the Atlantic islands especially, the insect becomes almost blue-black.

On the wing in June, July and the beginning of August, emerging over a long period. It has been suggested that the specimens found in fresh condition in August may be the offspring of those out in June, but this does not seem to be established.

LARVA cylindrical, but very plump; the extremities rounded; head shining pale brown, with two perpendicular darker clouds in front; mouth dark brown; body very pale greenish-grey, on the back more yellowish-grey, having the whole dorsal and lateral surface down to the spiracles dusted or reticulated with minute blackish flecks, which form a general cobweb-like network; dorsal and subdorsal lines indistinctly indicated by rather more dense longitudinal clusterings of the blackish atoms; on each segment, midway between the dorsal and subdorsal lines, and between the latter and the spiracles, is a roundish dot, ringed with black; each spiracle is indicated by one or two sharp black dots. Undersurface faintly tinged with green and covered with the most delicate possible network of grey atoms; also there is a black dot on each segment outside the line of the legs; these and the prolegs are greenish-white, and above the anal pair is a dusky black transverse bar. Hairs few and very

minute. (Described from a larva furnished by Mr. C. S. Gregson for that purpose.) When younger a series of dorsal diamond-shaped markings is formed of similar aggregated atoms.

End of June to August and probably September, but it curiously happens in this species that before the moth has ceased to fly, the larvæ have, from their rapidity of growth, become nearly or quite full fed. On *Silene maritima* and *S. inflata*, eating the buds and flowers as well as the seeds, for the first week hiding in the capsule; afterwards in the daytime among the lower leaves, crawling up at night to feed.

PUPA of ordinary *Noctua* shape, except that the tubercle usual in this group at the end of the wing cases, and containing the coiled tip of the tongue, is more than usually conspicuous and projecting; general surface quite glossy, dark red-brown; wing and limb covers very faintly sculptured with minute striations; dorsal and abdominal segments more distinctly, yet finely so, with tiny pits, the ordinary smooth band of each segment broader than usual; cremaster very short but broad; its spikes small and delicate, brown-black. In a very slight earthen cocoon under the surface of the ground. In this condition through the winter. It is said to remain occasionally more than one winter before emerging.

The moth does not seem to be found at all in the daytime; doubtless it hides among herbage, and very probably in the clefts of rocks. At dusk it flies with great rapidity, often for not more than about half an hour, between nine and ten o'clock P.M., visiting the blossoms of *Silene maritima* where the plant grows in great masses from clefts of the rocks facing the sea. Extremely swift and very shy, so timid indeed as to excite astonishment. It has been suggested that this timidity may be caused by the necessity for avoiding the numerous bats which fly along the sides of the rocks

which it frequents. Apparently the more level portions of the shore away from the rocks, although *Silene* may be abundant, have no attraction for this fastidious insect.

So far as any record is preserved, the first capture of this species in these islands was of a specimen which was said to have been taken (no date given) in Yorkshire. It was for many years in the collection of Mr. Bentley, and after his death for many more years in that of Mr. Edwin Shepherd, who exhibited it at a meeting of the Entomological Society of London after the re-discovery of the species. That it was a British specimen seemed to be proved by its identical colouring, but whether the true locality of capture was given is open to doubt. In 1866 the late Mr. Edward Hopley a well-known and much lamented artist, Mr. C. S. Gregson, and apparently a collector from Oldham, all captured specimens in the Isle of Man; and about the same date Mr. Warren Wright secured a larva at Tramore, co. Waterford, Ireland, from which in the following year he reared the moth. From that time till the present it has constantly been obtained, both in the perfect and the larva state, in the Isle of Man, and apparently in undiminished numbers; indeed the nature of the locality is such as absolutely to forbid the feats of greedy and unscrupulous collecting such as have tended so greatly to reduce the numbers of many more accessible local species. In Ireland no further capture of this insect seems to have been effected (since it is not found in that special resort of the *Dianthœciæ*, the Hill of Howth) until 1883, when it was again taken at Tramore by Mr. W. F. de V. Kane, who so well followed up this success as to meet with it in eleven other stations along the south coast of Ireland, among which are Mine Head, Ballycottin, Roche's Point, the Old Head of Kinsale, Galley Head, the cliffs near Glandore, Dursey Island, and the isles known as the Blaskets. I know of no locality for this species in England, Wales or Scotland, yet have little doubt that it will some day be found on the rocky coasts of at least the last two countries. Abroad it is

an exceedingly local species, and seems to be confined to the mountains of Central Europe.

8. *D. luteago*, var. *Barrettii*, *Dbl.*.—Expanse, $1\frac{3}{8}$ to $1\frac{1}{2}$ inch. Fore wings rather broad, rich dark purple-brown, blotched with brownish-white, the principal pale blotches forming an imperfect oblique central band reaching the anal angle; hind wings brown.

Antennæ of the male simple, finely ciliated, light brown; palpi broadly and loosely tufted, pale brown, dusted and barred with purple-brown; head similar, but with a small purple-brown raised tuft exactly between the antennæ; collar pale purple-brown, barred with a double crescent of dark purple-brown; remainder of thorax purplish-brown, the shoulder-lappets edged with brownish-white; the crests at the top and back tipped with dark chocolate; fascicles brownish-white; abdomen pale golden brown, sometimes faintly barred with darker; on the basal segments are very small dark-brown crests; lateral tufts rather conspicuous, anal tuft compressed, both golden brown. Fore wings rather broad, the costa very gently curved; apex bluntly rounded; hind margin not very oblique, almost straight to near the anal angle, then rounded off; dorsal margin gracefully curved; colour purple-brown, clouded and blotched with dusky-white, which is coarsely dusted with scales of the dark ground colour; basal line abbreviated, broken into two dark chocolate brown spots or short streaks, bounded outside by parallel pale clouds; first line nearly perpendicular, indistinct, indented, chocolate-brown, preceded by pale clouding, which, indeed, occupies the dorsal half of the space between this and the basal line; second line much curved, dark chocolate, broken up into a series of crescents; subterminal line dirty white, slender, continuous, but irregular and repeatedly angulated, edged on each side by dark ground colour, but situated in a much paler hind-marginal space, of which a blotch toward the apex and a larger one near the

anal angle are conspicuously pale; orbicular stigma dirty white, edged and centred with chocolate, and placed in a large cloud of the paler colour lying across the costal half of the wing, which, with the pale blotch at the anal angle, forms the oblique broken central stripe or cloud which distinguishes the species; reniform stigma somewhat rhomboidal, only very indistinctly margined, whitish-brown; claviform stigma long, indistinctly edged with black; from its tip a black streak passes straight to the second line, cutting the oblique central cloud; costal margin dusted with hoary, and having toward the apex three or four yellowish-white dots; nervures also distinguished by a whitish dusting; cilia dark brown, dusted with black and faintly dashed with brownish white. Hind wings rather small, uniformly smoky-brown, with darker brown nervures; cilia cloudy-white, with a smoky-brown band. Female very similar, but with the fore wings rather narrower and more blunt; also slightly darker in colour; abdomen without the anal tuft, moderately stout, conical and pointed.

Underside of the fore wings pale smoky-brown, with the costa darker, but showing three yellow dots before the apex; at the end of the discal cell is an angulated pale streak. Hind wings brownish-white, much dusted with brown, especially along the costal region; nervures brown; beyond the middle is a slender curved brown transverse stripe. Body and legs, with the tufts, light brown; tibiae black brown, barred with dull yellow.

The insect as here described is extremely constant in colour and markings. It seems to be confined to Ireland, and was long supposed to be a distinct species, but has been identified with *luteago*, Hub., a species found on the continent of Europe, and of a dull orange or ochreous colour, with the markings as here described, but of a pale yellow or straw-colour. There is at first sight no resemblance between them, yet, with the exception of colour, no distinction of any importance can be found. Mr. Kane writes: "I have bred a good many; all

were of our usual type except one which shows a decided tinge of the ochreous of the continental *D. luteago*." I have not seen this specimen but have no doubt of the identity of the two forms. The only English specimen of this species of which I have any knowledge is in the collection of Mr. W. E. Boyd. It has but little resemblance to the Irish form as described, and no resemblance at all to that found abroad, yet it is in my opinion undoubtedly this species. It is of a dull umbreous with a tinge of grey, the orbicular stigma whitish ochreous, the remaining portions of the oblique band pale yellowish brown and less distinct; the hind marginal region obscurely paler grey-brown; all the markings are identical, but the tone of colour is very sombre. It is a female of the usual shape and structure. Another, a male, reared by Mr. W. F. H. Blandford from a larva found by him on the coast of South Wales, and generously placed by him in my collection for the purposes of this work, is somewhat intermediate between the last and the Irish form, but much nearer the English. It also has no apparent resemblance to the continental insect. Its colour is a rather warmer, softer brown with a yellowish or almost olive-yellow tinge, the central oblique bar more tinged with yellow, as is the hind marginal region and especially the basal space below the middle. Both these last specimens are slightly smaller than the Irish examples, and their fore wings are not quite so broad.

On the wing from June to August, but, so far as has been ascertained, only in one generation.

LARVA stoutest at the third and fourth segments, the second tapering a little to the smaller and rather narrow head, and behind from the tenth segment to the anal extremity; the lobes of the head deeply defined at the back of the crown; ventral and anal legs short and well beneath the body; the segments very lightly and finely wrinkled towards the well-cut divisions on the back; the sides much dimpled. The

colour of the head is reddish-brown and shining, the lobes outlined on the face with blackish-brown, defining well the triangular division and the upper lip, and below this the mouth itself. The body is of a light fawn, inclining to flesh colour; a narrow scale-like plate of a glossy pale yellowish-fawn colour is on the second segment, with an interval of the paler skin toward the head; a similar plate is on the anal flap; and a dorsal vessel of brownish-grey shows faintly through the skin; the rather small tubercular dots are fawn-coloured, each with a short bristle; spiracles black; anterior legs pale fawn colour, the ventral and anal legs with a fringe of dark brown hooks.

The young larva at first is of a very pale greenish-drab colour with blackish head and narrow blackish plate on the second segment. After the first moult, when it has fairly become an internal feeder, its head is shining reddish brown, and the narrow shining plate on the second segment is of a similar colour but a little paler; the rest of the body tinged with livid reddish-grey, the skin rather shining and semi-transparent, through which a dark internal vessel is visible; the anterior legs reddish brown. (W. Buckler.)

July to September, on, or in, the large fleshy root of *Silene maritima*. But when young it appears, at least sometimes, to attack the seeds in the manner of the other *Dianthœciæ*, and even the leaves and shoots. Mr. Buckler writes: "The young larvæ were hatched on the ninth and tenth of July. While they had a couple of flowers, with stems and leaves, of *Silene maritima* only, they were at first rather restless, but after a few hours one or two settled down upon the leaves near their extremities, where they ate little sinuous channels in the fleshy substance, others chose the axils and nodes of the stems, tunnelling into them and round which little lumps of frass soon gathered. On inspecting the two *Silene* flowers the male flower appeared not to have been touched, nor apparently the female flower, but on pulling open the calyx I saw a little

heap of similar frass inside, ejected from the seed capsule, proving that one of the larvæ had been there. When I opened the capsule subsequently I found it therein, alive; it had moulted once and the unripe seeds were nearly all devoured.

“As some of the young larvæ were still roaming about I tried them with a small piece of the root of the plant, when they all soon disappeared. On the fourth day while inspecting the piece of root I detected two small holes in it with heaps of minute cream-coloured frass adhering to them; and on the seventh day I examined the axil of a stem and leaf, where I found that a larva had mined its way downwards and was lying a quarter of an inch below in the stem waiting apparently for its first moult, but my stripping away half the stem to expose it proved fatal and it soon after died.” The same fate attended others of the larvæ, which indeed showed a singular absence of appreciation of Mr. Buckler’s efforts to secure accurate portraits at various ages, and finally only one larva remained. “On September 13th I turned out the contents of the pot, by inverting it, to search for the larva, but no search was needful, for it at once rolled into view; it had evidently done feeding, for a great quantity of pale frass, quite fresh, filled up a large cavity in the shoulder of the thickest root; if it had made any chamber or gallery the falling away of the light earth had quite destroyed it.” Happily this larva was less exigent, and after being figured, and wandering about a good deal, contentedly settled down under a fragment of root to change to pupa, and eventually produced a moth. In the case of the specimen reared by Mr. Blandford it is evident that the stems of the plant alone had served the larva for food, since no portion of the root was taken; indeed, there was no suspicion that this species would be found in the locality, and from the large number of *Dianthœcia* larvæ there collected and reared, but one of *this* species emerged.

The only respect in which Mr. Buckler’s larva differed

from that of *D. luteago*, as described by M. Guenée, was that its spiracles were black, whereas in that of *luteago* they are described as being flesh-coloured encircled with black. Its habits appeared to be identical with those of typical *D. luteago*.

PUPA rather cylindrical in the middle portion. The palpus-covers rather filled out in front of the head; wing and limb-covers smooth and brilliantly glossy but finely sculptured with incised lines along the dorsal margin of the wing-covers; end of the tongue protruding in a conspicuous knob at the end of the wings, the curl-in of the end of the tongue quite visible; dorsal and abdominal segments sculptured in pits, as in the other species, and each with the usual smooth band; cremaster rather short and thick, with the spikes curiously divergent, even forming a crescent; colour generally rich bright red-brown or darker red-brown; anal spikes black. (Pupa furnished by Mr. Kane for description.) Subterranean, but apparently forming hardly any cocoon. In this condition through the winter.

The moth appears usually to hide in the daytime among herbage, but has been taken sitting upon a rock. At dusk it flies with great swiftness and visits the blossoms of the large masses of *Silene maritima* growing among the rocks close to the sea. The first specimen of which there is any record was taken by myself on the 10th June, 1861, as it was flying wildly round the lantern of the Bailey Lighthouse, Hill of Howth, near Dublin. This specimen remained for several years unique, and finally was named, as a distinct species, by Mr. Henry Doubleday. In 1865 two more specimens, male and female, were taken close to the same place by Mr. E. Birchall. In the next two or three years others were secured by Mr. W. F. Kirby and others, and to the present time this species has continued to be found in the same restricted locality, and never in very large numbers.

Another locality for it has, I believe, been found on the south coast of Ireland, but has not been divulged; but it surely must inhabit many of the rocky and precipitous portions of the coast of that country. The only specimen known to have occurred in England is that already referred to; it was taken on the north coast of Devon at Ilfracombe by Mr. W. C. Boyd in July 1879, by lamplight, as it was flying over flowers of *Silene maritima*. As already stated a single specimen was obtained by Mr. Blandford, now Hon. Secretary of the Entomological Society of London, from a larva found in 1884 near Tenby. This is the only specimen known to have been obtained in the Principality. I know of no captures elsewhere in the United Kingdom. Abroad *D. luteago*, in its more typical form, is known to inhabit Central and Southern France, Germany, Switzerland, Northern Italy, Corsica, Southern Russia and the great mountain regions of Central and Western Asia.

While this sheet is going to press further information comes to hand modifying in some degree the above statements. A second Welsh specimen has been captured this month (June 1897) by Mr. F. C. Woodforde, in Carnarvonshire, North Wales. It is a female in fine condition, darker in colour than any of those described, and its general tone grey-brown rather than purple-brown, but extremely dark. The shape of its fore wings is rather more acute than in them, and it seems to indicate another local variation, though nearer to the Irish than to the South Wales form.

At the same time Major A. Ficklin, in the course of a trip to the Land's End, Cornwall, has had the good fortune to secure four specimens of this species, all at flowers of *Silene maritima*. Two of these, male and female, are in magnificent condition, and the latter rather unusually large; their colour presents another new phase, all the pale cloudings of the fore wings, over the basal and hinder areas, being extended and having a distinctly hoary or glaucous tint, while the central oblique pale band is scarcely so distinct as usual; moreover

these examples have the hind margin rather full, the female in particular, causing unusual breadth of fore wings and consequently a less pointed apex. The local variations of the present species seem to be extremely curious and definite, and they are the more remarkable in that none of them, so far, seem to point in the smallest degree to the typical form as found on the Continent of Europe.

Genus 20. **ULOCHLÆNA.**

ANTENNÆ pectinated; eyes naked and without lashes; thorax slightly crested at the back; abdomen without crests; fore wings short, blunt, very neat in outline and markings; dorsal margin ciliated and rolled slightly up; hind wings broad.

We have but one species; another, very similar in size and shape, inhabits the south of Europe.

1. **U. hispida**, *Tr.*—Expanse $1\frac{1}{4}$ to $1\frac{3}{8}$ inch. Fore wings dark umbreous; nervures, stigmata and transverse lines white; a white stripe each along the dorsal and hind margins; hind wings white tinged with grey; cilia long.

Antennæ of the male strongly pectinated with rather long, slender, solid teeth which are minutely ciliated and decrease gradually in length to the extreme tip, delicate pale drab or brownish-white; palpi short, broadly and loosely tufted, blackish-brown; head strongly tufted, smoky-brown, a white tuft at the base of each antenna, and between them a distinctly protuberant tuft of the head-scales; collar pale brown, edged with white; shoulder-lappets white, broadly edged with smoky purplish-brown; remainder of the thorax pale brown, or smoky brown, with two pairs of tufts at the back forming a double crest, white barred with black-brown; fascicles creamy-white; abdomen very pale brown, almost

covered with white hair-scales and without dorsal crests; lateral and anal tufts small, white. Fore wings somewhat triangular, narrow at the base and gradually increasing in width; costal margin very straight; apex bluntly angulated; hind margin very faintly crenulated, regularly curved and but little oblique, except when approaching the anal angle; dorsal margin rather broadly fringed with oblique white scales and rolled back so that these scales are partially erect; colour deep rich smooth umbreous, streaked and barred with black; basal line abbreviated to two black spots or streaks edged inwardly with yellowish white; first line straight, very little oblique, broadly white, edged on each side with a slender black line and sometimes divided by a faint brown shade; second line much curved and strongly angled, broadly white or pale brown, divided throughout by a browner thread, edged inwardly by black crescents, but outwardly throwing off long brownish-white conical streaks to the subterminal line, the spaces between these being occupied by long black wedge-shaped streaks, subterminal line a broad white evenly curved stripe lying along the hind margin and giving an aspect of peculiar neatness and definite outline to this species; between the first and second lines the nervures are conspicuously white and the subcostal throws off white blotches to the costal margin; orbicular stigma white, faintly clouded with brown and edged with black; reniform stigma conspicuously white, edged with black and containing two perpendicular fawn-coloured streaks—this stigma and the dorsal portion of the broad white second line seem to form a broad perpendicular interrupted white band crossing the wing—costa beyond the middle regularly dotted with white; dorsal margin pure white; extreme hind margin edged with minute black-brown crescents; cilia very long, the basal half pale brown clouded with darker, the outer half white shaded with pale brown, the whole divided by whiter dashes. Hind wings broad, rounded, white, with a faintly brown central lunule, followed by a rather darker brown slender

transverse stripe, outside which the margin is faintly clouded with brown; cilia very long, pure white. Fore wings of the female very slightly narrower, the ground colour a little darker; hind wings clouded with brown from the base and becoming uniformly pale smoky-brown beyond the transverse stripe to just before the hind margin, where there is a narrow white space edged with dark brown marginal crescents; antennæ threadlike; abdomen stout; otherwise similar.

Underside of the fore wings pale smoky-brown except at the hind margin, which is broadly—and the costa toward the apex, which is narrowly—brownish white; hind wings white; central spot and the following transverse stripe conspicuously smoky-brown; hind marginal space and cilia white; but in the female clouded with smoky-brown. Body dusky white; leg tufts dark smoky-brown; legs dark brown, barred with yellow.

Rather variable in the tone and depth of the ground colour, which in some individuals is tinged with chocolate-brown, in others with grey-brown or slate-grey; also in the colour of the pale markings, which often are of a brownish-white, or, on the other hand, are broadened and rendered more conspicuous. More rarely the markings are partially obliterated, the basal portion and that between the second and subterminal lines becoming almost wholly dark brown. These variations are rather of a local character, though every intermediate shade is found, specimens from the Isle of Portland being often of a dark grey colour, while those from Devon have the white markings tinged with brown. Occasional specimens are found of a pale olive-grey with very faint markings; but one such, in the collection of Mr. R. Adkin, has the row of black-brown wedges before the subterminal line very large, conspicuous, and complete. In all these cases the colour of the insect as preserved in the cabinet is referred to. From a statement by Mr. N. M. Richardson, it appears that—at any rate, at Portland—*living* or *freshly killed* specimens have a distinct tinge of violet or

pinkish-lilac, which after a few weeks totally disappears; when present it is spread over the whole of the fore wings, but is most conspicuous on the hind margin and cilia. A curious aberration in the collection of Mr. S. Stevens has the two upper stigmata joined together and converted into a single long loop. Dr. Mason has one of which the ground colour is pale yellowish-grey.

On the wing from the end of August to the beginning of October.

LARVA moderately stout, the head polished and very slightly narrower than the second segment; body cylindrical and of nearly uniform width throughout; segmental divisions well defined; skin soft and smooth; colour stony greyish-brown, in some specimens strongly suffused with rust-colour, more particularly so at the segmental divisions. Head pale brown with darker mandibles, and a conspicuous streak of dark sienna-brown on the upper part of the inner side of each lobe; two slender dark smoky lines, enclosing between them an indistinct pale line, form the dorsal stripe; subdorsal lines greyish-yellow, bordered above by a series of longitudinal dull black streaks, and below by a series of large marks of a similar colour, these lower marks, however, being very indistinct on the frontal segments; there is only a faint indication of a very fine pale line along the spiracles, which themselves are intensely black; ventral surface, legs, and prolegs uniformly of a dingy grey tint, and the skin so translucent that the working of the muscles of the whole surface can be distinctly seen through it. (G. T. Porritt.)

September to March on grasses—*Poa annua*, *Triticum repens*, and apparently on any grass growing upon the cliff-slopes which it frequents; also occasionally on low plants such as lettuce and plantain. The remarks of Lieutenant E. W. Browne on this larva are interesting: "Wishing to learn something of its habits, on 18th February, 1890, I began to search the grass in localities where the imago had been plentiful, and

on that evening found half a dozen, which, to my surprise, were nearly full-fed, and on the succeeding evenings I took a few more. They are very lethargic, not falling off their food plant when touched, but requiring considerable persuasion to induce them to quit their hold of the blade of grass on which they may be feeding; indeed, some held on so tightly that it was necessary to break off the blade of grass in order to take them. I found them generally at the bottom of the slopes on the tufts of grass overhanging places where the soil had been crumbled away by the action of the weather. I placed some of the largest in a large glass bottle with some two inches of sifted earth at the bottom, and saw that they buried themselves entirely in the earth during the day, coming up after dark to feed."

PUPA rather dumpy in appearance, being broad across the thorax, but the abdominal divisions much narrower, and tapering sharply off to the anal point; neither the head, leg, nor wing-cases at all prominent, the whole surface being rather evenly and bluntly rounded; polished, almost uniformly bright red-brown. (G. T. Porritt.) In a compact cocoon of earth and silk among the roots of the grass. In this condition through the summer.

The moth hides itself in the daytime on the ground at the roots of grass. At night it sits on the grass stems at about half their height, and is exceedingly sluggish. It is very little noticed on the wing, but flies late at night and comes occasionally to light. Neither flowers nor any kind of sweets seem to have any attraction for it. Almost all the specimens in collections have been found at night by the aid of a lantern. As they sit about on the grass they are said to look exactly like the little stones so abundant on the hill-sides. Entirely confined to the sea-coast, frequenting the grassy slopes either at the top of precipitous cliffs or down the sides of those which are more accessible. First taken in this country nearly fifty years ago in the Isle of Portland,

and this bold headland is still one of the favourite localities for the insect. It has been found at Swanage, Dorset; and still exists in the Isle of Wight, at Exmouth, Torquay, Teignmouth, Dartmouth, and Plymouth, in Devon, and also in Cornwall. A single specimen, taken by Mr. A. E. Hudd at Clifton, Bristol, must surely have been in search of new quarters. I know of no record in any other part of the United Kingdom. Abroad it is also extremely local, being apparently only recorded from France and Eastern Spain.

Genus 21. **APOROPHYLA.**

ANTENNÆ in the male pectinated or notched; eyes naked, but having front and back lashes; palpi small; thorax with a small crest at the back; abdomen furnished with one or two very small dorsal crests; fore wings bluntly pointed, somewhat narrowly trigonate.

LARVÆ elongate, smooth, rather brightly coloured; on low plants.

PUPÆ subterranean.

Our three species are readily recognisable:—

A. Fore wings black, edge of reniform stigma yellow.

E. nigra.

B. Fore wings grey-brown, black, or slate-grey, barred with black, stigmata concolorous.

E. lutulenta.

C. Fore wings grey or grey-brown, with longitudinal black streaks.

E. australis.

1. **E. lutulenta**, *Bhk.*—Expanse $1\frac{3}{8}$ to $1\frac{1}{2}$ inch. Fore wings broad behind, either almost unicolorous dark grey-brown, slate-grey, or deep black, with a broad central band very faintly or very strongly expressed; hind wings of the male white, of the female grey-brown.

Antennæ of the male pectinated three-fourths of their length with rather short, solid, abundantly ciliated teeth,

apical portion thread-like, the whole light brown; palpi rather narrowly tufted, dull brown, apical joint slender but distinct; head and thorax dull pale purplish-brown, densely covered with loose fluffy scales, among which the top and back crests, though present and tipped with darker colour, are rendered rather obscure; fascicles yellowish-white; abdomen very pale brown, with abundant long yellowish-white hair-scales on its basal portion, the remainder more mouse-coloured; lateral tufts small, anal tuft narrow and rather elongated. Fore wings of moderate breadth, becoming broad behind; costa nearly straight; apex suddenly rounded; hind margin gently curved, but not very oblique; dorsal margin nearly straight; colour dull heavy purplish-brown or greyish-brown, yet with a superficial greasy gloss; markings usually extremely faint, often quite obscured; when visible the basal line is faintly black, twice angulated but abbreviated; first line double, of a deeper shade of purple-brown, broken into three crescents, and the space enclosed by the double line grey; second line faintly darker purple-brown, much curved, bent back, and abundantly angulated, obscurely edged outwardly with pale grey; the central space between these two lines sometimes darkened; subterminal line faintly pale grey, edged inwardly with a darker brown than the ground colour, and much indented; orbicular and reniform stigmata very obscure, often hardly perceptible; when visible, tinged with pale grey, and palest at the margins; claviform stigma a mere faint cloudy brown spot; costa obscurely dappled with grey; hind margin edged with a faint yellowish line; cilia dull purple-brown. Hind wings rather broad, rounded, pure white, or with the nervures faintly dusted with brown; hind margin edged with an undulating brown line; cilia pure white. Antennæ of the female thread-like; fore wings, if possible, still more uniform in colouring—deep umbreous, sometimes dusted with paler brown; hind wings smoky-brown, paler at the base, darkest along the hind margin.

Underside of the fore wings of the male glossy pale

brownish-grey, the nervures a little thickened; discal cell partially filled with long dark hair-scales; at the end of this cell is a brown spot, closely followed by the faintest possible darker transverse stripe. Hind wings white, dusted toward the costal margin with greyish-brown; nervures pale brown; central spot small, deep brown; hind margin edged with a scalloped brown line; body and leg-tufts whitish-brown; legs umbreous, barred in front with dull yellow.

This description applies to the ordinary form of the species as found locally in the South and West of England. Here it varies but little, except that in some specimens, more particularly from Sussex, the central band is darker, and its markings are more visible; on the other hand, some specimens from Wales are more tinged with ashy-grey; and in a few instances the hind wings of the females are much paler being tinged to the middle, or even over the whole surface, with the white of the male. One specimen from Sussex, in my own collection, is of a clear pale grey.

In some parts of Scotland and Ireland the insect assumes very different characters. In one constantly recurrent form in those localities the antennæ are black; the head and thorax glossy black-brown, or almost jet-black; fore wings slate-black or glossy-black, with the first and second lines still deeper jet-black, the space between them equally black or blotched with deep black, and the stigmata edged with jet-black; the subterminal line is only obscurely indicated by a cloudy indented bar tinged faintly with red or yellow, and inwardly bordered with deep black; hind wings white in the male, with rather darker nervures and a dark central dot, the scalloped hind-marginal line black; in the female very dark smoky-grey. This very beautiful local race is usually known in these islands as var. *Luncburgensis*, but considerable doubt exists as to whether this varietal name is correctly applied.

Along with it in the same localities, and, like it, occurring in both sexes, is an even more beautiful recurrent race. Fore

wings of a rich dark or pale slate-grey, with the first and second lines and the central band enclosed by them, slate-black or deep black, very bright and conspicuous; the subterminal line dusted with purple, and its inner edging deep black; the head and thorax slate-grey, but the antennæ light brown; the hind wings as in the last described; thorax agreeing with the fore wings. This race is known—apparently correctly—as var. *Sedi*; and it must be admitted that, as varietal names, these have the advantage of not being vitiated or even rendered vague and useless by all shades of intermediate forms. In rare instances, however, the last described variety has the central bar *very narrow* and deeply black. In the collection of the late Mr. H. Doubleday at Bethnal Green Museum is a lovely specimen of a paler slate-grey—the precise tinge of that in *Agrotis Ashworthii*—with the central band darker slate-grey, but the lines bordering it grey-black.

On the wing in August, September and the beginning of October.

LARVA elongate, cylindrical, velvety; head rounded, green, hardly shining; mouth black; general colour bright apple-green, minutely irrorated with grey; a grey dorsal shade very frequently forms blackish dots at the incisions of the segments; subdorsal line white, distinct; a broad yellowish or greenish-white spiracular band, its upper and lower margins white, the former edged with a violet line, which joins the white spiracles; under surface slightly paler than the ground colour; legs and prolegs tinged with purple.

A variety occurs having the white subdorsal lines represented by series of grey or dark ferruginous dashes.

When young, pale apple-green, with a white spiracular line; this becomes fainter when the larva is three-fourths grown, but at maturity resumes its bright colour, and is accompanied by the violet edging. (C. Fenn.)

Mr. Buckler says that the very young larva has a dark

purplish-brown head, the body pale green and translucent, the visible internal organs giving the appearance of a dark grey stripe down the back; dark brown plates on the second and anal segments; and the tubercular spots distinct, blackish, each with a long dark brown hair.

A full-grown larva sent him from Scotland was of a bright olive-green, the dorsal stripe blackish from the fifth to the twelfth segments, and on each of these segments a black streak in front of the upper edge of the subdorsal line; the usually violet slender spiracular line being black. Variations in the larva appear in this case to run parallel with those of the moth.

September or October to May or June, hibernating when very small. On *Poa annua*, *Aira cespitosa*, and other grasses; also on dock, plantain, heather, mint, groundsel, chickweed, marigold, *Potentilla fragariastrum*, *Scabiosa arvensis*, *Lithospermum arvense*, and in the spring on the unexpanded leaf-buds of blackthorn and hawthorn. Feeding at night; resting in the daytime stretched out on stems of grass or the underside of the leaves of its other food plants. Mr. Fenn says that when at rest it does not use its anal prolegs, but extends them straight out or in an arch; but at the slightest alarm curls up and falls to the ground.

PUPA apparently undescribed.

The moth is rarely taken in the daytime, apparently hiding itself among herbage. At dusk it flies and comes readily to ivy-bloom and to sugar, and in its more northern and western localities to the blossoms of ragwort. Apparently it emerges from the pupa some days or weeks earlier in the north than in the south. Very uncertain in its appearances: Mr. W. Holland records that within his knowledge it completely disappeared from a locality near Reading in which he had found it commonly, yet after thirteen years reappeared in similar plenty. It is certainly very local, seems to prefer sandy coasts, or chalky localities or greensand, inland, and

has been taken more or less rarely or locally in Kent, Sussex, Surrey, North and South Devon, Cornwall, Somerset, Berks, Oxfordshire, Cambridgeshire, Huntingdonshire, Gloucestershire, Cheshire, Lancashire, Cumberland, Yorkshire, and Northumberland—the dark varieties beginning to show themselves in these northern counties. In Wales it has been found in Carmarthenshire, and apparently also in North Wales. In Scotland it has a wide distribution—Roxburgh, Jedburgh, Berwick, Moray; Strathglass, Loch Laggan, Inverness; Aberdeenshire, Argyleshire, and the Hebrides and Orkneys. In Ireland almost confined to the coast—Galway, Sligo, Mayo, Londonderry; most frequent in the north-west. Abroad it seems to be tolerably well distributed in France, Germany, Switzerland, Hungary, Northern Italy, Spain, and Dalmatia.

2. **A. nigra**, *Haw.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings brown-black or deep black; at the outer edge of the reniform stigma is an upright yellow broken streak; hind wings in the male white, in the female smoky-black.

Antennæ of the male pectinated to the tip with short, solid, finely ciliated teeth, those toward the apex more oblique and slender, black-brown; palpi and head smoky black; thorax black; collar rather erect and having across the middle of the front a slender deeper black bar; shoulder lappets rather uplifted; top and back crests small and obscure but tipped with deeper black; fascicles white; abdomen covered on the basal segments with long white hair-scales; thence dark smoky-brown or smoky-black; lateral and anal tufts spreading and rather produced into points. Fore wings elongated, somewhat pointed; costa long and nearly straight; apex very bluntly rounded; hind margin oblique and gently curved, also very slightly crenulated; dorsal margin straight; colour dull black, with a faint dusting of reddish-brown before and beyond the middle—sometimes hardly noticeable; at the base of the

dorsal margin is a tuft of long white scales shading off at their tips to black-brown; basal line when perceptible deep black, broken into two or three dots which have paler margins; first line jet black, deeply and sharply angulated; second line placed only just beyond the middle of the wing, deep black, much curved and formed into a series of crescents with long points which run along nervures and render them more deeply black; subterminal line hardly perceptible, but indicated by a row of small reddish clouds edged inwardly by a series of deep black wedges; orbicular stigma obscure, ringed with deep black; reniform stigma similar, except that down its outer margin is a row of three or four yellow or yellowish-white dots or spots forming a sort of broken perpendicular streak which is the only distinct marking upon the wing; claviform stigma edged with deep black; cilia black, faintly crenulated. Hind wings of moderate breadth, with the hind margin rather sinuous; clear white, tinged along all the margins with brown and having the nervures faintly dusted with dark brown; extreme hind margin edged with a smoky-brown line; cilia white mixed with smoky brown. Antennæ of the female threadlike; body rather stout, conical and pointed; the markings on the fore wings rather more perceptible; hind wings suffused with smoky-black, usually shading off to white at the base.

Underside of the fore wings smoky black with white cloudy streaks from the base; discal cell filled with long prostrate smoky-black hairs; costa near the apex dotted with white. Hind wings dull white thickly dusted with smoky-brown along the costal and hind-marginal regions and the nervures; central spot small, black; beyond it is a faint slender smoky-black transverse stripe; cilia much blackened. Body and legs, with leg tufts, smoky black, the tibiæ deeper black. At the edges of the two large spiracular openings at the base of the abdomen in the male are long curved tufts of yellow hair-scales, usually folded closely down into the

openings, but sometimes extended like a fan. These are supposed to diffuse a scent useful to the insect.

Hardly variable, except that in the north the reddish-brown dusting of the fore wings disappears and they become wholly black, except the yellow of the outer margin of the reniform stigma, and in some instances even this is curtailed or nearly obliterated. Specimens sent from Carlisle by Mr. G. B. Routledge are of a deep glossy black.

On the wing in September and October.

LARVA cylindrical, of nearly uniform thickness, the head rounded and but little smaller than the second segment; the anal segment tapering to its extremity. Head green suffused with pink; on the second segment a dull pink plate; ground colour brilliant pale yellow-green, bright grass-green, or bright olive-green, deepest in tint at the extremities and often suffused in front with pink. The dorsal stripe in some individuals blackish but faint, in others more red; but always forming one intensely black or red mark just at the beginning of each segment; and in some cases this dark spot is confluent with the two anterior large black raised dots, thus forming blunt arrow-heads pointing forward; subdorsal stripe red or blackish, sometimes complete, but oftener interrupted in the middle of each segment; the skin-folds at the incisions bright yellow. Spiracles white placed in black crescents; immediately beneath them is a narrow pale sulphur-yellow or greenish-yellow stripe; under surface and legs pale green, the latter tipped with pink at their extremities, usual raised dots, when visible, black, and the front pair much the larger.

Or, ground colour cinnamon-brown, a narrow pale greenish-yellow stripe beneath the spiracles; skin folds at the segmental divisions tinged with grey; dorsal stripe faintly indicated by a dusky spot at the beginning of each segment; subdorsal stripe more distinct, tinged with black.

Or, deep dingy crimson on the back and sides, subspiracular

stripe greenish-yellow ; head, dorsal plate, under surface and legs rather paler than the back ; a broad dorsal and narrow subdorsal stripe tinged with black, but at the beginning of each segment quite black.

Or, the whole of the back between the subdorsal lines brilliant deep citron-yellow ; below this to the spiracles of the same ground colour, but almost entirely suffused with dark red ; head, dorsal plate and anal segment also suffused with red ; dorsal stripe broad, composed of two confluent red lines with blunt red arrow-heads at the beginning and end of each segment, margined in front with short black streaks ; subdorsal line black and interrupted in the middle of each segment ; under surface greenish with a large red blotch along the sides above the legs, the latter being orange-red. In this, as in all the previous variations, the spiracles are white placed in lunate black blotches. (W. Buckler.)

November to June on *Galium mollugo* and other low plants, and on fine grasses, but in confinement will feed willingly upon hawthorn, dock, and chickweed ; feeding at night, resting on the stems of grass or low plants in the day-time.

PUPA apparently undescribed.

The moth doubtless hides in the daytime among herbage, it seems never to be observed at that time. At dusk it flies and comes readily to the attraction of sugar, ivy-bloom, ragwort blossom and to the flowers of the *Arbutus* : also in hot autumns, when the blackberries are very sweet, it joins the other autumn *noctuae* in feasting upon them, the tongue being thrust between the sections of the fruit to penetrate it. Never apparently very common in the south, though found in various parts of Devon, Cornwall, Somerset, Dorset ; rarely in Sussex and Surrey ; very rarely in Norfolk ; more frequently in Hunts, Cambs, Northamptonshire, Gloucestershire ; scarce in Lincolnshire and Lancashire, more local in Yorkshire ; common in Cumberland and Westmoreland, and

not very scarce in the Isle of Man. Probably in most parts of Wales, since it is recorded from Colwyn Bay in the extreme north; from Neath, Glamorganshire; in some numbers at Laugharne, Carmarthenshire; and even rarely at Pembroke. In Scotland widely distributed: found in Perthshire and the Clyde valley; in Arran, Bute, and elsewhere in the western district; and abundantly in some years in Aberdeenshire, Moray and Inverness. In Ireland very rare—usually on the coast—and recorded only in the neighbourhood of Dublin, in Kerry, Galway, Donegal, and Antrim. Abroad its range includes France, Central and Southern Germany, Switzerland and the greater part of the South of Europe.

3. **A. Australis**, *Bdv.*—Expanse, $1\frac{2}{3}$ to $1\frac{1}{2}$ inch. Fore wings pale grey or grey-brown; orbicular stigma flattened; transverse lines hardly perceptible; at the base and along the hind margin are short black horizontal lines; hind wings white in the male, pale brown in the female.

Antennæ of the male thickly pectinated with short solid ciliated teeth to near the apex, brown; palpi very short, narrowly tufted, smoky brown, apical joint minute, white; head white, barred across the face with light brown and clouded with the same above, between the antennæ are two raised brown tufts edged with black; collar pale brown with a slender central black bar; shoulder lappets uplifted, white, edged on each side with smoky black; remainder of thorax whitish-brown with a very small top crest; back crest more defined, smoky black tipped with white; fascicles dull white; abdomen pale brown; basal segments abundantly covered with long white scales, partly concealed by which are one or two small black-tipped dorsal crests; lateral tufts small, anal tuft broad and spreading, whitish brown. Fore wings narrow, costa nearly straight till it approaches the apex, which is decidedly rounded; hind margin short, oblique, curved; dorsal margin straight, ciliated with oblique black-brown scales; colour pale

greyish-brown or whitish-grey, faintly tinged with brown toward the costal and hind margins; basal line only indicated by two minute black dots, but below these is a slender black longitudinal line arising from the middle of the base, and below it, close to the dorsal margin, another, rather longer and more conspicuous; first line obscure, brownish-black, but hardly recognisable, since it runs to the middle of the wing in long acute angles which appear like united longitudinal streaks; second line also obscure, black-brown, moderately curved, but arranged in a series of shorter yet very acute angles; subterminal line absent but replaced by a row of spindle-shaped cloudy black-brown streaks, between which the nervures from the second line are also blackened quite to the hind margin; orbicular stigma ovate, prostrate, edged with black and preceded by a black streak; reniform stigma tinged with brown and in its lower portion with black, also divided and faintly edged with black; space between it and the orbicular blackened to the costal margin; claviform stigma slenderly edged with black and attached to a black streak, parallel with which is usually another upon the dorsal margin; cilia black-brown dusted with white. Hind wings short, snowy white; nervures and hind marginal line pale brown, cilia white. Antennæ of the female simple; fore wings slightly broader behind; ground colour, with that of the thorax, more uniformly tinged with pale brown; space between the two upper stigmata not blackened; hind wings pale brown, darkest at the hind margin; cilia white with a yellow shade along the base; body stouter and more pointed.

Underside of the fore wings in the male smoky-white, more smoky-brown in the middle and there clothed with long hair-scales; reniform stigma smoky-black; cilia smoky-brown dashed with white. Hind wings white, dusted along the margins with smoky-brown; nervures and hind marginal line light brown, cilia white. Body pale smoky-brown; leg-tufts more purplish-brown; tibiæ umbreous, barred with pale yellow. In the female the fore wings are more uniformly

pale brown with a smoky tinge; hind wings white, faintly dusted with light brown along the margins.

Not very variable, specimens taken at the Isle of Portland in the collection of Mr. N. M. Richardson are exceedingly pretty, the males especially being of a light bright grey, or whitish-grey, or even chalky-white, with the markings brought much more sharply into notice than is usual. On the other hand, Mr. S. Stevens has a specimen entirely suffused with dark grey, and Mr. L. Prout has taken one nearly black in the Isle of Wight. Mr. Kane says that those found at Wexford are rather strongly marked with black.

On the wing from the end of August to October.

LARVA rather stout, cylindrical, but tapering slightly behind; brilliant yellow-green or greenish-yellow; the head green, freckled with red; a red unpolished semicircular plate on the back of the second segment; on the back of each of the other segments is a red diamond, the front part of which, for about a third of its length, is black; through it runs the pale pink dorsal line edged with red, thus cutting what would be a black triangle into two black wedges pointing forward; subdorsal line black at the beginning of each segment; spiracles white, placed in black crescents; the space between them and the subdorsal line thickly freckled and streaked with deep red; subspiracular stripe pale primrose-yellow, its lower edge softened a little into the ground colour and followed below by a blotch of red or pink on each segment; prolegs tipped with pink; ventral surface pale yellowish-green.

Or, ground colour rather deep reddish-pink on the back and sides, the freckled side-stripe and dorsal diamonds of darker purplish-red, with other details as in the preceding.

Or, ground colour of the whole surface olive-green, but on the back appearing only at the beginning of each segment as a narrow transverse band in which are visible the pinkish-white dorsal line and the black wedges, the latter much

shortened; the rest of each segment is covered by a broad, transverse, dark purple-brown band, extending to the spiracles and hiding all other markings; each white spiracle is in a large black blotch connected with a narrower blackish-brown transverse band on the ventral surface of each segment; head, entire second and half third segment, anal tip and legs, and also a faint spiracular line visible only on the anterior segments, are all of the olive-green ground colour.

When very young—just hatched—greenish tinged in front with black; head brown, usual raised dots distinct, each with a stiff bristle.

After a moult, full green with darker dorsal line and whitish subspiracular stripe, the folds yellow. When half an inch in length varieties begin to show themselves, some remaining green with purplish-red dorsal line, while in others the subspiracular stripe becomes edged along the spiracles with purplish-pink. After this the dorsal purplish lines begin to open and form the dorsal diamond, and the pink subdorsal lines faintly appear. From this the more brilliant colourings are gradually assumed—the back yellower and the sides rose-pink, or brilliant grass-green with purple-pink sides, the oblique marks on the front of each segment black and forming a divided Λ , the subdorsal line also marked with black in front of each segment; and the spiracular yellow. From these the adult colourings are soon assumed. (W. Buckler.)

October to April, May, or June, on *Poa annua* and other smooth grasses, *Silene maritima*, chickweed, and other low-growing plants, even garden pink, and chicory; feeding at night.

PUPA very cylindrical, tolerably even in bulk throughout, though rather thicker in the middle, very smooth and polished; the tail ending in a small spike; colour rich brown. (W. Buckler.)

The moth hides itself upon the ground in the daytime, usually among the grass, but sometimes does not even *hide* itself, since Mr. J. W. Douglas has found it sitting on the bare sandy ground without concealment. In the evening also it sits on the blades of grass on sandhills and other favoured localities; but also flies, and is attracted by sugar, ivy-blossom, and light. Apparently almost confined to our southern coast and adjoining chalk ranges, and moderately common at Deal on the sandhills; at Brighton and Lewes, where it is found on the Downs; in the Isle of Wight; at Portland, where in some seasons it is plentiful; in Devon, at Torquay, Teignmouth, and Bolthead; and on the coast of Cornwall. The Rev. T. W. Daltry informs me of the capture of a single example twenty-five years ago on a gas-lamp at Stoke-on-Trent, Staffordshire, but it is difficult to imagine this to have been anything more than a casual specimen from the south, which may have travelled under the cover of a railway truck, unless it was in the act of migration. In Ireland it is recorded by the late Mr. Edwin Birchall in Wicklow and Waterford, and Mr. Kane adds that it is not scarce on the sandhills off Wexford Harbour. I know of no other localities in the United Kingdom. Abroad it is rather local, but is found in France, Corsica, Sardinia, Greece, and Dalmatia.

Genus 22. **EPUNDA.**

ANTENNÆ pectinated in the male, simple in the female; each having a tuft of scales in front of the base, eyes naked; lashes small at front and back; thorax crested at the top and back; abdomen crested on three segments; fore wings of rather even width, blunt; hind wings rather short.

We have but one species.

1. **E. lichenea**, *Hüb.*—Expanse, $1\frac{3}{8}$ to $1\frac{5}{8}$ inch. Antennæ pectinated in the male, fore wings greenish-grey, marbled with green, and often in a less degree with purple and white;

transverse lines near together, black; a row of purple and black clouds near the hind margin; hind wings white, edged with brown; smoky-brown in the female.

Antennæ of the male strongly pectinated with slender, solid, ciliated teeth which terminate suddenly before the tip, or are there reduced to mere stumps, pale brown; palpi very short and inconspicuous, rather horizontal, olive-brown, the terminal joint extremely slender, dull red, tipped with white; head strongly tufted with raised olive-brown scales, and having a prominent tuft of similar scales in front of the base of each antenna; collar densely covered with scales, upraised, pale olive-brown, faintly barred with purple-brown, and edged with paler; shoulder-lappets much upraised, olive-brown dusted with white, and edged with umbreous; rest of thorax pale olive-brown, tinged with red-brown, top crest very loose and indistinct, back crest more compact, doubled, and tipped with dark-brown; fascicles brownish-white; abdomen pale brown, the basal segments covered with whiter hairs, and the dorsal ridge provided with three minute oblique crests tipped with black-brown; lateral tufts inconspicuous, anal tuft rather broad and thick, clouded above with black. Fore wings somewhat even in width; costa straight, apex rather suddenly rounded; hind margin fully curved and faintly crenulated; dorsal margin straight to near the base, where is a somewhat prominent, almost angulated portion fringed with long smoky-white scales and faintly curled up; ground colour greenish-grey marbled with green and clouded with white, or in some instances with purple; basal line limited to two black spots edged with smoky-white; first line very obscure, oblique, brownish-black, formed into a series of very fine slender curves, the hollows of which, on the inner side, are filled up by dusky-white, or faintly purple, clouds; second line a curved series of black dots edged outwardly by a cloudy stripe or succession of cloudy spots of dusky white; subterminal line a series of obscure white dots bordered inwardly by a row of small dark-brown triangles which lie in a dull purple band;

orbicular stigma round, faintly pink or red, centred with black, and edged by a black ring; reniform stigma broad, obscure, partially margined with black, faintly purple, divided by a white cloudy streak which spreads into a white spot at the lower corner, upper margin open to the costa; claviform stigma short and very broad, smoky-black, edged with deep black; just before the reniform stigma is a slender, black, undulated and indented transverse cloudy stripe or central shade; costa regularly spotted with black and white; hind marginal area dusky-green with a row of pale purple or pink marginal dots, each edged by a black-brown lunule; cilia crenulated, dusky purple, edged and dashed with dark brown. Hind wings rounded, pure white, covered toward the base with long yellowish-grey hairs; nervures faintly brown; central spot a large brown lunule; hind margin sharply edged with black-brown crescents; cilia white, intersected and clouded with pale brown. Female rather more obscurely coloured, with more green suffusion over the fore wings; the hind wings much suffused with smoky-brown, and showing faint traces of a darker central transverse line; antennæ threadlike; body stouter, with a smaller anal tuft.

Underside of the fore wings of the male smoky-grey, much dusted with white beyond the middle, and having an obscure transverse white stripe before the hind margin; discal cell broadly filled with long prostrate smoky-brown hair-scales; dorsal margin whitish-grey; hind margin and cilia broadly spotted with purplish-white, these spots edged and divided by two undulating dark-brown exterior lines in the paler cilia. Hind wings as on the upper side, except a small additional dusting of brown along the costal margin. Body and leg-tufts pale smoky-brown; legs dark umbreous, much barred with yellowish-white.

Rather liable to local variation, Devon specimens being rather large and more suffused with green, those from South Wales and other western districts smaller and with more of the purple tints and the green darker; those from the Isle

of Portland pale grey, with but little green marbling, and the pale markings all white or pinkish-white—an exceedingly pretty form—but all these shades of variation are connected by intermediates. In Mr. S. J. Capper's collection are specimens of a peculiar *dull* grey with the markings very obscure except that the black wedges near the hind margin are distinct and sharply defined, and the row completed.

On the wing from the end of August to the beginning of October.

LARVA.—Head obviously narrower than the body, extremely shining, emitting several slender hairs; body uniformly cylindrical, obese, smooth, with very few, distant, minute hairs, only discoverable under a lens. Head olive-brown, tessellated with paler markings; body dull olive-brown on the back, pale transparent olive-green on the under surface, the two colours divided by a paler stripe, which includes the spiracles; down the middle of the back is a series of somewhat lozenge-shaped darker markings, and on each side of each of these is a short oblique paler mark, the whole of these markings obscure and indistinct, yet viewed together constituting a dark median stripe, with a paler and interrupted stripe on each side; legs shining, prolegs opaque, both pellucid, and of an orange-green colour. (E. Newman.) Very variable in colour; while young many are of a soft velvety pale green; others mottled with deeper green; when half-grown many retain the green colour, while others become pale or dark olive, and all are freckled with dusky-black on the back and sides. When full-fed some are similar, but the dorsal darker markings are then manifest, often as dusky-black triangles with their apices pointing forward.

October or November to May or June on groundsel, chickweed, dock, dandelion, ragwort, scabious, burnet, sorrel, primrose, *Centranthus ruber*, *Linaria cymbalaria*, and especially on *Sedum acre*. Feeding at night, when also it

loves to expose itself on grass blades; but hiding by day at the roots of plants.

PUPA thickest in the middle, blunt in front; wing and limb covers very level and smooth, but abundantly sculptured with minute pitted lines; dorsal and abdominal segments even more minutely striated, indeed almost as smooth as the usual hinder bands; colour deep red-brown; cremaster short and broad, black-brown; its two spikes long and very slender, pale brown. In a rather tough cocoon of silk mixed with sand, under the surface of the ground.

The moth hides during the day among herbage close to the ground. It flies at dusk for a short time, and is strongly attracted by light and in some degree by sugar and ivy-bloom. It has a curious habit, so soon as its short flight is over, of resting upon dead sticks, often the dead lower branches of large furze bushes, or if a hedge occurs in its neighbourhood, on any dead branches, remaining in this quiescent state for hours, so that it is easily secured by the aid of a lantern. Doubtless another flight takes place later at night or before morning.

It does not seem to have been known in this country before 1847, but when discovered was soon found in plenty. Entirely confined to the sea-coast, but frequenting sandy slopes, hillsides, cliffs, and the more settled and weedy parts of sea sandhills. Apparently very rare in the South-east of England, and scarce even in Sussex, but much more frequent in the Isle of Wight, and not rare at Portland; quite common on the coasts of Devon and Cornwall; also found on those of Somerset and Gloucestershire, in abundance in Cheshire and Lancashire, and at Scarborough in Yorkshire. In Wales it is common along the Carmarthenshire and Pembrokeshire coasts, and probably in other parts. I have but one record in Scotland—at Fullerton, near Glasgow—and do not know whether this has been confirmed. Most likely it is to be found in many portions of the sea-shores of the southern

half of Ireland, but the records are few; Howth, near Dublin, and in plenty at Rossleigh, Kerry. Abroad it appears to have only a restricted range, but is found in Southern and Western France, Portugal and Sicily.

Genus 23. **DASYPOLIA.**

Antennæ hairy, palpi drooping, eyes naked, with long lashes in front and back; thorax smooth; abdomen hairy, without crests; wings very densely scaled; vein 5 of hind wings well marked, arising from the middle of the cross-bar.

We have but one species.

1. **D. templi**, *Thunb.*—Expanse, $1\frac{1}{2}$ to 2 inches. Of a hairy or downy appearance; antennæ bristly; fore wings dull yellowish-brown, marbled, and sometimes banded, with dull pale yellow; hind wings rather paler.

Antennæ of the male not pectinated, but feathered with long slender bristles in pairs on each joint, so as to represent pectinations, and accompanied by abundance of shorter bristles of various lengths, light brown; palpi small, drooping, narrowly tufted, apical joint hardly visible, dull brown; head densely tufted with dark brown scales; thorax broad and robust, thickly covered with long scales which lie smoothly back and are only just gathered to a small point at the back, pale olive-brown, dusted with darker; fascicles spreading, pale brown; abdomen very fluffy, with abundance of long hair-scales, pale olive-brown or yellowish-brown, without crests; lateral tufts distinct and spreading; anal tuft small. Fore wings somewhat ovate, very thick in texture, with coarse, dense scales; costa curved; apex and hind margin rather fully rounded, the latter crenulated toward the anal angle; dorsal margin straight to near the base, where it is rather fully curved in; colour dull yellowish-brown or ochreous-brown, more or less clouded with darker; all the markings ordinarily very obscure; when visible the basal line

is indicated by two dark brown cloudy spots; first line obscurely smoky-black, rather perpendicular and repeatedly angulated; second line black-brown, oblique, but curved back strongly to the costa, forming a series of obscure crescents, outside which is a faint stripe of pale ground colour; subterminal line an irregular row of obscure yellowish cloudy spots edged inwardly by a jagged dark brown shade; orbicular stigma, when perceptible, very small, circular, dusky-yellow; reniform stigma also small, often invisible, only indicated as a dusky-yellow blotch, sometimes centred with brown; on the costa beyond the middle are three or four dull yellow dots; cilia olive-brown, regularly dashed with dusky-yellow. Hind wings rather short, rounded, thick in texture from the coarseness of the dense scales, very pale yellowish brown, dusted all over with dark brown; beyond the middle is an obscure, transverse, smoky stripe, and outside this another still more obscure; hind margin faintly edged with darker brown; cilia pale yellowish-grey. Female larger and stouter, sometimes considerably so. Antennæ threadlike; the fore and hind wings in some instances much darker, and the markings usually more definite; otherwise quite similar.

Underside of the fore wings light brown dusted with darker and having a smoky tinge; beyond the middle is a distinct slender black-brown transverse stripe; on the costa beyond the middle are three faint yellow dots separated by dashes of smoky-black. Hind wings also pale brown, abundantly dusted with dark brown and having a narrow transverse black-brown stripe beyond the middle; cilia of all the wings yellow-brown. Body yellow-brown, tinged with red-brown; leg-tufts olive-brown, legs more umbreous, rather short, densely clothed with scales, the front tibiae faintly barred with dull yellow.

Variation in this species is almost confined to paler and darker shades of colouring and to the greater or less indistinctness of the markings as already indicated; and it moreover appears to be local or climatal, since the tendency

in inland rocky localities seems to be in the direction of yellower colour and more obscure markings, that on the coast to larger size, greater distinctness of the markings, and sometimes to deeper colour; yet this is by no means invariable.

On the wing from the end of August or September to November, then hybernating and reappearing on the wing in March or April.

LARVA moderately stout, cylindrical, tapering very little at either extremity, smooth and shining; the folds and segmental divisions very slightly indented; a triangular inflation round the spiracles; the raised spots shining and the legs well developed. Head brownish-red; mouth dark brown; on the back of the second segment is a reddish shining plate divided down its centre by a thin line of flesh-colour, thickly margined in front—where it is widest—and more delicately behind with dark brown. General surface flesh-colour, having the pulsating dorsal vessel visible as a stripe of a darker tint of the same; the raised spots are brown and conspicuous, generally round, but sometimes oval on the third and fourth segments; on these segments also they are placed in a transverse row on the back and end at the sides in a triangular group of three larger spots; altogether there are twelve spots on each of these thoracic segments, the other segments to the twelfth inclusive have the usual two pairs on the back of each and the thirteenth one pair, the anterior larger than the posterior pair and all gradually diminishing in size from the fifth to the eleventh segment, but on the twelfth they become larger again and are there transversely oval in shape; each spiracle has a large round spot above and below it, another behind, and a small one in front of it; these two last mentioned are sometimes both small and sometimes one of them is absent, but the two that are above and below the spiracles are larger than any upon the back. Spiracles oval, whitish outlined with black; on the anal

segment there are four brownish-red plates, thus placed—on the anterior part, above the fold of the anal flap, a central semicircular plate margined with dark brown, and on each side of it, at an obtuse angle, a small narrow oblong plate; the fourth and largest plate is on the anal flap and has its anterior edge undulating and margined with dark brown, its anal extremity ending in two very small points. Anterior legs brownish-red; prolegs slightly tipped with brown. (Adapted from Buckler.)

April to August on—or rather in—*Heraclium sphondylium*, feeding in the thick tap-root and in the stems. When but just from the egg boring at once into the stem, or, if at first into the leaf, afterwards into the stem, also drinking the sap which flows into its tunnel; feeding down the middle of the stem into the root-stock and apparently never showing itself outside until full fed, unless the supply of food fails. When full fed it eats its way out just below the surface of the earth to pupate. In confinement it feeds equally well in parsnip, the young larvæ boring into the stem and passing down into the tap-root in the same manner, and, perhaps induced by the size and succulence of the cultivated root, producing very fine and large examples of the moth.

PUPA elongated, rather uniform in thickness, the abdominal segments being stout, though deeply divided, and hardly tapering except suddenly at the anal segment; purple-brown with a curious, livid, leaden hue from a lead-white bloom which covers the whole surface; wing and limb-covers minutely sculptured with fine incised lines, segments only finely pitted along the extreme front edge of each; cremaster very short, but thick, broad, hollowed beneath, black, with two very short terminal spikes, also black. In the earth, but apparently without any cocoon, close to the plant in which the larva has fed.

The moth hides in the daytime among rocks, and under blocks of stone, as well as among herbage. At night it

flies, usually rather late, and is readily attracted by a strong light, such as that of a lighthouse, or even a gas lamp on the coast, but is not known to frequent flowers or to pay any attention to sugar or food of any kind. It pairs before the winter, and hibernates in crevices of rocks, or more usually among loose stones where these lie in dense masses, resting on their undersides. There is a tradition, perhaps not wholly destitute of foundation, that when the peculiar habits of the insect were discovered—forty or fifty years ago—some of the more energetic Lancashire collectors went over into the South Yorkshire hill districts, and, with much labour, *took down* large extents of the walls of loose stone which there divide the fields, and even demolished one shed, finding in the course of demolition a considerable number of these moths. It is further remembered that rewards were offered for the discovery of the destroyers of the walls, and that after this time enthusiastic collectors were constrained to confine their operations to the quarries on the hill sides. It is a well-established fact that female moths of this species, found in such situations, and confined in chip boxes in a cool place, will remain quietly alive until the spring and then deposit fertile eggs. Yet hibernation takes place equally in both sexes.

Apparently found only in rocky districts, on high hills, and upon the coast. I find no record in the Eastern Counties or on the south-east coast, though it must surely occur; but it is found, sometimes not rarely, in the Isle of Wight, at Weymouth, Portland, Poole, and Chickereil, on the coast of Dorset; near Exeter, and from Torquay to Plymouth on that of Devon; at Land's End, Cornwall; in Somerset, Gloucestershire, the Isle of Man, Cheshire, Lancashire, and Cumberland; and inland in various localities in Yorkshire—commonly on hills in the South-west Riding; and once (at a gas-lamp, and taken by Mr. Masefield) at Cheadle, Derbyshire. In Wales it has been found near Carmarthen, and in Caldý Island near Tenby, in the South, and at Colwyn Bay

in the North, and probably occurs in many intervening localities.

In Scotland it is widely distributed but rare, recorded from Carluke, Edinburgh, and at Balerno and the Isle of May, also at Dundee, Aberdeen, Moncrieff Hill, Perthshire, where Sir Thomas Moncrieffe found specimens sitting under lumps of *unslaked lime!* in the Orkneys, and at Unst in Shetland. In Ireland I obtained six specimens many years ago from a lighthouse at Howth, near Dublin, and it has since been taken, rarely, in Antrim and Donegal. Probably it only requires looking for—November is a late date for collecting on a rocky coast. Rather a local species abroad, but found in Sweden, Norway, Finland, Livonia, the mountains of Silesia, the Tyrol, and the Valais.

Genus 24. **POLIA.**

Antennæ ciliated, sometimes with minute tufts, eyes naked, with rather long front and black lashes; thorax crested at the back; abdomen with one to four partially prostrate crests; hind margin of fore wings decidedly crenulated; v. 5 of hind wings but faintly perceptible, arising from the middle of the cross bar.

LARVÆ smooth, somewhat brightly coloured, head rather full-sized, on low plants.

PUPÆ of the usual type, with the points rather long.

We have three species, readily separated.

A. Fore wings white, marbled with grey and yellow.

P. flavicincta.

A². Fore wings white, marbled with black lines and with a central black X mark.

P. chi.

B. Fore wings grey, marbled with black and tinged with orange.

P. xanthomista.

1. **P. flavicincta**, *Fab.*—Expense $1\frac{5}{8}$ to $1\frac{3}{4}$ inch. Fore wings white or greyish-white, much marbled with grey in

small clouds; faint orange-yellow clouds at the base, the edges of the stigmata, and on the subterminal line; first and second lines black, jagged, united on the dorsal margin; hind wings white, banded and clouded with smoky-grey.

Antennæ of the male simple, thickly but very minutely ciliated, light brown; palpi short, narrowly tufted, smoky-grey, the apical joint minute, rather darker; head pale grey, tufted, more especially so above the bases of the antennæ; thorax broad, densely clothed with long scales, whitish-grey dusted with darker, smooth, the back crest only being indicated by a drawing together of the scales into obscure knobs; fascicles white; abdomen greyish-white, the dorsal ridge surmounted by two or three very small oblique tufts or crests, barred with black, tipped with white, and placed only on the middle abdominal segments; lateral tufts spreading, dirty white; anal tuft broad and dense, greyish-white with a warm tint of brown at the sides. Fore wings rather broad behind; costa very slightly curved; apex rounded; hind margin oblique, rounded and distinctly crenulated; dorsal margin slightly curved; colour white, dusted and clouded with grey: basal line limited to two small black streaks broadly edged outside with white; first line oblique, broken up into a series of black spots and streaks, all clouded with a grey dusting and broadly bordered inwardly with white; second line slender, black, very oblique, forming a series of crescents having at the point of junction on each nervure a black dot edged with white; the crescent in this line which lies nearest to the dorsal margin coalesces with a long angle of the first line; subterminal line a rather obscure series of white, or orange-coloured, curved or triangular spots edged inwardly with cloudy dark grey arrow-head spots or blotches, and followed by a grey spot in the hollow of each curve; orbicular stigma obscure, somewhat squared, white, centred with grey; reniform stigma even more obscurely white, clouded with grey; claviform stigma represented by a large grey-black loop; central space around

the stigmata more abundantly dusted with dark grey than the rest of the wing; costa regularly and broadly spotted with black to beyond the middle, the intervals being white, beyond this three white dots lie in a clouded space toward the apex; hind margin and cilia ornamented with white loops which run out to the tips of the crenulations, and between them enclose small grey cloudy spots. Those examples in which the subterminal line is clouded with orange-yellow have the edges of the stigmata of the same colour, also small clouds near the base of the wing and sometimes on the other transverse lines. Hind wings white, much dusted with pale smoky-grey, especially so toward the hind margin; nervures smoky-grey to the middle, where is a slender, curved, transverse, grey stripe, indented throughout, and some of the angles blackened; central spot small, obscure, grey; toward the hind margin the grey dusting forms a broad cloud which, however, is broken close to the margin by an obscure, broken, notched, white stripe; cilia white dusted with grey. Female stouter, also apparently less disposed toward yellow clouding on the fore wings, otherwise similar.

Underside of the fore wings greyish-white, with the nervures darker; discal cell smoky-grey and a similar partial transverse line beyond it. Hind wings white, dusted with light brown along the costa, and with dull smoky-brown toward the hind margin; central spot small, smoky-black; beyond it is a slender cloudy-black transverse line, blackened on the nervures; cilia white. Body greyish-white, anal tuft light reddish-brown; leg tufts smoky-white; tibiae dark brown, barred with white.

Variable in the ground colour and also in the depth of the markings, the central portion sometimes being of far deeper tone than the rest; the yellow colouring also is uncertain—partial or even absent. In Norfolk there appears to be a tendency toward extreme whiteness in the ground colour, the markings becoming also far paler, even in rare instances to pale pearly grey. One in my own possession is almost

white. Others from the same district are darkened with a smoky suffusion. In Yorkshire this last phase of variation becomes much intensified, and replaces the usual pale forms almost entirely, so that many specimens are as dark as *Acronycta megacephala* and bear a most curious resemblance to it. In the collection of Mr. G. T. Porritt is a still more extreme form, from the same district, its fore wings being wholly suffused with smoky-black, with the exception of the four pale transverse lines and the pale dashes in the cilia, all of which are of a clear yellowish-white. There is also much variation in the depth or absence of colour in the hind wings, and they do not by any means always follow the fore wings in this respect.

On the wing in September and October.

LARVA cylindrical and moderately stout; the head full and but little narrower than the second segment, the segments very smooth and scarcely defined when the larva is stretched out, though when it turns round the skin folds itself at some of the segmental divisions and then shows distinctly pale yellow in the folds. Ground colour bluish-green or yellowish-green; a slightly darker dorsal line has a series of minute yellowish dots or specks through its middle; spiracular line dark green or blackish-green, but is only a mere edging to a yellowish-green sub-spiracular stripe, which melts away gradually below into the green of the undersurface; spiracles white, outlined with black; the ventral surface of the same green as the back, and has a faint central whitish stripe; legs and prolegs clear green; all the rest of the green surface, except the head, and a smooth velvety plate on the second segment, minutely freckled with atoms of whitish-yellow, a few more distinct than the rest marking the subdorsal line in an inconspicuous manner. (W. Buckler.)

April or May to July, on chickweed, groundsel, mint, ragwort, mugwort, dock, plantain, honeysuckle, everlasting pea, fox-glove blossoms, and other herbaceous plants, and on ivy,

currant, apricot, and the lower branches of garden shrubs, feeding at night. The egg is laid in October and hatches in the spring.

PUPA rather elongated, stoutest in the middle, abdomen somewhat extended, terminated by a broad tumid black-brown cremaster, which is armed with two fine black converging and recurved spikes; wing-covers abundantly sculptured with fine incised lines, anterior portions of dorsal and abdominal segments more scantily with minute pits, but the whole surface glossy; colour rich red-brown. In a strongly constructed but flexible cocoon of silk, soft inside but outwardly covered with sand or earth; subterranean.

The moth is very fond of gardens, its larva feeding on almost any weeds and many cultivated plants; it may be found sitting near the ground on walls, or among the plants; it also frequents lanes, roads and cultivated ground, as well as woodlands. It flies at dusk and is rather conspicuous on the wing from its light colour; it is not known to frequent flowers much, but comes readily to sugar. At one time it was common in the gardens of the suburbs of London, but has now apparently moved further away; rare in Kent, Sussex, and the rest of the south-coast counties to Devon, where it is more frequent; and found locally in Cornwall; much more common in the Eastern Counties, and Berks, Oxfordshire, Somerset, and Gloucestershire, extending up the west through Herefordshire and the adjoining counties to Lancashire, where it is rare. Rather common in the Southern Midlands, recorded once only in Derbyshire, but widely distributed—in its darker varieties—in Yorkshire. I can find no record in Wales where it *must* exist; and in Scotland the only indication is the note by Dr. Buchanan White (with doubt) from the districts of the Tay and Moray. In Ireland, Mr. E. Birchall recorded it from Wicklow, but this statement does not seem to have been confirmed. Abroad its range extends almost all over Continental Europe.

2. **P. xanthomista**, *Hub.*; **nigrocincta**, *Tr.* — Expanse $1\frac{2}{3}$ to $1\frac{1}{2}$ inch. Fore wings grey, mottled with darker and spotted with white; upper stigmata large, pale grey, from between them is a black central cloud; hind wings white in the male, smoky-brown with white cilia in the female.

Antennæ of the male ciliated with regular stout bristles which seem to imitate fine pectinations, dusky brown; palpi slenderly tufted, dark grey, tipped with white; head dusky white, with two black spots on the face and a raised tuft tipped with black between the antennæ; thorax dark grey, mixed with white; front of collar whiter; top and back crests very small and obscure, the latter barred with black; fascicles white; abdomen blackish-grey mixed with white, the basal segment covered with long white hair scales, among which on the dorsal ridge is a small smoky-black crest tipped with white; lateral tufts small, white; anal tuft narrow, pale grey. Fore wings rather narrow; costa very nearly straight; apex bluntly angulated; hind margin crenulated, very faintly curved and but slightly oblique; dorsal margin a little rounded; colour pale grey, almost wholly dusted or mottled with bluish-grey; basal line double, angulated, abbreviated, deep black, the intermediate space white, first line also broadly double, much scalloped, deep black, the enclosed space in the middle portion forming white crescents; second line very obscure, dark grey, formed into a series of crescents, the ends of which run as points along the nervures and are followed by a white spot upon each, this line also is edged in each scallop with white; subterminal line barely perceptible, a faint succession of whitish cloudy dots; orbicular stigma large, pale grey, edged inwardly with yellow, and bordered with black; reniform stigma very obscure, pale grey, with two or three yellow dots at its inner edge, where also it is bordered by a large grey-black cloud, which occupies the space between these two stigmata, and proceeds across the wing as a broad central shade; costal margin spotted with

black and white; cilia crenulated, grey, dusted with darker and spotted with white. Hind wings white, clouded faintly with grey toward the hind margin which is edged by a black line; nervures dusted with brown and black; central spot small, smoky-black; cilia white. Antennæ of the female quite threadlike; fore wings broader and dusted or shaded with orange-yellow, not only at the inner edge of each stigma, but also at the basal and first lines, and more broadly along the subterminal line; hind wings dark smoky-grey, with blacker nervures and marginal line, and white cilia.

Underside pale silvery grey in the male, darker grey in the female; costal region and nervures dusted with grey-brown; a dark smoky cloud in the discal cell; cilia dusky white. Hind wings white, faintly dusted with grey; central spot smoky black, followed by a very faint slender transverse grey-black line, sometimes only visible on the nervures. Body whitish-grey; leg tufts white; legs dark grey barred with white, except the first pair in which the tibiæ are blackish-brown barred with dull yellow.

Usually only very slightly variable in the depth of colour of the dark grey mottling and orange-yellow dots or shading; Mr. Sydney Webb possesses a beautiful specimen in which the latter is developed into strong orange lines and suffusion; and a dark female in which the orange dots are large and conspicuous all along the transverse lines and around the stigmata. One in Dr. Mason's collection, on the other hand is much suffused with very dark grey, so that all the markings are obscured. Apparently by no means so variable here as abroad, where many examples have the fore wings of a very bright white with only the central bar darker; or on the other hand are very dark and much spotted with yellow; or wholly devoid of it.

On the wing in August and September.

LARVA cylindrical, elongate, rather flattened beneath; skin thin and semi-transparent; head rounded and highly

polished, pale yellowish-brown or ochreous-yellow; body ochreous with a strong reddish or lilac tinge, minutely dusted with brown; the anterior segments appear greenish when the larva is extended; incisions shaded with pink or lilac; the only marking is an inconspicuous greyish dorsal line; legs yellowish brown; prolegs tipped with dark brown; spiracles brown; undersurface very pale green. (C. Fenn.) When very young, according to Mr. C. S. Gregson, it is of a clear, slightly pellucid, emerald green, with a light spiracular line. As it grows it becomes of a more pellucid light mineral green with faintly indicated, double, dorsal and subdorsal lines, between which are three minute light dots on each segment; spiracular line whitish-green, well defined upon its upper edge, toned off into the green colouring below; head glassy; feet light green. From this the adult colour as already described is gradually assumed.

April to June or July; but it is confidently asserted, and seems to be established, that in some cases a portion of a brood of eggs, or more rarely the whole brood, hatches in September or October, and in that case the young larvæ hibernate. On *Armeria maritima* (Thrift), especially devouring the flowers, *Plantago maritima*, and more rarely on *Silene maritima*; in confinement on lettuce, dock, violet and dandelion; probably on many low-growing plants. Hiding in the daytime under vegetable refuse or any light soil available in its rocky haunts, or in the tufts of thrift and plantain; crawling up at night to feed, and very fond of stretching itself on the stems of these plants, where it is easily collected, with the aid of a lantern, by those sufficiently strong and sure-footed to scramble over masses of sea-cliff at night. Difficult to rear from the egg, since the larvæ after feeding steadily to near full growth, are apt to die off at about the last change of skin. Mr. Gregson says that they should be kept very warm, if possible with the full blaze of the sun upon their habitation. It is not improbable

that a sprinkling of water, possibly even salt water, at or near this stage of life may be advantageous.

PUPA stout, smooth, light brown, ovoid to the end of the wing covers, thence sharply conical to the anal segment, out of which spring two rather large hooks. In a silken cocoon among dead vegetable substances, or in the earth. (C. S. Gregson.)

The moth seems never to be found in the daytime; doubtless it sits in crevices of rocks or among herbage. At dusk it flies and may occasionally be attracted by means of sugar or light; but the vast majority of specimens in collections have been reared from larvæ collected at night when well grown, on the plants already mentioned. Entirely confined with us to rocky sea coasts, and preferring those portions which lie near to high-water mark, almost or quite within the splash of the waves in rough weather. Here the larvæ revel in their periodically salted food plants, and the moths do not wander very far. The first specimen known to have been found in these islands was captured at a lighthouse in August 1862, near Padstow, Cornwall, and passed into the possession of that lamented artist, Mr. Edward Hopley, by whom it was recorded. In August 1867 the first specimen *reared* was so obtained by Mr. N. Greening from a larva found by him in the Isle of Man. From that date to the present hardly a year has passed in which that prolific locality has not furnished larvæ or moths in greater or less numbers. In September 1880 a single specimen was secured at sugar in a little wood situated close to the sea cliffs near Saundersfoot, South Pembrokeshire, by Dr. Hearder. In September 1890 two were taken by the same means at Ilfracombe, North Devon, by Messrs. Dixey and Longstaff, and a very few more have since been captured in the same district. It is said that a magnificent series of specimens has been secured at New Quay, Cornwall, by Dr. Riding; one also has been taken at the Lizard,

and another near Truro in the same county. So far as is at present known this is the extent of its range in the United Kingdom.

Abroad it is not so strictly confined to the coast, but is found in Southern Germany, Hungary, Switzerland, North Italy, Spain and the South of France.

3. **P. Chi**, *L.*—Expanse $1\frac{3}{8}$ to $1\frac{1}{2}$ inch. Fore wings white dusted with grey, markings abundant, slender, black; a small horizontal black bar with forked tips lies below the stigmata; hind wings white, or clouded with grey, more so in the female. Varieties with darker fore wings are frequent.

Antennæ of the male threadlike but for one-half their length ciliated with minute stiff bristles which imitate pectinations, smoky brown with the base white; palpi small, rather narrowly tufted, white, clouded with black at the sides, apical joint small, black, head dull white with a divided black bar across the face and a distinct white tuft of scales at the base of each antenna; collar white, distinctly barred, in two arches, with black; remainder of thorax white dusted with grey, and having a few black dots at the tips of the shoulder lappets, crests very obscure, that at the back faintly tipped with black; fascicles white; abdomen white, abundantly dusted with grey, but the basal segments covered with long white scales in which are two dorsal crests tipped with smoky black; lateral and anal tufts small. Fore wings narrow at the base and rather so throughout; costa nearly straight; apex bluntly rounded; hind margin slightly crenulated, curved and below the middle very oblique, dorsal margin nearly straight; colour white, dusted with grey; basal line black, sharply angulated and broadly duplicated, the enclosed space pure white, uniting with a rather curved deep black streak from the middle of the base; first line dark grey or black, double and enclosing a white stripe, but much angulated; second line widely curved, duplicated and forming a double series of grey-black crescents and angles, between which also

is a white stripe or line; subterminal line a series of irregular, angular, or triangular white spots, each edged behind by a black crescent or triangular spot; orbicular stigma large, ovate, white, edged with grey; reniform stigma also large, upper half white, lower grey, edged with darker grey; between them is a cloudy black spot forming a sort of rough ring which throws off a cloud to the costa; claviform stigma white; partly edged with deep black and joined to the largest crescent of the second line, thereby forming a black bar with forked ends, which is the most conspicuous marking on the wing; costal margin regularly spotted with black, or toward the apex with dark grey; cilia white, spotted with small pale grey clouds. Hind wings white with the nervures partially dark grey; central spot lunate, dusky black; a row of small grey clouds lies before the hind margin, which is white, sharply edged with black; cilia white. Female very similar; antennæ quite filiform; body stouter; hind wings dusted with grey and much more clouded with dark grey before the hind margin; also having in the middle a curved, irregular, slender, dark grey transverse line.

Underside of the fore wings white; discal cell and nervures clouded with grey; dorsal margin pearly white; reniform stigma a dusky black crescent; beyond it are two faint slender grey transverse stripes, the first incomplete; apex clouded with grey. Hind wings white faintly dusted on the nervures with grey; central spot very small, black; hind margin edged with black lunules; cilia white. Body dusky white; leg tufts white; legs grey, the tibiæ barred with white.

Extremely variable in the ground colour from pure clear white to every shade of paler and darker slate-grey, smoky-grey, and even grey-black. Occasionally in the whitest examples the markings are indistinct and partially suppressed and in the darkest they are at times much obscured, but as a rule the markings are very constant. With regard, however, to the intermediate white lines or stripes with which the usual transverse lines are embellished there is great and

marked variation; often in the various shades of grey, these remain conspicuously white, so that the slate-grey, or smoky-grey surface is broken up and beautifully set off, and in more black-grey examples this results in producing remarkably handsome specimens; but quite as frequently these lines share the general suffusion of grey—light, slate, smoky or blackened—producing a smooth, uniform, even gloomy, appearance—which even the dark markings scarcely relieve. Intermediates are of course found—one from Mr. G. T. Porritt's collection is before me, a male black-grey to the sub-terminal line, which is brightly white, with its edging of black arrow heads also sharply defined; another from the same collection is as smoothly and regularly blackish-slate colour as the well-known London form of *Acronycta psi*, and wonderfully like it. These are both from South Yorkshire, as are many other curious and interesting dark intermediate forms and also those having all the white stripes conspicuous on a very dark ground. In all cases the thorax agrees with the fore wings, but the hind wings, though sometimes darkened, are by no means always so. Stephens in his *Illustrations* describes as a new species, under the name of *olivacea*, a specimen of this species of an olive-green colour with the usual white lines conspicuous. He states that it was taken at Cramond near Edinburgh, and is the only specimen which he has seen. Apparently it is a rare form, and I cannot say that I have seen in any collection a specimen fully agreeing with Stephens's description. A faint olivaceous tinge is sometimes observed, but the name *olivacea* has often been used for the slate-grey varieties. Another rare form is yellowish-grey or brownish-grey, but in this the white lines are seldom distinct.

On the wing in August and September.

LARVA rather slender, cylindrical, though tapering a little at either end, the head rounded and the antennal papillæ well developed; the segmental divisions very delicately defined as

well as the intermediate wrinkles, so that the skin appears very smooth and soft. The colour on the head and back is a delicate bluish-green, quite opaque on the back; the dorsal line very thin—a mere pale thread—and edged with darker green than the ground colour; subdorsal line whitish, better defined, and also edged with darker, indeed this line on the thoracic segments is white; beneath it, as far as the spiracles, the colour is transparent yellowish, or else a full green, so clear as to show the branchial vessels through it; this colour deepens gradually below till it terminates in a fine blackish-green line, along the lower edge of which are the white spiracles, outlined with black; spiracular stripe brilliant, pure white, very broad along the middle segment, and a little attenuated toward each end, often extending along the side of the head toward the mouth, and ending behind at the extremity of the posterior legs; under-surface and legs rather paler and more yellowish-green than the back; after the thoracic segments the tubercular dots are arranged in threes on either side of the dorsal line; they are paler than the ground colour and sometimes ringed with a little darker colour.

The variations seem to be in the depth of the general ground-colour—more or less blueness of the green—and in the presence or absence of a small blackish oval ring with whitish centre (or false spiracle) on the sides of the third and fourth segments.

The young larva when first hatched is pale olive-green, the large head pale brown with distinct dots and hairs; in a couple of days rather bluish green; in a fortnight, of a full deep green with the lines and dots paler green; in another month the colour changes to yellow-green, and then the fine lines are whitish; by the end of May the adult colouring is assumed. (W. Buckler.)

It has been stated that in this larva when just hatched from the egg the first usual pair of prolegs is not visible at all, and the second pair only indicated by two minute

papillæ, and that the young larva then loops like a geometer. After the first moult the second pair are more fully developed, but still destitute of hooklets and not used in walking, and the first pair only just visible; and it is not until after the third moult that the second pair comes fully into use, nor until after one more that the first pair is perfected.

March or April to the beginning of June on dock, sallow, willow, hawthorn—both leaves and flowers—*Genista tinctoria*, *Sonchus*, *Lactuca*, *Arctium*, *Aquilegia*, *Salvia*, and other low-growing plants.

PUPA smooth and regular in outline, tapering gently to each end, the last segment of the abdomen terminating rather bluntly and furnished with a knob, from which is emitted a pair of *very fine* bristle-like hooked spines; the colour of the pupa is reddish-brown and the surface glossy. In a tough cocoon of silk and earth, under the surface of the soil. (W. Buckler.)

The winter is passed in the egg state.

The moth sits in the daytime on walls, especially loving the rough stone walls used in our more northern counties instead of hedges to divide the fields, but by no means despising ordinary masonry—houses, sheds, or the blocks of stone in hedge-banks. It is a very curious circumstance that the dark varieties of the moth by no means select dark walls, but make themselves obvious where the masonry is light coloured; nor, on the other hand, do the usual white forms avoid the walls blackened by the smoke of the great manufacturing towns, but even seem to prefer to sit conspicuously upon them. The same may be said of places in which trees are more available than walls. The late Mr. J. Sang, one of our most keen and accurate observers, pointed out long ago the habit of the whitest moths in this species of sitting on the blackest tree trunks, and the darker varieties

upon the whitest walls. Similarly in the north of Ireland white forms may be found quite at home on the black basaltic rocks of the County Derry—where, strange to say, dark varieties are never known to occur.

At dusk it flies strongly and swiftly, and is readily attracted by sugar or light, or captured flying along the roadsides and the margins of fields; but does not seem to frequent woods. The only district of the South of England in which it is known to occur is Devon and Dorset—in the latter very rarely, but in the former abundantly in the Dartmoor district, where it sits on granite blocks as well as on stone walls, and where it was first noticed by Curtis early in this century; it is also found in less numbers on both the north and south coasts of that county. One specimen has been taken at Oxford by the Rev. C. T. Cruttwell, but at Southam, Warwickshire, it occurs regularly, and thence very soon becomes common in that county, and in Leicestershire, Nottinghamshire, and the Midlands generally, except the eastern portions; also in Herefordshire and Worcestershire; further northward common in all the more hilly districts and in many of them plentiful. The darker varieties seem to be more frequent in Lancashire and Yorkshire, and as already stated the darkest forms are found in the south of the latter county, also in the maritime portions of Durham and Northumberland. In North Wales it is recorded from Dolgelly, and doubtless is widely distributed, but I have never seen it in South Wales. In Scotland it seems to return very much to the typical pale colouring, or very rarely to that of the olive-green variety, and is widely distributed—Roxburghshire, the Clyde valley, abundant and quite normal in Argyleshire and Perthshire, also found in the more eastern districts to Moray—where it even ascends the mountains to 1200 feet above sea level—and to West Ross, though I find no record in the islands. In Ireland, also, it is widely distributed and in many parts common; being of normal pale forms, and brightly coloured, even in Sligo, Donegal, Derry and Antrim. Abroad, also, its

colour is much more constantly pale in its range over the greater portion of Central and Northern Europe, Spain, north of Italy, Southern Russia, and the mountain regions of Central Asia.

Genus 25. **DRYOBOTA.**

Antennæ hardly ciliated; eyes naked; thick eye-lashes at front and back; thorax squared, crested at the top and back; abdomen with one prostrate crest; fore wings narrow and bluntly pointed, the hind margin rather full below the middle. Vein 5 of the hind wings very weak, arising from below the middle of the crossbar.

We have but one species.

1. **D. protea**, *Bork.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings green or greenish-brown marbled with brighter green, rosy-purple, white, or black, or combinations of these; stigmata usually paler, and a pale blotch placed obliquely below the orbicular, often followed by a larger one toward the anal angle; hind wings greyish-white, obscurely banded with dark smoky-grey.

Antennæ of the male simple, but furnished with tufts of minute bristles which simulate very short pectinations, also ciliated with still more minute hairs, dark brown; palpi somewhat erect and elongated, dusky brown, third joint conspicuous, black; head yellowish-brown densely covered with raised scales, a tuft at the base of each antenna, and between them a higher tuft blackened in front; collar raised and in the middle bent forward, pale brown, margined and faintly barred with black; remainder of the thorax much squared from the prominence of the uplifted shoulder-lappets, pale brown dusted with darker, the shoulder-lappets edged with black; top crest strong, pushing the collar forward; back crest thick and rather short, each tuft barred in front with black and tipped behind with white; fascicles dusky pale-brown; abdomen smoky-brown dusted with pale brown

and covered from the base with long dusky scales, among which is a very small dusky-black crest on the back of the basal segment; lateral and anal tufts spreading, rather glossy. Fore wings narrow; costal and dorsal margins extremely straight; apex rounded; hind margin faintly crenulated, gently curved, but having a small hollow just above the anal angle; colour dark greenish-brown with more or less purple clouding; basal line black, rounded, indented and broken, but enclosing a pinkish-grey blotch; first line very obscure, oblique, faintly duplicated, dusky black, terminating in a black spot on each margin; second line scarcely perceptible, except as one or two black streaks toward the dorsal margin, and as a pale edging to the central area, which is clouded with black; subterminal line dusky-white, undulating and indented, edged on the outside by obscure black clouding; orbicular stigma a very faint blackish-grey or pinkish-grey loop in a large oblique pinkish-white or greyish-white cloud, which extends as far as the black streaks of the second line near the dorsal margin, and is edged on both sides with cloudy black; beyond it in the same direction is a rounded or ovate similar cloud before the anal angle; reniform stigma hardly perceptible, but shaded with pinkish-grey and green-grey and enclosing a paler line; claviform stigma a blacker streak in the black clouding; costal margin spotted with black, dorsal margin less distinctly with black and white; hind margin edged by a row of minute deep black lunules or triangles, each bordered behind with pale grey or pale green; cilia dull greenish-grey, dashed with darker. Hind wings rather short, rounded and with the margin faintly crenulated, but slightly hollowed before the anal angle; dusky-white at the base shading into dark smoky-grey behind, but with an irregular and sometimes broken narrow white cloud lying along the hind margin; central spots obscurely dusky-grey, as also are the nervures; cilia dusky-white, intersected by a smoky-black line. Female similar, but with a rather stouter body, and antennæ quite simple.

Underside of the fore wings smoky greenish-black, paler toward the dorsal margin and in the hind marginal region, where it is dusted with white and black; in the reniform stigma is a deep black streak; this is followed by a cloudy-black transverse line; hind wings greyish-white, dusted all over with black; central spot large, distinct, black; beyond it is a faint transverse line of black atoms; hind margin edged with black lunules and streaks; cilia dirty grey, containing black lines. Body and leg tufts pale brownish-grey, with a purple flush; legs green-grey, barred with black.

Exceedingly variable; hence its name. This is mainly in the ground colour and the extent of dark markings, and seems to be found almost equally wherever the species exists. The green ground is usually either of a rather dark green or some shade between this and greenish-white or pale reddish-green; but also more rarely reddish-white, or white clouded with light red or purplish-pink; the black marbling also varies greatly in intensity and extent, in some specimens presenting delicate pale markings, grey rather than black; in others close and abundant, yet definite marbling, in some cases with the stigmata and pale spots much obscured, in others with all these very strongly defined; others again have strong and heavy blotching of the darker surfaces, either dark brown or black, with stigmata and central blotches white or tinged with pink or light red. One specimen before me is greenish-white, with the faintest possible marblings, merely a black loop with some purplish-pink round it in the middle of the wing, and some black dots along the costa; another has the dorsal margin, apex, stigmata and usual round blotches white, the rest of the wings marbled with red and deep black; a third, even blacker, has all the pale markings light purplish-pink; and a fourth is dark green, with but faint indications of paler spots. Dr. Mason has a specimen of a clear pale green, with an irregular light red shade through the middle, and branching to the anal angle, with only a few dark dots and streaks. These are perhaps the more extreme

forms, but some of them are not infrequent, and every possible grade and combination of intermediate variation is found. In Scotland there is a tendency to somewhat deeper blackness of colour and marbling, some examples being very nearly black.

On the wing from the end of August to the beginning of October, but in Scotland it sometimes begins to emerge as early as the first week in August.

LARVA cylindrical, stout; head dull brown, front of collar yellow; body green freckled with yellow; dorsal line primrose yellow; raised dots green, not distinguishable, each emitting a very fine hair.

When just hatched the head is large, shining black; body faint violet-grey; the usual dots inconspicuous; after a time the body becomes brown, with the head and collar black; the dorsal and subdorsal lines pale brown; raised dots minute, black; after another interval the head is brown, the collar edged in front with yellow, the second segment greenish, the body ochreous mottled with dull green, the dorsal line primrose, the subdorsal and spiracular lines mere yellow threads, spiracles green, ringed with black and the dots still black; but as it reaches full growth the dots lose their blackness, the subdorsal and spiracular lines disappear and the adult colouring is assumed. (Adapted from Rev. J. Hellins.)

March to June, the winter being passed in the egg-state. When newly hatched the larva bores into a bud of oak, and lives and feeds therein; in May when the oak-buds are opening it spins together the young leaves with a good deal of silk and so forms a habitation; but after the last moult it feeds openly upon the leaves of oak, and may very easily be shaken from them into an umbrella. It is advisable when rearing this larva to remember that if the sprays of the oak on which it is fed are placed in water, it will, if it can possibly do so, force its way down into the water, and so commit voluntary—or involuntary—suicide.

PUPA apparently undescribed—subterranean.

The moth seems to hide, in the daytime, mainly among herbage or thick masses of leaves, but may occasionally be found on the trunks of trees, and in Scotland has more than once been found in plenty sitting on pine trunks. It has been found occasionally hidden under thatch. At night it is strongly attracted by sugar, sitting quietly upon it, and may thus be secured with perfect ease; equally fond of ripe blackberries when the autumn is sufficiently warm to ripen them to a greater sweetness than usual; and may even be taken at blossoms of *Phlox*, and other flowers. Extremely uncertain in its appearances, one season in multitudes in its favourite haunts and in moderate numbers in oak woods generally; in other seasons hardly a specimen is to be found. Confined to oak woods, and open country with plenty of oak timber, and in such situations found throughout the whole of England; probably also in Wales, though I have no record. In Scotland rather local, but abundant in Argyleshire and Moray, and in Perthshire extending up the hills to 600 feet above sea-level; also found in various parts of the Clyde Valley, and in Roxburghshire. In Ireland it was recorded by Mr. E. Birchall, but doubts have been thrown on the correctness of his information—yet it surely must occur.

Abroad it has a wide range through Central, Southern, and Western Europe, Sweden, Livonia, Sardinia and Corsica.

Genus 26. **CLEOCERIS.**

Antennæ pectinated, eyes naked, with long back lashes; thorax small, crested at the back; abdomen rather slender, crested on the third segment; fore wings narrow; vein $\bar{5}$ of the hind wings slender, curved, arising near the middle of the crossbar.

We have but one species.

1. **C. viminalis**, *Fab.*—EXpanse $1\frac{1}{2}$ to $1\frac{1}{4}$ inch. Fore wings shining greyish-white, clouded faintly with lilac or purple; a slender black basal line; and a slender purple-grey central band. Hind wings white, clouded behind with smoky-brown.

Antennæ of the male pectinated with short thick oblique ciliated teeth which become shorter beyond the middle and dwindle to a saw-like form before the tip, dark brown, base white; palpi short, moderately tufted, pale brown; head silvery-grey, with a black bar across the face, and raised tufts at the bases of the antennæ; thorax silvery greyish-white; shoulder lappets edged with purple-brown; at the back of the thorax the scales are drawn together and abruptly terminated, as though cut off, forming a false, or imitation, crest, which is tipped with purple-brown; fascicles dirty white; abdomen silvery-white, dusted with brown; dorsal ridge ornamented with two or three minute purple-brown crests; lateral and anal tufts spreading, greyish-white. Fore wings rather narrow; costa faintly curved; apex rather squarely angulated; hind margin to the middle straight and very little oblique, thence rounded off and even very slightly hollowed close to the anal angle; dorsal margin faintly curved; colour pale silvery-grey softly clouded and dusted with greyish lilac and purple; from the middle of the base is a short, deep black longitudinal streak; basal line only perceptible as two cloudy black dots; first line obscure, double, broken, and angulated, purple-brown; second line even more obscure, but from the costa a series of cloudy wedge-shaped dots edges a whitish shade to the middle, then, bending strongly inward, turns and proceeds to the dorsal margin as a purple-brown streak; subterminal line a mere irregular pale division between a dusky silvery-grey hind marginal stripe, and a broken, irregular, cloudy purple or purple-grey stripe outside the second line; orbicular stigma greyish-white partially edged with a black line, reniform stigma white with a central, dividing, lilac-grey

shade, margined with black, strongly so on the inner side; just beyond it is the darkest portion of the purplish-grey stripe; crossing the wing from between these two stigmata is a slender dark purple-grey central shade, and touching it a black wedge which arises from the second line; on the other side is the claviform stigma, very narrow and edged with purple-black; costal margin regularly spotted with purplish-black clouds; hind margin edged with black lunules; cilia lilac-brown, barred with silvery-white. Hind wings rather narrow, with the hind margin somewhat undulating; pale smoky grey, at the base of the costal margin almost white; a darker cloud lies along the hind margin; cilia white. Female extremely similar, antennæ simple, body hardly stouter, but with a very small anal tuft.

Underside of the fore wings smoky-brown, tinged with red along the costal margin and especially toward the apex; broadly silvery-grey along the dorsal margin, and with a narrow silvery-grey band along the hind marginal region; reniform stigma indicated by a smoky black line. Hind wings white, dusted with purple-brown over the costal area; central spot large, black; beyond it is a curved incomplete purplish-brown transverse stripe; hind margin edged with a brown line. Body, legs, and leg-tufts pale purplish-brown, front tibiæ barred with white.

Variation in the southern districts is very slight, though in the fens there is a tendency to greater whiteness of ground colour, with a flush of purple or pink; elsewhere rather more tendency toward slate-grey; and in rare instances the basal half of the fore wings is dark smoky-grey or slate-grey, while the outer half remains of the normal colour. A very beautiful example of this form has been taken at Reading, by Mr. A. H. Hamm; another, having the two colours very sharply divided in the middle of the wings, was reared in Kent, by Mr. W. R. Jeffery; and I have seen a third in the collection of Mr. Percy Richards. A general suffusion of dark grey or purplish-slate colour appears in more northern districts, and

with it a form in which the fore wings are wholly dark purple-brown, purple-black or slate-black, usually with the stigmata equally suffused or else the reniform is a shade paler. These dark forms are common in South Yorkshire, almost to the exclusion of the paler, and mingled with the more typical, are found in various districts farther north. Mr. Percy Bright has a charmingly pretty specimen from Moray, in which the ground colour of the fore wings is deep slate-grey, but the base, the stigmata, and a broad subterminal stripe are soft whitish-grey. Another in the same collection is rich dark purple-grey with a black central stripe, and another black stripe near the base, both very straight, and the stigmata edged with pale grey. Shetland examples are pale in the ground colour, but large, and with the markings intensified.

On the wing from the end of June to the beginning of August.

LARVA elongate, smooth, cylindrical, very slightly tapering to each end; skin thick; head rather large, shining, whitish-bone colour; mouth and the incision between the head and the second segment black; general colour pale green; dorsal line broad, white or yellowish-white; subdorsal line of the same colour, threadlike: spiracular line yellowish or whitish, the lower edge indistinctly defined; usual raised spots large, whitish and distinct; incisions of the segments tinged with yellow; spiracles black; a black mark in front of the base of each of the legs. (C. Fenn.) Apparently it is not always green. Mr. W. R. Jeffrey has found it of a brown colour; and curiously enough this brown larva—which fed on aspen—produced an unusual variety of the moth, already alluded to.

March to June, on willow, especially *Salix caprea* and *S. cinerea*, and more rarely on poplar, willow, osier, aspen and even hawthorn; when young drawing together the opening shoots with silk and feeding within, when more

grown rolling or folding a leaf together and forming a silk-lined habitation therein. Hatched in March or April, the winter being passed in the egg state.

PUPA bright chestnut-colour. Not more fully described. Spun up among dead leaves on the ground.

The moth hides during the day among leaves, either dead leaves on the ground or in thick masses of foliage, and is sometimes beaten out into the umbrella or folding net when working for larvæ of other species. At dusk it flies and is rather easily seen; it also is strongly attracted by sugar, honey-dew, rush-bloom, flowers of red valerian and other sweets, and in a less degree by light. It more especially frequents damp woods and in them is usually common throughout the Southern, Eastern, South Midland, and Western districts of England, though in Cornwall it appears to be rare. In the North Midlands it is more local and sometimes scarce, but when common here, and in all the more northern districts to Westmoreland and Cumberland, the darker forms seem to accompany the paler, or even to supplant them.

In Scotland it is also local, yet occurs apparently in most districts to the Hebrides, Orkney and even Shetland Isles, but is not everywhere accompanied by the blackened forms. In Ireland it is said to be extremely local, but is recorded from Kerry, Galway, Sligo, and Antrim.

Abroad it ranges through the greater part of Central and Northern Europe, Northern Italy, Southern Russia, and the mountainous districts of Central Asia.

Genus 27. **CHARIPTERA.**

Antennæ ciliated; eyes naked, with large front and back lashes; thorax very square, with raised patagia, and crested at the top and back; abdomen stout, with one to three small

crests; fore wings broad, blunt, rounded behind, margins strongly spotted; vein 5 of hind wings slender, curved.

LARVÆ thick, naked, marbled, hiding in chinks of the bark of trees.

PUPÆ subterranean.

1. **C. aprilina**, *L.*—Expanse $1\frac{3}{4}$ to 2 inches. Thorax robust, bright green with black markings; collar green, edged above with deep black; fore wings bright green with numerous black markings edged with white; hind wings smoky-black with slender white stripes, and white spots in the cilia.

Antennæ of the male simple, long, very faintly ciliated, brown; palpi short and small, white with the sides black, apical joint slender; head tufted, green shaded with white, two conspicuous tufts between the antennæ; thorax broad and squared; collar bright green edged with white and behind this with deep black; shoulder-lappets broad and uplifted, bright green, edged with black; rest of thorax similar, top crest rather compressed, slenderly tipped with black; back crest conspicuous, double, the sides of each tuft being broadly black; fascicles broad, white; abdomen dusky white abundantly dusted with black, but the basal segments covered with long white scales, among which, on the dorsal ridge, are three small obliquely raised crests or tufts tipped with black; lateral and anal tufts very small, smoky-black. Fore wings rather broad; costa gently rounded; apex blunt and somewhat squared; hind margin crenulated, nearly perpendicular below the apex but rounded off below the middle; dorsal margin nearly straight; colour bright pea-green or cobalt-green; basal line black broken into two short streaks, one on the costa, the other at the middle of the base, both edged outwardly with white and duplicated, or rather the duplicate of the lower is thickened into a short black blotch below which on the base of the dorsal margin is

a short black longitudinal streak; first line deep black, double, enclosing a slender white stripe, perpendicular, broken at the nervures and much indented; second line very oblique, widely curved, not attaining the costa, but formed into a series of deep black crescents and faintly duplicated, the hollows of the crescents being filled in with white; sub-terminal line a mere faint white clouding which divides the hind marginal space and is edged inwardly with black wedges or arrow-heads which are largest near the anal angle; orbicular stigma small, round, greenish-white, ringed with black; reniform stigma large, elongated into a broad white, or greenish white, crescent which contains a black line and is also edged in front and behind with black; the orbicular is clasped by a black stripe broken at the nervures and passing to the dorsal margin as an intensified, not to say crystallised, central shade; costal margin regularly spotted with black and having upon it, before the apex, an angulated oblique black streak; along the extreme hind margin is a row of black triangles, each followed by a smoky-black spot in the cilia, which otherwise are white. Hind wings rather short, rounded, smoky-black, paler at the base; central spot large, black; beyond it is an obscure curved and waved white transverse line or stripe, and close to the hind margin another, rather distinct toward the anal angle; extreme edge black; cilia white, spotted with smoky-black. Female very similar but with still blacker hind wings.

Underside of the fore wings smoky-white, clouded in the middle with black; dorsal and hind margins broadly shining white, the nervures in the latter dark; reniform stigma black; beyond it is a partial black transverse cloud, and a similar stripe lies before the marginal white band; cilia as on the upper side. Hind wings glossy white dusted with brown at the base and over the costal area, and with grey over the remaining surface; central spot large, dull black; beyond it is an incomplete curved black transverse stripe; hind margin edged with large black dots. Body and leg

tufts pale smoky-grey; legs dull white, regularly barred with black; first pair very strong, and after death extremely stiff at the joints.

This species bears an extraordinary resemblance to *Diphthera Orion*, but is very much more robust, its thorax more squared, its abdomen much stouter; its collar green, while that of *D. Orion* is black; and the black edge of its subterminal line disposed in wedges, while in the latter species, it forms a continuous stripe.

Usually very little variable in the size of the black markings, or the intensity and extent of their white edgings. In colour it unfortunately is unreliable, the green fading very slowly and imperceptibly, but surely, and becoming, in the course of many years, even dull orange. At the same time the white lines fade quite away. In the north of Ireland, in Scotland, and even on Dartmoor, Devon, there is often extension of the black central band of the fore wings, sometimes to a very considerable degree. In the collection of Mr. P. M. Bright is a specimen taken in the New Forest the ground colour of which is a singular greenish-white, with the black markings normal. One taken in Sussex by the Rev. E. N. Bloomfield is pale green, but devoid of black in the markings, which are merely indicated in paler colour.

On the wing in September and October; but in the north-east of Scotland it has been taken in plenty at the end of August. It does not hibernate; and its name appears to be somewhat inappropriate, unless it has been given because the moth *does not* appear in April. The winter is passed in the egg state.

LARVA stout, naked, somewhat cylindrical, but moderately flattened beneath; and with the prolegs placed rather wide; head rounded, greyish-green, inner edge of the lobes margined with black; body grey-green, or very dusky-brownish green, almost exactly the colour of the outer bark of the oak tree; dorsal line broad, white, interrupted by a series of very broad

greenish-black markings of a rough diamond form, or alternate angulated streaks which reach the spiracular stripe, which is also dark but edged beneath with paler; raised spots white, undersurface and legs pale grey-green.

The Rev. J. Hellins says that the newly-hatched larva has the head, and a plate on the second segment, shining black, and the body dingy drab with a paler spiracular line. At this time (March and April) it bores its way into an unopened oak-bud, eating out the interior and lodging in the chamber thus made. This condition appears to last till the beginning of May, when, after its second moult, the head is black, the body whitish, with a pattern of eight broad dorsal diamonds in black freckles, darkest on the sides, and mixed with dull orange; dorsal line white, but broken into short streaks; spiracles and usual raised dots black. At this time it begins to feed without concealment on the opening buds, and from this the adult colouring is gradually assumed.

March to June on oak, feeding as already described, but after ceasing to feed in concealment it hides itself during the daytime in a chink of an oak-trunk, where it is sufficiently protected by its extraordinary resemblance to the bark of the tree.

PUPA apparently undescribed. In a brittle cocoon underground, usually at the foot of an oak-tree, immediately below the surface, often among the roots of a sod of grass growing in the angle of the base of the tree.

The moth conceals itself in the daytime so as to be very seldom seen; but apparently *not* upon the ground, therefore most probably upon the branches of oak-trees. It is wonderfully like a piece of the loose lichen which grows so freely upon oak-trunks in woods, yet does not often sit on the trunks. Its succession of protective resemblances has been pointed out by the Rev. J. Hellins, who says that the eggs are ribbed, and reticulated with black and white, so as closely to resemble small specks of lichen; while it requires a keen

eye to discover even a large full-grown larva when in an open interstice of bark, in full view; each of its changes of colouring after becoming an external feeder being equally adapted for concealment. That a moth should be produced which has another, and totally different, protective resemblance, of a most deceptive character, furnishes food for much thought.

The moth comes freely to sugar on oak-trees at dusk, sits down at once and allows itself to be captured with perfect indifference; sometimes even settling to feed when the light of the moon is brilliant enough to show it without the light of a lantern. Probably other sweets are equally acceptable; it certainly appreciates ripe blackberries when the weather is hot enough to give them their fullest flavour. Confined to oak woods and open country where oaks are plentiful, and in such situations abundant in the South, and not scarce throughout England, yet I find no record of its occurrence in Wales. In Scotland found in Roxburghshire, Lanark, Ayrshire, and elsewhere in the Clyde Valley, and the districts of the Tweed, Solway and Forth; farther north it is found in Perthshire and Aberdeenshire, and plentifully both in Argyle and Moray. In Ireland in the County Dublin, Wicklow, Tullamore, Westmeath, Cavan, Galway, Sligo, Tyrone, Armagh, Antrim, Derry, and Down; in some of these districts plentifully, in others rarely.

Abroad it has a considerable range through Central Europe, South Sweden, North Italy, Sardinia, Livonia and Southern and Eastern Russia.

Genus 28. **MISELIA.**

Antennæ pectinated in the male; eyes naked, but provided with large front and back lashes; thorax squared, slightly crested at the back; patagia large and uplifted; abdomen with four or five erect dorsal crests; fore wings broad and blunt; vein 5 of hind wings slender, curved.

LARVÆ twiglike, flattened beneath.

PUPÆ subterranean.

1. **M. oxyacanthæ**, *L.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Thorax much squared, lappets large; fore wings rosy-brown, dusted upon and near the nervures with glistening green; a black streak from the base, and a curved clear white streak above the anal angle; hind wings smoky pale brown.

Antennæ of the male shortly pectinated with small, solid, closely placed teeth, which are minutely ciliated, light brown; palpi very short, almost obscured by dense tufts of long scales, rich brown; apical joint very slender, dark brown, tipped with white; head densely covered with long rich brown scales, and having a large raised tuft at the back of the antennæ; collar broad, purple-brown, with a curved black transverse bar below the middle; thorax much squared, the shoulder lappets being raised at the back and sides, and the shoulder portions extended, whitish-brown, edged with purple-brown; rest of the thorax rather flattened, purplish-brown, dusted with white, the scales at the back drawn together into a flat tuft or crest of rich purple-brown; fascicles pale reddish-brown; abdomen glossy golden-brown, the dorsal ridge ornamented with three or four conspicuous chocolate-coloured crests; lateral tufts thick and spreading, anal tuft rather small. Fore wings very broad behind; costa faintly curved; apex bluntly angulated; hind margin filled out in the middle, crenulated, rounded off below the middle, and the two hollows between crenulations next the anal angle decidedly more excavated than the rest, throwing out the angle to a point; dorsal margin very gracefully curved; colour light chocolate-brown, clouded with darker, and dusted with glistening green; basal line absent; a short black line from the middle of the base lies beneath the median nervure; first line very near the base, slender, black, formed into two large curves, which are divided by the black line from the base; second line extremely faint, oblique, slender, chocolate-brown,

but edged toward the dorsal margin by a parallel white crescentic streak, backed by a black cloud; subterminal line a faint row of brownish-white dots edged inwardly by small cloudy dark chocolate spots; orbicular and reniform stigmata large, and both somewhat rounded, pale purple-brown; clavi-form stigma very broad, faintly edged with black; basal space above the black streak rounded and rather pale; space beyond the second line also pale, forming a broad pale chocolate stripe from the apex to below the middle; the principal nervures all strongly and broadly dusted with brilliant metallic green, the smaller nervures and the dorsal area more faintly so. At a short distance from the apex are two pointed black streaks, and nearer the anal angle three more, the latter arising from the extreme margin, which is edged by slender black crescents and preceded by a row of glossy green spots; cilia unusually long, crenulated, pale chocolate-brown, clouded with darker. Hind wings smoky-brown with a purplish gloss, faintly paler at the base; beyond the middle is a slender smoky-black transverse stripe, edged outwardly with dirty-white; nearer the hind margin is a row of dusky-white spots, that nearest the anal angle hollowed and embracing a black spot; cilia pale chocolate-brown, dusted with whitish-brown. Female very similar, but with simple antennæ, and the abdomen stouter and showing but little of the lateral and anal tufts. Hind wings rather darker.

Underside of the fore wings smoky chocolate-brown; reniform stigma paler; from the costa toward the apex are four short yellowish-white oblique streaks; hind wings brownish-white abundantly dusted with chocolate-brown; central spot brown; beyond it is a slender undulating transverse grey-brown stripe; hind margin broadly clouded with smoky-brown. Body golden brown with purple-brown tufts; leg-tufts paler; legs pale purple-brown, barred with black.

In its ordinary typical form not very variable, but slightly so in the depth of its chocolate clouding, more so in the

abundance or deficiency of the glistening green dusting on and near the nervures, which even in some pale examples is occasionally quite absent. But in a well-known and constantly recurrent melanic variety, known as var. *capucina*, the ground colour is deep dark chocolate-brown or black-brown, the markings all very obscure except the white curved streak above the anal angle, which is always present and generally conspicuous; and there is little or no trace of the glistening green scales. This variety hardly appears to be united with the ordinary form by intermediates; it seems to occur rarely or sparingly with it everywhere, more commonly in the Midland counties, and in South Yorkshire, Derbyshire and Shropshire appears to be quite as frequent as the typical insect. In the cabinet of the late Mr. F. Bond is a strange aberration having the markings of the fore wings almost obliterated by dashes of white, though the nervures are dark; in that of the late Mr. H. Doubleday is a whitish-brown specimen without chocolate clouding, but shaded with pink, and possessing the dusting of glistening green, and also the usual lines and anal streak.

On the wing in September and October, sometimes even to the beginning of November. It does not hibernate, the winter being passed in the egg state.

LARVA elongate, rounded above, flattened beneath; twelfth segment raised into a bifid hump; head rounded, the face flat; anal prolegs extended behind. Variable, greyish-brown, reddish-brown, or dull ochreous, mottled, dusted, and marbled with dark grey and greenish; dorsal and spiracular lines faintly darker, the former bisecting a series of outlines of indistinct grey diamonds; on the eleventh segment is a conspicuous oblique black lateral dash pointing backwards, from the extremity of which a pale stripe proceeds to the tip of the dorsal hump; a similar black dash often appears on the fourth segment, where it is broadly shaded with pale ochreous; usual spots whitish encircled with black; undersurface

whitish-green and with a very conspicuous greenish central stripe containing a row of black blotches. Front edge of second segment black. Head pale reddish-brown with the face blackish, edged and marked with white. Legs dull brown or pink. When young it loops very considerably in walking. (C. Fenn.)

A much paler form, even greenish-white blotched with dull green, and showing faintly the usual markings, seems to be somewhat common in the New Forest. In this variety it closely resembles the lichens growing on the trunks of trees and bushes; in its darker form its likeness to a twig or to the bark of a branch is quite as marked as in the twiglike larvæ of the *Geometridæ*. The deception is very nearly perfect in each case.

April to the end of May or beginning of June on hawthorn, blackthorn, and apple, feeding at night, hiding in the daytime on the bark of the branches, or close to the ground.

PUPA soft, wrinkled, semitransparent, incisions well defined; anal extremity blunt, with a small protuberance. Colour dull yellowish, incisions and dorsal shade pale brown. Subterranean, in a hard oval cocoon of silk and earth. (C. Fenn.) The larva lies rather long in the cocoon before assuming the pupa state.

The moth, though extremely beautiful in its colouring, does not seem to be often visible in the daytime. It hides itself in thick masses of herbage, or in bushes in hedges or woods, or under overhanging masses of plants on a hedge bank. At night it flies very softly in rather late dusk, and is extremely susceptible to the attractions of sugar and ivy-bloom, and even of blackberries in a hot autumn, settling down so quietly that it may be taken with perfect ease in the hand.

It is plentiful in woods and lanes in the South of England, though less so in Cornwall, and still inhabits the outskirts of London; also found, apparently, throughout England and

Wales, with local variation as already described. In Scotland it seems to have resumed its normal form and is found in Roxburghshire, Ayrshire and the Clyde Valley generally, Argyleshire, Perthshire, Aberdeenshire and elsewhere in the districts of the Tweed, Solway, Clyde, Forth, Tay, Dee and Moray. In Ireland it appears to be generally distributed and in many parts abundant, but the dark variety very rare. This dark aberration appears to be almost or quite confined to the British Isles, but in its normal form the species is widely distributed in Central Europe, the South of France, Sweden, the North of Italy, Corsica, Dalmatia, Southern and Eastern Russia and Armenia.

(**M. bimaculosa**, L.—A large species, about the size of *Aplecta nebulosa*, greyish-white with brown lines and marbling, and three enormous white stigmata. Of this species Stephens writes (*Illustrations of British Entomology*, vol. iii. p. 24): “The only indigenous example which I have seen of this insect is contained in the collection at the British Museum, to which it was presented by Dr. Leach; it was captured near Bristol, I believe, in July 1815.” This specimen is still in the British Museum, and has on its pin Dr. Leach’s label. It is set in the ordinary drooping fashion of very old British insects. In Dr. Mason’s collection is a second specimen said to have been captured by Peter Bouchard, from whom it passed into the possession of Mr. Marshall, Leicester. The testimony of the actual captor does not appear in either case to be available, and as no subsequent evidence of the presence of the species in these islands has been furnished, it seems safe to regard these specimens as having been accidentally introduced from abroad, especially as the original example was found in the vicinity of a great seaport such as Bristol. Curtis figured the species and its larva from Hübner, but furnished no evidence of its British origin. The range of the species seems to be restricted to France, North Italy, Germany, Hungary and Russia.)

Genus 29. **VALERIA.**

Antennæ pectinated in both sexes; eyes naked, but provided with long front and back lashes; thorax stout, scales erect and extremely dense, faintly crested at the top, strongly at the back; abdomen strongly crested, stout; fore wings broad, with expanded, crenulated hind margin; hind wings short, crenulated.

1. **V. oleagina**, *Fab.*—Expanse $1\frac{3}{4}$ inch. Fore wings broad, expanded behind, with very long scalloped cilia; purple-brown, much clouded with green; reniform stigma large, conspicuously white; hind wings short, white, bordered with dark smoky-brown.

Antennæ of the male pectinated with rather short, curved, solid teeth, minutely ciliated, light brown; palpi short, small, purple-brown, almost concealed by long loose scales, the apical joint black, tipped with pinkish-white; head densely tufted in front, and also at the back of the antennæ, purple-brown; collar upraised, purple-brown, dusted with white and with black, and in its lower portion tinted with green; remainder of thorax covered with dense masses of raised purple-brown scales and furnished with top and back crests, the latter by far the larger; the whole dusted with green, purple, and black; fascicles smoky-grey; abdomen smoky-white, obscured by an abundant dusting of dark smoky-grey; on the dorsal ridge of each segment but the last is a conspicuous purple-brown crest, those on the second and third being the largest; lateral tufts hardly perceptible; anal tuft small and contracted. Fore wings moderately broad, very so behind; costa almost straight; apex rounded; hind margin very fully rounded and dilated, strongly crenulated or scalloped deeply to just above the anal angle, which is prominent; dorsal margin very gracefully curved; colour rich dark purplish-umbreous, much clouded with soft rich green; basal line limited to two black streaks edged with green; first line faintly suggested in

small slender black streaks, but duplicated and very perpendicular; second line a faint curved series of crescents and small black streaks; subterminal line merely indicated by a line of cloudy white dots; orbicular stigma a faint white ring edged with black; reniform stigma large and very conspicuous, snow-white edged with black; claviform stigma broad but very obscure, edged with black; down all the nervures and especially over the angles of subdivision is a broad thick dusting of lovely soft rich green, and a similar stripe lies along the hind margin, which is edged with small black lunules; costal margin dotted with white, the largest spot being over the white reniform stigma; cilia unusually developed, purple brown, most beautifully set off by two undulating, intersecting yellowish lines which follow the course of the crenulations; at the tip of each nervure is a white dash. Hind wings short and rather broad; hind margin distinctly crenulated; colour white, broadly bordered along the hind margin with dark smoky-brown; central spot large, lunate, smoky purplish-grey; between it and the hinder dark stripe is a slender dotted purplish-black transverse line; extreme hind margin edged with purple-black; cilia long, crenulated, smoky-grey dashed with pale yellow, and having a dark yellow basal line. Antennæ of the female also pectinated, but rather more shortly so; in all other respects the sexes are extremely alike.

Underside of the fore wings smoky-white to beyond the discal cell, which is filled up with long silky hairs; place of the reniform stigma indicated by a round black spot in a white cloud; following it is a narrow smoky-black transverse stripe, and beyond this a very broad similar stripe filling the hind marginal space, but divided by pale nervures; costa near the apex spotted with white. Hind wings silvery-white, dusted with brown and black, abundantly so along the costal and hind marginal regions; central spot conspicuously deep black; beyond it is a central transverse line of black dots, angles and streaks. Body very thickly clothed with scales,

dark smoky-brown ; leg-tufts smoky-black ; legs black, much barred with yellow.

Apparently not variable.

Stated to be on the wing in March and April, but the one British specimen of which there is a definite record was taken in July. Possibly it may be double-brooded.

LARVA brown-grey ; thoracic segments thickened, rather paler ; from the fourth segment are oblique pale streaks from the back on the sides ; on the eleventh and twelfth segments are two pairs of blunt points ; on the sides two yellowish longitudinal lines, between which are placed the black spiracles ; head black with an orange collar.

In May on old lichen-covered bushes of blackthorn, which it resembles in colour, usually resting on the twigs or bark in the darker inner portion of the bush ; descending to the earth for pupation. (Prof. G. Hofmann.)

PUPA undescribed.

The most definite record of this extremely rare species in these Islands is that by Mr. E. Donovan, author of *Natural History of British Insects*, 1792 to 1816. He says: "We accidentally met with an individual of this species on the wing about twilight, one summer evening in the month of July 1800, near Fishguard in Pembrokeshire, South Wales. It occurred among a number of other insects of the *Noctua* and *Bombyx* families by the side of low hedges which divide the fields and meadows at a short distance from the town. This is the only specimen we have seen British." Donovan's figure accurately represents this species—a rather small example. Twenty years ago the late Rev. Henry Burney informed me that the specimen was still in existence in the Oxford Museum, and I understand from Professor Poulton that it is still in the Hope Museum there, and is now a rather worn-looking example with broken antennæ, but with every indication of genuineness,

In the collection of the late Mr. J. F. Stephens, author of the *Illustrations*, in the British Museum, are five specimens, all set exactly in the same manner—that formerly in use in this country—that is, with a rather drooping appearance, from the front edge of the fore wings being scarcely advanced before the head. These, Mr. J. W. Douglas informs me, were fully believed in by Mr. Stephens, who stated that they were taken—though not by himself—on a fence or on trees in Richmond Park, Surrey. In the collection of Dr. P. B. Mason is a specimen labelled as taken on the park paling at Richmond by the late Mr. Edwin Shepherd.

In Mr. Haworth's paper in the first volume of the *Transactions of the Entomological Society of London*, entitled "Review of the Rise and Progress of the Science of Entomology in Great Britain, chronologically digested," 1807, in a very full account of the works on entomology then extant in this country, he remarks respecting the *British Miscellany*, by James Sowerby, F.L.S.: "Table 37 finely represents, as a new species, the rare *Bombyx oleagina* of Fab. and of Lep. Brit., and *Noctua oleagina* of Hüb. Schmet, cum icone. I have seen Mr. Plastead's specimen, here mentioned, several years since, which that gentleman dug the pupa of in Battersea Fields along with *Noctua Persicariæ*, and have also seen another which was caught in Scotland twenty years ago, and my friend Mr. Donovan, F.L.S., found one in Wales."

Stephens says (*Illustrations of British Entomology*, 1829): "Very rare; specimens have been found in Richmond Park, and one was taken in the pupa state by Mr. Plastead some twenty or thirty years ago in Battersea Fields; others have occurred near Bristol, and Mr. Donovan, I believe, captured one in South Wales; it has also been taken in Scotland; my specimens were from the former locality (*sic*), and I have been fortunate enough to have had nearly a dozen examples at various periods." These, so far as I know, are all the existing records of the species in the British

Islands. All may not be genuine—certainly some appear open to doubt—but as no evidence seems to exist of more modern captures, the most reasonable conclusion appears to be that this is one of the species which has died out with us, from climatal or other causes, or which has been merely a temporary inhabitant, from immigration and subsequent extinction. It may be remarked, with regard to Mr. Donovan's capture, that Fishguard in Pembrokeshire is a particularly remote spot—I think sixteen miles from the nearest railway station—and that, so far as is known, no effort has been there made to re-discover the insect.

Its range abroad is somewhat restricted—Germany, Austria, Hungary, Galicia, Piedmont, Spain and South Sweden.

Genus 30. **LUPERINA.**

Antennæ notched, ciliated; eyes naked, without lashes; thorax only faintly crested at the back; abdomen with one or two minute crests; fore wings narrow, blunt; hind wings rather narrow, vein 5 hardly visible, but arising from the middle of the cross-bar.

LARVÆ dull-coloured, almost without markings, usual raised dots imperceptible; on grasses, on or near the roots.

PUPÆ subterranean.

1. **L. testacea**, *Hüb.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings dull brown, central band usually darker, and containing near the dorsal margin one or two black bars; hind wings of the male pure white, of the female white margined with brown.

Antennæ of the male rather short, ciliated with distinct pairs of tufts of fine bristles so as to resemble minute pectinations, which extend to the tips, pale brown; palpi small and narrowly tufted, horizontal, dull brown, third joint short

and blunt; head light brown, not strongly tufted, but there is a small elevation of the scales between the antennæ; thorax rather smooth, pale umbreous dusted with paler, with a few dark brown dots on the shoulder-lappets; fascicles small, brownish-white; abdomen thinly scaled, dull pale brown with a dusting of white; basal segments covered with long brownish-white hair-scales, among which, on the dorsal ridge, are one or two short and exceedingly fugitive dull brown tufts or crests; lateral and anal tufts small. Fore wings rather narrow, the costa very faintly curved; apex rounded; hind margin also rounded, but slightly excavated towards the anal angle; dorsal margin faintly hollowed in the middle; colour dull pale umbreous clouded with darker brown and the nervures indicated in the same colour; basal line faintly suggested by two dusky spots; beneath them is a small horizontal black line arising from the middle of the base; first line black, but obscure and incomplete, widely angulated and preceded by a faint brown shade; second line black but incomplete and not very distinct, edged by a more complete pale brown line; subterminal line merely an irregular undulating pale brown thread, very faint and not edged inwardly with dark colour, outwardly it is usually bounded by a dark brown hind-marginal stripe; orbicular and claviform stigmata small, reniform large, all very pale brown, or almost yellowish-brown, obscurely edged with black; sometimes a black streak is visible before the orbicular, and a squared black or dark brown blotch between it and the reniform; beneath these, where the first and second lines approach each other, is usually a black bar uniting these lines and enclosing the claviform stigma, sometimes another on the dorsal margin, and in such examples the central band is usually clouded with dark brown; often another black streak—tooth-shaped—lies on the same margin nearer the base; costa faintly spotted with black; cilia dark brown, dashed with paler. Hind wings rather narrow and small, clear white, edged along the hind margin with a few dark-brown lunules,

cilia white faintly tinged with brown. Female much stouter, antennæ threadlike, fore wings often suffused with deeper brown, or else uniformly of the ordinary brown without a darker central band; hind wings white, usually clouded in some degree with light brown along the hind margin.

Underside of the fore wings dull pale smoky-brown, shading off to white in the middle and the dorsal margin; hind wings white dusted along the costal region with brown; body whitish-brown; legs and leg-tufts dull umbreous, the former barred with paler.

Not a very variable species inland, but on the coast, and especially on the western coasts, it is quite otherwise. The range of ground colour there is from the palest drab or even brownish white marbled with pale brown, to blackish-umbreous with or without central blacker markings; the central black bar above the dorsal margin is usually faint or even absent in the palest forms, yet occasionally large and strongly marked; in the darkest it sometimes becomes a black rectangular blotch. It is curious that these extreme forms occur together—the whitest and blackest that I have met with were found on the Pembrokeshire coast. In the South of Ireland a more uniformly dark race is accompanied by normal specimens and also by a curiously mealy-looking, grey-brown variety, and in the female by deep umbreous forms. One which I took many years ago on the Irish coast is of a smooth uniform dark brown without mottling of either paler or darker, but with the stigmata and subterminal line tinged with yellow, and has a very unusual aspect. In all these variations the colour of the thorax coincides with that of the fore wings. In Mr. R. Adkins' collection are two female specimens—also from Ireland—in which the fore wings are singularly striped between the nervures with yellow; Mr. G. T. Porritt has a male the fore wings of which are wholly brownish-ochreous, the markings only faintly deeper yellow-brown; and another of the usual pale umbreous, but with the hind margin black-brown; and in Mr. E. A. Atmore's collection is a female of

a uniform dark umbreous, except that the first, second and subterminal lines are pale *yellow*. Another form, of which three specimens were raked from overhanging edges of sand-hills at Rhyl, North Wales, in August 1862, is of so singular an appearance that the late Mr. H. Doubleday, to whom two of them were sent, considered them to belong to a distinct species, to which he gave the name of *Luperina Guenéei*, publishing a description in the *Entomologists' Annual* for 1864, p. 123. These differ from ordinary *L. testacea* more particularly in the circumstance that while the central portion of the fore wings is of the same pale yellowish-brown as the remainder of the wings, the second line is comparatively distinct, formed into black crescents *and edged with white*, while the cilia are strongly chequered with brown and pale drab, and the hind wings of a singularly pure white without even the marginal brown lines. Further search in the same locality failed to reveal additional specimens, and, so far as I know, none precisely resembling these have since been found, but intermediates fully connecting them with the more usual pale forms of *L. testacea* are now known, and there seems no room for doubt that the supposed *L. Guenéei* is simply an extreme variety of that species. It has a curious superficial resemblance to *Agrotis ripæ*. A single example appears to have been in the collection of M. Guenée in France, and for this reason it was named by Mr. Doubleday after that distinguished entomologist. Two of the three Rhyl specimens passed through the hands of Mr. J. B. Hodgkinson into the collection of the Rev. Henry Burney, and after his decease into that of Dr. P. B. Mason, who has deposited one of them in the National Collection; the other is before me, with one intermediate variety, also from Dr. Mason's cabinet. The third example seems to have been purchased by a lady at Fulham, but its present resting-place is unknown to me. Two so-called *Guenéei* in the collection of the late Mr. F. Bond do not fully agree with this variety of *L. testacea*. Another form of a greyer colour, of which a

specimen appears to have been taken in Lancashire, has been recorded, in error, under the name of *L. Nickerlii*.

On the wing in August and September.

LARVA rather thick and stumpy in repose, cylindrical, yet tapering a little in front and behind; head rounded, lobes well defined, between them is a point on the crown; legs placed well beneath the body; without any trace of the usual raised dots, though with a strong lens the minute hairs are seen to spring from the situations in which such dots would be placed in most *Noctua* larvæ; anal plate rounded off rather abruptly behind, divided into three ridges, and rather concave, contrasting with the convex surface of the other segments; these are transversely divided by deep wrinkles into prominent ridges, most pronounced on the twelfth and front portion of the thirteenth segment; skin minutely wrinkled, yet glistening; head glossy, light brownish-yellow, mouth dark brown; dorsal plate rather paler and shining; body generally flesh-colour, often of a livid tint; the ridges of the back and sides with more colour than the deep hollow wrinkles, which are of a paler, purer flesh-colour; the back of the two hindmost segments is darker, especially on the ridges, culminating in rather dark brown on the front portion of the anal plate; spiracles deep pink, strongly outlined with black. When younger more pinkish-grey. (Adapted from Buckler.)

Probably from October (but the time at which the eggs hatch is not certainly known to me) till June or July; on *Poa annua* and other grasses, feeding at, and just above, the roots, in the grass-tufts; concealing itself almost always underground.

PUPA $\frac{3}{4}$ inch long, of moderate bulk, very uniform in thickness, tapering but little till near the tip, which is furnished with two slightly divergent fine points curved downward; colour light brown. (W. Buckler.) The whole surface is smooth and glossy, and almost without sculpture, except a band of minute and abundant punctures round the front

portion of each of the three larger abdominal segments; cremaster extremely short, and with its spikes black; spiracles very strongly marked.

The moth is not often seen in the daytime, but hides among grass upon the ground. At dusk it flies swiftly about fields, lanes, and grassy places generally, but is never found at sugar, nor known to feed at flowers or any kind of sweets. The male is strongly attracted by light, and may be seen about every gas-lamp in the suburbs of towns or in the country, dashing backwards and forwards around the light in the wildest state of excitement. Later it settles down on the lamp and so remains till towards morning. The female seems only to fly sluggishly about grassy places, and may, with the male, be found in plenty at night sitting upon grasses. Excessively abundant in the South of England, common even in the London suburbs, also plentiful in the Eastern and Western districts, and in Wales; but apparently much less common in the Midland counties, especially Leicestershire, Derbyshire, and Staffordshire, and also in the more mountainous parts of the North of England, though it is there common on the coast. In Scotland it continues common on the East coast to Moray, where it is sometimes abundant; but in the West is not recorded farther north than Ayrshire and other parts of the Clyde district. Common all over Ireland, but especially so on the coast. Abroad it is found throughout Central Europe, the northern parts of Spain and Italy, Sweden, Dalmatia, and Southern Russia.

2. **L. Dumerilii**, *Dup.*—Expanse $1\frac{1}{8}$ to $1\frac{3}{8}$ inch. Fore wings rather pointed, pale drab, central band and hind margin wainscot-brown; upper stigmata yellowish-drab; a broad smooth pale stripe beyond the central band; hind wings white.

Antennæ of the male furnished with short curved bristles in minute tufts resembling short pectinations, also finely ciliated, pale brown; palpi divergent, broadly tufted, pale drab, third joint distinct; head whitish-brown, strongly tufted

between the antennæ; thorax rather flattened, loosely scaled, pale drab, the hinder scales drawn together into a small oblique crest, the tufts of which are tipped with rusty black and white; fascicles whitish-brown; abdomen pale drab, dusted with brown; a small fugitive crest on the second segment; lateral and anal tufts small and obscure. Fore wings rather sharply pointed; costa very straight; apex suddenly angulated; hind margin oblique and only very slightly curved, but faintly hollowed close above the anal angle; dorsal margin straight to near the base, then rather widely curved in; colour pale drab or whity-brown; basal line indicated by two dark brown streaks; first line slender, dark brown, nearly perpendicular, and but slightly angulated; second line smooth, oblique, scarcely indented, dark brown; the central space between these two lines soft wainscot-brown with the nervures white; subterminal line imperceptible except as forming the indented edge of a wainscot-brown stripe which lies along the hind margin; orbicular stigma oblique, reniform almost lunate, both yellowish-drab, unmarginated; on the costa are two or three black-brown dots; extreme hind margin edged with flattened triangular brown dots; cilia pale umbreous, prettily looped with brownish-white. Hind wings not broad, white; nervures and hind-marginal line very faintly tinged with brown; cilia white. Female larger; antennæ threadlike; body much stouter; otherwise similar.

Underside of the fore wings pale smoky-brown, dusted with yellowish-white along the dorsal and hind margins, and on the reniform stigma. Hind wings white, the nervures tinged with pale brown, and a dusting of the same along the costal region; central spot small, lunate, dusky-brown. Body whitey-brown; legs and leg-tufts smoky-brown.

On the wing in September.

The larva and pupa appear to be quite unknown.

In the *Entomologists' Annual*, 1855, Mr. H. T. Stainton

wrote of this species: "Only a single British specimen is known; it is in the collection of the late Mr. George Robertson, of Limehouse." This statement, however, seems open to doubt, since Mr. Robertson's collection, still in excellent order, is in the possession of his family at Liverpool, and no specimen of the present species can be found therein. For another, said to have been taken in the Isle of Arran, there appears to be no better evidence. But in November 1858 Mr. A. F. Sealey, of Cambridge, recorded the capture, by himself, of two specimens "in the South of England," and of one more by Mr. W. Farren. This statement is practically confirmed by the late Mr. W. Farren himself, who wrote in 1885: "In September 1858, in company with Mr. A. F. Sealey, I took two specimens in the South of England; one of these was in Mr. Sealey's collection, the other went to that of Mr. Frederick Bond. The next year I took three more in the same locality. One I gave to my friend, Alfred Fryer, which I believe is still in his cabinet. I forget where the other two went to, but I think one went to the Rev. H. Burney." At the same time, Mr. J. W. Dunning put it upon record that he was one of those who joined in sending Mr. Farren on this collecting expedition, and that he still possessed one specimen of the present species, in poor condition. These appear to be all the published records of the species in this country. The place of capture seems to have been sedulously concealed by the captors, but by others has been variously stated as the Isle of Wight and the Isle of Portland, and common report says that the specimens were taken at a lighthouse. The most probable explanation is that a very slight migration of the species took place about that time, bringing a few specimens to our extreme southern shores, where the species did not succeed in establishing itself. It is said to be found in the neighbourhood of Paris upon elm-trunks, but it is far more likely to hide among grass. Its range abroad seems to be small—France, Dalmatia and Asia Minor.

Genus 31. **CERIGO.**

Antennæ of the male finely ciliated; eyes naked, without lashes; thorax smooth in front, decidedly crested at the back; abdomen very smooth, but with minute crests; fore wings broad, almost truncate; hind wings broad; vein 5 straight from the middle of the cross-bar, but hardly perceptible.

We have but one species.

1. **C. cytherea**, *Fab.*; **matura**, *Staud. Cat.*—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings broad, dark umbreous marbled with black; transverse lines yellowish-white; hind wings pale straw-colour, with a broad smoky-brown hind border, invaded toward the anal angle with white.

Antennæ of the male notched with short saw-like teeth, each surmounted by a tuft of minute bristles, otherwise much ciliated, dark brown; palpi rather short, dark brown, the terminal joint thick and pointing forward; head densely tufted on the face and on the top, but the tufts divided by a transverse hollow of short scales, blackish-brown; thorax dark brown dusted with black; edges of the collar and shoulder lappets indicated in blackish-brown; at the back is a small crest of two tufts tipped with white; fascicles smoky-white; abdomen pale smoky-brown, very smooth; dorsal ridge with one or more slightly raised tufts or crests of darker brown, which are so fugitive as usually to appear absent; lateral tufts very small and neat; anal tuft narrow, dark brown. Fore wings broad, especially so behind; costal and dorsal margins very straight; apex bluntly angulated; hind margin very full, even expanded, and hardly oblique, except below the middle, where it is rounded off, strongly crenulated; colour dark umbreous, clouded and dusted with black, and when very fresh faintly flushed with golden yellow; basal line obscure, limited to two black spots; first line unusually near the base of the wing, and rather perpendicular, yet

much angulated, one angle near the dorsal margin being very long, black, edged inwardly with dusky-white; second line less oblique than usual, curved, undulating and distinct, black, edged outwardly with white, rather sharply so in its lower half; subterminal line dusky-white, excessively waved and indented; orbicular and reniform stigmata rather small, merely indicated by dusky-white margins, edged with black; claviform stigma long, black-edged; on the costal margin near the apex are three small white dots; hind-marginal region often clouded with whitish-brown, and even with white toward the extreme margin, which is edged by a scalloped black line; cilia purplish-brown, with a paler line along the base. Hind wings rather ample, shining pale yellow or straw-colour, with the nervures glistening; along the hind margin is a broad smoky-brown border, suddenly narrowed and invaded with white as it approaches the anal angle; where this narrowing takes place an undulating black line, which edges the remainder of the extreme margin, suddenly ceases, and the cilia, which to this point are smoky-grey mixed with yellow, become white—a curious and very unusual circumstance. Female with threadlike antennæ and stouter body, but extremely similar.

Underside of the fore wings dark smoky-brown; reniform stigma and dorsal margin dusky-yellow; hind wings pale yellow, dusted along the costal region with smoky-brown; hind-marginal band as on the upper side. Body very glossy, pale smoky-brown; legs dark brown, barred with yellow; leg-tufts purplish-brown.

Usually very little variable, except in the depth of the yellow colour of the hind wings; but in Ireland Mr. Kane finds it more so, some examples being of a dark bistre-brown with pale lines, the stigmata ferruginous, and the band of the hind wings more than usually dark; also others of brighter colour, but with the nervures beyond the middle very pale. In Dr. Mason's collection is a specimen with the fore wings unicolorous dark leaden-brown, shaded with dull grey.

On the wing in July and August.

LARVA stout, cylindrical, only tapering off at the extreme ends. Head rounded, smaller than the following segment; semitransparent, pale brown, with darker streaks on the inner edges of the lobes; body pale purplish-brown or ochreous-brown, smooth and soft to the touch, and with but few fine hairs; dorsal line double, broken into a series of pairs of dark streaks, one pair on the front portion of each segment except the second, third and fourth, which are tinged with rather darker colour than the rest of the body; subdorsal line also double, darker brown, very slender; spiracular line similar, but placed in a darker shade; usual dots and spiracles hardly perceptible; under-surface and legs pale brown or grey.

September to April or May on various grasses, *Poa*, *Nardus*, *Aira*, &c., apparently preferring those growing in dry and stony places. It feeds on mild nights throughout the winter, and may be swept up when so feeding, almost full grown, in January and February. It seems to be most frequent on chalk hills. In the daytime it hides among the grass roots.

PUPA apparently undescribed.

The moth hides usually in the daytime among grass and herbage close to the ground, but may occasionally be found sitting on a paling; it flies at dusk and is strongly attracted by sugar or the bleeding sap of a tree, and may more rarely be taken at a gas-lamp. Not usually very common—Guenée says that the larva is tender, and that few reach the perfect state—but it is apparently distributed over the whole of England and Wales, and fairly plentiful in the North-West counties; also found in the South of Scotland and on the East coast so far north as Moray, but otherwise scarce and local in that country. In Ireland it has been taken near

Dublin, in Louth, Monaghan, Londonderry, Armagh, Sligo, and commonly at Castle Taylor, Galway.

Abroad it is found throughout Central Europe, Southern France, Northern Italy and in Dalmatia.

Genus 32. **HAMA.**

Antennæ ciliated; eyes naked, with lashes at the back; thorax somewhat smooth, top crest scarcely indicated, back crest small; abdomen rather smooth, with three to five small crests; fore wings somewhat elongated, of moderate breadth; hind wings ample, vein 5 very slender, curved at its origin.

LARVÆ smooth, naked, of dull colours, feeding on low plants but keeping much concealed.

PUPÆ subterranean.

We have three species—difficult to tabulate—

- A. Fore wings shining, dark umbreous mottled with black. *H. abjecta.*
- A². Fore wings not very glossy.
- B. Fore wings pale yellow-brown, much marbled with darker brown. *H. anceps.*
- B². Fore wings pale umbreous, much marbled with dark umbreous and black. *H. furva.*

1. **H. abjecta**, *Hüb.*—Expanse $1\frac{5}{8}$ to $1\frac{7}{8}$ inch. Fore wings moderately broad, obtuse, shining blackish-brown; markings usually obscure, but reniform stigma generally edged outwardly with white spots; hind wings smoky-brown with a yellowish gloss.

Antennæ of the male ciliated with minute regular tufts of fine bristles, pale brown; palpi rather narrowly tufted, pale brown shaded at the sides with smoky-brown, apical joint short, pointed forward; head and thorax brown, dusted all over with smoky-brown; collar a little erected and faintly banded in front with darker brown; top and back crests both reduced

to mere small points or knobs of scales; fascicles yellowish-white; abdomen smoky yellowish-brown, more or less covered with long smoky-brown scales which lie rather close; on the basal and sometimes on the second segment is a small oblique crest barred with black-brown; lateral tufts spreading and placed on a rather full ridge; anal tuft broad, smoky-grey in the middle, light reddish-brown at the sides. Fore wings rather broad and blunt, extremely smooth and shining; costal margin faintly curved, apex bluntly angulated; hind margin below it hardly oblique, fully rounded, minutely crenulated, and rather hollowed just above the anal angle; dorsal margin nearly straight; colour smoky-umbreous or blackish-brown; markings very obscure, often hardly perceptible; basal line scarcely indicated; first line incomplete, nearly perpendicular, broken at the nervures into several obscure black curves; second line not very oblique, forming a curved series of faint black crescents divided by the nervures, which here are sometimes streaked with black, and pass through a rather paler narrow stripe which borders the second line; subterminal line slender, undulating, whitish-grey, formed in the middle into a short blunt **W**, and bordered inwardly by wedge-shaped black streaks and clouds, outwardly by small dusky clouds; orbicular stigma oval, indicated by a faint edging of black; reniform stigma pale grey-brown, dotted on the outside, or sometimes all round, with dusky white, and edged with black, or in more obscure specimens imperfectly margined and with the dots hardly visible; claviform stigma very short and small, a mere black curve attached to the first line; toward the apex the costal region is usually somewhat darkened and bears on its extreme edge three white dots; extreme hind margin sharply edged with black lunules or triangles, and outside these by a pale yellow line at the base of the cilia, which are shining smoky-brown, dashed with paler. In our most frequent form these markings are barely perceptible. Hind wings smoky-white, with a yellow gloss, shading darker to a

large smoky-brown cloud along the hind margin; nervures smoky-brown; cilia white, clouded with pale brown. Female stouter and with the antennæ threadlike; otherwise quite similar.

Underside of fore wings very pale smoky-brown; costal and dorsal margins smoky-white; beyond the middle are two slender partial transverse blackish-brown lines, the second arising from a dusky costal triangle near the apex. Hind wings white, abundantly dusted with smoky-grey along the costal and hind-marginal regions; central spot small, lunate, dusky; beyond it is a slender, curved and indented, transverse smoky-brown line, beyond which the hind margin becomes gradually darker smoky-brown; cilia white. Body dirty greyish-white; anal tuft dull ochreous; legs dark brown barred with white; leg-tufts tinged with reddish-brown.

As already intimated, the form which it has been necessary to use for description, if any markings were to be described at all, is not the most frequent in this country, that which is so being almost devoid of markings and nearly unicolorous shining dark smoky-brown or brown-black; yet in almost every example some of the markings exist, the whitish dots of the reniform stigma and the subterminal line being the most constant, and the rest showing themselves in ever varying degrees. In the collections of the late Mr. F. Bond and Dr. Mason are specimens of a paler ground colour in which the markings are thrown into far greater distinctness. In the former collection, now at Dover, is another specimen very strongly blotched with three long pale stripes lengthwise, partly obliterating the usual markings. But by far the finest variety that I have seen was obtained near Harwich, Essex, by Mr. G. F. Mathew, R.N. In it the orbicular and reniform stigmata are both yellowish-white; the ground colour almost pale grey with distinct black blotches, one near the base of the dorsal margin, one larger, near the middle of the wing, uniting the first and second lines, and several along the subterminal line, these last very velvety. It has a

wonderful likeness to the variety *remissa* of *Apamea gemina*. A very similar but darker specimen has been found in Suffolk this summer by the Rev. C. T. Cruttwell.

On the wing from the end of June till August.

LARVA stout, cylindrical, the segments plump, moderately well-defined, and puckered on the sides with short wrinkles, the spiracular region forming a puffed ridge along the eleventh and twelfth segments; prolegs short, thick, placed well beneath the body; head glossy, bright reddish-brown; dorsal and anal plates and legs similar; body glossy, glaucous, greenish-grey, some parts along the sides at intervals dark and translucent, displaying a little of the internal anatomy; dorsal line visible as a pale pink dorsal vessel; raised dots small, faintly deeper grey, slightly roughened and having each a minute central reddish-brown dot and a fine hair.

When younger, rather shining flesh-colour, palest on the thoracic segments, clouded with dull purplish-brown with the head, plates, and raised dots shining red-brown. (W. Buckler.)

September(?) to June, on *Poa maritima*, *P. distans*, *P. Borreri* and other grasses growing in, or at the edges of, salt marshes; feeding at night; hiding during the day under stones or rubbish on the ground, just above tide-mark. Mr. Buckler says that it may be found wherever these grasses grow along sea-banks, the margins of tidal rivers, salterns, muddy creeks, and salt-water ditches; also that he found three or four examples by turning over large numbers of stones, with much labour. The larvæ had made their way quite underneath the stones, forming a small chamber among the matted grass.

PUPA of the usual form, wing, leg and antenna covers roughened with fine sculpture; front of each abdominal segment also roughened with minute punctures; cremaster flattened and terminated by two pointed spines; general colour bright red, becoming in time more purple-brown;

cremaster black. In a silken cocoon under a stone in the place where the larva has hidden.

The moth hides itself in the daytime on the ground among grass or under *Atriplex* or other herbage; and flies at rather late dusk, visiting the flowers of thistle, scabious, *Silene inflata* and other plants; it is also strongly attracted by sugar when placed upon the leaves and stalks of thistles or other prominent herbaceous plants, continuing to arrive till 11 P.M., settling down very quietly on the sugar, but not always easy to find, as it will crawl into the middle of the plant. Apparently almost confined to the coast, the estuaries of tidal rivers, and valleys which open out to the sea, but its favourite haunts seem to be the embankments raised to keep the sea out of low-lying grass lands, which in earlier times have been salt marshes. In such situations, in some years, common on the coasts of Kent, Essex, Suffolk and Norfolk; also found on those of Sussex, Hants, Dorset, Somerset and Cornwall, and in Gloucestershire, Herefordshire, Lancashire, Yorkshire and Durham. It seems, moreover, to be found occasionally in the Cambridgeshire and Huntingdonshire fen district, especially near Monks Wood, Hunts; and has been taken very rarely in Warwickshire. The only record which I find in Wales is in Flintshire; in Scotland, strange to say, it has occurred in Moray and in the Shetland Isles, but I know of no other records. In Ireland it has been found at Howth and abundantly at Waterford; also at Dunleer, Louth; and in the meadows at the top of Belfast Lough.

Abroad its range is very extensive: Southern and Western France, Holland, South Sweden, North Germany, Russia, Asia Minor, Armenia, Tartary, and the mountain regions of Central Asia.

2. **H. anceps**, *Hüb.*; **infesta**, *Tr.*; **sordida**, *Staud. Cat.*
—Expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inch. Fore wings narrow, yellowish-brown, marbled with darker brown; costa dappled with

black clouds; upper stigmata both large, pale, the reniform projecting a yellow dash from its centre; hind wings dusky white, bordered with smoky brown.

Antennæ of the male threadlike, but ciliated with exceedingly minute tufts of bristles, light brown; palpi rather small, whitish-brown, darker at the sides, apical joint rather prominent and tipped with brown; head and thorax yellowish-brown; the collar faintly barred and edged—and the shoulder-lappets edged—with darker brown; crests extremely short and obscure; fascicles dirty-white; abdomen whitish-brown, the basal segments abundantly covered with long white scales, among which are two or three very small dorsal crests tipped with dark brown; lateral tufts small and obscure; anal tuft narrow, dusky-yellow. Fore wings rather narrow; costa hardly curved except toward the apex, which is bluntly rounded; hind margin also rounded, not very oblique, rather short, faintly crenulated and having a small hollow just above the anal angle; dorsal margin straight; colour yellowish-brown, marbled with brighter and darker browns; basal line faintly indicated in broken brown streaks, first line very obscure and not readily perceptible, but consisting of long brown angles between the larger nervures; second line more noticeable, not very oblique, brown, edged outwardly with pale drab; subterminal line only perceptible as a meandering series of pale curves forming in the middle a short broad **W**, sometimes bordered inwardly with faint reddish clouds, and usually outside by an indented darker brown hind-marginal stripe; orbicular stigma oblique, large, rather ovate, pale drab; reniform stigma large and erect, yellow-brown, clouded in its lower portion with dark brown and leaden-grey, and emitting from its centre a horizontal yellow-brown dash; these two stigmata both edged with black dotting, and the space between them red-brown; claviform stigma broad, obscurely reddish-brown; nervures dusted with black; between the second and subterminal lines is frequently a broad unmarbled band of the pale ground colour, or else some patches

of the same in the darker clouding; along the costal margin, so far as the reniform stigma, is a series of cloudy black spots, beyond this three pale yellow dots; extreme hind margin edged with black lunules; cilia dark brown, dashed with yellow and with a yellow line along the base. Hind wings dusky-white, with a sheen of golden green along the costal margin; nervures smoky-brown; hind margin broadly clouded with smoky-brown, in which is a white bar above the anal angle; cilia white, divided in part by a smoky-brown line. Female extremely similar, but with the body stouter.

Underside of the fore wings brownish-white; discal cell filled with long downy scales; reniform stigma smoky-brown, followed by a dash of the pale colour which is edged with smoky clouding, and this bounded by a smoky black transverse line, beyond which is another; nervures edged with brown and conspicuous. Hind wings white, dusted, on the costal half especially, with light brown; nervures similarly dusted; central spot very small, smoky-black. Body and legs whitish-brown; tibiæ umbreous, barred with yellowish-white.

Usually not variable, or only slightly so in the depth and extent of brown marbling and markings on the fore wings; but a specimen was exhibited at one of the meetings of the South London Entomological Society, by Mr. Oldham, which had a curious curved white streak from the reniform stigma running into the apex of the wings.

On the wing in June.

LARVA pale brown with an obscure darker dorsal stripe and two similar stripes on each side; four black dots on each segment; under the side stripes on each segment, at the back, a more oblique darker streak; head, dorsal plate and anal flap black-brown (Bkh.). This is the only attainable description. The late Mr. Buckler says, in a private letter to Mr. J. Gardner, that Mr. J. E. Robson sent him young larvæ which had been reared from the egg; that he fed them to full growth

on lettuce, and that one went to earth in November, but that no moth emerged. In accordance with his strict rule he did not place the figures which he took of these larvæ with those which he had fully worked out, and although careful search has been made among his drawings in the possession of the Ray Society these cannot be found. He states, however, that the larva is remarkably like that of *Apamea basilinea*, and this statement has been confirmed by the circumstance that the Rev. H. H. Crewe, long ago, reared a specimen from a larva which he could not distinguish from that of *A. basilinea*.

Apparently from July to probably March or April, on grasses, but too little is really known of its habits to admit of a positive statement.

PUPA undescribed.

The moth hides in the daytime on the ground among herbage, or under any sufficient concealment, sometimes even in thatch, but has been known in intensely hot weather to fly to flowers in the sunshine. At dusk it flies freely, comes readily to sugar and to blossoms of *Silene inflata* and other flowers.

Moderately common throughout the southern half of England, becoming very rare in the Northern Midlands, yet in some years abundant in Lancashire, Cheshire and Durham, and widely distributed in Yorkshire. Perhaps on the whole most common toward the coast. Also probably throughout South Wales, since it is not rare in Pembrokeshire. In Scotland it is found in the Clyde Valley, locally in the eastern districts to Moray, and much more rarely inland to Perthshire and Inverness; also present in the Shetland Isles. In Ireland the only specimen observed appears to be one which I took at Malahide, near Dublin, on July 4, 1860. This example, which is still in my possession, is quite unusually pale in colour. Abroad its range is rather more southern—Central Europe, Northern Italy, South Sweden,

Northern and Eastern Turkey, the Ural Mountain district, and Armenia.

3. *H. furva*, *Hüb.*—Expanse $1\frac{1}{2}$ inch. Fore wings rather narrow, dull brown marbled with darker; markings very obscure; subterminal line yellowish-white; outer edge of reniform stigma spotted with white; hind wings dusky-white, broadly clouded behind with smoky-brown.

Antennæ of the male simple, minutely ciliated, dark brown; palpi rather short, broadly tufted, dark brown, apical joint minute; head and thorax tufted, dark brown dusted with white and with black, the lower half of the front of the collar paler brown; top and back crests small and neat; fascicles smoky-white; abdomen glossy dark brown, upon its dorsal ridge are from two to four minute oblique black-brown crests or tufts; lateral and anal tufts broad and spreading. Fore wings somewhat narrow; costa very straight, apex rather suddenly rounded; hind margin oblique, crenulated, faintly excavated at the anal angle; dorsal margin straight; colour dull umbreous, dusted and mottled with dark umbreous and black; all the markings very obscure; basal line broken into cloudy black streaks, one of which is spread along the base of the dorsal margin; first line perpendicular, deep black, arranged into strong curves and angles; second line a more indistinct row of short black curves placed less obliquely than usual and followed by a parallel row of black dots or streaks on the nervures, the enclosed narrow space being paler brown; subterminal line complete, dusky-white or yellowish-white, very slender, much indented, and formed in the middle into a flat **W**; orbicular stigma obscure, faintly edged with white and enclosed at front and back by short black lines; reniform stigma also obscure, edged inwardly with black, but outwardly by a curved row of white dots, more or less visible; clavi-form stigma hardly indicated; costa sparingly dotted with yellowish-white; extreme hind margin edged with black lunules or small triangles, outside which are two parallel,

slender, undulating lines, the inner dull yellow, the outer black; these lie along the base of the cilia, which are dark brown dusted with dull yellow. Hind wings not broad, brownish-white, shading off to a dark smoky-brown cloud which fills the hind marginal area; central spot and nervures obscurely dark brown; cilia crenulated and having along the base a distinct undulating yellow line, edged by a parallel line of smoky-brown; the tips white. Female rather stouter, but accurately similar.

Underside pale umbreous, shading off to greyish-white at the hind margin, and to pearly-grey on the dorsal margin; reniform stigma dusky-white, closely followed by a dark brown transverse stripe, and this after a pale interval by another. Hind wings dusky-white, broadly dusted along the costal margin with dark brown; nervures and hind margin similarly but more minutely dusted; central spot dusky-black; beyond it is a curved, slender, wavy, dark brown transverse line fading out before it reaches the dorsal margin; hind margins of all the wings distinctly edged with black lunules. Body pale brown, dusted with smoky-brown; legs dark umbreous, barred with dull yellow; leg-tufts and anal tuft dark smoky-brown; from the base of the abdomen, in the male, spring two long curved tufts of yellow hairs, which meet beneath.

Hardly variable, except that it becomes more richly coloured and darker in the North of Scotland, and very black in the West of Ireland.

On the wing in July and August, even in September in the North.

LARVA moderately stout, nearly uniform in thickness, except that the first and last segments are a little smaller; head full and rounded, lobes well defined, jaws large; segments of the body plump, distinct at the divisions; general colour of the body light and rather shining pale flesh colour, almost light drab on the thoracic segments, melting gradually

thence to a more warm pink tint except the under-surface which is pallid; down the middle of the back can just be seen, deep beneath the surface of the skin, a faint appearance of a pinkish-brown dorsal vessel, gently pulsating; head very glossy, dark brick-red with a few fine hairs, upper lip flesh-colour, mouth dark brown; across the second segment is a broad glossy plate, reddish-brown, rather brighter than the head, its front margin slightly waved and boldly defined with very dark brown, the semicircular hind margin distinctly edged with similar dark brown; between this plate and the head is an interval of pale skin; anal plate glossy, light reddish-brown edged with dark brown; raised dots rather small, smallest on the middle segments, dull reddish-brown, each bearing a hair; spiracles small, oval, black; legs reddish-brown; prolegs fringed with dark brown hooks.

The newly hatched larva is dirty white, with dark brown head, plates, and minute dots; in two months it becomes of a light pink, with head, plates, and raised dots of the same colour, but shining; in the spring after hybernation it is dirty white or pale drab, or pink, the head, plates, and spots brownish-red or pinkish-brown as before. From this it rapidly assumes the adult colouring.

September to June on grasses—*Poa trivialis*, *P. nemoralis*, and *P. annua*—the very young larvæ hiding themselves at once, on emergence, at the base of a tuft of grass, and spinning together the earth, rubbish, and grass roots for protection; towards the winter they construct smooth, silk-lined, oval nests or chambers among the grass roots; here they pass the winter, coming out in mild weather to feed, when they eat away the grass shoots close to the root; but when feeding up in the spring they occupy during the day less carefully constructed nests, being mere dome-covered hollows, out of which they proceed every night to feed, generally as before close to the grass roots, but occasionally on the panicles of seeds. (Adapted from Mr. W. Buckler's very full description.) Mr. J. Dunsmore, when collecting the larvæ in

Scotland to supply Mr. Buckler, wrote me, "the larva feeds on rank grasses on an old wall. When you turn over the top stones you observe them feeding all round the edges."

PUPA moderately stout, of the usual form; close below the ends of the wing-covers the abdomen begins gradually to taper, and there the two free segments are more deeply cut than those behind them; the tip has a blunt prolongation furnished with a central pair of straight pointed spines, and farther apart, outside them, another pair, thinner, shorter, and curved a little outwards; the colour of the tip and spines is black; of all the rest deep rich red-brown, the whole surface, with the exception of a narrow band of punctures across the front of the more prominent abdominal rings, very glossy. Assuming this state loose in the peaty soil underneath the grass, without making any cocoon whatever. (W. Buckler.)

Doubtless the moth hides by day among grass on the ground or in chinks of rocks. It flies at dusk, is strongly attracted by flowers of ragwort, thistle, wild thyme, guelder-rose, and *Scabiosa columbaria*; and comes eagerly to sugar dropped upon leaves of plants in its mountainous or rocky haunts, flying all night, and continuing to attend at the feast till morning. Mainly attached to rocky districts, both on the coast and inland, and to mountains, on the latter sometimes abundant. Usually a northern and western species, but it has been taken rarely in Sussex; not rarely on Dartmoor, Devon, and has even been found at Devonport and at Whitsand Bay, Cornwall; also in Somerset and Gloucestershire, and in Shropshire; widely distributed in Yorkshire, Westmoreland, and Cumberland. In Wales it is sometimes abundant on the mountains, especially those of limestone formation in the neighbourhood of Llangollen; but in all probability in suitable places throughout the Principality, since I have found it casually even at Pembroke. In Scotland it occurs near Edinburgh, in Aberdeenshire,

Morayshire, Ayrshire, and apparently all the hill districts of the West of Scotland, and in the Hebrides, Orkneys and Shetland Isles. In Ireland on the Hill of Howth near Dublin, in Wicklow, Louth, Londonderry, Donegal, Armagh, Carlingford, and Sligo. Abroad in many parts of Central Europe, especially the regions of the Alps and Pyrenees. Finland, Southern Russia, Eastern Siberia, Armenia, and the mountain regions of Central Asia.

Genus 33. **XYLOPHASIA.**

Antennæ cylindrical, almost naked; eyes naked, with nearly prostrate lashes at the back; thorax slightly crested at the top and back; abdomen with one to five crests; fore wings elongated, rather pointed; hind margin slightly crenulated; hind wings broad, vein 5 very slender and curved back at its origin.

LARVÆ stout, shining, but of plain dull colouring, raised dots shining and conspicuous; hiding by day at the roots of plants.

PUPÆ subterranean.

We have six species, a table of which may be useful:

A. Subterminal line indistinct.

B. Fore wings whitish-ochreous, nervures thickened.

X. lithoxylea.

B². Fore wings reddish-ochreous, surface smooth.

X. sublustris.

B³. Fore wings pale reddish-brown with dark hind margin;
or dark purple-brown.

X. rurea.

A². Subterminal line distinct.

C. Subterminal line much toothed, with a distinct **W**.

X. polyodon.

C². Subterminal line waved.

D. A black streak from the middle of the base.

X. hepatica.

D². A dark streak at the base of the dorsal margin.

X. scolopacina.

1. **X. lithoxylea**, *Fab.*—Expanse $1\frac{3}{4}$ to $1\frac{7}{8}$ inch. Fore wings long and rather pointed, the nervures thickened, whitish-ochreous, clouded behind with darker ochreous; transverse lines scarcely perceptible; hind wings white with a smoky border.

Antennæ of the male simple, faintly ciliated, pale brown; palpi rather small, pale drab, tinged at the sides with chocolate-red, apical joint slender but distinct; head pale drab with a bar of bright chocolate on each side beneath the antennæ; collar pale drab tinged above with red, and having a slender central bar of chocolate-brown; shoulder-lappets whitish-drab dusted along the edges with red atoms; rest of the thorax similar, crested at the top and back, all the tufts tipped with red-brown; fascicles long, white; abdomen very pale wainscot-brown or whitish-drab with a dorsal row of pinkish-brown crests on the anterior segments and sometimes with the middle segments and the anal tuft tinged with pale chocolate; lateral tufts tinged with red. Fore wings long and rather pointed, nervures thickened and rib-like, and rendered conspicuous by a white edging; costa very faintly curved; apex suddenly and bluntly rounded; hind margin oblique, slightly rounded, crenulated and below the middle suddenly hollowed in two scallops reaching to the anal angle; dorsal margin gracefully curved and hollowed; colour whitish-ochreous clouded considerably with pale wainscot-brown and almost without definite markings; basal line only suggested by faint brown streaks on the costa and median nervure; first line hardly more perceptible, but in some individuals complete as an extremely slender series of long angles, which, however, usually only represent themselves as faint longitudinal brown lines; second line indicated by a double row of pale chocolate dots on the nervures; subterminal line absent but its position partly

indicated by the waved edge of a series of hind-marginal chocolate clouds, those in the middle showing faint indications of a drab **W**, above and below which are also pale chocolate streaks on the nervures and several leaden streaks between them; in the middle of the wing is a brown cloud near the costa, and nearer the dorsal margin a sharp dark-brown streak; costa obliquely spotted with rusty-brown; cilia pale brown, scalloped and edged with chocolate. Hind wings brownish-white with browner nervures and a broad cloud of brown atoms near the hind margin, along which are three or four brown spots; cilia yellowish-white. Female decidedly stouter, otherwise similar.

Underside of the fore wings whitish-drab dusted with light brown, the dorsal region pearly white, the nervures in the hinder portions swollen as on the upper side; along the extreme margin is a row of black-brown wedges. Hind wings yellowish-white faintly dusted with pale brown, more so upon the nervures, which are thus rendered conspicuous; the cross-bar enclosed in a large lunate brownish central spot; toward the hind margin a series of dots upon nervures indicates a slender brownish transverse line; a few more dark brown dots lie along the extreme hind margin. Body and legs whitish-brown; leg-tufts tinged with purple-red; front tibiæ umbreous barred with pale yellow.

Hardly variable except in a small degree in intensity of markings.

On the wing in June and July.

LARVA cylindrical, tapering a little from the third segment to the head and from the eleventh to the anal extremity; third and fourth segments subdivided by transverse wrinkles, the others plump, well-defined, and puckered a little along the sides; the usual raised dots large, black or black brown; head and dorsal and anal plates lustrous, black or brown-black; skin of the body tough, smooth, and shining, ground colour brownish-grey slightly tinged with fawn-colour and

with green, a very little paler below the spiracular region; under-surface faintly tinged with dull green; dorsal pulsating vessel of a deeper tint of the ground colour than the back; upper lip rather dark fawn-colour; the antennal papillæ a little paler; anterior legs fawn-colour tipped with blackish; spiracles black. When very young pinkish-brown, head, plates and raised dots whitish. Very little change of colour seems to take place for several months, but before its quite settling down to hibernate the head, plates and spots become black. From this there is but little alteration till full growth. (Adapted from Buckler.)

October to May on grasses such as *Poa annua*; feeding upon the whitish portions just above the roots at night, hiding during the day in a chamber formed by itself, and lined with silk, among the roots of the grass; hibernating in such a chamber but coming forth to feed whenever the weather is mild.

PUPA of the usual *Noctua* form, but elongated and very blunt in front—almost flattened, and produced in the front of the head into a slight knob; wing and limb-cases brightly polished and very smooth, with only faint traces of sculptured lines; antenna-cases sculptured with cross-channels; dorsal segments glossy but more distinctly marked with fine punctures; abdominal segments brilliant, but the front edge of each sculptured with distinct pits in a narrow band, and the hinder edge also banded, but smooth and hoop-like, general colour red-brown; cremaster rather large and long, black, provided with two curled-down bristles. Mr. Buckler gave no definite description of this pupa, but fortunately he gave me the pupa-skin from which he had reared a moth, and from this a description is supplied. It does not appear whether any cocoon is formed, but the pupa state is assumed among the roots of grass.

The moth may occasionally be seen in the daytime sitting with its wings drawn down into a very steep roof, upon a

post or fence, and its resemblance to a chip of wood, newly cut off, is then seen to be most remarkable. Usually, however, it conceals itself among grass or herbage close to the ground; but flies at dusk and is then conspicuous from its pale colour. It comes freely to sugar, honey-dew and other sweets, but not very often to light. Common throughout England and in some districts abundant; also doubtless throughout Wales, since it is plentiful in Pembrokeshire. In Scotland it seems more attached to the eastern side of the country, and is found so far north as Moray; but the wet and mountainous western districts do not appear to suit it, and no record seems to exist of its appearance north of the Clyde Valley. In Ireland it is fairly common and generally distributed. Its range abroad is through Central Europe, Northern Italy, Dalmatia, Asia Minor, and the mountain regions of Central Asia.

2. **X. sublustris**, *Esp.*—Expanse $1\frac{5}{8}$ to $1\frac{7}{8}$ inch. Fore wings smooth, the nervures not thickened; light yellowish fulvous, with two chocolate clouds in the middle, and two similar blotches on the hind margin; hind wings dusky-white tinged behind with fulvous.

Antennæ of the male simple, ciliated, light brown, the ciliations red-brown; palpi rather small but broadly tufted, pale chocolate, apical joint pointed, white; head dull pale chocolate-brown; a tuft of similar scales at the base of each antenna; collar upraised, pale reddish-brown, slenderly barred in the middle with black-brown; remainder of the thorax loosely scaled, paler reddish-brown, crests loose and obscure but tipped with deeper red; fascicles reddish-white; abdomen dull pale reddish-ochreous; dorsal crests small and obscure, light chocolate, much hidden by abundant long hair-scales on the basal segments; lateral tufts small, anal tuft large, pale chocolate. Fore wings rather narrow and pointed, smooth from the nervures not being swollen; costa rounded; apex very bluntly angulated, almost rounded; hind margin

slightly crenulated, not very oblique, but rounded off more toward the anal angle; dorsal margin nearly straight; colour dull ochreous-brown or yellow-fulvous, without definite markings; no indication of the basal and first lines except in unusually well-marked specimens, when the former is seen to consist of two faint reddish loops, and the latter of a series of extremely faint reddish-brown angles between the large nervures; second line generally perceptible though usually not attaining either margin, a series of faint red-brown crescents with their points running out upon the nervures and there tipped with darker dots; subterminal line only faintly visible under a lens as a rather paler series of V-like angles; outside this is a cloudy triangle of red-brown or purplish-brown above the middle, and another, smaller, close to the anal angle; in the centre of the wing is an oblique and broadly angulated chocolate-brown transverse cloud, often appearing more like two large cloudy blotches; on either side of it is sometimes a paler indication of the upper stigmata, both oval and flattened but hardly outlined; costal margin much clouded with pale chocolate streaks, and having toward the apex three or four pale yellow dots; cilia purple-brown, dashed at each crenulation with darker. Hind wings smoky-white, abundantly dusted beyond the middle with ochreous-brown; nervures darker brown; central spot large, elongated, smoky-black, followed in the middle of the wings by a slender, smoky-brown, transverse shade, in which the nervures are rusty-brown; cilia crenulated, concolorous, but tipped with white. Female rather paler in the ground colour and with the markings slightly more noticeable, otherwise similar.

Underside of fore wings light purple-red, brighter toward the apex and hind margin; dorsal region pearly yellowish-white; nervures paler. Hind wings yellowish-white, with the whole costal and apical region broadly dusted with purple-red; central spot small, dusky black; beyond it is the faintest possible indication of a pale red transverse line.

Body legs and leg-tufts pale chocolate-red; tibiæ faintly barred with paler.

Hardly variable, except that the cloudy chocolate markings are sometimes very faint, the fore wings consequently almost unicolorous yellow-brown. In North Lancashire specimens are found in which the fulvous tints are replaced by purplish-brown and drab.

On the wing in June and July.

LARVA not described. It is said to be similar to that of *X. lithoxylea* but of a redder colour.

PUPA said to resemble that of *X. lithoxylea*, but to have a stouter cremaster with four bristles.

The moth is rarely seen in the daytime. It doubtless hides among grass and herbage or under dead leaves on the ground. It flies at rather late dusk, and comes readily to sugar and to light. Apparently, it is principally attached to chalk and limestone districts, especially on the coast, though it is common enough in beech woods on chalk hills inland. It formerly occurred at Hampstead, North London, but has doubtless been expelled by the prevalence of buildings. Abundant on the coast of Kent and also in the beech woods of Oxfordshire, Berkshire, Wiltshire and Bucks; common also on the Dorset coast, less so inland; rare in Devon, local in Somerset and Gloucestershire; also found, though not abundantly, in Huntingdonshire, Cambridgeshire, Suffolk, and Norfolk, and rarely in Lincolnshire, Yorkshire, Worcestershire and Lancashire, but apparently not noticed in the Midlands nor further north than Yorkshire; and I have no record in Wales. Much more generally distributed in Ireland, formerly common in the outskirts of Dublin; also recorded from Galway, Sligo, Westmeath, King's County, Tipperary, Wicklow, and Tyrone, and in some of these districts abundant. Abroad its range seems to be restricted to France, Holland, Germany, and Central and Western Russia.

3. **X. polyodon**, *L.*; **monoglypha**, *Staud. Cat.*—Expanse 2 inches. Fore wings brown in all shades of umbreous to brown-black, usually marbled with white and whitish-brown; stigmata large, pale; lines much indented, edged with white; a large white **W** in the subterminal; hind wings pale brown or brownish-white.

Antennæ of the male simple, minutely ciliated, dark-brown; palpi small, narrowly tufted, pale chocolate, apical joint minute, paler brown; head very pale purplish-brown, slenderly barred in front with chocolate and deeply spotted with the same at the sides, collar pale drab dusted with purple-brown and slenderly barred in the middle with black-brown, behind this is a fainter, parallel, purple-brown bar, shoulder-lappets much uplifted, pale brown striped on each side with chocolate or black-brown; remainder of thorax drab, dusted with purple-brown; top and back crests conspicuous and barred or faintly edged with the same colour; fascicles white, abdomen drab or pale brown, basal segments abundantly covered with long pale scales; dorsal ridge ornamented with four or five oblique crests which are barred with brown; lateral and anal tufts spreading, reddish-brown, the side portions of the latter opening out at times broadly, like a fan. Fore wings long, narrow at the base, pale brown or whitish-brown, marbled with various shades of brighter and darker umbreous-brown; basal line limited to two slender angulated black streaks, beneath which, arising from the middle of the base, is a somewhat indented black longitudinal line, and below this, close to the dorsal margin, another; first line obscure, oblique, brown or black, formed into very long and broad angles between the principal nervures, and often edged inwardly with white; second line more distinctly black, edged with white, oblique, curved and arranged into numerous crescents which form produced angles at their junctures on the nervures, and very often black points or dots beyond them; subterminal line rather broken and obscured, white or brownish-white, waved, indented and

extended in the middle into a large broad **W**; from this and the other angles of this line long black or brown-black wedges or arrow-heads run inward, while the outer side of this line is broadly clouded with dark brown or brown-black; orbicular stigma very large, ovate, oblique, sometimes quite elongated, drab or pale brown, edged with black; reniform stigma very large, less distinct, edged inwardly with black, outwardly with a broken whitish-brown obscuration which often assumes a similar shape; the central space around these stigmata is often filled in with dark brown, which forms a central band attaining the dorsal margin; costa beyond the middle dotted at intervals with white; extreme hind margin edged with flattened black triangles; cilia rather crenulated, pale brown dusted with dark brown and dashed with dull yellow; a line of this last colour lies along their base. Hind wings very dusky, smoky-white at the base, shading into smoky-brown in the middle; the whole hind-marginal region filled with a smoky-brown cloud which is preceded by a faint similar slender line; central spot large, pale smoky-brown; nervures similar; hind margin slightly crenulated, edged with an undulating black line; cilia dusky white with the base yellow.

Underside of the fore wings pale umbreous or pale reddish-brown, dorsal region pearly-white; reniform stigma forming a large black-brown crescent; beyond it is a slender dark-brown transverse line followed by a similar broad band, notched below the costal margin. Hind wings dusky-white, abundantly dusted along the costal and hind-marginal regions with light umbreous; central spot rather round, smoky-black; beyond the middle is a slender smoky-black transverse line, dotted on the nervures; a smoky-black cloud lies before the hind margin. Body and legs light-brown; leg-tufts pale purplish-brown.

Always and everywhere variable as already described, in the shade of ground colour and depth of markings, especially of the central cloudy band; in southern districts often blotched with white before the apex and hind margin, or

having a large flat white triangle close to the anal angle, which more rarely extends itself into a white stripe along the dorsal margin. Northward and westward an opposite tendency shows itself, the colour becoming more uniformly umbreous, sometimes absorbing the central dark shade, in others giving it a blacker tint; and the general colour becomes intensified in various degrees until a deep rich black is attained, which, in some individuals, occupies the entire surface of the fore wings; in others is blotched with brown, or assumes various shades of rich black-brown; in the majority the pale edges of the transverse lines are visible, and in a still larger number the **W** in the subterminal line—indeed, this is sometimes traceable when the rest of that line has disappeared—but, as already remarked, there are specimens smoothly-black without even this relief. These black varieties in various degrees seem to commence to appear in the northern Midlands, and are common in South Yorkshire, while in the Scottish mountain districts they become predominant, though the brown forms are never absent. Some of the most beautiful of the aberrations are found in Sutherlandshire—velvety-black-brown, or with the central band and marginal cloud black, and white transverse lines in a rough umbreous surface; purplish brown with pale lines; and in one specimen belonging to Mr. F. J. Hanbury there is even a tinge of grey in the brown. This is the only specimen of this species which I have ever seen having any tinge of *grey* in its colouring. An example in the collection of Mr. Robert Adkin, otherwise of the uniform dull umbreous variety, has conspicuous whitish-brown blotches before the apex and anal angle, and is of a very unusual appearance; it is from the south of Scotland. In the north of Ireland specimens of dark red-brown and chocolate colour are found with those of uniform umbreous; in the west of that country the vast majority are dark-brown shading to black, but everywhere accompanied by the more normal forms. Occasionally, though rarely, an individual is met with of not more than

two-thirds the size of ordinary examples, and with proportionately narrower fore wings. This variety has a curious parallel in *Triphæna pronuba*.

On the wing in June, July and August, and very casually, as a probably second generation, in September, more certainly so in October and November of years in which the autumns have been very warm.

LARVA stout; its skin shining, smooth; head very glossy, black-brown, black, or purplish-red; dorsal and anal plates similar; usual raised dots large and conspicuous, brown or black, each with a single fine hair; upper lip greyish-brown; body grey, brownish-grey, or reddish-grey, or even pale grey, faintly banded with darker, or with reddish-grey, on each segment; within the area of the trapezoidal dots on the back of each segment from the fourth to the twelfth are six pale grey marks—namely, a pair of transverse, short, curved and pointed streaks, with their broad bases separated only by a mere line on the middle of the back, and rather close behind them four round dots which range in a transverse row between the hinder pair of the usual raised dots; below the spiracular region the general colour is paler; spiracles black, or grey outlined with black; legs greyish-brown, spotted and tipped with black; the black spots on the side of the third and fourth segments sometimes vary both in number and shape.

Another variety has the dorsal surface dark purplish-grey, changing gently along the spiracular region to dingy brownish-red on the undersurface, the head purplish-red. (W. Buckler.)

August or September to June on grasses, eating the grass-stem just above the roots; inhabiting a small chamber among the grass roots in the daytime, in the same manner as *X. lithoxylea*; feeding at night.

PUPA very similar to that of *X. lithoxylea*, but stouter, and having a broader and shorter, rather tapering cremaster. (Buckler.) Subterranean.

The moth sits by day on posts, fences, palings, walls, anywhere in which it can push its head into a corner and fancy itself hidden, also in far greater plenty among grass, herbage and dead leaves on the ground. At dusk it flies vigorously, and greedily resorts to every description of sweet available, indeed, at sugar it is in some seasons a terrible nuisance, covering the surface with its numbers, dashing down upon and dislodging any less abundant moth, almost, if not actually, fighting with its companions for possession of the coveted feast. It sits usually with its wings raised and slightly quivering, ready to fly at the least alarm, and so occupies far more than its share of room upon the sugar patch; also when it flies off and sweeps round eager to return, challenges notice, and hinders the unfortunate collector in every possible way. Where red valerian or any other attractive flower is plentiful this moth is equally in evidence, and in its most abundant seasons it most decidedly is not a favourite with the eager collector.

Certainly one of our most abundant *Noctua*, occurring in almost equal numbers all over the United Kingdom, except, perhaps, in the Shetland Isles, where it appears not to be very common. Of the black-brown varieties the most southern locality yet observed seems to be Sheerness, Kent, where, however, but a single example has been met with—by Mr. J. J. Walker, R.N.—The Rev. E. Hallett Todd has found it in Leicestershire, and it is rare in Derbyshire, but in South Yorkshire, as already stated, it begins to be plentiful. Apparently it is a somewhat modern form of the species; at least it was considered a rarity in 1857, when Richard Weaver took eight specimens. So far as I know this variety is confined to the British Isles; but in its paler brown normal form the insect is plentiful all over the temperate portions of Northern Europe, and Central Europe, and is found in Spain, Northern Italy, Northern Turkey, Southern Russia, Asia Minor, Armenia, and Siberia.

(**X. Zollikoferi**, *Frr.*—In the *Entomologist*, 1870, the late Mr. Henry Doubleday stated as follows: “In the beginning of October 1867, Mr. Harding took a large *Noctua*, at Deal, which was unknown to me, but which I thought might be *Xylophasia Zollikoferi*, from M. Guenée’s remark that some authors had placed this species 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.”

This specimen is still in Mr. Doubleday’s collection at Bethnal Green Museum, and is in excellent preservation. The suggestion has been made that it is nothing more than a singular variety of *X. polyodon*, but with this view I do not find myself able to agree. It is a male, and of the size and breadth of fore wings of the female *X. polyodon*—that is, broader and fuller than in the male—its costal and dorsal margins are very broadly whitish-brown, as are the nervures and a stripe before the hind margin; the middle area and hind margin of a coarse dull umbreous; from the middle of the base is a black, longitudinal, rather sinuous streak one third the length of the wing; stigmata mere faint pale clouds hardly margined; no transverse lines except a cloudy indication of the subterminal, in which there is no indication of the usual sharply pointed white **W**, but in the place thereof very short, obtuse, obscure angles. Hind wings rather clear white, with distinct brown nervures and only a very narrow faint smoky-brown cloud before the hind margin. This appearance of the whitened nervures long basal streak and obliterated **W** on the fore wings, and white hind wings, gives the insect an altogether different aspect from that of any of the numerous known varieties of *X. polyodon*. It must be admitted, however, that it is quite as different from the figure of *X. Zollikoferi* in Dr. Hofmann’s work recently published; but, on the other hand, it agrees well with the examples of that species

in the British Museum. No other specimen seems to have occurred in this country, and supposing that Mr. Doubleday's example to be a genuine *X. Zollikoferi*, there can be little doubt, considering the very limited range of that species, that it was accidentally introduced, rather than a willing migrant.)

4. **X. rurea**, *Fab.*—Expanse $1\frac{5}{8}$ inch. Fore wings blunt, reddish-drab with a chocolate blotch at the base, two at the hind margin, and a larger one in the middle of the costa; or else dark purple-brown with dull yellow reniform stigma; hind wings smoky-brown.

Antennæ of the male simple, ciliated, dark brown; palpi short, broadly tufted, pale purple-brown, with the sides dark chocolate, apical joint slender and small; head tufted, pale brown, streaked and dusted with chocolate; collar pale red-brown, barred and edged with arched lines of chocolate-black, the intermediate spaces dusted with white; shoulder-lappets smooth, dark chocolate-red; rest of thorax pale brown, with small crests at the top and back, which are barred and tipped with chocolate; fascicles brownish-white; abdomen whitish-brown, basal segments obscured by long white hair-scales; dorsal ridge ornamented with four or five small chocolate-red crests; lateral and anal tufts light purplish-red. Fore wings rather blunt; costal margin gently curved; apex angulated; hind margin crenulated, oblique, more curved toward the anal angle; dorsal margin straight; colour pale reddish-brown or reddish-drab, clouded with chocolate red; the usual pattern of markings hardly perceptible, but there are vague indications of a first line in broad angles of reddish cloudy streaks or chocolate dots on the principal nervures; and of the usual second line in pairs of chocolate dots on the divided nervures; a white stripe lies along the dorsal margin, and touching it at the base is a short longitudinal deep black streak, often angulated; the costal portion of the middle area of the wing is occupied by a large chocolate-red cloud, in which may be perceived a long, narrow, almost battledore shaped, paler

orbicular stigma, and the whitish margins of an obscure red reniform stigma; beyond this the costal margin is obscurely dotted with white; along the hind marginal area is an interrupted series of long wedge-shaped clouds of chocolate-red, and at the anal angle a triangle of the same colour; extreme hind margin edged with black lunules; cilia long and distinctly crenulated, chocolate-red with paler dashes, the whole barred with darker red-brown. Hind wings dull smoky-brown; nervures hardly darker; cilia mixed pale brown and white, with an intersecting darker brown line. Female very similar, but the ground colour of the fore wings often rather whiter and the chocolate blotches more tinged with dark purple; body rather stouter, with small anal tuft.

Underside of the fore wings smoky light red; dorsal margin paler; nervures strongly expressed and pale-edged; reniform stigma a dark smoky cloud. Hind wings shining reddish-white, the costal region broadly light purple-red, dusted with darker; nervures dusted with brown; central spot lunate, black; hind margin edged with black lunules; cilia yellowish-red, tipped with white. Body and legs light purplish-red; tibiæ purple-brown, barred with white.

Along with the typical form as already described is found, apparently everywhere, though in the South far less commonly, a permanently recurrent variety known as *combusta*, having no trace of the ordinary ground colour, the thorax and fore wings being uniformly dull purple-red or liver-colour, with the markings scarcely visible, but the stigmata rather paler and the reniform slightly tinged with yellow; this form is more frequent in the north, and in Scotland in some districts becomes predominant, the colour also deeper, the nervures blackened, and the edge of the reniform stigma distinctly yellow or even orange. Another form, found more particularly in the South of Scotland, is extremely beautiful; it is in some degree like the type, but the ground colour is of a beautifully smooth silvery-white, shaded with ashy-grey, with the purple-brown clouds and blotches intensified, sometimes

even blackened, the dots of the transverse lines, or the first line itself, more distinct, and the reniform stigma yellow; but this form is not so constant as the var. *combusta*, and has occasionally a far more considerable marbling of purple-brown almost all over the fore wings; another variety much nearer to the type, and found in Aberdeenshire, has the fore wings so much suffused with rusty brown as to render the usual blotches less noticeable; and others varying to softer brown are found in this district, where also Mr. Arthur Horne finds extremely rich red *combusta* forms, and those tinged with silvery white. In Shetland and the Hebrides the latter form is intensified and accompanied by all variations to the darkest possible *combusta*, sometimes nearly black, in others quite of a chestnut colour. In Mr. P. M. Bright's collection is a specimen having the red blotch in the middle of the costa extended and intensified into a rich dark purple-red central band, the transverse lines also being visibly white. A pretty form found in Cumberland by Mr. G. Routledge also has the lines complete, but upon a pale grey ground; indeed, when the comparatively dull appearance of the typical and ordinary specimens of this species is taken into consideration, the beauty and silvery glossiness of some of the northern variations is surprising.

On the wing in June and July.

LARVA stout, cylindrical but tapering a little behind, second segment fully as broad as the rest, but the head narrower, rounded, smoky-black, very glossy, papillæ distinct; dorsal plate black, with three white longitudinal bars; body pale yellowish-grey above the spiracles, dirty-white below them; dorsal line distinct and complete, white, dorsal region on each side of it tinged with slate-grey; subdorsal line but faintly perceptible as a dusky thread; spiracular line dusky dark grey or brown; raised dots rather large, black, as also are the spiracles and pairs of dots below them; anal plate of the colour of the body; legs and prolegs greyish-white.

Or, head shining chestnut, dorsal plate still black barred with white, but general colour of the body light chestnut-red, with the under-surface, legs, and prolegs pale yellow-grey; dorsal stripe bluish-grey; raised dots brown; but spiracles and the pairs of dots below them still black, and a black anal plate divided with white at the dorsal line.

Or, ground colour of the dorsal region above the spiracles bluish slate-grey; dorsal line and all the surface below the spiracles dull pale greyish-green; head and usual raised dots, as well as the spiracles and their attendant spots, black; but a subdorsal line visible, dull yellowish-red. When younger this subdorsal line is more conspicuous; the ground colour bluish-grey and the dorsal and spiracular lines white.

August to April or May, on grass, feeding at night, hiding among the roots by day. When full grown rather fond of making itself a chamber under moss at the foot of a tree.

PUPA of very ordinary form, wing and limb covers and thoracic portion brightly polished and smooth; dorsal and abdominal segments rather broadly banded on the anterior margin with sculpture of minute punctures; general colour deep chestnut-brown, cremaster short and broad, with small lateral points and a pair of long hooked bristles of a darker brown. Under moss or rubbish on or under the ground.

The moth hides, like its congeners, among grass and herbage in the daytime, or occasionally on a fence or wall, or under any covert; flying at dusk and coming readily to sugar, also commonly flying along hedge-sides and lanes, and frequenting any attractive flowers, such as raspberry blossom. Common in all parts of the United Kingdom to the Shetland Isles and in many parts abundant; varying locally as already detailed. Abroad its range is very wide, Central and Northern Europe, Northern Italy, Southern and Eastern Russia, Eastern Siberia, Japan, the mountain regions of Central Asia; and also parts of North America, where it is known as *X. vultuosa*.

5. **X. hepatica**, *Hüb.*—Expanse $1\frac{5}{8}$ inch. Fore wings broad, pale or dark purple-brown, with a black basal streak, a large chocolate blotch in the middle of the costa, and smaller ones at the base and hind margin; hind wings dark smoky-brown.

Antennæ of the male simple, very faintly ciliated, red-brown; palpi rather short but broadly tufted, pale brown with the sides dark chocolate, terminal joint minute; collar pale brown toward its base, with a long curved black bar across its middle, and above this a broad bar of purple-brown edged with pale brown; shoulder-lappets purple-brown; remainder of thorax lighter brown, the rather short top and back crests chocolate tipped with pale brown; fascicles brownish-white; abdomen light brown, much covered with long pale hair-scales having darker tips; a dorsal crest on each segment except the anal, all dark chocolate and the third and fourth the most conspicuous; lateral and anal tufts spreading, pale purplish-brown. Fore wings rather blunt; costa gently curved; apex suddenly rounded, almost angulated; hind margin rounded and crenulated but slightly hollowed just above the anal angle; dorsal margin nearly straight; colour pale brown more or less shaded and clouded with chocolate-brown or purple-brown; at the base is a short black horizontal streak, and below it, near the dorsal margin, another, both edged with chocolate; basal line double but scarcely noticeable, purple-brown, but limited to two pairs of small curves near the costa; first line incomplete, black, preceded by an obscure, rather distant duplicate, but only forming three curved streaks; second line more obscure, hardly perceptible, but when present composed of a series of flat curves or streaks of cloudy black between the nervures, and throwing off upon them, at some distance, a row of black dots often placed on pale streaks; subterminal line merely the pale margin of a series of purplish-brown clouds pointing inward; it is waved and indented, but less so than is usually the case and forms a very flat **W** close to the anal angle, but

only a **V** in the middle; orbicular stigma ovate, prostrate, strongly black-edged except at the upper side; reniform stigma obscure, hardly complete, edged inwardly by a straight, deep black, perpendicular line which sometimes is double, and has at its lower corner one or two white dots, outwardly it is pale brown and scarcely margined; claviform stigma a short obscure black loop; space from the costa to the two upper stigmata, and often the entire central band, dark chocolate or chocolate red, and sometimes the further space from the second to the subterminal line similarly suffused; on the costa to the middle are cloudy black spots, beyond this several minute brownish-white costal dots; middle of the hind margin and also the anal angle clouded with purplish-black and edged with minute black triangles; cilia dark chocolate with a dull yellow dash in the middle of each crenulation. Hind wings rounded, with the margin crenulated, pale smoky-brown, darker or black-brown toward the hind margin; cilia yellowish-white, clouded, and divided by brown lines. Female similar but usually of the more suffused purple-brown colouring.

Underside of the fore wings dull pale smoky-brown; nervures distinctly marked; reniform stigma blacker and followed by an incomplete, dull, black-brown transverse stripe; hind wings similar, but with a smoky-black central spot and beyond it a slender curved smoke-coloured stripe. Body and leg-tufts pale purplish-brown; anal tuft light chocolate; legs dark brown, barred with white. In the darker individuals smoky-black transverse stripes appear on all the wings, which in the paler form are scarcely perceptible.

Variation seems to be nearly confined to the two forms as already described, occurring always together—that with the larger portion of the fore wings pale reddish-brown, and that in which they are mainly suffused or clouded with rich purple-brown—of these the first is most plentiful in the South, and apparently the second in the North, where also

it becomes more blackened. Intermediates occur but not so frequently. Mr. Kane states that Irish specimens are all of the richer darker race.

On the wing in June and July.

LARVA.—Dorsal region dark brown; central dorsal line whitish, bordered on either side, on each segment, by two black spots; subdorsal lines slender, indistinct, whitish. Head and post-capital segment dark brown, the former mottled with a paler colour and traversed by two black lines; sides pinkish-drab, marked on each segment with a black spot; under-surface pale drab; back and sides thinly furnished with slender hairs. (H. H. Crewe.) In Mr. Buckler's figures the black dorsal plate is divided longitudinally by three or five white lines, and the anal plate is black-brown and divided by the white dorsal line; the raised dots are large and, with the spiracles, black; but the dorsal region is of a paler brown than above described, or even of a pale brownish-grey. In one case the anterior or thoracic segments are red-brown and the remainder pale slate-grey.

Mr. Buckler describes the young larva as follows. When three-quarters of an inch long, of moderate stoutness; head brown and shining; dorsal plate brown, finely divided by very thin dorsal and broader subdorsal lines of a pale yellow, below these blackish-brown; ground colour dark purple-grey-brown, much and finely freckled with darker; dorsal line paler ochreous-brown; a faint subdorsal stripe of unfreckled ground colour can just be discerned, it is edged with darker freckles; raised dots blackish-brown, a large one above each spiracle; undersurface paler than the back, freckled with reddish-ochreous; spiracles outlined with black; anal plate shining brown, with paler dorsal and subdorsal lines. Before hybernation it assumes the adult larval colouring and has nearly attained full growth.

August to March, April, or even May, on grasses, especially

Aira caspitosa, chickweed, and other low-growing plants, feeding at night, concealing itself, like its congeners, in the daytime in the middle of a tuft of grass, but fond also of hiding under moss on the trunks and spreading roots of trees. Much attracted by sweets, and has often been known to travel up the trunk of a tree to a height of four or five feet to feed on the sugar placed thereon to attract moths.

PUPA dark red, blackish on the thorax and upper part of the abdomen; enclosed in a neat cocoon of earth or moss. (H. H. Crewe.)

The moth hides in the daytime among dead leaves on the ground, or at the roots of herbage; it comes at dusk to sugar in the most eager manner, and will even seem to fight with *X. polyodon* for a share, though this fighting probably amounts to no more than a struggle to keep its place at the feast; certainly either of them when dashing down recklessly upon the sugar-patch covered with moths suggests an idea of fighting very foreign to our usual estimation of these altogether harmless creatures. This species is attracted by honey-dew—especially when upon nettles—and by flowers; also less freely by light; moreover it has a vigorous flight at early dawn, when it again attacks the sugar or any available sweet. Principally confined to woods, greatly preferring those away from the coast. In such localities common over the whole of the South of England, also the Eastern and Western counties, but apparently very scarce in the Midlands, and there only recorded from Staffordshire. Widely distributed in Yorkshire, and sometimes taken in Durham, Northumberland, Lancashire and Cumberland. Probably in all woods in South Wales, since I have found it in Pembrokeshire. In Scotland it seems scarcely to have been noticed beyond the border, the only record which I find being in the Tweed district; also local and uncommon in Ireland, but found rarely near Dublin, also in Wicklow, Cork, Cavan and Tyrone. Abroad it is comparatively a more southern species,

being found in most parts of Central Europe where suitable woods exist; in Southern Sweden, the Ural Mountain district, Tartary and the mountainous regions of Central Asia.

6. **X. scolopacina**, *Esp.*—Expanse $1\frac{1}{4}$ to $1\frac{1}{2}$ inch. Fore wings pale drab softly clouded with red-brown, darkest along the hind margin; a black longitudinal streak at the base of the dorsal margin; reniform stigma white. Hind wings pale purplish-brown.

Antennæ of the male simple, minutely ciliated, dark brown; palpi small, moderately tufted, pale brown, more black-brown at the sides, third joint minute; head light brown, a small paler tuft at the base of each antenna; thorax pale brown, across the front of the collar is a faint slender blackish-brown bar; shoulder-lappets uplifted, dusted with dark brown; top and back crests small but broadly tipped with deep purple-brown; fascicles pale drab; abdomen pale purplish-brown, the dorsal ridge ornamented with three or four minute oblique purple-brown crests; lateral tufts spreading, yellow-brown; anal tuft smoky-brown in the middle, yellow-brown at the sides. Fore wings very neat, rather blunt; costa gently curved; apex squarely angulated; hind margin below it not very oblique, yet below the middle suddenly bent more obliquely to the anal angle and even faintly excavated, also slightly crenulated; dorsal margin nearly straight; colour yellowish-drab or very pale wainscot-brown, clouded with pale chocolate; at the base of the dorsal margin is a short horizontal black streak, edged with chocolate; basal line usually absent, when visible slender, twice angulated, abbreviated, reddish-brown; first line, when visible, nearly perpendicular, but sinuous and angulated, chocolate-brown, often only indicated by two or three dots upon nervures; second line rather upright, but suddenly bent out into a large curve round the reniform stigma and composed of a series of very slender crescents between the nervures, upon which the junction points are drawn sharply

out, these latter points being the most noticeable portions of the line; an obscure pale shade of the ground colour sweeping in flat curves through a hind-marginal clouding of chocolate-red suggests the subterminal line; orbicular stigma only indicated by portions of a chocolate margin; reniform stigma white, but not conspicuously so, more or less invaded by the brown ground colour, but open above and throwing off a white cloud to the costa; between those two stigmata is an ill-defined cloud or patch of chocolate-brown from the costa, in some instances continued across the wing as a sinuous central shade; costa otherwise dotted or clouded with chocolate, and beyond the middle more distinctly dotted with yellow-brown; along the hind margin are some dark chocolate streaks and a row of black dots; cilia chocolate-black spotted with pale brown. Hind wings pale smoky-brown with a purplish flush; nervures and central spot faintly darker; cilia white, intersected by a broken brown line. Female quite similar, hardly stouter.

Underside of the fore wings smoky-brown, paler toward the dorsal margin, much paler toward the apex; nervures blackened; an indistinct curved smoky-brown bar lies beyond the discal cell. Hind wings dusky white dusted with brown, especially so toward the costa; central spot smoky-black; half way between it and the hind margin is a curved, smoky-black transverse stripe. Body and legs pale smoky-brown.

Not very variable, though specimens taken in the South of England are usually more warmly coloured and strongly marked than those from further north. Professor Meldola has taken examples in Surrey of a very warm rich tint. In the collection of Mr. S. J. Capper is a specimen of which the ground colour is yellowish-white, and the only markings a central costal spot and the clouding of the hind margin. Occasional specimens have the fore wings suffused with chocolate-red in a very soft smooth manner, the only distinct marking in them being the whiter reniform stigma.

On the wing in July and August.

LARVA slender and uniformly cylindrical; head and plate on the second segment of a translucent greenish tint, and there is a black mark on each side of the mouth. Ground colour of the body olive-green above; spiracular region light sulphur-yellow; under-surface greenish; on the back a fine thread-like line of yellowish or pale grey, enclosed by two others of dark grey, forms the dorsal line, and passes through a series of slate-coloured ellipses; subdorsal line narrow, slate colour, beginning at the third segment, and after the fifth merging into a broad lateral stripe (which commences on the second segment) of dark slate-grey, most intense at its lower edge; just above which, on each segment, is a blackish shining tubercle furnished with a bristle; ordinary dorsal raised dots small, with minute hairs. (W. Buckler.)

When younger green with a brown head and yellowish-white dorsal and spiracular lines.

September (?) to June, on *Triticum repens* and other coarse grasses, also on woodrush (*Luzula*). It is said to bite off the grass stem at some distance above the surface and then to eat downwards, devouring the lower portion to the ground; feeding generally at night and hiding close to the earth, but occasionally to be found during the afternoon.

PUPA rather slender, wing and limb-cases extremely smooth and brilliantly polished, almost without sculpture; dorsal and abdominal segments also brightly polished, but having on the anterior portion of each a narrow band of punctured sculpture; anal segment thick and very fully rounded, the two long hooked bristles springing directly from it, with hardly any cremaster; colour bright chestnut. Subterranean.

The moth loves deep shady woods, and sometimes hides in the daytime among the dense masses of leaves on oak and other trees, from which it may be beaten out; also sits

occasionally on the trunks of trees, and far more frequently among the long wood-grasses close to the ground. At dusk it flies freely to flowers of bramble, *Angelica*, and other plants, and comes willingly to sugar. Its home in this country is in South Yorkshire, in the large woods round Sheffield and Rotherham; there it is sometimes abundant, but it has a rather wide range with us. A single specimen was taken a good many years ago at Hythe, Kent, by Mr. McLachlan, another was found at Saltwood in the same county, and there is a record in Cornwall; in Devon it has been taken in the woods of Dartmoor; also found rarely in Dorset. Upwards of twenty years ago it was taken in some plenty, both in the imago and larva states, in the woods of Hampstead and Highgate, lying just north of London, and it has continued to exist there, in spite of collectors, up to a very recent period. It may now increase again, since the woods—so far as they still exist—are not available for collecting in. As already stated, Professor Meldola used to take this species in Surrey; and it still occurs in the middle and west of the county; and has once been taken at Lewisham, Kent, in the south-east suburbs of London, by Mr. Fenn. It is also met with very locally in Berks, Oxfordshire, Somerset, Herefordshire, Buckinghamshire, Suffolk, Norfolk; and more frequently in Sherwood Forest, Notts; also in Derbyshire, Staffordshire and Cumberland, and very rarely in Lancashire. I find no record of its capture in Scotland, Ireland or Wales. Abroad its range is more southern—Central Europe, North Italy, South Sweden, and apparently some portions of the mountain regions of Central Asia.

Genus 34. **APAMEA.**

Antennæ of the male ciliated; eyes naked, provided with short lashes at the back; thorax with the top crest small, sometimes hardly noticeable, back crest small and short;

abdomen long, with small crests; fore wings rather short and blunt, broad behind; hind wings with vein 5 very faint, arising from the middle of the cross-bar.

LARVÆ rather short and stout; skin tough and shining, showing the longitudinal lines; raised dots prominent and glossy.

PUPÆ subterranean.

Rather a difficult genus to tabulate.

A. Fore wings shining brown with a black basal streak.

A. basilinea.

A². Fore wings with two black basal streaks, one of them on the dorsal margin.

B. Fore wings grey.

A. connexa.

B². Fore wings brown, broad; first line curved in a wide arch.

A. gemina.

B³. Fore wings brown, narrow; reniform stigma edged outside with white.

A. unanimis.

A³. No basal streak; fore wings short and blunt, any shade of brown, to black; reniform stigma white, yellow, or pale brown.

A. oculoa.

C. Fore wings silvery grey, reniform stigma yellow, a very large purple-brown costal triangle.

A. ophiogramma.

1. **A. basilinea**, *Fab.*—Expanse $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings smooth, pale brown, softly clouded with reddish-brown; a black line from the middle of the base; hind wings pale brown.

Antennæ of the male simple, very minutely ciliated, pale brown; palpi short, broadly tufted, pale brown barred with darker, terminal joint minute; head and thorax pale brown, dusted with red-brown; back crest obscure, oblique, unicolorous; fascicles dark brown; abdomen rather glossy golden-brown, with three or more conspicuous dorsal crests tipped with dark brown; lateral and anal tufts light golden-brown. Fore wings smooth, extremely neat and almost

shining, costa faintly curved; apex very bluntly angulated; hind margin rounded and regularly crenulated—almost scalloped; dorsal margin very gracefully curved; colour smooth pale drab-brown, softly tinged with redder brown or even with dark brown, but without conspicuous markings, the most noticeable being a sharply marked slender black streak from the middle of the base; basal line scarcely perceptible, limited to two pairs of cloudy brown dots; first line very faint and slender but regularly angulated, black-brown; second line even more faint, limited to a series of obscure brown crescents edged outwardly with paler brown; nervures outside this dotted with black; subterminal line an obscure cloudy series of brown curves edging a pale space before the hind margin; orbicular stigma large, very obscure, paler brown, edged on each side with dusky black; reniform stigma also large and obscure, pale brown, slenderly edged on each side and below with black, inside which is a whiter line, the lower portion often filled in with a brown cloud; both open above; around them the central space between the first and second lines is more tinted with red-brown than the rest of the wing; costa to the reniform stigma dotted with cloudy brown spots, beyond it with three minute white dots which are followed by a sub-apical yellowish-white streak; cilia smoky-brown with a paler basal line. Hind wings rather broad, margin rounded, glossy pale brown, paler at the base; nervures darker brown; cilia yellowish-brown tipped with white. Female extremely similar, but with the fore wings a little paler and the anal tuft much smaller.

Underside of the fore wings dull brown, abundantly dusted with darker, the nervures whiter, and the dorsal region toward the base brilliant with a pearly golden gloss; reniform stigma smoky-black. Hind wings pale brown, more abundantly dusted with dark brown; central spot small, black; beyond it is a faint curved brown transverse line; extreme hind margin clouded with white. Body and legs

brown, the latter barred with pale yellow; leg-tufts similar, but dusted with purple-brown.

Variation very slight, but occasional specimens have the ground colour whitish-brown; in others there is a tinge of grey-brown. Mr. S. J. Capper has a specimen, taken in Durham, of a dark slate-brown; and in the cabinet of Mr. W. H. B. Fletcher is one in which the dark central clouding is grey-brown, and forms a well-marked band. Scotch and Irish specimens are often rather more strongly clouded with either grey-brown or red-brown.

On the wing at the end of May and in June, in the north also in July.

LARVA stout, slightly tapering at each end, but otherwise cylindrical; head black, mouth paler; dorsal plate barred longitudinally with black and white or brownish-white, the black bars four in number; body very pale olive-brown or grey-brown; dorsal line rather broad, greyish-white, edged with short undulating black lines; subdorsal stripe ill-defined, dusky-white; spiracular line a row of dusky-black dashes, clouded with olive-brown, or else edged with greyish-white and looped with grey-brown; under-surface very pale grey; raised dots and spiracles black; legs and prolegs whitish-grey.

August to March, hibernating when rather small. On grasses, feeding at night, hiding at the roots in the day time.

PUPA of the usual form, wing and limb cases hardly glossy, minutely and abundantly sculptured with fine striæ and pittings; eye-covers rather prominent, smooth and glossy; dorsal segments minutely wrinkled and punctured in broad bands; abdominal segments more glossy and very faintly punctured, not in distinct bands; cremaster a round black knob, very obtuse, and furnished with extremely fine small spikes; general colour bright red-brown. In a rather strong

cocoon of silk and dead grass-leaves or moss on the surface of the ground or just beneath it.

The moth hides in the manner of its congeners among grass, dead leaves on the ground, herbage, and occasionally in any snug corner of a garden wall or fence. At dusk it comes to sugar, honey-dew, the sap of a bleeding tree, or to raspberry and other flowers. Especially fond of open fields, gardens, lanes and roadsides, and found all over the United Kingdom, except perhaps a portion of the Midland counties, and often abundantly, but rare in the Shetland Isles, and not common in the south-west corner of South Wales. Abroad it is found all over the temperate portions of Northern Europe, Central Europe, Northern Italy, Dalmatia, Southern and Eastern Russia, the mountain regions of Central Asia, and Japan, where it shows hardly any variation from the English type. In North America, however, it takes the rather more strongly marked form, with the central band and lines darker, and is known under the name of *fnitima*, Clem., occurring from New England through the Northern, Eastern and Middle United States, Texas, Colorado and Oregon, and also in Canada.

2. **A. gemina**, *Hüb.*—Expanse, $1\frac{1}{2}$ to $1\frac{5}{8}$ inch. Fore wings broad, dark purplish-brown, marbled with paler, the first line forming a crescent from the dorsal margin to the middle; or else with the dorsal margin, stigmata and broad hinder band much paler. Hind wings smoky-brown.

Antennæ of the male simple, rather short and thick, minutely ciliated, dull brown; palpi broadly tufted, dark brown, the apical joint almost concealed; head and thorax purple-brown, not very dark, the front of the collar crossed by a dark brown line; crests very short and obscure, but their tips a little darkened; fascicles greyish-white; abdomen purplish-brown, abundantly covered with dusky-yellow hair-scales; dorsal ridge with three or four crests tipped with purple-brown; lateral and anal tufts full and spreading, the

latter sometimes like a fan. Fore wings broad and very blunt behind; costa curved; apex bluntly rounded; hind margin below it very perpendicular, obscurely crenulated, curved off to the anal angle; dorsal margin slightly rounded; colour dark purple-brown or blackish-brown, much marbled or mottled with dull greyish-brown or reddish-brown, the markings all obscure; a black streak in the middle of the base and another close to the dorsal margin; basal line only visible as a short pale curve, edged on each side with dark brown; first line pale grey-brown, edged inwardly with black, and forming a wide crescent-like curve from the median nervure to the dorsal margin, slightly indented in its middle; second line placed just beyond the middle of the wing, a mere pale shade, hardly indicated, but enclosed between dark brown lines; subterminal line complete, but very indistinct, dusky white, abundantly waved and indented, and forming a rather flat **W** in the middle, also edged on each side by black-brown clouds; orbicular and reniform stigmata large, but very obscure, without definite margins; nervures from the base throughout dusted and dotted with black and white; on the costal margin beyond the middle are three distinct yellow dots; extreme hind margin edged with minute black lunules and a faint yellow line; cilia purple-brown, obscurely dashed with yellow and dusted with black. Hind wings broad, margin rather undulating; colour pale smoky-brown, with a broad ill-defined smoky-black or black-brown band toward the hind margin; nervures darker; cilia white, more yellow at the base, and divided by a partial dark line. Female quite similar, except that the body is stouter and the anal tuft smaller.

Underside of the fore wings smoky grey-brown; browner along the costal region, more shining white along the dorsal; nervures dusted with white; costal margin dotted with the same toward the apex. Hind wings dusky-white, with a yellow gloss; broadly dusted over the costal portion with purplish-brown; central spot black; beyond it is a faint

slender partial transverse line, dotted with black on the nervures; along the hind margin a smoky-brown cloud; cilia dusky-white, clouded with smoky-brown. Body and leg-tufts pale purplish-brown; legs dark brown, barred with white; anal tuft tinged with reddish-brown.

A constantly recurrent and reliable variety known as var. *remissa* has the thorax paler brown on the top, but the collar and shoulder-lappets blackened, the bar in front of the collar black; the two stigmata whitish-grey, and the dorsal margin broadly of the same colour; the broad space between the second and the subterminal lines also whitish-grey, brownish-grey, or very pale silvery-grey, forming a pale band. In some examples the base of the costa is also clouded with pale grey down to the black central streak; but the central space around the stigmata and the greater portion of the basal and hind marginal areas remain of the usual brown-black or purple-brown, so that this variety has a very striking and distinct appearance, and is constantly taken for a different species by inexperienced collectors, or especially mistaken for *Hadena genistæ*, to which species it bears a wonderful resemblance. It varies in shade of colour, and all intermediate gradations between it and the type are met with, though rarely; while in northern and western districts its peculiarities are intensified, as for instance in South Wales, where this variety becomes a very handsome and striking insect. A very old specimen of this form, originally from the collection of Mr. A. Haworth, now in that of Mr. S. Stevens, has a broad distinct stripe of pale ochreous down the median nervure, completely dividing the central dark colouring, and giving the insect a very different appearance. Upon its pin is Haworth's label, "*oblonga*." Another in the same collection is of an almost unicolorous grey-brown. In Mr. Sydney Webb's is a complete range of forms from typical to the extreme of the var. *remissa*. Mr. Kane has met with a curious variety near Cork—smaller, dark grey, but the markings all traceable; while at Portlaw, Waterford,

the Rev. W. W. Flemyng finds the more typical form tinged with red-brown, and with the stigmata yellow, the var. *remissa* being there unusually large, clouded with bright brown, and the stigmata conspicuously yellowish-white.

On the wing in June and July.

LARVA cylindrical, of moderate and almost uniform stoutness, tapering but little at either end; the head rounded, shining, brownish-grey freckled with darker; dorsal and anal plates black, highly polished, divided by the dorsal and subdorsal lines, which are almost white; general colour brownish-grey, finely striated longitudinally with a darker tint of the same; dorsal line yellowish-white, uniform in tint throughout, and bordered with dark grey; subdorsal stripe brownish-ochreous, but little paler than the colour of the back; spiracular stripe broad, light drab with paler edges; spiracles oval, yellowish-drab delicately outlined with black; raised dots blackish, each bearing a grey-brown hair; under-surface and legs of the same colour as the back. It possesses the same distinguishing characters when young, which continue unchanged to its maturity. (W. Buckler.)

August(?) to March upon *Phalaris arundinacea*, *Triticum repens*, *Poa annua* and other grasses, more especially those which grow in damp ground; hibernating while rather small at the roots of the grasses, hiding in the same situations during the day and feeding at night.

PUPA of the usual form, the wing-covers wrinkled and dull from excessive abundance of minute incised and ridged sculpture with which they are covered; dorsal segments also wrinkled, and the anterior half of each of the first four similarly sculptured in fine incised lines mingled with rougher ridges and pits; from this the remaining dorsal and abdominal segments are sculptured only in pits, placed in a band which becomes narrower on each till on the final two it disappears; colour dull chestnut; cremaster black, broad and thick, and furnished with a pair of slender hooked bristles; beneath

this the anal formation is rather distinct. In a coarse cocoon among grass roots.

The moth hides in the daytime among dense rank grasses growing in damp places, especially in the sides of woods and damp meadows near them; at night it is far more strongly attracted by the blossoms of these grasses than by sugar, though it will come to that bait in moderate numbers. It also loves honeydew, the blossoms of *Rhododendron*, *Silene*, *Echium*, and other flowers. Found apparently all over England in such suitable places, and often abundantly; more local in the fens; also in Wales to Pembrokeshire; and in many parts of Scotland, extending to the Orkneys and Hebrides; and common everywhere in Ireland. Abroad its range is very wide, but principally more southern—the greater part of Central Europe, Finland, South Sweden, North Italy, Southern and Eastern Russia, Tartary, the mountain regions of Central Asia, the North of India—quite typical in the Himalayas, and with it the var. *remissa*. This latter form is also sharply marked in North America, where the species, there called *separans*, is common in the Eastern and Middle United States, North Carolina, and Wisconsin.

3. **A. unanimitis**, *Tr.*—Expanse $1\frac{1}{4}$ inch. Fore wings pale chestnut-brown, very regularly mottled with darker; two short black streaks at the base; reniform stigma edged with white; hind wings pale smoky-brown, central spot and hinder region darker.

Antennæ of the male regularly notched in front, thickly ciliated, dark brown; palpi broadly tufted, dark brown outside, pale yellow-brown within, third joint rather thick and porrected; head densely tufted, yellow-brown, dusted with white, and the longer scales tipped with black; a black spot on each side of the face; collar very thick and erect, yellow-brown, almost golden-brown at the base, dusted with white, black, and dark brown, and having across the middle a slender black bar; remainder of thorax chocolate-brown dusted with paler,

shoulder-lappets striped with black-brown, top and back crests small, tipped with the same and with white; fascicles dusky white; abdomen dusky pale brown dusted with black; basal segments abundantly covered with long white hair-scales; dorsal ridge ornamented with three or more raised crests which are barred with black and tipped with white, lateral and anal tufts spreading, light golden brown. Fore wings rather ovate; costa regularly curved; apex bluntly rounded; hind margin rather fully rounded and faintly crenulated, but with a small hollow close above the anal angle; dorsal margin short and nearly straight; colour pale chestnut-brown, much marbled or mottled with red-brown and black-brown; from the middle of the base arises a thickened and rather forked deep black streak, and below it on the dorsal margin is another, shorter and straight; basal line very obscure but double, limited to two pairs of cloudy black streaks near the costa; first line also obscure, black, double and divided by a pale brown thread, angulated on each nervure and arranged between them in wide curves; second line black, closely followed by a pale brown line edged with darker, the whole forming two broad curves, and less oblique than is usual; subterminal line pale brown, waved, formed in the middle into an obscure flat **W**, and edged outwardly by a purple-brown submarginal cloud which is often cut by black streaks; orbicular stigma obscure, rather oblique, open above, otherwise slightly margined with black; reniform stigma more definite, edged with white, and outside this by a fine black margin, but internally pale brown with a dark brown loop; claviform stigma small, edged with deep black; round the stigmata, between the first and second lines, is rather more brown clouding than elsewhere, so that in some specimens a darker central band or shade is produced; all the nervures faintly indicated by short alternate dashes of black and pale grey-brown; extreme hind margin edged with black lunules; cilia dark brown with a yellow-brown line along their base, and similar dashes from it. Hind wings

rather short, rounded, brownish-white at the base, shading off to smoky-brown behind, but also dusted with yellowish-white; nervures dark brown; central spot large, rather round, smoky-black; cilia yellowish-white, broadly dashed with brown. Female very similar, hind wings a little longer; body hardly stouter, but tapering to a point behind, with a very small anal tuft.

Underside of the fore wings pale smoky-brown tinged with purple toward the costa; reniform stigma indicated by a cloudy black spot; following it is a smoky-black stripe, blackest on the costa; outside this the nervures are dusted with white, and on the costal margin are three or four yellow-brown dots. Hind wings very pretty, greyish-white abundantly dusted with grey-brown, and shaded along the whole costal region with purple; central spot black; beyond it is a smoky-black, sinuous, transverse stripe followed by a similar hind-marginal stripe. Body yellowish-brown, dusted with black; legs purplish-brown, but with the tibiæ black, barred with yellow; leg tufts and abdominal tufts pale purple-brown.

A little variable in the depth of the ground colour, more so in the extent and intensity of the red-brown, or dark brown marbling; this last being in some individuals almost absent from the dorsal margin and from a broad band beyond the second line, while in others it is uniform to the exclusion of central darker clouding. In the collection of Mr. W. H. B. Fletcher is one having a broad pale yellow-brown band before the hind margin.

On the wing in June and the beginning of July.

LARVA cylindrical, of about uniform moderate stoutness, tapering a very little at each end, head smaller, smooth and lustrous, brown, very dark brown round the mouth; dorsal plate shining brown, finely divided by a white dorsal line; skin of the body glossy yet covered with minute wrinkles. The whole colouring consists in lighter and darker tints of reddish-brown inclining to ochreous; dorsal stripe after the second

segment wider, whitish-ochreous, very finely edged with darker brown, and, on each segment, it passes through a narrow ellipse of dark brown freckles; subdorsal stripe of similar width, very little paler than the ground colour, but with darker edges; spiracular stripe broader, of the same colour, defined by a paler edging above and below; spiracles brown delicately outlined with black; under-surface and legs slightly darker than the spiracular stripe, faintly freckled with a still paler tint; legs spotted with brown, prolegs tipped with the same; raised dots brown. The infant larva is bluish-green with delicate paler grey lines and the skin-folds tinged with ochreous; head, with dorsal and anal plates, black, but soon the head and dorsal plate become brown, the general colour also pale brown and the longitudinal stripes paler, something as in the adult larva. (Adapted from Buckler.)

July to April on grasses, especially *Phalaris arundinacea*, but not refusing *Triticum repens*, *Aira flexuosa* and other grasses, especially those growing in wet places; feeding at night. It attains full growth usually in October or November, then hibernates among grass roots, or under moss at the feet of willow or poplar trees, or in a chamber among loose earth at the edge of a ditch, but comes forth again in the spring, yet apparently does not feed later than February.

PUPA rather slender, moderately glossy, red-brown; head-cover darker and rather smooth and prominent; limb-covers sculptured all over with fine cross striæ; wing-covers also abundantly sculptured with striæ and minute pits; segments all more glossy, those of the back rather wrinkled and vaguely sculptured, but those of the abdomen having a narrow anterior band of fine punctures; cremaster hardly noticeable, a very short blunt knob, with a closely appressed pair of slender hooked bristles, light brown. In a silken cocoon, if possible under loose bark. Mr. J. Gardner states that the larva will travel sometimes to a height of eight or nine feet

up a tree-trunk to find a suitable place. In default of loose bark it will enter dead stems of burdock, thistle, or teasle, or spin up in any concealed situation, the silk of its cocoon being tough and adhering firmly to surrounding substances.

The moth hides by day among grasses and other herbage ; at dusk it flies in damp meadows, the edges of moist woods, fens and marshes, and is readily attracted by sugar and honeydew. At one time it was abundant in certain years in Hackney Marshes in the east of London, but has now become quite scarce there ; always rather local, and also uncertain in its appearance—abundant one year, scarce for several more—but found in suitable places in Sussex, Surrey, Hants, Dorset, Devon, Somerset, Gloucestershire, Berks, Oxfordshire, Cambridgeshire—sometimes very plentifully in the fens—Norfolk, Suffolk, Leicestershire ; but apparently rare or absent in most of the midland counties, certainly rare in Staffordshire ; more frequent in Herefordshire, Cheshire, Lancashire, Yorkshire, Lincolnshire ; less so in Westmoreland, Cumberland and Durham. Probably in suitable places in all parts of Wales, since it is not scarce in Pembrokeshire ; also found in Aberdeenshire and various other districts of Scotland, in the west extending to Argyle and the Orkneys. Scarce in Ireland, but taken near Dublin and in Wicklow, Louth, Westmeath, and Armagh. Abroad it seems to have a rather restricted range through a portion of Central Europe and the Ural Mountain district.

4. *A. oculea*, *Gn.* ; *didyma*, *Staud. Cat.*—Fore wings short and blunt, pale brown, red-brown, drab, umbreous, or black-brown, marbled all over with darker, or else having a darker central band which is angulated at its outer margin ; reniform stigma white, yellow, or pale brown, often conspicuous ; hind wings smoky-brown. (No satisfactorily concise description of this, always variable species, is possible.)

Antennæ of the male simple, minutely ciliated, brown ; palpi small, narrowly tufted, brown, apical joint small, black-

brown; head pale brown or purplish-brown, densely scaled and having a small tuft at the base of each antenna; collar rather narrow, usually some shade of brown, with a slender, doubly arched, deeper brown or black bar across the front; remainder of thorax similarly brown, the top crest perceptible, hardly divided but concave in front, back crest forming two low parallel ridges, very often of a different—paler—colour, drab, pale brown, or pale chestnut, but also often concolorous; fascicles smoky-white; abdomen silvery-grey or whitish-brown, the dorsal ridge ornamented with from two to six small oblique crests, barred with brown or black; lateral and anal tufts small, pale purplish-brown. Fore wings short and rather broad and blunt behind; costa almost straight; apex bluntly angulated, hind margin below it almost perpendicular, but rounded off below the middle and crenulated, especially so above the anal angle; dorsal margin straight; colour pale brown, drab, red-brown, purple-brown, umbreous, brown-black, or any intermediate colour, more or less mottled with darker brown and often with the markings very obscure; when visible, basal line a faint, double, angulated, dark-brown streak; first line equally obscure, a series of faint brown-black curves, more faintly duplicated; second line bent, but in sections unusually straight and devoid of curves, most perceptible from the reniform stigma to the dorsal margin, and faintly duplicated outside; subterminal line undulating, faintly paler and almost without darker margin, except that in those forms which have the previous portion pale it usually borders a series of red-brown or purple-brown clouds along the hind margin; the portions of the nervures immediately preceding it ordinarily dusted with dark brown, or white, or both; orbicular stigma faintly indicated by a blacker margin; reniform stigma also margined with black, but within this edged on the outer side, or partially filled in, with clear white or pale brown, and forming an irregular crescent—which indeed is the most reliable marking on the wing—claviform stigma slightly edged with black-brown;

costa as far as the reniform stigma spotted with brown, thence dotted with white; at the extreme hind margin is a yellow or pale brown line, edged on either side with brown, and also on the inner side with black dots; cilia dusky grey-brown dashed with paler brown. Hind wings rounded, but with the hind margin rather sinuous and loosely crenulated; dusky brownish-white at the base, shading off to dark smoky-brown behind; extreme hind margin edged with a sinuous yellow line; cilia smoky-brown. Female extremely similar through all mutations in colour and markings.

Underside of the fore wings pale smoky-brown, with a greenish pearly gloss along the dorsal margin and a purplish flush over the remainder; toward the hind margin is a faintly smoky transverse stripe; cilia more smoky-black. Hind wings dusky yellowish-white, dusted all over, but particularly along the costal and apical regions, with purplish-brown; central spot very faintly black; a similar transverse band before the hind margin. Body and leg-tufts pale purplish-brown; legs darker brown, barred with white.

As already shown, variable in an extraordinary degree in all localities, so that it is difficult to judge which is entitled to be called the normal or typical form. The most abundant *range* is that of those having the fore wings brown in some shade, marbled or mottled *all over* with darker; but one of extreme frequency has also a faint or more distinct central band from a blackening of the space between the first and second lines; and another, also plentiful, has the dorsal margin and the broad band between the second and sub-terminal lines of some light bright brown, while the enclosed portion forms a very large, darker red-brown, purple-brown, or umbreous triangle along the costal half of the wing; these characters are partially combined in those specimens which with the broad pale hinder band have a dark central space, and in these there is in some individuals a deep black horizontal bar above the dorsal margin, joining the first and second lines. Another and rather different range of variation

is of uniform deep purple-brown to brown-black or dull black, often with the subterminal line more visible and yellow, or dotted with yellow; often also with blacker marbling on the central band; very often with a brightly contrasting yellow, orange, or white reniform stigma. It may be remarked that this stigma is most eccentric in colour, varying through yellow, brown, and white, in every different form of the insect, and apparently in no way governed by any tendency in them to darker or paler. In all varieties the thorax follows the colour of the fore wings, except that the back crest or the portion lying between its tufts is erratic in colour, usually not differing, but in some examples, without reference to their colour, yellow, orange, reddish-brown, or even chestnut. It is impossible without excessive verbosity to convey a full idea of all the variations and shades of variation in this species; all are united by intermediates, though it must be admitted that some of the extremes are decidedly more frequent than their less pronounced allied types. Where every collection contains curious variations it is hardly practicable to particularise, but I must mention a specimen of which the dorsal half of the wing and the broad hinder band are of a pale *cream* colour, with the costal region and hind marginal clouds blackish-brown, in the collection of Major A. Ficklin; and another from Ireland which is actually tinged with rosy-purple. All the striking varieties were at one time supposed to be distinct species and received a number of names—*i-niger*, *rava*, *furca*, *didyma*, but all were united by that excellent entomologist, the late Henry Doubleday, and the existence of intermediate forms has rendered these names almost valueless.

On the wing in July and August.

LARVA thick-skinned, smooth and shining, cylindrical, though a little stoutest at the thoracic segments, whence it tapers to the rather narrow-pointed and flattened head; and also gradually to the anal segment; head light brown, mouth

darker, ocelli black; plate on the second segment light brown, divided in the middle by a paler line; on the anal segment is a semicircular shining pale brown plate; colour of the body light green, a rather broad oval deeper green marking on each segment forms a dorsal pattern edged on each side by a purplish-pink stripe; spiracles dusky-white ringed with black; under-surface and legs pale green. Or, the whole surface above the spiracles deep green, with slender dull-red dorsal and subdorsal lines, and the under-surface and legs light green. Or, pale yellowish-green, with pale red dorsal and subdorsal lines, each faintly edged with blackish atoms, undersurface and legs paler grey.

September (?) to April or May on grasses, *Festuca arundinacea*, *Dactylis glomerata*, *Holcus mollis*, *Aira cæspitosa*, and probably many others, also on *Luzula pilosa*, living within the stem of the grass, and feeding on the unopened flowers. Its presence may be detected by the small round hole near the tip of the grass-shoot from which the excrement is extruded. Mr. E. R. Bankes states that it even inhabits flower-stems of *Iris fetidissima*.

PUPA undescribed.

The moth hides in the daytime under copings of walls, or in a chink of any kind in a wall, post, or fence; but in the vast majority of cases among grass and herbage on the ground. At night it comes eagerly to sugar, honeydew, the flowers of *Glyceria fluitans*, or anything sweet, and I have found it commonly, late at night, sitting on the leaves of the great masses of reeds in the fens. It is one of our most abundant *Noctua*, occurring in plenty everywhere throughout the British Isles. Moreover, all its more striking varieties seem to be equally universal. Abroad it abounds throughout Central Europe, the temperate portions of Northern Europe, Italy, Turkey, Southern and Eastern Russia, Armenia, Asia Minor, India, and Japan; also in Canada, and throughout the United States, to Vancouver Island, Colorado, and New Mexico,

though in certain varieties known under the names of *vulvivaga*, Morrison, and *fractilinea*, Grote.

5. **A. connexa**, *Bkh.*, **pabulatricula**, *Staud. Cat.*—
Expanse $1\frac{1}{4}$ inch. Fore wings greyish-white, with faint brown mottlings, a black basal streak, and a black-brown central band interrupted by the large white stigmata; hind wings smoky-brown.

Antennæ of the male slightly notched, minutely ciliated, light brown; palpi rather long, broadly tufted outwardly, black brown, yellowish-white on the inner side, apical joint long and tufted; head thickly covered with erect scales, conspicuously so in front and between the antennæ, yellowish-white with a curved brown bar across the face; collar yellowish-white, slenderly barred with black-brown and edged with light brown; shoulder-lappets black-brown with a yellow-brown blotch down the middle of each; remainder of thorax greyish-white, the top and back crests quite noticeable, tipped with yellow-brown or chestnut; fascicles white; abdomen pale grey dusted with black, but obscured by long greyish-white hair-scales; on the dorsal ridge are five oblique black or brown-black crests; lateral and anal tufts spreading. Fore wings narrow at the base, broader behind; costa gently curved; apex bluntly angulated; hind margin slightly curved, rather oblique, more rounded toward the anal angle; dorsal margin very gently rounded; colour greyish-white; from the middle of the base arises a distinct black streak under the median nervure; below it, close to the base of the dorsal margin, is another lying in a dusky cloud; basal line only indicated by a cloudy black spot on the costa; first line black-brown, broken into streaks above the middle, but forming a wide curve below, also preceded by a parallel faint brown line, the two enclosing a slender stripe of the white ground colour; otherwise the basal space below the median nervure is clouded with brown; second line oblique, curved, faintly black-brown except below the

middle, where it is more strongly marked, also followed by a parallel row of faint brown dots; subterminal line white, indicated by its attendant row of small brown wedges and minute brown clouds; orbicular stigma large, rather oval, oblique, white slenderly edged with black and containing a pale brown cloud; reniform stigma very large, white, but faintly margined with grey, except at the back where it is edged with black; within it is an obscure grey line; claviform stigma a very faint black loop, but attached below to a far more distinct black horizontal bar which unites the first and second lines; the rest of the space between these lines and around the stigmata is in some degree filled in with dark brown, indicating a broad central band usually broken in the middle, the portion of it from the black bar to the dorsal margin forming a conspicuous squared blotch, which is the most noticeable marking on the wing; costa clouded with pale brown, and toward the apex dotted with white; extreme hind margin edged with minute black lunules, which in its upper portion are preceded by dark streaks on the nervures; cilia grey, dusted with white. Hind wings not broad, hind margin rather sinuous; smoky brown, the base paler or streaked with smoky-white in which the nervures remain dark; cilia white, clouded with pale brown. Female extremely similar, body only a little stouter.

Underside of fore wings dull pale smoky-brown; discal cell downy with long prostrate hair-scales; costal margin narrowly, and hind margin broadly, yellowish-white dusted with brown; nervures thickened and conspicuous. Hind wings greyish-white, dusted, especially toward the costa, with brown; central spot triangular, smoky black; beyond it is a curved transverse stripe of similar atoms, beyond which the whole hind-marginal area is more sparingly dusted, and a similar transverse band is formed near the margin. Body and leg-tufts grey-brown dusted with darker; legs smoky-brown, barred with white or pale yellow.

Hardly variable except in the greater or less completeness

of the broad central band, and in the tinge of brown over the grey-white ground colour, but Dr. Mason possesses a specimen of which the ground colour is wholly *dark* grey, and the central band tinged with brown.

On the wing in August and the beginning of September.

LARVA unknown in this country. Entomologists living in the districts in which it is most plentiful assure me that they have searched for it often, by day and by night, but in vain. Hofmann, however, furnishes a description: "Yellow-brown; dorsal line yellowish edged with black; side lines dark grey-brown shaded with black above and below; spiracles black; under-surface yellow-grey; head brown with two black arched stripes. In May on grasses." But his figure is quite disproportionately large for the size of the present insect, and suggests some doubt as to its accuracy.

PUPA undescribed, subterranean.

The moth sits, not unfrequently, squeezed into a crevice of bark on the trunks of oak-trees in the woods which it frequents, and from its colour would be very conspicuous but for its not distant resemblance, in that position, to the excrement of a bird; but it hides in far greater numbers among herbage and dead leaves on the ground, whence it may be seen at dusk to rise almost from under the feet of the passer-by. At this time it comes freely to sugar on the oak trunks. Exceedingly local in this country, and, so far as I know, only found in any abundance in the woods of South Yorkshire, especially those around Sheffield, Rotherham, Wakefield, and Barnsley; also taken in Cumberland, and formerly in woods in Norfolk. Dr. Buchanan White informed me that it had been found in the South of Scotland, in the districts of Clyde and Tay, but I know of no recent records there. Abroad also it is a local species, but is found in some parts of Germany, Livonia, Galicia, the Ural Mountain district, and elsewhere in Russia.

6. **A. ophiogramma**, *Esp.*—Expanse $1\frac{1}{4}$ inch. Fore wings silvery whitish-brown; a broad, somewhat triangular purple-brown blotch, occupying most part of the costa, extends to below the middle of the wing and includes the yellow reniform stigma; two other purple-brown triangular blotches are on the hind margin; hind wings pale smoky-brown.

Antennæ of the male rather stout, simple, downy in front, light brown; palpi small, horizontal, narrowly tufted, dark brown, apical joint black; head brown in front, brownish-white above; collar erect, brownish-white, broadly barred near its upper margin with purple-brown; remainder of thorax pale drab or brownish-white, the shoulder-lappets dotted with brown or black; top crest small but erect and divergent; back crest small and obscure, fascicles white; abdomen pale drab dusted with brown; on the dorsal ridge are one or two almost prostrate tufts, hardly to be called crests; lateral tufts spreading; anal tuft broad, tinged with pale chestnut. Fore wings blunt, costa gently curved; apex bluntly rounded; hind margin almost perpendicular, and straight to below the middle, whence it is elbowed and more oblique—even hollowed above the anal angle, which is thus rendered prominent; dorsal margin straight; colour silvery pale buff or whitish-brown, slightly clouded behind with fulvous, the ordinary pattern of markings only obscurely indicated; basal line suggested by a pair of faint brown curves above the median nervure; first line very oblique, white, faintly edged in the dorsal portion with black; second line just visible as a disjointed series of white curves followed at some distance by a row of white dots placed between black ones on the nervures; from the base of the costa originates a large purple-brown blotch, the margin of which, crossing the basal line, curves down the first line to below the middle of the wing, then proceeds straight to the second line and follows it to the costa, thus forming a most conspicuous flatly triangular blotch, the broad base of which occupies

nearly all the costal margin; in it is the faintly visible orbicular stigma, indicated by a paler edging, and the more conspicuous reniform stigma, as an ovate yellow spot edged with purple-black; the claviform stigma lies closely along the apex of this triangular blotch as an ovate black streak outside which is a white cloud; subterminal line indicated by an irregular series of faintly red clouds edging a paler shade; outside this is a pair of blue-grey clouds near the middle of the hind margin, often lying in an obscure chocolate blotch; a larger, rather triangular, purple-brown blotch lies near the anal angle, and both are edged with minute black streaks or lunules; beyond this the hind margin is edged with smoky-black streaks; cilia pale brown, regularly dashed with blue-grey. Hind wings rather large; hind margin sinuous, brownish-white tinged with smoky-brown toward the hind margin; nervures rather darker; cilia white, divided and intersected with brown. Female quite similar, except that the hind wings are a little paler and the body slightly more pointed, with a small anal tuft.

Underside of the fore wings pale smoky-brown, dusted along the costa and hind margin with paler; nervures beyond the middle edged with white. Hind wings yellowish-white; costal region broadly dusted with brown; apical portion clouded with purplish-brown; central lunule dusky-black; beyond it is a faint, slender, transverse line followed by a more complete blackish-brown stripe. Body very pale purple-brown; legs black-brown; leg tufts white.

Usually not very variable, but in a remarkably fine series reared by Mr. F. J. Hanbury are specimens having the ground colour pale slate-grey, dark slate, and smoky slate, with intermediates and more normal specimens; one of the ordinary colouring has the orbicular stigma and a blotch near the hind margin rich orange-yellow.

On the wing from the end of June to the beginning of August.

LARVA not active, elongated, cylindrical, but the segments rather deeply divided, hardly tapering at either extremity; head rounded but somewhat flattened, shining pale brown, mouth darker; dorsal plate broad, shining horn-colour with darker clouding in front and a smoky-black edging on each side, also faintly divided in the middle by a white line; anal segment also covered with a large, convex, dull, horny plate, set with fine hairs and edged in front with smoky-black; twelfth segment edged at front and back with black-brown clouds, and the eleventh at the back with the same; otherwise the dorsal region is of a dull pale liver-colour or yellowish-pink, edged with paler at the sides; spiracles large, smoky-brown; in front of each are placed two similar small dots, and one below; undersurface, to these dots, yellowish-white; legs and prolegs very similar in colour. When younger the general colour is wholly dull yellowish-white; and the head and plates are sometimes brown-black. Larvæ for description here were supplied by Mr. F. J. Hanbury.

September to May or June on *Phalaris arundinacea*, a large strong grass which grows in wet places and on the edges of ditches and streams, but is also, in a striped variety known as "ribbon-grass" or "gardener's garters," grown freely in old gardens. The larva lives within the central stem, eating out the young growing shoot, but leaves the grass to hibernate in the ground during the severity of winter, returning to the grass and feeding up in the same manner in the spring.

PUPA very cylindrical to the ends of the wing-cases, and having these and the limb-covers exceedingly smooth and glossy; eye and head-covers slightly prominent, above these the front is rather blunt; all these parts are sculptured in very minute incised lines which do not interfere with their brilliant gloss; red-brown with an orange tint; the dorsal and abdominal segments also brilliant, deeper red, but with a narrow band of minute abundant pitting on the anterior, and a dark smooth band on the posterior edge of each; cremaster

an extremely slender spike without any broad or flattened base, but divided at the tip into two curved and hooked bristles. In a thin flexible cocoon of silk and earth, beneath the surface of the ground, or among dead grass leaves or rubbish.

The moth may occasionally be found sitting in the daytime on a fence, post, or wall, but doubtless hides more frequently among herbage and the dead leaves of its favourite grass. At night it comes willingly to sugar, but is shy and readily falls or flies off. It is said to take some pains to conceal itself from the observer by hiding behind a leaf or stem if available while sucking the tempting bait. It also loves the blossoms of *Scrophularia aquatica*—a dangerous temptation, since they are also much frequented in the evening by belated wasps—and will come occasionally to light. Not a common species, and mainly confined to marshy places and the banks of rivers and ditches, except where it finds a suitable home in a garden. In the year 1852 it was plentiful at Putney, and at Hammersmith in 1859, both places in the London suburbs and now covered with houses; but at that time and for some years subsequently it was a frequent species in London suburban gardens; it then became gradually scarcer, and had been long looked upon as a rare insect when, in 1887, its larva was discovered in an old garden overgrown with ribbon-grass, since which time it has gradually become much more frequent in these suburbs. Elsewhere it is found in Kent, Surrey, Berks, Herts, Essex, Suffolk, Norfolk, Cambridgeshire and Northamptonshire, and apparently has once been taken in Durham. I find no record of its occurrence in Wales or Scotland, but in Ireland it is obtained locally near Dublin, in Louth, Westmeath, Kilkenny, Galway, Sligo, Armagh, and Belfast. Abroad it is also local, but widely spread through Holland, Belgium, Germany, Hungary, Central Russia, and the mountain regions of Central Asia.

ADDITIONS AND CORRECTIONS

Noctua ditrapezium (Page 58).—The statement that larvæ have been found near Rotherham, Yorkshire, proved to be erroneous.

Aporia cratægi (Vol. I. p. 18).—The female is described as having “blacker nervures.” For *blacker* read *browner*.

Cerura vinula (Vol. III. p. 97).—In my remarks upon the fluid secreted by the pupa and used by the emerging moth to soften its cocoon, I somewhat hastily assumed that the fluid in question is identical with that secreted by the larva in its eversible prothoracic gland. Mr. Oswald H. Latter (*Trans. Ent. Soc.*, London, 1897) has confirmed the previous statement of Professor Poulton that this last—the fluid secreted in the prothoracic gland—is formic acid; and he goes on to show that this acid is rubbed by the larva upon the silk with which it is forming its cocoon, and has the effect of changing the fibrous character of the silk to the tough, hardened gelatinous material of the ordinary cocoon of this species.

On the other hand, he proves that the fluid secreted by the pupa, and employed by the emerging moth to assist it in penetrating the hard shell of the cocoon, is of an alkaline character—potassium hydroxide.

It is not only interesting, but wonderful, to find the creature producing in succession, and without partaking of nourishment during the interval, powerful chemical solvents of so totally opposite a character, from closely adjacent portions of its structure.

INDEX

	PAGE		PAGE		PAGE
Apamea . . .	379	Eurois . . .	101	dahlii . . .	64
basilinea . . .	380	adusta . . .	114	depuncta . . .	41
connexa . . .	396	herbida . . .	102	ditrapezium . . .	55
gemina . . .	383	occulta . . .	106	festiva . . .	69
oculea . . .	391	satura . . .	111	flammatra . . .	49
ophiogramma . . .	399	Hadena . . .	166	glareosa . . .	30
unanimis . . .	387	chenopodii . . .	199	neglecta . . .	98
Aplecta . . .	154	contigua . . .	167	plecta . . .	38
advena . . .	154	dentina . . .	195	rhomboidea . . .	58
nebulosa . . .	162	genistæ . . .	188	rubi . . .	88
tincta . . .	158	glaucia . . .	191	sobrina . . .	78
Aporophyla . . .	271	oleracea . . .	185	subrosea . . .	81
Australis . . .	280	peregrina . . .	179	triangulum . . .	44
lutulenta . . .	271	pisi . . .	181	umbrosa . . .	91
nigra . . .	276	suasa . . .	175	xanthographa . . .	94
Axylia . . .	1	thalassina . . .	171	Pachetra . . .	145
putris . . .	1	Hama . . .	343	leucophœa . . .	145
Cerigo . . .	340	abjecta . . .	343	Polia . . .	294
cytherea . . .	340	anceps . . .	347	chi . . .	303
Chareas . . .	127	furva . . .	351	flavicincta . . .	294
graminis . . .	127	Hecatera . . .	216	xanthomista . . .	299
Chariptera . . .	317	dysodea . . .	217	Triphæna . . .	4
aprilina . . .	318	serena . . .	220	fimbria . . .	5
Cleoceris . . .	313	Heliophobus . . .	133	interjecta . . .	12
viminalis . . .	314	cespitis . . .	137	janthina . . .	9
Crymodes . . .	119	popularis . . .	133	orbona . . .	14
exulis . . .	119	Luperina . . .	332	pronuba . . .	23
Dasypolia . . .	289	Dumerilii . . .	337	subsequa . . .	19
templi . . .	289	testacea . . .	332	Ulochloena . . .	266
Dianthœcia . . .	223	Mamestra . . .	204	hispidula . . .	266
albimacula . . .	243	albicolon . . .	205	Valeria . . .	328
cæsia . . .	254	brassicæ . . .	208	oleagina . . .	328
capsincola . . .	239	persicariæ . . .	212	Xylomiges . . .	141
carpophaga . . .	228	Miselia . . .	322	conspicillaris . . .	141
(compta) . . .	248	(bimaculosa) . . .	327	Xylophasia . . .	355
conspersa . . .	249	oxyacanthæ . . .	323	hepatica . . .	372
cucubali . . .	236	Neuria . . .	151	lithoxylea . . .	356
irregularis . . .	224	saponaria . . .	151	polyodon . . .	362
luteago . . .	259	Noctua . . .	28	rurea . . .	368
Dryobota . . .	309	augur . . .	34	scolopacina . . .	376
protea . . .	309	baja . . .	85	sublustris . . .	359
Epunda . . .	284	brunnea . . .	61	(Zollikoferi) . . .	367
lichenea . . .	284	c-nigrum . . .	51		



PLATE CXXXVII.

- FIG. 1. *Axylia putris*, male.
1*a.* „ „ female.
1*b.* „ „ larva, Mr. W. Buckler.
2. *Triphæna fimbria*, male.
2*a.* „ „ female.
2*b.* „ „ var.
2*c.* „ „ „ Mr. G. T. Porritt.
2*d.* „ „ larva, Mr. W. Buckler.



1.



1'



1b



2.



2'



2d



2b



2c

R. Morgan del. et lith.

Vincent Brooks Day & Son Imp.

J. Reeve sculp. London.





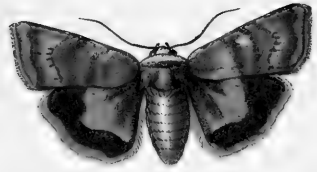
PLATE CXXXVIII.

FIG. 1. *Triphæna janthina*.

- | | | | |
|-----|---|-------------|------------------------|
| 1a. | „ | „ | var. |
| 1b. | „ | „ | „ |
| 1c. | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | interjecta, | male. |
| 2a. | „ | „ | female. |
| 2b. | „ | „ | larva, Mr. W. Buckler. |
| 3. | „ | subsequa. | |
| 3a. | „ | „ | var. Scotland. |
| 3b. | „ | „ | larva, Mr. W. Buckler. |



1



1a



1b



2



2a



1c



2b



3b



3



3a

R. Mercuri del. et lith.

Amos Brooks, Day & Son, Imp.



PLATE CXXXIX.

FIG. 1. *Triphæna orbona*.

1 <i>a.</i>	„	„	var.	North Ireland.
1 <i>b.</i>	„	„	„	South England.
1 <i>c.</i>	„	„	„	North-east Scotland.
1 <i>d.</i>	„	„	„	„
1 <i>e.</i>	„	„	„	„
1 <i>f.</i>	„	„	„	„
1 <i>g.</i>	„	„	„	„
1 <i>h.</i>	„	„	„	„
1 <i>i.</i>	„	„	„	South Wales.
1 <i>j.</i>	„	„	larva.	Mr. W. Buckler.

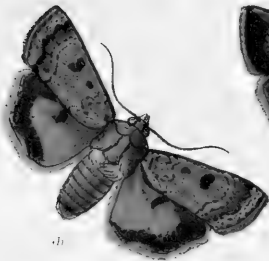
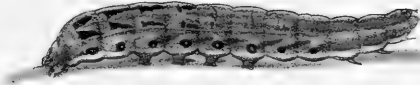
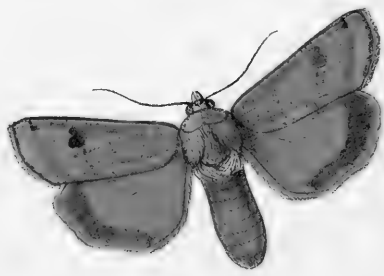
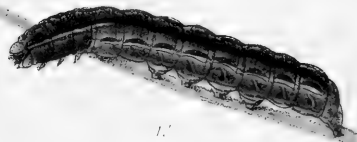
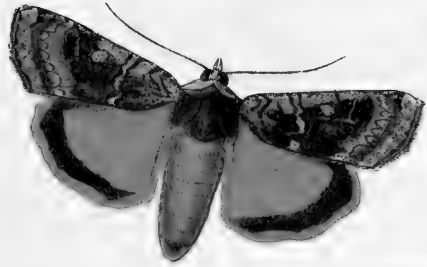
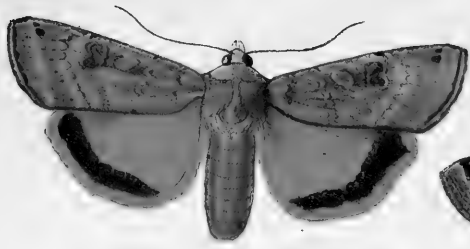




PLATE CXL.

FIG. 1. *Triphæna pronuba*.

1 <i>a.</i>	”	”	
1 <i>b.</i>	”	”	
1 <i>c.</i>	”	”	
1 <i>d.</i>	”	”	
1 <i>e.</i>	”	”	small var.
1 <i>f.</i>	”	”	var. Mr. W. Holland.
1 <i>g.</i>	”	”	larva, Mr. G. C. Bignell.



R. Morgan del. et lith.

Vincent Brooks, Day & Son Imp.

J. Reeve & Co. London

PLATE CXLI.

FIG. 1. *Noctua glareosa*.

- | | | | |
|--------------|---|--------------|--|
| 1 <i>a</i> . | „ | „ | var. |
| 1 <i>b</i> . | „ | „ | „ Shetland Isles. |
| 1 <i>c</i> . | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | plecta. | |
| 2 <i>a</i> . | „ | „ | var. |
| 2 <i>b</i> . | „ | „ | larva, Mr. W. Buckler. |
| 3. | „ | augur, male. | |
| 3 <i>a</i> . | „ | „ | female. |
| 3 <i>b</i> . | „ | „ | var. recorded as <i>A. Helvetina</i> , Dr.
P. B. Mason. |
| 3 <i>c</i> . | „ | „ | larva, Mr. W. Buckler. |

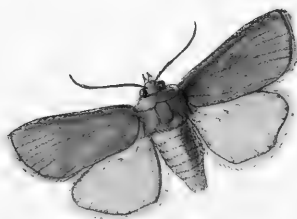
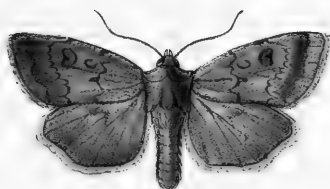
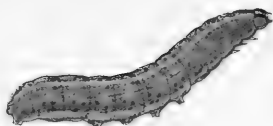


PLATE CXLII.

FIG. 1. *Noctua depuncta*.

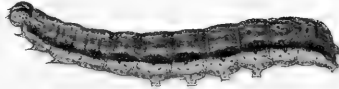
- 1a. ,, ,, var.
- 1b. ,, ,, larva, Mr. W. Buckler.
- 2. ,, *triangulum*, male.
- 2a. ,, ,, female.
- 2b. ,, ,, larva, Mr. G. C. Bignell.
- 3. ,, *c-nigrum*.
- 3a. ,, ,, var.
- 3b. ,, ,, larva, Mr. W. Buckler.
- 4. ,, *flammatra*, Norfolk, Mr. W. H. Thornthwaite.



1



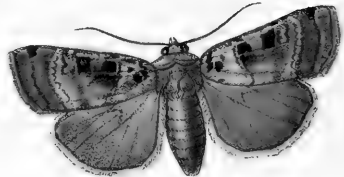
1a



1b



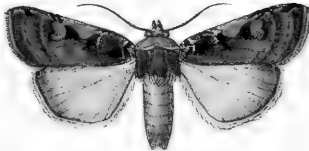
2



2a



2b



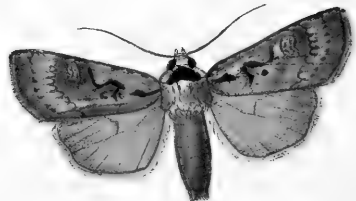
3



2b



3a



3

Wm. B. ...

P. ...

J. Feen & Co London

PLATE CXLIII.

- FIG 1. *Noctua ditrapegium*, male.
1*a.* „ „ female.
1*b.* „ „ larva, Mr. W. Buckler.
2. „ *rhomboidea*, male.
2*a.* „ „ female.
2*b.* „ „ larva, Mr. W. Buckler.
3. „ *brunnea*, male.
3*a.* „ „ female.
3*b.* „ „ var.
3*c.* „ „ „ Yorkshire, Mr. G. T.
Porritt.
3*d.* „ „ „ larva, Mr. W. Buckler.



1



1^a



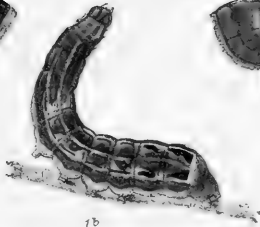
2



2^a



3



1^b



2^b



3^a



3^a



3^b



3^c

Dr. M. J. H. H. H. H.

Dr. J. H. H. H. H.

London: Printed by ... 1857



PLATE CXLIV.

FIG. 1. *Noctua dahlii*, male.

- 1*a.* " " female.
- 1*b.* " " var. West of Scotland.
- 1*c.* " " larva, Mr. W. Buckler.
- 2. " *sobrina*, male.
- 2*a.* " " female.
- 2*b.* " " larva, Mr. W. Buckler
- 3. " *subrosea*, male.
- 3*a.* " " female, Dr. P. B. Mason
- 3*b.* " " male, var. Dr. P. B. Mason.



1.



7^a



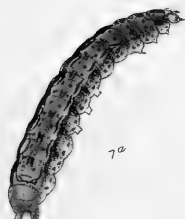
7^b



2.



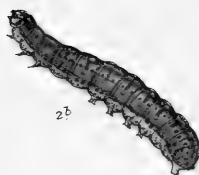
2^a



7^a



3.



2^b



3^a



3^b

R. Morgan del et lith.

Vincent Brooks Day & Son litp

L. Rouse & F. Schmitt

PLATE CXLV.

FIG. 1. *Noctua festiva*, male.

1 <i>a.</i>	”	”	female, var.				
1 <i>b.</i>	”	”	male, var. Mr. F. J. Hanbury.				
1 <i>c.</i>	”	”	”	”	”	”	”
1 <i>d.</i>	”	”	”	”	”	”	”
1 <i>e.</i>	”	”	”	”			
1 <i>f.</i>	”	”	”	”			
1 <i>g.</i>	”	”	”	”			
1 <i>h.</i>	”	”	”	”			
1 <i>i.</i>	”	”	larva, Mr. W. Buckler.				

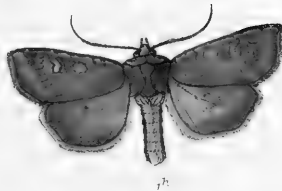
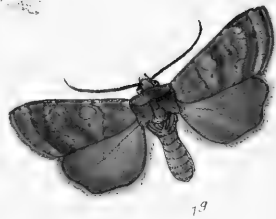
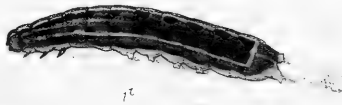
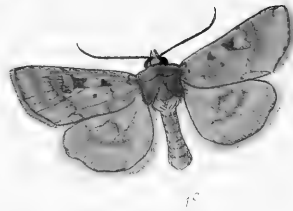
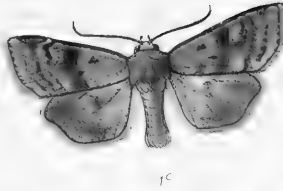
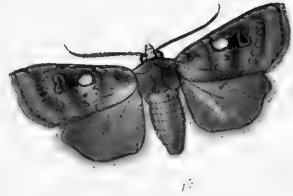
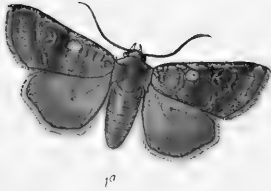


PLATE CXLVI.

FIG. 1. *Noctua festiva*, var. *conflua*, male.

1 <i>a.</i>	”	”	”	”	female.	
1 <i>b.</i>	”	”	”	borealis,	male, Shetland, Mr.	
						F. J. Hanbury.
1 <i>c.</i>	”	”	”	”	”	”
1 <i>d.</i>	”	”	”	”	”	”
1 <i>e.</i>	”	”	”	”	”	”
1 <i>f.</i>	”	”	”	”	female	”
1 <i>g.</i>	”	”	”	”	”	”
1 <i>h.</i>	”	”	”	”	”	”
1 <i>i.</i>	”	”	”	”	male	
1 <i>k.</i>	”	”	”	”	”	



1



7a



7b



7c



7d



7e



7f



7g



7h



7i



7k



PLATE CXLVII.

- FIG. 1. *Noctua baja*, male.
- 1*a.* " " female.
 - 1*b.* " " larva, Mr. W. Buckler.
 - 2. " " *rubi*, male.
 - 2*a.* " " female.
 - 2*b.* " " var. Dr. P. B. Mason.
 - 2*c.* " " larva, Mr. W. Buckler.
 - 3. " " *umbrosa*, male.
 - 3*a.* " " female.
 - 3*b.* " " larva, Mr. W. Buckler.

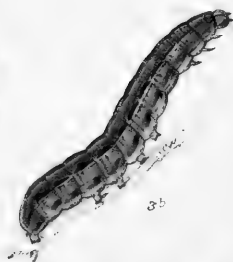
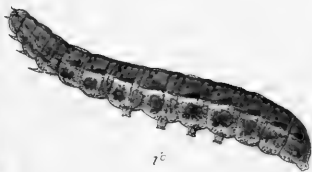
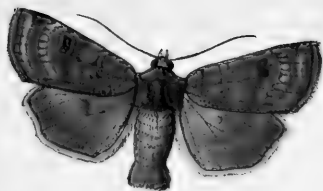




PLATE CXLVIII.

FIG. 1. *Noctua xanthographa*, male.

- | | | | |
|-------------|---|-----------|--------------------------|
| 1 <i>a.</i> | „ | „ | female, |
| 1 <i>b.</i> | „ | „ | male, var. |
| 1 <i>c.</i> | „ | „ | „ „ |
| 1 <i>d.</i> | „ | „ | „ „ |
| 1 <i>e.</i> | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | neglecta. | |
| 2 <i>a.</i> | „ | „ | var. Mr. G. T. Porritt. |
| 2 <i>b.</i> | „ | „ | „ Mr. F. C. Woodforde. |
| 2 <i>c.</i> | „ | „ | „ larva, Mr. W. Buckler. |



1



1a



1b



1c



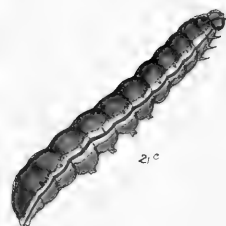
1d



1e



2



2c



2a



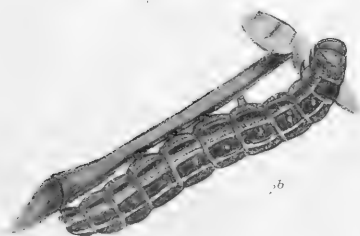
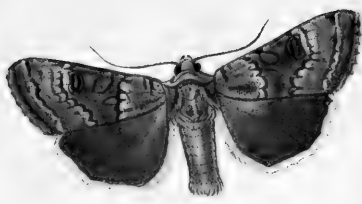
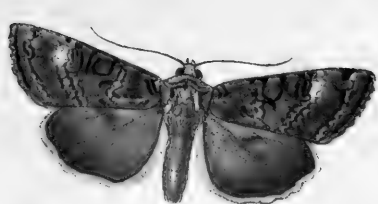
2b

1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900

PLATE CXLIX.

FIG. 1. *Eurois herbida*.

- | | | | |
|--------------|---|---|-------------------------|
| 1 <i>a</i> . | „ | „ | var. Dr. H. H. Corbett. |
| 1 <i>b</i> . | „ | „ | „ „ „ |
| 1 <i>c</i> . | „ | „ | „ „ „ |
| 1 <i>d</i> . | „ | „ | „ Mr. G. T. Porritt. |
| 1 <i>e</i> . | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | „ | satura, male. |
| 2 <i>a</i> . | „ | „ | female. |
| 2 <i>b</i> . | „ | „ | larva. |



F. M. & S. Child

Vincent Brooks Day & Son Ltd

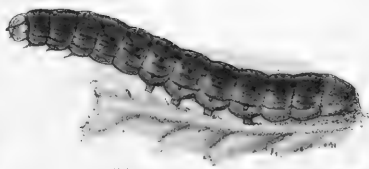
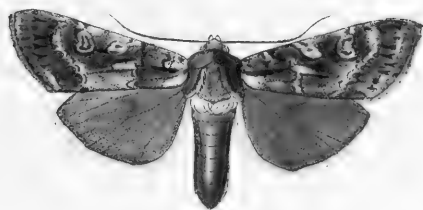
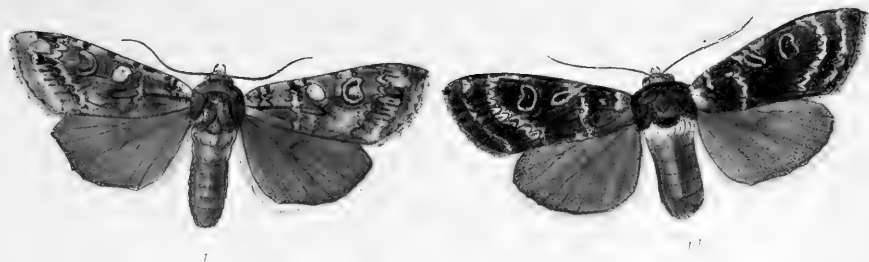
L. Rees & Co. London



PLATE CL.

FIG. 1. *Eurois occulta*.

- | | | | |
|-----|---|-----------------|------------------------------------|
| 1a. | ” | ” | var. Scotland. |
| 1b. | ” | ” | ” bred by Mr. R. Adkin. |
| 1c. | ” | ” | larva, Mr. W. Buckler. |
| 2. | ” | <i>adusta</i> , | male. |
| 2a. | ” | ” | female. |
| 2b. | ” | ” | var. Yorkshire, Mr. G. T. Porritt. |
| 2c. | ” | ” | ” Perthshire, Mrs. A. Fraser. |
| 2d. | ” | ” | larva, Mr. W. Buckler. |



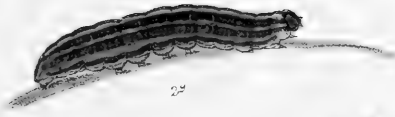
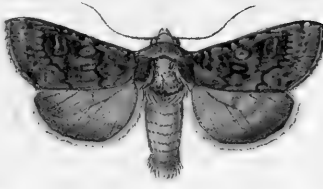
1. *M. gl. n. = 10*

11. *M. gl. n. = 10*



PLATE CLI.

- FIG. 1. *Crymodes exulis*, Perthshire.
1*a.* " " Shetland.
1*b.* " " var. *Maillardi*, Shetland.
2. *Charæas graminis*, male.
2*a.* " " female.
2*b.* " " male, var.
2*c.* " " " "
2*d.* " " female "
2*e.* " " " "
2*f.* " " " "
2*g.* " " larva, Mr. W. Buckler.



R. M. G. n. l. e. m. l. h.

W. H. & C. G. Day & Co. 10 P.

L. Reeve & Co. London

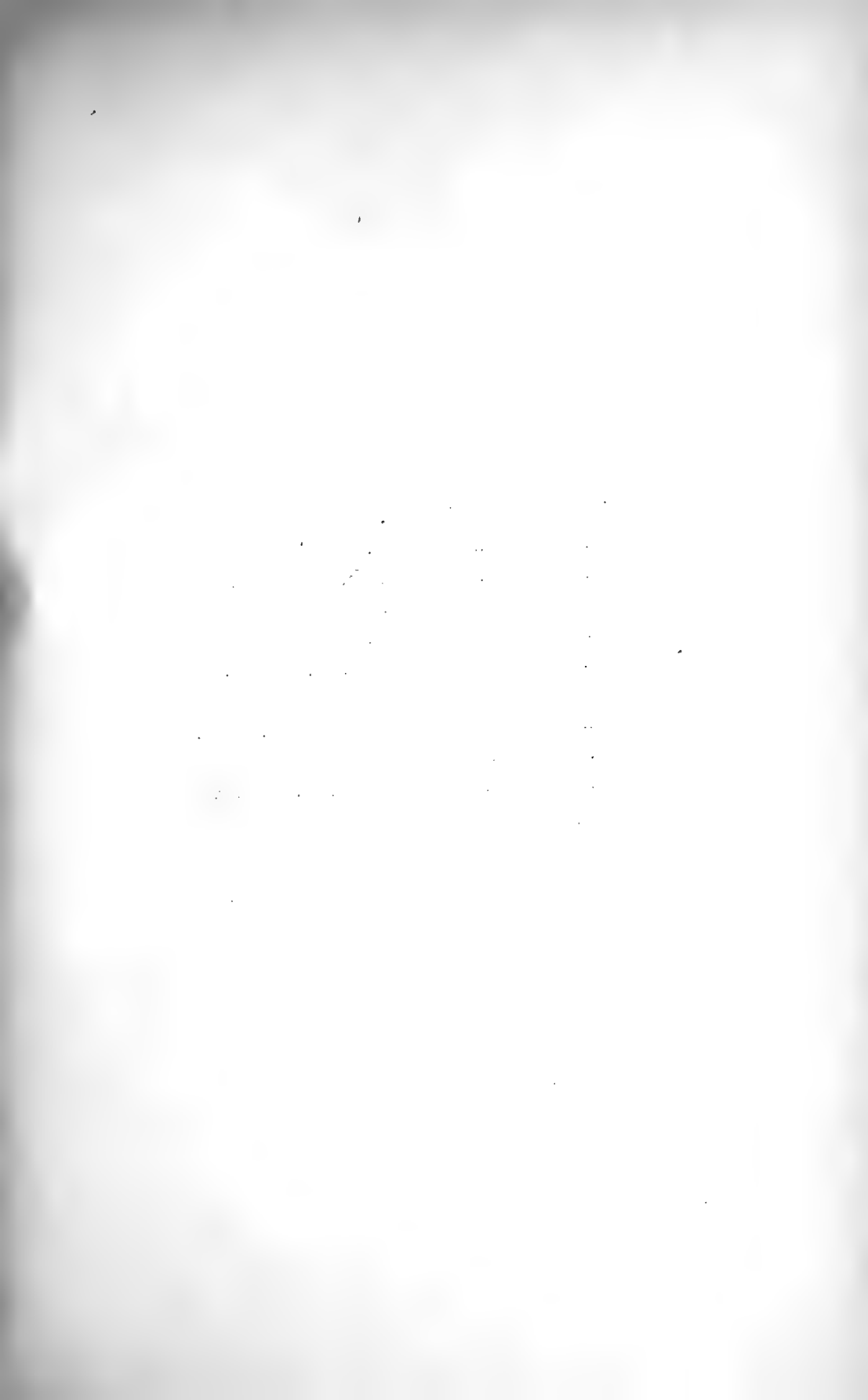


PLATE CLII.

- FIG. 1. *Heliophobus popularis*, male.
1*a.* " " female.
1*b.* " " larva, Mr. W. Buckler.
2. " *cespitis*, male.
2*a.* " " female.
2*b.* " " larva, Mr. W. Buckler.
3. *Xylomyges conspicillaris*.
3*a.* " " var. Dr. John H. Wood.
3*b.* " " " " "
3*c.* " " larva, Mr. W. Buckler.



Morgan del et lit

Vincent Brooks, Day & Son Imp

L Reeve & Co London





PLATE CLIII.

FIG. 1. *Pachetra leucophæa*, male, Mr. F. J. Hanbury.

- | | | | | | |
|------------------------------------|----|----|------------------------|----|----|
| 1 <i>a.</i> | ,, | ,, | female, | ,, | ,, |
| 1 <i>b.</i> | ,, | ,, | male, var. | ,, | ,, |
| 1 <i>c.</i> | ,, | ,, | ,, | ,, | ,, |
| 1 <i>d.</i> | ,, | ,, | female, | ,, | ,, |
| 1 <i>e.</i> | ,, | ,, | ,, | ,, | ,, |
| 1 <i>f.</i> | ,, | ,, | larva, Mr. W. Buckler. | | |
| 2. <i>Neuria saponariæ</i> , male. | | | | | |
| 2 <i>a.</i> | ,, | ,, | female. | | |
| 2 <i>b.</i> | ,, | ,, | larva, Mr. W. Buckler. | | |



1.



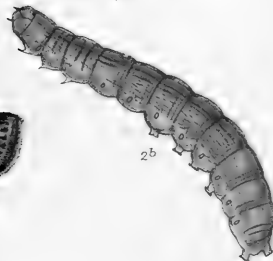
1a



1f



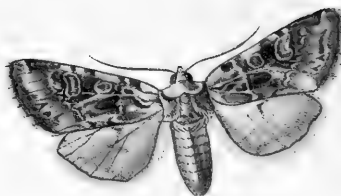
1b



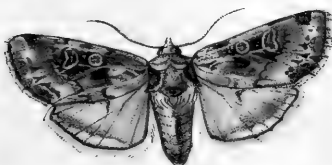
2b



1c



1d



1e



2



2a

R Morgan del. et lith

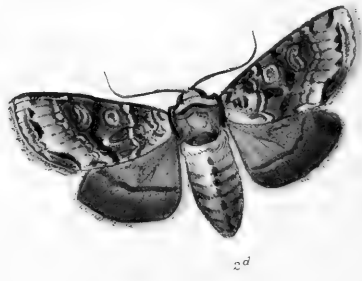
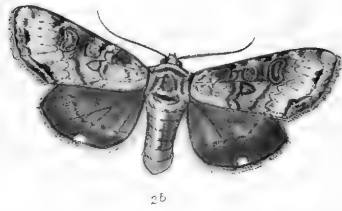
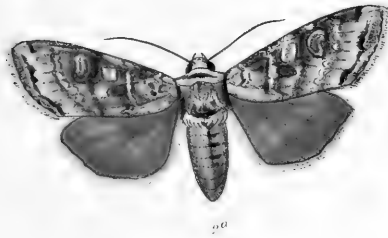
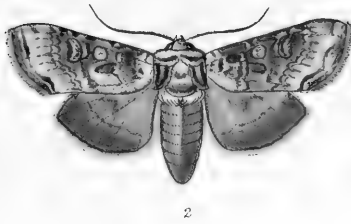
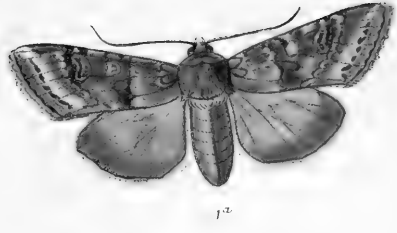
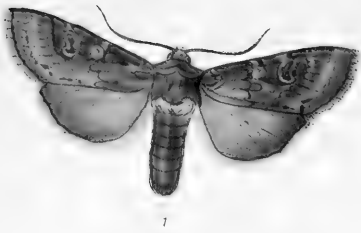
Vincent Brooks, D. y & C. en. Imp.

L. Reeve & C^o London

PLATE CLIV.

FIG. 1. *Aplecta advena*, male.

- | | | | |
|-------------|---|-----------------|-------------------------------------|
| 1 <i>a.</i> | „ | „ | female. |
| 1 <i>b.</i> | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | <i>tincta</i> , | male, South of England. |
| 2 <i>a.</i> | „ | „ | female, „ „ |
| 2 <i>b.</i> | „ | „ | Scotland. |
| 2 <i>c.</i> | „ | „ | Staffordshire, Mr. F. C. Woodforde. |
| 2 <i>d.</i> | „ | „ | var. „ „ „ |
| 2 <i>e.</i> | „ | „ | larva, Mr. W. Buckler. |



R. Morgan del et lith

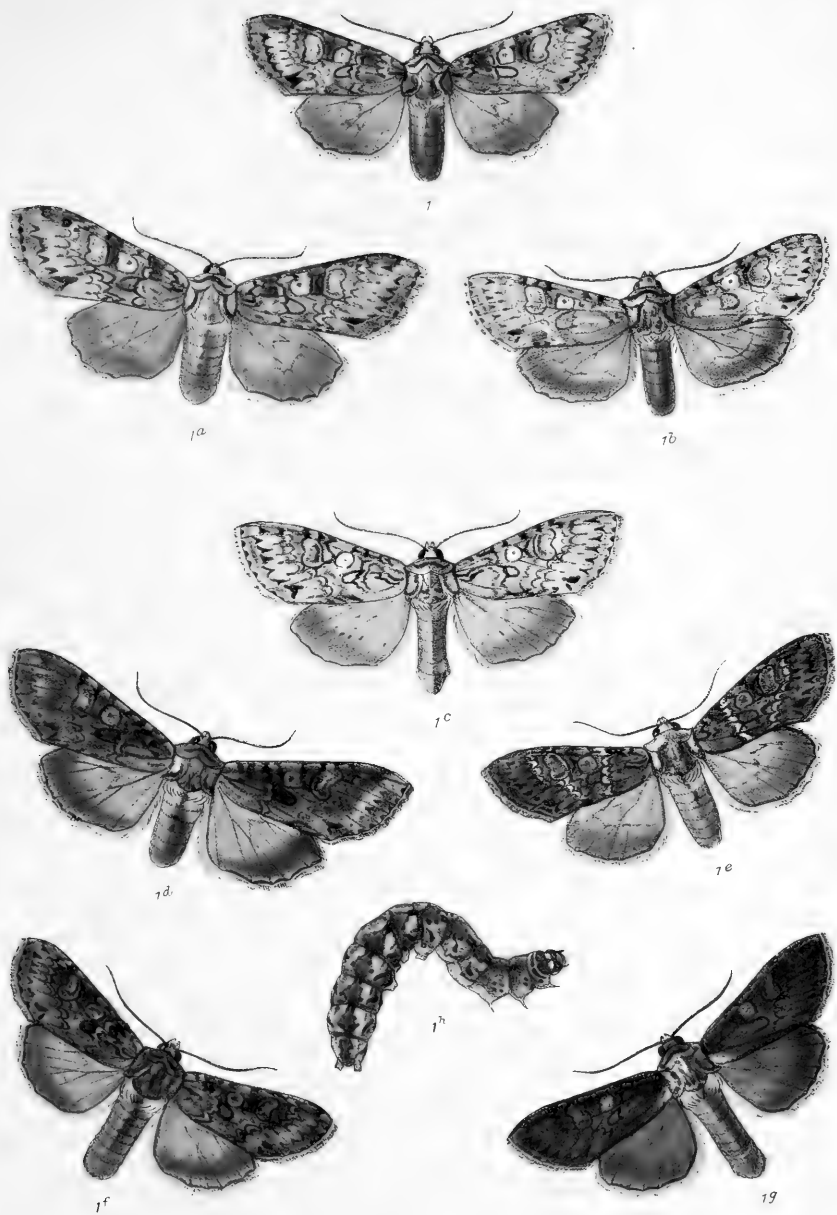
Vincent Brooks Day & Son Imp

L. Reeve & Co London.

PLATE CLV.

FIG. 1. *Aplecta nebulosa*, male.

1a.	„	„	female.	
1b.	„	„	male, var. Pembroke.	
1c.	„	„	female, var.	„
1d.	„	„	„	„
1e.	„	„	male,	„ Norfolk.
1f.	„	„	„	„ Cheshire.
1g.	„	„	„	„ „ Mr. J. Collins.
1h.	„	„	larva,	Mr. W. Buckler.





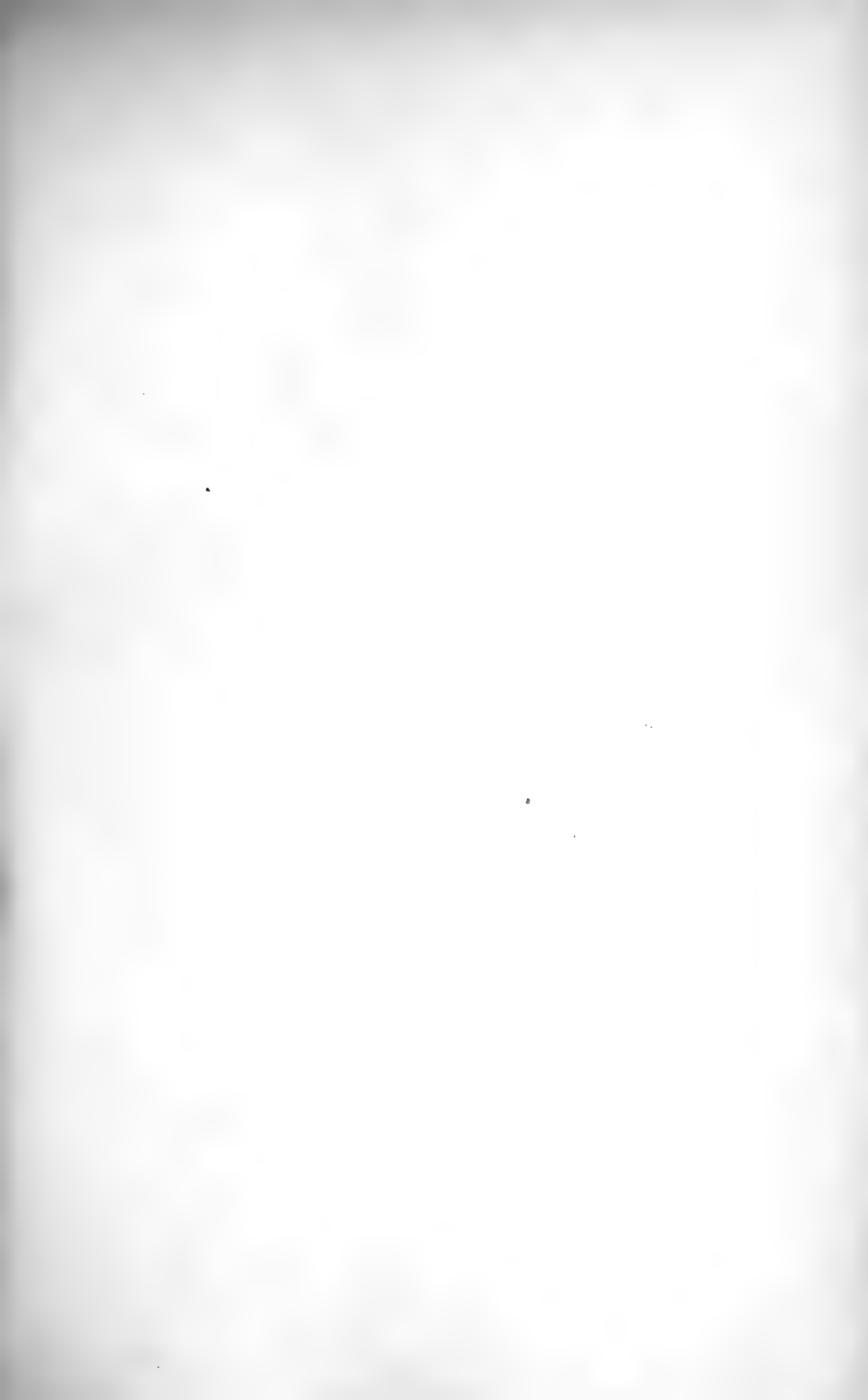


PLATE CLVI.

- FIG. 1. *Hadena contigua*, male.
1*a.* ,, ,, female.
1*b.* ,, ,, var. Scotland.
1*c.* ,, ,, larva, Mr. W. Buckler.
2. ,, *thalassina*, male.
2*a.* ,, ,, female.
2*b.* ,, ,, male, var. Dr. H. H. Corbett.
2*c.* ,, ,, female, var.
2*d.* ,, ,, larva, Mr. W. Buckler.
3. ,, *peregrina*, Mr. R. McLachlan.

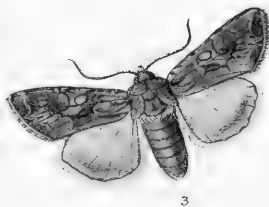
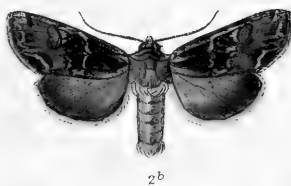
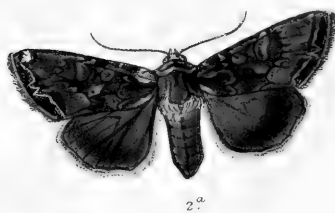
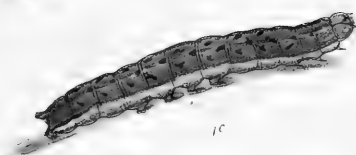
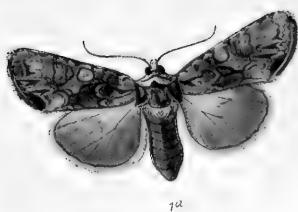


PLATE CLVII.

FIG. 1. *Hadena suasa*, male.

- 1*a.* " " female.
- 1*b.* " " var.
- 1*c.* " " " Chatmoss.
- 1*d.* " " larva, Mr. W. Buckler.
- 2. " pisi, male.
- 2*a.* " " female.
- 2*b.* " " var.
- 2*c.* " " " Mr. P. M. Bright.
- 2*d.* " " " " " "
- 2*e.* " " larva, Mr. W. Buckler.



R Morgan del, et lith.

Wentworth Brothers, Day & Son, Imp

L Reeve C^o London





PLATE CLVIII.

FIG. 1. *Hadena oleracea*.

- 1*a.* ,, ,, var. Scotland.
- 1*b.* ,, ,, larva, Mr. W. Buckler.
- 2. ,, *genistæ*, male.
- 2*a.* ,, ,, female.
- 2*b.* ,, ,, larva, Mr. W. Buckler.
- 3. ,, *glauca*, male.
- 3*a.* ,, ,, female.
- 3*b.* ,, ,, var.
- 3*c.* ,, ,, larva, Mr. W. Buckler.



W. W. Gardel et lith

Vincent Brooks Day & Son Imp.

L. Reeve & Co London

PLATE CLIX.

FIG. 1. *Hadena dentina*, male.

- | | | | |
|-------------|---|---|-------------------------|
| 1 <i>a.</i> | „ | „ | female. |
| 1 <i>b.</i> | „ | „ | var. |
| 1 <i>c.</i> | „ | „ | „ |
| 1 <i>d.</i> | „ | „ | „ |
| 1 <i>e.</i> | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | | <i>chenopodii</i> male. |
| 2 <i>a.</i> | „ | „ | female. |
| 2 <i>b.</i> | „ | „ | var. |
| 2 <i>c.</i> | „ | „ | var. <i>albifusa</i> . |
| 2 <i>d.</i> | „ | „ | larva, Mr. W. Buckler. |



1



1^a



1^b



1^c



1^d



1^e



2



2^d



2^a



2^b



2^c

PLATE CLX.

- FIG. 1. *Manestra albicolon*, male.
1*a.* " " female.
1*b.* " " larva, Mr. W. Buckler.
2. " *brassicæ*, male.
2*a.* " " female.
2*b.* " " larva, Mr. W. Buckler.
3. " *persicariæ*, male.
3*a.* " " female.
3*b.* " " larva, Mr. W. Buckler.



1



1a



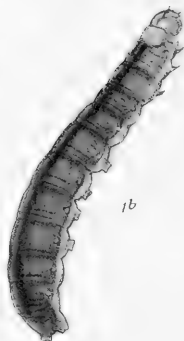
2



3b



2a



1b



3



2b



3a





PLATE CLXI.

- FIG. 1. *Hecatera dysodea*, male.
- | | | | |
|-------------|---|---------|---|
| 1 <i>a.</i> | „ | „ | female, Mr. P. M. Bright. |
| 1 <i>b.</i> | „ | „ | var. |
| 1 <i>c.</i> | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | serena. | |
| 2 <i>a.</i> | „ | „ | var. Pembrokeshire. |
| 2 <i>b.</i> | „ | „ | larva, Mr. W. Buckler. |
| 3. | | | <i>Dianthoccia irregularis</i> , male, Mr. S. Webb. |
| 3 <i>a.</i> | „ | „ | female. „ |
| 3 <i>b.</i> | „ | „ | larva, Mr. W. Buckler. |



1



1^a



1^b



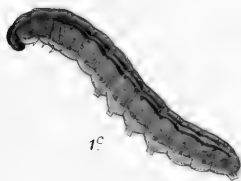
2



2^a



2^b



1^c



3^b



3



3^a

PLATE CLXII.

FIG. 1. *Dianthœcia carpophaga*, South of England.

1a.	„	„	var. Suffolk.
1b.	„	„	„ „
1c.	„	„	„ Sussex.
1d.	„	„	„ Mr. S. Webb.
1e.	„	„	„ South Scotland, Mr. A. Elliot.
1f.	„	„	„ South Wales, Mr. W. F. H. Blandford.
1g.	„	„	„ „
1h.	„	„	„ capsophila, Ireland.
1i.	„	„	„ „ „
1j.	„	„	„ „ „ Mr. S. Webb.
1k.	„	„	larva, type, Mr. W. Buckler.
1l.	„	„	„ „ var. capsophila, Mr. W. Buckler.

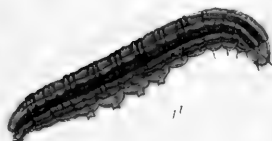
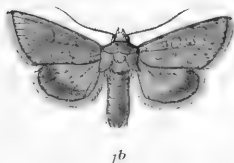
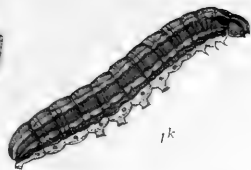


PLATE CLXIII.

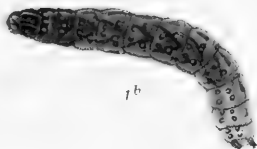
- FIG. 1. *Dianthcecia cucubali*, male, Mr. S. Webb.
1*a.* " " female "
1*b.* " " larva, Mr. W. Buckler.
2. " *capsincola*, male.
2*a.* " " female.
2*b.* " " var. Mr. S. Webb.
2*c.* " " larva, Mr. W. Buckler.
3. " *albimacula*, male, Mr. J. W. Downing.
3*a.* " " female, Mr. S. Webb.
3*b.* " " larva, Mr. W. Buckler.



1



1^a



1^b



2^b



2^a



3^b



2^b



2^c



3



3^a



PLATE CLXIV.

FIG. 1. *Dianthoëcia conspersa*, Mr. S. Webb.

1 <i>a.</i>	”	”	var.	”
1 <i>b.</i>	”	”	”	Mr. W. C. Boyd.
1 <i>c.</i>	”	”	”	Forres, Mr. S. Webb.
1 <i>d.</i>	”	”	”	Aberdeen, ”
1 <i>e.</i>	”	”	”	Shetland, ”
1 <i>f.</i>	”	”	”	” ” ”
1 <i>g.</i>	”	”	”	N. Wales, ”
1 <i>h.</i>	”	”	larva,	Mr. W. H. B. Fletcher.



1



1a



1b



1c



1d



1e



1f



1h



1g

R. Morgan del et lith.

Vincent Brooks Day & Son Imp

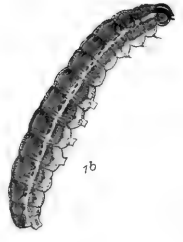
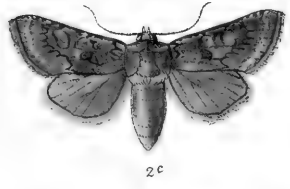
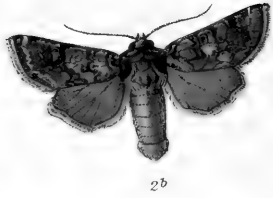
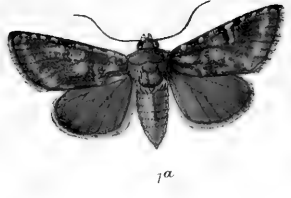
L. Reeve & Co London





PLATE CLXV.

- FIG. 1. *Dianthœcia cœsia*, male.
1*a.* „ „ female.
1*b.* „ „ larva, Mr. W. Buckler.
2. „ „ *luteago*, var. *Barrettii*, male
(original specimen).
2*a.* „ „ „ „ female.
2*b.* „ „ „ „ South Wales, Mr.
W. F. H. Blandford.
2*c.* „ „ „ „ North Devon, Mr. W. C.
Boyd.
2*d.* „ „ „ „ larva, Mr. W. Buckler.
3. *Ulochlœna hispida*, male.
3*a.* „ „ „ female.
3*b.* „ „ „ var. Dr. P. B. Mason.
3*c.* „ „ „ „ larva, Mr. W. Buckler.



R. Morgan del. et lith.

Vincent Brooks, Day & Son. Imp.

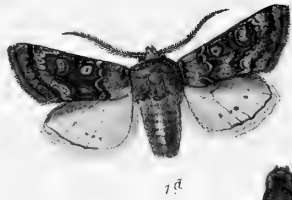
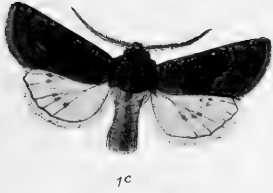
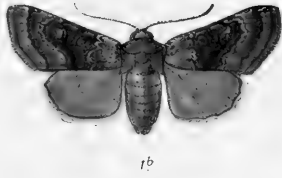
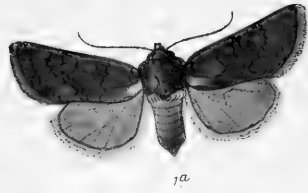
L. Reeve & Co. London.



PLATE CLXVI.

FIG. 1. *Aporophyla lutulenta*, male.

- | | | | |
|-------------|---|--------|--|
| 1 <i>a.</i> | „ | „ | female. |
| 1 <i>b.</i> | „ | „ | var. Kent, Major A. Ficklin. |
| 1 <i>c.</i> | „ | „ | „ Sligo, Mr. P. Russ. |
| 1 <i>d.</i> | „ | „ | „ „ „ „ |
| 1 <i>e.</i> | „ | „ | larva, Mr. W. Buckler. |
| 2. | „ | nigra. | |
| 2 <i>a.</i> | „ | „ | var. Carlisle, Mr. G. B.
Routledge. |
| 2 <i>b.</i> | „ | „ | female, „ „ |
| 2 <i>c.</i> | „ | „ | larva, Mr. W. Buckler. |



R Morgan del et lith.

Vincent Brooks, Day & Son Imp

L Reeve & Co London



PLATE CLXVII.

FIG. 1. *Aporophyla australis*, male, Mr. F. J. Hanbury.

- | | | | | | |
|-------------|---|---|------------|-----------------|---|
| 1 <i>a.</i> | „ | „ | female, | „ | „ |
| 1 <i>b.</i> | „ | „ | male, var. | „ | „ |
| 1 <i>c.</i> | „ | „ | female, | „ | „ |
| 1 <i>d.</i> | „ | „ | larva, | Mr. W. Buckler. | |

2. *Epunda lichenea*, male.

- | | | | | | |
|-------------|---|---|------------------------|--------------------------|--|
| 2 <i>a.</i> | „ | „ | female. | | |
| 2 <i>b.</i> | „ | „ | male, var. Portland, | Mr. N. M.
Richardson. | |
| 2 <i>c.</i> | „ | „ | female, var. Pembroke. | | |
| 2 <i>d.</i> | „ | „ | larva, | Mr. W. Bückler. | |



1



1a



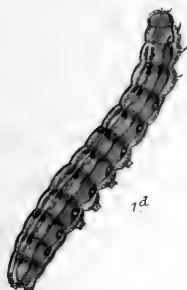
1b



1c



2



1d



2a



2d



2b

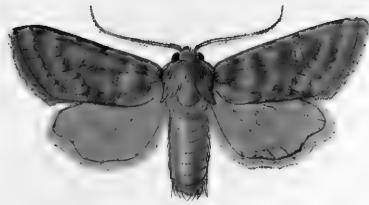


2c



PLATE CLXVIII.

- FIG. 1. *Dasyptolia templi*, male.
- | | | | |
|-------------|---|---|---------------------------|
| 1 <i>a.</i> | „ | „ | female, Major A. Ficklin. |
| 1 <i>b.</i> | „ | „ | male, var. |
| 1 <i>c.</i> | „ | „ | female, var. |
| 1 <i>d.</i> | „ | „ | larva, Mr. W. Buckler. |
2. *Polia xanthomista*, male, Mr. S. J. Capper.
- | | | | |
|-------------|---|---|------------------------|
| 2 <i>a.</i> | „ | „ | female, „ „ |
| 2 <i>b.</i> | „ | „ | larva, Mr. W. Buckler. |



1



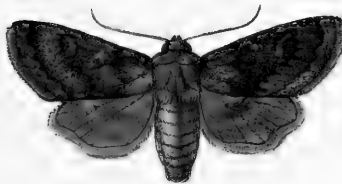
1^a



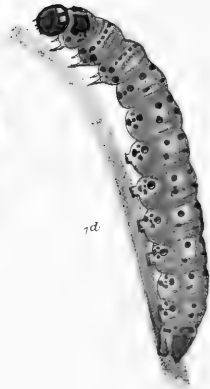
1^b



2^b



1^c



1^d



2



2^a

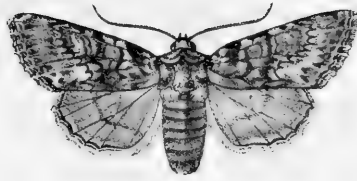




PLATE CLXIX.

FIG. 1. *Polia flavicineta*, male.

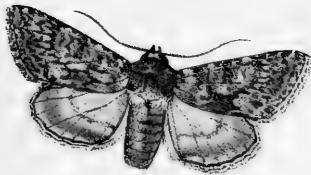
- | | | | |
|-----|---|---|--|
| 1a. | „ | „ | female. |
| 1b. | „ | „ | var. Huddersfield, Mr. G. T.
Porritt. |
| 1c. | „ | „ | „ „ „ „ |
| 1d. | „ | „ | „ Norfolk |
| 1e. | „ | „ | „ Mr. Sydney Webb. |
| 1f. | „ | „ | larva, Mr. W. Buckler. |



1a



1b



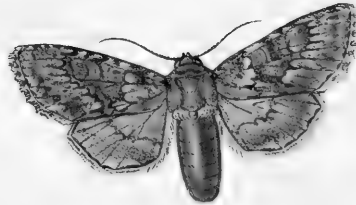
1c



1f



1d



1e

R. Morgan del. et lith.

Vincent Brooks Day & Son Imp.

L. Reeve & Co. London.



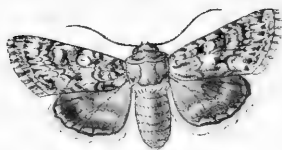
PLATE CLXX.

FIG. 1. *Polia chi*, male.

- 1*a.* " " female.
- 1*b.* " " var. Mr. Sydney Webb.
- 1*c.* " " " Mr. G. T. Porritt.
- 1*d.* " " " " "
- 1*e.* " " " " "
- 1*f.* " " " " "
- 1*g.* " " " " "
- 1*h.* " " " *olivacea*, Dr. Mason.
- 1*i.* " " " larva, Mr. W. Buckler.



7a



7b



7c



7d



7e



7f



7g



7h



7i



7j



PLATE CLXXI.

FIG. 1. *Dryobota protea*, male.

1*a.* ,, ,, female.

1*b.* ,, ,, var.

1*c.* ,, ,, ,, Dr. Mason.

1*d.* ,, ,, ,, ,, "

1*e.* ,, ,, larva, Mr. W. Buckler.

2. *Cleoceris viminalis*, male.

2*a.* ,, ,, female.

2*b.* ,, ,, var. Reading, Mr. A. H.

Hamm.

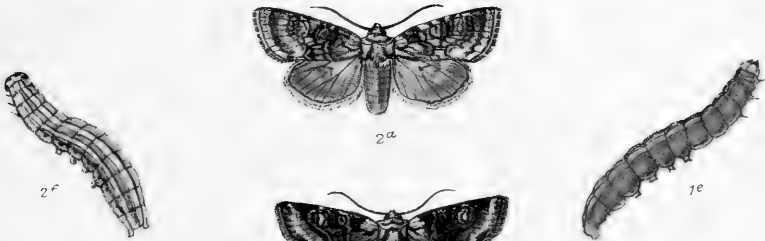
2*c.* ,, ,, ,, Scotland, Mr. P. M.

Bright.

2*d.* ,, ,, ,, N. England ,, "

2*e.* ,, ,, ,, ,, "

2*f.* ,, ,, larva, Mr. W. Buckler.



R. Morgan del et lith

Vincent Brooks, Day & Son Imp

L. Reeve & Co London



PLATE CLXXII.

FIG. 1. *Chariptera aprilina*.

- | | | | |
|--------------------------------|----|----|--------------------------------------|
| 1 <i>a.</i> | ,, | ,, | var. Ireland, Capt. E. W.
Browne. |
| 1 <i>b.</i> | ,, | ,, | ,, ,, ,, ,, |
| 1 <i>c.</i> | ,, | ,, | ,, Rev. E. N. Bloomfield. |
| 1 <i>d.</i> | ,, | ,, | ,, Mr. G. T. Porritt. |
| 1 <i>e.</i> | ,, | ,, | larva, Mr. G. C. Bignell. |
| 2. <i>Miselia oxyacanthæ</i> . | | | |
| 2 <i>a.</i> | ,, | ,, | var. |
| 2 <i>b.</i> | ,, | ,, | ,, capucina. |
| 2 <i>c.</i> | ,, | ,, | larva, Mr. W. Buckler. |



1



1a



1b



1c



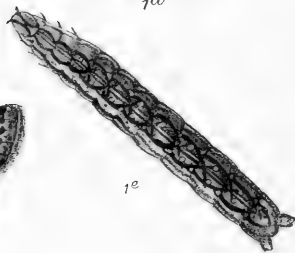
1d



2c



2



1e



2a



2b

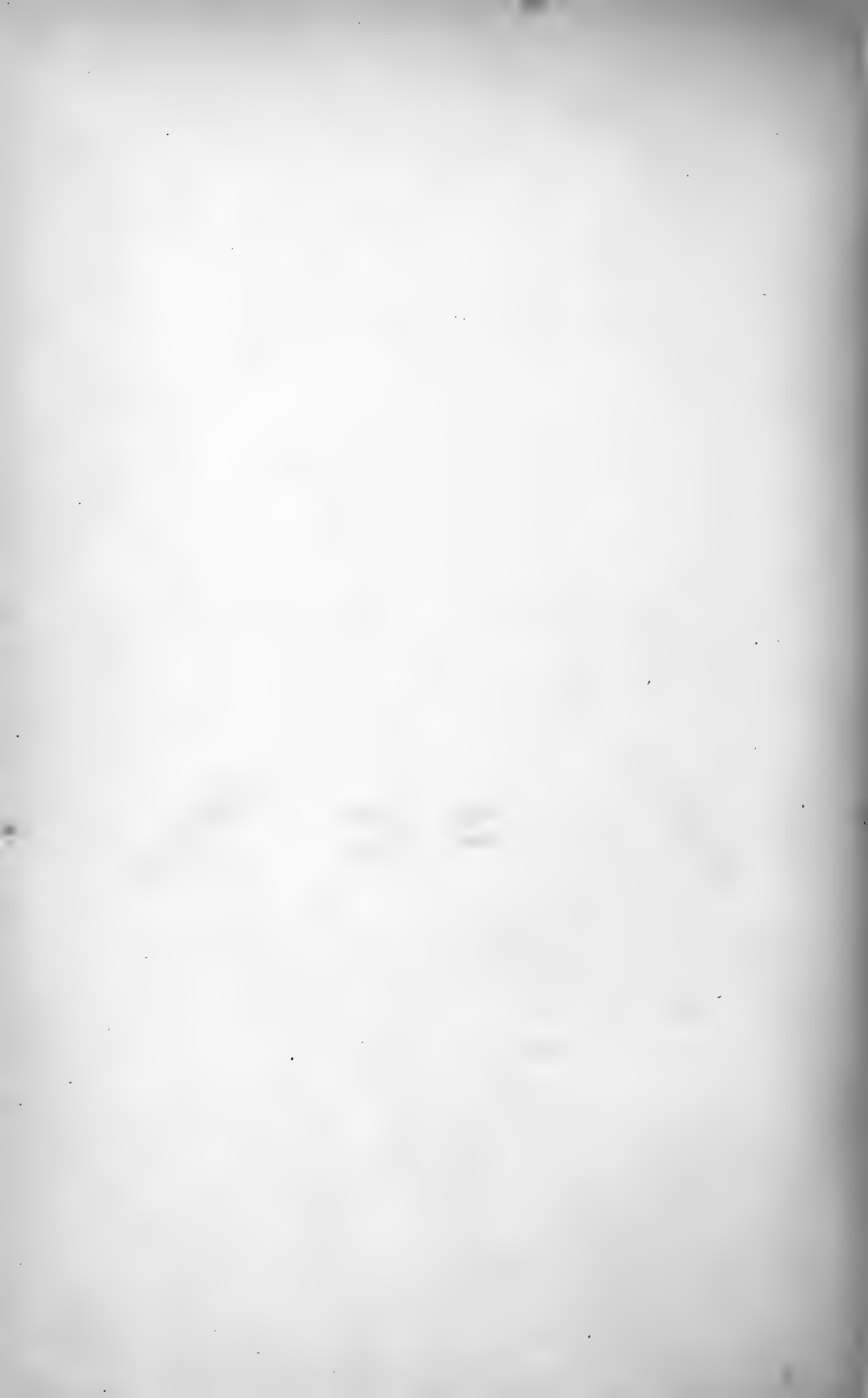




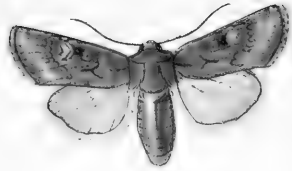
PLATE CLXXIII.

FIG. 1. *Luperina testacea*, male.

1 <i>a.</i>	„	„	female.
1 <i>b.</i>	„	„	male var. Mr. E. A. Atmore.
1 <i>c.</i>	„	„	female var. West of Ireland.
1 <i>d.</i>	„	„	„ „ Mr. G. T. Porritt.
1 <i>e.</i>	„	„	„ „ Dublin coast.
1 <i>f.</i>	„	„	„ „ Isle of Wight.
1 <i>g.</i>	„	„	„ „ Dr. P. B. Mason.
1 <i>h.</i>	„	„	male var. Guenèei, „ „
1 <i>i.</i>	„	„	„ intermediate, „ „
1 <i>j.</i>	„	„	„ var. Mr. G. T. Porritt.
1 <i>k.</i>	„	„	larva, Mr. W. Buckler.



1



1a



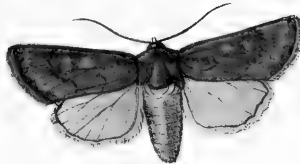
1b



1c



1d



1e



1f



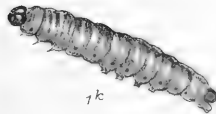
1g



1h



1i



1k



1j





PLATE CLXXIV.

- FIG. 1. *Luperina Dumerili*, male.
1*a.* " " female.
2. *Valeria oleagina*, male.
2*a.* " " female.
3. *Cerigo cytherea*, male.
3*a.* " " female.
3*b.* " " larva, Mr. W. Buckler.



1



1a



2



2a



2b



3



3a

R Morgan, del, et lith

Vincent, Brooks, Day & Son, Imp

L Reeve & Co London

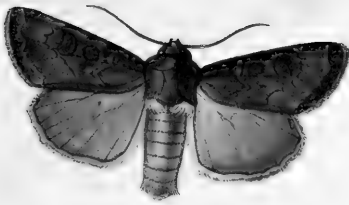




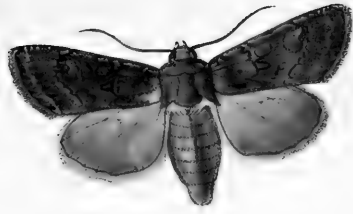
PLATE CLXXV.

FIG. 1. *Hama abjecta*, male.

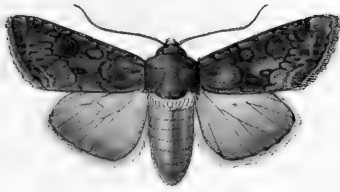
- 1*a.* ,, ,, female.
- 1*b.* ,, ,, var.
- 1*c.* ,, ,, larva, Mr. W. Buckler.
- 2. ,, anceps, male.
- 2*a.* ,, ,, female.
- 2*b.* ,, ,, var. Ireland.
- 2*c.* ,, ,, var.



1



1^a



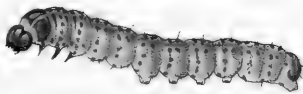
1^b



2



2^a



2^c



2^b



2^c

R. Morgan del, et lith.

Vincent Brooks Day & Son Imp.

L. Reeve & C^o London





PLATE CLXXVI.

- FIG. 1. *Hama furva*, male.
1*a.* „ „ female.
1*b.* „ „ larva, Mr. W. Buckler.
2. *Xylophasia lithoxylea*, male.
2*a.* „ „ female.
2*b.* „ „ larva, Mr. W. Buckler.
3. „ „ *sublustris*, male.
3*a.* „ „ female.
3*b.* „ „ var.

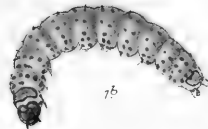
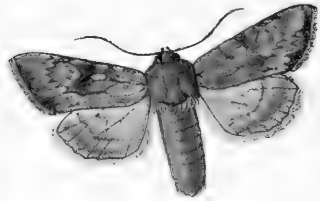
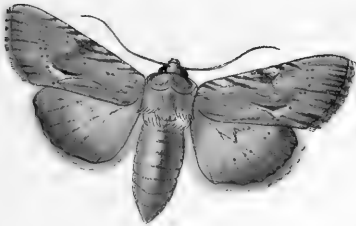
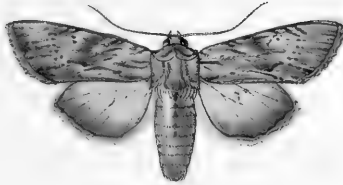
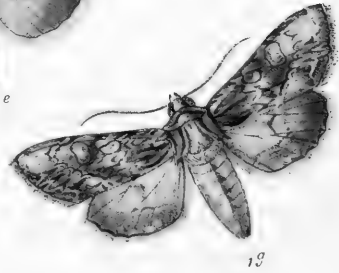
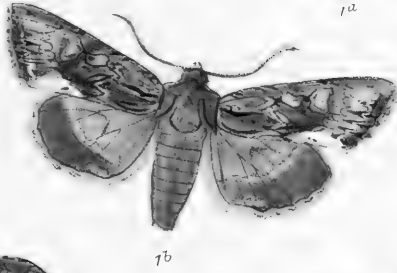
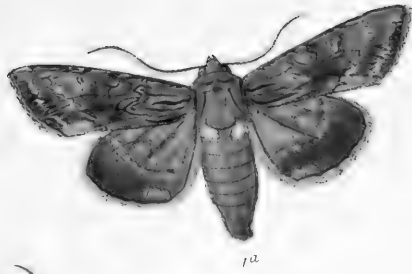


PLATE CLXXVII.

- FIG. 1. *Xylophasia polyodon*, male.
- | | | | |
|-------------|---|---|-------------------------------------|
| 1 <i>a.</i> | „ | „ | female. |
| 1 <i>b.</i> | „ | „ | var. Pembroke. |
| 1 <i>c.</i> | „ | „ | „ Norfolk. |
| 1 <i>d.</i> | „ | „ | „ „ |
| 1 <i>e.</i> | „ | „ | „ Surrey. |
| 1 <i>f.</i> | „ | „ | „ Dublin. |
| 1 <i>g.</i> | „ | „ | „ Sutherland, Mr. F. J.
Hanbury. |
| 1 <i>h.</i> | „ | „ | larva, Mr. W. Buckler. |



R Morgan del, et lith

Vincent Brooks, Day & Son Imp

L. Reeve & Co London.



PLATE CLXXVIII.

FIG. 1. *Xylophasia polyodon*, var. Galway.

1 <i>a.</i>	”	”	”	Sutherlandshire, Mr. F. J. Hanbury.
1 <i>b.</i>	”	”	”	”
1 <i>c.</i>	”	”	”	”
1 <i>d.</i>	”	”	”	”
1 <i>e.</i>	”	”	”	Yorkshire, Mr. G. T. Porritt.
1 <i>f.</i>	”	”	”	”
1 <i>g.</i>	”	”	”	West of Ireland.



1



1a



1b



1c



1d



1e



1f



1g





PLATE CLXXIX.

FIG. 1. *Xylophasia rurea*, male.

- | | | | |
|-----|---|---|------------------------------|
| 1a. | „ | „ | female. |
| 1b. | „ | „ | var. Aberdeen, Mr. A. Horne. |
| 1c. | „ | „ | „ „ „ |
| 1d. | „ | „ | „ „ „ |
| 1e. | „ | „ | „ Lanark, Mr. K. J. Morton. |
| 1f. | „ | „ | „ Haslemere, Surrey. |
| 1g. | „ | „ | „ Mr. P. M. Bright. |
| 1h. | „ | „ | „ larva, Mr. W. Buckler. |



1.



1^a



1^b



1^c



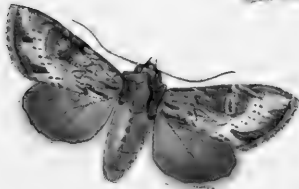
1^d



1^e



1^h



1^f



1^g

R. Morgan del et lith.

Vincent Brooks Day & Son Imp

I. Reeve & C^o London

PLATE CLXXX.

- FIG. 1. *Xylophasia rurea*, var. *combusta*, Surrey.
- | | | | | | |
|-------------|---|-----------------|------------------------|---|----------------------------|
| 1 <i>a.</i> | „ | „ | „ | „ | Yorkshire. |
| 1 <i>b.</i> | „ | „ | „ | „ | Aberdeen, Mr.
A. Horne. |
| 1 <i>c.</i> | „ | „ | „ | „ | Shetland. |
| 2. | „ | hepatica, male. | | | |
| 2 <i>a.</i> | „ | „ | female. | | |
| 2 <i>b.</i> | „ | „ | var. | | |
| 2 <i>c.</i> | „ | „ | „ | | |
| 2 <i>d.</i> | „ | „ | larva, Mr. W. Buckler. | | |



1



1a



1b



1c



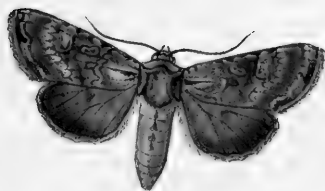
2



2a



2d



2b



2c



PLATE CLXXXI.

FIG. 1. *Xylophasia scolopacina*, male.

1*a.* " " female.

1*b.* " " var. London district.

1*c.* " " var.

1*d.* " " larva, Mr. W. Buckler.

2. *Apamea basilinea*, male.

2*a.* " " female.

2*b.* " " var.

2*c.* " " "

2*d.* " " larva, Mr. W. Buckler.



1.



1c



1b



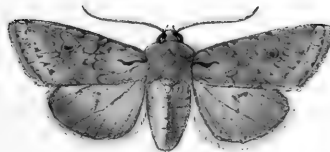
1c



2



1a



2a



2a



2b



2c

PLATE CLXXXII.

FIG. 1. *Apamea gemina*, male.

- | | | | |
|-------------|---|---|------------------------|
| 1 <i>a.</i> | „ | „ | female. |
| 1 <i>b.</i> | „ | „ | var. |
| 1 <i>c.</i> | „ | „ | „ West of Ireland. |
| 1 <i>d.</i> | „ | „ | „ |
| 1 <i>e.</i> | „ | „ | „ Wiltshire. |
| 1 <i>f.</i> | „ | „ | „ remissa. |
| 1 <i>g.</i> | „ | „ | „ „ South Wales. |
| 1 <i>h.</i> | „ | „ | larva, Mr. W. Buckler. |



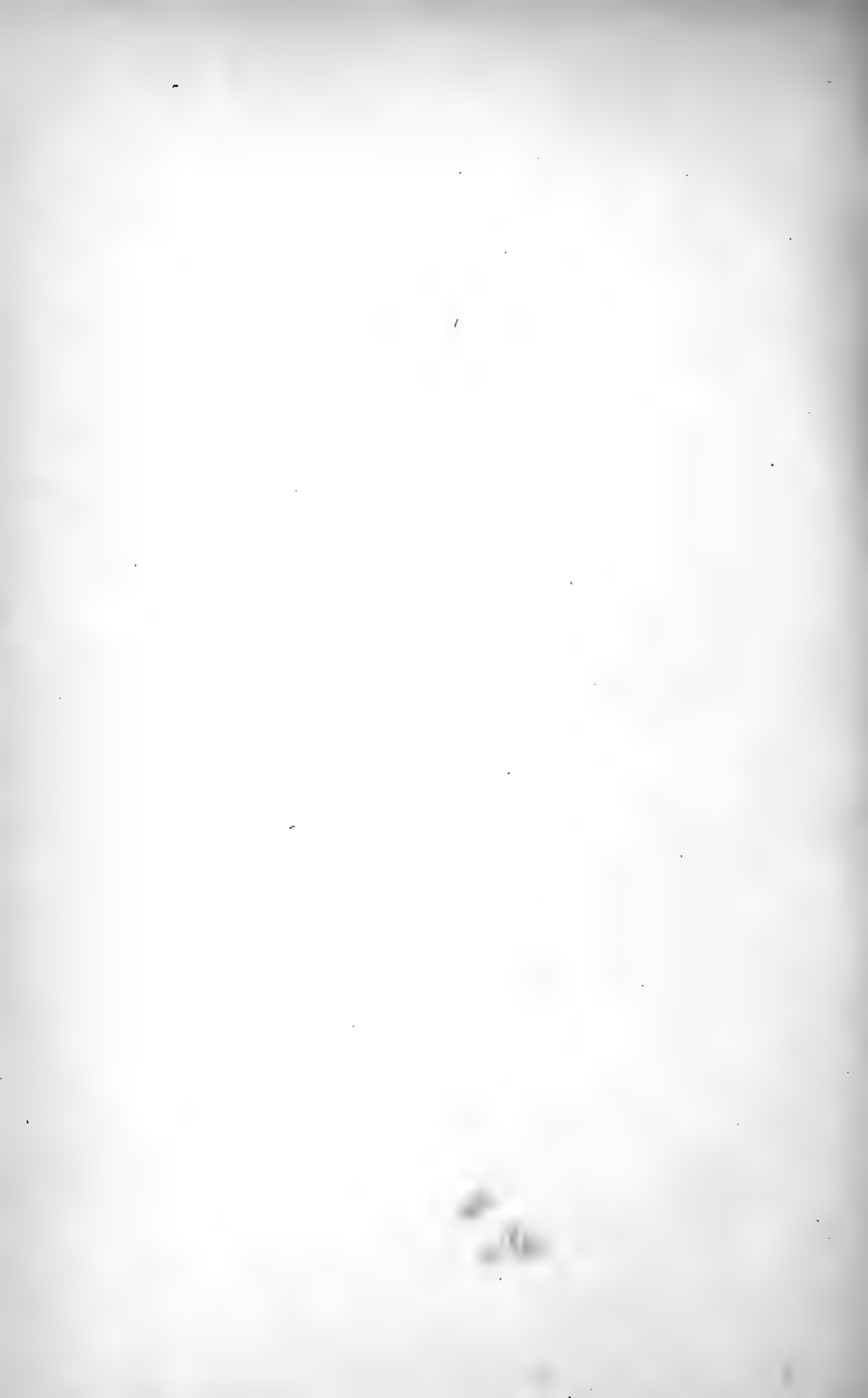




PLATE CLXXXIII.

FIG. 1. *Apamea oculatea*.

1 <i>a</i> .	”	”	var. Pembroke.
1 <i>b</i> .	”	”	” Norfolk.
1 <i>c</i> .	”	”	” ”
1 <i>d</i> .	”	”	”
1 <i>e</i> .	”	”	”
1 <i>f</i> .	”	”	”
1 <i>g</i> .	”	”	” Pembroke.
1 <i>h</i> .	”	”	”
1 <i>i</i> .	”	”	” Norwich.
1 <i>j</i> .	”	”	” Mr. A. Ficklin.
1 <i>k</i> .	”	”	larva, Mr. W. Buckler.



1



1a



1b



1c



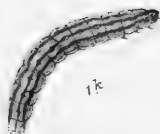
1d



1e



1f



1k



1g



1h



1i



1j

R. Morgan del et lith

Vincent Brooks Day & Son, Cap

L. Reeve & Co London



PLATE CLXXXIV.

- FIG. 1. *Apamea connexa*, male.
- | | | | | |
|-------------|---|---|--|---------------------------|
| 1 <i>a.</i> | „ | „ | female. | |
| 1 <i>b.</i> | „ | „ | var. Dr. P. B. Mason. | |
| 2. | „ | „ | unanimis, male. | |
| 2 <i>a.</i> | „ | „ | female. | |
| 2 <i>b.</i> | „ | „ | larva, Mr. W. Buckler. | |
| 3 | „ | „ | ophiogramma, male. | } Mr. F. J. Han-
bury. |
| 3 <i>a.</i> | „ | „ | female. | |
| 3 <i>b.</i> | „ | „ | var. | |
| 3 <i>c.</i> | „ | „ | „ | |
| 3 <i>d.</i> | „ | „ | larva, furnished alive, by
Mr. F. J. Hanbury. | |



1



1a



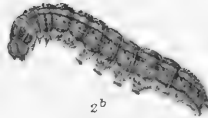
1b



2



2a



2b



3



3a



3d



3b



3c

R. Morgan del et lith.

Vincent Brooks, Day & Son, Imp.

J. Reeve & Co. London.











QL
555
G7B3
v.4
Ent.

Barrett, Charles
Golding, 1836-1904.
The Lepidoptera of
the British Islands: a
descriptive account of
the families, genera...

DATE

ISSUED TO

SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00245281 1

nhent. QL555 G7B3

v. 4 The Lepidoptera of the British Is