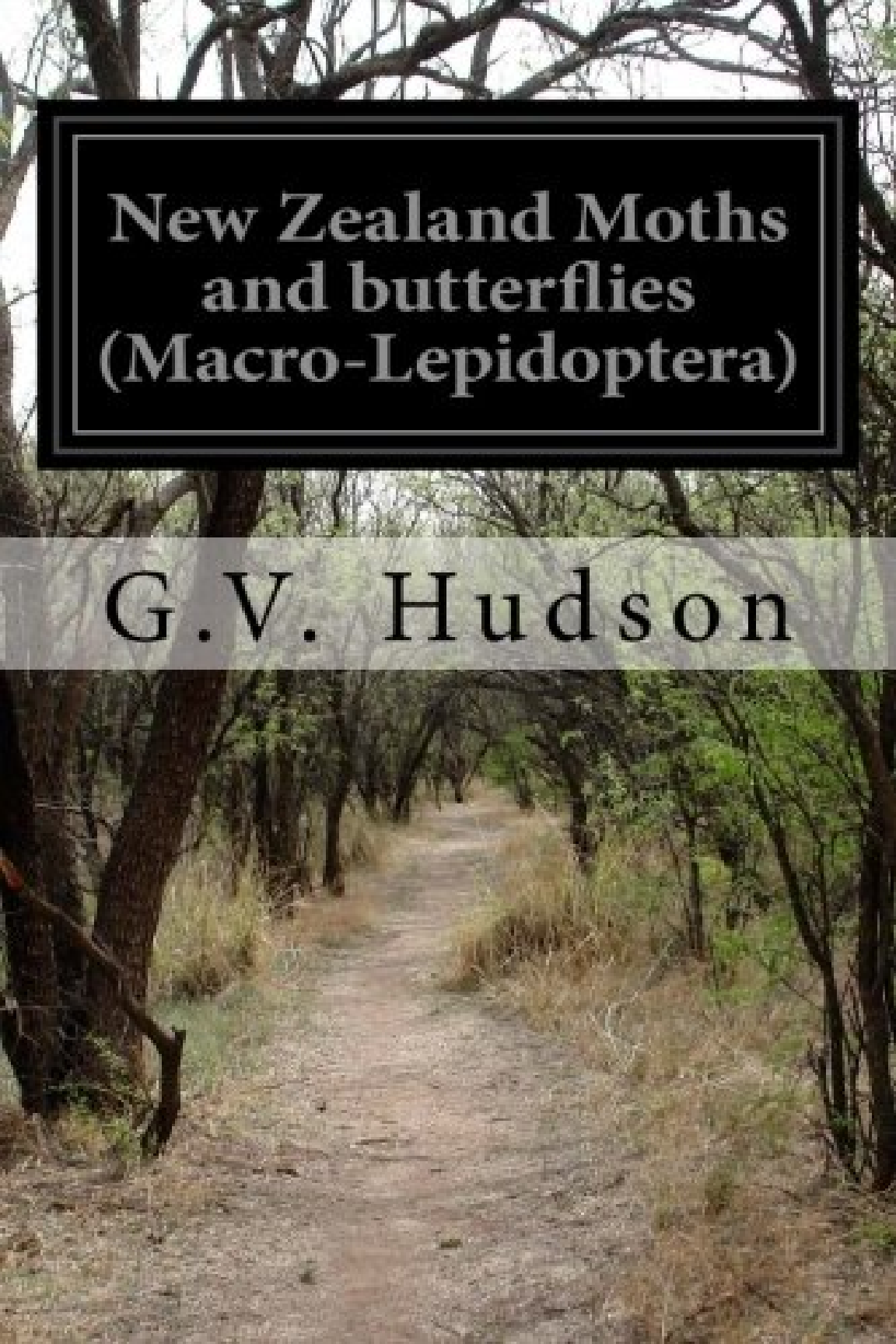

New Zealand Moths and butterflies (Macro-Lepidoptera)
G.V. Hudson

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NEW ZEALAND

MOTHS AND BUTTERFLIES.

"The rearing of larvæ, . . . when joined with the entomological collection, adds immense interest to Saturday afternoon rambles, and forms an admirable introduction to the study of physiology."

HERBERT SPENCER, *in 'Education.'*

"When simple curiosity passes into the love of knowledge as such, and the gratification of the æsthetic sense of the beauty of completeness and accuracy seems more desirable than the easy indolence of ignorance; when the finding out of the causes of things becomes a source of joy, and he is counted happy who is successful in the search; common knowledge of Nature passes into what our forefathers called Natural History, from whence there is but a step to that which used to be termed Natural Philosophy, and now passes by the name of Physical Science."

THOMAS HENRY HUXLEY, *in 'The Crayfish.'*

"It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling

through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with Reproduction; Inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the conditions of life, and from use and disuse: a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms. Thus, from the war of Nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is a grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved."

DARWIN, *in 'The Origin of Species.'*

NEW ZEALAND

MOTHS AND BUTTERFLIES

(MACRO-LEPIDOPTERA).

BY

G. V. HUDSON, F.E.S.,

Author of 'An Elementary Manual of New Zealand Entomology.'

WITH 13 PLATES.

LONDON:

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1898.



PREFACE.

The present work is intended as a guide to those who desire to collect or study our native *Lepidoptera*, and also as a book of reference to the general reader.

In the Introduction I have first given an outline of the Transformations and Structure of the *Lepidoptera*. Then a brief sketch of the Darwinian theories respecting the origin of species and their special

application to various phenomena exhibited by moths and butterflies, as well as a short outline of the general principles which have been followed in framing modern classifications of the order. Next follow five chapters on the various groups dealt with.

With a few exceptions this work only treats of what are, for the sake of convenience, termed the *Macro-Lepidoptera*. A similar work on the numerous and interesting species of *Micro-Lepidoptera* found in New Zealand may at some future time be undertaken.

In conclusion, I have to discharge the pleasurable duty of thanking the numerous entomologists who have so liberally assisted me in the production of this work. First, and especially, my thanks are due to Mr. Meyrick, without whose masterly papers and 'Handbook' but little could have been accomplished. Next, to Mr. R. W. Fereday, who very kindly allowed me to figure many species of which he alone possesses specimens—in itself an invaluable assistance. I have also to express my thanks to Messrs. E. F. Hawthorne, H. P. Hanify, R. I. Kingsley, A. Norris, A. Philpott, and others for the loan of specimens, and for much valuable information regarding the localities and habits of rare or local species. Lastly, I have to acknowledge the aid so willingly given by my lamented friend, the late Mr. A. S. Olliff, of Sydney.

KARORI, WELLINGTON,
NEW ZEALAND,
1897.

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INTRODUCTION.

The order *Lepidoptera*, which includes all those insects commonly known as Moths and Butterflies, is chiefly distinguished by its members possessing four wings clothed with numerous minute scales, the term *Lepidoptera* being derived from the two Greek words, λεπις, a scale, and πτερον, a wing. The mouth of these insects is suctorial, the maxillæ forming a spiral proboscis which is coiled up between the large labial palpi when not in use (see Plate I., figs. 5 and 6). The other oral organs are rudimentary. To acquire this form these insects pass through three very distinct

stages, viz., the Egg, the Larva, and the Pupa.

I.—METAMORPHOSIS.

THE EGG.

The eggs of *Lepidoptera* are generally somewhat globular, much flattened above and beneath. Some are very elaborately sculptured, whilst others are quite smooth. They are usually white or yellowish, but always change much in colour as the contained embryo develops.

THE LARVA.

The larvæ of moths and butterflies are popularly known as caterpillars. They always consist of thirteen segments, segment number one being the head. The head is furnished with several simple eyes (Plate I., fig. 2, AA), a pair of very short antennæ (BB), and a very powerful masticatory mouth. The mouth consists of the following organs: The labrum, or upper lip (1); a pair of mandibles, or upper jaws, working like scissor-blades (2,2); two maxillæ, or lower jaws (3,3), each carrying a jointed organ termed the maxillary palpus; and the labium, or lower lip (4); which bears another pair of minute jointed appendages—the labial palpi.

Segments 2, 3, and 4, which answer to the thorax of the perfect insect, are each furnished with a pair of legs. They consist of the six following joints (fig. 2): (*a*) coxa, (*b*) trochanter, (*c*) femur, (*d*) tibia, (*e*)

tarsus, and (*f*) claw. These legs correspond to those of the perfect insect. The remaining nine segments of the body constitute the abdomen. Usually segments 7 to 9 and 13, each have a pair of fleshy pads, which are termed prolegs and are furnished on their edges with a row of minute hooklets (see Plate I., fig. 14, proleg highly magnified). It is these hooklets which enable caterpillars to hold on by means of their prolegs with such great tenacity. The number of the prolegs varies considerably in different groups and families.

The *spiracles*, or orifices of the air-tubes, are situated on each side of the larva just above the legs. They are usually present on segments 2 and 5 to 12, but vary considerably in different groups and families. The larva is provided with a very complete digestive system, which consists of the following organs (see Plate I., fig. 9): A, the œsophagus; D, the ventriculus; F, the clavate intestine; E, the ilium; H, the colon; K, the biliary vessels; and O, the spinning vessels. These last open at a small orifice in the labium termed the spinneret (fig. 2, 5). They supply the silken threads which are employed by most larvæ in constructing their cocoons, and which also serve in cases of danger as a rapid means of retreat. Many larvæ, which live on shrubs and trees, suddenly lower themselves to the ground by means of one of these silken threads, and thus often escape being devoured by insectivorous animals.

The entire growth of the insect is accomplished during the larval condition, the increase in size being frequently very rapid. Owing to this circumstance larvæ are often compelled to shed their skin, and in many species a very considerable alteration both in

the shape and colour takes place at each moult, or ecdysis as it is sometimes termed.

THE PUPA.

The pupa of a Lepidopterous insect is completely encased in a chitinous envelope. With the exception of a slight twirling of the abdominal segments it is incapable of any motion. In the pupa of *Micropteryx* the mandibles and labial palpi are said to be functionally active, but this is a very exceptional though extremely interesting case. In conjunction with other evidence it would appear to indicate that the *Lepidoptera* originated from insects with active pupæ. The number of free or movable segments of pupæ varies considerably in different groups and genera, and by some modern authors it is regarded as a character of much importance in the framing of their classifications. The various organs of the perfect insect are distinctly marked out on the otherwise uniform integument of the pupa. In some groups, notably the *Micropterygina*, these organs are much more distinctly indicated than in others.

II.—ANATOMY.

THE PERFECT INSECT OR IMAGO.

In common with all other members of the class, the body of a Lepidopterous insect consists of three main divisions: (1) the head, (2) the thorax, and (3) the abdomen.

THE HEAD.

The front of the head is termed the *face*, the top the *crown*, the sides are nearly entirely occupied by the compound eyes (Plate I., fig. 11, AA), and the lower surface by the organs of the mouth.

The *Eyes* consist of a very large number of simple lenses arranged in the form of two hemispheres, one on each side of the head. The *ocelli*, or simple eyes, are situated on the crown, and are usually almost entirely covered by scales.

The *Antennæ* are two jointed appendages attached to the top of the head above the eyes. They vary very much in structure. The following are the terms used in describing the different forms of antennæ in the *Lepidoptera*:—

1. *Pectinated*, when the joints have long processes like the teeth of a comb. If these are on one side only, the antennæ are *unipectinated*; if on both sides, *bipectinated*. (Plate I., fig. 20, bipectinated antenna of *Nyctemera annulata*.)

2. *Dentate*, when the joints are armed with slight pointed spines.

3. *Serrate*, when the joints have sharp projections like the teeth of a saw. (Fig. 18, antenna of *Melanchra composita*.)

4. *Filiform*, when the whole antenna is simple or thread-like. (Fig. 19, antenna of *Epirranthis*

alectoraria.)

The clothing of the antennæ also varies, and is distinguished as under:—

1. *Ciliated*, when clothed with one or two series of short, fine hairs.

2. *Fasciculate-ciliated*, when the hairs are collected into tufts. (Fig. 17, antenna of *Chloroclystis plinthina*.)

3. *Pubescent*, when the antennæ are clothed with uniform short hairs. (Fig. 19.)

The functions of the antennæ are still a matter of dispute amongst entomologists. The majority of the older naturalists regarded them as organs of hearing. The antennæ are almost always more fully developed in the male than in the female. From this circumstance many modern entomologists consider that one of their functions is to enable the former to find the latter.

The organs of the mouth are thus distinguished:—

1. The *Labrum*, or upper lip (Plate I., fig. 11, *l*), a minute rudimentary plate situated in front immediately above the proboscis.

2. The *Mandibles*, or upper jaws (m.m), two minute sickle-shaped organs situated just below the labrum, also rudimentary.

3. The *Proboscis*, or *Haustellum*[1] (c), a tubular

extensible organ formed of the two maxillæ, or lower jaws, which have become greatly elongated, semi-tubular, and closely pressed together at the edges, but separable at the will of the insect—a structure which enables the organ to be easily cleansed when necessary, and is extremely interesting as indicating so clearly the true development of the proboscis from the maxillæ.

The *Maxillary palpi* (p.p) are two jointed organs attached to the base of the proboscis and very frequently rudimentary, but fully developed amongst certain of the *Micro-Lepidoptera*.

The *Labium*, or lower lip, is situated below the proboscis and carries the *Labial palpi* (figs. 5 and 6), two large jointed organs which are very conspicuous in nearly all the species and often quite conceal the maxillary palpi. They are usually regarded as organs of touch, but their true function does not seem to be properly understood. In the *Lepidoptera* they appear to protect the proboscis, which, when out of use, is always coiled up in a spiral between them. The labrum and mandibles can only be seen by removing the large labial palpi.

THE THORAX

carries the organs of locomotion, which consist of two pairs of wings attached to its sides, and three pairs of legs attached beneath, a pair belonging to each of the three segments of which the thorax is composed. On the front of the thorax there are two flap-like organs covered with scales, termed the *patagia*.

The *Wings* vary greatly in shape, but usually they are triangular. The portion of the wing which joins on to the thorax is termed the *base*. The front margin is called the *costa*, the outer margin the *termen*, and the lower margin the *dorsum*, these being described as situated when the wing is extended in flight. The angle between the costa and termen is called the *apex*, and the angle between the termen and the dorsum the *tornus* (see Plate I., fig. 1). The termen and dorsum are edged with a fringe of hair-like scales, termed the *cilia*. At the base of the hind-wings is generally situated a stiff bristle, or several stiff hairs, called the *frenulum*, the ends of which pass through a chitinous process on the under side of the fore-wing near the dorsum. This process is termed the *retinaculum*, and serves, in conjunction with the frenulum, to lock the wings together during flight. In the female both these organs are often very imperfectly developed, the frenulum consisting of several bristly hairs, and the retinaculum of a group of stiff scales. In many of the *Lepidoptera* both frenulum and retinaculum are entirely wanting.

"In the *Micropterygina*, a membranous or spine-like process called the *jugum* rises from the dorsum of the fore-wing near the base and passes under the hind-wing, which is thus held between the process and the overlapping portion of the fore-wing."—(Meyrick.)

The veins of the wings are thus described by Mr. Meyrick:—

"The wings are traversed by a system of *Veins*—tubular structures which serve at once as extensions of the tracheal system, and to form a stiff framework

for the support of the wing. In the normal type of *Lepidoptera* the fore-wings possess three free veins towards the dorsum, termed 1*a*, 1*b*, and 1*c*; a central cell, out of which rise ten veins, numbered 2 to 11, the sides of the cell being known as the upper median, lower median, and transverse veins respectively; and a free subcostal vein, numbered 12; whilst the hind-wings differ from the fore-wings in having only six veins rising from the central cell, numbered 2 to 7, so that the free subcostal vein is numbered 8 (see Plate I., figs. 3 and 4, assumed type of neuration of a Lepidopterous insect). In some forms a forked parting-vein traverses the middle of the cell longitudinally, and a second parting-vein traverses the upper portion, so as to form a secondary cell; but these are more frequently absent or represented only by folds in the membrane. In a few forms there is a tendency to the production of several false veins, termed *pseudoneuria*, appearing as short branches from the subcostal vein of the hind-wings to the costa; these are thickenings of the membrane, and are commonly very irregular and variable, often uneven in thickness or incomplete. Sometimes one of these near the base is better developed and more permanent in character; it is then termed the *præcostal spur* (see Plate I., figs. 8^9 and 27^9). Modifications in the general arrangement of the veins may arise through any of the following processes, viz.: (1) *obsolescence*, when a vein loses its normal tubular structure, becoming attenuated and reduced in substance, until it appears a mere fold of the membrane (Plate II., fig. 60, vein 5 in hind-wings of *Selidosema*); (2) *stalking*, when the two veins are fused together for a portion of their length from their base, so as to appear to rise on a common stalk (Plate II., fig. 34, veins 6 and 7 in hind-wing of

Hydriomena); (3) *coincidence*, when two veins are fused together for the whole of their length, so that one appears entirely absent, an extreme form of stalking; (4) *anastomosis*, when two veins rise separate, meet, and are fused together for a certain distance, and then separate again (Plate II., fig. 23, veins 7 and 8 in the hind-wings of the ♀ of *Tatosoma*); (5) *concurrence*, when a vein rises separate, runs into another, and does not separate again, an extreme form of anastomosis; (6) *connection*, when two veins are connected by a short transverse bar passing from one to the other, a special form of anastomosis, evolved from the ordinary form under the influence of a tendency to lateral extension (Plate II., fig. 28, veins 7 and 8 in hind-wing of *Paradetis*). Vein 1*b* in both wings is often furcate at the base.

"The type of veins in the *Micropterygina* differs from that described above in two essential particulars, viz.: (1) there may be three additional veins in the fore-wings, rising out of vein 11 or 12; and (2) the veins of the hind-wings are practically identical in number and structure with those of the fore-wings, being thus much more numerous than in the ordinary type. There is also often a system of cross-bars between the veins near the base of the wing (Plate I., figs. 22 and 23, neuration of *Hepialus*).

"The structure of the veins can be best observed on the under surface of the wing, where they are more prominent. The student should begin by completely denuding of scales a few wings of common species: the wing should be cut off and laid on a moistened piece of glass, to which it will adhere; the scales should then be removed, first from one surface and

then from the other, with a fine, moist camel's-hair brush—an operation requiring a little patience and delicacy of touch; the veins will thus be rendered conspicuous.[2] When, however, the student has familiarised himself with the general subject, it will not be found necessary in practice to resort to this process; most details will be easily observed without denudation[3]; where this is not the case (as where the veins are closely crowded or otherwise obscured), the scales can be removed with the brush on the under surface in the locality of the difficulty only, without cutting off the wing or otherwise damaging the specimen, which remains in the collection available for all purposes as before; with proper practice, even the smallest species are amenable to this treatment, which does not require more skill than the actual setting of the specimen. Some workers prefer to put a drop of benzine on the spot, which renders it temporarily transparent; the effect is short-lived, as the benzine evaporates rapidly, and the cilia (if long) are liable to be damaged by this method."

The *Legs* consist of the following joints (see Plate I., fig. 21): (1) *coxa*, (2) *trochanter*, (3) *femur*, (4) *tibia*, (5) *tarsus*, (6) *claw*. The tarsus normally consists of five joints, but is more or less aborted when the leg is not employed for walking. The spines (SS) on the tibiæ of the several legs vary considerably in size and number. They are often useful to the systematist for purposes of classification.

THE ABDOMEN

consists of nine segments, some of which are often

fused together. It contains the various internal organs, of which the most important are those of Digestion and Reproduction. The *Digestive System* (Plate I., fig. 10) consists of the following organs: A, the *œsophagus*, or throat; C, the *sucking stomach*; D, the *ventriculus* or stomach; E, the *small intestine*; G, the *cœcum*; H, the *colon*; K, the *biliary vessels*; N, the *salivary vessels*. The function of the *sucking stomach* is to exhaust the air in the throat and proboscis, and thus to cause the ascent of the fluids into the stomach when the insect is feeding.

III.—ORIGIN OF SPECIES.

The theory of the origin of species as propounded by Darwin may be thus very briefly summarised:—

VARIATION.—No two organisms are exactly alike; there is always some variation from the parent form, in some cases very slight, in others considerable. (For examples of variation see Plate VII., figs. 1 to 9, varieties of *Hydriomena deltoidata*; Plate VIII., figs. 42 to 47, varieties of *Epirranthis alectoraria*; Plate IX., figs. 6 to 14, varieties of *Selidosema productata*; Plate X., figs. 13 to 23, varieties of *Azelina gallaria*; Plate X., figs. 39 to 47, varieties of *Declana floccosa*.)

INHERITANCE.—Many of these variations are inherited—a fact demonstrated by our domestic plants and animals, where man has selected and bred from varieties suitable for his purposes, and has thus produced races in which the variation is permanent. Many of the races of domestic animals differ as much from one another as do some distinct species of wild

animals.

STRUGGLE FOR EXISTENCE.—All animals and plants produce far more offspring than can possibly survive, thus giving rise to the struggle for existence. For example: The average number of eggs laid by a Lepidopterous insect is certainly over 100, and in many species this number is greatly exceeded. Assuming each female to lay 100 eggs, the progeny from a single pair would amount, after six generations, to over six million individuals.

NATURAL SELECTION, or the SURVIVAL OF THE FITTEST.—In the struggle for existence which necessarily results from such a great increase of individuals, those variations which favoured the possessors would be preserved, whilst those which did not, would be gradually exterminated. This principle of the preservation of the favourable varieties in the struggle for life is called Natural Selection, or the Survival of the Fittest.

DIVERGENCE OF CHARACTER.—As there are so many different places and conditions in the economy of nature which can be occupied by organic beings differently constituted, individuals which diverged most from the original type would be brought into less severe competition, than those which diverged only in a slight degree. For instance, if we represent the original form as A, occupying one place in the economy of nature; a second form as B, occupying a somewhat similar place; a third form as C, occupying a very different place to A although somewhat similar place to B, it is obvious that B would enter into severe competition with both A and C, whilst A

and C might not trend to any great extent on one another's place in the natural economy; hence B would be exterminated before either A or C. In other words, natural selection continually tends to increase the slight differences, which we call varieties, into the greater differences, which we call species.

The following phenomena, which have long been observed by students of the *Lepidoptera*, will serve as excellent examples of the operation of natural selection:—

PROTECTIVE RESEMBLANCE.—This term is applied to those classes of form or colour which enable an animal to so closely resemble its surroundings as to escape the notice of its enemies. Numerous examples of protective resemblance exist in the New Zealand moths and butterflies; in fact, it may safely be asserted that nearly all the colouring we observe in these insects has been acquired for protective purposes. The following species, amongst many others which will be described hereafter, exhibit in a very marked degree the phenomenon of protective resemblance: *Epirranthis alectoraria*, *Selidosema dejectaria*, and *Drepanodes muriferata* resemble dead leaves; *Chloroclystis bilineolata*, *Tatosoma agrionata*, and *Erana graminosa* resemble, when at rest, patches of moss; *Selidosema productata* and *S. lupinata* resemble the bark of trees; *Chloroclystis lichenodes*, *Declana floccosa*, and *Elvia glaucata* resemble variously coloured lichens. It is almost unnecessary to point out that all those variations, which tended to conceal the possessors from their enemies, would be preserved in the struggle for existence, and that these

numerous and perfect instances of protective resemblance would inevitably result from the operation of natural selection. The dark colouration of Alpine and Arctic *Lepidoptera*, which enables them to rapidly absorb heat during the short and fitful gleams of sunshine experienced on mountains or in high latitudes, is also an instance of adaptation to conditions through the influence of natural selection. This was first pointed out by Lord Walsingham in 1885. The almost complete absence of white species in these localities is a good example of the extinction of forms unfitted to their surroundings.

CONTRAST COLOURS.—In this class of colouring the fore-wings only are protectively coloured, the hind-wings being very conspicuous. Contrast colouring is well exemplified by several of the insects included in the genus *Notoreas*. The sudden exhibition of the hind-wings during flight dazzles the eye of the pursuer. When the insect immediately afterwards closes its wings and the fore-wings alone are visible, it is extremely difficult to see. This form of protective colouring was also first drawn attention to by Lord Walsingham. (See page 75.)

WARNING COLOURS.—Insects, which are unfit for food or nauseous, are not protectively coloured, but on the contrary are rendered as conspicuous as possible. This class of colouring is well illustrated by one of our commonest moths, *Nyctemera annulata* (Pl. IV., figs. 1 and 2). The principle of warning colours was first discovered by Mr. A. R. Wallace, and is graphically described in Professor Poulton's entertaining work, 'The Colours of Animals.' The possession of nauseous qualities would be of little value to an insect, unless it could be at once

recognised by insectivorous animals and avoided as food. If a nauseous insect were not easily identified it would speedily be destroyed by what Professor Poulton ingeniously terms "experimental tasting"; hence, through the process of natural selection, all nauseous species have become very conspicuously coloured. It may be remarked that warning colours are extremely rare amongst the New Zealand species, and I am not aware of any other example than that already given.

MIMICRY.—This term is applied to those remarkable cases where a harmless or edible species imitates in form and colouring a highly armed or nauseous species. No instances of this extremely interesting class of protection are yet known amongst the New Zealand *Lepidoptera*, but a very perfect example of mimicry exists between two common introduced species of *Hymenoptera* and *Diptera*, the well-known honey-bee and the drone-fly. The superficial resemblance between these two insects is very close. The bee, as every one knows, is armed with a powerful sting, whilst the drone-fly is unarmed. In this case it can be seen that if a harmless insect varied in the direction of resembling a formidable or objectionable species it would be a decided advantage to it, and such varieties would tend to be continually preserved and improved, through the operation of natural selection. The subject of mimicry has been alluded to here as it is not impossible that some instances of it may yet be discovered in connection with our native *Lepidoptera*.

ORNAMENTAL COLOURING.—This class of colouring occurs in many species, especially amongst the butterflies, and is not apparently connected in any

way with protection. Darwin supposes that it has arisen through the females of each species always selecting the most beautiful males as mates, hence these alone would leave progeny, and the females themselves would afterwards become beautiful through the effects of inheritance. This principle Darwin has termed Sexual Selection, and has discussed it in great detail in his work on the 'Descent of Man.' The fact, that amongst birds and butterflies the males are nearly always the most brilliantly coloured and the most beautiful, together with an immense mass of other evidence, tends, I think, to entirely support Darwin's theory, although it should be mentioned that several eminent naturalists, including Mr. Wallace, do not admit the principle of Sexual Selection.

IV.—CLASSIFICATION.

From a further consideration of the foregoing principles it will be seen that all existing species are held to be descended by true generation from pre-existing species, and that, consequently, all the relationships we observe between species are explained by community of origin. The most natural system of classification is, therefore, that which best reveals the scheme of descent, or, as it is termed, the phylogeny, of the group of organisms classified. To construct a perfect system of classification on these principles a knowledge of not only all the existing species of *Lepidoptera* would be essential, but also of all the extinct species, and it is needless to say that such knowledge is quite unattainable. Nevertheless large numbers of species are now known from many parts of the world, and a very extensive collection

has recently been employed by Mr. Meyrick in framing a classification of the *Lepidoptera*, which is, to the best of my belief, the first constructed on strictly Darwinian principles. Although adopting Mr. Meyrick's system in the present work I do not agree unreservedly with all his conclusions; but I have not attempted to alter his system in accordance with my own views, as I conceive that the conclusions of a naturalist, who has only had the opportunity of studying a restricted fauna, would necessarily be liable to considerable error.

The general principles on which Mr. Meyrick has founded his system are practically those laid down by Darwin in his 'Origin of Species,' and may be thus summarised:—

A. Resemblances between all organisms are explained by community of origin, the amount of difference representing the amount of modification and expressible in the classification as varieties, species, genera, families, groups, orders, &c. The amount of difference does not *necessarily* bear any direct relation to time, many forms remaining almost stationary whilst others are undergoing development.

B. By a consideration of the following laws the age of a division can be approximately arrived at; that is to say, its position in the great genealogical tree of the *Lepidoptera* can be, to some extent, determined:—

"(1) No new organ can be produced except as a modification of some previously existing structure.

"(2) A lost organ cannot be regained.

"(3) A rudimentary organ is rarely redeveloped."—(Meyrick.)

C. The greatest care is necessary to avoid being misled by adaptive characters, *i.e.*, characters which are very important to the welfare of the species, and hence much modified through the agency of natural selection. A familiar instance of superficial resemblance, due to the presence of similar adaptive characters, may be observed in fishes and whales, where two groups of animals with but little real relationship have, through living under similar conditions, become extremely like each other in external appearance. Other examples might be given amongst exotic *Lepidoptera*. Thus, many noxious species are closely mimicked by harmless forms which are often far removed from them in real affinity. These cases of adaptive resemblances abound amongst all organisms, and have often deceived experienced naturalists. It is in consequence of the illusive nature of these external resemblances amongst different members of the *Lepidoptera*, that the structure of the neuration of the wings is now considered of such great importance as a character for purposes of classification. The numerous modifications in the position of the veins and their presence or absence in certain groups can, so far as we are able to see, have had very little effect on the well-being of those insects possessing such modifications. Hence it may fairly be assumed, that these structures have been free from the influence of natural selection for a very lengthened period. It is thus contended that the neuration of a Lepidopterous insect probably reveals more plainly than any other character its true relationship with other species.

The descent of all the *Lepidoptera* from some ancient member of the *Trichoptera* (or caddis-flies) is thus proved, according to Mr. Meyrick:—

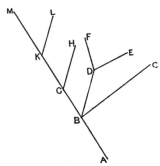
"From a consideration of the laws enunciated above, there can be no doubt that the *Micropterygina* are the ancestral group of the *Lepidoptera*, from which all others have descended; this is sufficiently proved by the existence of the four or more additional veins in the hind-wings of that group, for these veins, if not originally present, could not have been afterwards produced. Of the two families of that group, the *Micropterygidæ*, which possess an additional vein (or veins) in the fore-wings, and fully developed six-jointed maxillary palpi, must be more primitive than the *Hepialidæ*. Now if the neuration of the whole of the *Lepidoptera* is compared with that of all other insects, it will be found that in no instance is there any close resemblance, except in the case of the *Micropterygidæ*; but the neuration of these so closely approaches that of certain *Trichoptera* (caddis-flies) as to be practically identical. The conclusion is clear, that the *Lepidoptera* are descended from the *Trichoptera*, and that the *Micropterygidæ* are the true connecting link. If the other marked structural characters of the *Micropterygidæ* are taken into consideration, viz., the possession of the jugum, the large development of the maxillary palpi as compared with the labial, and the sometimes functionally active mandibles, they will be all found commonly in the *Trichoptera*, affording additional confirmation. It may be added that in one New Zealand species of *Micropterygidæ* (*Palæomicra chalcophanes*) vein *1b* is basally trifurcate, a character frequent in the *Trichoptera*, but not yet discovered in any other *Lepidopteron*. In most *Trichoptera* the veins

of the hindwings are much more numerous than those of the fore-wings, in the *Micropterygina* they are usually equal in number, in other *Lepidoptera* they are less numerous; in the course of descent there has therefore been a greater progressive diminution in the number of veins of the hind-wings as compared with those of the fore-wings, though these also have diminished.

"It is unnecessary to trace back the descent of the *Lepidoptera* further; but it may be worth while to point out that we may assume as the primitive type of Trichopterous neuration, a system of numerous longitudinal veins gradually diverging from the base, mostly furcate terminally, and connected by a series of irregularly placed cross-bars near base, and another series beyond middle."

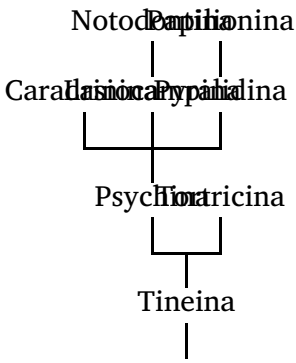
The following is Mr. Meyrick's method of arrangement, which has been adopted in this book:—

"The natural order of arrangement, which is that of a much-branched tree, cannot be adequately expressed by a simple linear succession, such as is alone practicable in a book. It is, however, possible to devise a linear succession which shall be consistent with the natural genealogical order, if some additional explanation can be given. The method here adopted is as follows:—



"Suppose the accompanying diagram represents a portion of the genealogical tree; then the order will begin at M and descend to K, recommence at L and descend to K, and thence to G, recommence at H and descend to G, and thence to B, recommence at F and descend to D, recommence at E and descend to D and thence to B, recommence at C and descend to B and thence to A, and so on. Thus the order begins with the most recently developed forms and descends gradually to the earliest or most ancestral, which are the last in the book. To understand the order in practice, it may be assumed that each genus is descended from that which immediately follows it in the book, unless its actual descent is expressly stated otherwise; such statement will, of course, require to be made before every recommencement of a fresh branch. This system has been adhered to throughout, and after a little use will not be found unintelligible. If adopted in the arrangement of a collection in the cabinet, it would be a good plan to indicate the recommencement of a fresh branch by a special mark, such as a red bar drawn above the first (or highest) species."

PHYLOGENY OF LEPIDOPTERA. (After Meyrick.)



Micropterygina

V.—GEOGRAPHICAL DISTRIBUTION.

The details of geographical distribution are given under the headings of the respective species, so far as I have been able to ascertain them; but our knowledge in this direction is necessarily limited, and I have found much difficulty in obtaining reliable information, on account of the obstacles which exist in regard to the correct identification of species in other countries.

The distribution of the species within New Zealand is also very imperfectly known at present, owing to the paucity of collectors and observers, particularly in the extreme north of New Zealand, and on the west coast of the South Island. In the latter locality no doubt many interesting species remain to be discovered, especially amongst the mountain ranges.

In employing the book for identifications, the reader is recommended to first refer to the Plates and see if he can find anything at all resembling the species he has, and then to refer to the description for verification. In dealing with variable forms, it is always well to remember that the *shape* of markings is generally far more constant than their intensity, or even their colour.

The purely descriptive portions of the work have been made as brief as possible, and characters, of special importance for the identification of species, are printed in italics. Those who desire to consult

more detailed descriptions may readily do so by referring to Mr. Meyrick's papers, in the Transactions of the New Zealand Institute and elsewhere. References to such papers are invariably given under the synonomy of each species which has been described by Mr. Meyrick.

It should be mentioned that the figures and descriptions in this work have been prepared from nature, quite separately, and no attempt has been made to reconcile the figure with the description. This course has been followed so that any character, which may have been accidentally omitted from the figure, will not necessarily be wanting in the description.

The figures of neuration (Plates I. and II.) have all been made from fully denuded specimens examined under the microscope. They are in nearly every instance considerably enlarged. Each drawing has afterwards been compared with Mr. Meyrick's description, and if found to differ, a second examination of the wings has been made with a view to a reconciliation of results. Any important differences observed between Mr. Meyrick's descriptions and my final results are in every case specially mentioned.

NEW ZEALAND

MACRO-

LEPIDOPTERA.

I.—THE CARADRININA.

The *Caradrinina* may be distinguished by the following characters:—

"The maxillary palpi are obsolete, the fore-wings have vein *1b* simple or hardly furcate, *1c* absent, and 5 approximated to 4 towards base. The hind-wings are furnished with a frenulum, vein *1c* is absent, and 8 is connected or anastomosing with cell." (See Plate II., figs. 1 to 12 and 14 to 18.)

"Imago with the fore-wings more or less elongate-triangular, termen not very oblique; hind-wings broad-ovate.

"Larva sometimes very hairy, usually with 10 prolegs, those on segments 7 and 8 sometimes absent. (Plate III., figs. 7, 8, 9, 10, 11, 15 and 16.) Pupa with segments 9 to 11 free; not protruded from cocoon in emergence."—(Meyrick.)

So far as New Zealand is concerned, the *Caradrinina* may be said to comprise that group of the Lepidoptera formerly known as the *Noctuina*, with the addition of the family *Arctiadæ*. Its members are chiefly nocturnal fliers; the body is usually stout, the forewings are narrow, and (except in the *Arctiadæ*) mostly dull-coloured, with three very characteristic spots. 1. The orbicular stigma, a round spot situated near the middle of the wing; 2. The claviform stigma usually somewhat club-shaped and situated immediately below the orbicular; and 3. The reniform stigma, a kidney-shaped marking situated beyond the orbicular. The claviform is very frequently absent, and the orbicular less frequently so, but the reniform is an almost constant character

throughout the entire group, with the exception of the *Arctiadæ*.

There are three families of the *Caradrinina* represented in New Zealand, viz.:—

1. ARCTIADÆ.

2. CARADRINIDÆ.

3. PLUSIADÆ.

Family 1.—**ARCTIADÆ.**

The *Arctiadæ* may be characterised as follows:—

"Eyes smooth. Tongue developed. Posterior tibiæ with all spurs present. Hind-wings with veins 6 and 7 connate or stalked (rarely approximated or coincident), 8 anastomosing with cell nearly or quite from base to middle or beyond."—(Meyrick.) (See Plate II., figs. 1, 2, and 4, 5.)

This interesting family, although generally distributed throughout the world, is very poorly represented in New Zealand. Unlike most of the *Caradrinina*, many of the included species are day fliers and gaily coloured. One of these, *Nyctemera annulata*, is probably one of the most familiar of New Zealand insects, whilst the four remaining representatives of the family are but seldom seen. To British entomologists the name of "tiger moths" will probably at once recall several conspicuous and beautiful members of this family.

Three genera of the *Arctiadæ* are represented in New Zealand, viz.:—

1. NYCTEMERA.

2. UTETHEISA.

3. METACRIAS.

Genus 1.—NYCTEMERA, Hb.

"Tongue well developed. Antennæ in ♂ bipectinated throughout. Palpi moderately long, porrected or rather ascending, with appressed scales; terminal joint moderate, cylindrical. Forewings with vein 6 out of 9 or separate, 7 and 8 out of 9, 10 connected with 9 by a bar. Hind-wings with veins 6 and 7 stalked or separate, 8 anastomosing shortly with margin of cell near base." (Plate II., fig. 3 head, 4 neuration of fore-wing, 5 ditto of hind-wing.)

"The single New Zealand species is endemic, but nearly allied to an Australian form."—(Meyrick.)

NYCTEMERA ANNULATA, Boisd.

(*Leptosoma annulata*, Boisd., Voy. Astr. v. 197, pl. v. 9; Dbld., Dieff, N. Z. ii. 284. *Nyctemera doubledayi*, Walk., Bomb. 392. *Nyctemera annulata*, Meyr., Proc. Linn. Soc., N.S.W., 1886, 700; ditto, Trans. N. Z. Inst. xxii. 218.)

(Plate IV., fig. 1 ♂, 2 ♀; Plate III., fig. 9, larva.)

This species is perhaps one of the best known of the New Zealand Lepidoptera, occurring in great profusion in all parts of both North and South Islands. It is also common at Stewart Island, in the neighbourhood of cultivation.

The expansion of the wings is about 1¾ inches. *All the wings are deep sooty black. The forewings have an irregular cream-coloured band running from beyond the middle of the costa towards the tornus.* This band is interrupted in the middle, and crossed by several black veins, which sometimes almost break it up into a chain of spots. The hind-wings have a single large cream-coloured spot near the middle. The body is black, with several orange markings on the thorax, and a series of broad orange rings on the abdomen.

This species varies a good deal in the extent of the cream-coloured markings.

The larva feeds on the New Zealand groundsel (*Senecio bellidioides*), but in cultivated districts it is more often observed on *Senecio scandens*, a plant having a superficial resemblance to ivy, which frequently grows in great profusion on fences and hedgerows in various parts of the country.

Mr. W. W. Smith informs us[4] that it also feeds on the common groundsel (*S. vulgaris*) as well as on *Cineraria maritima*. I have often seen these caterpillars on mild days in the middle of winter, and full-grown specimens are very common towards the end of August, so that I think there is little doubt that the species passes the winter in the larval condition. At other seasons there is a continuous succession of broods.

The length of the caterpillar when full grown is 1½ inches. It is covered with numerous tufts of long black hair, and is black in colour, with the dorsal and lateral lines dark-red. There are several large blue spots round the middle of each of the segments, and the membrane between each segment is bluish-grey. In younger larvæ the bluish-grey colouring extends over a considerable portion of the insect.

This caterpillar may be readily found, as it feeds on the upper surface of the leaves fully exposed to view. Its hairy armour evidently renders it unpalatable to birds, and hence the secret habits we observe in most larvæ are absent in this species.

When full-fed it selects a secluded spot, generally a crevice in the trunk of a tree, where it spins an oval cocoon of silk intermixed with its own hairs. Here it changes into a shining black pupa, speckled and striped with yellow. The insect remains in this state about six weeks.

The moth first appears in September, and continues abundant until about the end of March. It is extremely common, especially during the latter end of summer, when specimens may often be seen flying in all directions. Mr. Meyrick observes[5] that this species has the curious habit of soaring in the early morning sunshine, soon after sunrise, in calm, fine weather. He states that he has seen them in numbers, flying round the tops of trees, at a height of over 100 feet. I can fully corroborate the accuracy of this interesting observation, and have noticed the insect to be most active between the hours of five and eight on fine mornings in midsummer. The habit is certainly a very unusual one, as most insects are rarely seen at that time of the day.

This moth is confined to New Zealand, but two closely allied species, belonging to the same genus, are found in Australia.

Genus 2.—UTETHEISA, Hb.

"Head smooth. Ocelli large. Antennæ in ♂ ciliated, with longer setæ at joints. Palpi moderate, ascending, with loosely appressed scales. Thorax smooth beneath. Abdomen smooth-scaled. Tibiæ smooth-scaled, spurs very short. Fore-wings with veins 7 and 8 out of 9, 10 connected with 9. Hind-legs with veins 3, 4, 5 rather approximated, 6 or 7 connate or short-stalked, 8 from middle of cell."

"A small genus inhabiting the warmer regions of the world. Larva with rather scanty hairs, some finely branched."—(Meyrick.)

Represented in New Zealand by a single species of wide distribution.

UTETHEISA PULCHELLA, L.

(*Deiopeia pulchella*, Meyr., Trans. N. Z. Inst. xxii. 217.)

(Plate IV., fig. 3.)

This species was first observed in New Zealand in February, 1887, when I captured a single specimen in the Wainui-o-mata valley. Since that time Mr. A. Norris has seen two others near Petone, one of which is now in his collection. All the specimens at present noticed have consequently occurred in a very restricted portion of the Wellington District, though it is probable that the insect is far more generally distributed throughout the country than these records would seem to indicate.

The expansion of the wings is about 1¼ inches. *The fore-wings are white, with five irregular transverse rows of oblong crimson spots, alternating with six irregular rows of small black dots.* The hind-wings are white, irregularly clouded with black on the termen; there are two small black spots near the middle. The body is white; the head and thorax are spotted with crimson,

and the antennæ are black.

The larva is thus described by Newman:—[6]

"The ground colour is leaden with a covering of black hairs; there is a broad white stripe down the back, and on each segment down the side is a double scarlet spot. On the continent of Europe this caterpillar is said to feed on the forget-me-not (*Myosotis arvensis*)."

In New Zealand the moth appears in February. Mr. Meyrick remarks[7]:—"It is probably only an occasional immigrant. Although a feeble-looking insect, it possesses extraordinary capabilities of flight, and is sometimes met with far out at sea. It occurs throughout Europe, Asia, Africa, Australia, and the Pacific Islands." It is well known to English entomologists as a great rarity, and many discussions have taken place at various times as to the propriety of retaining it on the list of British Lepidoptera.

Genus 3.—METACRIAS, Meyr.

"Tongue obsolete. Antennæ in ♂ moderately bipectinated throughout. Palpi rather short, hairy, concealed in rough hairs of head. Thorax and femora densely hairy beneath. Anterior tibiæ with developed spine beneath, and apical hook. Fore-wings with vein 2 from ⅔, 6 from point with or out of 9, 7 and 8 out of 9, 10 sometimes connected with 9 at a point above 7. Hind-wings with veins 3 and 4 almost from point, 6 and 7 from point or short-stalked, 8 from about ⅓. Wings in ♀ rudimentary. (Plate II., fig. 1 neuration of fore-wing, fig. 2 ditto of hind-wing.)

"An interesting and peculiar genus, apparently most allied to some Australian forms of *Spilosoma*, but quite distinct. Three species have been discovered,

two of them quite recently, and it is not unreasonable to hope that additional forms may hereafter be found amongst the mountains, to which they seem especially attached."—(Meyrick).

METACRIAS STRATEGICA, Hdsn.

(*Arctia strategica*, Hdsn., Entom., 1889, 53. *Metacrias strategica*, Meyr., Trans. N. Z. Inst. xxii. 216.)

(Plate IV., fig. 4.)

This handsome species is at present only known by a single specimen, captured by Mr. W. W. Smith, near the summit of the Richardson Range, in South Canterbury, at an elevation of about 3,000 feet.

The expansion of the wings of the male is 1½ inches. *The fore-wings are black, with two broad, dull yellow, longitudinal streaks*; between the costa and the first streak is a very fine yellowish line, and between the two streaks there are three similar lines. *The hind-wings are bright yellow, with a broad black band, parallel to the termen, interrupted just before the tornus; the vicinity of this black band is tinged with crimson.* The body is black; the top of the head, collar, and sides of the thorax and abdomen are dull yellow. The female is probably apterous.

This species may be readily distinguished from the two following by the yellow collar, absence of any large spot in the centre of both fore-wings and hind-wings, and the red colouring of the termen of the hind-wings. The moth was taken in February, frequenting a species of *Carmichælia*. It may be looked for in the mountainous regions of South Canterbury, but at present nothing further is known of its habits.

METACRIAS ERICHRYSA, Meyr.

(*Metacrias erichrysa*, Meyr., Proc. Linn. Soc. N. S. W., 1886, 749; ditto, Trans. N. Z. Inst. xxii. 216.)

(Plate IV., fig. 5.)

This species was discovered by Mr. Meyrick on Mount Arthur in the Nelson District in 1886. Since that time I have taken eleven specimens in the same locality, and have seen several others, but as yet I have not heard of its occurrence elsewhere.

The expansion of the wings is 1½ inches. *The fore-wings are black, with orange-yellow markings.* These consist of a fine line near the costa, becoming very broad near the base, several elongate markings between the veins near the middle, a series of spots near the termen, and a broad streak parallel to the dorsum. The hind-wings are orange-yellow, with a curved black spot in the middle, and a broad black band on the termen, ending considerably before the tornus, and nearly broken a little before its termination. The female, according to Mr. Meyrick,[8] is "wholly whitish-ochreous; wings minute, aborted; legs short, stout, well developed."

The life-history is thus described by Mr. Meyrick[9]: "The larva is wholly black, clothed with long black hairs, those covering segmental incisions brownish-ochreous. It feeds on *Senecio bellidioides*. The pupa is enclosed in a slight cocoon."

The perfect insect occurs in January, frequenting sunny, grassy slopes on the mountain-sides, at about 4,000 feet above the sea-level. It flies with great rapidity; hence it is generally very difficult to catch.

METACRIAS HUTTONII, Butl.

(*Phaos huttonii*, Butl., Cist. Ent. 487; *Metacrias huttonii*, Meyr., Proc. Linn. Soc. N. S. W., 1886, 750; Trans. N. Z. Inst. xxii. 216.)

(Plate IV., fig. 6.)

This interesting species was discovered at Lake Wakatipu, by Professor Hutton.

The expansion of the wings of the male is 1⅛ inches. The fore-wings are black; *there is an oblique crimson line near the base*, two broad longitudinal cream-coloured lines above and below the middle, and a double transverse series of oblong cream-coloured spots near the termen. The hind-wings are pale ochreous, with a black crescent-shaped spot near the middle, and a broad black band almost touching the termen except a little before the tornus. The female is apterous.

Described and figured from a specimen in Mr. Fereday's collection.

Family 2.—**CARADRINIDÆ.**

The *Caradrinidæ* are distinguished by the following characters:—

"Ocelli usually present. Tongue usually well developed. Labial palpi moderate, more or less ascending, second joint densely scaled, usually rough, terminal rather short, obtuse. Thorax usually densely hairy beneath. Posterior tibiæ with all spurs present. Fore-wings with veins 7 and 8 out of 9, 10 connected with 9. Hind-wings with veins 3 and 4 connate or short-stalked, 5 obsolete or imperfect, parallel to 4, 6 and 7 connate or short-stalked or seldom closely approximated only, 8 shortly anastomosing with cell near base, thence evenly diverging." (Plate II., figs. 6, 7, 8, 9, 10, 11.)

"A dominant family in temperate regions, especially

in the northern hemisphere, the species being very numerous and often occurring in great plenty; within the tropics, however, their place is largely taken by the *Plusiadæ*. The structure is in most particulars remarkably uniform, the neuration and palpi being practically identical throughout the family. The markings are usually very similar, and the colouring dull and adapted to conceal insects which are accustomed to hide amongst dead leaves or refuse; hence this family is not one of the easiest or most attractive to study. The species are the most truly nocturnal of all the Lepidoptera; few are readily obtainable by day, but at night they are found in abundance at flowers or sugar. Imago with fore-wings usually elongate, body relatively stout, and densely scaled. It may be noted as an established conclusion that antennal pectinations, if not extending to the apex of the antennæ, are in this family seldom sufficient to mark generic distinction.

"Ovum spherical, more or less distinctly ribbed, and reticulated. Larva usually with few hairs, often nocturnal, sometimes subterranean; often very polyphagous. Pupa usually subterranean."—(Meyrick.)

The family is represented in New Zealand by the following twelve genera:—

Sub-family 1.—POLIADES
1. MISELIA.
2. ORTHOSIA.
3. XANTHIA.

Sub-family 2.—MELANCHRIDES	4. PHYSETICA. 5. LEUCANIA. 6. ICHNEUTICA. 7. MELANCHRA. 8. ERANA.
Sub-family 3.—CARADRINIDES	9. BITYLA. 10. AGROTIS. 11. HELIOTHIS. 12. COSMODES.

Sub-family 1.—POLIADES	1. MISELIA. 2. ORTHOSIA. 3. XANTHIA.
Sub-family 2.—MELANCHRIDES	4. PHYSETICA. 5. LEUCANIA. 6. ICHNEUTICA. 7. MELANCHRA. 8. ERANA.
Sub-family 3.—CARADRINIDES	9. BITYLA. 10. AGROTIS. 11. HELIOTHIS. 12. COSMODES.

Sub-family 1.—*POLIADES*.

"Eyes naked, ciliated (*i.e.*, furnished with a marginal row of long cilia curving over them)."—(Meyrick.)

Genus 1.—MISELIA, Steph.

"Antennæ in male filiform, moderately ciliated. Thorax with anterior angles projecting, somewhat crested. Abdomen not crested."—(Meyrick.)

We have at present but one New Zealand species.

MISELIA PESSOTA, Meyr.

(*Miselia pessota*, Meyr., Trans. N. Z. Inst. xix. 29.)

(Plate V., fig. 26.)

This little species has occurred at Wellington in the North Island, and at Lake Coleridge and Rakaia in the South Island.

The expansion of the wings is 1 inch. The fore-wings are dull purplish-brown; *there is an oblong black mark at the base of the dorsum containing a slender curved white line*; the orbicular is rather small, round, margined first with dull white and then with black; the reniform is large, oblong, dull white, margined with pale ochreous towards the base of the wing; *there is a conspicuous oblong black mark between the orbicular and reniform stigmata*. The hind-wings are dull grey, with the cilia paler.

The perfect insect appears in January. One specimen was taken at sugar in the Wellington Botanical Gardens, and two specimens are recorded from Canterbury. It is evidently a scarce species.

Genus 2.—ORTHOSIA, Ochs.

"Head rough-scaled; eyes naked, ciliated. Antennæ in male ciliated. Thorax with or without anterior crest. Abdomen not crested.

"A considerable genus of nearly universal distribution, though mainly found in temperate regions of both hemispheres. The imagos are almost all autumnal, and their yellow and ferruginous colouring is doubtless adapted to the autumn tints of falling leaves."—(Meyrick.)

Represented in New Zealand by three species.

ORTHOSIA MARGARITA, Hawth.

(*Orthosia margarita*, Hawth., Trans. N. Z. Inst. xxix. 283.)

(Plate V., fig. 31.)

This species was discovered at Wellington by Mr. E. F. Hawthorne.

The expansion of the wings is about 1⅓ inches. The fore-wings are dark brownish-black and rather glossy; there are several obscure dark marks near the base; the orbicular is oval, oblique, brownish-yellow, slightly darker in the middle; the claviform is almost obsolete; the reniform is rather large, bordered with dull white towards the base and termen; beyond the reniform there is a very distinct wavy transverse line; another line is situated near the termen emitting several black wedge-shaped markings from its inner edge. *The hind-wings are shining white and iridescent, with the veins black and the costa and termen narrowly shaded with black.*

Described and figured from specimens in Mr. Hawthorne's collection.

ORTHOSIA COMMA, Walk.

(*Mamestra comma*, Walk., Noct. 239; Butl., Voy. Ereb., pl. ix., 6. *Graphiphora implexa*, Walk., Noct. 405. *Hadena plusiata*, ib., Suppl. 742; *Nitocris bicomma*, Gn., Ent. Mon. Mag. v., 4. *Orthosia comma*, Meyr., Trans. N. Z. Inst. xix. 30.)

(Plate V., fig. 27 ♂, 28 ♀; Plate III., fig. 11, larva.)

This is apparently a common and generally distributed species. It has occurred plentifully at Wellington, Blenheim, Christchurch, and Rakaia.

The expansion of the wings is about 1½ inches. The fore-wings are dark grey crossed by four wavy, black-margined, transverse lines; beyond the outermost of these lines there is a black band running parallel with the termen, and beyond this again a broader band of the ground colour; the orbicular spot is very minute and dull white; the reniform, which is surrounded by a black shading, is large, yellow towards the costa, and white towards the termen. The hind-wings are dark grey. The females are generally much darker than the males, some specimens having the fore-wings very dark brownish-black.

Both sexes vary a good deal in the depth of colouring, but the markings appear to be quite constant.

The larva is dark brown, tinged with pink; the subdorsal region is paler, there are a series of diagonal blackish stripes on each segment, and the anterior portions of the larva are much darker than the rest of the body.

The specimens I reared were fed on lettuce, but I expect that the caterpillar feeds on low plants generally. It is full grown about January. The pupa state is spent in the earth.

The moth appears in January, February, and March. It is very common at the flowers of the white rata, and may also be attracted by sugar and by light.

ORTHOSIA IMMUNIS, Walk.

(*Tæniocampa immunis*, Walk., Noct. 430. *Cerastis innocua*, ib. 1710 (locality probably erroneous). *Agrotis acetina*, Feld., Reis. Nov. pl. cix. 6. *Orthosia immunis*, Meyr., Trans. N. Z. Inst. xix. 30.)

(Plate V., fig. 29.)

This species has occurred at Wellington in the North Island, and at Blenheim in the South Island.

The expansion of the wings is 1⅜ inches. *The fore-wings vary from bright orange-brown to dull reddish-brown*; there is an obscure black dot near the base, a faint transverse line at about one-fourth; the orbicular is oval, faintly outlined in brown; the claviform is very faint, its position indicated by a small brown dot; the reniform is large, oblong, much indented towards the termen, doubly outlined with dull yellow and containing a blackish spot towards its lower edge, its posterior margin is shaded with dark brown; there are several faint, wavy, transverse lines near the termen, and the termen itself is shaded with brownish-black; the cilia are reddish-brown. The hind-wings are dull grey; the cilia are pale reddish-ochreous tipped with white. *The head is covered with scattered white scales*, the thorax is reddish-brown, and the abdomen is grey tipped with reddish-brown; *the upper joints of the tarsi of the anterior legs are white*.

The perfect insect appears in January, February, and March. It frequents the blossoms of the white rata, where it occasionally may be taken in the daytime, but more frequently at night. It is not, however, a common species.

Genus 3.—XANTHIA, Tr.

"Antennæ in male filiform, moderately ciliated. Thorax with sharp compressed anterior and small posterior crest. Abdomen not crested."—(Meyrick.)

Only one New Zealand species is known at present.

XANTHIA PURPUREA, Butl.

(*Graphiphora purpurea*, Butl., Cist. Ent. ii. *Xanthia ceramodes*,

Meyr., Trans. N. Z. Inst. xix. 31. *X. purpurea*, ib. xx. 46.)

(Plate V., fig. 32.)

This handsome species has been found at Wellington in the North Island, and at Dunedin in the South Island.

The expansion of the wings is 1½ inches. The fore-wings are rich, glossy reddish-brown with several scattered whitish scales; there is a distinct yellow mark on the costa at about one-fourth, forming the beginning of a broken transverse line; the orbicular is small, round, and yellowish; the reniform is small, crescentic and yellowish, *the space between the orbicular and the reniform is very dark blackish-brown*; beyond the reniform there is a conspicuous white mark on the costa forming the beginning of a second broken transverse line; a third shaded line is situated near the termen. The hind-wings are pale brown with a dark spot in the middle, very conspicuous on the under surface.

The perfect insect appears from September till April. It is usually taken at sugar or light, but is not a very common species.

Sub-family 2.—*MELANCHRIDES*.

Eyes hairy.

Genus 4.—PHYSETICA, Meyr.

"Palpi with terminal joint in male greatly swollen, as broad as second, rather short, rounded, with an orifice in outer side, in female normal. Antennæ in male filiform, simple. Thorax and abdomen smooth."—(Meyrick.) (Plate II., fig. 8.)

PHYSETICA CÆRULEA, Gn.

(*Agrotis cærulea*, Gn., Ent. Mo. Mag. v. 38. *Physetica cærulea*,

Meyr., Trans. N. Z. Inst. xix. 5.)

(Plate IV., fig. 7.)

This fine species has occurred at Wellington in the North Island, and at Blenheim and Rakaia in the South Island.

The expansion of the wings is 1⅝ inches. *The fore-wings are slaty-blue*; there is an obscure, wavy, whitish transverse line near the base, two very wavy blackish lines at about one-third, a dark transverse shaded line across the middle, containing the orbicular spot, then a very wavy line followed by a darker space and a wavy, dull, whitish terminal line. Hind-wings dark grey, paler near the base, cilia shining white.

The perfect insect appears in October, December, and January. Mr. Fereday states that it was formerly very common at blossoms.

Genus 5.—LEUCANIA, Ochs.

"Head rough-scaled; eyes hairy. Antennæ in male ciliated. Thorax with or without slight anterior crest. Abdomen not crested.

"A very large cosmopolitan genus, equally common everywhere; it is a development of *Melanchra*, to which some of the New Zealand species give such a complete transition that a line of demarcation can hardly be drawn. The larvæ all feed on *Gramineæ*."—(Meyrick.)

We have seventeen species.

LEUCANIA GRISEIPENNIS, Feld.

(*Mamestra griseipennis*, Feld., pl. cix. 22. *Chera virescens*, Butl., Cist. Ent. ii. 489. *Spœlotis inconstans*, ib. 545; *Leucania moderata*, Meyr., Trans. N. Z. Inst. xix. 7 (nec Walk.). *Leucania griseipennis*, Meyr., Trans. N. Z. Inst. xx. 44.)

(Plate IV., fig. 8.)

This species has occurred at Wellington in the North Island. In the South Island it has been taken at Mount Arthur, Lake Coleridge, Rakaia, Akaroa, and Lake Guyon.

The expansion of the wings is 1½ inches. The fore-wings are dull greenish-grey; there are two obscure blackish transverse lines near the base and several dull white dots; *a very conspicuous transverse curved black shade near the middle, followed by an extremely jagged dull white transverse line, another less jagged transverse line near the termen; the orbicular is oval, pale, edged with black*; the reniform and claviform are also pale but inconspicuous; the cilia are tinged with brown. The hind-wings are grey *with the cilia wholly white.*

The following variety, taken on Mount Arthur, is thus described by Mr. Meyrick:—

"*Var. A.* Thorax and fore-wings without ochreous tinge, with numerous white scales tending to form suffused spots and margins to lines; cilia distinctly barred with darker; hind-wings grey, with dark grey, irregular terminal band."[10]

The perfect insect appears from November till March, and is said to be very common in certain localities. It has been taken at considerable elevations in the Nelson province (4,700 feet above the sea-level on Mount Arthur, by Mr. Meyrick and myself). In Wellington it is certainly a scarce species.

LEUCANIA MODERATA, Walk.

(*Agrotis moderata*, Walk., Suppl. 705. *Eumichtis sistens*, Gn., Ent. Mo. Mag. v. 39. *Mamestra sistens*, Meyr., Trans. N. Z. Inst. xix. 19. *Leucania moderata*, ib. xx. 45.)

This species has occurred at Rakaia in the South Island. It very closely resembles the preceding species, from which it is said to be distinguished by the cilia of the hind-wings, which are "partially grey in *Leucania moderata*, wholly white in *L. griseipennis*."—(Meyrick.)

The perfect insect appears in February. I am unacquainted with this species.

LEUCANIA TEMPERATA, Walk.

(*Bryophila temperata*, Walk., 1648 (nec Meyrick). *Xylina inceptura*, ib. 1736. *X. deceptura*, ib. 1737. *Leucania temperata*, Meyr., Trans. N. Z. Inst. xx. 45.)

"Terminal joint of palpi moderate; form of wing as in *Leucania griseipennis*, first and second lines whitish, inconspicuous, margined with black dots, second line evenly curved, subterminal perceptible; cilia grey, indistinctly barred with white. Hind-wings grey."—(Meyrick.)

Described by Mr. Meyrick from the British Museum specimens.

I am unacquainted with this species.

LEUCANIA NULLIFERA, Walk.

(*Agrotis nullifera*, Walk., Noct. 742; Butl., Voy. Ereb., pl. ix. 5. *Alysia specifica*, Gn., Ent. Mo. Mag. v. 3. *Leucania nullifera*, Meyr., Trans. N. Z. Inst. xix. 7.)

(Plate IV., fig. 9; head, Plate II., fig. 11.)

This large though sombre-looking insect has occurred in the North Island at Taupo and Wellington. In the South Island it has been taken commonly at Mount Arthur, Christchurch, and Rakaia.

The expansion of the wings is from 2½ to 2¾ inches. *The fore-wings are uniform dull grey*, with a double row of very faint white spots parallel to the termen; *the hind-wings, head, thorax, and abdomen are pale grey*.

In some specimens the fore-wings are quite destitute of markings, whilst in others the ground colouring varies considerably, and is occasionally dull brown instead of grey.

The larva is very stout, bright yellowish-brown, considerably paler on the under surface; the dorsal line is faintly indicated, the subdorsal and lateral lines are dull brown, with a chain of elongate white spots beneath each; the spiracles and dorsal surface of the posterior segments are black; there are also numerous white dots all over the larva.

This caterpillar feeds on spear-grass (*Aciphylla squarrosa*), and only a single individual inhabits each clump. It devours the soft, central portions of the tussock, and its presence can generally be detected by a quantity of pale brown "frass," or discoloration, which is generally visible near the bases of the leaves. Owing to the formidable array of spines presented by the spear-grass, this larva can have but few enemies. The presence of these spines makes the insect a difficult one to obtain without special apparatus. A sharp pair of strong scissors, however, will enable the collector to cut off a sufficient number of the "spears" to allow of the insertion of a small trowel or hatchet under the root. The plant can

then be lifted out of the ground, and the larva afterwards carefully extracted from its burrow in the stem. These larvæ are full grown about the end of May, which is consequently the best time to obtain them for rearing. The pupa is enclosed in an earthen cell amongst the roots of the spear-grass. The moth appears in November, December, January, February, and March. It is sometimes attracted by light. I have found it commonly on the Tableland of Mount Arthur at elevations of from 3,500 to 4,000 feet above the sea-level, where its food-plant also flourishes.

LEUCANIA PURDII, Frdy.

(*Leucania purdii*, Frdy., Trans. N. Z. Inst. xv. 195; Meyr., ib. xix. 8.)

(Plate IV., fig. 11.)

This fine species was discovered at Dunedin by Mr. Purdie. A single specimen has also been taken at Wellington.

The expansion of the wings is from 2¼ to 2½ inches. *The fore-wings are brownish-crimson; there are two broad, shaded, yellow, longitudinal streaks above and below the middle*; the costa is margined with yellow near the base, and the dorsum is yellow throughout its entire length; the cilia are deep orange. The hind-wings are dark grey, and the cilia yellow.

The perfect insect appears in December.

Described and figured from specimens in the collections of Messrs. Fereday and Hawthorne.

LEUCANIA ATRISTRIGA, Walk.

(*Xylina atristriga*, Walk., Suppl. 756. *Mamestra antipoda*, Feld., Reis. Nov., pl. cix. 23. *Leucania atristriga*, Meyr., Trans. N. Z. Inst. xix. 8.)

(Plate IV., fig. 12.)

This smart-looking species is very common in the North Island in the neighbourhood of Wellington. In the South Island it has occurred abundantly at Nelson, Christchurch, Lake Coleridge, and Dunedin.

The expansion of the wings is about 1½ inches. The fore-wings are rich reddish-brown; *there is a broad bluish-grey longitudinal streak on the costa, reaching nearly to the apex, and a very broad, pale brown, longitudinal shading on the dorsum; there is a conspicuous longitudinal black stripe in the middle of the wing from the base to one-third, the orbicular, reniform, and claviform spots are bluish-grey, edged with black*, the transverse lines are very indistinct; the cilia are reddish-brown. The hind-wings are dark grey with the cilia ochreous.

This species varies slightly in the intensity of its markings and in the extent of the pale dorsal area.

The moth first appears about January and continues in great abundance until the middle or end of April, being one of the last of our *Leucanias* to disappear in the autumn. It is extremely partial to the flowers of the white rata (*Metrosideros scandens*), where, on warm, still evenings, it may be often met with in the utmost profusion. It also comes freely to sugar, and is frequently attracted by light.

LEUCANIA PROPRIA, Walk.

(*Leucania propria*, Walk., Noct. iii.; Gn., Ent. Mo. Mag. v. 2;

Butl., Voy. Ereb., pl. ix. 4; Meyr., Trans. N. Z. Inst. xix. 9.)

(Plate IV., fig. 13.)

This insect has occurred in the South Island at Mount Arthur, Blenheim, and Mount Hutt.

The expansion of the wings is 1½ inches. The fore-wings are pale ochreous; *there is a conspicuous longitudinal black streak in the middle of the wing, extending from the base to about one-third, and a broad, dark brown longitudinal shading, slightly above the middle, from one-fourth to the termen*; the reniform is rather small, dull grey, faintly edged with darker, the orbicular and claviform are very indistinct or absent; there is a transverse series of black dots on the veins a little before the termen, and another series on the termen; the cilia are ochreous banded with brown. The hind-wings are pale grey, with a terminal series of small black marks; the cilia are ochreous. The head and thorax are pale reddish-brown, and the abdomen is ochreous.

This species varies slightly in the depth of its colouring.

The perfect insect is met with from January till March. On the Mount Arthur Tableland it occurred very commonly at about 3,800 feet above the sea-level. In this locality it was freely attracted by light, and large numbers of specimens were captured by the aid of a single candle, exhibited at the tent door during mild evenings.

LEUCANIA ACONTISTIS, Meyr.

(*Leucania acontistis*, Meyr., Trans. N. Z. Inst. xix. 9.)

(Plate IV., fig. 14.)

A single specimen of this species was captured at Castle Hill by Mr. J. D. Enys, and is now in Mr.

Fereday's collection.

The expansion of the wings is 1⅜ inches. *The fore-wings are dull ochreous; the veins are slightly darker; there is a fine, black, doubly-curved, longitudinal streak from the base to about one-third.* The hind-wings are pale yellowish-grey. The cilia of all the wings are dull ochreous.

Described and figured from the specimen in Mr. Fereday's collection.

LEUCANIA PHAULA, Meyr.

(*Leucania phaula*, Meyr., Trans. N. Z. Inst. xix. 10.)

(Plate IV., fig. 15.)

Two specimens of this insect, "bred from tussock grass," were found at Christchurch.[11]

The expansion of the wings is 1½ inches. The fore-wings are dull ochreous, with the veins obscurely indicated by black and white dots; there is a curved series of minute black dots near the termen. The hind-wings are pale ochreous, clouded with grey towards the termen. The cilia of all the wings are dull ochreous. This insect may be distinguished from *Leucania unica* by its larger size, duller coloration, less oblique termen of fore-wings, and simple antennæ in the male.

The perfect insect appears in November.

Described and figured from a specimen in Mr. Fereday's collection.

LEUCANIA ALOPA, Meyr.

(*Leucania alopa*, Meyr., Trans. N. Z. Inst. xix. 10.)

(Plate IV., fig. 16.)

This species has occurred at Lake Coleridge and at Lake Guyon.

The expansion of the wings is about 1½ inches. *The fore-wings are dull orange-brown*; there are three obscure black dots at about one-third; *the reniform is represented by a rather conspicuous cloudy spot*; there is a curved series of black dots near the termen. The hind-wings are grey, paler towards the base. The cilia of all the wings are dull orange-brown.

The moth appears in March.

Described and figured from a specimen in Mr. Fereday's collection.

LEUCANIA MICRASTRA, Meyr.

(*Leucania micrastra*, Meyr., Trans. Ent. Soc. Lond. 1897, 383.)

(Plate IV., fig. 10.)

Three specimens of this insect have occurred in my garden at Karori.

The expansion of the wings is 1⅝ inches. The fore-wings are *bright orange-brown*; there are several white scales near the base, two black-edged white dots at about one-third, *a small black spot with a shining white dot on each side of it at the origin of veins 3 and 4*, and a series of black and white dots on all the veins near the termen; the cilia are orange-brown *tipped with white*. The hind-wings are pale ochreous-brown. The cilia are ochreous broadly *tipped with white*.

This species somewhat resembles *Leucania alopa* in general appearance, but the wings are narrower and the colour of the fore-wings is considerably brighter.

The moth appears in December.

LEUCANIA UNICA, Walk.

(*Leucania unica*, Walk., Noct. 112; Butl., Voy. Ereb., pl. ix. 9. *Nonagria juncicolor*, Gn., Ent. Mo. Mag. v. 2. *Leucania unica*, Meyr., Trans. N. Z. Inst. xix. 10.)

(Plate IV., fig. 17.)

This insect has been taken at Blenheim and at Rakaia.

The expansion of the wings is 1⅜ inches. The fore-wings are dull ochreous with the veins darker; there are one or two obscure blackish dots at about one-third from the base, and several faint dots near the termen. Hind-wings paler with very pale cilia; *the antennæ in the male are moderately bipectinated.*

The moth appears in November.

Described and figured from Mr. Fereday's specimens.

LEUCANIA AROTIS, Meyr.

(*Leucania arotis*, Meyr., Trans. N. Z. Inst. xix. 11. *Leucania aulacias*,[12] Meyr., Trans. N. Z. Inst. xix. 11.)

(Plate IV., fig. 18.)

This species has occurred at Wellington in the North Island. In the South Island it has been found at Blenheim, Christchurch, and Rakaia.

The expansion of the wings is about 1½ inches. *The fore-wings are cream-colour with the veins finely marked in grey; there is a series of streaks of darker cream-colour between the veins*, and a

row of minute black dots near the termen; the cilia are cream-colour. The hind-wings are dark grey with the cilia white.

The perfect insect appears in November and December. It is rather a scarce species.

LEUCANIA SULCANA, Fereday.

(*Leucania sulcana*, Frdy., Trans. N. Z. Inst. xii. 267, pl. ix.; Meyr., Trans. N. Z. Inst. xix. 11.)

(Plate IV., fig. 19 ♂, 20 ♀.)

This species has occurred at Akaroa and at Dunedin.

The expansion of the wings is from 1½ to 1¾ inches. *The fore-wings are light ochreous with the veins white*; there is a shaded, brownish, longitudinal streak near the apex, another from the end of the cell to the termen, a stronger streak from the base of the wing to near the tornus, and another along the dorsum; there is a minute black dot near the base above the middle, a slightly larger dot at about one-third, a conspicuous dot between the origins of veins 3 and 4, and a very minute dot on vein 6. *Hind-wings dark blackish-grey, cilia paler.*

The perfect insect appears in February, and has been taken at sugar.

Described and figured from specimens in Mr. Fereday's collection.

LEUCANIA SEMIVITTATA, Walk.

(*Leucania semivittata*, Walk., Suppl. 628; Meyr., Trans. N. Z. Inst. xix. 12.)

(Plate IV., fig. 21 ♂, 22 ♀.)

This species has occurred commonly at Christchurch, Mount Torlesse, and Dunedin.

The expansion of the wings is from 1⅛ to 1⅜ inches. The fore-wings are pale ochreous; there is a very obscure, shaded, brownish, longitudinal streak below the middle, *a conspicuous black dot at the base, a second at about one-sixth, a third at one-third*, a fourth between the origins of veins 3 and 4, a curved series of minute terminal dots. Hind-wings much paler with a darker blotch near the middle. In the female the wings are browner with the dots much smaller or absent.

The moth appears in April and May, being found at night on the blossoms of the *scabious*.

Described and figured from specimens in Mr. Fereday's collection.

LEUCANIA BLENHEIMENSIS, Frdy.

(*Leucania blenheimensis*, Frdy., Trans. N. Z. Inst. xv. 196; Meyr., ib. xix. 12.)

(Plate IV., fig. 23 ♀.)

This rather striking insect has occurred at Napier and at Blenheim.

The expansion of the wings is about 1½ inches. *The fore-wings are cream-coloured with the veins darker*; there are three faint black dots at about one-third, a curved series of black dots near the termen, *the termen itself being strongly shaded with dark greyish-brown*; the cilia are dark greyish-brown. The hind-wings are grey, paler towards the base; the cilia are also grey.

Described and figured from a specimen in Mr. Fereday's collection.

LEUCANIA UNIPUNCTA, Haw.

(*Leucania unipuncta*, Haw., Lepidoptera Britannica, p. 174, No. 37. *Leucania extranea*, Gn., Noct. v. 77; Butl., Voy. Ereb., pl. ix. 2; Meyr., Trans. N. Z. Inst. xix. 12.)

(Plate IV., fig. 24.)

This species has occurred at Napier and at Wellington in the North Island. In the South Island it has been found at Nelson and at Christchurch.

The expansion of the wings is 1¾ inches. The fore-wings vary from dull ochreous to bright reddish-ochreous; there are numerous indistinct blackish dots; *the orbicular and reniform are almost round and slightly paler than the rest of the wing; there is a minute white dot immediately below the reniform and an obscure, oblique blackish line from the apex of the wing* ending in a series of minute black dots; *the termen is not indented*. The hind-wings are grey, darker near the termen; the cilia are white.

Varies considerably in the ground colour and in the extent of the black speckling.

"The larva is extremely variable. Its usual colour is pale brown with a white dorsal line and several dark lines on each side.

"Young larvæ closely resemble their food-plant in colour, and occasionally this is persistent throughout life; in fact the larva is very variable. Feeds on various grasses."[13]

The perfect insect first appears about January, and continues in increasing numbers until the middle or end of April. It is often met with at sugar.

This species is of almost universal distribution, having occurred in Australia, Java, India, Europe,

and North and South America. In England it is regarded as a great rarity.

Genus 6.—ICHNEUTICA, Meyr.

"Antennæ in male strongly bipectinated throughout. Thorax and abdomen smooth."—(Meyrick.)

This genus is very closely allied to *Leucania*. It appears to be exclusively limited to New Zealand, where it is represented by two conspicuous species. Probably when the extensive mountainous regions of the country have been more fully explored by entomologists other species will be discovered.

ICHNEUTICA DIONE, n. sp.

(Plate IV., fig. 27 ♂.)

A single specimen of this interesting species was captured by Mr. C. W. Palmer, on Mount Arthur at an elevation of about 4,400 feet.

The expansion of the wings is 1½ inches. The fore-wings are dull blackish-brown, *darker near the middle; there is a rather oblique, white, longitudinal stripe below the middle from about one-eighth to one-third; above this there is a very conspicuous, large, elongate white mark; this mark has a semicircular indentation above, probably representing the orbicular; another indentation towards the termen, probably representing the reniform, and below this it emits two short teeth-like projections*; beyond these markings the ground colour becomes paler, and is traversed by an obscure, jagged, transverse line; the cilia are grey. The hind-wings are pale grey; the cilia are also grey. The body is dark brownish-black. The pectinations of the antennæ of this insect are slightly shorter than those in *Ichneutica ceraunias*.

The type specimen is slightly damaged; but the species is so evidently distinct that I feel no hesitation in describing it.

ICHNEUTICA CERAUNIAS, Meyr.

(*Ichneutica ceraunias*, Meyr., Trans. N. Z. Inst. xix. 13.)

(Plate IV., fig. 25 ♂, 26 ♀).

This handsome species has hitherto only occurred on the Tableland of Mount Arthur, where, however, it seems to be common.

The expansion of the wings of the male is 1¾ inches, of the female 2 inches. The fore-wings of the male are rich orange-brown, paler towards the base. There are two very broad, longitudinal, yellowish stripes, one on the costa and the other on the dorsum. The costal stripe divides into two branches before its termination, one of which is produced downwards; there is also a *conspicuous white mark a little beyond the middle of the wing emitting two tooth-like projections towards the termen*, and two narrow, dark brown streaks near the base of the wing. The hind-wings are dark brownish-grey. The head, thorax, and abdomen are yellowish-brown, and the antennæ are very strongly bipectinated. The female is much narrower in the wings, the ground colouring is dull brown, and the markings are all dull yellow.

This species varies slightly in the intensity of the markings.

The moth appears early in January. It is much attracted by light. In 1891 I took over twenty specimens by means of a single candle exhibited, during three evenings, at the door of my tent. Prior to this date only one specimen had been taken by Mr. Meyrick during January, 1886. All these moths were met with over 3,500 feet above the sea-level, so that the insect is evidently confined to mountain regions.

Genus 7.—MELANCHRA, Hb.

"Head rough-scaled; eyes hairy. Antennæ in ♂ ciliated, or sometimes bipectinated with apex simple. Thorax with more or less developed anterior and posterior crests. Abdomen more or less crested, in ♀ obtuse. Anterior tibiæ rarely with apical hook."

"A large genus of very general distribution, but much

commoner in temperate regions of both hemispheres. Relatively much more numerous in New Zealand than elsewhere."—(Meyrick.)

This genus includes no less than thirty-four species. Some of these are extremely difficult to distinguish owing to the obscurity of their markings, which offer unusual obstacles to clear description and delineation. I have, however, endeavoured to point out what, in my opinion, constitute the most reliable distinctions; but I fear that amongst those species, where only one or two specimens are known, cases of real difficulty will arise. Future investigation will no doubt result in a remodelling of some of the more obscure species in this genus.

It may be well to point out that the genus *Melanchra* was formerly known by the name of *Mamestra*.

MELANCHRA DISJUNGENS, Walk.

(*Heliophobus disjungens*, Walk., Noct. 1681; Butl., Voy. Ereb., pl. ix. 1. *Hadena nervata*, Gn., Ent. Mo. Mag. v. 40. *Mamestra disjungens*, Meyr., Trans. N. Z. Inst. xix. 15.)

(Plate V., fig. 43.)

This species has occurred in the South Island at Ashburton and at Rakaia.

The expansion of the wings is about 1⅜ inches. The fore-wings are brownish-grey; *the veins are very conspicuously marked in white*, the orbicular and reniform are large, white, each with a dusky centre; there is a conspicuous, white, transverse line near the termen, emitting two white, tooth-like projections on veins 3 and 4, *and connected with a longitudinal line running to the base of the wing*. The hind-wings are grey with the cilia white.

The perfect insect appears from November till January. It was formerly a common species near Rakaia, but is now much scarcer.

MELANCHRA PARACAUSTA, Meyr.

(*Mamestra paracausta*, Meyr., Trans. N. Z. Inst. xix. 15.)

(Plate IV., fig. 28 ♂, 28A ♀.)

This species has occurred in the South Island at Mount Arthur, Castle Hill, and Invercargill.

The expansion of the wings is about 1⅜ inches. *The fore-wings are dull white with an irregular, central, longitudinal, blackish-brown streak becoming very broad towards the termen; there is an oval reddish-brown blotch near the base, but no distinct transverse lines; two conspicuous elliptic, white marks are situated on the termen near the tornus.* The hind-wings are pale grey, with an obscure central shade and a series of brownish dots along the termen.

The species appears somewhat variable. In some male specimens the white colouring is largely replaced by pale yellowish-brown. Described and figured from specimens in the collections of Messrs. Fereday, Hawthorne, and Philpott[14].

MELANCHRA INSIGNIS, Walk.

(*Euplexia insignis*, Walk., Suppl. 724. *Xylina turbida*, ib. 754. *Mamestra polychroa*, Meyr., Trans. N. Z. Inst. xix. 16. *Mamestra insignis*, Meyr., ib. xx. 45.)

(Plate IV., fig. 29 ♂, 30 ♀.)

This pretty species has occurred at Palmerston and

Wellington in the North Island, and at Blenheim, Christchurch, and West Plains near Invercargill in the South Island. It is probably common and generally distributed.

The expansion of the wings is about 1⅜ inches. *The fore-wings are pinkish-brown*; there is a short black streak near the centre of the wing at the base, and an irregular, extensive black marking along the dorsum; *the orbicular, reniform, and claviform spots are large, margined first with green and then with black*; a fine white line is situated parallel with the termen, edged with green, and emitting two sharp tooth-like markings; beyond this line the ground colour of the wing is dark-brownish-black. The hind-wings are dull brown, darker towards termen; the cilia are white with a brown line. The antennæ of the male are slightly bipectinated. In the female the ground colour is considerably paler, the black markings much darker, and more suffused, and the posterior half of the reniform is usually creamy-white.

Some specimens have the green and black markings slightly more pronounced, but otherwise there are no important variations.

The eggs are deposited in October and November. When first laid they are pale greenish-white, but become dark brown in the centre as the enclosed embryo develops. The young larvæ emerge in about a fortnight. At this time the two anterior pairs of prolegs are very short, causing the caterpillar to loop up its back when walking. In colour the young larva is pale brown, with numerous black warts emitting several long, stiff bristles. It is very active, and busily devours the soft green portions of the dock leaves, leaving the harder membrane untouched. Twelve days later the larva becomes pale green in colour, and moults for the first time, after which traces of subdorsal and lateral lines present themselves. Growth then proceeds with great rapidity, and in

another eleven days the larva again sheds its skin. The last moult occurs a fortnight later.

At this time the larva is pale greenish-brown, inclining to yellow on the ventral surface. The lateral lines consist of a series of black markings near the posterior margin of each segment; the subdorsal lines are represented by four oblique black marks on each side of the four posterior segments of the larva. The region between these lines is much clouded with yellowish-green or pink, the larvæ having a tendency to diverge into pink and green varieties. The anal segment is dull yellow. The head is brown, with two black stripes and several black dots.

Whilst rearing these larvæ I noticed that during the daytime they invariably hid themselves under the blotting paper at the bottom of the breeding cage. No doubt, under natural conditions, they retreat beneath the ground, only coming abroad at night to feed. This habit would account for the difficulty experienced in finding larvæ of this genus in a state of nature.

The pupa state is spent in the earth, and occupies about a month.

The moth appears towards the end of January. It evidently hibernates through the winter, as it is often seen very late in the autumn, and is always one of the first moths to come to sugar in the early spring. It is frequently observed at rest on fences and trees in the daytime.

MELANCHRA MAYA, n. sp.

(Plate IV., fig. 31.)

A single specimen of this species was taken on the Tableland of Mount Arthur, at an altitude of about 3,500 feet.

The expansion of the wings is 1⅝ inches. The fore-wings are bright yellowish-brown, paler towards the apex; there are two broad, shaded, black stripes at the base, one near the middle edged with yellow above, and one below the middle edged with yellow beneath; the orbicular is oval, oblique, edged with black except towards the costa; the claviform is rather irregular, dark purplish-brown; *the reniform is very large, dark purplish-brown edged with black; there is a large elongate patch of very dark brown at the tornus, partly edged first with yellow and then with black*; another smaller patch is situated on the termen near the middle, bisected by a fine yellow line. The hind-wings are grey; the cilia of all the wings are yellowish-brown. The head and thorax are purplish-brown, the abdomen dull brownish-grey.

MELANCHRA PLENA, Walk.

(*Erana plena*, Walk., Suppl. 744. *Mamestra sphagnea*, Feld., Reis. Nov., pl. cix. 17. *Dianthœcia viridis*, Butl., Cist. Ent. ii. 547. *Mamestra plena*, Meyr., Trans. N. Z. Inst. xix. 17.)

(Plate IV., fig. 32.)

Apparently common in the Canterbury district, where it has been taken at Christchurch and Mount Hutt. In the North Island it has occurred in the neighbourhood of Wellington.

It resembles *Melanchra insignis* in every respect except that the head, thorax, and fore-wings are entirely suffused with green; there is no central black streak at the base, and the orbicular, reniform, and claviform spots are smaller.

It varies a little in the intensity of the green colouring.

The eggs are deposited early in November. At first they are white in colour, but soon become dull brown, with two concentric circular markings. The young larva closely resembles that of the *Melanchra insignis*, but is much more sluggish. It feeds on grasses and other low plants.

In about six weeks' time it is full grown, when it still resembles the caterpillar of *Melanchra insignis*, except that its colouring is considerably darker, and a number of rust-red spots are situated on the subdorsal line. This larva also appears to spend the daytime underground, only coming abroad in the evening to feed. The pupa is concealed in the earth.

The perfect insect may be occasionally found at rest on tree-trunks in the forest, where it is very hard to discover, as it almost exactly resembles a little patch of moss or lichen. Specimens are sometimes noticed in the middle of winter, so there is little doubt that this species hibernates. It occurs in spring as late as November, and as the pupæ emerge during the latter end of January the insect is about for most of the year.

MELANCHRA LITHIAS, Meyr.

(*Mamestra lithias*, Meyr., Trans. N. Z. Inst. xix. 17.)

(Plate IV., fig. 33.)

Two specimens of this species were taken at Castle Hill by Mr. J. D. Enys, and are now in Mr. Fereday's collection.

The expansion of the wings is 1¼ inches. *The fore-wings are*

slaty-brown; there is a broken, black-edged, white, transverse line near the base, and another at about one-third; the orbicular is indicated by a conspicuous black-edged white crescent, the reniform is large, oblong, white, margined with black, and crossed by two grey lines; there is an interrupted white terminal transverse line and a series of black dots on the termen. The hind-wings are grey, paler towards the base; the cilia of all the wings are slaty-brown.

Described and figured from a specimen in Mr. Fereday's collection.

MELANCHRA MUTANS, Walk.

(*Hadena mutans*, Walk., Noct. 602. *H. lignifusca*, ib. 603. *Mamestra angusta*, Feld., Reis. Nov., pl. cix. 18. *M. acceptrix*, ib., pl. cix. 19. *Hadena debilis*, Butl., Proc. Zool. Soc. Lond., 1877, 385, pl. xlii. 6. *Mamestra mutans*, Meyr., Trans. N. Z. Inst. xix. 17.)

(Plate IV., fig. 34 ♂, 35 ♀, 36 ♂, variety; Plate III., fig. 15, larva.)

This is a very abundant species throughout the country.

The expansion of the wings is about 1½ inches. The fore-wings are pale reddish-brown in the male, grey in the female; the markings are black and somewhat indistinct; the orbicular spot is nearly round, the claviform semicircular, the reniform large and not margined with black towards the termen; a line runs parallel with the termen, and emits on its outer side a tooth-like mark; inside this line the ground colouring of the wing is usually lighter. The hind-wings are grey, darker in the male; the cilia are white with a cloudy line. The head, thorax, and abdomen are brown in the male, grey in the female. The antennæ are slightly bipectinate in the male.

This species varies much in the ground colouring of the fore-wings, especially in the male, where it

ranges from pale pinkish-brown to dark brown. The wings of the female are frequently much clouded with dark grey.

The larva is rather stout, with the anterior segments wrinkled. It varies much in colour; the dorsal surface is usually reddish-brown; the lateral line is broad and black; a series of subdorsal stripes are also black; the ventral surface is green. Sometimes these markings are hardly visible, and the larva is entirely green, whilst occasionally the brown colouring predominates.

It is a sluggish caterpillar, and feeds on low plants (*Plantago*, &c.) during the whole of the spring and summer. It often frequents the luxuriant growth surrounding logs and stones which have long been left undisturbed.

The pupa state is spent in the earth or amongst moss on fallen trees. When this stage occurs in the summer it is of short duration, but in the case of larvæ becoming full grown in the autumn, the regular emergence does not take place until the following spring.

The moth may be observed on mild evenings nearly all the year round, but is commoner during the summer. It is an extremely abundant species, and is very often seen resting on tree trunks during the daytime, in which position the colouring of both sexes will be seen to be very protective.

MELANCHRA AGORASTIS, Meyr.

(*Mamestra agorastis*, Meyr., Trans. N. Z. Inst. xix. 18.)

(Plate V., fig. 30 ♀.)

This species has occurred at Wellington in the North Island, and at Akaroa and Lake Guyon in the South Island.

The expansion of the wings is about 1½ inches. *The fore-wings are rich reddish-brown,* with dull yellowish-white markings; the claviform is small, grey, margined with dark reddish-brown; the orbicular is also rather small, grey, margined with dull white; the reniform is rather large, oblong, dark grey, margined rather broadly with yellowish-white. The hind-wings are dark brown. *The antennæ of the male are shortly pectinated.*

This species very closely resembles a dark specimen of *Melanchra pelistis* so far as the female is concerned, which is the only sex I have had an opportunity of examining.

The perfect insect appears in February and March. It is a scarce species.

MELANCHRA PICTULA, White.

(*Dianthoecia pictula*, White, Tayl. New Zeal., pl. i. 3. *Meterana pictula*, Butl., Proc. Zool. Soc. Lond., 1877, 386, pl. xlii. 1. *Mamestra pictula*, Meyr., Trans. N. Z. Inst. xix. 18.)

(Plate IV., fig. 37 ♂.)

Three specimens of this handsome species have occurred at Lake Coleridge in the South Island.

The expansion of the wings is 1⅝ inches. The fore-wings are grey, very faintly tinged with pink, the markings are yellowish-green margined with black, *the reniform is large, oval, clear white, with a minute white dot above and below it,* there is a series of conspicuous black-edged yellow spots near the termen; the cilia are grey with a series of minute black and white dots at their base. *The hind-wings are pale crimson shaded with dark grey near*

the termen, there is an obscure grey spot near the middle; the cilia are grey. The sides of the abdomen are bright crimson.

The moth appears in March.

Described and figured from a specimen in Mr. Fereday's collection.

MELANCHRA RHODOPLEURA, Meyr.

(*Mamestra rhodopleura*, Meyr., Trans. N. Z. Inst. xix. 19.)

(Plate IV., fig. 38.)

This species has been taken in the North Island at Napier and Wellington.

The expansion of the wings is 1½ inches. The fore-wings are greenish-grey, with the markings yellow margined with black; *the hind-wings are dark grey* with a terminal series of small yellow spots. The sides of the abdomen are bright crimson.

This insect is very closely allied to *Melanchra pictula*, *but the absence of the white reniform spot and the grey hind-wings, will at once distinguish it from that species*.

The perfect insect appears in May and June. It is decidedly rare.

MELANCHRA MEROPE, n. sp.

(Plate V., fig. 2.)

A single specimen of this handsome insect was taken in the Wellington Botanical Gardens in October, 1887.

The expansion of the wings is nearly two inches. *The fore-wings are rich chocolate-brown, with yellow markings outlined in very deep brown*; there is a rather broad broken transverse line near the base; a yellow blotch containing a slender curved brown line, on the dorsum at about one-fourth, forming the end of another extremely broken transverse line; *the reniform is large, finely outlined with brown towards the base of the wing and half filled in with yellow towards the termen; between the reniform and the dorsum there is a jagged yellow transverse line*; there is a terminal series of dark brown streaks and yellow spots, and the termen itself is scalloped; the cilia are dark brown. The hind-wings are pale brown, pinkish tinged; there is an obscure terminal line; the cilia are brownish-pink. The head and thorax are dark brown, the abdomen pale brown, with the crests darker.

MELANCHRA PELISTIS, Meyr.

(*Mamestra pelistis*, Meyr., Trans. N. Z. Inst. xix. 20.)

(Plate V., fig. 3 ♂, 4 ♀.)

This species has occurred at Wellington and at Paikakariki, in the North Island. In the South Island it has been found at Akaroa and Lake Coleridge.

The expansion of the wings is about 1½ inches. The fore-wings are dull ochreous more or less shaded with dark reddish-brown, *especially in the vicinity of the transverse lines*; there are several obscure pale marks near the base; *the orbicular is grey, margined towards the dorsum with a conspicuous white or dull yellow crescentic line; the claviform is small, round, dull grey, edged with darker; the reniform is large, darker grey, paler towards the costa, margined with white or dull yellow towards the base of the wing and termen*; there are two obscure transverse lines, the outer one often being slightly toothed towards the termen; sometimes there is a terminal series of minute black marks; the cilia are brown. The hind-wings are dark grey, with the cilia white.

This species varies considerably in the ground colouring of the fore-wings. In some specimens the

wing is almost entirely rich reddish-brown, whilst in others this colouring is confined to the vicinity of the stigmata and transverse lines. Numerous intermediate varieties exist which seem to connect these two forms.

The perfect insect appears in January, February, and March. It is very common in the Wellington Botanical Gardens on the white rata blossoms.

MELANCHRA PROTEASTIS, Meyr.

(*Mamestra vitiosa*, Meyr., Trans. N. Z. Inst. xix. 20 (nec Butl.).
Mamestra proteastis, Meyr., Trans. N. Z. Inst. xx. 45.)

(Plate IV., fig. 40 ♂.)

This insect is very common in the neighbourhood of Christchurch.

The expansion of the wings is 1¼ inches. The fore-wings are dark chocolate-brown; there are several very obscure marks near the base, the orbicular and claviform spots are almost invisible, the reniform is pale brown with a minute dot above and below it towards the termen, followed by a pale, darker-margined, transverse line. The hind-wings are dull brownish-grey, with the cilia paler. The female is rather darker in colour than the male.

This is a very obscurely marked insect, closely allied to the next species, from which it can only be distinguished with difficulty. *Its somewhat smaller size and the two minute white dots on the reniform stigma appear to be the most definite characteristics.*

The perfect insect appears in May and June.

Described and figured from specimens in Mr. Fereday's collection.

MELANCHRA VITIOSA, Butl.

(*Apamea vitiosa*, Butl., Proc. Zool. Soc. Lond., 1877, 384, pl. xlii. 3. *Mamestra ochthistis*, Meyr., Trans. N. Z. Inst. xix. 20. *Mamestra vitiosa*, Meyr. Trans. N. Z. Inst., xx. 45.)

(Plate IV., fig. 42; Plate III., fig. 16, larva.)

This is a scarce species in the neighbourhood of Wellington. In Christchurch it is very common.

The expansion of the wings is 1⅜ inches. In general colouration it closely resembles the preceding insect, but is considerably paler, with the markings much more distinct. There are no clear white dots above or below the reniform stigma, the orbicular is obliquely oval and rather conspicuous, and the claviform is strongly margined with black.

The larva is rather robust, very pale green above with numerous white lines and dots; dark green beneath with yellow dots. In the light part there is a triangle of black spots on each segment. The young larva has a strong pink lateral line, but in mature specimens this line is confined to the anterior and posterior segments only. Length when full grown about 1¼ inches.

This caterpillar feeds on *Melicope simplex*, and when amongst the foliage of its food-plant it is extremely hard to detect, owing to its protective colouring and sluggish habits. The larva is full grown about October.

The pupa is enclosed in a light cocoon on the surface of the ground.

The perfect insect appears from November till April.

MELANCHRA DIATMETA, Meyr.[15]

(Plate V., fig. 5.)

This species has occurred at Wellington.

The expansion of the wings is 1⅜ inches. The fore-wings are reddish-brown; there is a short longitudinal black streak near the base, an obscure yellow transverse line at about one-fourth, and several short oblique brown or yellow marks on the costa; the orbicular is oval oblique outlined very distinctly in yellow; the reniform is white, margined with yellow towards the base of the wing; *there is a black longitudinal streak at the base on the dorsum, which bends upwards at about one-fourth, and runs in a somewhat curved direction to a little above the tornus*. The veins are faintly marked in black, and there are several large yellow dots between the veins near the termen; the termen itself is slightly indented, the cilia are reddish-brown. The hind-wings are greyish-brown with the cilia reddish. There are two very conspicuous curved yellowish stripes on each side of the thorax.

The perfect insect appears in September and October. It is a rare species.

MELANCHRA TARTAREA, Butl.

(*Graphiphora tartarea*, Butl., Proc. Zool. Soc. Lond., 1877, 384, pl. xlii. 2. *Mamestra tartarea*, Meyr., Trans. N. Z. Inst. xix. 21.)

(Plate V., fig. 6.)

This species has occurred on the Murimutu Plains in the North Island. In the South Island it is a common species in the neighbourhood of Christchurch.

The expansion of the wings is 1½ inches. The fore-wings are dark chocolate-brown; there is a short, dark-margined, pale transverse line near the base, and another at about one-third, the claviform spot is small, oval, dark brown, margined with black, the orbicular and reniform are very large, pale brown and very conspicuous; *there is a broad pale brown terminal band, and a narrow shading of pale brown along the dorsum*. The hind-

wings are dark grey and the cilia dull white.

This species can easily be recognised by the pale terminal band of the fore-wings.

The perfect insect appears in March and April.

MELANCHRA HOMOSCIA, Meyr.

(*Mamestra homoscia*, Meyr., Trans. N. Z. Inst. xix. 21.)

(Plate V., fig. 7; Plate III., fig. 10, larva.)|.

This dull-looking species has hitherto only occurred in the Wellington district, where it seems to be fairly common.

The expansion of the wings is about 1⅜ inches. The fore-wings are uniform dark grey; the veins are marked with a series of white dots, preceded and followed by black marks; the orbicular, reniform, and claviform spots are scarcely visible; an indistinct wavy line runs parallel with the termen. The hind-wings are grey; the cilia are white with a cloudy line. The head, thorax, and abdomen are grey.

Sometimes the grey colouring is very much darker, and a faint wavy line is present between the orbicular spot and the base of the wing. In other respects the species does not vary.

The larva is rather attenuated and black in colour; the dorsal line is narrow and bright yellow; the subdorsal is broader and white; and the lateral line is pale brown. The head, legs, prolegs, and under surface are pale brown, speckled with black; the spiracles are pink; a conspicuous white spot is situated above the spiracles.

This caterpillar feeds on the Tauhinu (*Pomaderris ericifolia*) in December and January. It is very active in its habits, and immediately drops to the ground when disturbed. It is much infested by a dipterous

parasite. The pupa state is spent in the earth and lasts about six weeks.

The moth appears in February, March, and April. It is attracted by light, and in consequence often enters houses.

MELANCHRA OMICRON, n. sp.

(Plate V., fig. 42.)

This species was discovered at Wellington by Mr. A. Norris.

The expansion of the wings is about 1½ inches. The fore-wings are pale olive-green, mottled and striped with dull grey; there is a double transverse line near the base, another at about one-fourth, and another at about one-half, passing between the orbicular and the reniform; beyond this there are two indistinct shaded lines, and a terminal series of black marks; *the orbicular is large, almost circular, and sharply outlined in black*; the claviform is small and indistinct, and the reniform ill-defined, obscurely outlined in black towards the base. The hind-wings are brownish-grey, darker towards the termen.

The perfect insect appears in November.

MELANCHRA COMPOSITA, Gn.

(*Cloantha composita*, Gn., Noct. vi. 114. *Auchmis composita*, Walk., Noct. 616; Butl., Voy. Ereb., pl. ix. 12. *Mamestra maori*, Feld., Reis. Nov., pl. cix. 24. *Leucania dentigera*, Butl. *Mamestra composita*, Meyr., Trans. N. Z. Inst. xix. 22.)

(Plate V., fig. 8 ♂, 9 ♀; Plate III., fig. 7, larva.)

One of the most abundant of our night-flying moths,

occurring in great profusion throughout the country.

The expansion of the wings is about 1½ inches. The fore-wings are pale reddish-brown, darker towards the middle. There are two elongate, pointed, white markings touching the termen below the middle, and a central white streak, interrupted in the middle, by a small semicircular white mark, which represents the lower portion of the reniform spot; the orbicular and claviform spots are obsolete. The hind-wings are dark grey. The head and thorax are reddish-brown, and the abdomen is dark grey. The antennæ are serrate in the male but simple in the female. In some specimens the white markings are more extensive than usual, but otherwise there are no important variations.

The larva is bright reddish-brown; the dorsal stripe is broad and black; the subdorsal narrower, edged with white; the lateral lines are dull red, white, and black; the ventral surface, head, legs, and prolegs are greenish-grey with black markings; the spiracles are black.

This caterpillar varies considerably in the intensity of the light and dark markings. It feeds on grasses in January and September, and is very active. It often occurs in prodigious numbers, and at such times may frequently be seen travelling at a great rate over bare ground in search of food. Amongst the grass it is hard to detect, as the striped colouring is very protective in that situation.

The pupa state is spent in the earth, or under moss on fallen trees.

The moth appears from September till April. It is double-brooded. A few of the second brood emerge in the autumn and hibernate as moths, but the majority pass the winter in the pupa state. Hence we sometimes meet with specimens on mild evenings in the middle of winter.

This insect is much attracted by light, and occasionally assembles in vast numbers round a brilliant lamp. I have had as many as one hundred specimens in my verandah at Karori, attracted during two or three hours. It is by far the commonest insect at the collectors' sugar, the numerous visitors of this species eagerly jostling each other in their haste to obtain a share of the sweets. *M. composita* is likewise observed in the utmost profusion on attractive flowers of all kinds, crowding out the rarer and more aristocratic species. Mr. Hanify has drawn my attention to the remarkable habit this insect has of suddenly stopping during its flight, and thus eluding pursuit. It also takes wing with unusual rapidity. Specimens of this moth may constantly be observed at rest in various situations during the daytime, when the protective character of the colouring will be at once apparent, especially when the insect is partially concealed amongst grass. Mr. Meyrick informs us that this species is common in Tasmania and South-Eastern Australia.

MELANCHRA STEROPASTIS, Meyr.

(*Mamestra steropastis*, Meyr., Trans. N. Z. Inst. xix. 22.)

(Plate V., fig. 10 ♂, 11 ♀.)

This insect has occurred in the North Island at Napier. In the South Island it has been taken at Blenheim and Christchurch, but does not seem to be a common species anywhere.

The expansion of the wings is from 1¼ to 1½ inches. In general appearance it somewhat resembles the preceding species, from which it may chiefly be distinguished by the absence of the sharp white central line and conspicuous tooth-like markings

near the termen. *There is also a minute white dot situated at the junction of veins 3 and 4 of the fore-wings.* The hind-wings are dark grey.

The perfect insect appears from November till February.

Described and figured from Mr. Fereday's specimens.

MELANCHRA INFENSA, Walk.

(*Orthosia infensa*, Walk. 748. *Mamestra arachnias*, Meyr., Trans. N. Z. Inst. xix. 23. *Mamestra infensa*, Meyr., ib. xx. 45.)

(Plate V., fig. 12.)

This species has occurred in the North Island at Napier, and in the South Island at Blenheim.

The expansion of the wings is about 1½ inches. The fore-wings are reddish-brown, slightly speckled with dull white except on a suffused central streak from the base to about two-thirds; an obscure, moderately broad white costal streak extends from the base to two-thirds, sharply defined near the base only, and containing several very oblique ill-defined blackish marks; the orbicular is narrow oval, longitudinal, very finely margined with white and then with black; the claviform is obsolete; the reniform is only indicated by two white dots, representing its lower angles; the transverse lines are very acutely dentate but hardly traceable; the subterminal line is indicated only by three very acute slender whitish-ochreous dentations—one below apex, two touching the termen below the middle; the cilia are reddish-brown mixed with dull white. The hind-wings are dark grey; the cilia are dull white, with a faint grey line and tips white. The head, palpi, and thorax are reddish-brown speckled with white; the forehead with two black transverse lines; and the collar with a slender white line; thorax with strong anterior double tuft. Abdomen light reddish-grey.

Description compiled from that of Mr. Meyrick.

Figured by Mr. W. B. Hudson from a specimen in Mr. Fereday's collection.

MELANCHRA OMOPLACA, Meyr.

(*Mamestra omoplaca*, Meyr., Trans. N. Z. Inst. xix. 24.)

(Plate V., fig. 13.)

This species has occurred in the South Island at Lake Coleridge and Rakaia.

The expansion of the wings is about 1½ inches. The fore-wings are dark reddish-brown, there is a short black median streak from the base, margined above with ochreous-white; the space between this and the costa is marked with suffused ochreous-whitish lines; in one specimen a blackish suffusion extending from base of the dorsum obliquely to orbicular and reniform, the space between this and the subterminal line is suffused with pale whitish-ochreous; the orbicular and reniform are blackish-fuscous, black-margined, and connected by a blackish-fuscous spot; the orbicular is large, roundish; the reniform with its outer edge white; the claviform is small, suboval, blackish-fuscous; the transverse lines are indistinct; the subterminal is obscurely paler or hardly traceable, with two somewhat acute dentations below the middle; the terminal space is mixed with blackish-fuscous; the cilia are reddish-fuscous mixed with blackish. The hind-wings are fuscous-grey; the cilia grey-whitish, with a grey line.

The perfect insect appears in December, February, and March.

Description compiled from that of Mr. Meyrick. Figured by Mr. W. B. Hudson from a specimen in Mr. Fereday's collection.

MELANCHRA ALCYONE, n. sp.

(Plate V., fig. 14 ♂.)

During the autumn of 1894 several specimens of this interesting species were captured in the Wellington Botanical Gardens by Mr. A. Norris.

The expansion of the wings of the ♂ is 1⅝ inches, of the ♀ 1½ inches. The fore-wings of the male are *warm brown, darker towards the base*; there is a wavy, white-edged, black, transverse line at about one-fifth, followed by a round black spot; *the costa is yellowish, with four pairs of short oblique black marks*; the orbicular is large, oval, oblique, pale yellowish-brown slightly darker in the middle; the claviform is small, obscure, and brownish-black; the reniform is black, outlined with dull white; *there is a series of very acute, dull white, tooth-like terminal markings*, and the termen itself is slightly scalloped; the cilia are dark brown. The hind-wings are grey with a series of small dark marks on the termen; the cilia are reddish-ochreous. The head and anterior portion of the thorax are reddish-ochreous; the rest of the thorax is rich brown, and there is a conspicuous black transverse line between the pale and dark colouring; the abdomen is reddish-ochreous with the crests reddish-brown. The female is much darker and duller than the male, the markings are much less distinct, there are several additional jagged transverse lines, and the white markings of the male are indistinctly indicated in drab.

The perfect insect appears in March.

MELANCHRA DOTATA, Walk.

(*Dasypolia dotata*, Walk., Noct. 522. *Mamestra dotata*, Meyr., Trans. N. Z. Inst. xix. 24.)

(Plate V., fig. 16.)

This species has occurred at Nelson.

The expansion of the wings is 1½ inches. The fore-wings are very dark brownish-black; there are several obscure black marks near the base; *the orbicular is large, oblong, finely margined with*

black, the claviform is triangular, also finely margined with black, both orbicular and claviform are surrounded by a conspicuous black shading; the reniform is large ear-shaped, white towards the termen and dark brown towards the base of the wing, the white portion is traversed by a curved brownish line; there is a curved transverse line near the termen, the space immediately inside this line being paler than the rest of the wing; there is a terminal series of obscure pale dots. The hind-wings are dark brown, paler towards the base; the cilia are also brown.

A single specimen of this insect was reared from a pupa found at Wakapuaka, near Nelson. Mr. Fereday also has a specimen, but without note of locality.

MELANCHRA ASTEROPE, n. sp.

(Plate V., fig. 15.)

A single specimen of this insect was taken at light on the Tableland of Mount Arthur, in January 1891, at about 3,600 feet above the sea-level.

The expansion of the wings is 1⅜ inches. The fore-wings are dull brown *with a pale area on the dorsum near the base, and a very broad pale band just before the termen*; there is a broken black-edged transverse line near the base, and a fainter transverse line at about one-third; the orbicular is oblong, the claviform crescentic, *and the reniform oblong, white, and very conspicuous*, all are strongly outlined in black; there is a shaded transverse line on each side of the broad pale terminal band; the termen is dark brown; the cilia are brown, and the veins are marked in black. The hind-wings are pale grey; there is a rather conspicuous dark crescent in the middle, and two shaded transverse lines; the cilia are grey.

This species is evidently allied to *Melanchra dotata*.

MELANCHRA STIPATA, Walk.

(*Xylina stipata*, Walk., Suppl. 753. *Mamestra stipata*, Meyr., Trans. N. Z. Inst. xix. 25.)

(Plate V., fig. 17 ♀.)

This fine species has occurred at Wellington in the North Island, and in the South Island at Christchurch, and West Plains, near Invercargill.

The expansion of the wings is 1¾ inches. The fore-wings are brown; there is a shaded, pale yellowish-brown, longitudinal line on the costa, *and an extensive irregular patch of the same colour from about two-thirds to within a short distance of the termen; the orbicular is large, oval, oblique, pale yellowish-brown; the claviform is semicircular, broadly margined with black*; the reniform is dull grey, with one large and one small white mark towards the termen; the termen is broadly shaded with dark blackish-brown, except near the apex of the wing and a little below the middle. The hind-wings are dark brownish-grey, with the cilia reddish-brown. The female is rather paler with a slightly olive tinge. Both sexes vary a little in the depth of their colouring.

The perfect insect appears from October till May. It is common at Christchurch, but rather scarce in Wellington.

MELANCHRA OCTANS, n. sp.

(Plate V., fig. 1.)

This distinctly marked little species was discovered by Mr. Philpott, at Mount Linton, near Invercargill.

The expansion of the wings is 1¾ inches. The fore-wings are pale ochreous-brown; there are several wavy brown transverse lines near the base, two lines at about one-third, *then a large* **V***-shaped white mark extending almost from the costa and touching the dorsum*; the orbicular and reniform spots are situated in the middle of this mark, the orbicular is very finely outlined in

brown, and contains a black dot towards the base of the wing; the reniform is large, dark brown, *surrounded by a large triangular dark brown shading*; there is an obscure subterminal line; the termen is slightly indented. The hind-wings are dark brown, paler towards the termen.

This species may be immediately recognised by the large, white, **V**-shaped markings on the fore-wings.

The perfect insect appears in March.

MELANCHRA RUBESCENS, Butl.

(*Xylophasia rubescens*, Butl., Cist. Ent. ii. 489. *Mamestra rubescens*, Meyr., Trans. N. Z. Inst. xix. 25.)

(Plate V., fig. 18 ♂.)

This insect is apparently a mountain species. It has been taken at Mount Arthur, Castle Hill, and Lake Wakatipu.

The expansion of the wings is about 1⅝ inches. The fore-wings are pale orange-brown, the orbicular and claviform spots are faintly margined with reddish-brown; the reniform is dark brown and very conspicuous; there are two large reddish-brown markings on the termen. The hind-wings are dark grey tinged with red. The cilia of all the wings are reddish-brown.

This species varies slightly in the shape and extent of the markings on the termen of the fore-wings, which occasionally cause the pale ground colour to form tooth-like projections. It also varies a little in the intensity of the other markings, and in the depth of the ground colour.

The moth appears in January and February, and is attracted by light. I have taken it in some abundance

on the Tableland of Mount Arthur, at an altitude of 3,500 feet above the sea-level.

MELANCHRA LIGNANA, Walk.

(*Hadena lignana*, Walk., Noct. 758. ? *Xylophasia morosa*, Butl., Cist. Ent. ii. 543. *Mamestra lignana*, Meyr., Trans. N. Z. Inst. xix. 26.)

(Plate V., fig. 19 ♂.)

This pretty species is very common at Wellington in the North Island. In the South Island it has occurred at Mount Hutt.

The expansion of the wings is 1½ inches. *The fore-wings are greyish-cream-colour*, slightly paler on the costa. There are two very distinct blackish transverse marks on the costa near the base, and two others at about one-third; *the stigmata are all sharply and finely outlined in black; the orbicular is oval, the claviform triangular, the reniform large and oblong, containing a smaller black-edged mark in its centre, and a blackish blotch towards its lower margin*; beyond the reniform there is a faint jagged transverse line; there are two dark patches on the termen, *the pale ground colour forming two sharp tooth-like markings slightly below the middle*; the termen itself is slightly indented, and the cilia are dark brown. The hind-wings are dark grey with the cilia white.

Some specimens of this insect are slightly darker than others, but in other respects there are no important variations.

The perfect insect appears from October till April. It comes freely to sugar and to light, and is often taken at rest on trees and fences in the daytime.

MELANCHRA CŒLENO, n. sp.

(Plate IV., fig. 39.)

This interesting species has been taken at Wellington by Messrs. Hawthorne and Norris.

The expansion of the wings is 1⅜ inches. The fore-wings are very pale brownish-cream-colour; *there is a large irregular dark brown patch on the dorsum from about one-eighth to about two-thirds, another smaller patch at the tornus, and another still smaller on the termen a little above the middle*; there are two very obscure transverse lines; the orbicular is finely outlined in brown; the reniform contains two very dark brown dots, and is rather strongly outlined in brown towards the base. The hind-wings are dark grey. The cilia of all the wings are grey with a paler line.

The perfect insect appears in November.

MELANCHRA USTISTRIGA, Walk.

(*Xylina ustistriga*, Walk., Noct. 630. *X. lignisecta*, ib., 631. *Mamestra ustistriga*, Meyr., Trans. N. Z. Inst. xix. 26.)

(Plate V., fig. 20 ♂, 20A ♀.)

This beautiful insect has occurred commonly at Wellington in the North Island, and in the South Island, at Blenheim, Christchurch, and Lake Coleridge.

The expansion of the wings is about 1¾ inches. *The fore-wings, head, and thorax are pinkish-grey in the male, pale grey in female; the orbicular spot is rather large, nearly round, finely outlined in black; the reniform is very large, margined with black towards the base of the wing, and usually touching the orbicular spot or connected with it by a short black line*; the claviform is triangular, also black margined; there is a cloudy oblique line below the

reniform, and an irregular line between the reniform and the termen. The hind-wings and abdomen are pale pinkish-grey in male, dull grey in female; the cilia are white with a cloudy line.

This insect varies slightly in size, especially in the female. The larva is dull greyish-brown, with the subdorsal and lateral lines darker. It feeds on honeysuckle during the summer months.

The pupa state is spent in the earth.

The moth is very irregular in its appearance. I have captured specimens in January, February, March, April, July and September. It appears to pass the winter in both the pupa and imago states. It is very partial to light, and in consequence often enters houses.

MELANCHRA PRIONISTIS, Meyr.

(*Mamestra prionistis*, Meyr., Trans. N. Z. Inst. xix. 27.)

(Plate V., fig. 21 ♂.)

This species is common at Wellington in the North Island. In the South Island it has been taken at Rakaia.

The expansion of the wings of the male is 1⅝ inches, of the female 1¾ inches. *The fore-wings are rather pale yellowish-brown, with numerous irregular longitudinal grey streaks*; there are several very obscure jagged transverse lines, and the stigmata are almost invisible; *a very broad blackish longitudinal band is situated on the dorsum*. The hind-wings are brownish-grey; the cilia are grey tipped with white. The head and thorax are grey tinged with yellowish-brown; there is a conspicuous blackish streak on each side of the thorax.

In this species the dorsal band is often considerably paler, but otherwise there is no variation.

The perfect insect appears from November till April. It comes freely to sugar, and occasionally to light. It is also sometimes met with at rest on trees in the daytime, where its colouring is protective. I have noticed that this moth is much commoner in some years than in others.

MELANCHRA PHRICIAS, Meyr.

(*Mamestra temperata*, Meyr., Trans. N. Z. Inst. xix. 27 (nee Walk.). *Mamestra phricias*, Meyr., ib., xx. 46.)

(Plate V., fig. 22.)

This species has occurred in the Manawatu district in the North Island. In the South Island it has been found at Christchurch and Lake Coleridge.

The expansion of the wings is about 1½ inches. *The fore-wings are pale silvery-grey*; there are several obscure blackish marks near the base, *two dark, shaded, transverse bands, one just before the orbicular, and one between the orbicular and the reniform*; the orbicular is round, nearly white, with a faint greyish ring in the middle; the reniform is large, oblong, margined first with white and then with black; there is a series of black crescentic marks near the termen, and another smaller series on the termen; the cilia are dark grey. The hind-wings are dull brownish-grey, the cilia are grey tipped with white. The terminal joint of the palpi is elongated.

The perfect insect has been taken in December, February, March and June, and is attracted by light. It is rather a rare species.

MELANCHRA CUCULLINA, Gn.

(*Xylocampa cucullina*, Gn., Ent. Mo. Mag. v. 40. Agrotis mitis, Butl., Proc. Zool. Soc. Lond., 1877, 383, pl. xlii. 5. *Mamestra cucullina*, Meyr., Trans. N. Z. Inst. xix. 28.)

(Plate V., fig. 23 ♂.)

This species has occurred at Mount Arthur, and at Rakaia.

The expansion of the wings is 1⅜ inches. *The fore-wings are bluish-grey, speckled and dappled with blackish-brown*; there is a pale transverse line near the base, partially edged with black; the orbicular is round, containing a blackish dot in the middle; the reniform is elongate-oval, including a dark spot in its lower portion; the space surrounding the stigmata is clouded with dark blackish-brown; there is a terminal series of small blackish crescentic marks, and the cilia are dark grey. The hind-wings are brownish-grey; the cilia are also grey tipped with white.

This species is evidently closely allied to *M. phricias, but may at present be distinguished by its darker and more bluish colouring.*

The perfect insect appears in January and March. I have taken it at light on the Tableland of Mount Arthur, at 3,600 feet above the sea-level.

Genus 8.—ERANA, Walk.

"Eyes hairy. Antennæ in male filiform, simple, with scattered single cilia. Thorax with anterior and posterior crests. Abdomen with strong dorsal crests towards base. Fore-wings in male beneath with a very long dense tuft of scent-giving hairs from base; transverse vein absent, 7 and 8 out of 9, 10 free. Hind-wings with transverse vein absent, costa in male broadly dilated."—(Meyrick.) (Plate II., fig. 9 fore-wing, 10 hind-wing.)

[16]

We have one species representing this interesting genus.

ERANA GRAMINOSA, Walk.

(*Erana graminosa*, Walk., Noct. 605. *E. vigens*, ib., Suppl. 743. *Erana graminosa*, Meyr., Trans. N. Z. Inst. xix. 28.)

(Plate V., fig. 24 ♂, 25 ♀; Plate III., fig. 8, larva.)

This beautiful species appears to be fairly common in many forests in the North Island. It has occurred at Wanganui, Masterton, Palmerston, and Wellington. In the South Island it has been taken by Mr. Philpott, at West Plains, near Invercargill.

The expansion of the wings is about 1½ inches. The fore-wings are bright green; there are three paler green transverse lines, edged with black; one near the base of the wing, one just beyond the reniform spot, and one close to the termen; this last is inwardly much clouded with dark olive-green; the reniform spot is pale green edged with black. The hind-wings are very broad, pinkish-brown, tinged with green on the termen. In the female the hind-wings are considerably narrower, and are not so strongly tinged with green as in the male.

Some specimens appear to be rather darker than others, but beyond this I have not detected any variation.

The eggs are rather large, globular, flattened above and beneath, and pale green in colour.

The larva feeds on the mahoe (*Melicytus ramiflorus*).

When first excluded from the egg it is about ⅛ inch long, and of a very pale green colour. After the first moult the caterpillar is bright green, darker towards the head, with white dorsal, subdorsal, and lateral lines; there are eight rows of shining black spots, each spot emitting a number of stout black bristles; the head is yellowish-brown with a few black dots. After the last moult the larva has a totally different appearance. It is pale green marbled with darker green; there is often a whitish lateral line, and an obscure series of diagonal green stripes on the sides of each segment. Sometimes the whole larva has a pinkish-brown tinge, and there are often two or three rows of pale spots. In fact the full-grown caterpillar is very variable in its colouring.

These larvæ hibernate during the winter months, often secreting themselves in the burrows which have been made in the stems of the mahoe by various species of wood-boring insects. They come abroad about the end of August, and are full grown early in October. The pupa state is spent in the earth.

The moth appears in December, January, February, March and April. It is often found at rest on tree-trunks in the daytime, where its beautiful green colouring causes it to resemble, in the closest possible manner, a patch of moss. Mr. Hawthorne tells me that he has frequently found dead specimens in this situation.

This insect is, I think, commoner at slight elevations above the sea-level, forest ranges of from 500 to 1,000 feet in height being apparently the most favourable localities for the species. The appearance of the moth over so long a period would seem to indicate that there are two generations in a year, but I have never found full-grown larvæ in the middle of summer. There is, however, no doubt that the insect passes the winter in the larval condition. This species

is often met with very late in the season, frequenting the few remaining blossoms of the white rata until the first or second week in April. Mr. Meyrick thus alludes to the scented tuft of hairs in the male insect: "The large tuft of the fore-wings is the source of a very strong vanilla-like perfume, which scents the box in which the specimens are contained for more than a week after their death; the scent is excited more strongly, even in the dead specimen, by stirring the tuft with a pin."[17]

I can fully testify to the accuracy of this interesting observation.

Sub-family 3.—*CARADRINIDES*.

"Eyes naked, not ciliated."

Genus 9.—BITYLA, Walk.

"Antennæ in male filiform, shortly ciliated. Thorax not crested, collar sub-erect. Abdomen not crested."—(Meyrick).

Of this genus we have two species in New Zealand.

BITYLA DEFIGURATA, Walk.

(*Xylina defigurata*, Walk., Suppl. 756. *Bityla thoracica*, ib. 869. *Bityla defigurata*, Meyr., Trans. N. Z. Inst. xix. 31.)

(Plate V., fig. 33.)

This species has been taken at Palmerston in the North Island, and at Blenheim, Christchurch, Lake Coleridge, Dunedin, and West Plains near

Invercargill, in the South Island.

The expansion of the wings is 1½ inches. *The fore-wings are uniform dull bronzy-brown and very glossy*; there are one or two faint indications of transverse lines. The hind-wings are dark grey, also glossy.

The perfect insect appears in January, February, and March, and is attracted by light. The single specimen I possess in my collection was taken in July, evidently hibernating. It is a rare species.

BITYLA SERICEA, Butl.

(*Bityla sericea*, Butl., Proc. Zool. Soc. Lond. 1877, 387, pl. xlii. 12; Meyr., Trans. N. Z. Inst. xix. 31.)

(Plate V., fig. 34.)

This rather striking insect has occurred at Wellington in the North Island, and at Christchurch and Lake Guyon in the South Island.

The expansion of the wings is about 1¾ inches. *The fore-wings are very dark greyish-black, darker near the termen, and very glossy*; there are several isolated white scales towards the base of the wing, and a very obscure transverse line at about three-fourths; the cilia are cream colour and very conspicuous. The hind-wings are dark grey and glossy; *the cilia are pale grey, very broadly tipped with cream colour*.

The perfect insect appears in February and March, and is attracted by light. It is a rather scarce species.

Genus 10.—AGROTIS, Ochs.

Head rough-scaled; eyes naked. Antennæ in ♂ ciliated, often

acutely bidentate or bipectinated, with apex simple. Thorax usually with more or less developed anterior and posterior crests. Abdomen not crested. Tibiæ all spinose.

"A very large genus occurring all over the world but much more plentifully in the northern hemisphere. The larvæ are very indiscriminate in their tastes, often feeding on almost any low plant; they are frequently subterranean in habit, but usually emerge by night to feed."—(Meyrick.)

This genus is represented in New Zealand by five species, one of which is an insect of almost world-wide distribution.

AGROTIS YPSILON, Rott.

(*Noctua ypsilon*, Rott. Agrotis suffusa, Hb. *Agrotis ypsilon*, Meyr., Trans. N. Z. Inst. xix. 32.)

(Plate V., fig. 35 ♂, 36 ♀.)

This handsome insect is probably very common throughout the country. It has occurred abundantly at Napier, Wellington, Nelson, Christchurch, Ashburton and Invercargill.

The expansion of the wings is 2 inches. The fore-wings are pale brown, shaded with rich brown on the costa and termen; the reniform is large and black, with a conspicuous longitudinal streak pointing towards the termen; the orbicular is round, centred with black; the claviform is elongate; there is a dark shaded line below the reniform, followed by a double wavy transverse black line. The hind-wings are grey with pinkish reflections; they are shaded with darker grey towards the termen; the cilia are white, the head and thorax are dark brown, the abdomen grey. In the female the brown costal shading extends across the central portions of the fore-wings to the dorsum, and the general colouring is also darker.

There are no noteworthy variations in either sex. The larva feeds on the roots of grasses. Its head is pale brown mottled with darker brown, and its body is lead-colour with darker dorsal and lateral lines. It remains underground during the daytime, coming abroad at night to feed.

The pupa is red-brown with a very sharp, spine-like extremity. It is concealed in the earth.[18]

The perfect insect appears in January, February and March. It is often very abundant at various blossoms in the evening, and comes readily to sugar. It is an insect of almost universal distribution, occurring in Australia, China, India, Africa, Europe, and North and South America.[19]

AGROTIS ADMIRATIONIS, Gn.

(*Agrotis admirationis*, Gn. (nec Meyrick), Ent. Mo. Mag. v. 38.)

(Plate V., fig. 37.)

This species has been taken at Christchurch.

The expansion of the wings is 1⅜ inches. The fore-wings are dull grey; there are two minute black marks on the costa near the base, a slender interrupted transverse line at about one-third, *the orbicular, reniform, and claviform spots are very large and conspicuous, surrounded by a dark grey shading*; there is a series of black dots on the termen. The hind-wings are pale grey. The cilia of all the wings are also pale grey.

Described and figured from a specimen in Mr. Fereday's collection. I am assured by Mr. Fereday that the above-described insect is the true *Agrotis admirationis* of Guenée, described from an identical

specimen which he forwarded to Guenée. The following species, which is regarded by Mr. Meyrick as *Agrotis admirationis*, Gn. (see Trans. N. Z. Inst. xix. 33), is therefore renamed as below.

AGROTIS INNOMINATA, n. sp.

(*Agrotis admirationis*, Meyr. (nec Guenée), Trans. N. Z. Inst. xix. 33.)

(Plate V., fig. 39 ♂.)

Two specimens of this species have been taken at Wellington.

The expansion of the wings is 1⅜ inches. The fore-wings are pale pinkish-yellow; there is a slender black longitudinal streak on the costa at the base, *a broad black longitudinal streak at the base near the middle, and another a little beyond the base above the middle, containing the orbicular and reniform stigmata, these are sharply outlined in pinkish-yellow*; there are several rather indistinct black streaks between the veins, and a series of terminal black dots; the cilia are dull pinkish-yellow. The hind-wings are dull white; there is a series of brownish terminal dots, and the veins are marked in brown; *the cilia are shining white*. The head and thorax are pinkish-brown; the latter has two transverse black lines near the head, and two longitudinal black streaks on each side. The abdomen is dull white tipped with pale brown.

One specimen of this insect is considerably tinged with very pale olive-green instead of pink, but it is otherwise identical. As the available material is so extremely limited, I am unable to say which is the typical form.

The perfect insect appears in December. I am indebted to Messrs. J. H. Lewis and W. R. Morris for

my specimens.

AGROTIS SERICEA, Butl.

(*Chersotis sericea*, Butl., Cist. Ent. ii. 490. *C. inconspicua*, ib. 545. *Agrotis sericea*, Meyr., Trans. N. Z. Inst. xix. 33. *A. inconspicua*, ib. 34. *Agrotis sericea*, Meyr., Trans. N. Z. Inst. xx. 46.)

(Plate V., fig. 38 ♀.)

This species has occurred in the South Island at Christchurch, Rakaia, and Ashburton.

The expansion of the wings is about 1½ inches. The fore-wings vary from very pale grey to dark blackish-grey; there is an obscure transverse line near the base, and another at about one-fourth; *the orbicular is oval and dark centred, the claviform is elongate, often very obscure, the reniform is broad dark centred, usually joined to the orbicular by a dark patch*; all the stigmata are outlined in black; beyond the reniform there is a rather jagged transverse line, and *several faint wedge-shaped markings*; there is a series of minute elongate black marks on the termen; the cilia are grey with three dark lines. The hind-wings are grey with several fine black marks on the termen; the cilia are white.

This species seems to be rather variable both in ground colour and in markings.

The perfect insect appears in October, November, December and January. It is not a common species.

AGROTIS CEROPACHOIDES, Gn.

(*Agrotis ceropachoides*, Gn., Ent. Mo. Mag. v. 39; Meyr., Trans. N. Z. Inst. xix. 34.)

(Plate VI., fig. 1.)

This species has occurred at Rakaia.

The expansion of the wings is 1½ inches. *The fore-wings are bluish-grey, dotted and streaked with darker grey; there are no distinct markings*, except an obscure transverse shading near the termen, and a series of dull terminal spots; *the costa is slightly concave*. The hind-wings are grey, paler towards the base, with a dark line on the termen; the cilia of all the wings are grey.

The perfect insect appears in July, August and September.

Described and figured from a specimen in Mr. Fereday's collection.

Genus 11.—HELIOTHIS, Ochs.

"Head rough-scaled; eyes naked. Antennæ in ♂ ciliated. Thorax without crest. Abdomen not crested. Tibiæ spinose, anterior tibiæ with horny apical hook.

"A rather small genus, but very generally distributed, though commoner in subtropical regions; it is a development of *Caradrina*; some of the species have a very wide natural range. The larvæ feed especially on the blossoms of their food-plants."—(Meyrick.)

This genus is represented in New Zealand by the world-wide *Heliothis armigera*.

HELIOTHIS ARMIGERA, Hb.

(*Heliothis armigera*, Hb. *H. conferta*, Walk., Noct. 690. *H. armigera*, Meyr., Trans. N. Z. Inst. xix. 34.)

(Plate V., fig. 40 ♂, 41 ♀.)

This species has occurred plentifully at Waimarama (Hawkes Bay) and Wellington, in the North Island; and at Nelson, Blenheim, Christchurch, Rakaia, and Ashburton in the South Island. In Wellington it is certainly not so common as formerly, and Mr. Meyrick observes that its abundance is declining in some other localities also.

The expansion of the wings is from 1½ to 1¾ inches. The fore-wings are pale yellowish-brown, sometimes tinged with red. There is an irregular band of dull grey or brown near the termen; *the reniform is small and black; the orbicular minute, also black; the claviform is obsolete*; there are several very indistinct traces of transverse lines towards the base of the wing. The hind-wings are dull yellow, *with a very broad, blackish, terminal band*. The head and thorax are yellowish-brown, and the abdomen is dull yellow.

This insect varies a good deal in the ground colouring of the fore-wings, which ranges from dull yellow to brick-red, or even to dark yellowish-brown. The hind-wings are also much darker in some specimens than in others.

The larva feeds on the seeds and flowers of various plants. It is extremely variable in its colouring.

Some specimens are dull green, with a few obscure red spots on the sides of the anterior segments. Others are brownish-black, with many fine yellow stripes and dots, and the red spots confined to the three anterior segments. Others, again, have numerous olive-green, white, and pale green lines, with a reddish blotch on the side of nearly every segment.

This caterpillar is often rather destructive in gardens. Amongst other things, it devours tomatoes and peas, the flowers and young fruit of pumpkins and vegetable marrows, the flowers and leaves of

geraniums, veronicas, &c. It is full grown in the autumn.

The pupa is concealed in the earth, the insect remaining in this condition until the following summer.

The moth appears in January and February. It often flies by day, and may then be seen disporting itself amongst the flowers of the Scotch thistle. Its larva may also be found feeding on these flowers.

This insect is practically cosmopolitan; it has occurred in the following countries: Australia, Samoa, India, Ceylon, Madagascar, Africa, Europe, North and South America.[20]

Genus 12.—COSMODES, Gn.

"Eyes naked. Antennæ in male filiform, shortly ciliated. Thorax with strong transverse anterior and posterior crests. Abdomen strongly crested towards base. Hind-wings with veins 6 and 7 short-stalked."—(Meyrick.)

We have only one species in New Zealand.

COSMODES ELEGANS, Don.

(*Phalæna elegans*, Don. Ins. N. H. *Cosmodes elegans*, Gn., Noct. vi. 290; Meyr., Trans. N. Z. Inst. xix. 35.)

(Plate VI., fig. 2.)

This beautiful species has occurred at Napier and Ohau in the North Island. In the South Island it has

been taken at Christchurch and Governor's Bay.

The expansion of the wings is 1⅛ inches. The fore-wings are rich orange-brown, with *four large green spots margined with silver*; there is a curved silvery mark near the apex. The hind-wings are pale yellow, shaded with orange-brown towards the termen; the cilia are pale orange-brown mixed with white.

The perfect insect appears in March and April.

Mr. Meyrick states that it occurs commonly in Eastern Australia.[21]

Family 3.—**PLUSIADÆ.**

The *Plusiadæ* are characterized as follows:—

"Ocelli usually distinct. Tongue well developed. Posterior tibiæ with all spurs present. Fore-wings with veins 7 and 8 usually out of 9, 10 usually connected with 9. Hind-wings with veins 3 and 4 connate or short-stalked, 5 well developed, 6 and 7 connate or short-stalked or seldom closely approximated only, 8 shortly anastomosing with cell near base, thence evenly diverging." (See Plate II., figs. 14 to 18.)

"This family is by no means very prominent in temperate regions, but within the tropics it assumes immense proportions, and is there, probably, the most abundant family of the Lepidoptera. There is much greater diversity of size, colour, and form than in the *Caradrinidæ*, and also more variation in structure, though this remains more uniform than usual. Imago with fore-wings usually relatively broader and less elongate than in the *Caradrinidæ*, body often more slender.

"Ovum spherical, more or less reticulated, often also ribbed. Larva with few hairs, sometimes with prolegs on segments 7 and 8 absent or rudimentary. Pupa usually in a cocoon above the ground."—(Meyrick.)

The family is represented in New Zealand by the following four genera:—

Sub-family 1.—HYPENIDES
1. HYPENODES.

Sub-family 2.—PLUSIADES
2. PLUSIA.
3. DASYPODIA.
4. RHAPSA.

Sub-family 1.—HYPENIDES	1. HYPENODES.
Sub-family 2.—PLUSIADES	2. PLUSIA. 3. DASYPODIA. 4. RHAPSA.

Sub-family 1.—*HYPENIDES*.

Vein 5 of hind-wings parallel to 4.

Genus 1.—HYPENODES, Gn.

Head loosely scaled, with small frontal tuft. Antennæ in ♂ ciliated. Palpi very long, porrected, second joint thickened with rough projecting scales, terminal rather short, cylindrical. Thorax with appressed scales. Abdomen with small crest near base. Tibiæ smooth-scaled. Fore-wings with vein 7 separate, 9 and 10 out of 8. Hind-wings with vein 5 parallel to 4.

"Although consisting of very few species, this genus is almost universally distributed. Imago with fore-wings unusually elongate. Larva without prolegs on segments 7 and 8."—(Meyrick.)

We have one species in New Zealand.

HYPENODES EXSULARIS, Meyr.

(*Hypenodes exsularis*, Meyr., Trans. N. Z. Inst. xx. 46.)

"*Male.*—16 mm. (about ¾ inch). Head, antennæ, thorax, and abdomen whitish-ochreous, brownish-tinged; abdominal crest black. Palpi dark fuscous. Legs dark fuscous, posterior pair whitish-ochreous. Fore-wings elongate, posteriorly gradually dilated, costa slightly arched, termen obliquely rounded; ochreous-brown, closely irrorated with rather dark fuscous; a black mark beneath costa at base; a cloudy blackish longitudinal mark in disc beyond middle; second line obscurely indicated, paler, anteriorly partly blackish-edged, from posterior extremity of discal mark to dorsum beyond middle; an oblique wedge-shaped white spot from apex, touching second line; a sub-terminal series of white dots; a terminal row of black dots; cilia fuscous, with a basal series of whitish-ochreous dots. Hind-wings pale whitish-grey; a grey transverse discal spot; a dark grey interrupted terminal line; cilia grey-whitish.

"Taranaki, in March; one specimen.

"In the British Museum is an unnamed specimen from China, which appears to be certainly the same species; it, therefore, probably ranges through many of the South Pacific islands. From its small size and inconspicuous appearance it is doubtless often overlooked."—(Meyrick.)

Sub-family 2.—*PLUSIADES*.

Vein 5 of hind-wings more or less approximated to 4.

Genus 2.—PLUSIA, Ochs.

"Head rough-scaled. Antennæ in ♂ very shortly ciliated. Palpi rather long, curved, ascending, second joint rough-scaled, terminal moderately long or short, more or less rough-scaled in

front, somewhat pointed. Thorax with large central or posterior crest. Abdomen with one or more crests. Tibiæ rough-scaled. Hind-wings with vein 5 more or less approximated to 4." (Plate II., figs. 14 and 15.)

"A considerable genus, occurring throughout the world. Most of the imagos are handsome insects, often with metallic markings; some of them fly actively in bright sunshine. Larva usually without prolegs on segments 7 and 8, segment 12 more or less prominent above. Pupa in a rather open cocoon."—(Meyrick.)

This genus is represented in New Zealand by a single and very widely distributed species.

PLUSIA CHALCITES, Esp.

(*Plusia criosoma*, Dbld., Dieff. N. Z. 285; Butl., Voy. Ereb., pl. x. 1, 2. *P. argentifera*, Gn., Noct. vi. 352. *P. eriosoma*, Meyr., Trans. N. Z. Inst. xix. 36.)

(Plate VI., fig. 3 ♂.)

This insect is probably generally distributed in the North Island, and in the northern portions of the South Island. It has occurred very commonly at Taranaki, Napier, and Nelson, but in Wellington it is rather a scarce species.

The expansion of the wings is about 1½ inches. The fore-wings are dark grey with bronzy reflections; there is a pale band on the termen, and several of the transverse lines are indicated by paler colouring, the two basal ones being often silvery; *the orbicular is partly outlined with golden-white, and the claviform is wholly filled in with the same colour*. The hind-wings are yellowish-grey, darker towards the termen.

Mr. Meyrick mentions a variety in which the characteristic golden-white discal spots on the fore-wings are absent. I have not yet had the good fortune to see this form, and think it must be a rare one.

The larva has twelve legs; it is much attenuated towards the head; its colour is pale green, darker on the back; there is a number of wavy white lines and dots on the larva, as well as a few isolated black dots and hairs. It feeds on geraniums, mint, bean, Scotch thistle, and many other garden plants and weeds. Its original food appears to have been the "potato plant" (*Solarium aviculare*); but now it only occurs on this shrub in uncultivated localities, where there is no European vegetation.

The pupa is enclosed in a cocoon of white silk, generally situated between two dead leaves on or near the ground.

The moth first appears about September, and continues abundant until the end of summer. In Nelson I have seen it in great profusion, hovering over various flowers in the evening, at which time it also occasionally endeavours to gain access to beehives. In the same locality I have met with the young larvæ in the middle of winter, so that there is probably a continuous succession of broods all the year through in favourable situations.

This insect is found in Australia, Pacific Islands, Africa, South Asia, South Europe, and occasionally in the South of England.[22]

Genus 3.—DASYPODIA, Gn.

"Eyes naked. Palpi with terminal joint very slender. Antennæ in male filiform, hardly pubescent. Thorax and abdomen not crested. Tarsi in male very much thickened, with dense scales (*teste Guenée*)."—(Meyrick.)

We have one species.

DASYPODIA SELENOPHORA, Gn.

(*Dasypodia selenophora*, Gn., Noct. vii. 175; Meyr., Trans. N. Z. Inst. xix. 38.)

(Plate VI., fig. 4.)

This large and very handsome insect has occurred at Auckland, Napier, and Wellington in the North Island, and at Nelson, Richmond, and Christchurch, in the South Island.

The expansion of the wings is about 3 inches. *The fore-wings are very rich deep brown*; there are two faint jagged transverse lines near the base, a straight shaded line at about one-third; *the reniform is very large, crescentic, steely blue, finely margined first with black, then with orange, and then again with black; the centre of the crescent is filled in with black; beyond this spot there are three fine black wavy transverse lines emitting three very sharp teeth between the reniform and the dorsum*; there is a faint shaded line near the termen. The hind-wings are rich brown, slightly paler than the fore-wings; there are three shaded, wavy, transverse lines. The termen of both wings is slightly scalloped with a minute bluish-white dot at each indentation; the cilia are dark brown.

The life-history is thus described by Mr. Colenso:—

The larva when full grown is about 3¾ inches in length, elongate, slightly thicker in the middle, and with the skin

smooth. It is ash-colour, speckled with minute points of black and red; two minute carmine spots are situated close together on its back; and, when in motion, two large triangular black splashes are also visible. The under side of the larva is dull white, with several dull olive spots corresponding to its ventral prolegs. Its head is small, and pale Indian yellow in colour; its anal and ventral prolegs are large; on being touched the caterpillar coils itself up very rapidly and closely.

The specimen from which Mr. Colenso's description was taken, was found at rest on the trunk of a large acacia-tree, which is probably the food-plant of the larva.

The pupa is enclosed in a cocoon formed of leaves fastened together with silk. The insect appears to remain in this condition for about two months.

The pupa-case (after emergence) is nearly cylindrical, very obtuse at the head, and tapering regularly downwards from the end of the wing-cases, with the tail conical; the abdominal segments are very strongly marked. Its colour is dark red, with a bluish or violet bloom, but smooth and shining on its prominent parts.[23]

The perfect insect appears in January, February, and March, but it is rather a scarce species. It is attracted by light, and thus occasionally enters houses, where specimens are generally captured. Mr. Meyrick states that this insect occurs commonly in Eastern Australia.[24]

Genus 4.—RHAPSA.

"Eyes naked. Palpi very long, obliquely ascending, loosely

rough-scaled throughout, second joint with dense long projecting tuft above towards apex, terminal joint moderate, Antennæ in male moderately bipectinated, apex simple. Thorax and abdomen not crested. Fore-wings in male beneath with large broad costal fold on anterior half."—(Meyrick.) (Plate II., figs. 16 and 17 neuration of ♂ *Rhapsa scotosialis*; fig. 18 head of ditto.)

We have two species.

RHAPSA SCOTOSIALIS, Walk.

(*Rhapsa scotosialis*, Walk., Suppl. 1150. *Herminia lilacina*, Butl., Proc. Zool. Soc. Lond. 1877, pl. xlii. 11. *Rhapsa scotosialis*, Meyr., Trans. N. Z. Inst. xix. 38.)

(Plate VI., fig. 5 ♂, 6 ♀.)

This remarkable species is extremely abundant and generally distributed throughout the country.

The expansion of the wings is 1⅜ inches. *The fore-wings have the costa considerably arched towards the apex, and the termen is bowed outwards in the middle*; the colour is pale brown in the male and dark brown in the female; there are several obscure black marks near the base; *the orbicular is very small, orange or pale grey outlined in black, the claviform is absent, the reniform is conspicuous, the outer edge is much indented, the inner edge is outlined with dull orange-red*, there is a black blotch between the orbicular and the reniform; beyond the reniform there is a curved transverse line enveloping a series of minute black dots, then a very conspicuous wavy transverse line shaded towards the base of the wing; *there is a pale triangular area at the apex*, and a series of small crescentic dark brown markings on the termen; the cilia are dark brown. The hind-wings are greyish-ochreous; there is a rather faint line across the middle, followed by a broad shade; a series of small crescentic marks is situated on the termen; the cilia are dark greyish-ochreous. *The antennæ of the male are strongly bipectinated. The female is considerably darker, the markings are less distinct and numerous, and there is no black blotch between the orbicular and the reniform.*

Some male specimens are much paler in colour than others, but with this exception there does not appear to be any important variation.

The eggs are round, flattened above, bright green, becoming dull purplish about two days after being laid.

The young larva when first emerged is about ⅛ inch in length; the head is brown; the body dull white, with a series of black tubercles round each segment, each tubercle emitting a tuft of bristles. The larva has sixteen legs, but the two anterior pairs of ventral claspers are not employed in walking, the caterpillar's mode of progression, consequently, resembling that of a larva with twelve legs only. The food-plant is *Piper excelsum*.

The perfect insect appears from September till April, and is very common amongst undergrowth in the forest. It is seldom found in the daytime, but at night it is extremely abundant in densely wooded situations. It flies in a very stealthy manner, and may soon be recognised on the wing by this feature alone. When disturbed it always secretes itself amongst dead fern fronds or other vegetable refuse, where its sombre colour effectually conceals it.

The costal fold on the under side of the fore-wing of the male contains a very large tuft of extremely long hairs. It probably emits a scent agreeable to the female.

RHAPSA OCTIAS. Meyr.

(*Hyperaucha octias*, Meyr., Trans. Ent. Soc. Lond., 1897, 383.)

(Plate VI., fig. 7.)

This interesting little species has recently occurred in some numbers in the neighbourhood of Wellington. I have no record at present of its capture in any other

New Zealand locality.

The expansion of the wings is about 1 inch. The fore-wings have the costa straight, and the termen with a large projection slightly above the middle; the colour is pale brown; *there is a broad dark brown patch on the costa at the base*, a jagged transverse line at about one-fourth, *a very broad, oblique, blackish-brown, oblong patch on the costa at about one-third; beyond this patch is situated the reniform which is very large, indented towards the termen where it is outlined in dark brown*; there is a very fine jagged transverse line from beneath the reniform to the dorsum; *a large irregular patch of dark brownish-black just before the apex*, and an obscure transverse line; there is a series of minute, dark brown, crescentic marks on the termen. The hind-wings are dull whitish-grey; there is a faint blackish dot in the middle, a wavy line a little below the middle, and a terminal series of small dark marks. The antennæ are filiform in both sexes.

The perfect insect appears in October, November and December. It frequents dense forest ravines, and is generally disturbed from amongst dead leaves or old fern fronds. It is usually a very scarce species, but appears to be much commoner in some years than in others. According to Mr. Meyrick, it is also found in Australia.

This species is placed by Mr. Meyrick in the genus *Rhapsa*. The simple antennæ and absence of the broad costal fold in the males would appear, however, to remove it from that genus, as restricted by him in the 'Transactions' of the New Zealand Institute, xix. 38. In all other respects it appears to conform to the genus.[25]

II.—THE NOTODONTINA.

The *Notodontina* are characterized as follows:—

"The maxillary palpi are obsolete. Fore-wings with vein 1b usually furcate, but with lower fork often weak or tending to be obsolete, 5 rising not nearer to 4 than to 6, parallel, 7 and 8 out of 9. Hind-wings almost always with frenulum, 1c absent. (Plate II., figs. 19 to 64, and Plate I., figs. 12 and 13.)

"Imago with fore-wings more or less broad-triangular; hind-wings broad-ovate."—(Meyrick.)

Larva (in New Zealand) generally with 10 or 12 legs only (Plate III., figs. 12, 17, 18, 19, 20, 21, 22, and 24), rarely with 16 (*Sphinx*, Pl. III., figs. 13 and 14).

"Pupa with segments 9 to 11 free; not protruded from cocoon in emergence."—(Meyrick.)

This is a very extensive group of the Lepidoptera, and so far as it is represented in New Zealand is equivalent to that group formerly known as the *Geometrina*, with the addition of the family *Sphingidæ*. The insects here included comprise many of our most interesting, abundant, and beautiful species. Some of them are so extremely variable that it is often a matter of considerable difficulty to determine the most convenient points on which to base the specific distinctions; although fortunately great advances have been made in this direction of late years owing to the increase in the number of workers, and the consequent accumulation of available material. In connection with this portion of the subject, special mention should be made of Mr. Meyrick's paper on the group, which appeared in the 'Transactions' of the New Zealand Institute for 1883. This essay has been of the greatest value in dispelling the doubts which formerly existed respecting the limits of many of the most variable species.

The *Notodontina* are represented in New Zealand by the six following families:—

1. HYDRIOMENIDÆ.
2. STERRHIDÆ.
3. MONOCTENIADÆ.
4. ORTHOSTIXIDÆ.
5. SELIDOSEMIDÆ.
6. SPHINGIDÆ.

Family 1.—**HYDRIOMENIDÆ.**

The *Hydriomenidae* are thus characterized:—

"Tongue well developed. Fore-wings with vein 10 rising separate; anastomosing with 11 and 9 (forming double areole), or rising out of 11 and anastomosing with 9 (forming simple areole). Hind-wings with vein 5 fully developed, parallel to 4, 6, and 7 almost always stalked or connate, 8 anastomosing with upper margin of cell from near base to beyond middle, or sometimes approximated only and connected by a bar or shortly anastomosing beyond middle." (Plate II., figs. 19 to 43.)

"A very large family distributed in equal plenty throughout all temperate regions, but becoming scarcer within the tropics. The structure is very uniform throughout, and the generic distinctions slight. Imago with body slender, fore-wings usually broad.

"Ovum broad, oval, rather flattened with usually oval reticulations. Larva elongate, slender, with few hairs, without prolegs on segments 7 to 9; often imitating live or dead twigs and shoots. Pupa usually subterranean."—(Meyrick.)

This family is very extensively represented in New Zealand by the following fifteen genera:—

1. TATOSOMA.
2. PARADETIS.
3. CHLOROCLYSTIS.
4. PHRIXOGONUS.
5. ELVIA.
6. HYDRIOMENA.
7. EUCHŒCA.
8. ASTHENA.
9. VENUSIA.
10. ASAPHODES.
11. XANTHORHOE.
12. LYTHRIA.
13. DASYUR
14. NOTORE
15. SAMANA

1. TATOSOMA.
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9. VENUSIA.
10. ASAPHODES.
11. XANTHORHOE.
12. LYTHRIA.
13. DASYURIS.
14. NOTOREAS.
15. SAMANA.

Genus 1.—TATOSOMA, Butl.

"Face smooth. Palpi long, straight, porrected, shortly rough-scaled, terminal joint short. Antennæ in male simple, stout, gradually dilated from base to near apex, apex attenuated. Abdomen in male very excessively elongate. Hind-wings in male deeply excised near dorsum, dorsal lobe folded into a long pocket, fringed with hairs. Fore-wings with vein 6 rising out of 9, 7 from or above angle of areole, 10 anastomosing moderately with 9, 11 anastomosing moderately with 10, 12 free. Hind-wings with veins 6 and 7 separate, 8 free, united with 7 before transverse vein by an oblique bar.

"This singular genus is a remnant of a widely diffused, but now fragmentary group, to which belong also *Lobophora* (Europe), *Rhopalodes* (South America), *Sauris* (Ceylon), and *Remodes* (Borneo.) In

all, the hind-wings of the male are peculiarly modified, usually much diminished in size, and with the dorsum formed into a distinct lobe, the object of which is unknown. A similar structure is found only in one or two genera of *Tortricina*. *Rhopalodes* is the nearest genus to this, but vein 5 is said to be obsolete, and the lobe does not form a pocket; in *Sauris* the areole is simple, and the antennæ thickly scaled; in *Remodes* the areole is also simple, the antennæ flattened and scaled, and the dorsum is furnished with three superposed lobular folds, so that it represents the extreme of development in this direction."—(Meyrick.)

It will be seen on reference to Plate II., figs. 22 and 23, which represent the structure of the hind-wings of the male and female of *Tatosoma agrionata* respectively, that in the male veins 1 and 2 are absent, having no doubt become absorbed during the formation of the characteristic sexual lobe; vein 8 is connected with the margin of the cell by an oblique bar, this being probably due to an extension of the wing in the costal region, compensating for the loss in the dorsal region due to the above-mentioned lobe. In the hind-wings of the female the normal neuration of the family is almost preserved, the only peculiar feature consisting in the origin of veins 6 and 7 from a point on the margin of the cell.

Of this remarkable genus we have three species, and I think it quite possible that others may reward the industry of future collectors.

TATOSOMA LESTEVATA, Walk.

(*Cidaria lestevata*, Walk. 1416. *Sauris ranata*, Feld. cxxxi. 11., *Tatosoma lestevata*, Meyr., Trans. N. Z. Inst. xvi. 67.)

(Plate VI., fig. 25 ♂.)

This beautiful species has occurred at Wainuiomata, near Wellington, in the North Island, and at Nelson and Christchurch, in the South Island.

The expansion of the wings is 1⅜ inches. *The fore-wings are bright-green; there are four wavy, black, transverse lines; the first near the base, the second a little before the middle, the third considerably beyond the middle, and the fourth near the termen*; the terminal line is very faint towards the tornus, and it emits three or four very sharp, longitudinal, black, tooth-like marks; all the transverse lines are much stronger where they cross the principal veins. The hind-wings are very pale yellowish-green.

The perfect insect appears in February. At present I believe the species is represented by four specimens only—two in Mr. Fereday's collection and two in my own.

TATOSOMA AGRIONATA, Walk.

(*Cidaria agrionata*, Walk. 1417. *Cidaria tipulata*, ib. 1417. *Cidaria inclinataria*, ib. 1418. *Cidaria transitaria*, ib. 1419. *Sauris mistata*, Feld. cxxxi. 12. *Tatosoma transitaria*, Meyr., Trans. N. Z. Inst. xvi. 68. *Tatosoma agrionata*, Meyr., Trans. N. Z. Inst. xvii. 64.)

(Plate VI., fig. 26 ♂, 27 ♀.)

This fine species has occurred commonly at Wellington in the North Island. It is generally distributed in the South Island, and has also been found at Stewart Island.

The expansion of the wings is about 1½ inches. *The fore-wings are bright-green traversed by numerous black, wavy, transverse lines; these black lines are grouped into four more or less distinct bands, the outermost of which is interrupted at each of the veins*; there is a conspicuous black dot in the middle of the wing, a number of small triangular black marks near the termen, and a series of minute black dots on the termen. The hind-wings are ochreous, tinged with green towards the termen. In the female the abdomen is much shorter, and the hind-wings are larger than in the male.

The perfect insect appears from December till April. It frequents dense forests, and is generally found at rest on the trunks of trees. In these situations the pattern of the fore-wings is extremely protective, the whole insect bearing the closest possible resemblance to a patch of moss. This species may also be taken at sugar, and sometimes at light, but I have found that it can be obtained most plentifully by a careful scrutiny of the tree-trunks in a favourable locality. As a rule I think that the males are considerably commoner than the females. I have noticed them in the proportion of about four to one.

TATOSOMA TIMORA, Meyr.

(*Tatosoma agrionata*, Meyr. (nec Walker), Trans. N. Z. Inst. xvi. 68. *Tatosoma timora*, Meyr., ib. xvii. 64.)

(Plate VI., fig. 28 ♂, 29 ♀.)

This rather sombre, though interesting insect, has occurred at Palmerston and Wellington in the North Island, and at Christchurch and Akaroa in the South Island.

The expansion of the wings is 1⅜ inches. *All the wings are sparsely covered with scales. The fore-wings of the male are dull reddish-brown, with numerous obscure transverse dusky stripes; there are two rather conspicuous blackish blotches on the costa*, a white dot in the middle of the wing, a wavy, pale, transverse line near the termen, and a series of black terminal dots; the veins are dotted in black. The hind-wings are very small, dull grey, with the lobe large and conspicuous. *The female is faintly tinged with green, the markings on the fore-wings are rather indistinct*; the hind-wings are small, though much larger than those of the male.

The perfect insect appears from November till May.

It frequents densely wooded districts, but is not a common species.

Genus 2.—PARADETIS, Meyr.

"Palpi short, arched, roughly-scaled beneath. Antennæ bipectinated. Fore-wings with vein 6 from below 9, 7 from below angle of areole, 10 very shortly anastomosing with 9, 11 out of 10 considerably before angle of areole, 12 free. Hind-wings with veins 6 and 7 stalked, 8 separate, united to 7 before transverse vein by an oblique bar.

"This singular genus is of quite uncertain affinity, and stands at present alone. The simple areole, and connecting bar of 7 and 8, can only have arisen by modification of the normal type of this family, to which it must be referred. It is also the only New Zealand genus except *Declana* in which the female has pectinated antennæ; but this character recurs in a few exotic genera not otherwise allied."—(Meyrick.)

Plate II., figs. 27 and 28 represent the neuration of the male of *Paradetis porphyrias*, vein 2 of the hind-wings being absent in that sex. In the female, which is the sex from which Mr. Meyrick characterized the genus, the vein is present as usual. Only one species is known.

PARADETIS PORPHYRIAS, Meyr.

(*Parysatis porphyrias*, Meyr., Trans. N. Z. Inst. xvi. 58. *Paradetis porphyrias*, Meyr., ib. xviii. 184.)

(Plate VI., fig. 36 ♂.)

This interesting little insect has occurred in the South Island at Mount Arthur, Castle Hill, the Otira Gorge, and Lake Wakatipu.

The expansion of the wings is about ¾ inch. *The fore-wings of the male are deep purplish-brown*; there is a wavy, reddish, transverse line at about one-third and another at about two-thirds; between these two lines near the dorsum there are often four, more or less distinct, yellow dots; there is an obscure orange mark at the origin of the first line and a conspicuous mark at the origin of the second. *The hind-wings are deep purplish-brown.* The cilia of all the wings are white. *The fore-wing has the apex hooked and the termen deeply excavated above and below the middle.* The female is very much paler; the lines are more distinct and the veins are marked in brown.

The perfect insect appears in January. It frequents rather open spots in the forest, and flies in a very busy manner close to the ground amongst the numerous ferns and other plants, which are always abundant in such situations. It is consequently very inconspicuous and sometimes difficult to capture. Thus, no doubt, it is often overlooked, and perhaps is much commoner than at present appears probable.

Genus 3.—CHLOROCLYSTIS, Hb.

"Face with short cone of scales. Palpi rough-scaled. Antennæ in male shortly ciliated. Abdomen crested. Fore-wings with areole simple, vein 11 running into or anastomosing with 12. Hind-wings with vein 8 anastomosing with cell from near base to beyond middle." (Plate II., figs. 19 and 20.)

"This genus is especially characteristic of New Zealand, and is also found in South Asia, a few stragglers occurring in Europe and elsewhere."—

(Meyrick.)

We have twelve species, several of which are very beautiful.

CHLOROCLYSTIS PLINTHINA, Meyr.

(*Pasiphila plinthina*, Meyr., Trans. N. Z. Inst. xx. 49.)

(Plate VI., fig. 8.)

This pretty species has occurred at Wellington.

The expansion of the wings is about ½ inch. All the wings are traversed by numerous obscure, wavy, reddish-yellow lines; the fore-wings have a dark shading near the base, *a very large white blotch in the middle*, and a dark chocolate-brown patch near the apex. *The hind-wings have a large shaded white patch in the middle*, a blackish dot near the base, and a series of brownish crescentic marks on the termen; the cilia of all the wings are pale brown barred with brownish-black. The termen of the fore-wings is very oblique, of the hind-wings rather irregular.

Many specimens of this insect are strongly tinged with green, and the shape and size of the white patches on the fore- and hind-wings are subject to slight variations.

The perfect insect appears in November and December. It frequents brushwood, where it may be occasionally taken at rest on tree-trunks but more often dislodged from the foliage. It is not a very common species.

CHLOROCLYSTIS BILINEOLATA, Walk.

(*Eupithecia bilineolata*, Walk. 1246. *E. muscosata*, ib. 1246. *Scotosia humerata*, ib. 1362. *Eupithecia semialbata*, ib. 1708. *E. cidariaria*, Gn., Ent. Mo. Mag. v. 62. *Cidiaria aquosata*, Feld., pl. cxxxi. 33. *Helastia charybdis*, Butl., Cist. Ent. ii. 503. *H. calida*, ib. 504. *Pasiphila muscosata*, Meyr., Trans. N. Z. Inst. 50. *P. bilineolata*, ib.)

(Plate VI., fig. 9 type, fig. 10 variety.)

This beautiful little species is common, and generally distributed throughout the country.

The expansion of the wings is ¾ inch. *The fore-wings are bright green with numerous wavy darker lines.* There is a jagged transverse black line near the base, two at about one-fourth, enclosing a rather paler space; beyond this there are several rather irregular, fine black marks, and an obscure white patch below the apex; the cilia are dull green. The hind-wings are grey slightly tinged with reddish; the dorsum and termen are shaded with green, and there is a number of curved black lines on the dorsum; the cilia are dull greenish-grey. The termen of the fore-wings is slightly bowed, and all the wings are finely scalloped and sharply outlined in black.

A very distinct variety frequently occurs in which the entire ground colour is *orange-yellow*. This variety can be artificially produced by exposing a typical specimen to the fumes of bruised laurel leaves. Intermediate forms may also be found, but are much scarcer than either the typical form or the variety.

The larva (according to Mr. Purdie[26]) is about ½ inch long; colour brownish, surface very rugged; body tapering somewhat towards the head. Two pairs of small dorsal tubercles about the middle, the posterior pair being larger; oblique lateral dark markings faintly seen on dark ground colour; below lighter. Food-plants: *Aristotelia*, *Leptospermum ericoides*, *Rubus* (?), and *Muhlenbeckia* (?). Found in

December and January.

The perfect insect appears from September till May, and is often very common. It rests on tree-trunks with outspread wings, in which position it so closely resembles a patch of moss that it is extremely difficult to detect, even when specially searched for.

CHLOROCLYSTIS ANTARCTICA, n. sp.

(Plate VI., fig. 20.)

This species was discovered by Mr. Philpott at West Plains, near Invercargill.

The expansion of the wings is ⅞ inch. The fore-wings are rather dull green; there is a reddish-brown patch near the base, followed by two, slightly oblique, reddish bands; the central band is very broad, green, traversed by numerous fine wavy lines; there is a broad reddish band on the termen. The hind-wings are slaty-grey, tinged with pink towards the termen and dorsum. The cilia of all the wings are pink barred with black.

Two other specimens kindly given to me by Mr. Philpott have the bands on the fore-wings more or less brown in place of red, but are otherwise identical.

This insect is evidently very closely allied to *C. bilineolata*, but its larger size, longer wings, and barred cilia will, I think, distinguish it from that species.

The perfect insect appears in November.

CHLOROCLYSTIS ARISTIAS, Meyr.

(*Chloroclystis aristias*, Meyr., Trans. Ent. Soc. Lond. 1897, 385.)

(Plate VI., fig. 21 ♂, 22 ♀.)

This beautiful insect was discovered on the Mount Arthur Tableland in January, 1896, at an elevation of about 4,000 feet.

The expansion of the wings is 1⅛ inches. *All the wings are very pale greenish-grey*. The male has three distinct dark brownish bands near the base, an irregular broad suffused band near the middle, becoming obsolete before it reaches the dorsum, a dark patch at the apex, another patch on the termen below the apex and another near the tornus. The hind-wings are traversed by numerous, very fine, wavy blackish lines, becoming darker towards the dorsum. In the female there are three wavy reddish-brown bands on the costa of the fore-wings, becoming obsolete towards the dorsum, then a wavy yellowish line, followed by two rust-red patches. The hind-wings resemble those of the male. Both sexes have the veins dotted with black, and the cilia of all the wings are grey barred with black.

The perfect insect was found in a limestone valley at the foot of Mount Peel, where it was fairly common.

CHLOROCLYSTIS NEREIS, Meyr.

(*Pasiphila nereis*, Meyr., Trans. N. Z. Inst. xx. 51.)

(Plate VI., fig. 11 ♂.)

This insect has occurred at Mount Arthur, Mount Hutt, and the Humboldt Range, Lake Wakatipu, at elevations from 2,500 to 4,000 feet.

The expansion of the wings is nearly an inch. *All the wings are dusky grey with numerous black and dull white, wavy transverse lines*; there is often a somewhat paler area near the apex of the

fore-wings, and the termen of the hind-wings is slightly scalloped; the cilia are dull white barred with dark greyish-black.

The perfect insect appears in January and February. It generally frequents cliffs on mountain sides, resting with outspread wings on the dark rocky surfaces. In these situations it is extremely difficult to detect, and the protective value of its colouring is thus at once demonstrated.

CHLOROCLYSTIS DRYAS, Meyr.

(*Pasiphila dryas*, Meyr., Trans. N. Z. Inst. xxiii. 97.)

(Plate VI., fig. 12 ♂.)

This species has occurred at Wellington.

The expansion of the wings is 1 inch. *The fore-wings are dull rosy-brown, traversed by numerous obscure blackish transverse lines, somewhat concentrated towards the middle and forming an ill-defined central band*; the termen is slightly shaded with blackish, and the veins are marked with dotted lines. The hind-wings are grey, tinged with rosy-brown; there are numerous very faint blackish transverse lines and the veins are marked with blackish dots. The cilia of all the wings are dark grey. The termen of the hind-wings is rather irregular.

The perfect insect appears in December and January, and is attracted by light. I once took a specimen in July, but this may have been due to an exceptionally mild winter.

CHLOROCLYSTIS SPHRAGITIS, Meyr.

(*Pasiphila sphragitis*, Meyr., Trans. N. Z. Inst. xx. 51.)

(Plate VI., fig. 13 ♂, 14 ♀.)

This extremely variable insect has occurred at Wellington in the North Island, and at Christchurch in the South Island.

The expansion of the wings of the male is ⅝ inch, of the female ¾ inch. *The fore-wings are pale ochreous; there is a narrow darker area at the base followed by a narrow oblique pale band*; then a broad central band, formed of numerous oblique, wavy, brown, transverse lines, next, a rather narrow curved pale band, followed by several small irregular patches on the termen, sometimes forming a dark brown terminal band; all the markings are much darker on the costa, and portions of the costa, termen, and dorsum are frequently tinged with green. The hind-wings are pale ochreous; there are numerous wavy, pale brown lines on the dorsum, becoming obsolete towards the costa. The termen of all the wings is edged with fine black crescents. The cilia are pale ochreous barred with dark brown.

The perfect insect may be met with from September till February, but is most abundant in the early spring. It is extremely common in the Wellington Botanical Gardens, frequenting the forest gullies, where numerous specimens may be easily dislodged from amongst the dense undergrowth. This moth rests with expanded wings on the leaves and stems of shrubs, but is extremely difficult to find in such situations, the colouring of the insect causing it to closely resemble the droppings of birds.

CHLOROCLYSTIS LICHENODES, Purd.

(*Pasiphila lichenodes*, Purdie, Trans. N. Z. Inst. xix. 70.)

(Plate VI., figs. 15 and 16, varieties.)

This extremely interesting species has occurred at Wellington in the North Island, and at Dunedin in

the South Island; it has also been found at Stewart Island.

The expansion of the wings is about ¾ inch. The fore-wings are dull green; *there is a large pale brown area near the base, divided by fine black lines into three distinct patches*; the central portion of the wing is mottled with black, pale brown, and dull green; *there is a very broad, irregular band of chocolate-brown near the termen, outlined with black towards the base and with white towards the termen, the white line almost dividing the band into four or five patches*. The hind-wings are dull greenish-brown; there are several irregular black and white transverse lines and small patches of chocolate-brown, the markings being more distinct towards the dorsum. The cilia of all the wings are pale brown barred with dark brown.

I have observed that in many specimens of this species the ground colour is entirely pale brown instead of green; the markings, however, are not variable.

The perfect insect appears from November till February. It frequents forests, resting with outspread wings on lichen-covered tree-trunks, where its wonderfully perfect protective colouring may be seen to great advantage. The remarkable brown patches on the wings have undoubtedly been acquired for this protective purpose, and Mr. Purdie's name is certainly a most appropriate one. It is not, I think, a common species.

CHLOROCLYSTIS INDICATARIA.

(*Eupithecia indicataria*, Walk. 1708. *Pasiphila indicataria*, Meyr., Trans. N. Z. Inst. xx. 52.)

(Plate VI., fig. 17 ♂, 17A ♀.)

This rather dull-looking species has occurred at Napier and Wellington in the North Island, and at Nelson in the South Island.

The expansion of the wings is ⅞ inch. *The fore-wings of the male are dull greenish-grey*; there is an oblique, black-edged, reddish, transverse band at about one-third, and another very irregular band near the termen; between and beyond these bands there are numerous irregular, broken, reddish and blackish transverse lines; there is a rust-red patch on the termen below the apex. The cilia are grey barred with brown. The hind-wings are dull grey with several faint, jagged, transverse lines; the termen is rather irregular. The female is much browner than the male, and the lines are more numerous and distinct, especially on the hind-wings. *The antennæ are simple in both sexes.*

The perfect insect appears from October till March, and is fairly common in wooded localities. It is sometimes attracted by light.

CHLOROCLYSTIS INDUCTATA, Walk.

(*Coremia inductata*, Walk. 1322. *Scotosia subitata*, ib. 1362. *Pasiphila inductata*, Meyr., Trans. N. Z. Inst. xx. 53.)

"This is a distinct species; but I have only seen the British Museum specimens, and am unable to say to which section it belongs, or to give a proper description. The termen of the fore-wings is more bent, and the hind-wings are narrower than in any other species; ground colour light reddish, with the margins of the median band formed by distinct black lines."—(Meyrick.)

I am unacquainted with this insect.

CHLOROCLYSTIS MACULATA, n. sp.

(Plate VI., fig. 18.)

This interesting species was discovered at Wellington by Mr. W. P. Cohen.

The expansion of the wings is about ⅞ inch. *All the wings are creamy-white slightly tinged with green. The fore-wings have several irregular large black marks on the costa* extending about two-thirds towards the apex; there is a curved transverse series of black dots at about two-thirds, and several obscure brown marks on the termen near the middle and at the tornus. *The hind-wings have several irregular rows of conspicuous black spots.* The cilia are cream-coloured barred with black. The apex of the fore-wing is very much rounded.

The perfect insect appears in December, and is attracted by light.

Described and figured from a specimen kindly given to me by Mr. Cohen.

CHLOROCLYSTIS RECTILINEATA, n. sp.

(Plate VI., fig. 22.)

This species was discovered at Wellington by Mr. W. P. Cohen.

The expansion of the wings is ¾ inch. *The fore-wings are pale grey*; there are several irregular black, transverse lines near the base, very broad on the costa; a broad, pale, central area with no distinct markings; *then two very fine, almost straight, parallel, dark transverse lines alternating with two broader white lines, and followed by a very conspicuous black line, this being again immediately followed by a fainter black line*; beyond these lines the wing is darker, with a wavy transverse white line and a row of black terminal marks. The hind-wings are grey with several faint, wavy, transverse lines and a series of darker marks on the termen. The cilia of all the wings are grey.

Described and figured from a specimen kindly given to me by Mr. Cohen.

Genus 4.—PHRISSOGONUS, Butl.

"Face with short cone of scales or smooth. Palpi moderate or short, porrected, more or less rough-scaled. Antennæ in male ciliated or naked. Posterior tibiæ with all spurs present. Fore-wings in male with swelling or tuft or rough scales on costa, vein 5 sometimes distorted or absent; areole simple, 11 running into 12. Hind-wings with vein 8 anastomosing with cell from near base to beyond middle."—(Meyrick.)

We have one species in New Zealand.

PHRISSOGONUS DENOTATUS, Walk.

(*Scotosia denotata*, Walk. 1361. *Phibalapteryx parvulata*, ib. 1721. *Phrixogonus denotatus*, Meyr., Trans. N. Z. Inst. xx. 53.)

(Plate VI., fig. 19 ♂.)

This dull-looking insect is common and generally distributed throughout the country.

The expansion of the wings is ¾ inch. *The fore-wings are very dark grey*, with numerous obscure black and pale brown transverse lines; there are several black dots on the veins, and a white mark on the termen near the apex. The hind-wings are pale grey with numerous wavy black lines, especially near the dorsum. *The antennæ are simple in both sexes.* The cilia are dull pink barred with black. The female is slightly tinged with reddish-brown. *The male has a peculiar dilation on the costa, beyond the middle, beneath which is a naked longitudinal mark occupying the space between veins 10 and 12, these veins being slightly distorted in consequence.*

The larva, which feeds on the blossoms of the

wharangi (*Brachyglottis repanda*), is pale green with a series of elongate triangular brown markings down the back and an obscure series of brown marks on each side. It may be found during the latter end of October and beginning of November, but is extremely inconspicuous amongst its food-plant. The pupa is concealed in a light cocoon constructed of the remains of the blossoms.

The perfect insect appears from October till February. It frequents dense undergrowth in the forest, and is generally found resting with extended wings on the dark-coloured stems of the kawakawa (*Piper excelsum*), where it is practically invisible. In this situation its colouring is evidently specially adapted for protective purposes.

Genus 5.—ELVIA, Walk.

"Face smooth. Palpi rather long, straight, porrected, densely rough-scaled above and beneath, terminal joint short. Antennæ in male stout, flattened, bipectinated (2½). Thorax somewhat crested. Fore-wings with vein 6 from a point with 9, 7 from angle of areole, 10 anastomosing moderately with 9, 11 out of 10, running shortly into 12. Hind-wings with veins 6 and 7 stalked, 8 anastomosing with 7 from near base to near transverse vein."—(Meyrick.)

We have one species.

ELVIA GLAUCATA, Walk.

(*Elvia glaucata*, Walk. 1431; Feld. cxxxii. 25. *Elvia donovani*, Feld. cxxxii. 5. *Elvia glaucata*, Meyr., Trans. N. Z. Inst. xvi. 65.)

(Plate VI., fig. 23 and 24 varieties.)

This very pretty insect is generally distributed throughout the country.

The expansion of the wings is about an inch.

The fore-wings vary from pale green to dark steely blue, rarely pale reddish-brown; *there is an almost straight, black transverse line near the base; a broad curved line before the middle, shaded towards the termen; then a straight line, breaking up into dots towards the dorsum, followed by a conspicuous cream-coloured blotch near the costa; this again is followed by a fine jagged cream-coloured line*; there is a terminal series of black dots. The hind-wings are cream-coloured, tinged with steely blue or green towards the termen; there are a few obscure transverse lines and a short series of dots from the dorsum. The apex of the fore-wing is very blunt, and the termen is slightly hollowed out towards the tornus; *the termen of the hind-wings is deeply scalloped*.

This species is extremely variable. In addition to the variations above indicated, the markings of many specimens differ considerably in intensity, and there are frequently several large cream-coloured blotches towards the base or middle of the forewings.

The perfect insect appears from September till March, but is not a common species. It frequents forest districts, and may sometimes be found at rest on tree-trunks, where the beautiful colouring of its fore-wings closely imitates that of certain lichens, and renders its detection in such situations extremely difficult. Unlike the insects included in the two preceding genera, this species closes its wings when at rest, the anterior pair alone being visible. These wings are not held flat, but are curiously folded longitudinally, and the end of the abdomen is also curled upwards. By slightly raising the insect above the level of the surrounding surface, this peculiar

attitude considerably increases its resemblance to a lichen growing on the stem or branch of a tree. It will also be observed that in this species, which when at rest exposes only its fore-wings, these alone are protectively coloured; whilst in the genera *Chloroclystis* and *Phrissogonus*, where both pairs of wings are displayed, both pairs are protectively coloured.

Genus 6.—HYDRIOMENA, Hb.

"Face with somewhat projecting or loose scales, or with conical tuft. Palpi rough-scaled. Antennæ in male ciliated, rarely dentate or naked. Abdomen not crested, or with crests on two basal segments only. Fore-wings with areole double. Hind-wings with 8 anastomosing with cell from near base to beyond middle. (See Plate II., fig. 32 head, figs. 33 and 34 neuration of *Hydriomena deltoidata*.)

"A very large genus, principally characteristic of temperate regions in both hemispheres.—(Meyrick.)

There are twelve New Zealand species.

HYDRIOMENA GOBIATA, Feld.

(*Cidaria gobiata*, Feld. cxxxi. 2. *Phibalapteryx simulans*, Butl., Cist. Ent. ii. 506. *Phibalapteryx undulifera*, Butl., Cist. Ent. ii. 506. *Phibalapteryx anguligera*, Butl., Cist. Ent. ii. 507. *Phibalapteryx rivularis*, Butl., Cist. Ent. ii. 507. *Scotosia gobiata*, Meyr., Trans. N. Z. Inst. xvi. 70. *Cephalissa gobiata*, ib. xviii. 184.)

(Plate VI., fig. 43 ♂, 44 ♀.)

This insect has occurred plentifully at Wanganui and

Wellington in the North Island, and is generally distributed throughout the South Island.

The expansion of the wings is from 1 to 1¼ inches. *All the wings vary from pale ochreous to rather dull yellowish brown, sometimes very slightly tinged with green. There is usually a large number of fine, slightly waved, oblique lines arranged on both pairs of wings, very like the markings in Venusia verriculata* (see page 53), both insects evidently having acquired this style of colouring for similar protective purposes. In many specimens the whole of the anterior portion of the fore-wings, a small area at the base of the hind-wings, and a band near the termen are much paler in colour than the rest. There is usually a very oblique elongate pale area near the apex, and an irregular dark spot considerably below the apex. The outline of all the wings is more or less distinctly scalloped.

The larva (according to Mr. Purdie[27]) is about 1 inch in length, greyish-brown, with a rough prominent dorsal tubercle about the ninth segment. There are sometimes other smaller tubercles. It feeds on various species of *Coprosoma* in January, March, and May.

The perfect insect appears from October till March, and generally frequents rather open country where Manuka and Cabbage Tree Palms are abundant.

HYDRIOMENA PRIONOTA, Meyr.

(*Arsinoe prionata*, Meyr., Trans. N. Z. Inst. xvi. 73. *Anachloris prionata*, Meyr., ib. xviii. 184.)

(Plate VI., fig. 47.)

This species has been taken in the South Island at Mount Arthur, Castle Hill and Dunedin.

The expansion of the wings is rather under 1½ inches. The fore-wings are dull yellowish-brown, with many obscure, wavy, transverse, brown lines, which tend to form two ill-defined bands, one rather narrow near the base and the other much broader near the middle of the wing. *The hind-wings are very pale yellowish-brown*; there are a few obscure dark lines near the dorsum. *The veins are distinctly dotted in black, and the outline of all the wings is deeply scalloped.*

The perfect insect appears in January, but is not common.

HYDRIOMENA DELTOIDATA, Walk.

(*Coremia deltoidata*, Walk. 1321. *Cidaria inclarata*, Walk. 1411. *Cidaria perductata*, Walk. 1412. *Cidaria congressata*, Walk. 1412. *Cidaria conversata*, Walk. 1413. *Cidaria descriptata*, Walk. 1414. *Cidaria bisignata*, Walk. 1415. *Cidaria aggregata*, Walk. 1415. *Cidaria congregata*, Walk. 1415. *Cidaria plagifurcata*, Walk. 1416. *Coremia pastinaria*, Gn., E. M. M. v. 64. *Cidaria inopiata*, Feld. cxxxii. 3. *Cidaria monoliata*, Feld. cxxxii. 8. *Cidaria perversata*, Feld. cxxxii. 14, 24. *Scotosia deltoidata*, Meyr., Trans. N. Z. Inst. xvi. 70. *Cephalissa deltoidata*, Meyr., Trans. N. Z. Inst. xviii. 184.)

(Plate VII., figs. 1 to 9 varieties.)

This pretty insect is extremely abundant throughout the country.

The expansion of the wings varies from 1⅛ to 1⅜ inches. The fore-wings vary from brownish-black to dull orange-brown; there is a small darker area near the base, then two pale whitish wavy transverse lines, then a broad darker central band, often containing within it a still darker central band, bounded by two wavy black transverse lines; beyond the central band there are nearly always two or three pale brown or whitish, wavy, transverse lines, then an interrupted line just before the termen, and a short oblique whitish line below the apex; there is a black dot a little above the centre of the wing, and *a white dot on the*

termen near the middle. The hind-wings are yellowish-brown, with several wavy, transverse lines near the dorsum; there is a series of fine crescentic black lines on the termen of both fore- and hind-wings.

This species is extremely variable, but may generally be recognised by a careful scrutiny of the above-named characters. One very striking variety occasionally met with has the central band of the fore-wing completely divided in the middle, which thus forms two dark patches, one on the costa, and one on the dorsum. (See Plate VII., figs. 7 and 8.) A further development of this variety, of which I have only seen one example, taken by Mr. Hawthorne at Springfield, Canterbury, and now in his collection, has only the costal patch present, the whole of the lower portions of the band being completely obliterated.[28] (See Plate VII., fig. 9.) The minor varieties are too numerous to specify.

The larva feeds on grasses. When full-grown its length is about 1 inch. The colour is dark brown, with the skin very much wrinkled. It is sluggish in its habits, and lives through the winter, becoming full-grown about the end of September. During severe weather it generally seeks refuge from the elements amongst the stalks and roots of the rank herbage often surrounding stones or fallen logs.

The pupa is concealed in the earth.

The perfect insect appears early in January, and continues in the utmost profusion until the middle or end of March. It may often be seen resting with the wings folded backwards and forming together a triangle, whence the moth has probably derived its

name of *deltoidata*. In the neighbourhood of Wellington I have observed that this insect has very much decreased in numbers during the last ten or fifteen years.

HYDRIOMENA HEMIZONA, Meyr.

(*Hydriomena hemizona*, Meyr., Trans. Ent. Soc. Lond. 1897, 385.)

(Plate VII., fig. 10.)

This insect has occurred at Terawhiti in the North Island, and at Mount Arthur in the South Island.

The expansion of the wings is about 1⅜ inches. The fore-wings are blackish-brown, darker towards the apex and termen; *there is an obscure rust-red wavy band near the base, and another at three-fourths, considerably bowed towards the termen at the middle*; there are also numerous wavy darker lines. The hind-wings are dull grey, and the termen is slightly scalloped.

This species may be distinguished from any of the varieties of *H. deltoidata* by its *narrower wings, and the absence of any distinct central band on the fore-wings*.

The perfect insect appears in January. It is a scarce species.

HYDRIOMENA SUBOCHRARIA, Dbld.

(*Aspilates (?) subochraria*, Dbld., Dieff. N. Z. ii. 285. *Camptogramma subochraria*, Butl., Cat., pl. iii. 16. *Camptogramma strangulata*, Gn. x. 423. *Camptogramma fuscinata*, Gn., E. M. M. v. 92. *Arsinoe subochraria*, Meyr., Trans. N. Z. Inst. xvi. 73. Anachloris subochraria, Meyr., ib. xviii. 184.)

(Plate VI., figs. 45 and 46 varieties.)

This species is fairly common and generally distributed throughout the country.

The expansion of the wings is about 1¼ inches. *The fore-wings are bright ochreous-yellow*; there is a brown dot a little above the middle, *and a dark brown transverse band at about three-fourths; the termen is shaded with dark brown*. The hind-wings are ochreous, with an obscure central transverse line.

A variety (*Hydriomena fuscinata*, Gn.) often occurs in which the whole of the wings are more or less tinged with purplish-brown (Plate VI., fig. 46).

The perfect insect appears from November till April. It chiefly frequents tussock country and swampy situations. In the Wellington district it is extremely abundant in the clearings at the foot of the Tararua Range. According to Mr. Meyrick the typical form is common in Tasmania and Victoria.

HYDRIOMENA TRIPHRAGMA, Meyr.

(*Cidaria triphragma*, Meyr., Trans. N. Z. Inst. xvi. 74.)

"*Male.*—26-27 mm. (about 1 inch). Fore-wings moderate, termen strongly sinuate; pale dull greyish-purple; a very small darker basal patch, outer edge strongly convex, margined by a dark fuscous fascia, posteriorly whitish-edged; a dark fuscous fascia before one-third, irregularly outwards-curved, posteriorly suffused, anteriorly sharply defined and whitish-edged; a minute blackish discal dot; a dark fuscous fascia beyond middle, forming a strong angle in middle, upper and lower halves both inwards-curved, anteriorly suffused, posteriorly sharply defined and whitish-edged. Hind-wings moderate, termen somewhat irregular, projecting in middle; whitish-ochreous mixed with pale purplish; an angulated darker band before middle.

"A very distinct species, probably not variable.

"Blenheim; two specimens received by Mr. Fereday from Mr. Skellon."—(Meyrick).

I am unacquainted with this species, which Mr. Fereday stated he was unable to identify. I have therefore inserted Mr. Meyrick's description without alteration.

HYDRIOMENA RIXATA, Feld.

(*Cidaria rixata*, Feld. cxxxii. 1; Meyr., Trans. N. Z. Inst. xvi. 75. *Coremia squalida*, Butl., Cist. Ent. ii. 505.)

(Plate VII., fig. 11.)

This pretty insect is very common, and generally distributed throughout the country.

The expansion of the wings is about 1 inch. The fore-wings have a dull green patch near the base, with numerous dull brown and dull white wavy transverse lines; *there is a very broad blackish-brown central band paler in the middle, but almost black at the edges; this band has a large rounded projection on its outer edge near the middle, and below this projection it is deeply indented*; the remainder of the wing is dull yellowish-green, with several brown and white transverse lines; one of the white lines is more conspicuous than the rest and very wavy; there is a shaded oblique black mark from the apex. The hind-wings are very pale yellowish-brown; there are a few obscure brownish transverse lines near the dorsum, and a faint series of crescentic marks near the termen.

The perfect insect appears in December and January, and frequents the overhanging banks of streams in densely wooded ravines, where it often occurs in the utmost profusion.

HYDRIOMENA PURPURIFERA, Fereday.

(*Cidaria purpurifera*, Fereday, Trans. N. Z. Inst. xvi. 119; Meyr., ib. 75.)

(Plate VII., fig. 12.)

This extremely pretty insect has been taken in the South Island at Mount Arthur, Mount Hutt, Castle Hill, Dunedin, and Lake Wakatipu.

The expansion of the wings is about 1 inch. The fore-wings are rather bright green; there is a darker area near the base, *a very broad purplish-brown central band, with a large square projection on the middle of its outer edge; above this projection there is a very conspicuous white mark, bordering the central band*; the remainder of the wing is green; there is a wavy white line near the termen, and an oblique bluish-black mark near the apex. The hind-wings are pale brownish-yellow.

This species is closely allied to *Hydriomena rixata*, but easily distinguished by its brighter green colouring, purplish central band with square projection, and broad white marking beyond the central band.

The perfect insect appears in December and January, and frequents forest at elevations of from 1,000 to 3,000 feet. It is found in drier situations than the preceding species, and is not confined to forest streams. It is common in certain localities, but is not nearly so generally distributed as *Hydriomena rixata*.

HYDRIOMENA SIMILATA, Walk.

(*Cidaria similata*, Walk. 1413. *Cidaria timarata*, Feld. cxxxii. 19. *Cidaria similata*, Meyr., Trans. N. Z. Inst. xvi. 76.)

(Plate VII., fig. 14.)

This beautiful species has occurred at Napier and Wellington in the North Island, and at Christchurch, Dunedin, Lake Wakatipu, and Invercargill in the South Island.

The expansion of the wings is 1¼ inches. *The fore-wings are dark brown, with the veins and margins broadly shaded with bright green; there are numerous irregular wavy blackish streaks forming three ill-defined darker transverse bands*; the first at the base; the second from one-fourth to about two-thirds, partially divided into two from the costa downwards; and the third near the termen outwardly edged with white. The termen itself is bordered first with green, and then with a series of fine black marks; the cilia are dark brown. The hind-wings are very pale reddish-brown, darker towards the dorsum, with numerous pale brown wavy transverse lines. There is a series of black crescentic marks on the termen, and the cilia are pale reddish-brown.

This species is rather variable. The spaces between the darker bands on the fore-wings are usually green, but in some specimens this is partially or wholly replaced by pale yellowish-brown. The dark bands also vary considerably in width and distinctness, and in many specimens the central band is entirely divided by a conspicuous pale brown or green transverse space.

The larva, according to Mr. Purdie, is about 1 inch long, cylindrical. Back a dull deep green; lateral stripe reddish-white, edged below with a darker colour; ventral side lighter green, with four parallel white or yellow lines close together, extending from the forelegs to the prolegs. Outer side of prolegs white. There are traces of a median dorsal stripe of brownish-red on the anal segments. Beaten from *Coprosma*. Found in January. Mr. Purdie states that he is not quite certain as to the identification of the species, as the median belt of the fore-wings is much more distinctly defined, and the colour is a duller green than is usual in *H. similata*.

The perfect insect appears from November till March. It is generally found resting on moss-covered tree-trunks, where its colouring affords it a most efficient

protection from enemies.

HYDRIOMENA CALLICHLORA, Butl.

(*Cidaria callichlora*, Butl., Cist. Ent. ii. 509; Meyr., Trans. N. Z. Inst. xvi. 76.)

(Plate VII., fig. 13.)

This beautiful insect has occurred at Wellington in the North Island, and at Christchurch and Invercargill in the South Island.

The expansion of the wings is about 1 inch. *The fore-wings are bright green, with three very distinct wavy black transverse lines*; the first near the base, the second a little before the middle, and the third considerably beyond the middle; between these there is a number of fainter fine wavy lines. The hind-wings are whitish with several very faint wavy transverse lines; the cilia of all the wings are dull yellowish-brown.

The perfect insect appears in January, February, and March. Described and figured from a specimen in Mr. Fereday's collection.

HYDRIOMENA ARIDA, Butl.

(*Melanthia arida*, Butl., Cist. Ent. ii. 505. *Cidaria chaotica*, Meyr., Trans. N. Z. Inst. xvi. 76. *Cidaria arida*, Meyr., ib. xvii. 64.)

(Plate VII., fig. 15.)

This species has occurred in the South Island at Akaroa, Mount Hutt, Arthur's Pass, and Dunedin.

The expansion of the wings is 1 inch. The fore-wings are dull grey; there is a fine yellowish transverse line near the base, *and a very broad central band with a prominent projection somewhat*

below the middle, almost touching the termen; there is a brown dot above the middle of the wing and numerous fine brown wavy lines in the central band; the veins are marked in white near the termen. The hind-wings are pale ochreous, with a few very faint transverse marks near the dorsum. The termen of the fore-wings is slightly bowed in the middle.

The perfect insect appears in January and February, and frequents forest, sometimes being found as high as 2,600 feet above the sea-level. Described and figured from a specimen in Mr. Fereday's collection.

HYDRIOMENA SIRIA, Meyr.

(*Cephalissa siria*, Meyr., Trans. N. Z. Inst. xvi. 93.)

(Plate VI., fig. 48.)

This odd little species was discovered by Professor Hutton at Dunedin.

The expansion of the wings is ⅝ inch. *The fore-wings are rich brown with two transverse bands of darker brown*; the first near the base, rather narrow; the second near the middle, considerably broader, especially on the costa. *The hind-wings are bright orange.* The termen of the fore-wings is slightly excavated below the apex, and considerably bowed a little below the middle.

Described and figured from a specimen in Mr. Fereday's collection.

Genus 7.—EUCHŒCA, Hb.

"Face smooth, flat. Antennæ in ♂ shortly ciliated. Palpi short, slender, loosely scaled. Fore-wings with areole simple. Hind-wings with vein 8 anastomosing with cell to beyond middle.

"A small genus containing a few species distributed throughout the northern hemisphere and one Australian."—(Meyrick.)

We have one species.

EUCHŒCA RUBROPUNCTARIA, Dbld.

(*Ptychopoda rubropunctaria*, Dbld., Dieff. N. Z. li. 287. *Asthena visata*, Gn. ix. 438. *Asthena*, Gn., E. M. M. v. 42. *Asthena pulchraria*, Butl., Cat. pl. iii. 18. *Hippolyte rubropunctaria*, Meyr., Trans. N. Z. Inst. xvi. 60. *Epicyme rubropunctaria*, Meyr., ib. xviii. 184.)

(Plate VI., fig. 35.)

This little species is common and generally distributed throughout both the North and South Islands, and has also occurred at Stewart Island.

The expansion of the wings is about ⅞ inch. *All the wings are pale ochreous, with numerous obscure reddish transverse lines.* On the fore-wings there are four transverse series of black dots; the first near the base, the second a little before the middle, the third a little beyond the middle, and the fourth on the termen; between the second and third series of dots there is very frequently *an elongate blackish patch, especially towards the dorsum*. The hind-wings have three series of black dots; the first near the base, the second near the middle, and the third on the termen. The termen of both fore- and hind-wings slightly projects near the middle.

This species varies considerably in the extent of the blackish marking near the middle of the fore-wings, as well as in the colour and intensity of the reddish transverse lines.

The larva is thus described by Mr. Fereday:[29] "The caterpillar

has ten legs, is cylindrical, rather stout, with the segmental divisions incised; its colour is pale dull green, sometimes suffused with pink, brown, purple, or dark green; the dorsal line is purplish-brown, suffused, the central line whitish; the spiracular line is whitish, broadly margined with purplish-brown; the segmental divisions are pale yellowish-brown."

The food is *Haloragis alata*, a common herbaceous plant growing in swampy situations. The pupa is enclosed in a slight earth-covered cocoon.

The perfect insect appears from September till March, and is sometimes common. It is generally found in wooded districts, but prefers rather open situations in the vicinity of streams, where its food-plant may often be seen. According to Mr. Meyrick, [30] this insect is common in New South Wales, Victoria, and Tasmania, and the Australian and New Zealand specimens are similar in appearance.

Genus 8.—ASTHENA.

"Face smooth, flat. Antennæ in ♂ shortly ciliated. Palpi short, slender, loosely scaled. Fore-wings with areole double. Hind-wings with vein 8 anastomosing with cell to beyond middle.

(Plate II., figs. 30 and 31.)

"A genus of a few widely scattered species most numerous in the Australian Region."—(Meyrick.)

We have two species.

ASTHENA PULCHRARIA, Dbld.

(*Acidalia pulchraria*, Dbld., Dieff. N. Z. ii. 286. *Chlorochroma*

plurilineata, Walk. 563, 676. *Asthena ondinata*, Gn. ix. 438, pl. xix. 4; Butl., Cat. pl. iii. 20. *Cidaria ondinata*, Feld. cxxviii. 17. *Asthena pulchraria*, Meyr., Trans. N. Z. Inst. xvi. 69.)

(Plate VI., fig. 37 ♂, 38 ♀.)

This beautiful little insect has occurred at many localities throughout both the North and South Islands. It is probably a common species in most wooded districts.

The expansion of the wings is almost an inch. *All the wings are very pale greenish-white with numerous faint green, wavy, transverse lines.* The fore-wings have a more or less distinct brown band on the costal edge, and a conspicuous greenish central dot. The hind-wings often have a slight projection on the termen near the middle.

The perfect insect appears from October till May, and frequents dense forest undergrowth. It is chiefly attached to the Kawakawa (*Piper excelsum*), and may often be found resting with outspread wings on the under-surfaces of the leaves of this plant, where it is very inconspicuous. There are probably two or more broods during the summer.

On the 11th of May, 1892, I observed large numbers of this species flying over the Manuka bushes in the Wellington Botanical Gardens in brilliant moonlight. The night was very cold, but notwithstanding this the moths were most numerous and active. The appearance of this insect under such unusual conditions may have been quite accidental, as I have never seen a recurrence; but one is often somewhat unobservant in the winter, hence the record of this observation may be of use in directing the attention of others to the subject.

According to Mr. Meyrick this species is also found in Tasmania, and South-east Australia.

ASTHENA SCHISTARIA, Walk.

(*Acidalia schistaria*, Walk. 782. *Asthena subpurpureata*, Walk. 1588. *Acidalia tuhuata*, Feld. cxxviii. 5. *Asthena schistaria*, Meyr., Trans. N. Z. Inst. xvi. 69.)

(Plate VI., figs. 39, 40 ♂, 41, 42 ♀ varieties.)

This pretty species is common, and generally distributed throughout the country.

The expansion of the wings is nearly an inch. *All the wings vary from very pale brown to rather dull purplish-brown; there are numerous jagged, darker, transverse lines forming several more or less distinct bands.* The first of these bands extends from the base to about one-eighth; the second, composed of only two or three lines, is situated at about one-third; the third extends from three-fourths to about five-eighths; there are in addition, numerous very fine, wavy lines near the termen. The spaces between these bands are paler, and in some specimens the bands are very conspicuous, whilst in others they are hardly perceptible. One specimen in my collection (Plate VI., fig. 39) has a very broad chocolate-brown band across the middle of both pairs of wings, the remaining portions being unusually pale in colour. There is always a dark brown dot in the centre of each wing, and a series of very fine dots on the termen.

The larva, which feeds on Manuka (*Leptospermum*), is very ornamental. Its general colour is light green, with black dorsal and lateral stripes, and a series of diagonal markings bordered with crimson; the legs and prolegs are also crimson, and the segments are divided by brilliant yellow rings, a white line extending down each side of the larva.

This caterpillar is difficult to find, as it remains closely concealed amongst the dense Manuka foliage, from which it can be dislodged only by vigorous and

continued beating. The larvæ allow themselves to fall a short distance, hanging suspended by a silken thread, which they rapidly ascend when the danger is past.

The pupa is enclosed in a slight cocoon about one inch below the surface of the earth.

The perfect insect appears from October till April. It is very common in most situations where its food-plant is found and, owing to its pale colour, is readily seen when flying in the evening twilight. Specimens may also be taken in the daytime resting with outspread wings on the trunks of trees and on fences, where they are much more easily detected than many other species.

Mr. Meyrick thinks that this insect will also be found in Australia.

Genus 9.—VENUSIA, Curt.

"Face smooth. Antennæ in ♂ bi-pectinated, apex simple. Palpi loosely scaled. Fore-wings with areole simple. Hind-wings with vein 8 anastomosing with cell to beyond middle."—(Meyrick.) (Plate II., fig. 13, head of *V. verriculata*; figs. 25 and 26, neuration of *V. undosata*.)

We have three species represented in New Zealand.

VENUSIA VERRICULATA, Feld.

(*Cidaria verriculata*, Feld. cxxxi. 20. *Panopœa verriculata*, Meyr., Trans. N. Z. Inst. xvi. 62. *Pancyma verriculata*, ib. xviii. 184.)

(Plate VI., fig. 30 ♂, 31 ♀.)

This remarkable species has occurred at Wellington in the North Island, and in the South Island at Christchurch, Ashburton, Dunedin and West Plains.

The expansion of the wings is about 1½ inches. *All the wings are pale yellowish-brown, with many straight oblique parallel dull brown lines; on the fore-wings there are three lines broader and more isolated than the rest, running from the apex to the dorsum*; on the hind-wings the lines near the middle are rather thicker than the others, and have a broad space on each side of them; *all the lines are clearly marked on the abdomen, so that each line appears to be continuous from one side of the moth to the other*.

The perfect insect appears from October till May, and frequents the Cabbage Tree Palm (*Cordyline*), on which its larva probably feeds. According to Mr. Fereday the moth always rests on the dead leaves of the plant, keeping its wings in such a position that the lines are continuous with the parallel veins of the dead leaf, which they precisely resemble in appearance. We have, I think, in this species a most instructive instance of special adaptation to surrounding conditions; and the action of natural selection, in preserving favourable variations of colour and habit, appears to be here unmistakably indicated. Had our investigations been confined to the examination of cabinet specimens only, we might have long remained in the dark as to the explanation of such an unusual type of wing-marking.

VENUSIA XANTHASPIS, Meyr.

(*Hermione xanthaspis*, Meyr., Trans. N. Z. Inst. xvi. 61. *Aulopola xanthaspis*, Meyr., ib. xviii. 184.)

(Plate VI., fig. 32 ♂.)

This handsome insect has occurred in the South Island at Mount Arthur and at Lake Guyon.

The expansion of the wings is a little over 1 inch. *The fore-wings are bright yellow; there is a broad pale reddish-brown band on the costa; a conspicuous oval dark brown spot above the middle*, often touching the costal band; a double series of minute brown dots near the termen. The hind-wings are pale yellow, with a double series of minute brown dots parallel to the termen.

The perfect insect appears in January, February, and March. It is apparently a rare species. Mr. Fereday has six specimens taken at Lake Guyon, and I have two specimens captured on the Tableland of Mount Arthur, at an elevation of about 3,500 feet. These comprise, I believe, all the specimens at present taken.

VENUSIA UNDOSATA, Feld.

(*Cidaria undosata*, Feld. cxxviii. 2. *Epiphryne undosata*, Meyr., Trans. N. Z. Inst. xvi. 60.)

(Plate VI., fig. 33 ♂, 34 ♀.)

This neatly marked little insect has occurred at Napier and Palmerston in the North Island; and at Nelson, Mount Hutt, Christchurch, Dunedin, and Lake Wakatipu in the South Island.

The expansion of the wings is hardly an inch. *All the wings are pale yellow with a variable number of fine jagged reddish-brown transverse lines, which are usually most distinct towards the termen.* The fore-wings have a broad band of reddish-brown along the costal edge; a blackish dot above the middle just touching the costal band, and a small brown mark near the apex. The hind-wings have a minute black dot a little above the middle.

This species is rather variable: in some specimens the transverse lines are much broader, forming bands of reddish-brown; in others the whole of the wings are dull reddish-brown, except a small yellow area near the base; whilst others are *entirely dull greyish-brown with the transverse lines very faint*, intermediate varieties between all these forms also occurring.

The larva, according to Mr. Purdie,[31] is about ½ inch long, feeding on the Ribbonwood (*Plagianthus betulinus*). The ground colour is green, with the dorsal and lateral stripes white. The dorsal stripe is interlined with short black dashes, and there is a dark blotch about the ninth segment. The dorsal and lateral stripes may be margined with purplish-red. The under side is green. The larvæ were found in April.

The perfect insect appears from November till February, and frequents forest. According to my experience it is rather a local species, although plentiful where found. Mr. Meyrick states that it is "very common in bush, from August to February, and in May."[32]

Genus 10.—ASAPHODES, Meyr.

"Face with a tuft or hardly projecting scales. Palpi moderate, porrected, rough-scaled. Antennæ in male bi-pectinated, apex simple. Thorax glabrous beneath. Posterior tibiæ with all spurs present. Fore-wings with areole simple. Hind-wings with vein 8 anastomosing with cell from near base to beyond middle."—(Meyrick.) (See Plate II., figs. 35 and 36, neuration of *Asaphodes megaspilata*.)

We have five species of this genus in New Zealand.

ASAPHODES ABROGATA, Walk.

(*Aspilates abrogata*, Walk. 1075. *Fidonia (?) servularia*, Gn., E. M. M. v. 43. *Thyone abrogata*, Meyr., Trans. N. Z. Inst. xvi. 61. *Asaphodes abrogata*, Meyr., ib. xviii. 184.)

(Plate VII., fig. 21 ♂.)

This species has occurred at Murimutu in the North Island; and in the South Island at Kekerangu, Christchurch, Castle Hill, Dunedin, and Invercargill.

The expansion of the wings is 1 inch. *All the wings are ochreous with pale brown markings.* The fore-wings have a conspicuous dot in the middle, *a wavy transverse line a little beyond the middle, another line just before the termen, and a brown shading on the termen broader near the apex of the wing.* The hind-wings have a brown central dot and two transverse lines. The cilia of all the wings are brownish.

This species varies considerably in the distinctness of the brown markings, and there is occasionally a transverse line near the base of the fore-wings.

The perfect insect appears in February and March, and frequents open country, often at elevations of from 2,000 to 4,000 feet above the sea-level. It is, I think, rather a local species, though abundant where found. I met with it in considerable numbers on the chalk range near Kekerangu in the Marlborough Province.

ASAPHODES SIRIS, Hawth.

(*Asaphodes siris*, Hawth., Trans. N. Z. Inst. xxix. 283.)

(Plate VII., fig. 16.)

This interesting little species was discovered near Wellington by Mr. Hawthorne.

The expansion of the wings is about ⅞ inch. The fore-wings are dull ochreous; there is a small curved brown patch near the base; then a pale band, followed by a very broad brown central band, paler in the middle; there is a very sharp projection on the outer edge of the central band, a conspicuous black dot in the centre of the wing, and a series of minute black dots on the termen. The hind-wings are pale ochreous, with a faint central transverse line.

The perfect insect appears in March.

Described and figured from the type specimen in Mr. Hawthorne's collection.

ASAPHODES MEGASPILATA, Walk.

(*Larentia megaspilata*, Walk. 1198. *Cidaria assata*, Feld. cxxxi. 4. *Cidaria nehata*, Feld. cxxxi. 6. *Harpalyce megaspilata*, Meyr., Trans. N. Z. Inst. xvi. 63. *Probolæa megaspilata*, Meyr., ib. xviii. 184.)

(Plate VII., figs. 17, 18, and 19 ♂; figs. 19A and 20 ♀, varieties.)

This species is very common, and generally distributed throughout the country.

The expansion of the wings is about 1 inch. The fore-wings are dull ochreous; there is a series of fine brown and reddish wavy transverse lines near the base, forming a rather broad basal band; then a pale central area containing a blackish dot above the middle; next, a very distinct band made up of several fine wavy grey lines, with a rounded projection near the middle; this is followed by numerous pale brown curved marks forming more or less broken transverse lines; *there is always an oblique slaty patch below the apex*, and a series of minute dots on the

termen. The hind-wings are ochreous brown, slightly darker towards the base, with numerous indistinct wavy brown lines. *The apex of the fore-wing is very pointed and slightly hooked downwards; the termen is bowed near the middle.* The female is much duller and more uniform in colour than the male, and the antennæ are simple.

This species is very variable. Some male specimens have several more or less distinct white markings on the middle of the fore-wings; the transverse bands also differ considerably in both size and intensity. The females are not so variable; but in some specimens the bands on the fore-wings are almost absent, whilst others have the fore-wings rich brown, with a very conspicuous dark central band.

The eggs when first deposited are pale yellow. They turn dark reddish-brown for some days before the young larva emerges.

The young larva is rather stout, dark brownish-black with numerous fine parallel ochreous lines; the whole body is covered with rather long bristles.

The perfect insect appears from October till April, and frequents forest, where it is generally very abundant. It is a difficult insect to identify on the wing, and in consequence is often captured under a misapprehension.

This species probably hibernates in the imago state during the winter months, as we may often observe specimens abroad on mild evenings, at that season.

ASAPHODES PARORA, Meyr.

(*Harpalyce humeraria*, Meyr. (nec Walk.), Trans. N. Z. Inst. xvi. 64. *Harpalyce parora*, Meyr., Trans. N. Z. Inst. xvii. 63. *Probolæa*

parora, ib. xviii. 184.)

"*Male, female.*—29-34 mm. (about 1¼ inches). Fore-wings moderate, apex acute, termen excavated on upper half, acutely projecting in middle; varying from light grey to light reddish-fuscous; about eighteen irregular dentate darker striæ, sometimes partially obsolete; first three, seventh and eighth, and eleventh to thirteenth usually more distinct and blackish; seventh and eighth closely approximated, forming a small blackish or reddish spot on dorsum, sometimes partially suffused with blackish; eleventh to thirteenth closely approximated, widely remote from eighth, parallel to termen; a blackish discal dot; sometimes a broad purplish-grey median band; sixteenth sometimes spotted with blackish towards costa; a terminal row of blackish dots. Hind-wings moderate, upper angle broadly projecting, termen shortly projecting in middle; varying from whitish-grey to very pale reddish-fuscous, faintly striated with darker.

"Very variable in colour, but always distinguishable by the peculiar form of wing.

"Wellington, Christchurch, Mount Hutt; common amongst bush, in January, February, April, and May; probably generally distributed; twenty specimens."—(Meyrick.)

I am unacquainted with this insect, but it would appear to closely resemble *A. megaspilata*.

ASAPHODES RUFESCENS, Butl.

(*Larentia(?) rufescens*, Butl., Cist. Ent. ii. 502. *Eurydice cymosema*, Meyr., Trans. N. Z. Inst. xvi. 63. *Eurydice rufescens*, ib. xvii. 63. *Homodotis rufescens*, ib. xviii. 184.)

"*Male, female.*—25-29 mm. (about 1¼ inches). Fore-wings moderate, termen rather strongly sinuate; brown-whitish,

sometimes more or less suffused with brown; numerous fine dark fuscous sinuate subdentate lines; three before middle and four beyond middle more blackish, generally partially suffused with brown, leaving a clear median space on costal half, in which is a transverse blackish discal dot; termen suffusedly greyish; a suffused oblique dark fuscous sub-apical streak. Hind-wings moderate, termen irregularly crenulate, somewhat projecting in middle; grey whitish; several subdentate grey lines, only distinct towards dorsum; a dark grey discal dot.

"Variable only in the degree of the brownish suffusion; in the markings of the fore-wings it agrees almost exactly with some forms of *A. megaspilata*, but, apart from structure, may be always known by the whitish hind-wings and rather larger size.

"Dunedin; ten specimens sent to Mr. Fereday by Capt. Hutton."—(Meyrick.)

I have only seen one specimen of this insect, in Mr. Fereday's collection, and it appeared to me to be identical with the somewhat variable female of *A. megaspilata*.

Genus 11.—XANTHORHOE, Hb.

"Face with somewhat projecting scales or conical tuft. Antennæ in male bi-pectinated, apex usually simple. Palpi rough-scaled. Fore-wings with areole double. Hind-wings with vein 8 anastomosing with cell to beyond middle."—(Meyrick.) (See Plate II., figs. 37 and 38.)

This interesting genus is relatively far more numerous in New Zealand than elsewhere, its place in other regions being largely taken by *Hydriomena*. We have no less than thirty-one known species, and many others will no doubt be ultimately discovered,

especially in the mountainous districts of the west coast of the South Island.

XANTHORHOE LIMONODES, Meyr.

(*Epyaxa limonodes*, Meyr., Trans. N. Z. Inst. xx. 54.)

(Plate VII., fig. 46 ♂.)

This species has occurred at Wellington and at Cape Terawhiti in the North Island.

The expansion of the wings is about 1 inch. *The fore-wings of the male are dull olive-green with numerous, rather obscure, wavy brownish transverse lines; these lines are all more distinct near the costa; there are two transverse rows of white dots near the base, a very broken line of white dots at about three-fourths, one of the dots forming a crescentic mark above the middle*; beyond this line the colour is often paler, especially towards the apex, but inside this line there is often a considerably darker patch; there is a very distinct blackish patch just below the apex. The apex of the wing slightly projects, and the termen is arched. The hind-wings are very pale greenish-ochreous; there is an obscure dusky transverse line in the middle. *The female has the fore-wings much browner; there are several additional rows of white dots and two conspicuous white spots above the middle.*

The species is rather variable. In many specimens the dorsal half of the fore-wing is much paler than the costal half.

The perfect insect appears from November till March, and frequents dense forest. It is not a common species.

XANTHORHOE SUBDUCTATA, Walk.

(*Larentia subductata*, Walk. 1198. *Epyaxa subductata*, Meyr., Trans. N. Z. Inst. xx. 55.)

This species has occurred at Auckland.

"The expansion of the wings of the female is 26 mm. (about 1 inch). Head, palpi, and thorax pale greyish-ochreous, somewhat mixed with yellow-greenish, and densely irrorated with fuscous. Antennæ whitish-ochreous annulated with fuscous. Abdomen grey-whitish, densely irrorated with fuscous. Legs dark fuscous, apex of joints ochreous-whitish, middle and posterior pair irrorated with grey-whitish. Fore-wings with costa gently arched, termen waved, slightly rounded, oblique; pale greyish-ochreous, mixed with yellow-greenish, and thinly sprinkled with fuscous, tending to form faint waved lines; three light fuscous fasciæ, each marked with three dark fuscous lines; first near base, outer edge sharply angulated above middle; second from two-fifths of costa to before middle of dorsum, slightly curved; third from two-thirds of costa to two-thirds of dorsum, outer edge somewhat prominent in middle, rather sinuate above it; a crescentic black obscurely whitish-margined discal spot; a short oblique cloudy fuscous streak from apex; cilia light fuscous, somewhat sprinkled with whitish. Hind-wings light grey; a grey discal dot before middle; a median band of three darker lines, outer rather prominent in middle; faint indications of other darker lines, most distinct posteriorly; cilia grey-whitish, with two cloudy grey lines."—(Meyrick.)

The perfect insect appears in December.

XANTHORHOE ROSEARIA, Dbld.

(*Cidaria rosearia*, Dbld., Dieff. N. Z. ii. 285, Butl., Cat. pl. iii. 13. *Coremia ardularia*, Gn., E. M. M. v. 63. *Coremia inamœnaria*, Gn., E. M. M. v. 63. *Epyaxa rosearia*, Meyr., Trans. N. Z. Inst. xvi. 71.)

(Plate VII., fig. 22 ♂, 23 ♀.)

This species has occurred at Wellington in the North Island; and in the South Island at Akaroa,

Christchurch, and Dunedin.

The expansion of the wings is about 1⅜ inches. The fore-wings of the male vary *from pale pinkish-grey to pale greenish-grey*; there is an obscure darker basal area, a rather broad central band, *formed of numerous shaded, wavy, dark grey lines, which are generally absent towards the middle of the band*; there is a black dot above the middle; the termen is shaded with dark grey, and there is an oblique pale mark near the apex. The hind-wings are grey with a few very faint wavy lines. The cilia of all the wings are pinkish-grey. *The female is dull yellowish-grey, with the markings very indistinct.*

Both sexes vary slightly in the ground colour, and in the intensity of the markings. Mr. Purdie has pointed out that the species is very liable to fade, and hence it appears to vary more than is actually the case.[33]

The eggs are oval, pale yellow, changing first to orange, and then to dull grey before hatching. The young larva, when first emerged, is pale greyish-brown and very slender. Later on the caterpillar becomes dull olive-green speckled with black; there are two paler stripes just below the middle of the back, then a fine black line, followed by a very fine white one, then a broad pink stripe on the side; below this is a broad black line followed by a white line and two fine black ones. The larva is moderately stout, and the two prolegs are very close together.

The larva, when full-grown, measures about ¾ inch in length. The general colour is dull reddish-brown, often greenish-tinged. The back and sides are marked with numerous slightly waved fine black lines; there is a double series of black dots down the back, a broad black lateral line, followed by a fine white line. The under side of the larva is pinkish-brown; the head greenish-brown speckled with black. The caterpillar is obscurely marked, and very variable. It is often clouded with greenish colouring.

The food-plant is watercress.

The pupa, which is enclosed in a slight cocoon

constructed of earth and silk, is found on the surface of the ground.

The perfect insect is most abundant in December, and is attracted by light. It seems to be about during the entire year, as Mr. Meyrick states that he has taken numerous specimens from May till September, and hence concludes that it is essentially a winter species.[34] I can to some extent confirm this observation, as I have also found the insect during the winter, although not commonly. It is probable that there are several broods in the course of a year, and that the species hibernates as an imago.

Regarding the synonymy of this species Mr. Meyrick remarks that "*C. ardularia*, Gn., is the male and *C. inamœnaria*, Gn., the female of this species. *C. subidaria*, Gn., quoted by Butler as a synonym, is an Australian species, and not identical."[35]

XANTHORHOE OROPHYLA, Meyr.

(*Epyaxa orophyla*, Meyr., Trans. N. Z. Inst. xvi. 71.)

(Plate VII., fig. 24 ♂, 25 ♀.)

This fine species has occurred in the South Island at Nelson, Castle Hill, Mount Hutt, Dunedin and Lake Wakatipu.

The expansion of the wings of the male is 1¼ inches, of the female 1⅜ inches. *The fore-wings of the male are pale brownish-grey*; there is an obscure bent blackish line near the base, *a moderately broad central band bounded by two very distinct shaded blackish lines, the basal one of which is not curved*; the termen is shaded with darker grey, and there is an oblique pale mark near the apex. The hind-wings are pale grey tinged with ochreous.

The female is slightly darker than the male; and there are numerous wavy pale and dark grey lines filling up the entire wing on each side of the central band.

The perfect insect appears in December, January, and February. It frequents open country on the mountain sides, at elevations of from 2,500 to 4,000 feet.

I observed it in great abundance on the Humboldt Range at the head of Lake Wakatipu, where it frequented the damp rocky precipices which were fringed with a luxuriant growth of Alpine plants. At Castle Hill it occurred much less commonly, so that it would appear to be most plentiful in the extreme south of New Zealand. The colouring is protective when the insect is resting on rock surfaces.

XANTHORHOE SEMIFISSATA, Walk.

(*Coremia semifissata*, Walk. 1320. *Coremia ypsilonaria*, Gn., E. M. M. v. 64. *Cidaria delicatulata*, Gn., E. M. M. v. 94. *Epyaxa semifissata*, Meyr., Trans. N. Z. Inst. xvi. 72.)

(Plate VII., fig. 26 ♂, 27 ♀.)

This extremely pretty insect is very common, and generally distributed throughout the country.

The expansion of the wings is about an inch. The fore-wings of the male are *pale pink*; there are several wavy brown lines near the base, *a very distinct brown central band, narrowest near the middle, but much broader on the costa than on the dorsum*; the centre of this band is paler towards the costa; the termen is shaded with brown, except near the apex of the wing; *the veins are dotted in black. The hind-wings are bright ochreous with numerous wavy darker lines.* The female is darker in colour than the male, the central band is broader; *there are numerous brown*

and pink wavy lines on each side of the central band, and the principal veins are marked in pale ochreous. The grey transverse lines on the hind-wings are much more distinct in the female than in the male.

The perfect insect appears from September till April, and is very common in rather open forest districts, usually frequenting undergrowth on the edges of the denser forest. It is often one of the earliest of the *Notodontina* to appear in spring, and its advent is then especially welcome to the collector after the long inaction of winter. It is evidently closely allied to *X. orophyla*, which appears to be the southern and Alpine representative of this interesting insect. *Coremia ypsilonaria*, Gn., is the male, and *Cidaria delicatulata*, Gn., is the female of this species.

XANTHORHOE LOPHOGRAMMA, Meyr.

(*Xanthorhoe lophogramma*, Meyr., Trans. Ent. Soc. Lond. 1897, 386.)

(Plate VII., fig. 47 ♂, 48 ♀.)

This species was discovered at Castle Hill in January, 1893.

The expansion of the wings is about 1⅛ inches. The insect differs from *X. semifissata* in the following respects: In the male the general colour is slightly duller, *the outer edge of the central band on the fore-wings is more indented, and the veins are not dotted in black*. In the female the markings on the fore-wings are less distinct, the veins are not marked in pale ochreous, the outer edge of the central band is more deeply indented, and there is a darker shading near the termen than in *X. semifissata*. *The hind-wings of both sexes are dark ochreous, without any transverse markings.*

XANTHORHOE CHLAMYDOTA, Meyr.

(*Epyaxa chlamydota*, Meyr., Trans. N. Z. Inst. xvi. 72.)

(Plate VII., fig. 28.)

This very handsome species has occurred at Wellington in the North Island, and at Christchurch and Akaroa in the South Island.

The expansion of the wings is 1¼ inches. The fore-wings are pale ochreous, *with two broad, dark, purplish-brown bands. The first, which is at the base, is slightly paler near the body, and strongly curved outwards towards the termen*; it is followed by several very fine pale brown transverse lines. *The second band is very broad, and is situated near the middle of the wing; its inner edge is curved inwards, and its outer edge has two rounded projections, one very large about the middle, and another much smaller near the dorsum*; the middle portion of this central band is considerably paler than the edges; *the two projections of the central band are bordered with bright red.* The upper part of the termen is ochreous, with several faint brown marks; the lower part is dull grey. The hind-wings are dark ochreous, with a few obscure purplish-grey markings; the termen of the hind-wing projects slightly near the middle, and is rather jagged.

The species varies a little in the depth of its colouring, but the markings appear to be constant. The perfect insect appears from November till April. It chiefly frequents forest, but is not a common species. At present, more specimens have been found in the Wellington Botanical Gardens than elsewhere.

XANTHORHOE STINARIA, Gn.

(*Camptogramma stinaria*, Gn., E. M. M. v. 92. *Larentia stinaria*, Meyr., Trans. N. Z. Inst. xvi. 78.)

(Plate VII., fig. 29 ♂.)

This species has occurred in the South Island at Christchurch, Dunedin, and at the foot of Mount Hutt.

The expansion of the wings is barely 1 inch. *All the wings are deep ochreous; the fore-wings have an oblique white line running from the dorsum near the base, towards the middle of the wing; this line is edged with blackish-brown towards the dorsum; there is a very conspicuous white transverse line at about three-fourths shaded with brown towards the body*; the apex of the fore-wing slightly projects. The hind-wings have no markings.

The perfect insect appears in December and January. It seems to be fairly common, frequenting *Carex subdola*.[36]

Described and figured from a specimen kindly given to me by Mr. Fereday.

XANTHORHOE MNESICHOLA.

(*Larentia mnesichola*, Meyr., Trans. N. Z. Inst. xx. 56.)

(Plate VII., fig. 39 ♂.)

This dull little species has occurred in the South Island on Mount Arthur, at elevations of from 4,000 to 4,800 feet.

The expansion of the wings is 1 inch. *The fore-wings are pale brownish-ochreous, and rather glossy; there is a series of minute black dots at the base, a second series at about one-third, then a cloudy curved band, slightly darker than the rest of the wing, followed by a third series of minute black dots; a fourth series is situated slightly before the termen.* The hind-wings are very pale brownish-ochreous.

The perfect insect appears in January. Mr. Meyrick

states that it is rather common.

XANTHORHOE PRÆFECTATA, Walk.

(*Acidalia præfectata*, Walk. 781. *Acidalia subtentaria*, Walk. 1610. *Acidalia absconditaria*, Walk. 1611; Butl., Cat. pl. iii. 21. *Larentia præfectata*, Meyr., Trans. N. Z. Inst. xvi. 78.)

(Plate VII., fig. 30.)

This interesting species has occurred in the South Island at the Dun Mountain, Mount Arthur, Christchurch, and Dunedin.

The expansion of the wings is about 1½ inches. *All the wings are pure white*; the fore-wings have a minute grey dot above the middle, *a series of extremely minute dots a little before the termen, and several rows of very faint grey marks close to the termen*. The hind-wings have a row of very obscure dots across the middle, and several rows of very faint grey marks close to the termen. The face and collar are brown, and there is sometimes an extremely faint brown tinge on the costal edge of the fore-wings. The body is pure white.

The perfect insect appears in November, December, January, and February. I do not think it is a very common species, and at present I have only observed it on the Dun Mountain near Nelson, at an elevation of about 2,700 feet above the sea-level. Here I took several specimens on the flowers of an Alpine veronica in the dusk of evening, and saw several others, which I was unable to capture. Mr. Meyrick has taken it on Mount Arthur at an elevation of 4,500 feet, and Mr. Fereday states that it frequents swampy places near Christchurch.

XANTHORHOE NEPHELIAS, Meyr.

(*Larentia nephelias*, Meyr., Trans. N. Z. Inst. xvi. 78.)

This species was discovered by Mr. Meyrick in the South Island at Arthur's Pass, West Coast Road, and he has since taken it on Mount Arthur.

"*Male, female*.—The expansion of the wings is 32-34 mm. (about 1¼ inches). Fore-wings moderate, in female narrower and more elongate, termen rounded; pale whitish-grey, slightly ochreous-tinged; an indistinct suffusion of dark fuscous scales before middle; a small dark fuscous discal dot; a rather irregular cloudy dark fuscous line beyond middle, sinuate beneath costa, shortly angulated in middle; a very faint stria beyond this; a terminal band composed of two rows of cloudy partially confluent dark fuscous spots, separating on costa; cilia pale whitish-grey. Hind-wings moderate, in female narrower, termen rounded; ground colour as in fore-wings, with a few grey scales posteriorly.

"A remarkable-looking species.

"I took two fine specimens above Arthur's Pass (4,600 feet), in January."—(Meyrick).

I am unacquainted with this species. It is evidently very conspicuous and distinct.

XANTHORHOE CATAPHRACTA, Meyr.

(*Larentia cataphracta*, Meyr., Trans. N. Z. Inst. xvi. 79.)

(Plate VII., fig. 33 ♂, 34 ♀.)

This large and conspicuous species has occurred in the South Island at Mount Arthur, Arthur's Pass, Lake Guyon, and Lake Wakatipu.

The expansion of the wings of the male is 1⅝ inches, of the

female 1½ inches. *The fore-wings are dull yellowish-brown, with numerous slightly waved oblique black and white transverse bands; one very broad white band is situated near the middle, and another at about three-fourths; there is a broad longitudinal reddish-brown line on the costal edge, in which the transverse lines almost disappear*; there is also a pale, somewhat triangular, area at the apex. The hind-wings are very pale greyish-ochreous. The cilia of all the wings are very pale ochreous. The female is duller and paler than the male.

The perfect insect appears from December till March, and frequents grassy slopes on the mountain sides, at elevations of from 3,000 to 4,000 feet. I observed this insect in great abundance on the Humboldt Range at the head of Lake Wakatipu, but have not found it at any of the other Alpine localities I have visited, so I imagine that it is a rather local species.

XANTHORHOE CLARATA, Walk.

(*Larentia clarata*, Walk. 1197; Butl., Cat. pl. iii. 14. *Cideria pyramaria*, Gn., E. M. M. v. 93. *Larentia clarata*, Meyr., Trans. N. Z. Inst. xvi. 79.)

(Plate VII., fig. 31 ♂, 32 ♀.)

This conspicuous species has occurred in the South Island at Lake Rotoiti, Mount Arthur, Castle Hill, Mount Hutt, Dunedin, and Lake Wakatipu.

The expansion of the wings of the male is 1½ inches, of the female 1⅜ inches.

The species differs from the preceding in the following respects: The ground colour of the fore-wings is brighter, the markings are less oblique and much more jagged; the large white central band is often broken up into several distinct oval patches; the costal edge is very slightly shaded with brown, *and the transverse lines do not disappear before reaching the costa*. The

hind-wings are bright ochreous. *The cilia of all the wings are white, strongly barred with yellowish-brown.*

There is slight variation in the details of the markings, but the species can always be immediately recognised.

The perfect insect appears in December, January, and February. It frequents open grassy places at elevations ranging from 2,000 to 4,500 feet, and is often extremely abundant in these situations.

XANTHORHOE COSMODORA, Meyr.

(*Larentia cosmodora*, Meyr., Trans. N. Z. Inst. xx. 57.)

This species was discovered by Mr. Meyrick in the South Island on Mount Arthur, at an elevation of 4,500 feet.

Female.—27 mm. (slightly over 1 inch). Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous, slightly brownish-tinged; abdomen with a double dorsal series of dark fuscous dots. Fore-wings with costa hardly perceptibly arched, termen slightly rounded, oblique; whitish-ochreous, slightly yellowish-tinged; a curved irregular black line rather near base, followed by a white line; median band rather darker, tinged with yellowish-fuscous towards edges, margined with dentate black lines and outside these with white, anterior from one-third of costa to two-fifths of dorsum, rather curved, posterior from two-thirds of costa to three-fourths of dorsum, somewhat prominent beneath costa, and with a more distinct double prominence in middle; two white dentate-edged spots within median band, first beneath costa, containing small black discal dot, second on dorsum; a waved white subterminal line; a fine dark fuscous terminal line interrupted into numerous dots; cilia whitish-ochreous, with dark fuscous bars hardly reaching base. Hind-wings whitish-ochreous, with faint darker greyish-tinged lines; a median band of four more distinct cloudy grey lines, first three

straight, fourth well marked, rather dark fuscous, waved, somewhat prominent in middle, beneath confluent with third; a faint white subterminal line; cilia pale whitish-ochreous, with a faint greyish line tending to form spots.

"Appears in January; one specimen. It is conceivable that this may be the other sex of the following species, but they are very dissimilar, and I do not at present think it probable."—(Meyrick.)

XANTHORHOE BRYOPIS, Meyr.

(*Larentia bryopis*, Meyr., Trans. N. Z. Inst. xx. 57.)

Discovered by Mr. Meyrick in the South Island on Mount Arthur, 4,500 feet above the sea-level.

"*Male*.—29-32 mm. (about 1¼ inches). Head, palpi, thorax, abdomen, and legs pale greyish-ochreous, slightly greenish-tinged, irrorated with blackish. Antennæ whitish, annulated with black. Fore-wings with costa gently arched, termen somewhat rounded, rather oblique; pale greyish-ochreous, tinged with olive-greenish, irrorated with blackish-grey, tending to form waved transverse lines on basal area; median band margined with dentate black lines and outside them with white; anterior from one-third of costa to one-third of dorsum, curved, posterior from beyond two-thirds of costa to three-fourths of dorsum, somewhat indented above middle, with a moderate double prominence in middle; three blackish-grey subdentate lines within median band, first near and parallel to anterior edge, other two near and parallel to posterior edge, first and second tending to be confluent below middle, space between these more or less suffused with white, enclosing a small black discal spot; an obscure dentate whitish subterminal line, anteriorly margined with dark fuscous, preceded and followed by waved fuscous lines; a terminal series of pairs of dark fuscous dots; cilia ochreish-grey, whitish, barred with fuscous, and with a fuscous basal line. Hind-wings ochreous-grey, with waved darker grey transverse lines, except towards base; a dark grey discal dot before middle; posterior edge of median band

formed as in fore-wings, followed by an obscure whitish line and somewhat paler band; terminal dots and cilia as in fore-wings, but more obscure.

"Appears in January; not uncommon. Nearest allied to *X. beata*."—(Meyrick.)

XANTHORHOE BEATA, Butl.

(*Cidaria beata*, Butl., Proc. Zool. Soc. Lond., 1877, 397, pl. xliii. 6. *Larentia beata*, Meyr., Trans. N. Z. Inst. xvi. 79.)

(Plate VII., fig. 35 ♂, 36 ♀.)

This very beautiful species has occurred at Wellington in the North Island, is common and generally distributed throughout the South Island, and has also been found at Stewart Island.

The expansion of the wings is about 1 inch. *The fore-wings are bright green; there is a darker area at the base edged with a jagged white line; then a paler band followed by a very broad darker green central band edged with very jagged white lines, and containing several white patches in the middle, one of which is situated close to the costa and encloses a black dot; beyond this central band there is a paler area, then an interrupted darker green band edged with white towards the termen.* There is an oblique pale mark from the apex of the wing. The hind-wings are very pale ochreous, sometimes slightly tinged with green; there are several obscure rows of dusky spots.

The white markings included in the central band are rather variable.

The egg is smooth, oval, and pale green in colour.

The young larva is orange-brown, becoming greenish-brown soon after emergence. The full-grown larva is dark brown above and pale brown beneath, the two colours being sharply separated on the sides by a broken white line. A series of **V**-shaped markings is situated on the back, each mark enclosing a paler area. Several fine black wavy lines traverse the darker

portions of the larva, and a dark mark, edged with black beneath, is situated on each segment just above the ventral surface.

The food-plant is watercress.

The pupa is enclosed in a frail cocoon on the surface of the ground.

The perfect insect appears from October till March, and frequents forest. It is often dislodged from dense undergrowth during the daytime, and may be found in the evening on the blossoms of the white rata. It is very much commoner in some years than in others; but occasionally several seasons will pass without our noticing a single specimen of this attractive insect. The colouring is extremely protective when the moth is resting on moss-covered tree trunks.

XANTHORHOE ADONIS, n. sp.

(Plate VII., fig. 49 ♂.)

This extremely beautiful insect has occurred in the South Island at Castle Hill, and at Lake Wakatipu.

The expansion of the wings is 1 inch. *The fore-wings are vivid green*; there is a broad, wavy, black transverse line near the base; a somewhat broken line at about one-third, much broader on the costa and edged with white towards the base; *a very conspicuous broad black line at two-thirds, shaded towards the base, and sharply edged with white towards the termen*; between this line and the termen there are several black marks, forming another extremely broken transverse line. *The hind-wings are pale orange-brown, with a faint grey central band.*

The perfect insect appears in January. It frequents

forests at elevations of from 1,000 to 2,000 feet above the sea-level, but it is not common.

Mr. Meyrick regards this insect as identical with *Xanthorhoe beata*.

XANTHORHOE CHLORIAS, Meyr.

(*Larentia chlorias*, Meyr., Trans. N. Z. Inst. xvi. 80.)

This species was discovered in the South Island at Castle Hill, by Mr. Meyrick.

"The expansion of the wings of the male is 30 mm. (about 1¼ inches). Fore-wings moderate, termen hardly rounded; bright yellow; base of costa dark fuscous-purple; a curved row of three very small dark purple-fuscous spots about one-fourth, and another of four spots before middle, costal spots larger; a triangular purple blotch on costa before apex, reaching half across wing, anteriorly margined by a strongly sinuate bluish-black streak; a row of three dark purple-fuscous dots from apex of this to dorsum, and a subterminal row of six similar dots; cilia yellow. Hind-wings moderate, termen rounded; rather paler than fore-wings, with two curved posterior rows of cloudy purple-fuscous dots.

"A very beautiful and conspicuous species.

"I took one fine specimen in a wooded gully near Castle Hill, at 3,100 feet, in January."—(Meyrick.)

XANTHORHOE ÆGROTA, Butl.

(*Selidosema ægrota*, Butl., Cist. Ent. ii. 499. *Larentia ægrota*, Meyr., Trans. N. Z. Inst. xvi. 80.)

(Plate VII., fig. 37 ♂.)

This rather inconspicuous species has occurred at Palmerston and Kaitoke in the North Island; and at Christchurch, Dunedin, and Lake Wakatipu in the South Island. It has also been taken at Stewart Island.

The expansion of the wings is about 1⅛ inches. *The fore-wings are dull ochreous-brown; there are several indistinct wavy blackish lines near the base, a black dot above the middle, then three or four more lines, followed by a cloudy shading on the termen.* The hind-wings are pale ochreous-brown. *The cilia of all the wings are dull ochreous-brown barred with black.*

The perfect insect appears from November till March and is sometimes very common. It usually frequents rather open situations in the neighbourhood of forest, and I have often observed it amongst the bushes of "Wild Irishman" (*Discaria toumatou.*) It is extremely abundant on the banks of the River Dart, at the head of Lake Wakatipu.

XANTHORHOE LUCIDATA, Walk.

(*Larentia lucidata*, Walk. 1200. *Coremia plurimata*, ib. 1321. *Panagra venipunctata*, ib. 1666. *Larentia psamathodes*, Meyr., Trans. N. Z. Inst. xvi. 81. *Larentia lucidata*, Meyr., Trans. N. Z. Inst. xvii. 64.)

(Plate VII., fig. 38 ♂.)

This rather dull-coloured species has occurred at Napier, Palmerston, and Wellington in the North Island, and at Dunedin in the South Island.

The expansion of the wings is 1 inch. *The fore-wings are dull yellowish-brown; there are numerous fine, almost straight blackish lines parallel to the termen, forming four more or less distinct transverse bands*; the first at the base rather broad, the second a little before the middle, the third beyond the middle, and the fourth just before the termen; there is a black dot a little above the middle of the wing, and the veins are marked with white dots between the transverse bands. The hind-wings are pale brownish-ochreous; there are numerous, rather faint, wavy, blackish, transverse lines, which are much more distinct near the dorsum. There is a series of distinct black dots on the termen of both fore- and hind-wings.

The perfect insect appears during the winter months from March till August. It is rather a scarce species, but on mild evenings it is sometimes taken at light.

XANTHORHOE HELIAS, Meyr.

(*Larentia helias*, Meyr., Trans. N. Z. Inst. xvi. 81.)

(Plate VII., fig. 40.)

Two specimens of this species have been taken at Dunedin in the South Island.

The expansion of the wings is 1 inch. All the wings are pale ochreous; the fore-wings have a slender brown transverse line at

the base, then a large loop-like marking from the costa, almost meeting a smaller, similarly looped marking from the dorsum; next a broad irregular dark brown band a little beyond the middle, considerably indented towards the termen; this is followed by a rather narrow pale band, and then by a narrow brown band, also indented towards the termen; there is a small oblique brown mark below the apex, and a terminal series of black dots. The hind-wings have several faint dusky transverse lines near the base, a row of small spots near the termen, and a terminal series of minute black dots. The cilia of all the wings are reddish-ochreous.

The perfect insect appears in January.

Described and figured from a specimen in Mr. Fereday's collection.

XANTHORHOE PRASINIAS, Meyr.

(*Larentia prasinias*, Meyr., Trans. N. Z. Inst. xvi. 81.)

(Plate VII., fig. 41.)

This bright-looking species has occurred in the South Island at Mount Arthur, Castle Hill, and Invercargill.

The expansion of the wings is 1⅜ inches. *The fore-wings are bright orange-yellow; there is a small brown area near the base, with the outer edge indented; then a pale band followed by a very broad brown central band, composed of wavy transverse lines, with irregular yellow spaces between them*, the largest of these spaces containing a small black dot; the outer edge of the central band is very wavy, and has several rather prominent projections near the middle; beyond this are several rather faint brownish lines; the cilia are yellow, barred with dark brown. The hind-wings are pale ochreous, shaded with grey near the base, and with yellow near the termen; the cilia are yellow, barred with brown.

The perfect insect appears in January, and frequents forest. It is found at elevations of from 2,000 to

3,000 feet, but is not by any means a common species.

XANTHORHOE CHIONOGRAMMA, Meyr.

(*Larentia chionogramma*, Meyr., Trans. N. Z. Inst. xvi. 82.)

(Plate VII., fig. 42 ♂, 43 ♀.)

This rather dull-looking species has occurred in the South Island at Mount Arthur and Mount Hutt.

The expansion of the wings is about 1⅛ inches. *The fore-wings are rather dark greyish-brown; there are numerous indistinct wavy paler and darker transverse lines near the base; a rather broad transverse brown band towards the middle, shaded towards the base, and edged with an interrupted jagged white line towards the termen*; beyond this there are several broken darker and paler lines. The hind-wings are very pale greyish-ochreous, clouded with grey near the base, and with several rows of small cloudy grey spots near the termen. The female is paler than the male and the markings are less distinct.

The perfect insect appears in December and January, and frequents wooded valleys on the lower slopes of the mountains, at elevations of from 2,000 to 3,000 feet.

XANTHORHOE CAMELIAS, Meyr.

(*Larentia camelias*, Meyr., Trans. N. Z. Inst. xx. 58.)

This species was discovered by Mr. Meyrick in the North Island at Whangarei.

"The expansion of the wings of the male is 23 mm. (rather less than 1 inch). Head, antennæ, and thorax whitish-ochreous, greyish-tinged, with a few dark fuscous scales. Palpi fuscous.

Abdomen whitish-ochreous, with a double dorsal series of dark fuscous dots. Legs whitish-ochreous, irrorated with purple-reddish and dark fuscous. Fore-wings with costa rather sinuate in middle, on anterior half gently, on posterior half very strongly arched, termen moderately sinuate below apex, bowed in middle; light greyish-ochreous, with numerous cloudy, waved, brown-grey transverse lines, somewhat bent near costa; a black discal dot; margin of basal patch and anterior edge of median band indicated by series of very minute white dots, preceded and followed by black points; posterior edge of median band marked by a darker line, followed by a fine white line reduced on lower half to a series of points, subterminal line represented by four cloudy blackish dots on upper half and another above tornus; cilia greyish-ochreous (imperfect). Hind-wings fuscous-whitish; a median band of four cloudy greyish lines, bent near costa; a cloudy grey spot above tornus; cilia fuscous-whitish (imperfect.)

"Appears in December. Immediately recognisable by the peculiar form of forewings."—(Meyrick.)

XANTHORHOE FALCATA, Butl.

(*Larentia falcata*, Butl., Trans. N. Z. Inst. xx. 58.)

A single specimen of this species is in the British Museum collection of New Zealand Lepidoptera. Of this specimen Mr. Meyrick remarks as follows:—

"This appears to be a good species allied to *X. camelias*, but with the costa of fore-wings less arched posteriorly, and posterior edge of median band practically straight, not bent near costa; also much darker in general colouring. I have not yet seen any specimen except the original type."

XANTHORHOE OBARATA, Feld.

(*Cidaria obarata*, Feld. cxxxii. 33. *Larentia obarata*, Meyr., Trans. N. Z. Inst. xvi. 82.)

(Plate VII., fig. 45.)

This little species has occurred at Wellington in the North Island, and at Christchurch and Mount Hutt in the South Island.

The expansion of the wings is barely 1 inch. *The fore-wings are pale greyish-ochreous; there is an interrupted reddish-brown transverse band near the base; two faint, interrupted, shaded blackish lines, one at about one-third and the other at about two-thirds, enclosing between them a large central area, which contains a very distinct black dot above the middle, and several irregular shaded black marks; beyond this there is a wavy reddish-brown band; the apex of the wing is somewhat projecting, and the termen is considerably bowed.* The hind-wings are pale grey, with a paler central band, and numerous faint, wavy, darker grey lines. *The cilia of all the icings are white, banded with dark grey.*

The perfect insect appears from November till January. Mr. Fereday states that it is a plain-frequenting species, especially attached to gorse hedges.[37]

Described and figured from a specimen kindly given to me by Mr. Fereday.

XANTHORHOE CHORICA, Meyr.

(*Larentia chorica*, Meyr., Trans. N. Z. Inst. xx. 58.)

(Plate VII., fig. 44.)

A single specimen of this beautiful insect was taken at Akaroa by Mr. Fereday.

The expansion of the wings is 1 inch. All the wings are pale

ochreous. The fore-wings have a short transverse black mark from the costa near the base; a fine wavy white transverse line, followed by a wavy black band; *the middle of the wing is white, marbled with very pale blue; beyond this there is a broad black band wavy towards the termen, with a very prominent rounded projection near the middle*; there are two reddish-brown marks on the costa before the apex, a blackish patch on the termen below the apex, and a row of terminal black dots; the apex is slightly projecting, and the termen is strongly arched. The hind-wings have several fine blackish transverse lines near the base; a broad shaded band in the middle, and a terminal series of black dots.

The perfect insect appears in January.

Described and figured from the specimen in Mr. Fereday's collection.

XANTHORHOE SUBOBSCURATA, Walk.

(*Scotosia subobscurata*, Walk. 1358. *Larentia petropola*, Meyr., Trans. N. Z. Inst. xvi. 82.)

This species has occurred in the South Island at the Otira Gorge.

"The expansion of the wings is 39 mm. (1½ inches). Fore-wings moderate, termen rounded dark grey, densely irrorated with bluish-whitish; costa broadly suffused with ochreous-whitish anteriorly; a very obscure curved ochreous-whitish line towards base, anteriorly dark-margined; two obscure curved subdentate adjacent whitish lines about one-third, followed by a dark line; a blackish discal dot; a very irregular dentate curved dark grey line beyond middle, followed by two adjacent whitish lines; a sharply dentate obscure whitish subterminal line, anteriorly dark-margined. Hind-wings moderate, termen rounded; markings as in fore-wings, but more obscure, paler and more suffused towards base.

"A fine species, with a peculiar bluish tinge.

"I took two specimens at rest on rock-faces in the Otira Gorge, at 1,800 feet, in January, and saw others."—(Meyrick.)

XANTHORHOE CINEREARIA, Dbld.

(*Cidaria (?) cinerearia*, Dbld., Dieff. N. Z. ii. 286. *Larentia (?) invexata*, Walk. 1199; Butl., Cat., pl. iii. 11. *Larentia semisignata*, Walk. 1200. *Larentia inoperata*, Walk. 1201. *Larentia diffusaria*, Walk. 1201. *Larentia punctilineata*, Walk. 1202; Butl., Cat., pl. iii. 12. *Cidaria dissociata*, Walk. 1734. *Cidaria semilisata*, Walk. 1735. *Larentia corcularia*, Gn., E. M. M. v. 61. *Larentia infantaria*, Gn., E. M. M. v. 62. *Helastia eupitheciaria*, Gn., E. M. M. v. 95. ? *Cidaria sphæriata*, Feld. cxxxi. 14. *Larentia cinerearia*, Meyr., Trans. N. Z. Inst. xvi. 83.)

(Plate VIII., figs. 2 and 2A, varieties.)

This species is extremely abundant, and generally distributed throughout the country.

The expansion of the wings is from ⅝ inch to 1 inch. *The fore-wings vary from pale to dark grey; there are generally four more or less distinct blackish marks on the costa, forming the beginning of transverse bands*; the rest of the wing is marbled with dark-grey or black, the disposition of the markings varying exceedingly in different specimens. The hind-wings are pale grey, with a black dot above the middle.

The variation existing in this species is very great, and is thus described by Mr. Meyrick:[38] "Three main forms occur: one large, greyer, and more uniform; a second of middle size whiter and generally strongly marked sometimes bluish-tinged, only found in the hills; and a third small greyish but ochreous-tinged, strongly marked; these are connected by scarcer intermediate forms, and are, I believe, due to the direct effect of food and situation.

"The larva feeds on lichens."

The perfect insect appears from October till March, and frequents a great variety of situations. The colouring of the fore-wings is beautifully adapted for protection on lichen-covered banks, rocks, or fences, where specimens may often be found resting with closed wings during the daytime. This species flies rather freely at evening dusk, and may then be taken plentifully at sugar, blossoms or light. It is, however, a difficult matter to procure specimens in really good condition for the cabinet, as the insect is so extremely restless when confined in a box that if it is not killed at once, it will speedily injure itself during its struggles to escape. This moth is found at elevations ranging from the sea-level to 3,500 feet.

XANTHORHOE ANTHRACIAS, Meyr.

(*Larentia anthracias*, Meyr., Trans. N. Z. Inst. xvi. 84.)

This species has occurred in the South Island at Mount Hutt and Lake Wakatipu.

"The expansion of the wings of the male is from 24-25 mm. (about 1 inch). Fore-wings moderate, termen sinuate; dark fuscous, faintly striated, more or less sprinkled with whitish; a curved blackish line near base, posteriorly obscurely whitish-margined; a curved, obscure whitish fascia at one-third, blackish margined and bisected by a blackish line; a well-defined black discal dot; a white fascia, partially mixed with fuscous, beyond middle, anteriorly strongly blackish-margined, posteriorly more obscurely, and bisected by a blackish line, somewhat irregular, moderately angulated in middle; an obscure dentate yellowish or whitish subterminal line; an interrupted black terminal line. Hind-wings moderate, termen rounded; dark fuscous; two nearly straight lines before middle, faintly darker; a faint paler or sometimes whitish sinuate fascia

beyond middle, margined and bisected with darker.

"Varies slightly in distinctness of pale markings.

"Mount Hutt and Lake Wakatipu (5,400 feet), on the open mountain sides, in December and January; twelve specimens."—(Meyrick.)

XANTHORHOE BULBULATA, Gn.

(*Cidaria bulbulata*, Gn., E. M. M. v. 94. *Larentia bulbulata*, Meyr., Trans. N. Z. Inst. xvi. 84.)

(Plate VIII., fig. 1.)

This species has occurred in the South Island at Kekerangu, Christchurch, Castle Hill, and Dunedin.

The expansion of the wings is barely 1 inch. *The fore-wings are very pale brownish-ochreous; there is a brown area near the base; a moderately broad brown central band with a distinct projection near the middle; the termen is broadly shaded with brown, with a wavy paler line in the middle of the shading*; there are often several oval paler marks in the middle of the central band, and pale brown spots and lines between the darker brown markings. *The hind-wings are bright orange, with the cilia pale brown.*

The perfect insect appears from September till March, and frequents open, grassy places, from the sea-level to elevations of from 2,000 to 3,000 feet.

Genus 12.—LYTHRIA, Hb.

"Face rough-haired or loosely scaled, antennæ in male bi-pectinated, apex sometimes simple. Palpi with long rough hairs. Thorax roughly hairy beneath. Fore-wings with areole simple. Hind-wings with vein 8 anastomosing with cell to beyond

middle."—(Meyrick.) (Plate II., figs. 39 and 40, neuration of *L. chrysopeda*.)

We have two interesting little species in New Zealand. The genus also occurs in Europe, and probably elsewhere.

LYTHRIA CHRYSOPEDA, Meyr.

(*Arcteuthes chrysopeda*, Meyr., Trans. N. Z. Inst. xx. 48.)

(Plate VIII., fig. 33 ♂, 34 ♀.)

This bright-looking little species has been taken in the South Island at Mount Arthur.

The expansion of the wings is about ¾ inch. *The fore-wings are very dark, glossy brown; there is a pale yellowish transverse line near the base, a broader, rather wavy orange-yellow line a little before the middle, another still broader at about two-thirds, and an indistinct fine line near the termen. The hind-wings are rich orange-brown, with three broad, wavy, dark brown transverse bands; the termen is narrowly margined with dark orange-brown.* The female is generally rather paler than the male, very faintly marked specimens occasionally occurring.

The perfect insect appears in January and February. It frequents the tussock openings in the forest on the Tableland of Mount Arthur, at elevations of from 3,000 to 4,000 feet. In these situations it appears to be fairly abundant, flying actively in the hottest sunshine.

LYTHRIA EUCLIDIATA, Gn.

(*Coremia euclidiata*, Gn. x. 420. *Coremia glyphicata*, ib. 420. *Fidonia catapyrrha*, Butl., Proc. Zool. Soc. Lond. 1877, 392, pl.

xliii. 2. *Stratonice catapyrrha*, Meyr., Trans. N. Z. Inst. xvi. 64. *Stratonice euclidiata*, ib. xvii. 63. *Arctesthes euclidiata*, ib. xviii. 184. *Arcteuthes euclidiata*, ib. xx. 47.)

(Plate VIII., fig. 35 ♂.)

This pretty little species has occurred in the South Island at Lake Rotoiti near Nelson, Lake Guyon, Otira Gorge, Dunedin, and Mount Linton near Invercargill.

The expansion of the wings is ¾ inch. The fore-wings are dark greyish-brown speckled with black and white; there is a curved black transverse line near the base, followed by a white line, then two black lines close together followed by another white line, then a broad black line followed by a pale central band containing a well-marked central dot, beyond this there are two angulated black lines, and a very conspicuous white line; there is a broad black shading on the termen, traversed by a rather obscure fine white line. The hind-wings are rather narrow, yellowish-orange speckled with black near the base, there is a strongly angulated black line near the middle, and an obscure blackish band near the termen. *On the under side the fore-wings are yellow, with two black transverse bands from the costa near the termen and a red mark near the apex; the hind-wings are streaked with white and yellow, and broadly bordered with red on the costa and termen; there are two very broad black transverse bands.* The female is paler than the male, with the dark markings rather narrower.

The perfect insect appears in February and March, and frequents open, sunny places, at elevations of from 1,000 to 2,000 feet above the sea-level.

Genus 13.—DASYURIS, Gn.

"Face rough-haired or with projecting scales. Palpi moderate, porrected, with long dense rough hairs. Antennæ in male shortly ciliated. Thorax and coxæ densely hairy beneath. Posterior tibiæ with all spurs present. Fore-wings with areole double. Hind-wings with vein 8 anastomosing with cell from

near base to beyond middle."—(Meyrick.) (Plate II., fig. 42, neuration of fore-wing. Hind-wing as in *Xanthorhoe*.)

Of this genus we have four species in New Zealand.

DASYURIS ENYSII, Butl.

(*Fidonia enysii*, Butl., Proc. Zool. Soc. Lond. 1877, 391, pl. xlii. 9. *Statira homomorpha*, Meyr., Trans. N. Z. Inst. xvi. 91. *Statira enysii*, ib. xvii. 65. *Stathmonyma enysii*, ib. xviii. 184.)

(Plate VIII., fig. 28.)

This species has occurred in the South Island on the Dun Mountain near Nelson, and at Mount Hutt.

The expansion of the wings is about 1 inch. The fore-wings are greyish-brown, with numerous wavy blackish transverse lines; there is usually a wavy yellowish transverse stripe near the base, and another broader and more conspicuous stripe near the termen; the termen itself is broadly shaded with dark brown. The hind-wings are orange-yellow; there is a small dusky brown area near the base, then a faint straight transverse line, followed by a slightly waved conspicuous dark brown line; there is a very wavy broad dark brown line near the termen, and the termen itself is narrowly edged with dark brown.

The perfect insect appears in January and February, and frequents stony situations on the mountains, at elevations of from 2,500 to 4,000 feet. I have taken numerous specimens on the "Mineral Belt," Dun Mountain, but have not yet met with it elsewhere. This insect is probably often mistaken during flight for *Notoreas brephos*, from which it may easily be distinguished by its *larger size, paler colouring, and simple antennæ of the male*.

DASYURIS ANCEPS, Butl.

(*Fidonia anceps*, Butl., Proc. Zool. Soc. Lond. 1877, 392, pl. xliii. 3. *Statira anceps*, Meyr., Trans. N. Z. Inst. xvi. 91. *Stathmonyma anceps*, ib. xviii. 184.)

(Plate VIII., fig. 29.)

This species has been taken in the South Island at Mount Arthur, Castle Hill, and Arthur's Pass.

The expansion of the wings is about 1⅛ inches. *The fore-wings are bluish-grey; there are four wavy dark grey transverse lines*, the three lines nearest the base are double, and the line nearest the termen is shaded towards the base. *The hind-wings are pale yellow*; there is a small dusky area near the base, then a slightly curved grey line, followed by two curved dark grey lines close together; there is a series of irregular blotches near the termen, and the termen itself is broadly edged with black near the apex of the wing, and narrowly near the tornus. The cilia of all the wings are bluish-grey, barred with dusky black.

The perfect insect appears in January and February, and frequents bare rocky situations on the mountains, at elevations of from 4,000 to 5,000 feet. On one occasion I met with this species very plentifully, though in poor condition, on Mount Peel, near Mount Arthur; but subsequent visits have led me to think that, as a rule, it is rather a scarce species. The bluish-grey colouring of the fore-wings affords this moth a most efficient protection from enemies, whilst resting on the rocky ground which it always frequents.

Apart from special characters, the fainter colouring of this insect will at once distinguish it from any of the numerous allied species.

DASYURIS PARTHENIATA, Gn.

(*Dasyuris partheniata*, Gn., E. M. M. v. 93; Meyr., Trans. N. Z. Inst. xvi. 92.)

(Plate VIII., fig. 30 ♂, 31 ♀.)

This bright-looking species has occurred at Wellington in the North Island, and at Mount Arthur and Mount Hutt in the South Island.

The expansion of the wings is about 1⅛ inches. *The fore-wings are bright orange-yellow; the base is speckled with black and dull green scales; there is a rather indistinct band at about one-third; a broad wavy dark brown band a little beyond the middle, with a projection towards the termen, followed by a clear space and another broad irregular dark transverse band*; the termen is broadly bordered with dark brown, which is often almost continuous with the last-named transverse band. *The hind-wings are bright orange; there is a large speckled area near the base edged with a curved black line, followed by a clear space, and an interrupted dark brown transverse line considerably beyond the middle*; the termen is rather narrowly edged with a dark brown line, wavy towards the base of the wing. The cilia of all the wings are yellow barred with black.

The species varies considerably in the extent of the dark markings, especially on the fore-wings.

The egg is oval and white, without sculpture.

The young larva, which is very attenuated, has sixteen legs. Its colour is pale yellowish-brown above, and dull ochreous beneath. The food-plant is unknown.

The perfect insect appears from October till March, and frequents open, grassy situations. At Wellington, during October and November, it is common on the cliffs close to the shores of Cook's Strait, flying very rapidly on hot, sunny days, which renders its capture very difficult in such steep situations. Mr. Fereday's specimens were obtained amongst the tussock grass

at the foot of Mount Hutt. The insect was also found plentifully on the slopes of Mount Arthur, at an elevation of about 4,500 feet above the sea-level, and also on the Tararua Range in the North Island.

DASYURIS HECTORI, Butl.

(*Euclidia hectori*, Butl., Proc. Zool. Soc. Lond. 1877, 387, pl. xlii. 4. *Statira hectori*, Meyr., Trans. N. Z. Inst. xvi. 91. *Stathmonyma hectori*, ib. xviii. 184.)

(Plate VIII., fig. 32.)

This very striking species has occurred in the South Island at Mount Arthur, Mount Hutt, and Ben Lomond, Lake Wakatipu.

The expansion of the wings is 1½ inches. *All the wings are dark greyish-black, speckled with bluish-grey scales.* The fore-wings have five rather indistinct wavy darker transverse lines, and a very broad darker shading near the termen; there is a fine white mark near the apex, continued as an indistinct wavy line towards the tornus. The hind-wings have three or four indistinct darker transverse lines, and a very broad terminal shading; there are two, more or less distinct, fine, wavy, white lines, the first a little below the middle, and the second near the termen; the cilia are dark grey barred with pale grey. *On the under side all the wings are dark blackish-grey, traversed by six broad, wavy whitish lines.*

The perfect insect appears in December, January and February, and frequents rocky crags on mountains, at elevations of from 4,700 to 5,700 feet above the sea-level. It delights to rest on blackened rocks in the hottest sunshine, but dashes away with the greatest rapidity on the approach of the collector, so that it is generally rather difficult to capture.

Genus 14.—NOTOREAS, Meyr.

"Face roughly haired. Palpi moderate, second joint with long or very long spreading hairs beneath, terminal joint moderate or rather long, often concealed. Antennæ in male bi-pectinated. Thorax beneath more or less strongly clothed with long hairs. Fore-wings with vein 6 rising out of 9, 7 almost from angle of areole, 10 anastomosing moderately with 9, 11 anastomosing moderately or very shortly with 10, 12 free. Hind-wings normal."—(Meyrick.) (See Plate II., fig. 43, fore-wing of *Notoreas brephos*.)

This interesting genus, of which we have no less than fifteen species, comprises a number of gaily coloured little insects, chiefly inhabiting mountain regions. All the species are day-fliers, and most of them only appear during the hottest sunshine. Mr. Meyrick regards the genus *Notoreas* as most closely approaching to the ancestor of the family *Hydriomenidæ*.

NOTOREAS INSIGNIS, Butl.

(*Aspilates insignis*, Butl., Proc. Zool. Soc. Lond. 1877, 393, pl. xliii. 1. *Pasithea insignis*, Meyr., Trans. N. Z. Inst. xvi. 85. *Notoreas insignis*, ib. xviii. 184.)

(Plate VIII., fig. 3 ♂.)

This very striking species has been taken in the South Island at Castle Hill.

The expansion of the wings of the male is 1¼ inches, of the female 1 inch. *The fore-wings of the male are dull yellowish-brown; in the middle of the wing there is an almost straight long white streak from the base to about three-fourths; there is another straight white streak parallel to the termen and almost touching the apex. The hind-wings are bright ochreous speckled with brown near the*

base. The female has the wings rather narrower than the male, and the ground colour is paler.

The perfect insect appears in January. Mr. Fereday's specimens, which formed the basis for the above figure and description, were captured on a bare mountain side at an elevation of about 4,000 feet. Mr. Hawthorne has directed my attention to the remarkable similarity existing between the markings on the fore-wings of this species and those on *Xanthorhoe stinaria*.

NOTOREAS ORPHNÆA, Meyr.

(*Pasithea orphnæa*, Meyr., Trans. N. Z. Inst. xvi. 85. *Notoreas orphnæa*, ib. xviii. 184.)

This species was discovered by Mr. Meyrick in the South Island at Lake Wakatipu.

The expansion of the wings of the female is from 28 to 30 mm. (about 1¼ inches). "Fore-wings moderate, termen rounded; dark fuscous, mixed with yellowish and whitish, which tend to form alternate fasciæ; a discal dot and numerous curved irregularly dentate blackish lines, varying in strength and intensity; cilia barred with blackish and whitish. Hind-wings moderate, termen rounded; dark fuscous; a blackish discal dot; a cloudy whitish irroration forming a double curved fascia beyond middle, and a dentate subterminal line; cilia as in fore-wings.

"Imitative in colour of the dark lichen-grown rocks.

"I took three specimens almost on the summit of Ben Lomond, Lake Wakatipu, at 5,600 feet, in January."—(Meyrick.)

NOTOREAS ISOLEUCA, Meyr.

(*Notoreas isoleuca*, Meyr., Trans. Ent. Soc. Lond., 1897, 386.)

(Plate VIII., fig. 27.)

This little species has been taken in the South Island on the Craigieburn Range, near Castle Hill.

The expansion of the wings is about ¾ inch. *All the wings are very dark blackish-brown; the fore-wings have five slender wavy white transverse lines. The hind-wings have three white transverse lines*, the first near the base, the second near the middle, and the third, which is very slender and considerably broken, near the termen. *The cilia of all the wings are white, barred with blackish-brown.*

The perfect insect was captured in January, amongst a varied growth of stunted Alpine vegetation, at an elevation of about 5,600 feet.

NOTOREAS MECHANITIS, Meyr.

(*Pasithea mechanitis*, Meyr., Trans. N. Z. Inst. xvi. 86. *Notoreas mechanitis*, ib. xviii. 184.)

(Plate VIII., figs. 9, 10, 11, varieties.)

This insect has occurred in the South Island at Mount Arthur, Arthur's Pass and Mount Hutt.

The expansion of the wings is about ⅞ inch. *All the wings are dark brownish-black. The fore-wings have an almost straight transverse yellow or white stripe near the base, edged with black towards the body; a rather wavy stripe at about one-third, edged with black towards the termen; then several irregular yellowish or white spots or marks, followed by a very distinct white stripe, somewhat projecting towards the termen near the middle; there is a broken fine yellow line near the termen.* The hind-wings have a shaded white or yellow transverse line near the base, another

near the middle, a third, considerably finer and often broken, near the termen. The cilia of all the wings are white shaded with grey near the base, *but with no distinct bars*.

The perfect insect appears from January till March, and flies with great activity in the hottest sunshine. It frequents grassy mountain sides at elevations ranging from 3,000 to 4,500 feet above the sea-level, and in these situations it is often very abundant.

NOTOREAS PARADELPHA, Meyr.

(*Pasithea paradelpha*, Meyr., Trans. N. Z. Inst. xvi. 86. *Notoreas paradelpha*, ib. xviii. 184.)

(Plate VIII., figs. 12, 13, 14, varieties.)

In the South Island this insect has occurred on Mount Arthur, and on Ben Lomond, Lake Wakatipu, at elevations of from 3,600 to 5,000 feet.

The expansion of the wings is about 1 inch. The species is said to be distinguished from the preceding "by the barred cilia, the absence of any clear yellow colouring, the less prominent angulation of the post-median line and the more elongate wings."[39] (Meyrick.)

The perfect insect appears in December, January and February. In habits it exactly resembles *Notoreas mechanitis*.

NOTOREAS PERORNATA, Walk.

(*Fidonia perornata*, Walk. 1672. *Pasithea perornata*, Meyr., Trans. N. Z. Inst. xvi. 87. *Notoreas perornata*, ib. xviii. 184.)

(Plate VIII., figs. 4, 5, 6, 7, and 8, varieties.)

This very pretty insect has occurred at Palmerston and Wellington in the North Island, and at Kekerangu, Mount Arthur, Lake Coleridge, Mount Hutt and Lake Wakatipu, in the South Island.

The expansion of the wings is about ¾ inch. *The fore-wings are dark brownish-black, with five transverse white or orange-yellow lines, which vary considerably both in width and colour in different specimens*; the two basal lines are almost straight, the rest are wavy, the last but one has, near the middle, a strong projection towards the termen. *The hind-wings are bright orange, with three or four more or less broken black transverse lines.* The termen is narrowly bordered with black; the cilia of all the wings are white, more or less distinctly barred with blackish-brown.

The perfect insect appears in February, March and April, flying very actively in the hot afternoon sunshine. It is extremely abundant on the coast hills in the neighbourhood of Wellington. It also occurs commonly at Kekerangu, and is occasionally found on mountains as high as from 3,000 to 4,000 feet above the sea-level. I have observed that all the Wellington specimens have the transverse lines on the fore-wings narrow and mostly white; those from Mount Arthur broad and white, those from Kekerangu and Lake Wakatipu broad and orange-yellow. The last-named forms approximate most closely to some of the very yellow varieties of *Notoreas paradelpha*.[40]

NOTOREAS STRATEGICA, Meyr.

(*Pasithea strategica*, Meyr., Trans. N. Z. Inst. xvi. 87. *Notoreas strategica*, ib. xviii. 184.)

(Plate VIII., fig. 15.)

A single specimen of this conspicuous species was

taken in the South Island at Lake Guyon, by Mr. W. T. L. Travers.

The expansion of the wings is 1⅜ inches. *The fore-wings are dull yellowish-brown, becoming blackish-brown near the base; there are two broad white transverse lines near the base, the outermost slightly curved, then a dull orange shading, followed by a very broad, outwardly bent, white transverse band, edged with black towards the base*; between this band and the termen there is a fine wavy white transverse line. *The hind-wings are dull yellowish-brown near the base, becoming blackish towards the termen; there is a small cream-coloured area near the base, then two rather broad, slightly irregular, cream-coloured bands, and a rather fine wavy white line near the termen.* The cilia of all the wings are white, barred with blackish-brown.

The perfect insect appears in January.

Described and figured from the type specimen in Mr. Fereday's collection.

NOTOREAS CALLICRENA, Meyr.

(*Pasithea callicrena* Meyr., Trans. N. Z. Inst. xvi. 87. *Notoreas callicrena*, ib. xviii. 184.)

(Plate VIII., fig. 16.)

A single specimen of this very handsome species was captured by Mr. Fereday in the South Island, high on the mountains at the head of Lake Wakatipu.

The expansion of the wings is 1⅜ inches. *The fore-wings are deep orange-brown, shaded with black near the base and in the vicinity of the three cream-coloured transverse bands; the first of these bands is situated near the base, the second at about one-third, and the third, which is rather wavy, at about two-thirds*; there is a fine wavy white line close to the termen. *The hind-wings are dark grey, with two broad cream-coloured bands, the first near the base and the*

second near the middle; there is a slender wavy line near the termen. The cilia of all the wings are cream-coloured, barred with brownish-black.

The perfect insect appears in January, and evidently frequents high mountains.

Described and figured from the type-specimen in Mr. Fereday's collection.

NOTOREAS NIPHOCRENA, Meyr.

(*Pasithea niphocrena*, Meyr., Trans. N. Z. Inst. xvi. 88. *Notoreas niphocrena*, ib. xviii. 184.)

This species was discovered by Mr. Meyrick in the South Island, at Arthur's Pass, West Coast Road.

"The expansion of the wings of the female is from 24 to 25 mm. (1 inch). Fore-wings moderate, termen rounded; rather dark fuscous, mixed and obscurely striated with orange; a curved white subdentate line before one-fourth, anteriorly blackish-margined; a similar white line beyond one-fourth, posteriorly blackish-margined; space between these sometimes suffused with orange; a slender irregularly dentate white fascia beyond middle, rather strongly angulated in middle, anteriorly blackish-margined, posteriorly closely followed by a dentate orange line; a dentate orange line near termen, dilated on costa. Hind-wings moderate, termen rounded; orange, lighter anteriorly; basal half dark fuscous mixed with orange, its outer edge irregularly curved; a dentate subterminal fascia and narrow terminal fascia dark fuscous, sometimes obscure.

"Possibly when the male is known this may prove to be a *Dasyuris*.

"I took two specimens on the mountain-side above Arthur's Pass at 4,500 feet, in January."—(Meyrick.)

NOTOREAS SIMPLEX, n. sp.

(Plate VIII., fig. 26.)

A single specimen of this species was captured on Mount Arthur in the South Island.

The expansion of the wings is about 1⅛ inches. *The fore-wings are bright ochreous; there are four broad black transverse bands near the base, edged with white, and separated from one another by yellow spaces of almost equal width*; the outermost of these bands is situated a little more than half-way between the base and termen; the last two lines become obsolete before they reach the costa; there are no other markings, except a black shading on the termen near the tornus, which is traversed by an obscure jagged paler line; the cilia are white barred with black. The hind-wings are bright orange-yellow, without markings; the cilia are ochreous.

The perfect insect appears in January.

The type-specimen was taken on the mountain-side, at an elevation of about 4,000 feet.

NOTOREAS FEROX, Butl.

(*Fidonia ferox*, Butl., Proc. Zool. Soc. Lond. 1877, 392, pl. xlii. 8. *Pasithea ferox*, Meyr., Trans. N. Z. Inst. xvi. 88. *Notoreas ferox*, ib. xviii. 184.)

(Plate VIII., fig. 17.)

Two specimens of this species were captured by Mr. J. D. Enys, at Castle Hill in the South Island.

The expansion of the wings is about 1 inch. The fore-wings are dull brown, with numerous fine, wavy, dusky lines and a faint dot above the middle. The hind-wings are orange-yellow, dotted

with black near the base; *there is a rather broad* STRAIGHT *transverse black band near the middle, followed by a much finer wavy line; there are three fine, wavy lines parallel with the termen, and the termen itself is finely bordered with black.*

Described and figured from a specimen in Mr. Fereday's collection.

NOTOREAS ZOPYRA, Meyr.

(*Pasithea zopyra*, Meyr., Trans. N. Z. Inst. xvi. 89. *Notoreas zopyra*, ib. xviii. 184.)

(Plate VIII., figs. 18 and 19, varieties.)

This bright-looking little species has occurred at Mount Arthur and at Mount Hutt, in the South Island.

The expansion of the wings is about ¾ inch. The fore-wings are *dark bluish-grey*, with numerous slender, wavy, blackish transverse lines, and a distinct blackish dot above the middle. The hind-wings are *bright orange*, speckled with grey near the base and dorsum; there are from two to four very fine, wavy, broken, blackish, transverse lines, and the termen is narrowly bordered with black.

The perfect insect appears in January, frequenting shingle flats on the mountain sides, at about 4,000 feet above the sea-level. It flies rapidly in the hottest sunshine, and, when it alights on the stones, is extremely difficult to find. The brilliant hind-wings, which are very conspicuous when the moth is flying, quite disqualify the eye from detecting the extremely obscure object, which the insect instantly becomes when resting with its fore-wings alone exposed. This method of increasing the value of protective tints by means of bright colours temporarily displayed was

very clearly described, I believe for the first time, by Lord Walsingham in his address to the Fellows of the Entomological Society of London, in January, 1891. It is certainly well exemplified by this and several other species of the genus *Notoreas*, and it will be at once noticed by the collector, how extremely difficult it is to follow these active little moths, as they fly with short and rapid flight over the grey rocks and stones, with which their fore-wings so completely harmonize; the momentary glimpse obtained of the brilliant hind-wings so completely deceives the eye, that there is much more difficulty in marking the spot where the insect alights, than would have been the case if the brilliant colour had never been displayed.

NOTOREAS VULCANICA, Meyr.

(*Pasithea vulcanica*, Meyr., Trans. N. Z. Inst. xvi. 89. *Notoreas vulcanica*, ib. xviii. 184.)

(Plate VIII., fig. 24.)

This species has been taken in the North Island at Makotuku, and the Kaweka Range, in the Hawkes Bay District.

The expansion of the wings is 1 inch. The fore-wings are *very dark blackish-grey*; there is a rather narrow black transverse line near the base, another at about one-third; then a small black dot, followed by a wavy, rather broad, black band, and two cloudy wavy black transverse lines near the termen. The hind-wings are *very dark orange; there is a large black basal patch, then a broad black band joining the basal patch near the dorsum; beyond this is a fine black line, then another broad black line followed by a very fine wavy line of the orange ground colour; the termen is very broadly margined with black*.

The perfect insect appears from January to March. Mr. Meyrick states that he found it resting on the roads near Makotuku.

Described and figured from a specimen in Mr. Fereday's collection.

NOTOREAS BREPHOS, Walk.

(*Fidonia brephosata*, Walk. 1037; Butl., Cat. pl. iii. 14. *Larentia catocalaria*, Gn., E. M. M. v. 62. *Fidonia brephos*, Feld. cxxix. 5. *Pasithea brephos*, Meyr., Trans. N. Z. Inst. xvi. 89. *Notoreas brephos*, ib. xviii. 184.)

(Plate VIII., figs. 20, 21, 22, and 23, varieties.)

This very pretty species is common, and generally distributed throughout the country.

The expansion of the wings is about 1 inch. The fore-wings are dark grey; there is a wavy black line near the base, two similar lines enclosing a very broad central area, with a black dot a little above the middle; beyond this there is a more or less distinct wavy band of pale grey or brown; there are several obscure wavy blackish lines near the termen. The hind-wings are bright orange, dotted with grey near the base and dorsum, with from two to four more or less distinct wavy black transverse lines, generally rather narrow; the termen is moderately broadly bordered with black.

This insect is extremely variable, and, so far as I can judge from an extensive series, several of the varieties appear to indicate that both *Notoreas zopyra* and *N. vulcanica* may ultimately have to be ranked as varieties of *N. brephos*, but the evidence on this point is not yet conclusive enough to render such a course at present desirable.

The perfect insect appears from December to March. It is very active, and is extremely fond of settling on roads or bare ground in the hot sunshine, instantly darting away on the approach of an enemy. It is also common on the mountains, and is often found at elevations of from 3,000 to 4,000 feet above the sea-level.

NOTOREAS OMICHLIAS, Meyr.

(*Pasithea omichlias*, Meyr., Trans. N. Z. Inst. xvi. 90. *Notoreas omichlias*, ib. xviii. 184.)

(Plate VIII., fig. 25.)

Two specimens of this dull-looking little species were captured at Castle Hill, by Mr. J. D. Enys.

The expansion of the wings is ⅞ inch. *All the wings are dark grey*; the fore-wings have several obscure blackish marks near the base, *a dull black spot on the costa at about one-third with a yellowish centre; beyond this there are four similar spots forming a transverse band*, and several more or less conspicuous wavy blackish lines near the termen. The hind-wings have several obscure wavy blackish transverse lines near the base and dorsum; the cilia are pale grey, obscurely barred with darker grey.

The perfect insect was taken "high up" on the mountains, probably at an elevation of about 5,000 feet.

This species is probably often overlooked through being mistaken for *Xanthorhoe cinerearia*.

Genus 15.—SAMANA, Walk.

"Face loosely haired. Palpi long, straight, porrected, attenuated. Antennæ in male dentate, ciliated (1). Fore-wings with vein 6 rising below 9, 7 from below angle of areole, 10 anastomosing strongly with 9, 11 anastomosing strongly with 10, 12 free. Hind-wings normal."—(Meyrick.)

Of this genus we have two species in New Zealand.

SAMANA FALCATELLA, Walk.

(*Samana falcatella*, Walk. xxvii. 197. *Panagra falcatella*, Meyr., Trans. N. Z. Inst. xvi. 93. *Samana falcatella*, Meyr., Trans. N. Z. Inst. xvii. 65.)

(Plate VIII., fig. 36.)

This unusual-looking species has occurred in the South Island, at Nelson and at Dunedin.

The expansion of the wings is 1¼ inches. The fore-wings are very pale ochreous, speckled with grey; *there is a very fine longitudinal black streak from a little beyond the base to considerably before the middle, slightly clouded above; an elongate dot above the middle; a very oblique slightly curved black streak from near the apex to the middle of the dorsum, edged with white towards the base, and clouded with brown towards the termen*; the apex of the wing is very acute. The hind-wings are white, with a black dot above the middle.

The perfect insect appears in February. It is apparently a rare species.

SAMANA ACUTATA, Butl.

(*Samana acutata*, Butl., P. Z. S. L. 1877, 401; Meyr., Trans. N. Z. Inst. xvii. 67.)

The type-specimen of this species exists in the

collection of the British Museum. According to Mr. Meyrick, who made a cursory examination of it, the species differs from *S. falcatella* in the following respects:—

The first dark line runs from the dorsum near the base to below the costa before the middle; the lower extremity of the second line is connected with the tornus by an oblique streak.

Family 2.—**STERRHIDÆ.**

"Face smooth. Tongue developed. Palpi shortly rough-scaled. Fore-wings with vein 10 rising out of 9, 11 anastomosing or connected with 9. Hind-wings with vein 5 fully developed, rising from middle of transverse vein, parallel to 4, 8 very shortly anastomosing with upper margin of cell near base, thence rapidly diverging."—(Meyrick.) (See Plate II., figs. 49 and 50.)

Although less numerous than the preceding, the family is pretty evenly distributed throughout the world, but poorly represented in New Zealand. We have only one genus, viz., LEPTOMERIS.

Genus 1.—LEPTOMERIS, Hb.

"Antennæ in male ciliated with fascicles. Posterior tibia in male dilated without spurs, in female with all spurs present. Hind-wings with veins 6 and 7 sometimes stalked (variable in the same species)."—(Meyrick.) (See Plate II., figs. 49 and 50.)

We have one species, which also occurs in Australia.

LEPTOMERIS RUBRARIA, Dbld.

(*Ptychopoda* (?) *rubraria*, Dbld., Dieff. N. Z. ii. 286; Walk. 781. *Fidonia* (?) *acidaliaria*, Walk. 1037. *Acidalia figlinaria*, Gn. ix. 454, pl. xii. 8. *Acidalia rubraria*, Meyr., Trans. N. Z. Inst. xvi. 57.)

(Plate VIII., fig. 37 ♂, 38 ♀.)

This pretty little insect is very common, and generally distributed throughout the country.

The expansion of the wings is about ⅞ inch. *The fore-wings are reddish-ochreous with three dull brown wavy transverse lines*, the first rather narrow at about one-fourth, the second slightly broader at about one-half, the third much broader, and sometimes partially divided near the costa; there is a black central dot, a series of rather large dull brown spots near the termen, and a chain of minute black dots on the termen. *The hind-wings are pinkish-ochreous; there is a dull brown wavy transverse band near the base, then two close together a little beyond one-half, a shading on the termen, and a very distinct series of minute black terminal dots.* The cilia of all the wings are dull brown, mixed with reddish-ochreous.

There is often considerable variation in the intensity of the colouring of this insect, some specimens being much darker than others, but the markings are very constant, and the species is thus always easily recognizable.

The eggs are yellowish-white, and very large for the size of the moth.

The young larva is brownish-purple with a dull white line on each side. The food-plant is unknown.

The perfect insect appears in January, February and March. In the late summer and autumn it frequents dried-up, weedy pastures, where it is often extremely abundant. Straggling specimens, which have

probably hibernated during the winter, may also be taken in the early spring.

Mr. Meyrick states that this species occurs very commonly in New South Wales, Victoria, and Tasmania, and that there is no difference between Australian and New Zealand specimens.[41]

Family 3.—**MONOCTENIADÆ.**

"Hind-wings with vein 5 fully developed, parallel to 4, rising from about or below middle of transverse vein, 8 free or anastomosing shortly near base or seldom from near base to beyond middle (then without areole of fore-wings), approximated to upper margin of cell to middle or beyond." (See Plate II., figs. 44 and 45.)

"Ovum subcylindrical, smooth. Larva more or less elongate, usually with few hairs, prolegs on segments 7, 8, and sometimes 9 rudimentary or absent. Pupa subterranean or in bark."—(Meyrick.)

According to Mr. Meyrick this is to be regarded as a decaying family. In Australia it is still prominent, being represented there by nearly 100 known species.

We have two genera represented in this country—

1. DICHROMODES.

2. THEOXENA.

Genus 1.—DICHROMODES, Gn.

"Face smooth. Palpi long, straight, porrected, roughly scaled above and beneath. Antennæ in male pectinated on inner side only. Fore-wings with vein 6 from a point with 9, 7 from angle of areole, 10 anastomosing moderately with 9, 11 separate, approximated to 10 in middle, 12 free. Hind-wings with veins 6 and 7 separate, 8 free, closely approximated to 7 from base to near transverse vein."—(Meyrick.) (See Plate II., figs. 44 and 45, neuration of *D. petrina*.)

There are three species belonging to this genus known in New Zealand.

DICHROMODES NIGRA, Butl.

(*Cacopsodos niger*, Butl., Proc. Zool. Soc., Lond. 1877, 395, pl. xliii. 4. *Dichromodes nigra*, Meyr., Trans. N. Z. Inst. xx. 60.)

(Plate VIII., fig. 40.)

This little insect has been taken at Nelson.

The expansion of the wings is ⅞ inch. *All the wings are dull black. The fore-wings have a darker central area, bordered by two jagged pale grey transverse lines*, the first at about one-third and the second at about two-thirds; there is also a faint line near the termen. The hind-wings have a very obscure dark central line.

The perfect insect appears in February. It occurs quite commonly on the track to the Dun Mountain, near Nelson, frequenting openings in the birch forest, where it may be captured at rest on bare ground in the hot sunshine, at elevations of from 1,500 to 2,000 feet.

DICHROMODES GYPSOTIS, Meyr.

(*Cacopsodos niger*, Meyr., Trans. N. Z. Inst. xvi. 94 (nec Butl.). *Dichromodes gypsotis*, Meyr., Trans. N. Z. Inst. xx. 60.)

This insect was discovered by Mr. Meyrick at Lake Wakatipu in the South Island.

The expansion of the wings of the female is 13 mm. (½ inch). "Fore-wings rather narrow, costa sinuate, termen sinuate; white, slightly mixed with grey; dorsum narrowly grey; a slender black fascia almost at base; a slender black fascia at one-third, dentate inwards above middle, dilated on costa; a slender black fascia beyond middle, sharply angulated in middle, dilated on costa, connected below middle with preceding fascia by a suffused bar; close beyond this a rather broad parallel grey fascia; an indistinct grey subterminal line. Hind-wings moderate; termen rounded dark grey."—(Meyrick.)

Taken in December, at an elevation of about 1,500 feet above the sea-level.

DICHROMODES PETRINA, Meyr.

(*Dichromodes petrina*, Meyr., Trans. N. Z. Inst. xxiv. 216.)

(Plate VIII., fig. 39.)

This dull-looking little insect has occurred at Paikakariki and Wellington in the North Island, and at Kekerangu in the South Island.

The expansion of the wings is ¾ inch. *The fore-wings are dull greenish-grey; there is a black, wavy, somewhat broken transverse line at about one-third, and another at about two-thirds, enclosing a slightly darker central band, with a black dot above middle*; there is also a darker shading on the termen, and an obscure wavy paler line. *The hind-wings are grey*, with an obscure wavy central line.

The perfect insect appears in January, February and March. It frequents dry, open, sunny situations, generally alighting on paths or roads. It is also attracted by light.

Genus 2.—THEOXENA, Meyr.

"Palpi moderate, triangularly scaled, porrected. Antennæ in male bi-ciliated with long tufts of cilia (5). Fore-wings with vein 6 from below 9, 7 from angle of areole, 10 out of 9 above 7, 11 anastomosing shortly with 9, 12 free, closely approximated to 11 on areole. Hind-wings with veins 6 and 7 from a point or short-stalked, 8 free, closely approximated to 7 from base to near transverse vein."—(Meyrick.)

We have one species.

THEOXENA SCISSARIA, Gn.

(*Panagra scissaria*, Gn., E. M. M. v. 43. *Theoxena scissaria*, Meyr., Trans. N. Z. Inst. xvi. 56.)

(Plate VIII., fig. 41.)

This delicate-looking species has occurred at Christchurch.

The expansion of the wings is 1 inch. *All the wings are white. The fore-wings have a longitudinal, slightly curved black line, extending from a little beyond the base, almost as far as the termen below the apex*; above this line there is a black dot at about one-third; the apex of the fore-wing is slightly hooked, and there is a row of minute black dots on the termen of both fore- and hind-wings.

The perfect insect appears in January. According to Mr. Fereday it frequents the plains near Christchurch, and towards the foot of Mount Hutt.

Described and figured from a specimen in Mr. Fereday's collection.

Family 4.—**ORTHOSTIXIDÆ.**

"Hind-wings with vein 5 fully developed, rising from about middle of transverse vein, 8 connected with upper margin of cell by an oblique bar towards base."—(Meyrick.) (See Plate II., figs. 46 and 47.)

This small family is represented in New Zealand by a single genus only. The peculiar oblique bar connecting vein 8 with the cell towards base, combined with the development of vein 5, distinguish it from all other families. If there is any chance of confusion with those forms of *Hydriomenidæ* in which vein 8 is also connected by a bar (though in them the bar is placed beyond and not before the middle of cell), the absence of the characteristic areole of the *Hydriomenidæ* will be a further test.

Genus 1.—EPIRRANTHIS, Hb.

"Face with appressed scales. Tongue developed. Palpi very short or moderate, porrected or subascending, rough-scaled. Antennæ in male evenly ciliated. Thorax rather hairy beneath. Femora glabrous; posterior tibiæ with all spurs present. Fore-wings with vein 10 anastomosing with 9, 11 anastomosing with 12 and 10 before 9. Hind-wings with 6 and 7 separate."—(Meyrick.) (Plate II., figs. 46 and 47, neuration of *Epirranthis alectoraria*; fig. 48, head of ditto.)

Represented in New Zealand by two species.

EPIRRANTHIS ALECTORARIA, Walk.

(*Lyrcea alectoraria*, Walk. 259; Meyr., Trans. N. Z. Inst. xvi. 95. *Aspilates* (?) *primata*, Walk. 1076; Butl., Cat. pl. iii. 4. *Endropia*

mixtaria, Walk. 1506; Butl., Cat. pl. iii. 5. *Amilapis* (?) *acroiaria*, Feld. cxxiii. 6. *Lyrcea varians*, Butl., Cist. Ent. ii. 496. *Ploseria alectoraria*, Hdsn., Manual N. Z. Ent. 86.)

(Plate VIII., figs. 42, 43, 44, 45, 46, and 47, varieties; Plate III., fig. 24, larva.)

This species has occurred in tolerable abundance at many localities in both the North and the South Islands. It is probably generally distributed throughout the country.

The expansion of the wings is from 1 inch to 1½ inches. The wings range in colour from pale yellow to dark orange-brown, dark reddish-brown, or even dull brown, with innumerable intermediate tints. There is often a central transverse line reaching from the costa of the fore-wing to the dorsum of the hind-wing. Many of the varieties are speckled with darker colour; others have irregular yellow patches, generally situated on the fore-wings just below the apex and on the dorsum near the base; there are often two white dots near the apex of the fore-wings.

Most of the varieties closely resemble the varied hues of fading leaves. In many of the forms greyish speckled marks occur on various parts of the wings, no doubt imitating the irregular patches of mould which are often present on dead leaves. One very well-marked variety is bright yellow, with the costa rosy and two large white-centred rosy spots arranged transversely on each wing. (See Plate VIII., fig. 47.) All the specimens of this insect are so extremely variable that it is almost impossible to adequately describe the species. The apex of the fore-wing is always very acute; the termen is bowed just below the apex, and is furnished with slight indentations of variable depth. The termen of the hind-wing is also furnished with variable indentations.

The egg is oval and much flattened above. When first laid it is pale green in colour, but becomes dull olive-green as the embryo develops.

The young larva is *very pale green*, with the head brownish-yellow. At this early stage its colouring already completely harmonises with that of the under side of the leaves of its food-plants, *Pittosporum eugenioides* and *P. tenuifolium*.

The full-grown larva is very robust, and about 1 inch in length. Its colour is pale green, with numerous yellow dots and a series of diagonal yellow stripes on each segment; there is, in addition, a series of broad crimson blotches on the back and a small crimson flap projecting from the end of the terminal segment; the prolegs and spiracles are also crimson.

The remarkable shape and colouring of this caterpillar, in conjunction with the peculiar attitude assumed when at rest, affords it complete protection, causing it to resemble, in the closest possible manner, one of the buds of its food-plant. These larvæ grow very slowly, and probably occupy three or four months in attaining their full size. They are very sluggish in their habits. The pupa is greenish-brown in colour. It is enclosed in a cocoon, constructed of two or three leaves of the food-plant, fastened together with silk. The insect remains in this condition for three weeks or a month. The moth first appears about the end of October, and is met with until the middle of March. It frequents forest, where it is occasionally dislodged from amongst the undergrowth. It is also found in the evening on the flowers of the white rata. It is, however, rather uncertain in its appearance, being much commoner in some years than in others.

EPIRRANTHIS HEMIPTERARIA, Gn.

(*Hemerophila hemipteraria*, Gn. ix. 220, pl. vi. 2. *Xyridacina hemipteraria*, Meyr., Trans. N. Z. Inst. xx. 60. *Ploseria hemipteraria*, Hdsn., Manual N. Z. Ent. 85.)

(Plate VIII., fig. 48 ♂, 49 ♀; Plate III., fig. 19, larva.)

This remarkable-looking species has occurred in the North Island, at Auckland and Wellington. At present it has not been observed in the South Island.

The expansion of the wings is from 1⅜ to 1⅝ inches. All the wings are pale ochreous-brown, with a variable number of minute black dots; there are four or five oblique, wavy brown transverse lines on both fore- and hind-wings, the central and terminal lines being often slightly darker than the others; there is always a black dot in the middle of the fore-wing, and a shaded spot near the termen below the apex. The apex of *the hind-wing is very pointed and projects downwards; the almost straight termen has a series of prominent projections*.

This species varies much in the intensity of the markings, and in the number of the black dots on both the fore- and hind-wings. The peculiar outline of its hind-wings, however, distinguishes it from any other species with which I am acquainted.

The larva feeds on veronicas in September and October.

Its length when full grown is about 1 inch. Some larvæ are green, with a broad bluish dorsal line, and two fine yellow lateral lines. Others are brown, with a dull yellow dorsal line.

During the daytime these caterpillars firmly clasp the stem of their food-plant with their prolegs, and hold the rest of their body rigidly out from the branch. In this position they are very inconspicuous, and may readily be mistaken for young leaves or twigs. At night they become much more active, and may then

be seen walking about and feeding.

The pupa is rather robust, with a sharp spine at its extremity. Its colour is pale olive-brown, with the wing-cases and sides of the abdomen pinkish. It is not enclosed in any cocoon, but is merely concealed amongst the dead leaves and rubbish around the stem of the veronica. The insect remains in this state for less than a month, so that the protection of a cocoon would appear to be unnecessary.

The moth appears in December and January. It usually frequents gardens and other cultivated places, probably on account of the number of veronicas that are often growing in such situations. It is also attracted by blossoms and by light, but is not a common species. The colouring and wing-outline of this moth cause it to very closely resemble a dead leaf, especially when resting amongst foliage or on the ground. This insect may be occasionally noticed abroad on mild evenings in the middle of winter; the females probably hibernate and deposit their eggs early in the spring.

Family 5.—**SELIDOSEMIDÆ.**

"Hind-wings with vein 5 imperfect (not tubular) or obsolete, 6 and 7 usually separate, 8 usually obsoletely connected with upper margin of cell near base, approximated to near middle." (See Plate II., figs. 51 to 64.)

"A very large family, equally common throughout all regions. It varies considerably in superficial appearance, and is also remarkable for the variability

of structure of veins 10 and 11 of the fore-wings in many (not all) species. Imago with body slender to rather stout; fore-wings broad to rather elongate, triangular; posterior tibiæ of male often enlarged and enclosing an expansible tuft of hairs. The structure termed the fovea is a circular impression on the lower surface of the fore-wings above the dorsum near the base, usually placed about the origin of the basal fork of 1*b*; it is generally confined to the male, and is often sub-hyaline, sometimes surmounted by a small thickened gland; it may possibly be a scent-producing organ. It is strictly confined to that branch of which *Selidosema* is the type, but is not invariably present there.

"Ovum subcylindrical or elongate-ovate, more or less reticulated, sometimes ribbed. Larva elongate, more or less slender, with few hairs, without developed prolegs on segments 7, 8, and usually 9; often remarkably like a twig of its food-plant. Pupa subterranean, or in a slight cocoon above ground."—(Meyrick.)

Of this extensive family we have nine genera represented in New Zealand:

1. SELIDOSEMA. 4. SESTRA. 7. AZELINA.
2. HYBERNIA. 5. GONOPHYLLA. 8. IPANA.
3. CHALASTRA. 6. DREPANODES. 9. DECLANA.

Genus 1.—SELIDOSEMA, Hb.

"Face with appressed or shortly projecting scales. Tongue developed. Antennæ in male bipectinated, towards apex simple. Palpi rough-scaled. Thorax sometimes crested posteriorly, hairy beneath. Femora nearly glabrous; posterior tibiæ in male dilated. Fore-wings in male with fovea; vein 10 sometimes connected with 9, 11 sometimes out of 10 near base only, or if separate, sometimes anastomosing with 12."—(Meyrick.) (Plate II., figs. 59 and 60, neuration of *Selidosema dejectaria*.)

This genus is universally distributed and of considerable extent. We have nine species in New Zealand.

SELIDOSEMA FENERATA, Feld.

(*Rhyparia fenerata*, Feld. cxxxi. 7. *Zylobara fenerata*, Butl., Cist. Ent. ii. 498. Meyr., Trans. N. Z. Inst. xvi. 97.)

(Plate VIII., fig. 50 ♂, 51 ♀.)

This species is common, and generally distributed throughout the country.

The expansion of the wings is about 1½ inches. The fore-wings of the male are *very pale* ochreous-brown; there is a double jagged transverse line near the base, a single jagged line a little before the middle, and a double one a little beyond the middle; an almost continuous jagged line near the termen. The hind-wings are very pale ochreous, almost white; *their outline is peculiar; the dorsum is very short, the termen very long, first oblique and then rounded with a small projection midway between the apex and the tornus*. The female has the fore-wings pale grey, and the hind-wings dull white; the markings resemble those of the male, but the outline of the hind-wing is of the usual form.

This insect varies slightly in the depth of its colouring. It may be distinguished from the allied species by the peculiar outline of the hind-wings in the male, and by the pale grey colouring of the female.

The perfect insect appears from October till March and is very common. It has a great liking for the faded fronds of tree-ferns, from which specimens may often be dislodged. Both sexes are very abundant at various blossoms during the evening, and are also attracted by light. The female is

sometimes observed in the winter months, and probably hibernates.

SELIDOSEMA RUDIATA, Walk.

(*Cidaria rudiata*, Walk. 1420. *Boarmia astrapia*, Meyr., Trans. N. Z. Inst. xxii. 218. *Boarmia rudiata*, Meyr., Trans. N. Z. Inst. xxiii. 101.)

(Plate IX., fig. 1 ♂, 2 ♀.)

This species is fairly common in the neighbourhood of Wellington, and has occurred at Dunedin, and at Stewart Island. It is probably generally distributed throughout the country.

The expansion of the wings of the male is 1½ inches, of the female 1⅝ inches. The fore-wings are *very pale ochreous-brown*; there are two interrupted jagged transverse lines near the base; a single very indistinct line in the middle; a double, nearly continuous jagged transverse line beyond the middle; a double jagged line near the termen completely interrupted in the middle; there is generally a dark patch on the termen just below the apex of the wing. The hind-wings are very pale ochreous. There is a series of black dots on the termen of both fore-wings and hind-wings, and the termen of the hind-wing is slightly indented.

This species varies a good deal in size; the specimens from Stewart Island are considerably larger and have more distinct markings, than those found in the vicinity of Wellington.

The larva is cylindrical, of even thickness throughout, and almost uniform dull greyish-brown in colour, occasionally with a series of small oblong black marks on segments 5, 6, 7, 8, and 9. It feeds on the young leaves and buds of the ake ake (*Olearia*

traversii). It is extremely difficult to find as it almost exactly resembles a twig of its food-plant. It is full grown about April.

The pupa is concealed in the earth.

The perfect insect appears from October till March. It seems to prefer cultivated districts, and is generally observed at rest on garden fences or tree-trunks. It also frequents flowers in the evening.

SELIDOSEMA SUAVIS, Butl.

(*Pseudocoremia suavis*, Butl., Cist. Ent. ii. 497. *Pachycnemia usitata*, Butl., Cist. Ent. ii. 501. *Pseudocoremia lupinata*, Meyr., Trans. N. Z. Inst. xvi. 98. *Boarmia suavis*, Meyr., Trans. N. Z. Inst. xxiii. 101.)

(Plate IX., fig. 3 ♂, 4 ♀.)

This species is very common and generally distributed throughout the country, and has occurred as far south as Stewart Island.

The expansion of the wings is 1¼ inches. The fore-wings of the male are *dull yellowish-brown, speckled with black*; there are two curved transverse lines near the base; a very obscure line near the middle, darker on the costa; two doubly curved lines beyond the middle, slightly darker on the dorsum; and two very faint jagged lines near the termen. The hind-wings are pale ochreous, tinged with brown near the termen. The female has narrower wings, shorter body, and is usually duller in colour than the male.

This insect is rather variable, some specimens of both sexes being much darker than others; but all the forms may usually be recognised by their dull

speckled colouring and absence of conspicuous markings.

The larva feeds on the white rata (*M. scandens*) and the tawa (*Beilschmiedia tawa*).

Its length when full grown is about 1⅛ inches. The upper surface is dark reddish-brown with numerous blackish stripes and white markings, which give it a very variegated appearance; the under side is pale green; there are two small tubercles on the back of the eighth segment.

The pupa is concealed amongst refuse on the ground, the larva constructing no cocoon before changing.

The perfect insect appears from October till April, and may often be observed on mild days in the middle of winter. It is common in forest districts, where it is usually seen resting on the tree-trunks, in which situation its colouring must afford it efficient protection from many enemies.

SELIDOSEMA HUMILLIMA, n. sp.

(Plate IX., fig. 5.)

This inconspicuous-looking insect has occurred at Wellington.

The expansion of the wings of the male is about 1⅛ inches. *The fore-wings are dull yellowish-brown; there are three short oblique dark brown stripes on the costa, inclined very much towards the termen*; the first of these stripes is distinctly double, and the second and third partially so; there is an indistinct brown mark just below the apex, several slender faint streaks on the veins near the middle of the wing, and a very distinct brown shading on the dorsum. The hind-wings are very pale ochreous.

This species may be readily distinguished from the other species of the genus by its small size and by the obliquity of the costal stripes. In *S. humillima* the costal markings slope very rapidly from the base towards the termen; in the other allied species these markings are but slightly inclined, and in some cases slope in the reverse direction.

The perfect insect appears from December till March. It frequents the immediate neighbourhood of Wellington, but is not a common species. At present I am only acquainted with the male insect.

SELIDOSEMA PRODUCTATA, Walk.

(*Larentia productata*, Walk. 1197 (?). *Selidosema pungata*, Feld. cxxxi. 23. *Selidosema* (?) *fragosata*, Feld. cxxxi. 29. *Zylobara productata*, Meyr., Trans. N. Z. Inst. xvi. 98.)

(Plate IX., figs. 6, 7, 8, 9, and 10 ♂ varieties, 11, 12, 13, and 14 ♀ ditto; Plate III., fig. 22, larva.)

This species is very common, and generally distributed throughout both the North and South Islands. It has also occurred at Stewart Island.

The expansion of the wings of the male is 1⅜ inches, of the female 1⅛ inches.

The fore-wings vary from pale yellowish-brown to rich chocolate-brown; there are two curved transverse lines near the base, generally enclosing a paler stripe between them; next a broad dark central area; then a wavy paler transverse line, usually followed by a very much paler irregular band, generally formed by two partially disconnected patches, one on the costa and one on the dorsum; there is a jagged, whitish, transverse line near the termen, *always broken in the middle*, and often

shaded with black towards the base of the wing. The hind-wings are ochreous, speckled with brown towards the dorsum; there is usually a brown central dot.

This is an extremely variable insect. In some specimens there are very extensive white patches on the wings, whilst in others the colouring is almost uniform rich brown, and the characteristic markings can only be detected with difficulty. It may, however, be distinguished from the allied species by the *interrupted pale jagged transverse line near the termen and by the absence of greenish colouring.*

The eggs are oval with the surface honeycombed; they are pale green in colour.

The young larva, when first hatched, is much attenuated, light reddish-brown with a broad pale lateral stripe, and a few bristles. The full-grown larva measures about 1½ inches in length; it is rather slender and has a large hump on the sixth segment. Its colour is dark reddish-brown, mottled and striped with dull white and greenish.

It feeds on the white rata (*Metrosideros scandens*). During the day it firmly grasps a stem of its food-plant with its prolegs, holding the rest of its body out from the branch in a perfectly straight and rigid position. When in this attitude it so exactly resembles a twig, that, even in the case of captive specimens, it is often a matter of the greatest difficulty to find a caterpillar amongst the branches. Several times I have even caught hold of a larva, thinking it to be a twig, so perfect is the resemblance. At night these larvæ become much more active, and by the aid of a lantern they may then be seen busily walking about and feeding.

The pupa is enclosed in a slight cocoon about two

inches below the surface of the earth. The larvæ of the autumnal brood remain in this condition during the winter, but in the case of the spring and summer broods the pupa state only occupies a few weeks.

The moth appears from November till May. It is very common in forest regions, and may be observed resting on the trunks of the trees, its pale yellow hind-wings being completely concealed by the mottled brown fore-wings. In this position the insect is almost invisible, and the protection afforded by its colouring is at once apparent. In the autumn evenings it is often very abundant at the blossoms of the white rata.

SELIDOSEMA ARISTARCHA, Meyr.

(*Selidosema aristarcha*, Meyr., Trans. N. Z. Inst. xxiv. 216.)

(Plate IX., fig. 17 ♂, 18 ♀; Plate III., fig. 17, larva.)

Of this fine species only about a dozen specimens have hitherto been captured, all of which have occurred in the immediate vicinity of Wellington. It is consequently at present a rarity, but future collectors will probably find the insect in many other parts of the country.

The expansion of the wings varies from 1¼ to 1½ inches. The fore-wings are light ochreous-brown; there is a small white-edged brown spot near the base; two oblique curved brown transverse lines enclosing between them a white space towards the dorsum; a short stripe on the costa, near the middle, edged with white towards the base of the wing; a doubly curved transverse line beyond the middle, finely edged with white towards the base of the wing; there is also a short white-edged brown stripe extending from the apex of the wing to the last-named transverse line, the two lines enclosing between them a

small pale triangular area; there are five short longitudinal brown lines running from the termen to the outermost of the transverse lines, two of them being tipped with white towards the base of the wing. The hind-wings are dull ochreous-brown, with two very faint brown transverse lines towards the dorsum, and several whitish spots and one brown spot near the tornus. The female is a little darker in colour than the male.

This insect varies slightly in size.

The larva feeds on *Cyathea dealbata* (tree-fern) in September. Its colour is dull reddish-brown with an irregular brownish-black blotch on the side of each segment, and a dark brown dorsal line. It is very sluggish in its habits.

The pupa is concealed amongst moss, &c., on the surface of the ground, the insect remaining in this state for about six weeks.

The moth appears from September till March, and frequents dense forests. It has been dislodged from its food-plant in the daytime, and has also been taken on the flowers of the white rata in the evening.

SELIDOSEMA MELINATA, Feld.

(*Numeria melinata*, Feld. cxxix. 9. *Pseudocoremia indistincta*, Butl., Proc. Zool. Soc. Lond. 1877, 394, pl. xliii. 8. *Pseudocoremia melinata*, Meyr., Trans. N. Z. Inst. xvi. 99.)

(Plate IX., fig. 15 ♂, 16 ♀.)

This species is very common, and generally distributed throughout the country.

The expansion of the wings of the male is 1¼ inches, of the

female 1½ inches. The fore-wings are *dull greenish-grey*, with black markings; there is a transverse line near the base; another near the middle, followed by two broken irregular lines, then a broader, paler area sometimes white, followed by a series of jagged pale markings shaded with black. The hind-wings are ochreous mottled with pale brown near the dorsum; there is a series of black dots on the termen of both fore- and hind-wings.

This species is extremely variable, but may always be recognised by its greenish tinge, and the absence of indentations on the termen of both fore- and hind-wings.

The larva, according to Mr. Purdie, is about ¾ inch long; dull green with darker longitudinal striations. It may be beaten from New Zealand broom (*Carmichælia*) in February. There must be some other commoner food-plant, as the moth is found in many localities where the New Zealand broom does not occur.

The perfect insect appears from November till March, and is generally very abundant in all wooded districts. It is also common in birch forests on the mountain sides, where it may be taken at altitudes of from 3,000 to 4,000 feet above the sea-level. In the lowlands I have observed as many as half a dozen specimens on a single tree-trunk. Whilst resting in this situation they are very inconspicuous, the colouring of the fore-wings harmonizing perfectly with the insect's surroundings, and the pale-coloured hind-wings being then entirely concealed by the upper pair. In connection with this fact it is very interesting to notice that in all those cases where the hind-wings are exposed to view during repose, they are protectively coloured in a similar manner to the fore-wings. It will be observed that the two following

species of *Selidosema* exhibit protective colouring on both pairs of wings, these being invariably exposed when the insects are at rest.

SELIDOSEMA DEJECTARIA.

(*Boarmia dejectaria*, Walk. 394. *Boarmia attracta*, Walk. 394. *Boarmia exprompta*, Walk. 395. *Tephrosia patularia*, Walk. 422; Butl., Cat., pl. iii. 8. *Tephrosia scriptaria*, Walk. 422. *Scotosia erebinata*, Walk. 1358. *Scotosia stigmaticata*, Walk. 1359. *Scotosia lignosata*, Walk. 1361. *Gnophos pannularia*, Gn., E. M. M. v. 42. *Scotopteryx maoriata*, Feld. cxxvi. 4. *Hemerophila* (?) *sulpitiata*, Feld. cxxvi. 7. *Hemerophila caprimulgata*, Feld. cxxvi. 12. *Boarmia dejectaria*, Meyr., Trans. N. Z. Inst. xvi. 100.)

(Plate IX., figs. 19, 20, 21 and 22 ♂ varieties, 23 and 24 ♀ ditto; Plate III., fig. 12, larva.)

This large insect is very common, and generally distributed throughout the country.

The expansion of the wings is from 1½ to 2 inches. The fore-wings vary from pale ochreous to very dark rich brown; there is an oblique transverse line near the base, often enclosing a darker basal area; a small dark brown spot in the middle of the wing surrounded by a ring; a very oblique, wavy, transverse line beyond the middle, often double towards the dorsum, and several irregular markings on the termen; there is often a white spot on the middle of the termen, and a pale blotch on the apex of the wing. The hind-wings resemble the fore-wings in colour; there are two obscure transverse lines near the base; generally forming a dark basal area; a wavy line near the middle, and a strongly shaded line near the termen. The termen of both the wings is indented, the depth of the indentations varying greatly in different specimens.

This insect is very variable, but its large size and *oblique transverse lines* suffice to distinguish it from any of the other allied species.

The larva feeds on a great variety of plants, mahoe (*Melicytus ramiflorus*), white rata (*Metrosideros scandens*), *Solanum aviculare*, fuchsia (*Fuchsia excorticata*), and *Pennantia corymbosa* being amongst the number. The caterpillar may often be recognised by a large hump, which is situated on each side of the third segment. Its colouring appears to be so entirely influenced by its surroundings that a description is impossible. For instance, larvæ taken from the pale green foliage of the mahoe resemble in colour the twigs of that plant; others captured feeding on the white rata are dark reddish-brown, those from *Solanum aviculare* are purplish slate-colour, whilst those from the fuchsia are pale olive-green tinged with brown, like the sprouting twigs.

The pupa is enclosed in a slight cocoon situated about two inches below the surface of the ground. Those larvæ which become full grown in the autumn remain as pupæ during the winter, but the summer broods only remain in the pupa state a few weeks.

The perfect insect appears from November till March. It has a great partiality for resting with outspread wings on the walls of sheds and outhouses, where it is frequently noticed by the most casual observer. It is very common in most situations, and may be taken in large numbers at sugar, light, or blossoms, during the whole of the summer. Its extreme abundance and great variability, in both the larval and imago states, would render it a good subject for a series of experiments, resembling those conducted by Messrs. Poulton and Merrifield on several allied European species.

SELIDOSEMA PANAGRATA, Walk.

(*Scotosia panagrata*, Walk. 1360. *Angerona menanaria*, Walk. 1500. *Epirrhanthis* (?) *antipodaria*, Feld. cxxvi. 3. *Hyperythra desiccata*, Butl., Cist. Ent. ii. 495. *Hyperythra arenacea*, Butl., Cist. Ent. ii. 495. *Barsine panagrata*, Meyr., Trans. N. Z. Inst. xvi. 100.)

(Plate IX., figs. 25, 26, 27, and 28 ♂ varieties, 29 and 30 ♀ ditto.)

This species is very common, and generally distributed throughout the country. It has occurred as far south as Stewart Island.

The expansion of the wings is from 1½ to 1¾ inches. The fore-wings of the male vary from pale yellowish-white to rich brown or dark brownish-black; there is a jagged transverse line near the base; a large black or white spot in the middle of the wing; a doubly curved transverse line beyond the middle, then a very jagged transverse line, followed by several paler markings, and an obscure line parallel with the termen. The hind-wings are paler in colour; there is a slightly curved transverse line near the base; a jagged line near the middle, and a very faint line beyond the middle. The termen of both fore- and hind-wings is slightly indented. The female varies from pale ochreous to dark slate-colour; the markings resemble those of the male, but the termen of the wings is more indented.

This species is so extremely variable that a more detailed description would be useless; its numerous forms may, however, be at once recognised by the *unbroken jagged transverse lines of both fore- and hind-wings*.

The larva is quite as variable as the perfect insect. When very young it is bright green, with a conspicuous white dorsal line; as age advances the caterpillar becomes dark olive-brown, sometimes

striped with paler brown or green, whilst many specimens retain the green colouring throughout the whole of their lives. The favourite food-plant is the kawa-kawa (*Piper excelsum*), which the larvæ voraciously devour, thus causing the riddled appearance which the leaves of that plant almost invariably present. These larvæ often select a forked twig to rest in, where they lie curled round, with the head and tail close together. Other food-plants are *Aristotelia racemosa* and *Myrtus bullata*. Those caterpillars found on the latter plant are strongly tinged with pink, and are consequently very inconspicuous amongst the young shoots, where they generally feed. The burrows of the larvæ of *Hepialus virescens* are frequently utilised by the caterpillars, which feed on the *Aristotelia*, as convenient retreats during the winter. When full-grown these caterpillars descend to the ground and construct loose cocoons of silk and earth on the under sides of fallen leaves. The moth usually emerges in about a month's time, but the autumnal larvæ either hibernate or remain in the pupa state throughout the winter.

The perfect insect appears from October till April. It frequents forest and is extremely common. It also occurs in great abundance on the white rata blossoms in the autumn, and specimens may be occasionally seen even in the depth of winter.

Genus 2.—HYBERNIA, Latr.

"Face with appressed scales or short rough scales. Tongue developed or weak. Antennæ in male bi-pectinated, pectinations sometimes short and terminating in fascicles of cilia, apex simple. Palpi shortly rough-scaled. Thorax with small triangular anterior crest, hairy beneath. Femora glabrous; posterior tibiæ

in male not dilated. Fore-wings in male without fovea; vein 10 sometimes out of 9, sometimes anastomosing or connected with 9, 11 sometimes out of 10, usually anastomosing with or running into 12, rarely absent. Female semiapterous or apterous."—(Meyrick.)

We have one species.

HYBERNIA INDOCILIS, Walk.

(*Zermizinga indocilisaria*, Walk. 1530. *Hybernia boreophilaria*, Gn., E. M. M. v. 61. *Hybernia indocilis*, Meyr., Trans. N. Z. Inst. xvi. 97.)

(Plate IX., fig. 31 ♂, 32 ♀.)

This species has occurred plentifully in the neighbourhood of Christchurch.

The expansion of the wings of the male is 1¼ inches, of the female ½ inch. *All the wings are pale grey, speckled with darker grey. The fore-wings have four obscure wavy transverse lines*; the first near the base, the second and third near the middle, rather close together, and the fourth near the termen, much interrupted; there is a series of black dots on the termen. The hind-wings have two very faint transverse lines, and a series of black terminal dots; the termen of the hind-wings is slightly scalloped. The cilia of all the wings are grey. *The female has the wings extremely small and quite useless for flight*; in colour and markings they resemble those of the male, except that the transverse lines are black and sharply defined.

The perfect insect appears from July to January. Mr. R. W. Fereday states that the male is found plentifully at rest on the bare ground, amongst *Leptospermum*, and the female on the stems.

Described and figured from specimens kindly given to me by Mr. Fereday.

Genus 3.—CHALASTRA, Walk.

"Face with a slight cone of scales. Palpi rather long, porrected, roughly scaled. Antennæ in male bi-pectinated. Fore-wings with vein 6 from below 9, 7 from below angle of areole, 10 very shortly touching 9, 11 free, 12 very shortly touching 11. Hind-wings normal."—(Meyrick.) (Plate II., figs. 51 and 52.)

This genus is represented by one species only.

I have made a very careful examination of several denuded specimens of *Chalastra pelurgata*, and I find that in the fore-wings veins 9, 10, and 11 rise almost from a point. Vein 10 afterwards approaches closely to 9, but does not actually touch it, and consequently does not form a true areole. Vein 12 also appears to me to be free.

CHALASTRA PELURGATA, Walk.

(*Chalastra pelurgata*, Walk. 1430. *Itama cinerascens*, Feld. cxxxi. 1. *Stratocleis streptophora*, Meyr., Trans. N. Z. Inst. xvi. 106.)

(Plate IX., figs. 33 and 34 ♂ varieties, 35 and 36 ♀ ditto; Plate III., fig. 21, larva.)

This species is very abundant in the neighbourhood of Wellington. It has also occurred at Palmerston North, and is probably common throughout the whole of the North Island. In the South Island it has been taken in the Otira Gorge, and at Dunedin, Otara and Invercargill.

The expansion of the wings is about 1⅜ inches. *The fore-wings of the male vary from pale orange-brown to dull yellowish-brown*; there is a doubly curved dark brown transverse line near the base; *a broad straight line a little before the middle; a very strongly curved line a little beyond the middle, and a less strongly curved line*

near the termen, often composed of a series of triangular white dots edged with dark brown; all these lines are much stronger on the costa, and are sometimes almost obliterated elsewhere. The hind-wings are pale yellow, with several brown-edged white spots at the tornus, and an indistinct line parallel to the termen. The apex of the fore-wing is considerably produced, and there is a large rounded projection on the termen. The hind-wings have several small projections on the termen. In the female the fore-wings are pale yellow or orange, the transverse lines and white spots are usually more conspicuous, and the projections on the termen of the fore- and hind-wings larger.

This is a very variable insect, especially in the male, some specimens of which sex are very much clouded and dappled with dark brown both on the fore- and hind-wings. Many of these darker forms might readily be taken for distinct species, when compared with the pale orange-brown variety, but a good series of specimens presents numerous intermediate forms which completely connect these extreme varieties. The females also vary, but are never as dark as the males.

The larva feeds on *Todea hymenophylloides*, a fern which grows in shady places in the depths of the forest. The length of the caterpillar when full grown is about 1¼ inches. It is very variable; some specimens are dull brown, with a row of green or pale brown lunate spots down each side, and a dark brown line down the back. Others are bright green, with a diagonal reddish-brown stripe on the side of each segment; the segmental divisions are reddish-brown, intersected by numerous very minute whitish lines.

The pupa is enclosed in a loose cocoon on the surface of the ground.

The perfect insect appears from November till March, and is very common in forest regions. It may often be dislodged from the dead fronds surrounding the stems of tree-ferns, and is also met with in great abundance towards the end of summer on the blossoms of the white rata.

Genus 4.—SESTRA, Walk.

"Face smooth. Palpi short, rough-haired beneath, porrected. Antennæ in male stout, serrate, shortly ciliated. Fore-wings with vein 6 from below 9, 7 from below angle of areole, 10 rising out of 9 above origin, anastomosing again shortly with 9, 11 anastomosing shortly with 10, 12 anastomosing shortly with 11. Hind-wings normal."—(Meyrick.) (Plate II., fig. 53, neuration of fore-wing of *Sestra humeraria*.)

We have two species in New Zealand.

It will be seen that my figure of the neuration of *Sestra humeraria* does not precisely agree with Mr. Meyrick's description. The differences in the results arrived at are probably due to the variability in structure of veins 10, 11 (and 12), mentioned when dealing with the characters of the entire family. Similar slight discrepancies also occur in connection with the three following genera.

SESTRA HUMERARIA, Walk.

(*Macaria humeraria*, Walk. 940. *Lozogramma obtusaria*, ib. 985. *Cidaria obtruncata*, ib. 1421. *Sestra fusiplagiata*, ib. 1751. *Amastris encausta*, Meyr., Trans. N. Z. Inst. xvi. 105. *Sestra humeraria*, ib. xviii. 184.)

(Plate X., figs. 1 and 2 varieties; Plate III., fig. 20, larva.)

This species is very common, and generally distributed throughout both the North and the South Islands; it also occurs plentifully at Stewart Island.

The expansion of the wings is 1⅜ inches. *The fore-wings are pale plum-colour*; there is an indistinct, curved, brownish transverse line near the base; *a straight dark brown line across the middle, and a curved series of blackish dots beyond the middle*; the apex is pointed, and the termen has a strong projection a little above the middle. The hind-wings are ochreous, with a series of minute brownish dots across the middle.

This is a variable species. The fore-wings are often much clouded with rich brown, and in some specimens scarcely a trace of the original purplish colour remains; the central straight transverse line is often absent, and the other lines are frequently very indistinct, except on the costa; the dots on the hind-wings are also often absent, and occasionally specimens are met with in which all the wings are almost white.

The larva is rather elongate, dull yellowish-brown or greenish-brown; there is a very broad dark brown dorsal line, and several wavy lateral lines; the prolegs are black, the spiracles are also black; there is a slight hump on the posterior edge of each of the last six segments, the hump on the penultimate segment being considerably larger than the others. The length of the caterpillar when full grown is about 1 inch.

It feeds on *Pteris incisa*, a beautiful pale green fern,

attaining a height of four feet or more, and growing in open situations in the forest. This fern is especially abundant on old decaying logs situated amongst light brushwood. When disturbed these larvæ immediately drop to the ground and coil themselves up. In this situation they are very inconspicuous, as their colouring so closely resembles that of the faded fronds or stems of the fern.

The pupa is buried in the earth about two inches below the surface, the insect remaining in this state during the winter months.

The moth first appears about September, and continues in great abundance until the end of March or beginning of April. It frequents forest, and is noticed most commonly in the neighbourhood of its food-plant. There are probably several broods in the course of a year.

SESTRA FLEXATA, Walk.

(*Cidaria flexata*, Walk. 1421.)

(Plate IX., fig. 37.)

This species has occasionally occurred in the neighbourhood of Wellington. I have no records of its capture elsewhere, but expect it will be found to be generally distributed.

The expansion of the wings is about 1¼ inches. *The fore-wings are bright orange-red*; there is a very faint transverse line near the base, darker on the costa; a dark red oblong mark on the costa near the middle; and a faint transverse line beyond the middle, also darker on the costa. The hind-wings are bright ochreous-yellow, with the cilia orange.

This insect varies considerably in the intensity of its colouring. It has long been considered as merely a variety of *Sestra humeraria*, but as I have not observed any intermediate forms, although the two insects frequently occur together, I think it may be regarded for the present as a distinct species.

The perfect insect appears from October till December, and is found in the same localities as *S. humeraria*.

Genus 5.—GONOPHYLLA, Meyr.

"Face shortly rough-haired. Palpi moderate, arched, ascending, shortly rough-scaled, terminal joint short. Antennæ in male rather stout, pubescent. Coxæ and femora densely rough-haired beneath. Fore-wings with vein 6 from below 9, 7 from below angle of areole, 10 shortly touching 9, 11 separate, 12 free. Hind-wings normal."—(Meyrick.) (Plate II., figs. 63 and 64, neuration of *Gonophylla nelsonaria*.)

Of this genus we have but one species.

GONOPHYLLA NELSONARIA, Feld.

(*Gonodontis* (?) *nelsonaria*, Feld. cxxiii. 3. *Gonodontis felix*, Butl., Proc. Zool. Soc. Lond. 1877, 389, pl. xlii. 10. *Phyllodoce nelsonaria*, Meyr., Trans. N. Z. Inst. xvi. 104. *Gonophylla nelsonaria*, ib. xviii. 184.)

(Plate X., figs. 3 and 4 ♂ varieties, 5 and 6 ♀ ditto.)

This handsome insect is common in the neighbourhood of Wellington. It has also occurred at Nelson and Dunedin, and is possibly generally distributed throughout the country.

The expansion of the wings is 1½ inches. The fore-wings of the male are *rich reddish-brown, mottled with darker*; there are several small white marks on the costa; a black dot in the middle of the wing, and *an almost straight white transverse line beyond the middle*; outside this line the wing is speckled with greyish-white. The hind-wings are pale pinkish-brown; there is a black dot in the middle, and a curved blackish transverse line a little beyond the middle, being a continuation of the transverse line of the fore-wing; beyond this line, and on the dorsum, there are generally several small blackish markings. The female has the fore-wings orange-red, speckled with darker; there is a doubly curved transverse line near the base, and an almost straight transverse line near the termen, both dark red; beyond the outer transverse line the wing is shaded with dark brown. The hind-wings are pale reddish-orange, with a curved blackish transverse line. In both sexes the apex of the fore-wing is projecting, and there is a strong angular projection on the termen a little before the middle; the termen of the hind-wing has several small projections.

The variation of this insect is considerable, especially in the male. The ground colour of the fore-wings often inclines to dull brown, or even dull yellowish-brown; the light and dark mottling, and the greyish markings near the termen are sometimes hardly visible; there is often a yellowish blotch opposite the large angle in the termen of the fore-wing. The hind-wings also are very variable in their colouring. All these varieties exist in the female in a less pronounced degree.

The perfect insect appears during the first week in February, and is generally over by the middle or end of March. The males are first noticed, the females not appearing until about a fortnight later. I have never taken this insect in the daytime, and in fact have never seen it except on the blossoms of the white rata, where, on fine evenings, it is often very abundant. As yet, however, Wellington is the only

locality where I have met with it.

Genus 6.—DREPANODES, Gn.

"Face with cone of scales. Palpi moderate, triangularly scaled, porrected. Antennæ in male moderate, simple. Fore-wings with vein 6 from below 9, 7 from below angle of areole, 10 very shortly touching 9, 11 rising out of 10 before angle of areole, 12 free. Hind-wings normal. (Plate II., figs. 61 and 62 neuration of *Drepanodes muriferata*.)

A characteristic South American genus. The single New Zealand species is very similar to some South American forms."—(Meyrick.)

DREPANODES MURIFERATA, Walk.

(*Gargaphia muriferata*, Walk. 1635. *Panagra ephyraria*, Walk. 1761. ? *Zanclognatha* (?) *cookaria*, Feld. cxxiii. 26. *Zanclognatha* (?) *haastiaria*, Feld. cxxiii. 32. *Drepanodes muriferata*, Meyr., Trans. N. Z. Inst. xvi. 107.)

(Plate X., figs. 7, 8, 9, 10, and 11 ♂ varieties, 12 ♀.)

This species is very abundant in the neighbourhood of Wellington. It has also been taken at Taranaki, Christchurch, Dunedin, Invercargill and Stewart Island, and is probably common and generally distributed throughout the country.

The expansion of the wings is about 1½ inches. All the wings of the male are yellowish-brown; there is a faint transverse line near the base, and a conspicuous darker transverse line running from a little before the apex of the fore-wing to the middle of the dorsum of the hind-wing; there is also a dark spot in the centre of the fore-wing, often containing two white dots. In the female, all the wings are slate-coloured; the transverse lines are

very faintly indicated, and the central dot of the fore-wing is reddish-brown. The apex of the fore-wing in each sex is conspicuously hooked, and the termen is bowed and sometimes has a very slight angle in the middle.

Both sexes of this insect are very variable. In the male, the ground colour ranges from dingy-brown to bright orange-brown; the transverse lines differ much in intensity, and in some specimens the central area of the wings enclosed by them is much darker than either the basal or the marginal portions; occasionally there is a series of black markings between the outer transverse line and the termen of the fore-wings, whilst the transverse line itself is frequently edged with a band of paler colouring. The female also varies in the ground colour and in the intensity of the transverse lines, which are sometimes marked by a few black dots.

The larva, according to Mr. Purdie, is light grey, cylindrical, about ⅝ inch in length. It may be beaten in February from an undergrowth of *Carpodetus* and *Aristotelia*.

The perfect insect appears from November till March. It frequents dense forest and is often very abundant. The colouring of the upper and under surfaces of its wings, and the shape of the wings are both very protective, giving the moth an exact resemblance to a dead leaf. When disturbed, the insect adds to this deception by keeping its wings quite motionless and rigidly extended, and allowing itself to fall through the air like a leaf. The resemblance in this case to the inanimate object is very perfect, and has no doubt enabled the moth to escape from many enemies. It is, in fact, an extremely interesting example of the

simultaneous development of structure and instinct in a useful direction, through the agency of natural selection.

This species is much attracted both by light and by blossoms.

Genus 7.—AZELINA, Gn.

"Face with some projecting hairs. Palpi rather long, obliquely ascending, roughly scaled, attenuated. Antennæ in male thick, simple. Fore-wings with vein 6 from below 9, 7 from below angle of areole, 10 very shortly touching 9, 11 separate, 12 free. Hind-wings normal.

A genus of some extent, specially characteristic of South America. Guenée made a separate genus (*Polygonia*) of the New Zealand species, but without any point of distinction."—(Meyrick.) (Plate II., figs. 54 and 55, neuration of *Azelina gallaria*.)

We have three species in New Zealand.[42]

AZELINA GALLARIA, Walk.

(*Selenia gallaria*, Walk. 185, Butl., Cat., pl. iii. 6, 7. *Euchlaena* (?) *palthidata*, Feld. cxxxii. 21, 22. *Stratocleis gallaria*, Meyr., Trans. N. Z. Inst. xvi. 105; *Azelina gallaria*, xx. 62.)

(Plate X., figs. 13 to 20 ♂ varieties, 21 to 23 ♀ ditto.)

This species is very common in the neighbourhood of Wellington. It has also occurred at Palmerston North, Makotuku, Christchurch, Dunedin and Stewart Island.

The expansion of the wings is 1¼ inches. The fore-wings of the

male vary from pale yellowish-brown to bright orange-brown, or reddish-brown; there is a wavy transverse line near the base, often obsolete except on the costa; another wavy transverse line beyond the middle, also frequently obsolete except on the costa; *followed by a very conspicuous straight line, often double, running obliquely from a little before the apex to the dorsum*; outside this line, near the tornus, there are, in most specimens, two black spots or one large rust-red spot; the termen has two projections near the apex, inside which there is usually a darker blotch. The hind-wings are as variable in colour as the fore-wings; there is one wavy line near the base, *followed by an almost straight line*, which is a continuation of the straight line of the fore-wing; beyond this line the ground colour is generally much darker; the termen itself has no projections. The female has broader wings and a shorter body than the male; the ground colour and markings are similar to those of the male, but are usually more sombre, and the termen of both fore- and hind-wings is furnished with a number of prominent projections. The under side of the wings in both sexes is beautifully marbled with yellow and reddish-brown, and several of the markings of the upper surface are faintly indicated.

This species, as will be seen from the foregoing, is so extremely variable that a more detailed description would be useless, especially as the straight, oblique, transverse lines of both fore- and hind-wings will at once distinguish it from the two other members of the genus.

The perfect insect appears from November till March. It frequents dense forest, and is most abundant at the flowers of the white rata in the evening. Earlier in the year, before the rata blooms, it may sometimes be taken at sugar.

AZELINA OPHIOPA, Meyr.

(*Gonophylla ophiopa*, Meyr., Trans. Ent. Soc. Lond. 1897, 387.)

(Plate X., fig. 26 ♂, 27 ♂ variety, 28 ♀.)

This species has occurred occasionally in the neighbourhood of Wellington, but has not yet been recorded from any other locality.

The expansion of the wings is 1½ inches. The fore-wings of the male are pale orange-brown; there is a doubly toothed shaded transverse line near the base, the teeth being marked with two black spots; *a conspicuous wavy transverse line runs from the apex to the dorsum*, and is also marked with several black dots; the space between the two transverse lines is paler than the rest of the wing; there is a row of small black dots on the termen, and the termen itself has two small projections. The hind-wings are yellowish at the base, becoming orange beyond the middle; there is a faint brownish transverse line near the base, and a conspicuous wavy transverse line at the middle, marked by a series of black dots; this central transverse line divides the yellowish ground colour of the basal area, from the orange ground colour of the rest of the wing. The female is larger and duller than the male; the fore-wings are yellowish drab, with the outer transverse line dull red; there is a series of minute black dots on the termen; the hind-wings are dull yellow, with a wavy central transverse line.

The only variety of this species which has come under my observation is a male. In this specimen all the wings are pale yellowish-brown, with very broad black transverse lines. (See Plate X., fig. 27.)

This insect is evidently closely allied to *Azelina fortinata*. It may, however, be distinguished from that species by the smaller projections on the termen of the fore- and hind-wings, and the dotted transverse lines of the male.

The perfect insect appears from January till April. It is met with much later in the season than either of the two other species of *Azelina*. It frequents forest,

and may be found on the blossoms of the white rata, but is, I think, the rarest of the genus.

AZELINA FORTINATA, Gn.

(*Polygonia fortinata*, Gn., E. M. M. v. 41. *Caustoloma* (?) *ziczac*, Feld. cxxxii. 4. *Azelina fortinata*, Trans. N. Z. Inst. xvi. 106.)

(Plate X., fig. 24 ♂, 25 ♀.)

This beautiful insect occurs occasionally in forests in both the North and the South Islands. It has been taken at Wellington, Nelson, Castle Hill, Akaroa, Mount Hutt, West Plains and Otara.

The expansion of the wings is 1¼ inches. The fore-wings of the male are pale orange-brown, with *a doubly toothed black transverse line near the base, and a less acutely toothed line beyond the middle*; between these there is a black mark on the costa; the termen has two large projections, and several smaller ones; between the outer transverse line and the termen there are several small black markings. The hind-wings are yellowish, clouded with orange-brown towards the termen, which also has several projections; there is a faint blackish line near the base, and a much stronger black line near the middle, starting from the dorsum and reaching about half-way across the wing. The female has the fore-wings dark brown, with the central area between the two transverse lines paler; the hind-wings are also considerably darker than those in the male.

This species varies a little in the depth of the ground colour, but not otherwise.

The perfect insect appears in December, January and February. It frequents dense forest, and is generally disturbed from amongst ferns and undergrowth.

Genus 8.—IPANA, Walk.

"Face roughly haired. Antennæ in male simple, shortly ciliated. Palpi as in *Declana*. Thorax densely hairy above and beneath, with slight median crest. Abdomen in male elongate. Femora densely hairy; posterior tibiæ in male short and much swollen, furnished on inner side with very large dense tuft of hairs. Fore-wings in male without fovea; veins 10 and 11 separate."—(Meyrick).

We have one species in New Zealand.

IPANA LEPTOMERA, Walk.

(*Ipana leptomera*, Walk., Noct. 1662.)

(Plate X., figs. 29, 31, and 31A ♂ varieties, 30 ♀.)

This species is common in the neighbourhood of Wellington, and I expect generally distributed throughout New Zealand; but as there appears to have been some confusion in Mr. Meyrick's papers between it and the female of *Declana junctilinea*, I am unable to assign the localities there mentioned to either of the species.

The expansion of the wings of the male is 1½ inches, of the female 1⅜ inches. The fore-wings of the male are uniform pale brownish-ochreous, generally with two transverse series of minute darker brown dots parallel to the termen, and two or three similar dots near the middle of the wing. There is a series of very small parallel brown lines on the costa. The hind-wings are greyish-brown with two very deep indentations in the termen. The female has the fore-wings pale grey, and the hind-wings darker grey; the markings and outline resemble the male.

In a few male specimens I have observed four large black spots on the fore-wings, two near the base, and two near the termen. All these spots are sometimes

joined together by a very broad black band, which extends along the whole of the central portion of the fore-wings. I have also a male specimen in which the fore-wings are entirely marbled with dark grey. In the female two or three moderately large spots are occasionally present on the fore-wings, near the termen. All these varieties appear to be much scarcer than the typical form.

The larva, which feeds on manuka (*Leptospermum*), has ten legs. It is rather slender, dark brown, mottled with grey and dull red. There are two large tubercles on the sides of the seventh and eighth segments. It is a sluggish caterpillar and is generally seen in a motionless condition, clasping the stem of its food-plant with its prolegs, and holding the rest of its body in a perfectly rigid position like a small branch. The pupa is enclosed in a cocoon of silk and refuse on the surface of the ground.

The perfect insect appears in January, February and March. It is a forest-dwelling species, and may often be captured in some numbers, at dusk, on the flowers of the white rata (*M. scandens*). It is very sluggish and nearly always drops to the ground when disturbed and feigns death.

Genus 9.—DECLANA, Walk.

"Face roughly haired. Antennæ in male bi-pectinated to apex or simple. Palpi with second joint ascending, rough-haired, terminal joint rather long, slender, clavate, porrected. Thorax densely hairy above and beneath, with more or less developed median crest. Femora densely hairy. Fore-wings in male without fovea; vein 6 sometimes out of 9, 10 sometimes out of 9, connected or anastomosing with 9, 11 sometimes out of 10,

sometimes connected or anastomosing with 10."—(Meyrick.) (Plate II., figs. 56 and 57, neuration of *Declana floccosa*, 58 head of ditto.)

We have seven species.

DECLANA ATRONIVEA, Walk.

(*Detunda atronivea*, Walk., Suppl. ii. 619. *Chlenias* (?) *manxifera*, Fereday, Trans. N. Z. Inst. xii. (1879), 268, pl. ix. 1. *Detunda atronivea*, Meyr., ib. xvi. 101.)

(Plate X., fig. 33 ♂, 34 ♀; Plate III., fig. 18, larva.)

This very handsome and conspicuous insect appears to be restricted to the North Island, where it is rather rare. It has occurred at Wellington, Otaki, and Napier.

The expansion of the wings of the male is 1⅝ inches, of the female nearly 2 inches. The fore-wings are *brilliant shining white, with numerous black markings*; these consist chiefly of three irregular branching transverse bands, and a series of wedge-shaped spots on the termen; the larger markings are brownish in the centre. The hind-wings are dark grey, becoming almost black on the termen, with a fine wavy transverse black line.

This species varies considerably in the size and shape of the black markings on the fore-wings, which are often slightly different on the opposite sides, in the same specimen.

The eggs of this moth are oval in shape, slightly roughened on the surface and light blue in colour. They are deposited towards the end of October. The young larva escapes by gnawing a hole out of the side.

When first hatched it is dull brownish-black, with creamy-white lateral lines and prolegs; the head is reddish. It feeds on *Panax arborea*. After the first moult the lateral lines become much wider, especially towards the head. After the second moult the two dorsal tubercles are fully developed, the thoracic segments much swollen and flattened above, the latter bearing traces of the black markings of the full-grown larva. After the third moult the larva becomes a dark brownish colour inclining to chocolate on the dorsal surface. The characteristic markings on the penultimate and anal segments of the adult larva now appear, and the dorsal tubercles are yellowish in colour; the extra prolegs are very small, and are visible as wart-like appendages on the lower surface of the tenth segment.

The full-grown caterpillar is a remarkable-looking animal. The head is very small; the first three segments of the body are enormously swollen and flattened above, the flattened portions being white, with several small black ring-shaped markings; there is a pair of large yellowish tubercles on the dorsal surface of the seventh segment, and two smaller ones on the tenth and eleventh segments; the larva is much stouter towards the posterior extremity, especially behind the ninth segment; the penultimate segment is furnished with a large creamy-white ridge, starting on the back and proceeding downwards and forwards; the extra pair of prolegs is small and only occasionally used in walking. The general colour of the larva is brownish- or blackish-green; the tenth and eleventh segments are generally darker, and there are many fine parallel lines of darker colouring on the central portions of the larva; the whole insect is also speckled with black; the spiracles are red. The larva varies a good deal in colour, but its peculiar structure will at once distinguish it from any other.

These larvæ often coil themselves up when at rest, clinging firmly with their large prolegs to their food-plant. Whilst thus engaged they have a very remarkable appearance. I have not yet ascertained the precise object of the peculiar shape and coloration of this caterpillar. It appears to resemble very closely a lichen-covered twig, but I suspect in this case there is something more special aimed at.

In connection with this subject, it is noteworthy that the flattened extremities of the elytra of the beetle, *Ectopsis ferrugalis*, closely resemble in both shape and colour the remarkable anterior segments of the larva of *D. atronivea*. As both insects feed on the same plant, and thus exist under very similar conditions, it is highly probable that the peculiarities have been independently acquired in each species for similar purposes.

The pupa is enclosed in a light cocoon amongst dead leaves, &c, on the surface of the ground.

The perfect insect appears in February and March, and may sometimes be taken at blossoms in the evening. It is also attracted by light, and has been found occasionally, in the daytime, resting on tree-trunks. It hibernates during the winter, coming abroad again the following spring to lay its eggs. I have observed that a good many pupæ from the autumnal brood do not emerge until September or October, so that the insect evidently spends the winter both as a pupa and as an imago.

DECLANA EGREGIA, Feld.

(*Chlenias egregia*, Feld. cxxxi. 24; Fereday, Trans. N. Z. Inst. xii. 268, pl. ix. 2. *Detunda egregia*, Meyr., ib. xvi. 101.)

(Plate X., fig. 35.)

This very handsome insect has occurred in the South Island at Nelson, Christchurch, Akaroa and the Otira Gorge.

The expansion of the wings is about 1¾ inches. *The fore-wings*

are creamy-white; there is a small dark brown mark at the base, a broad transverse wavy brown band before the middle, a very large four-cornered irregular brown mark beyond the middle, one of its corners touching the apex and the other the tornus; the termen is shaded with pale grey, and there is a series of faint brown marks on the costa and dorsum. The hind-wings are dull white, darker towards the termen; there are two very faint transverse lines.

The perfect insect appears from November till February. It is a very rare species.

Described and figured from a specimen in Mr. Fereday's collection.

DECLANA FLOCCOSA, Walk.

(*Declana floccosa*, Walk. xv. 1649. *Argua scabra*, Walk, xxviii. 448. *Declana feredayi*, Butl., Proc. Zool. Soc. Lond. 1877, 398, pl. xliii. 5. *Declana nigrosparsa*, Butl., Cist. Ent. ii. 500. *Declana floccosa*, Meyr., Trans. N. Z. Inst. xvi. 102.)

(Plate X., figs. 39 to 43 ♂ varieties, 44 to 47 ♀ ditto.)

This species has occurred very commonly at Wellington, Christchurch and Dunedin. It is probably generally distributed throughout the country.

The expansion of the wings is about 1⅜ inches. The fore-wings are pale greyish-white with numerous small brownish-black streaks, exhibiting a slight concentration near the apex. The hind-wings are dull white, clouded with greyish towards the termen.

This insect is so extremely variable that I have given descriptions of a few of the principal varieties below; all these forms may, however, be connected by specimens exhibiting every intermediate gradation both in colour and in markings.

1. Fore-wings with several large brown spots near the middle.

2. Fore-wings covered with numerous black spots (formerly known as *Declana nigrosparsa*) (fig. 47).

3. Fore-wings with two more or less conspicuous curved black or brown lines from costa to dorsum (figs. 41, 42, and 44).

4. Fore-wings with these transverse lines joined by two others running parallel to dorsum and costa.

5. Fore-wings with transverse lines and black spots (fig. 43).

6. Fore-wings diffused with dark greyish-black, except two broad bands of the original light colour extending from costa to dorsum; hind-wings darker than usual (fig. 45).

7. Fore-wings with a dark brown central band; hind-wings clouded with dark brown towards termen, with a faint curved transverse line near the middle (figs. 39 and 40).

All these varieties occasionally have tufts of orange-yellow scales on both the wings and on the body, and they also vary in other minor particulars (fig. 46).

The egg of this insect when first laid is oval in shape and light green in colour, becoming bronzy a few days before the emergence of the larva. The young larva is very attenuated, with only ten legs. Its colour is pale yellow striped with brownish-pink near the segmental divisions. It is very active, and does not devour the egg-shell after emergence.

The full-grown larva has the body much flattened underneath. In colour it is pale brownish-pink, with numerous irregular darker markings, which in some specimens almost form two broad subdorsal lines. The under surface of the larva is pale green. There is a series of fleshy filaments of a pinkish-brown colour along each side of the insect, and an extra pair of prolegs on the ninth segment.

This caterpillar is, however, very variable, its colouring appearing to depend largely on its surroundings. The favourite food-plants are *Leptospermum ericoides* and *Aristotelia racemosa*. The

larvæ found on the former plant are usually pale yellowish-brown, whilst those from the latter are much darker brown, often mottled with grey like the stems of the *Aristotelia*. A specimen I once found on a mountain beech (*Fagus cliffortioides*), the gnarled stem and branches of which were covered with grey lichens and mosses, was mottled with the most beautiful shades of greenish-grey. These larval varieties are very interesting, and in order to test the direct influence of food on the colouring of the larvæ, I once divided a batch of eggs deposited by a single female into two equal parts, and fed one half on *Aristotelia*, and the other half on *Leptospermum*. The differences in colouring between the two lots of larvæ thus treated were, however, of the most trivial description. This somewhat surprised me at first, as I had previously observed quite distinct varieties on each plant, when found in a state of nature. Hence I am now disposed to think that these differences have been brought about gradually, by natural selection acting on larvæ feeding on the same plant for a large number of generations. By this means a sufficient amount of variation might be accumulated, to cause the closest possible approximation in colouring to the stems of the several food-plants. It is also noteworthy that many of these food-plants grow in widely dissimilar localities, so that the free inter-breeding of insects dependent on them would not be likely to occur, and thus the peculiarities of colouring adapted to the stems of each food-plant would not be disturbed by the effects of inter-breeding.

In connection with the foregoing experiment it is also interesting to observe, that the specimens fed on *Aristotelia* matured much more rapidly than those on

Leptospermum; the former plant evidently being the more nourishing food for the larvæ. Also that out of the batch fed on *Aristotelia* 28 became moths, of which 12 were males and 16 females; whilst out of those fed on *Leptospermum* only 24 became moths, of which 15 were males and 9 females. In all other respects, excepting food-plant, the two lots of larvæ were subjected to identical treatment.

During the day this larva rests quietly attached to the stem of its food-plant, where it is very difficult to detect, as the filaments so closely embrace the twig or tree-trunk that the whole insect exactly resembles a swelling in the stem.

The pupa of *D. floccosa* is enclosed in a loose cocoon on the surface of the ground.

The perfect insect appears about September, and continues in more or less abundance until the end of April. There are most likely several broods in a season, and, as we frequently meet with specimens of the moth on mild days in the middle of winter, it probably also hibernates.

This insect is usually observed at rest on fences and tree-trunks, where its grey mottled colouring causes it to closely resemble a patch of lichen.

DECLANA JUNCTILINEA, Feld.

(Plate X., fig. 37 ♂, 38 ♀.)

This species has occurred occasionally in the Wellington Botanical Gardens. It is no doubt found

elsewhere, but I cannot give any other localities with certainty.

The expansion of the wings of the male is 1¼ inches, of the female 1⅜ inches. The fore-wings of the male are pale yellowish-brown, with two indistinct, irregular, transverse darker lines near the base, a conspicuous curved line a little beyond the middle, followed by a blackish patch; *there is a series of very fine parallel oblique brown stripes on the costa*, and several series of curved, blackish marks near the termen, and on the central portions of the wing. The fore-wings of the female are much greyer, with a conspicuous, irregular, white streak from the apex towards the dorsum, the central portions of the wing are white, and, with the exception of the fine, oblique costal stripes, the other markings of the male are usually absent. The hind-wings of both sexes are dull ochreous. The strongly pectinated antennæ of the male, and the oblique costal markings of both sexes, will at once distinguish this species from any of the varieties of *Declana floccosa*.

This moth varies in the intensity of the markings, which in some specimens are very indistinct.

The perfect insect appears from November till March. It is generally captured on blossoms in the evening.

DECLANA HERMIONE, n. sp.

(Plate X., fig. 36.)

A single specimen of this very handsome insect was captured at Khandallah near Wellington.

The expansion of the wings is 1¼ inches. *The fore-wings are bright purplish-brown, clouded with silvery-white towards the middle and on the termen*; there is a very fine oblique chocolate-brown mark at the base, a broad broken transverse band at about one-eighth; a fine curved transverse line at about three-fourths, shaded towards the termen; there are four wavy brown marks

on the termen inclining obliquely upwards towards the costa; the termen itself is narrowly edged with chocolate-brown. The cilia are silvery mixed with brown; the termen is very strongly bowed. The hind-wings are grey, shaded with purplish-grey towards the termen; the cilia are grey.

The type specimen was captured at sugar in November.

DECLANA GRISEATA, n. sp.

(Plate X., fig. 32 ♀.)

This species has occurred at Wellington in the North Island, and at Lake Wakatipu in the South Island.

The expansion of the wings of the male is 1⅛ inches, of the female 1⅜ inches. *The fore-wings are dull slaty-grey, with a slightly paler central band*; there is a fine oblique wavy transverse line at about one-fourth, another at about one-half, and indications of a third at about three-fourths; *numerous minute black streaks are thickly scattered over the wing, especially near the base and the termen*; the outline of the termen is very slightly scalloped. The hind-wings are pale grey, darker near the termen. The body is very dark slaty-grey. *The antennæ of the male are not bi-pectinated.*

The perfect insect appears in January, and is attracted by light. It is a scarce species.

DECLANA NIVEATA, Butl.

(*Declana niveata*, Butl., Cist. Ent. ii. 500. *Atossa niveata*, Meyr., Trans. N. Z. Inst. xvi. 104.)

This species has occurred at Dunedin, in the South Island.

"The expansion of the wings of the male is 30 mm. (about 1¼ inches). Fore-wings elongate-triangular, costa somewhat sinuate, termen rounded, dentate; dull white, faintly irrorated with grey; costa marked with short indistinct dark grey direct strigulæ; an irregular line towards base, and another twice angulated about two-thirds, obscurely indicated by dark grey scales; some scattered dark grey strigulæ before termen. Hind-wings moderate, termen crenate, angularly projecting in middle; wholly white.

"I took one fine specimen at rest on a tree-trunk near Dunedin, in February."—(Meyrick.)

Family 6.—**SPHINGIDÆ.**

"Head with dense appressed hairs. Ocelli absent. Eyes glabrous. Antennæ thickened towards middle or posteriorly, in male ciliated with partial whorls. Labial palpi moderate, ascending, with dense projecting scales. Thorax densely hairy beneath. Femora densely hairy. Fore-wings with vein 1*b* furcate, 6 out of 8, 9 absent (rarely present in exceptional individuals). Hind-wings with veins 3 and 4 approximated at base, 5 from middle of transverse vein, parallel to 4, 6 and 7 connate or stalked, 8 connected by oblique bar with margin of cell before middle, more or less approximated to 7 near beyond cell." (Plate I., figs. 12 and 13, neuration of *Deilephila* [after Meyrick].)

"This family is generally distributed, but is most plentiful in the tropics. The imagos are usually large insects, with stout, heavy bodies, elongate-triangular fore-wings with very oblique termen, and relatively small hind-wings; the wing muscles are very strong, and the flight exceptionally powerful. Ovum spheroidal, smooth. Larva stout, usually with an oblique, projecting anal horn, anterior segments sometimes retractile or raised in repose. Pupa subterranean."—(Meyrick.)

Only one genus is represented in New Zealand, viz., *Sphinx*.

Genus 1.—SPHINX.

"Tongue strongly developed. Antennæ less than one-half, gradually thickened to apex, then pointed, apex slender, hooked. Thorax with low double posterior tuft. Abdomen smooth, broad, conical, pointed. Tibiæ with appressed scales.

"A moderately large genus, ranging over the whole world, but principally characteristic of America. Imago flying at dusk, feeding on the wing."—(Meyrick.)

This genus is represented in New Zealand by one almost cosmopolitan species.

SPHINX CONVOLVULI, L.

(*Protoparce distans*, Butl. *Sphinx convolvuli*, Meyr., Trans. N. Z. Inst. xxii. 213.)

(Plate XIII., fig. 1.; Plate III., figs. 13 and 14 varieties of larvæ.)

This handsome insect often occurs in the northern portions of the North Island, but becomes very rare southward of Napier and New Plymouth. In the South Island it has been taken at Nelson, and recently a very mutilated specimen of what appears to be this species has been found by Mr. Philpott, near West Plains, Invercargill. With these exceptions I have not heard of its appearance in any other localities in the South Island.

The expansion of the wings is about 3½ inches. The fore-wings

are greyish-brown with several irregular, darker markings near the base; and a broad, dark, central band; beyond the central band there is a very irregular, pale grey, toothed line. The hind-wings are yellowish-grey, with four transverse, darker stripes, the outermost one strongly toothed. The head and thorax are dark grey, paler on the back, with two conspicuous tufts of pale grey hair on the shoulders. *The abdomen is grey, striped on the sides with rose-colour and black.*

The larva feeds on *Convolvulus*. Like many of the caterpillars of the *Sphingidæ*, there are two very distinct varieties: one is bright green, with white spiracles, and a series of diagonal yellow lines above them; the other is dull yellowish-brown, with broad blackish-brown dorsal and ventral lines, and a series of triangular blackish spots above the spiracles, which in this variety are jet-black. In both these forms of larvæ the anal horn is dark red tipped with black, and the skin is covered with numerous fine wrinkles. The length of the caterpillar when full grown is 3½ inches.

About the middle or end of February these larvæ generally bury themselves in the ground, where they are transformed into pupæ. They remain in that condition until the following summer.

The pupa is about 2 inches in length and is of a dark mahogany-brown colour. It is furnished with a large curved process, projecting from the lower side of the head, and containing the enormous proboscis of the future moth.

The perfect insect appears in November and December. It flies with incredible velocity at evening dusk, and is often observed hovering over flowers, and whilst poised in the air above them, extracts the

honey with its long proboscis. Mr. A. P. Buller has very kindly furnished me with the following interesting notes on the habits of this species, as observed by him in the Auckland district:—

"During the summer of 1879 I came across *S. convolvuli* in great numbers, near Ohinemutu, in the Hot Lake district, frequenting at dusk a tall, delicately perfumed meadow flower (*Œnothera biennis*, commonly called the evening primrose). They were to be seen on the wing soon after sundown, and on warm, still evenings literally swarmed. It was an extremely pretty sight to watch their rapid movements as they darted from flower to flower, never alighting, and keeping up a constant vibration of their wings as they probed the yellow blossoms. They appeared to be extremely local, for I only met with them on a few of the grassy slopes round the shores of Lake Rotorua. I visited the same locality two years later, at the same season, and only occasionally saw one, although the evening primrose was in full bloom at the time. In 1882 I captured several at flowers of the trumpet-tree (*Brugmansia*) in a garden near Auckland. The same summer I found large numbers of the larvæ at Waiwera (near Auckland), on a species of convolvulus growing in profusion on the sandhills in the vicinity. Although the larvæ were so abundant I never came across the perfect insect. I obtained some twenty or thirty of the pupæ, but unfortunately was never successful in hatching out the imago. As far as my knowledge goes, this beautiful moth is confined to the Auckland and Waikato districts, although I have heard of a single specimen being taken in Hawkes Bay."

I am also much indebted to Mr. Buller for the loan of

a very perfect specimen of this moth, expressly lent to me for figuring and describing in the present work.

Mr. Meyrick informs us that this insect occurs throughout Europe, Asia, Africa, Australia and the islands of the South Pacific, wherever a suitable situation is found, and has been met with far out at sea.[43] In America it is represented by a form which seems to be regarded as specifically distinct, but which he thinks is probably identical. If this be the case the insect is practically cosmopolitan.

III.—THE LASIOCAMPINA.

Not represented in New Zealand.

IV.—THE PAPILIONINA.

The *Papilionina* are distinguished by the following characters:—

"Head rough-haired. Ocelli absent. Tongue developed. Antennæ slender, dilated apically, forming a gradual or abrupt club. Labial palpi moderately long, more or less rough-haired, terminal joint rather pointed. Maxillary palpi obsolete. Thorax more or less hairy. Fore-wings with 1*b* simple, 1*c* absent, 5 usually from or above middle of transverse vein. Hind-wings without frenulum, 1*c* absent, 3 and 4 usually connate, 8 rising out of cell near base, rapidly diverging."—(Meyrick.) (See Plate I., figs. 7, 8, 15, 16, 25, 26, 27.)

This is one of the most interesting groups of the Lepidoptera. The insects comprised in it are popularly known as butterflies, and from their bright colouring and conspicuous appearance are always favourites with beginners. The *Papilionina* attain great development in the tropics, especially in South America, where, it is said, a single valley sometimes contains as many species as the whole of Europe. In New Zealand there are only fifteen species of butterflies, the group being extremely poorly represented both here and in the South Pacific Islands.

Formerly the *Papilionina* was known as the *Rhopalocera*, and was regarded as constituting a division of equivalent value to the remainder of the Lepidoptera, which was termed the *Heterocera*. For some time past entomologists have, however, practically abandoned this classification of the order, the *Heterocera*, or moths, being clearly composed of several groups each of equivalent value to the *Rhopalocera*, or butterflies. Mr. Meyrick states in his 'Handbook of British Lepidoptera' that the *Papilionina* "stands rather conspicuously isolated at the present day, but there is little doubt that its origin must be traced to the *Thyrididæ*, a family of the *Pyralidina*."

In this group the wings are generally held erect in repose, the under surface of the hind-wings and the apical portion of the under surface of the fore-wings being nearly always protectively coloured, these being portions of the wings exposed to view when the insect is at rest. There is an unusual amount of ornamental colouring on the upper surface. The flight is invariably diurnal. The larva has ten prolegs.

The three following families of *Papilionina* are represented in New Zealand:—

1. NYMPHALIDÆ.

2. SATYRIDÆ.

3. LYCÆNIDÆ.

Family 1.—**NYMPHALIDÆ.**

"Anterior legs in both sexes much reduced, useless for walking; posterior tibiæ without middle spurs. Fore-wings with veins 8 and 9 out of 7. Hind-wings with præcostal spur." (Plate I., figs. 7 and 8.)

"An extremely large family, mainly tropical. The species are of large or moderate size, usually dark-coloured, with light or bright bands or rows of spots.

"Ovum cylindrical or sub-conical, ribbed and often reticulated. Larva with pairs of tentacles or more usually series of bristly spines. Pupa exposed, suspended by the tail, often angular or with metallic spots."—(Meyrick.) (See Plate III., figs. 1, 2, and 3 larvæ, 27, 31 and 32 pupæ.)

We have three genera represented in New Zealand:—

1. ANOSIA.

2. VANESSA.

3. JUNONIA.

Genus 1.—ANOSIA.

"Eyes glabrous. Club of antennæ elongate, gradual. Fore-wings with vein 10 separate. Hind-wings with transverse vein present." (Plate I., figs. 7 and 8, neuration of *A. erippus*.)

"A genus of moderate extent, generally distributed within the tropics, with two or three species ranging beyond them. Imago with termen of fore-wings sub-concave. Larva with pairs of long tentacles. Both larva and imago are protected by a strong nauseous scent, or taste, and are uneatable to birds."—(Meyrick.)

We have two species in New Zealand.

ANOSIA ERIPPUS, Cr.

(*Papilio archippus*, Fabricius, Spec. Ins., p. 55, n. 243 (1781). *Danais archippus*, Butler, Butterflies of N. Z., Trans. N. Z. Inst. x. 265. *Anosia plexippus*, L.)

(Plate XI., fig. 1, fig. 2 under side; Plate III., fig. 3 larva, fig. 27 pupa.)

This handsome insect has occurred from time to time at various localities in both the North and the South Islands, but does not appear to be generally common. Particulars of the early captures of this butterfly are thus given by Mr. Enys[44]: "First recorded as a New Zealand insect by Mr. Fereday, in a paper read before the Canterbury Institute, January 2, 1874, and printed in vol. vi. of 'Transactions.' Mr. Fereday received the butterfly from F. H. Meinertzhagen, of Hawkes Bay. Dr. Hector also obtained it in Westland. It has also been caught near Auckland. In vol. xi. of

'Transactions' Mr. F. W. Sturm records that he first saw this insect, or a closely allied one, at the Reinga, up the Wairoa River, Hawkes Bay, December, 1840, or January, 1841. In 1848 he captured a number at the Waiau, a tributary to that river. Again in 1861 he captured three on the Rangitikei River near Mr. Birch's run. He also records other captures." From these records it will be seen that the insect was observed as early as 1840, and it thus seems scarcely probable that it was accidentally introduced by man, as Mr. Butler appears to suppose.[45] Recently *A. erippus* has occurred many times in the neighbourhood of Cook's Straits. In 1879 several specimens were bred from larvæ found by Mr. C. W. Lee near Wangaehu. In 1881 I captured two specimens near Nelson and saw three others. In 1890 two specimens were taken by Mr. R. I. Kingsley, and in January of the following year I captured two more, all near Nelson. During the autumn of 1892 one specimen was taken near Otaki by Mr. Rutherfurd, and several others were seen. The same year a specimen was also taken by Sir James Hector at Petone. In 1896, I understand from Mr. Kingsley, several specimens were again seen in the Nelson district.

The expansion of the wings is from 3¾ to 4¼ inches. Above, all the wings are rich orange-brown bordered with black, the veins are also black. There are two rows of small white spots round the margins of all the wings, and several orange-brown spots near the apex of the fore-wings. Beneath, the markings are similar, except that the white spots are larger, and the hind-wings are very pale yellowish-brown. The male has a black chitinous spot on vein 2 of the hind-wings which is wanting in the female; the wing-veins in the male are also slightly narrower.

The larva of this insect feeds on most of the different

kinds of milkweed (*Asclepias*), and also upon dogbane (*Apocynum*). A single caterpillar, fully grown, which was found in a building in the centre of the town of Wellington, formed the subject from which the figures of the metamorphosis of this insect were taken, but this specimen did not afford sufficient material for an exhaustive investigation of the life-history. The following account, taken from Professor Riley's 'Third Annual Report of the Noxious, Beneficial, and other Insects of the State of Missouri,' is therefore inserted:—

"The egg is invariably deposited on the under side of a leaf, and is conical and delicately reticulate with longitudinal ribs, and fine transverse striæ. It is yellowish when first deposited, but becomes grey as the embryo within develops.

"In about five days after laying the egg hatches, and the young larva as soon as hatched usually turns round and devours its egg-shell—a custom very prevalent with young caterpillars. At this stage it differs considerably from the mature larva; it is perfectly cylindrical, about 0·12 inch long, and of much the same thickness throughout. The head is jet black and polished; the colour of the body is pale greenish-white, with the anterior and posterior horns showing as mere black conical joints, and with two transverse-oval black warts, nearer together, on the first joint. It is covered with minute black bristles, arising from still more minute warts.

"When the young larva is three or four days old a dusky band appears across the middle of each joint, and by the fifth or sixth day it spins a carpet of silk upon the leaf, and prepares for its first moult. After the first moult the anterior horns are as long as the thoracic legs, the posterior ones being somewhat shorter; the characteristic black stripes show quite distinctly, but the white and yellow stripes more faintly. After this it undergoes but slight change in appearance, except that the colours become brighter, and that at each successive moult the horns become relatively longer. There are but three moults, and the intervals between them are short, as the larvæ frequently acquire their full growth within three weeks from hatching.

"As soon as the larva is full grown it spins a little tuft of silk to the under side of whatever object it may be resting upon, and after entangling the hooks of its hind legs in the silk it lets go the hold of its other legs and hangs down, with the head and anterior joints of the body curved. In this position it hangs for about twenty-four hours, during which the fluids of the body naturally gravitate towards the upturned joints, until the latter become so swollen that at last, by a little effort on the part of the larva, the skin bursts along the back behind the head. Through the rent thus made the anterior portion of the pupa is protruded, and by constant stretching and contracting the larval skin is slipped and crowded backwards until there is but a small shrivelled mass gathered around the tail. Now comes the critical period—the culminating point.

"The soft and supple chrysalis, yet showing the elongate larval form with distinct traces of its prolegs, hangs heavily from the shrunken skin. From this skin it is to be extricated and firmly attached to the silk outside. It has neither legs nor arms, and we should suppose that it would inevitably fall while endeavouring to accomplish this object. But the task is performed with the utmost surety, though appearing so perilous to us. The supple and contractile joints of the abdomen are made to subserve the purpose of legs, and by suddenly grasping the shrunken larval skin between the folds of two of these joints as with a pair of pincers, the chrysalis disengages the tip of its body and hangs for a moment suspended. Then with a few earnest, vigorous, jerking movements it succeeds in sticking the horny point of its tail into the silk, and firmly fastening it by means of a rasp of minute claws with

which that point is furnished. Sometimes severe effort is needed before the point is properly fastened, and the chrysalis frequently has to climb by stretching the two joints above those by which it is suspended, and clinging hold of the shrivelled skin further up. The moment the point is fastened the chrysalis commences, by a series of violent jerkings and whirlings, to dislodge the larval skin, after which it rests from its efforts and gradually contracts and hardens. The really active work lasts but a few minutes, and the insect rarely fails to go through with it successfully. The chrysalis is a beautiful object, and as it hangs pendant from some old fence-board or from the under side of an *Asclepias* leaf, it reminds one of some large eardrop; but, though the jeweller could successfully imitate the form, he might well despair of ever producing the clear pale-green and the ivory-black and golden marks which so characterize it.

"The chrysalis state lasts but a short time, as is the case with all those which are known to suspend themselves nakedly by the tail. At the end of about the tenth day the dark colours of the future butterflies begin to show through the delicate and transparent skin, and suddenly this skin bursts open near the head, and the newborn butterfly gradually extricates itself, and stretching forth its legs and clambering on to some surrounding object, allows its moist, thickened, and contracted wings to hang listlessly from the body."

The perfect insect appears in March and April, hibernated specimens being met with in the spring. It is a most striking species on the wing, and one which, when once seen, is not likely to be forgotten.

ANOSIA BOLINA, L.

(*Diadema nerina*, Butler, Butterflies of N. Z., p. 13. Female.—*Papilio nerina*, Fabr., Syst. Ent., p. 509, n. 277 (1775); Donovan, Ins. of New Holland, pl. 27, fig. 1 (1805). *Papilio iphigenia*, Pap. Exot., 1, pl. lxvii., figs. D, E, (1775). Var. *Papilio proserpina*, Cramer, Pap. Exot., 3, pl. ccxviii., figs. C, D, (1782). Male ? *Papilio auge*, Cramer, Pap. Exot., 2, pl. cxc., figs. A, B (1779).)

(Plate XII., fig. 7 ♂, 8 ♀, 9 under side.)

This fine species appears to be rare in New Zealand, but I think it has now occurred often enough to entitle it to a place amongst our native butterflies. The following is a list of the captures so far as I am able to ascertain them:—

From Mr. Eny's 'Catalogue of New Zealand Butterflies'[46] the first specimen taken appears to have been a male, which was captured by Dr. Sinclair, of Auckland, and sent to the British Museum before the year 1855. The Rev. Richard Taylor also caught one male specimen in his garden at Wanganui, and saw another, the only two he observed in thirty-four years. Dr. Baker saw one in his garden at Christchurch on lilac flowers, also a male. Mr. R. W. Fereday[47] records the capture of the first female specimen by a son of Mr. Thomas Tanner, near Napier, in January, 1876. On the 18th of March, 1885, Mr. R. I. Kingsley[48] took a fine female specimen in Nelson, and on the 25th of March, 1886, I saw another female specimen in the same locality; I also understand that quite a number of specimens of both sexes have been recently captured in the neighbourhood of Auckland.[49]

From the foregoing records, I think that there are

very good reasons for regarding this as an indigenous species, as it is very improbable that such a large number of specimens would have been accidentally introduced to the various localities at so many different times.

The expansion of the wings of the male is 3½ inches, of the female 4 inches. On the upper side all the wings of the male are rich brownish-black, with a large white blotch in the middle of each, surrounded by a patch of brilliant flashing blue; there is also a small white spot near the apex of the fore-wings and a series of white crescent-shaped markings on the termen of all the wings. The fore-wings of the female are brownish-black, with a patch of deep orange-brown near the tornus; there is a series of four very large oval white spots on the costa, beyond the middle, a smaller white spot near the apex, and three rows of small white marks parallel to the termen; the hind-wings are brownish-black, with a broad white band across the middle, several small white spots, and a double series of white markings parallel to the termen; all the wings of the female have brilliant bluish reflections near the white spots. On the under side the wings of both sexes are rich brown with white markings, and a double series of white crescents on the termen.

The female appears to be very variable in almost every respect.

The perfect insect appears in January, February and March. From its large size and brilliant colouring it is easily recognised. Although rare in New Zealand, it is very common in Australia. It also occurs in Java, New Guinea and the Loyalty Islands. A smaller representative is found in Samoa (*Anosia otaheitæ*, Feld.), which is probably only a variety of this species.

The figures and descriptions of this insect are taken from Australian specimens, which were kindly

forwarded to me by the late Mr. Olliff.

Genus 2.—VANESSA.

Eyes hairy. Club of antennæ abrupt. Fore-wings with vein 10 separate. Hind-wings with transverse vein present.

"A moderate genus, principally characteristic of the Northern Hemisphere. Larva with six or seven rows of bristly spines. Pupa with angular prominences, often with golden metallic spots."—Meyrick.

Of this very beautiful and interesting genus we have three species in New Zealand.

VANESSA GONERILLA, Fabr.

(*Papilio gonerilla*, Fabricius, Syst. Ent. p. 498, n. 237 (1775); Donovan, Ins. New Holland, pl. 25, fig. 2 (1805). *Vanessa gonerilla*, White in Taylor's New Zealand, pl. 2, fig. 1 (1855).)

(Plate XII., fig. 5, 6 under side; Plate III., figs. 1 and 2 larvæ, 31 and 32 pupæ.)

This handsome insect is the most familiar of New Zealand butterflies. It is very common and generally distributed throughout the country.

The expansion of the wings varies from 2⅜ to 2¾ inches. Above, all the wings are black, becoming bronzy towards the body. *The fore-wings have a band of dark red nearly across the middle, and a series of three small blue spots, and three larger white spots near the apex. The hind-wings have a broad dark red band near the termen, containing two pairs of black spots with blue centres.* On the under side the fore-wings are dark brown, with a broad patch of red in the middle, and a very conspicuous eye-like mark on the costa, consisting of a black central spot

surrounded by a blue ring, and encircled by a yellow crescent towards the termen. The hind-wings are brownish-grey, with many darker and paler markings; the four spots on the upper surface are faintly indicated on the under side by blackish rings and central dots; the colouring of the under side varies a good deal. It is considerably darker and duller in some specimens than in others.

The egg, which is deposited on a nettle-leaf, is barrel-shaped, ornamented with a series of longitudinal ribs meeting in a central spot on the top. It is pale green, with the ribs white. The young larva, when first hatched, is dusky-yellow, with the spines black. In about a week it moults for the first time, and is then of an almost uniform brown, with the lateral lines faintly indicated. Ten days later it again sheds its skin, after which time the white lateral markings are considerably stronger. The full-grown larva varies from black to reddish-brown, with interrupted pale lateral and dorsal lines. On the third and fourth segments there are four spines, on the fifth to eleventh seven spines; the twelfth segment has six spines, and the thirteenth two spines. There are numerous white dots all over the larva. The spines vary from pale green to black. The caterpillar is considerably attenuated at each end, the central portions being somewhat swollen. Length about 1½ inches.

This caterpillar constructs for itself a small tent by fastening together several of the leaves of its food-plant. In this dwelling it can feed, safely concealed from all enemies. There are two kinds of nettles constituting the food of this insect—one a small plant, which generally grows in little patches amongst ferns in the forest (*Urtica incisa*), the other a large shrub or tree often found in rather open situations near rivers (*Urtica ferox*). The shrub is easily recognised by the formidable array of long, white spines which project from the midrib of each leaf. The larvæ of *V. gonerilla* are much more easily collected on the tree nettle than on the dwarf species; their leafy tents being easily detected by an examination of the foliage. When once discovered the larvæ are best obtained by cutting off, with a pair

of strong scissors, the leaves which form their habitations. Like most larvæ of the genus *Vanessa*, these caterpillars are extremely voracious and soon eat themselves out of house and home. Those feeding on the tree nettle have an unlimited supply of leaves available both for food and shelter, but in the case of larvæ, which are dependent on the dwarf nettle for their supplies, no doubt individuals must occasionally die of starvation, as we sometimes observe large patches of the *Urtica incisa* completely destroyed by the larvæ of this butterfly. In some seasons these larvæ may be found as early as the middle of September, and continue abundant until the middle or end of January.

When full grown, this caterpillar suspends itself by the tail to a little patch of silk, which it has spun on the under side of a leaf, having also drawn two or three other leaves around it in the same way as the feeding larva. In this situation it hangs, with the head and three anterior segments slightly curved upwards, for nearly twenty-four hours before the transformation to the pupa state occurs. I have often watched these larvæ changing, and as their manœuvres during the process exactly resemble those of *Anosia erippus* a special description is unnecessary. The actual transformation may be easily observed in this species, as the larvæ are common and can be obtained in large numbers. It is well worth watching, and if a good many specimens are kept at once, some of them are sure to change at a convenient time for observation. The pupa varies from pale yellowish-brown to dark purplish-brown, darker on the wing-cases and ventral surface. The spines on the back are golden. The whole insect is also speckled with brown or black dots. The pupa

varies considerably in size as well as in colour. In this insect the pupa state is of very short duration, usually only lasting about a fortnight. I am informed by Mr. Helms that the pupa of *Vanessa gonerilla* is often destroyed by the common hemipteron, *Cermatulus nasalis*, which penetrates its shell by means of its long rostrum, and speedily consumes the liquid internal portions.

The perfect insect usually emerges early in the morning. It dries its wings for a few hours whilst resting on the old nettle-leaves which formed its home when a larva. The increasing warmth of the sunshine soon hardens the wings sufficiently to allow the new-born butterfly to fly away.

This insect is very common in most situations from January till April. It lives through the winter, appearing again on fine days towards the end of August. During the spring and early summer these hibernated individuals occur in great profusion, a few specimens always remaining until the earliest of the new ones have emerged; so that about December we may occasionally observe both hibernated and recent specimens together.

In the autumn these butterflies may be seen feeding on the flowers of the scabious and the white rata, thus preparing for their long winter sleep. In the spring, however, the insect is most abundant in the vicinity of the nettle-plants, where the females are busily engaged depositing their eggs.

I have noticed that this insect possesses the power of emitting a distinct grating or hissing noise, evidently

closely resembling the sound, which has been observed to be emitted by several European species of the genus.[50] This sound is only made when a specimen is roused from a semi-torpid condition; and it is thought that it may be useful to the insect for the purpose of intimidating intruders during its period of hibernation.

This butterfly is a rapid flier and may often be seen pursuing a straight course high above the tree-tops, apparently migrating in search of fresh breeding-grounds. It appears to have a singular liking for hill-tops, and a specimen which has selected one of these places will keep on returning to the same spot, after being repeatedly frightened away. In such situations, if the weather be calm and sunny, we may frequently see two specimens engaged in aerial battle. They fly upwards, and coursing round each other with great velocity, almost disappear in the clear blue sky. A few seconds later the two insects, gently fanning their wings in the warm sunshine, are again seen in their respective places.

VANESSA ITEA, Fabr.

(*Papilio itea*, Fabr., Syst. Ent., p. 498, n. 238 (1775); Donovan Ins. New Holland, pl. 26, fig. 1 (1805). *Vanessa itea*, Godart, Enc. Meth. ix. p. 321, n. 57 (1819); White in Taylor's New Zealand, pl. 2, figs. 2, 2 (1855). *Bassaris itea*, Hubner, Samml. Esot. Schmett. (1816-24). *Pyrameis itea*, Doubleday, Gen. Diurn. Lepid., p. 202 (1849).)

(Plate XII., fig. 3, fig. 4 under side.)

This beautiful butterfly is, I believe, fairly abundant in the northern portions of the North Island, but

becomes scarcer southwards of Napier and New Plymouth. In the South Island I believe I once saw a specimen at Nelson, but beyond that I can find no record of its occurrence there.

The expansion of the wings is about 2 inches. The fore-wings are black, becoming reddish-brown speckled with gold towards the base; *there is a very broad yellow band nearly across the middle, and one yellow and two white spots near the apex*. The hind-wings are rich reddish-brown, broadly bordered with black, especially towards the costa; there are four small black spots with blue centres near the termen, and a blue stripe bordered with black at the tornus. The under surface closely resembles that of *Vanessa gonerilla*, except that the red patch on the fore-wings is replaced by pale yellow, and the markings on the hind-wings are more sharply defined.

The perfect insect appears from January till April, hibernated specimens occurring in the spring. It is very fond of selecting a perch on the top of a hill, and often engages in violent encounters with *Vanessa gonerilla*. During the contest both insects course round each other with great rapidity, and generally ascend to a considerable elevation. They almost invariably return to their former resting-places. This is a fortunate habit for the collector, as it frequently enables him to ultimately capture a specimen, which he has almost touched with the net on several previous occasions. I have noticed this propensity to return to a favourite perch in the European species of the genus *Vanessa*, so that it is most likely a congenital habit, probably of great antiquity.

This insect has a fine appearance when flying; the large yellow spots on the forewings are then very conspicuous, and ensure its immediate and certain recognition.

VANESSA CARDUI, L.

(*Vanessa cardui*, L. *Cynthia kershawii*, McCoy, Ann. and Mag. Nat. Hist. iv., vol. i. p. 76 (1868). *Pyrameis cardui*, var. *P. kershawii*, Butler, Erebus and Terror Lep., p. 29 (1874).)

(Plate XII., fig. 1, 2 under side.)

This elegant butterfly occurs throughout both islands, but is very irregular in its appearance. In some years it is quite abundant, whilst in others scarcely a specimen will be seen. During the summer of 1889-1890 it was extremely plentiful in the Wellington district, being at that time much commoner than *Vanessa gonerilla*, but its appearance in such large numbers as this was, I think, very exceptional.

The expansion of the wings varies from 2 to 2¼ inches. *Above, all the wings are orange-red, spotted and mottled with black.* The fore-wings are bronzy towards the base; *in the black apex there are five white spots*. Near the termen of the hind-wings three of the black spots have blue centres. On the under side of the fore-wings the markings are very similar to those on the upper side, except that there are several additional white blotches, and the orange-red ground colour has a rosy blush towards the base. The hind-wings are very beautifully mottled with an elaborate series of pale brown, purplish-grey, yellowish-brown, and white markings; three of the large spots near the termen have pale blue centres.

I have not yet met with the larva of this insect, neither can I find any record of its having been observed in New Zealand. The following description by Mr. Stainton is taken from a European specimen: [51] "The spiny larva is brown with two dorsal and two lateral yellow lines; on the third, fourth, and twelfth segments there are four spines; on the fifth to eleventh segments seven spines, and on the

thirteenth two spines; it feeds solitarily in rolled thistle-leaves."

The perfect insect appears in January, February, March and April, hibernated specimens occurring from August until December. It is a much more wary butterfly than either *Vanessa gonerilla* or *V. itea*, and can seldom be captured after it has once been disturbed, although it will often return to the same spot several times in succession. In fact, owing to its extreme timidity, its capture is generally attended with some difficulty.

This insect is found almost throughout the entire world. In specimens from the Northern Hemisphere the black spots on the hind-wings have no blue centres, and the butterflies are a little larger than those found in the Southern Hemisphere, otherwise the two insects are exactly alike. The southern form has been called *V. kershawii* by several writers, but the differences do not appear to me to be sufficiently important to merit a distinct specific name, especially as both forms occur together in South Africa.

This insect has frequently been observed at various places on the European Continent migrating in vast swarms; and it seems probable that its strong migratory instinct may have led to its enormously wide range at the present time.

Genus 3.—JUNONIA.

"Eyes glabrous. Club of antennæ abrupt. Fore-wings, with vein 10 separate. Hind-wings with transverse vein, absent between

veins 4 and 5." (Meyrick.)

We have one species in New Zealand.

JUNONIA VELLEDA.

(Plate XI., fig. 16, fig. 17 under side.)

This butterfly was very common in the neighbourhood of Wellington during the summer of 1886-87. To the best of my knowledge the insect had not previously been observed in New Zealand, but I understand from Mr. R. Holloway that he has since met with it on the sea-coast near New Plymouth, in 1893, and at Motueka in 1898.

The expansion of the wings is nearly 2 inches. On the upper side all the wings are dull blackish-brown, with greenish or bronzy reflections. The fore-wings have two broad orange-brown stripes on the costa, and *a very large patch of the same colour along the termen, containing a large black spot with a bluish-white centre*; there are three irregular whitish marks near the apex of the wing, and a minute blue-centred ocellus. The hind-wings have *two very large orange-brown spots almost touching each other near the termen; each of these contains a large blue-centred ocellus in the middle*; there are also two terminal rows of brown crescent-shaped markings. Underneath, the markings of the fore-wings resemble those of the upper side, but they are very much paler, and the ground colour is light brown. The hind-wings are pale brown, with a wavy black line across the middle, followed by a brown shading towards the termen; there are also four small round black spots and a series of irregular black dots near the termen.

The perfect insect occurred very plentifully in December, January and February, and was fond of settling on barren, stony places in the hot sunshine. It was very timid and difficult to catch, darting off

with great rapidity when approached. During the season I managed to secure about nine specimens, some of them in very good condition. I am unable to explain the sudden appearance of this butterfly in New Zealand during the above-mentioned year. The large numbers, which were observed over extended areas, almost seem to forbid its accidental importation from Australia, whilst the distance of New Zealand from that continent would render immigration a most unlikely circumstance. On the other hand, if the insect is a regular inhabitant of this country, it is strange that it had never before been observed. When on the wing, its superficial resemblance to *Vanessa cardui* may have led to its having been overlooked, and hence it is very desirable that entomologists should use every effort to detect it in the future.

According to Mr. Olliff, this butterfly has a very wide geographical range, being found in Java, Sumatra, Tasmania and all parts of the Australian Continent. About the year 1830 it was described by Stephens, in his 'British Entomology,' under the name of *Cynthia hampstediensis*, on account of its having been taken at Hampstead, the well-known suburb of London. Subsequently it transpired that the specimen in question was no doubt of foreign origin, its "appearance" having been due to a practical joke perpetrated on the British Lepidopterists of the day.

Family 2.—**SATYRIDÆ.**

"Characters of *Nymphalidæ*, but fore-wings with vein 12 greatly dilated towards base." (Plate I., figs. 25, 26, and 27, neuration of *Erebia pluto*.)

"A large group of very general distribution. The species are usually of moderate size, generally dark coloured with light bands or spots, and with several round, black, white-centred spots on lower surface. Some of them are more fond of shady places than is customary in this group.

"Ovum spherical-ovate, surface reticulated and often ribbed. Larva more or less tapering towards extremities, with short hairs; segment 13 ending in two points; feeding on grass. Pupa suspended by the tail or unattached, sometimes subterranean."—(Meyrick.) (See Plate III., figs. 4 and 5 larvæ, 28 and 29 pupæ.)

Of this family we have three genera represented in New Zealand:—

1. ARGYROPHENGA.

2. DODONIDIA.

3. EREBIA.

Genus 1.—ARGYROPHENGA.

Eyes glabrous. Club of antennæ somewhat abrupt. Fore-wings with lower margin of cell greatly dilated towards base; veins 8, 9, 10, and 11 out of 7; vein 12 greatly dilated towards base.

Of this genus there is one species in New Zealand.

ARGYROPHENGA ANTIPODUM, Doubleday.

(*Argyrophenga antipodum*, Doubleday, Ann. and Mag. Nat. Hist. xvi. p. 307 (1845); Gen. Diurn. Lepid. pl. 63, fig. 6 (1851); Butler, Erebus and Terror Lep., pl. 8, figs. 4, 7 (1874).)

(Plate XI., fig. 4 ♂, 5 ♀, 3 variety, 6 under side of ♂, 7 under side of variety; Plate III., fig. 4 larva, fig. 29 pupa.)

This species occurs commonly on the tussock lands from Christchurch to Invercargill. In the provinces of Nelson and Marlborough it is, I believe, confined to situations having elevations of from 2,000 to 4,000 feet above the sea-level. It has never been captured in the North Island.

The expansion of the wings varies from 1⅜ to 1¾ inches. *Above, all the wings are dull brownish-black, paler near the body; the outer portion of each is covered with a large patch of bright orange-brown (northern form), or fawn colour (southern form); on the fore-wings this patch contains a large oval black spot, with two white dots in the middle; on the hind-wings there are two, three, or four black spots, with one white dot in the centre of each*; beneath, the markings on the fore-wings resemble those of the upper surface, except that there are often several short silvery stripes near the apex; the hind-wings are dull yellow, with silver streaks between the veins, and one broader streak in the centre of the wing. The female is much paler than the male, with the borders of the wings whitish.

This insect is extremely variable. The colouring appears to be much influenced by local conditions. On the Dun Mountain, Nelson district, at an elevation of about 2,700 feet, a very small light form occurs in which the sexes are almost exactly alike. There are only two perfect spots on the upper surface of the hind-wings; the other spot is rudimentary, and has no white central dot. On the under side there are no silver stripes near the apex of the fore-wings, and only five or six silver stripes on the marginal portions of the hind-wings (see Plate XI., figs. 3 and 7). At

Kekerangu, on the "Chalk Range," at an elevation of from 3,000 to 4,000 feet, a similar but slightly larger form occurs. On the Tableland of Mount Arthur, Nelson district, 3,600 to 4,600 feet above the sea-level, the females are paler than in either of the preceding forms, and the males darker, so that the sexes are well marked; but there are no silvery stripes on the under side of the apex of the fore-wings, and usually only five stripes on the marginal portions of the hind-wings. Finally, in the Canterbury, Otago and Southland butterflies (southern form), we have the large, very dark reddish-brown coloured male insect with large ocelli, and the extremely pale yellow female with small ocelli, the two sexes here exhibiting the greatest differentiation. On the under side, the male has several small silver stripes near the apex of the fore-wings, and seven stripes on the marginal portions of the hind-wings. (See Plate XI., figs. 4, 5, and 6.) In elevated situations in Canterbury, however, I have taken a somewhat similar variety to that found on the Mount Arthur Tableland. I have also taken similar forms on Mount Robert near Lake Rotoiti, Nelson district, these having, in addition, numerous white hairs on the wings near the body.

Besides these extreme variations, which appear to be largely dependent on local conditions, great variability exists with respect to the number and size of the ocelli or white-centred spots. In some specimens there are no ocelli on the hind-wings; in others, two, three, or four very minute ones, whilst others have all four very large. Occasionally specimens have a minute ocellus below the large one on the fore-wings. Were it not for the intermediate varieties, there would probably be little hesitation in

separating the extreme forms of this insect into several distinct species; but as they are connected by a host of intermediate forms, it is quite impossible even to divide them into varieties.

In a paper communicated to the 'Entomologist' in February, 1889,[52] by Mr. W. W. Smith, the author makes some interesting remarks on the variation of this butterfly, as observed by him in Canterbury and Otago. After pointing out the great diversity exhibited by different specimens in the depth of colouring, and in the number and size of the ocelli, he states that in his opinion the greatest variation occurs during the summers that succeed wet winters. In the year 1888 I had the opportunity of inspecting a most interesting series of this insect, presented by Mr. Smith to the Wellington Museum. They embraced specimens of very varied colouring, and included, amongst other remarkable forms, a male, which was entirely destitute of all ocelli, both on the fore- and on the hind-wings. Amongst these specimens, however, I did not see any resembling those I have described from Nelson and Marlborough. This collection has, I regret to say, since been disposed of by the Museum authorities, and cannot therefore be utilised by New Zealand students.

The larva of this insect feeds on the tussock grass (*Poa australis*). Its length, when full grown, is about 1 inch. The top of the head is furnished with a very large process, which projects forwards. The body is much attenuated towards the tail, which is bifid. The general colour is dull green, with a crimson line on each side and numerous alternate lines of yellow and white. The legs and prolegs are very small. There are

four wrinkles on the posterior edges of each segment.

When feeding, this caterpillar rests on a blade of the tussock, where it is very inconspicuous. It appears to prefer the dead or drier portions of the grass, and feeds and grows very slowly. It is strictly diurnal in its habits, relapsing into a death-like repose at night.

The pupa is suspended by the tail to an upright blade of the tussock. In the specimen I reared, I was fortunate enough to witness the actual transformation, and during the process, observed it seizing hold of the larval skin with its posterior segments, its manœuvres whilst thus engaged exactly resembling those of the pupa of *Anosia erippus*, described above by Professor Riley.

The length of the pupa is about ½ inch. Its colour is bright green, with a reddish line along the edge of each wing-case, and several white lines on the sides and back.

The perfect insect appears from December till the end of March. It is usually very abundant where found, the males being more numerous than the females in the proportion of about five to one. It flies amongst the tussock grass in a weak and aimless manner. When rapidly pursued it has a habit of plunging into a tussock and closing its wings, where it remains quite invisible until the danger is past.

The silver stripes on the under side of the hind-wings are very protective to the insect when at rest on its food-plant, the striped coloration of the larva and pupa no doubt serving similar protective purposes.

Genus 2.—DODONIDIA, Butl.

Characters as in *Argyrophenga*, except that vein 11 of the fore-wings rises from upper margin of cell, shortly before transverse vein.

We have one species in New Zealand.

DODONIDIA HELMSI, Fereday.

(*Dodonidia helmsi*, Fereday, Trans. N. Z. Inst. xv. 193.)

(Plate XI., fig. 14, fig. 15 under side; Plate III., fig. 5 larva, fig. 28 pupa.)

A single specimen of this interesting butterfly was discovered by Mr. R. Helms, in 1881, on the Paparoa Range, near Greymouth, at an elevation of about 1,500 feet above the sea-level. Until within the last three years only three other specimens had been captured, viz., one near Wainui-o-mata, in Mr. A. P. Buller's collection; one on the Dun Mountain, Nelson, at an elevation of about 2,500 feet, which is in my collection; and one on the Tableland of Mount Arthur, at about 3,300 feet, which was kindly given to me by Mr. C. W. Palmer. In the summer of 1894-95 several specimens were captured by Mr. P. Marshall near Wanganui,[53] and during the same season Messrs. Smithers and Hawthorne discovered the insect in considerable abundance at a locality near Silverstream, in the Wellington district. During the two following summers additional specimens were obtained near Silverstream, and I was fortunate enough to discover there a number of specimens of the larva, which furnished the material for the illustration and description of the preparatory stages of the insect given in this work.

The expansion of the wings is about 2 inches. *On the upper side all the wings are dark brown. The fore-wings have two broad bands of yellowish-orange, the outer one containing a small patch of dark brown near the costa, which touches a white-centred black ocellus. The hind-wings have one large patch of yellowish-orange containing two ocelli; a large ocellus, surrounded by a broad ring of reddish-orange, is situated on the tornus*; the tornus is produced into two very broad but short tails, which are bordered with white cilia. On the under side the fore-wings are light ochreous-yellow; there is a shaded brown patch at the base; the termen is broadly bordered with brown, the border containing a silver streak; two broad brown patches are situated on the costa, the outer one terminated by a small ocellus, and enclosing a silvery patch near the apex of the wing. *The hind-wings are silvery, narrowly bordered with deep reddish-brown, with five deep reddish-brown stripes running from the costa towards the tornus*; the fourth stripe from the base of the wing contains three ocelli surrounded by yellow rings; a conspicuous ocellus is situated at the tornus, surrounded by a broad orange-red ring.

This insect appears to vary a little in the extent of the yellowish-orange colouring of the upper side. It also varies in size, specimens from the North Island being slightly larger than those from the South Island.

The larva feeds on a species of sedge (*Galinia setifolia*), which always grows abundantly in the birch forests, where the butterflies are found. When full grown the length of this caterpillar is about 1¼ inches. Its body is much attenuated at each end and rather stout in the middle; the head and tail are bifid; there are numerous straight, shallow, transverse wrinkles on each segment, especially towards the head. The colour is green, with a number of fine, paler and darker green, dorsal and lateral lines; the head and thirteenth segment are yellowish. The legs are very minute, and the prolegs of moderate size. It is extremely susceptible to the attacks of a Dipterous parasite. In fact, out of thirty

larvæ kept by Mr. Hawthorne and myself, no less than 75 per cent. were thus destroyed. This larva feeds on the leaves of the sedge, eating out long notches parallel to the veins of the leaf. These notches are the best guides to follow in searching for the larva, as the colouring of the caterpillar renders its discovery amongst the food-plant extremely difficult. The larvæ should be looked for during the end of December or the beginning of January.

The pupa is rather stout, light green, with the edge of the wing-case and the prominences formed by the back and palpi, edged with crimson and white. It is suspended by the tail to any firm object in the neighbourhood of the sedge.

The perfect insect appears in February. It frequents sunny glades in the birch forest, usually at considerable elevations above the sea-level. Mr. Helms informs me that he has seen specimens near Greymouth in October, and hence concludes that there are two broods in the year. The butterfly is very difficult to capture, as it has a most provoking habit of resting on the foliage of the birch-trees, just out of the collector's reach. I am unable to explain the object of the remarkable colouring of the under side of this insect, but it is probably protective, although in what way has yet to be discovered.

Genus 3.—EREBIA, Dalm.

"Eyes glabrous. Club of antennæ abrupt." (Plate I., figs. 25, 26, and 27 neuration of *Erebia pluto*.)

"An extensive and essentially Alpine genus inhabiting

the mountains of Europe, Asia, North America, and South Africa. Pupa unattached amongst stem bases of grass."—(Meyrick.)

We have two species in New Zealand.

EREBIA PLUTO, Fereday.

(*Erebia pluto*, Fereday. *Erebia merula*, Hewitson, Ent. Mo. Mag. xii. 10 (1874). *Oreina othello*, Fereday, Trans. N. Z. Inst. viii. 302, 304, pl. ix. (1876). *Percnodaimon pluto*, Butl., Ent. Mo. Mag. xii. 153 (1876); Catalogue of N. Z. Butterflies, 10.)

(Plate XI., fig. 8 ♂, 9 ♀, 10 under side.)

This fine butterfly has occurred plentifully on many mountain-tops in the South Island, from Nelson to Lake Wakatipu. It has never been observed in the North Island.

The expansion of the wings of the male is 1¾ inches, of the female 2 inches. *On the upper side all the wings are a very rich bronzy-black. The fore-wings have a paler patch near the apex, containing two small, and three large black ocelli with white centres*; these ocelli are usually joined together. On the under side all the wings are considerably paler and greyer. The hind-wings have a series of pale spots near the termen, and a paler shade across the middle.

The insect varies chiefly in the number of ocelli. On the upper side of the fore-wings there are sometimes only four, the minute ocellus on the costa being absent, whilst occasionally a small extra ocellus appears below the normal series. On the under side this last-mentioned ocellus is very frequently, but not invariably, present. In some female specimens an extremely minute ocellus may be detected on the

upper surface of the hind-wings near the termen. On the under side of the hind-wings in both sexes the series of pale terminal spots are often absent, and the general depth of the colouring varies considerably.

Mr. Fereday has described and figured a very interesting variation occurring in the structure of the costal veins of this species,[54] vein 11 of the fore-wings sometimes running into 12 (see Plate I., fig. 26), and sometimes being entirely absent (fig. 25). After reading Mr. Fereday's article I examined the specimens in my own collection, and found that all those taken on Mount Arthur and on Mount Peel, in the Nelson district, had veins 11 and 12 joined, whilst the two specimens I took on Mount Enys, Castle Hill, West Coast Road, had vein 11 absent. As, however, Mr. Fereday has specimens exhibiting both forms of neuration, from Castle Hill and from Mount Hutt, I do not think it likely that the peculiarity is confined to butterflies from any particular locality. Like Mr. Fereday, I have observed that the specimens having veins 11 and 12 joined, are smaller than those having vein 11 absent.

The perfect insect appears in January, February and March. It frequents shingle slopes on mountains, at elevations ranging from 4,000 to 6,000 feet above the sea-level. Sometimes the butterflies occur in considerable numbers, flying in a lazy, aimless manner in the scorching sunshine, but instantly retreating into crevices between the stones when the sun is obscured. I have observed that this species is most abundant in the neighbourhood of the carpet grass, on which I fully anticipate its larva feeds. It seldom, however, settles on this grass, preferring to alight on the shingle, which, owing to the rarefied

air existing at such high elevations, soon becomes intensely heated by the sun's rays.

When disturbed this insect flies with considerable rapidity and thus often eludes the net, so that the capture of a good series of specimens on a rugged mountain-top is usually very exciting, if not actually dangerous work. As with many other insects, mountain ranges are more prolific in this butterfly than isolated peaks. Mount Peel, situated to the west of Mount Arthur, is the best locality I know of for this and many other Alpine species. Its gentle slopes enable the collector to work with perfect ease and safety, whilst the patches of rich soil occurring nearly to the top of the mountain support an unusually varied Alpine flora of great interest.

EREBIA BUTLERI, Fereday.

(*Erebiola butleri*, Fereday, Trans. N. Z. Inst. xii. 264; Catalogue of N. Z. Butterflies, 19.)

(Plate XI., fig. 11 ♂, 12 ♀, 13 under side.)

This interesting butterfly was described from three dilapidated specimens captured by Mr. J. D. Enys at Whitcombe's Pass, Canterbury, on March 8, 1879, at about 4,000 feet above the sea-level. From that time I believe no other specimens had been found until January, 1894, when I took quite a large number on the Humboldt Range, at the head of Lake Wakatipu, at elevations ranging from 4,000 to 5,000 feet above the sea-level.

The expansion of the wings of the male is 1⅝ inches, of the female 1½ inches. *On the upper side all the wings of the male are smoky-brown; the fore-wings have a large black ocellus near the*

apex, enclosing two white dots, followed by a smaller ocellus towards the dorsum; the hind-wings have three black spots near the termen, sometimes enclosing white dots. Occasionally these ocelli are surrounded by a patch of deep reddish-brown. The female is much paler, with large patches of yellowish-brown surrounding the ocelli. On the under side the fore-wings of the male are smoky-brown, with an irregular blotch of reddish-brown near the apex, surrounding a small white-centred black ocellus. *The hind-wings are dark reddish-brown, with several conspicuous black-edged silvery markings, and four yellowish-red spots near the termen.* The under side of the female is very much paler.

This butterfly varies considerably on the upper side in the number and size of the ocelli, and in the extent of the reddish-brown markings which surround them; on the under side the silvery spots on the hind-wings are also variable.

The perfect insect has been taken in January and March. It evidently frequents mountains in the South Island, at elevations of about 4,000 feet, but does not appear to be generally distributed in such localities. It seldom settles on the shingle, mostly resting on the snow grass, on which its larva probably feeds. It is a smaller insect than *E. pluto*, and flies much more feebly. These characteristics will at once enable the collector to distinguish it from *E. pluto* when on the wing.

Immediately a cloud obscures the sun these butterflies retreat into the tufts of the snow grass, remaining closely hidden there until the sun shines out again. This circumstance makes the capture of the insect, even in a favourable locality, a matter of considerable uncertainty, as bright sunshine is more often the exception than the rule on the summits of high mountains.

Family 3.—**LYCÆNIDÆ.**

"Anterior legs developed, but tarsi of ♂ more or less abbreviated, or with one or both claws absent; posterior tibiæ without middle spurs. Fore-wings with vein 7 absent, 8 and 9 stalked or coincident. Hind-wings without præcostal spur." (Plate I., figs. 15, 16, neuration of *Chrysophanus salustius*.)

"The family is large and very generally distributed. The species are of moderate size or more often rather small, usually blue, dark brown, or coppery-orange in colouring, often with series of small black pale-ringed spots on lower surface.

"Ovum flattened—spherical or subcylindrical, reticulated and sometimes ribbed, seldom smooth. Larva stout, with few hairs. Pupa attached by tail and a central belt of silk, or sometimes unattached or subterranean."—(Meyrick.)

We have two genera represented in New Zealand, viz.:—

1. CHRYSOPHANUS.

2. LYCÆNA.

Genus 1.—CHRYSOPHANUS, Hb.

"Eyes glabrous. Club of antennæ elongate. Fore-wings with vein 6 separate, 8 and 9 stalked." (Plate I., figs. 15 and 16 neuration of *C. salustius*).

"An extensive and nearly cosmopolitan genus. Larva short, stout, attenuated at extremities, with short

hairs. Pupa attached by the tail and central belt of silk, or sometimes unattached on the ground."—(Meyrick.)

There are three New Zealand species.

CHRYSOPHANUS SALUSTIUS, Fabr.

(*Chrysophanus salustius*, Fabr., Butler, Butterflies of N. Z., Trans. N. Z. Inst. x. 263. *Chrysophanus rauparaha*, Fereday, Trans. N. Z. Inst. ix. 460. *Chrysophanus maui*, ib. x. 252.)

(Plate XII., fig. 18 ♂, 19 ♀, 20 and 21 under side; Plate XIII., figs. 2, 3, 4, and 5 varieties.)

This pretty little butterfly appears to be very common in most parts of New Zealand. I have records of its occurrence in abundance at various localities, from Napier southwards to Invercargill.

The expansion of the wings varies from 1 to 1½ inches. *On the upper side all the wings are brilliant shining copper, with black markings.* Fore-wings with three spots near the middle, then a row of black spots, often forming a band nearly parallel with the termen, another row on the termen, generally touching the narrow black border of the wing. Hind-wings resembling fore-wings, except that there is only one elongate spot in the centre, and the terminal series of spots is nearly always separated from the black border. In the female the black spots are united and form bands, those on the termen often having violet or blue centres. The veins in both sexes are indicated by black lines, which are often double in the male, when the vein itself is coppery. On the under side the fore-wings are orange-brown, bordered with yellow; the spots resemble those of the upper side, except that the terminal series are generally faint or obsolete towards the costa. The hind-wings vary from light yellow to dull brown; the spots are dull greyish, the posterior series often having white centres.

From the foregoing it may be seen that the variation in this insect is considerable. After a careful examination of a large number of specimens taken at various localities in both North and South Islands, I am, however, unable to find characters of sufficient constancy to entitle any of the forms to specific rank. The most striking of these varieties appears to be that described by Mr. Bates as *Chrysophanus feredayi*. [55] (See Plate XIII., fig. 2, upper side; Plate XII., fig. 21, under side.) On the upper surface it has the central series of spots almost forming a band in the male, and the coppery ground colour is paler than in the typical form. On the under side the borders of the fore-wings, and the whole of the hind-wings are dull brown. This form closely resembles *C. rauparaha*, Fereday.[56] *C. maui*, Fereday, is evidently that variety of the male having the veins bordered with two fine black lines. Mr. Fereday states that he has never been able to find the female of his *C. maui*. This is readily accounted for by the fact, that the female of *C. maui* is nothing more than the female of *C. salustius*.

Recently two very remarkable aberrations of *C. salustius* have come under my notice; one captured by Mr. Hawthorne at Karori, in which the hind-wings are almost entirely suffused with blackish-brown, excepting a small patch of copper colour near the centre, and two patches on the termen. Another specimen, taken by Mr. Grapes near Paraparaumu, has the fore-wings also suffused with blackish-brown, except near the middle, where there are five coppery patches between the veins. On the under side there are six large oblong spots near the termen of the fore-wings, and a series of dusky oblong spots on the hind-wings. (See Plate XIII., fig. 3, fig. 4 under side.)

Plate XIII., fig. 5, represents another variety discovered by Mr. Grapes on the coast near Paikakariki, in the Wellington district. It is remarkable for the bright blue terminal spots which are present in both sexes.

The eggs of *C. salustius*, when first deposited, are pale green with yellow reticulations, the whole egg having a honeycombed appearance when magnified. They become uniform pale yellow before hatching. The young larva is shaped somewhat like a wood-louse. The head is quite hidden by the three anterior segments, which are much larger than the rest. After the first moult the larva becomes bright green, with a crimson line down the back; the head is then larger, and the three anterior segments considerably reduced. Unfortunately the life-history could not be investigated beyond this point, as the larvæ all died. The time of year when this occurred was late autumn, and it therefore seems probable that the larvæ hibernate and undergo their transformation early the following spring.

The perfect insect first appears in November and continues abundant until the middle or end of February. Specimens of what I believe to be a second brood may be taken in March and April if the weather be fine, but in stormy seasons these are frequently not observed. I have also noticed that the autumnal specimens are usually smaller and paler in colour than those captured in the spring.

This butterfly frequents open situations, and in fine, sunny weather it is often very common.

CHRYSOPHANUS ENYSII, Butl.

(*Chrysophanus enysii*, Butler, Ent. Mo. Mag. xiii. 153 (1876).)

(Plate XII., fig. 22 ♂, 23 ♀, 24 under side.)

This species is tolerably common in the Wellington district, and I expect it will be found to occur in most localities in the North Island. I have also taken the insect at Nelson, but have not heard of its capture elsewhere in the South Island.

The expansion of the wings varies from 1 to 1¼ inches. On the upper surface both sexes resemble some of the females of *Chrysophanus salustius*, except that the dark markings are very much broader, and the coppery colour is paler and less lustrous. On the under side the fore-wings are pale yellowish-brown, bordered with darker brown, with three black spots near the middle, and a chain of black spots beyond the middle. *The hind-wings are yellow, with a very large irregular patch of purplish brown extending over the costal and terminal portions.*

This insect varies chiefly in the extent of the dark markings on the upper side, which sometimes very much encroach on the golden ground colour. The spaces between veins 2, 3, and 4, near their origin are sometimes yellow and sometimes black, but, as every intermediate form exists, cannot be distinguished as species. Mr. Fereday regards the form with the black spaces as *C. feredayi*, Bates. As previously stated, however, I am inclined to think that *C. feredayi*, Bates, is the same form as *C. rauparaha*, Fereday.

This butterfly is essentially a forest-loving species, and may sometimes be taken quite plentifully in sunny openings on fine days, during December and January. It is not nearly so common as *C. salustius*,

and I do not think that there is more than a single brood in a season.

CHRYSOPHANUS BOLDENARUM, White.

(*Lycæna boldenarum*, White, Proc. Ent. Soc., Ser. 3, 1, p. 26 (1862). *Chrysophanus boldenarum*, Butl., Zool. Erebus and Terror, Ins. Lep., p. 29, n. 8, pl. 8, figs. 8, 9 (1874).)

(Plate XII., figs. 13, 14, ♂ varieties, 15 under side of ♂, 16 ♀, 17 under side of ♀.)

This brilliant little butterfly is very common in most localities in the South Island. In the North Island it has occurred at Lakes Wairarapa and Taupo.

The expansion of the wings is ⅞ inch. On the upper side the male has all the wings brown, *tinged with the most brilliant glistening purple*. The fore-wings have two or three black spots near the middle, a curved series beyond the middle, and on the termen. The hind-wings have two black spots near the middle, a series beyond the middle, and a terminal series, generally with blue centres. All the wings are narrowly bordered with black. The female is pale yellowish-brown, the spots resemble those of the male, except that all the marginal series have bright purple or blue centres. On the under side the fore-wings of both sexes are pale yellow, bordered with slaty-blue: the spots are the same as on the upper side. The hind-wings are brownish-grey in male, slaty-grey in female, with the basal portion darker, and the spots of the upper side always indicated.

This insect is extremely variable, but I do not think it likely that any of the numerous forms will prove sufficiently constant to be regarded as distinct species. The male varies in the size and number of the black spots, many of which are often absent; in the extent of the purple sheen which is sometimes absent from the hind-wings, sometimes partially absent from the fore-wings, and sometimes extends over the whole of both pairs of wings; also in the colour of such sheen, which often inclines towards blue. Some specimens are much paler than others, and so far as my experience goes, these are chiefly found at considerable elevations; in such specimens,

the ground colouring inclines towards yellow or orange, and the purple sheen is very brilliant, and extends over the whole of the wings. The female of this form is proportionately paler. Other specimens have the hind-wings almost black with no purple sheen, whilst in others the purple sheen remains. Another form has the usual markings, but the hind-wings are deep orange-brown, without purple sheen, which is also absent from the outer portions of the fore-wings. One female in my collection is dull brown, with yellow markings between the two rows of black spots. The under side is still more variable. One very striking form has only the basal portions of the fore-wings yellow, the rest of the ground colour is pale bluish-grey, and the spots black. On the hind-wings there are a number of black spots near the base; then an irregular band of black, and then a double row of marginal spots. An almost unlimited number of varieties appears to connect this form with one, in which all the markings on the hind-wings are nearly obsolete. The specimens of this insect taken in each district appear to exhibit differences from those taken elsewhere, but specimens also differ from the same district, so that at present we are unable to detect any well-marked local variation, or topomorphism, as it has been termed. It is consequently highly desirable that collectors should endeavour to obtain specimens from as many localities as possible, so that the nature of the variation of this butterfly may be better understood.

Mr. Fereday states[57] that after carefully examining a patch of *Donatia novæzealandiæ*, a plant he had noticed much frequented by this butterfly, he succeeded in finding a larva which there could be

little doubt would have given rise to this insect, had it lived. The following is taken from his description: The caterpillar is shaped like a wood-louse, hairy, and pale green. There is a series of conical purplish spots down the back, edged first with white, and then with dull red. On the sides there is a series of pale pinkish oblique stripes, blended with dull red towards the spiracles.

The perfect insect is very common in dry, stony places, generally near river-beds, during January, February and March. It flies only a short distance when disturbed, but is very quick on the wing, and hence difficult to catch until one becomes accustomed to it. In some places these little butterflies are so abundant that they take wing like a swarm of blow-flies. They seldom open their wings whilst at rest, so that when perched on the ground they are very inconspicuous.

Genus 2.—LYCÆNA, F.

"Eyes hairy. Club of antennæ elongate. Fore-wings with vein 6 separate, 8 and 9 stalked.

"A large genus of nearly universal distribution. Imago usually with a horny apical hook on anterior tibiæ. Larva short, stout, attenuated at extremities, with short hairs. Pupa attached by tail and often a central belt of silk, or unattached or subterranean."—(Meyrick.)

Represented in New Zealand by two species.

LYCÆNA PHŒBE, Murray.

(*Lycæna phœbe*, Murray, Ent. Mo. Mag., 1873, 107.)

(Plate XII., fig. 10, 11 under side.)

This little butterfly is extremely abundant in the neighbourhood of Nelson. I have also taken it in plenty in several localities in the Wellington district, and suspect it is common throughout the North Island. In other parts of the South Island its place appears to be taken by *L. oxleyi*.

The expansion of the wings of the male is 1 inch, of the female ⅞ inch. On the upper side all the wings are pale blue, broadly bordered with dull brown. The cilia are white, faintly barred with brownish. *On the under side all the wings, are pale slaty-grey.* There is a faint blackish spot, edged with white, near the middle of the fore-wings, and two rows of similar spots near the termen. The hind-wings have several very faint white-edged spots near the base, a row near the middle, and another row almost entirely white near the termen.

The perfect insect frequents waste grounds and sandhills, generally beside roads and river-beds, and when found is usually very common. It is on the wing from the beginning of October until the end of March.

LYCÆNA OXLEYI, Feld.

(*Lycæna oxleyi*, Felder, Reise de Novara Lep. ii., 280, pl. 35, fig. 6, 1865.)

(Plate XII., fig. 12 under side.)

According to Mr. Enys[58] this butterfly is common in both islands. I have taken specimens in the Canterbury and Nelson districts.

On the upper side this species can only be distinguished from the preceding by its somewhat brighter colour, and by the cilia which are more sharply barred with brown. *On the under side the whole of the fore-wings, and the central portions of the hind-wings between the outer and inner series of spots, are much darker and browner than in L. phœbe*; the spots themselves are also considerably darker, and the central series of the hind-wings is almost black. A careful examination, however, shows that the markings are practically identical in both species, although of different degrees of intensity. In view of the great variability, which many species of this genus are known to exhibit in other countries, I am inclined to think that this butterfly's claim to specific distinction is a very slender one.

The perfect insect may be taken in similar situations to *Lycæna phœbe*.

REPUTED NEW ZEALAND BUTTERFLIES.

The following species are recorded by various observers as having occurred in New Zealand. In nearly every case they are only represented by single specimens. They cannot, in my opinion, be regarded as properly belonging to the fauna:—

1. HAMADRYAS ZOILUS,[59] Fabr.

The expansion of the wings is 1 inch. On the upper side all the wings are black, becoming brown towards the base; the fore-wings have three dull white spots near the apex; the hind-wings have the whole of the central portions white.

Stated by Dieffenbach to occur in New Zealand, probably in error, as it has not since been observed. An Australian species. Mr. W. W. Smith, however, informs me, that his eldest son recently saw near

Ashburton a specimen of what he believed to be this butterfly; but as he was unable to capture it he cannot speak with any degree of certainty.

2. EUPLOÆ —— sp?

The expansion of the wings is 2¾ inches. On the upper side all the wings are dull, brownish-black, with a series of large white terminal spots.

Two or three specimens of this insect are stated by Mr. T. W. Kirk to have been taken near Flat Point on the east coast of the North Island, but no further details are forthcoming. The late Mr. Olliff, to whom I forwarded a sketch of the insect, informed me that it was not represented in the Sydney collections of Australian and South Sea Island butterflies, but he thought it might be a Malayan species of *Euploœ*.

3. VANESSA ATALANTA,[60] L.

The expansion of the wings is from 2½ to 2¾ inches. "The fore-wings are black, with a broad deep red central band, and with one large and five small white spots near the apex. The hind-wings are black, with a broad deep red band at the termen, in which are four black spots; at the tornus is a large blue-and-black spot."[61]

Mr. T. W. Kirk states[62] that he captured a specimen of this familiar English butterfly in the Wellington Botanical Gardens, in the summer of 1881. On a subsequent occasion he saw several others. No specimens have since been detected.

4. VANESSA URTICÆ, L.

The expansion of the wings is from 2 to 2¼ inches. "The fore-wings are reddish-orange with three large black spots on the costa (the third followed by a white spot), two smaller black spots near the centre, and one large one on the dorsum; a dark border, containing cresentic blue spots, runs along the termen. The hind-wings are black at the base, then reddish-orange, with a blue-spotted dark border along the termen."[63]

Mr. Kirk states[64] that he also obtained specimens of this very common English butterfly during the same season and in the same locality as *Vanessa atalanta*. None have been seen by other observers.

5. CATOPSILIA CATILLA,[65] Cramer.

The expansion of the wings is nearly 3 inches. On the upper side all the wings of the male are pale sulphur-yellow, with a minute brown mark at the apex. The female is paler, with a brown spot in the centre of the fore-wings, and a chain of brown spots on the termen towards the apex.

A single male specimen of this butterfly was captured in the grounds of St. John's College, Auckland, and is now in the Auckland Museum. The species is very common in Australia, and as this is the only specimen observed it was no doubt accidentally introduced from that country on board a steamer.

V.—THE PYRALIDINA.

Not dealt with in this volume.

VI.—THE PSYCHINA.

The *Psychina* are distinguished by the following characters:—

"Eyes glabrous. Maxillary palpi rudimentary or obsolete (yet sometimes well marked in pupa). Posterior tibiæ, with spurs very short, middle spurs often absent. Fore-wings with vein 1*b* furcate, 1*c* usually developed, 5 more or less approximated to 4. Hind-wings with frenulum, retinaculum often very broad, 1*c* present, 8 connected or anastomosing with cell." (See Plate I., figs. 30, 31 neuration of *Œceticus omnivorus*.)

"This ancient group, which furnishes the origin of the five preceding, is not now very prominent, though much more numerous in warm regions.

"Imago with fore-wings more or less elongate-triangular, hind-wings ovate, often rather small.

"Larva with 10 prolegs, usually with few hairs.

"Pupa with segments 8-11 free, usually 7 also (except in *Psychidæ*), in male 12 also; protruded from cocoon in emergence."—(Meyrick.)

The *Psychina* and *Micropterygina* are included amongst the *Micros* by most modern authors. I have, however, described and figured certain conspicuous and interesting species belonging to both these groups. The insects in question have, until so very recently, been regarded as *Macros*, that I think it would be a mistake to omit them in the present volume. There can, however, be no question that the modern view is the correct one, and that

notwithstanding the large size of some of the species, they are really closely allied to those *Micro-Lepidoptera*, with which they are now associated.

Of the *Psychina* we have one family represented in New Zealand—the *Psychidæ*.

Family 1.—**PSYCHIDÆ.**

"Head densely rough-haired. Ocelli large. Tongue obsolete. Antennæ half the length of the fore-wings or less, in male strongly bi-pectinated to apex. Labial palpi very short, hairy. Thorax densely hairy above and beneath. Abdomen, femora, and tibiæ densely hairy, posterior tibiæ without middle spurs, end spurs extremely short. Fore-wings with vein 1*a* anastomosing with 1*b* before middle; 1*c* (if present) coincident with 1*b* beyond middle, 7 absent. Hind-wings, with vein 8, connected by bar with upper margin of cell. Female apterous, without legs or developed antennæ.

"A rather small family of universal distribution, but commoner in warm countries. Male imago with thinly scaled wings, without markings; flight strong and swift, sometimes in sunshine. The female is almost wholly helpless; the abdomen is at first greatly distended with eggs, and ultimately shrivels up.

"Ovum oval, smooth. Larva inhabiting a strong portable silken case, covered with fragments of stick or refuse. Pupa within the larval case."—(Meyrick.)

There are two genera in New Zealand closely allied to each other.

1. ŒCETICUS.

2. OROPHORA.

Genus 1.—ŒCETICUS, Guild.

"Ocelli present. Antennæ ⅓, in male strongly bi-pectinated, much more shortly on apical half. Labial palpi extremely short, rough-haired. Abdomen in male very elongate, roughly hairy. Legs hairy, tibiæ without spurs, posterior tarsi extremely short and stout. Fore-wings with veins 4 and 5 short-stalked, 7 sometimes out of 9, 8 and 9 stalked, forked parting-vein well defined. Hind-wings with veins 4 and 5 stalked, forked parting-vein well defined, 8 connected by bar with cell beyond middle. An additional vein (9) rising from 8 beyond bar, another (10) from 8 before bar, and another (11) from base of costa running into 8 before 10." (See Plate I., figs. 30, 31.)

"This generic name was wrongly spelt *Oiketicus* by its originator and others, for which there is no possible justification. I have corrected it."—(Meyrick.)

Although I have made several examinations of fully denuded wings of *Œ. omnivorus*, I have been unable to discover any trace of the additional veins mentioned by Mr. Meyrick. The hair-like scales which clothe the wings of this insect are very long and slender, and might easily be mistaken for a short vein, if placed in the requisite position. I am disposed to think that the examination of undenuded specimens has led to the discrepancy between the results.

We have one species.

ŒCETICUS OMNIVORUS, Fereday.

(*Liothula omnivora*, Fereday, Trans. N. Z. Inst. x., 260, pl. ix. *Œceticus omnivorus*, Meyr., Trans. N. Z. Inst. xxii. 212.)

(Plate XIII., fig. 6 ♂; Plate III., fig. 26, larva in its case; fig. 25 ditto withdrawn from case.)

This interesting species is seldom seen as an imago in the natural state, although the cases constructed by its larva are of common occurrence. Specimens of these cases have been noticed at several localities between Palmerston, in the North Island, and Invercargill, in the South Island, so that apparently the insect is common, and generally distributed throughout New Zealand.

The expansion of the wings of the male is from 1¼ to 1½ inches. *The fore-wings are very elongate and narrow. All the wings are blackish-brown, and sparsely covered with scales*, the hind pair being semi-transparent. The body is very hairy, and deep black. The antennæ are broadly bi-pectinate at the base, becoming almost filiform towards the apex. The female insect is apterous, having a close superficial resemblance to a large maggot. The head and thorax are very small, and the legs and antennæ rudimentary. The extremity of the body is furnished with a two-jointed ovipositor, and there are a few scattered yellowish scales on various parts of the insect. Its length is about 1 inch.

The eggs of this species are deposited inside the old case, which the female insect never leaves during the whole of her life. The young larva when first hatched is about ⅛ inch in length. Its head and three anterior segments are corneous and much larger than the others, which are rather soft with the exception of the last one. These little larvæ are extremely active, and immediately after hatching leave the old case, and roam in all directions over the tree, letting themselves down from branch to branch by silken threads. They carry the posterior portion of their body elevated in the air, walking whilst doing so by

means of their strong thoracic legs.

The food-plants of this species are numerous. The following are a few of them: Manuka (*Leptospermum scoparium* and *ericoides*, *Cupressus macrocarpa*, *Pinus insignis*), and various species of willow, &c. These, it will be observed, include several introduced trees. In fact, the insect is a very general feeder. About three days after leaving the egg, the little caterpillar constructs a minute, conical-shaped, silken case, which it carries almost in an upright position on its posterior segments. Later on in life this case becomes too heavy to be held vertically, and is afterwards dragged along by the larva, and often allowed to hang downwards. The case has two apertures—a large one in front, through which the head of the larva is projected, and a smaller one at the posterior extremity, which allows the pellets of excrement to fall out of the case, as soon as they are evacuated.

Owing to the apterous and completely helpless condition of the female imago, it is evident that the dispersal of this insect must take place in the larval state. Distribution is of course quite impossible without a female being transported in some way, and from observations made on a good many larvæ of various ages, I am disposed to think that the migration of this insect to new localities takes place at an early age, possibly soon after its emergence from the egg. On this account I think that the occurrence of the moth in both North and South Islands is of great interest, as it would seem to indicate the existence of some connection between the two islands, at a period not sufficiently remote to have allowed any appreciable modification to take place in the insect's structure and habits. At the same

time, it should be borne in mind, that the protection afforded the larva by its case, and its ability to feed on so many different plants, may have rendered any modification unnecessary for the preservation of the species during recent times. The length of the full-grown caterpillar is about 1 inch. The head is dull yellow speckled with black. The first three segments are very hard, dark brown, with numerous white markings. The remaining segments are considerably thickened near the middle of the insect, rudimentary prolegs being present on the seventh, eighth, ninth, and tenth segments of the larva. The anal prolegs are very strong, and are furnished with numerous sharp hooklets, which retain the larva very firmly in its case. As the caterpillar grows, it increases the length of its domicile from the anterior, causing it gradually to assume a more tubular form, tapering towards the posterior aperture, which is enlarged from time to time. The outside is covered with numerous fragmentary leaves and twigs of various sizes, placed longitudinally on the case, and, frequently, near the anterior aperture the materials, owing to their recent selection, are fresh and green. The interior is lined with soft, smooth silk of a light brown colour, the thickness of the whole fabric being about the same as that of an ordinary kid glove, and so strong that it is impossible to tear it, or indeed to cut it, except with sharp instruments. The size of the case, when the caterpillar is mature, varies considerably, ranging from 2¼ to 3 inches or more in length, and about ¼ inch in diameter, the widest portion being a little behind the anterior aperture.

During the day the larva closes the entrance, and spins a loop of very strong silk over a twig, the ends being joined to the upper edges of the case on each

side; in this way it hangs suspended, the caterpillar lying snugly within. I have often known a larva to remain thus for over three weeks without moving, and afterwards resume feeding as before; this probably occurs whilst the inmate is engaged in changing its skin. At night the larvæ may be seen busily engaged: they project the head and first four segments of the body beyond the case, and walk about with considerable rapidity, often lowering themselves by means of silken threads; the only locomotive organs are, of course, their strong thoracic legs, which appear to easily fulfil their double function of moving both larva and case. If disturbed, these insects at once retreat into their cases, closing the anterior aperture with a silken cord, which is kept in readiness for the purpose, and pulled from the inside by the retreating larva. This operation is most rapidly performed, as the upper edges of the case are flexible, and thus fold closely together, completely obstructing the entrance. When full grown, this caterpillar fastens its case to a branch with a loop of strong silk, which is drawn very tight, preventing the case from swinging when the plant is moved by the wind, and also rendering the insect's habitation more inconspicuous, by causing it to resemble a broken twig. The anterior aperture is completely closed, the loose edges being drawn together and fastened like a bag. The posterior end of the case is twisted up for some little distance above the extremity, thus completely closing the opening there situated. It is lined inside with a layer of very soft silk spun loosely over the sides, and partly filling up each end. In the centre of this the pupa lies with its head towards the lower portion of the case, the old larval skin being thrust backwards amongst the loose silk above the insect.

The male and female pupæ may very easily be distinguished. The male pupa is rather attenuated, and has all the organs of the future moth plainly indicated on the integument, as is usual with lepidopterous pupæ. The female pupa, on the contrary, is merely a chain of segments, with a few faint indications of rudimentary organs on the anterior extremity. It is, moreover, much larger than the male pupa.

The insect remains in this condition during the winter months. About September the male pupa works its way down to the lower end of the case, forces open the old aperture there situated, and projects the head and thorax, the pupa being secured from falling by the spines on its posterior segments, which retain a firm hold in the silk. Its anterior portion then breaks open, and the moth makes its escape, clinging to the outside of its old habitation, and drying its wings.

The perfect insect must be about from September till December, but I have never then observed it. The only specimen I have seen was noticed flying very rapidly in the street in Wellington, in July. I was at first unable to tell what species it was, as it had a most unusual appearance on the wing, but its subsequent near approach enabled me to ascertain for certain that it was a specimen of this insect. In captivity I have also noticed the extreme activity of the male when first emerged. Indeed this moth is so vivacious, that it often happens, owing to the emergence usually taking place very early in the morning, that specimens are more or less injured by their efforts to escape, before they are discovered in the breeding cage. This restless energy of the male is

no doubt essential to the insect's well-being, as the females, hidden away in their cases and incapable of any movement, must of necessity be very hard to discover. The power of locomotion lost in the one sex is thus doubled in the other. Considering the protection afforded this insect by the case, which it inhabits during its preparatory stages, its enormous mortality from the attacks of a parasitic dipteron (*Eurigaster marginatus*) is very remarkable. In this connection the following analysis of 38 cases, gathered at random, may be of interest:—

26 had parasites.
8 were dead.
2 contained eggs.
2 contained living pupæ, 1 male and 1 female respectively.

Amongst some of these parasites I once obtained a specimen, which was in its turn infested by a secondary or hyper-parasite, belonging to the genus *Pteromalus*, in the order Hymenoptera. Eighteen of these minute insects emerged from a single pupa of *E. marginatus*. The method by which the *Pteromalus* introduces its eggs into the dipterous larva, which is in its turn enclosed in a caterpillar, is not at present known to entomologists; but it seems probable that the eggs of the hyper-parasite are either deposited in the eggs of the dipterous insect, or else on the very young larvæ, before they penetrate the skin of the caterpillar.[66]

Genus 2.—OROPHORA, Fereday.

"Ocelli present. Antennæ ⅔, in male moderately bi-pectinated throughout. Labial palpi rudimentary, hairy. Abdomen densely

hairy. Fore-wings with veins 4 and 5 short-stalked, 7 and 8 out of 9. Hind-wings with veins 4 and 5 stalked, parting-vein well defined, 8 connected by bar with cell beyond middle, and additional vein (9) rising out of 8 before bar."

We have one species.

OROPHORA UNICOLOR, Butl.

(*Psyche unicolor*, Butl., Proc. Zool. Soc., London, 1877, 381. *Orophora toumatou*, Fereday, Trans. N. Z. Inst. x. 262, pl. ix. *Orophora unicolor*, Meyr., Trans. N. Z. Inst. xxii. 212.)

(Plate XIII., fig. 7 ♂.)

This odd-looking little insect has been found by Mr. Fereday, at Rakaia.

The expansion of the wings is hardly 1 inch. *All the wings are rather broad, rounded, and very sparsely covered with dusky brown hair-like scales*; the body is very hairy, and the antennæ are slightly bi-pectinated. The female is apterous.

The life-history is thus described by Mr. Fereday: "I have never seen the larva. Its case measures in length about 16 lines (1⅜ inches); the exterior is covered with pieces of stems of grass from a line to 5 lines in length, laid longitudinally and in the manner of thatch; the interior is thinly lined with fine silk. The cases are found fixed to the twigs of the Wild Irishman (*Discaria toumatou*), but it may be inferred from the covering of the case, that it probably does not feed on the shrub but upon the tussock grass, generally growing where the shrub is found. It is some years since I found the cases on *Discaria toumatou*, growing in the river-beds of the Rakaia and Waimakariri, on the Canterbury Plains, and I did

not find any case in its earlier stage before the larva had fed up and changed into the pupa state."[67]

All Mr. Fereday's specimens were bred from the cases, and to the best of my belief no one has ever observed the insect on the wing. It is evidently a very scarce species, and is probably restricted to a few river-beds in the South Island.

VII.—THE TORTRICINA.

Not dealt with in this volume.

VIII.—THE TINEINA.

Not dealt with in this volume.

IX.—THE MICROPTERYGINA.

The following are the principal characters of the *Micropterygina*:—

"Fore-wings with an oblique membranous dorsal process (jugum) near base, forming with the dorsal margin a notch or sinus, which receives the costa of the hind-wings. Hind-wings without frenulum, 1*c* present, with 11 or more veins, neuration essentially, almost or quite identical with that of fore-wings. Fore-wings and hind-wings more than usually remote at origin.

"In the two families, which constitute this highly interesting group, is fortunately preserved a type of *Lepidoptera* whose existence could never have been inferred from a study of other forms. Without a knowledge of these two families the true origin of the order could never have been more than a matter of more or less probable conjecture. The *Micropterygidæ* are the primeval ancestors of all the Lepidoptera, indicating their origin from the *Trichoptera* so nearly that one or two more discoveries might make it hard to draw any line of demarcation. The *Hepialidæ* are an offshoot from the *Micropterygidæ* (with considerable extinction of intermediate forms), constituting a separate line of development quite unconnected with any other *Lepidoptera*; if, as is possible, this separate stem may have ever given rise to other branches forming distinct families, all trace of their existence seems to have been lost.

"Imago with fore-wings and hind-wings more or less semi-oval, termen and dorsum forming a nearly uniform curve.

"Larva with few hairs, with 10 to 16 prolegs, or apodal, living concealed.

"Pupa in *Hepialidæ* with segments 7 to 11 and in male 12, in *Micropterygidæ* with all segments free."—(Meyrick.)

In this work the *Hepialidæ* alone are dealt with, the *Micropterygidæ* being reserved for a future work. It may, however, again be mentioned that the last-named family contains amongst its New Zealand

representatives *Palæomicra chalcophanes*, a species which more closely approximates in structure to a Neuropterous insect than does any other member of the *Lepidoptera*. This insect is consequently regarded by Mr. Meyrick as the most ancient species of the order yet known. The survival of *Palæomicra* in New Zealand is quite in accord with the existence of such forms as *Apteryx* and *Dinornis* amongst the birds, the tuatara lizard (*Sphenodon*) amongst reptiles, and *Peripatus* amongst *Myriapoda*, archaic forms which have been preserved in this country through its long isolation from continental areas, and the resulting absence of more recent competing forms.

Family 1.—**HEPIALIDÆ.**

"Head rough. Ocelli absent. Tongue obsolete. Maxillary palpi obsolete. Tibiæ without spurs. Fore-wings with all main veins and costa connected by bars near base, 1*b* furcate, forked parting vein strong." (Plate I., figs. 22, 23, 24, 28, 29.)

"By no means an extensive family, yet of universal distribution. It stands more conspicuously isolated than any other group of *Lepidoptera*, for although it is without doubt a terminal development from the *Micropterygidæ* (that is one from which no existing family has originated), the gap between them is considerable; exotic genera, whilst differing in various details, are remarkably uniform in the more important peculiarities of structure, and do not at all tend to bridge the gap. The relatively large size of the *Hepialidæ* (of which some species exceed six inches in expanse of wing) may be attributed to the larval habits, which render these insects independent of the seasons or fluctuations of food-supply, thus

removing the check which ordinarily limits growth. The modified type of neuration may have resulted directly from the increase of size, involving a great strengthening of the main veins beneath the costa to support the weight. As a consequence of this strengthening, the flight of the larger species is very powerful, and to this, combined with a choice of larval food, which is often rather indiscriminate, may perhaps be ascribed the wide range of the group, rather than to its antiquity. It is probably of Indo-Malayan origin, and must have existed in that region long enough to acquire fixity of type before its dispersal, which, geologically speaking, may not have been exceedingly remote."—(Meyrick.)

There are two genera represented in New Zealand.

1. HEPIALUS.

2. PORINA.

Genus 1.—HEPIALUS, F.

"Antennæ ⅛ to ¼, in male lamellate or simple. Palpi short, drooping, hairy. Posterior tibiæ usually densely rough-haired, in male sometimes with long projecting tuft above. Fore-wings with vein 7 from angle, 8 remote, 9 and 10 stalked. Hind-wings as fore-wings, 8 seldom connate or stalked with 7." (Plate I., figs. 22 and 23, neuration of *Hepialus virescens*, 24 head of ditto.)

"A genus of universal distribution, but not very numerous in species. Ovum spheroidal, smooth. Larva elongate, active. Pupa with segmental whorls of spines, enabling it to move actively before emergence."—(Meyrick.)

Represented by one species only—the largest moth we have in New Zealand.

HEPIALUS VIRESCENS, Dbld.

(*Hepialus virescens*, Dbld., Dieff. New Zeal., ii. 284; White, Taylor New Zeal., pl. i. 6. *Hepialus rubroviridans*, White, l.c., pl. i. 1. *Charagia virescens*, Walk., Bomb., 1569; Scott, Trans. Ent. Soc. N. S. Wales, ii. 28. *C. fischeri*, Feld., pl. lxxx. 1. *C. hectori*, Butl., Proc. Zool. Soc. Lond., 1877, 380. *Hepialus virescens*, Meyr., Trans. N. Z. Inst., xxii., 211.)

(Plate XIII., fig. 16 ♂, 17 ♀; Plate III., fig. 23 larva, 30 pupa.)

This large and conspicuous insect appears to be generally distributed throughout the North Island.

The expansion of the wings of the male is 4 inches, of the female sometimes fully 5½ inches. The fore-wings of the male are *bright green, with a series of paler ring-shaped markings between the veins; an irregular row of white spots crosses the wing near the middle*, and a small white spot is situated on the costa at the base. The hind-wings are very pale yellowish-brown near the body, becoming pure white in the middle, and pale green on the termen. The head and thorax are green, the abdomen is white, tinged with green at the apex. The female has all the wings of a relatively more attenuated shape; *the fore-wings are green, mottled with black*; the hind-wings are pale reddish-brown, shaded with green near the termen; the abdomen is also reddish-brown, becoming green at the extremity.

The species is rather variable in both sexes. In the male the white spots on the fore-wings vary considerably in size, and there are occasionally several additional spots near the body. In the female the black markings of the fore-wings are sometimes much more extensive than the green ground colour. This dark form of the female was described by Butler as a distinct species, under the name of *Charagia*

hectori. In both sexes the green colouring is occasionally entirely absent, a dull orange-brown taking its place. I formerly attributed this peculiarity to the effects of fading, but Mr. Norris has shown me a very perfect specimen of this variety, which he bred from the pupa, he having noticed the orange-brown colouring immediately after the insect emerged.

The transformations of this insect are very interesting. The female lays an enormous number of very small, round, yellowish eggs, which she seems to deposit quite indiscriminately. The young larvæ consequently have to find their way along the ground to the stems of their food-plant, a large percentage no doubt perishing before they succeed in doing so, and this circumstance probably accounts for the great number of eggs produced.

The food-plants of this species are numerous; the following are a few of them: "wineberry" or "currant" (*Aristotelia racemosa*), apparently the favourite; "manuka" (*Leptospermum ericoides*); "ki-ki" (*Astelia solandri*); "black maire" (*Olea apetela*); titoki (*Alectryon excelsum*); and *Melicope*. The larva tunnels the stems of these trees, feeding entirely on the wood, which it bites off with its strong mandibles.

For the most part it inhabits the main stem of the tree, its gallery always having an outlet, which is covered with a curtain of silk and refuse, and is spun exactly level with the surrounding bark, and very inconspicuous. These burrows usually run towards the ground, and are mostly two or three inches from the surface of the trunk. In some instances the larvæ

inhabit branches, in which case, if they are small, the tunnels are made near the centre. Later on in its life, but probably some time before its transformation into the pupa, the caterpillar of this insect constructs a far more complicated burrow than the above. It consists of a spacious, irregular, but shallow cavity, just under the bark, having a very large opening to the air, which is entirely covered with a thin silken curtain, almost exactly the same shape and size as the numerous marks occurring at intervals on the trunks of many of the trees. Three large tunnels open into this shallow cavity: one in the centre, which runs into the middle of the stem, and one on each side, which run right and left just under the bark. These lateral tunnels are usually very short, but sometimes they extend half-way round the tree, and occasionally even join one another on the opposite side. The central tunnel has a slightly upward direction for a short distance inwards, which effectually prevents it from becoming flooded in wet weather; afterwards it pursues an almost horizontal course until it reaches the centre of the tree, when it appears to suddenly terminate. This, however, is not the case, for, if the gallery floor be carefully examined a short distance before its apparent termination, a round trap-door will be found, compactly constructed of very hard, smooth silk, and corresponding with the surrounding portion of the tunnel so exactly that it almost escapes detection. When this lid is lifted a long, perpendicular shaft is disclosed, which runs down the middle of the tree to a depth of 14 or 16 inches, and is about ½ inch in diameter. The upper end of this shaft is lined with silk, which forms a framework on which the trap-door rests when closed. The lid itself is of a larger size than the orifice which it covers, and this makes

it extremely difficult, if not impossible, to force it open from the exterior, especially as it always fits down very closely as long as the insect remains in its burrow. The object of this contrivance is, no doubt, to prevent the ingress of enemies, large numbers of spiders, slugs, wood-lice, and various orthoptera being frequently found in both central and lateral tunnels, but they are quite unable to pass the trap-door. The galleries of individual larvæ are all wonderfully alike, the only differences observable being in the length of the perpendicular shaft, and in the direction of the horizontal burrow, which is sometimes curved. These variations are usually caused by the presence of other tunnels in the tree, which the larva appears to carefully avoid; at least I have never known an instance where a larva has allowed its tunnel to communicate with another one, whether inhabited or otherwise.

The caterpillar, when full grown, measures from 2½ to 3 inches in length. It is tolerably uniform in thickness, and of a dull yellow colour. The head is large, dark brown, very irregularly striated, and covered with a few short bristles. The first segment is hard and shining with the back and sides ruddy-brown. Its spiracle, which is very large, is situated near the posterior margin, and a little above it there is a dull black spot, filling a slight concavity about the same size as the spiracle itself. Each remaining segment has on its dorsal surface two horny plates, and two similar plates are situated on each side immediately below the spiracle. The body of the larva is thinly covered with yellow and black bristles. In many specimens the ventral surface and connecting membrane between the horny plates is pale purple. Younger specimens differ in being of an olive-green colour, which is much more pronounced, when they are small.

The last act performed by the caterpillar, prior to undergoing its transformation, is the construction of the above-described trap-door at the top of its

burrow. This done the insect retreats to the bottom, its posterior segment resting on the termination of the vertical gallery. In the course of a few days the skin is cast off and worked downwards to the bottom of the burrow, underneath the last segment of the pupa.

This pupa varies from 2 to 2½ inches in length. It is attenuated in form and pale reddish-yellow in colour. The head and dorsal portion of the thorax are dark brown and harder than the rest of the body. The edges of the abdominal segments are furnished dorsally with a row of small hooklets above and below all the divisions; on the ventral surface there is only a single row, which is situated in front of each articulation.

As development progresses in the pupa it becomes darker in colour, especially on the wing-cases, where, in some female specimens, the future black markings of the moth are quite discernible as long as two months before emergence. Other specimens remain pale in colour until within a fortnight or three weeks of the appearance of the imago, when the green colouring of the wings suddenly becomes visible through their semi-transparent envelopes.

When about to emerge the pupa works its way up the vertical tunnel by means of the above-mentioned hooklets, forces open the trap-door, and wriggles along the horizontal burrow until it reaches the air, only the last three or four segments remaining in the tree. Its anterior portions then break open and the moth crawls out and expands its wings in the ordinary way, resting on the trunk of the tree, until they are of sufficient strength and hardness for flight.

The perfect insect appears in October and November. Although it must be common, it is rarely seen;

specimens are consequently best obtained in the pupa state and reared in captivity. The easiest way to find the pupa is to pass a straw into the horizontal burrow, and move it about until it touches the trap-door. The collector is at once apprised of this circumstance by a distinct hollow sound, produced by the straw when it comes in contact with the lid, which acts like a miniature drum. If no such sound is heard after moving the straw into every possible position, it may be assumed either that the insect has left the burrow, or that it is inhabited by a larva only. When, however, a pupa is actually discovered, a section of the tree-trunk should be cut out, extending from about two inches above the horizontal burrow to about one foot below it, and the log, thus obtained, taken home. Should a number of pupæ be found in one tree the whole trunk may then be taken, if practicable, and kept in a well-lighted room or a conservatory, until the enclosed insects emerge. The specimens usually come out of the pupa at about five or six o'clock in the evening, and if intended for the cabinet should be killed before dark, as they very soon injure themselves when flying.

The best time of year to obtain the pupa of this insect is during August and September, as most of the specimens are then in that condition. Apart from the indications above described, burrows containing larvæ may often be known by the fresh pellets of excrement which are present near the opening. The vacated burrows frequently have the remains of the old pupa shell at the entrance, and generally look gnarled and weather-worn. These indications are useful as guides to the collector before exploring the burrow with a straw in the manner above described.

This insect is much attracted by light, and in consequence sometimes enters shop-windows and houses. In fact nearly all the *captured* specimens are so taken, the moth being very rarely found in its native forests. This circumstance is no doubt due to its very perfect protective colouring which, notwithstanding its large size, causes it to be almost invisible, when resting on the branch of a tree. On one occasion I discovered a specimen in this situation; being obliged to leave it for a short time, I experienced the utmost difficulty in finding it again, although I had taken a special note of its position. This species appears to be much persecuted by insectivorous birds, as we may frequently see its large green wings lying on the ground, where they are very conspicuous.

Genus 2.—PORINA.

"Antennæ ¼-2/5, in male bi-pectinated, or more or less shortly bi-dentate. Palpi moderate, porrected, basal joint rough-haired, second joint rough-haired or almost smooth, terminal joint smooth, sometimes subclavate. Posterior tibiæ densely rough-haired. Fore-wings with vein 7 from angle of cell, 8 and 9 out of 10, rising from upper margin much before angle. Hind-wings as in fore-wings."—(Meyrick.) (Plate I., figs. 28 and 29 neuration of *Porina signata*.)

Of this genus we have eight species in New Zealand.

PORINA DINODES, Meyr.

(*Porina dinodes*, Meyr., Trans. N. Z. Inst. xxii. 206.)

(Plate XIII., fig. 8.)

This handsome species was discovered at Invercargill

by Professor Hutton.

The expansion of the wings is 2¾ inches. The fore-wings are dark brown. There is an irregular white mark with a brown centre at the base, several white dots and crescentic marks near the middle, an oblique series of double crescentic marks followed by a considerably fainter series near the termen. The hind-wings are yellowish-brown; the cilia of all the wings are white, barred with dark brown. *The antennæ of the male are strongly bi-pectinated.*

Described and figured from a specimen in Mr. Fereday's collection.

PORINA MAIRI, Buller.

(*Porina mairi*, Buller, Trans. N. Z. Inst. v. 279, pl. xvii., Meyr., Trans. N. Z. Inst. xxii. 207.)

A single specimen of this fine species was discovered by Sir Walter Buller on the Ruahine Ranges, in the Wellington district, during the summer of 1867.

The expansion of the wings is about 5 inches. "Wings large, broad, front-wings produced, ovate-triangular, pale dirty testaceous; six black spots terminating veins on outer margin, and bounded by a lunated marginal white band; a submarginal series of arrow-headed black spots, and beyond these a series of rounded spots, the first four encircled with white, the rest with pale brown; two broken, black discal lines filled in with brown; a broad irregular band to below centre of wing, beyond cell, and formed of three black lines with brown interspaces; a triangular white spot below cell and a white patch terminating it and traversed by two black crosses; two diverging black bars surrounded with white in centre of cell and a third surrounded with dirty testaceous near base; a large irregular patch of whitish-brown below end of cell, bounded on internal area by three unequally formed patches which together almost form the sides of a large triangle; two small spots near base; hind-wings greyish, becoming browner towards outer margin and crossed

by eight interrupted black bars."—(Buller).

The type specimen of this species was unfortunately lost in the wreck of the barque 'Assaye' in 1890. I have copied the above from Sir Walter Buller's original paper, and it may be well to point out that his description proceeds from the termen to the base, being the *reverse* order to that followed by me in all the other descriptions in this work.

The so-called "vegetable caterpillar" (infested with the *Sphæria* fungus [*Cordiceps robertsii*]) is, I think, very probably the larva of this insect. It was formerly supposed to be the larva of *Hepialus virescens*; but I have pointed out elsewhere[68] that this is certainly erroneous, the larva of *H. virescens* living in the stems of trees, and never going beneath the ground, even to pupate, whilst the "vegetable" larva is subterranean. The real point to be discovered is the precise species of *Lepidoptera* this caterpillar would develop into, if not attacked by the fungus; but at present no definite information has been obtained on the subject.

PORINA ENYSII, Butl.

(*Porina enysii*, Butl., Proc. Zool. Soc. Lond., 1877, 381, pi. xlii. 7.
Porina enysii, Meyr., Trans. N. Z. Inst. xxii. 207.)

(Plate XIII., fig. 9 ♂, fig. 10 ♀.)

This species appears to be confined to the North Island, where it is rather rare.

The expansion of the wings of the male is 2½ inches, of the female 3½ inches. The fore-wings are dark orange-brown, more or less marbled with yellow and dark brown; there is a very

variable number of small dull white spots margined with black and arranged irregularly on the wing. *The hind-wings are pinkish-brown, tinged with ochreous on the termen.*

This species varies a good deal in the extent of the darker markings, and number and position of the dull white spots. When alive it is usually very strongly tinged with pink.

The perfect insect appears in December and January, and frequents forests. It is especially fond of resting on the stems of tree-ferns in the daytime, where, however, it is extremely inconspicuous, and can only be discovered by very careful searching. It is also very partial to light, and specimens might perhaps be secured more plentifully, if a good attracting lamp were exhibited in a suitable locality.

PORINA CHARACTERIFERA, Walk.

(*Hepialus characterifer*, Walk., Suppl. 594. *Oxycanus impletus*, ib. 598. *Porina characterifera*, Meyr., Trans. N. Z. Inst. xxii. 208.)

(Plate XIII., fig. 11 ♂.)

This fine species has been taken in the North Island at Auckland, Kaitoke, and Wellington.

The expansion of the wings is about 3 inches. The fore-wings are rather dull yellow, finely marbled with black; *there are two conspicuous irregular black marks a little above the middle of the dorsum. The hind-wings are very dark purplish-brown with the cilia yellow, barred with brown.* The head and thorax are dull yellow, speckled with black, and the abdomen is dark purplish-brown, barred with dull white, with a yellow tuft at the apex.

The perfect insect appears in October, November, and December. At present I am only aware of four

specimens in collections, viz., two in the British Museum, taken at Auckland; one in Mr. Meyrick's collection, taken by Mr. H. B. Kirk on the Rimutaka Ranges, at an elevation of about 1,500 feet; and one kindly given to me by Mr. W. R. Morris, who took it at Wadestown, near Wellington.[69] It is evidently a scarce species, but may be looked for in the forest districts of the North Island.

PORINA CERVINATA, Walk.

(*Elhamma cervinata*, Walk., Suppl. 595. *Porina vexata*, ib. 597. *Pielus variolaris*, Gn., Ent. Mo. Mag. v. 1. *Porina fuliginea*, Butl., Cist. Ent. ii. 488. *Porina cervinata*, Meyr., Trans. N. Z. Inst. xxii. 208.)

(Plate XIII., fig. 12 ♂, fig. 18 variety of ♀.)

This insect is fairly common, and generally distributed throughout the country. It is very abundant in the Manawatu district.

The expansion of the wings is about 1½ inches. The fore-wings vary from brownish-black to dull yellow; there are several small white spots near the base margined with black, and an obscure cloudy central streak, sometimes containing one or two minute irregular white marks; near the termen a broad, pale, wavy line runs from the costa to the dorsum, and contains several elongate dull white spots, margined with black; another series of smaller spots is often situated between this line and the termen; there is a terminal row of small black spots. The hind-wings vary from pale greyish-brown to dull yellow. The cilia of all the wings are barred with dark brown.

This species is extremely variable. In many cases a large number of the spots is wanting. Mr. Meyrick states that the northern specimens are more yellow-ochreous, and more distinctly spotted than the

southern ones. He adds that "the ochreous forms are easily distinguished from other species by the numerous spots and the absence of a continuous pale discal streak; the fuscous forms are sometimes very similar in colouring to *P. despecta*, but they are distinctly shorter-winged, and the compound discal spots appear to be a good character."

I have taken several specimens of what appears to be a variety of this species on the Tableland of Mount Arthur. It is much paler than the typical form, the markings much less distinct, and the central portions of the fore-wings very pale yellow (see fig. 18).

The moth appears in October. It is very much attracted by light.

PORINA DESPECTA, Walk.

(*Hepialus despectus*, Walk., Suppl. 594. *Porina despecta*, Meyr., Trans. N. Z. Inst. xxii. 209.)

(Plate XIII., fig. 13 ♀.)

This species has occurred in the South Island, at Christchurch, the Otira River and Lake Wakatipu.

The expansion of the wings is from 1½ to 1¾ inches. The fore-wings are dull brown with several irregular dull white markings near the centre of the wing. The hind-wings are also dull brown. In general appearance it closely resembles the last-mentioned species (*P. cervinata*), *but may always be recognised by its longer and narrower wings, smaller body and antennæ, and absence of distinct markings near the termen.*

The perfect insect appears in January, and is usually taken at light.

PORINA UMBRACULATA, Gn.

(*Pielus umbraculatus*, Gn., Ent. Mo. Mag. v. 1. *Porina umbraculata*, Meyr., Trans. N. Z. Inst. xxii. 209.)

(Plate XIII., fig. 14 ♂.)

This species is probably common, and generally distributed throughout the country. It has been taken at Palmerston, North Wellington, Nelson, Christchurch, Invercargill and Stewart Island.

The expansion of the wings of the male is 1¾ inches, of the female 2¼ inches. The fore-wings are dull yellowish-brown; *in the centre there is a broad longitudinal blackish streak, containing a conspicuous straight white stripe, occasionally broken into two or three very elongate spots*; there are often several black dots along the termen. The hind-wings are dull ochreous, strongly tinged with pink towards the base.

This species varies considerably in the depth of the ground colour, and in the number of the black dots. A blackish shaded line, parallel to the termen, is also frequently present. The species may, however, be at once recognised by the straight, white, central stripe of the fore-wings.

The perfect insect appears from October till January, and is generally captured at light.

PORINA SIGNATA, Walk.

(*Elhamma signata*, Walk., Bomb. 1563. *Porina novæ-zealandiæ*, ib. 1573. *Porina signata*, Meyr., Trans. N. Z. Inst. xxii. 210.)

(Plate XIII., fig. 15 ♂; Plate III., fig. 6 larva.)

Apparently an abundant species in the North Island,

having been taken commonly at Napier, Palmerston and Wellington. I suspect it occurs in the South Island also, but I have no records of its capture there.

The expansion of the wings is from 2 to 2¼ inches. The fore-wings are dark brownish-ochreous, becoming dull white near the middle and on the termen; *there is a shaded central, longitudinal, blackish band containing several white spots, forming an irregular stripe in the middle of the wing*; there are also many irregular markings with dull white centres, chiefly situated near the veins, and often arranged in two or three rows parallel to the termen. All the markings are very variable, but the insect may be at once known by the irregular central white stripe. When alive the entire colouring is always strongly tinged with pink.

I have often found a large subterranean caterpillar, that I believe to be the larva of this insect; but as I have never succeeded in rearing a specimen, I cannot assign it to this species with absolute certainty.

The length of this larva when full grown is nearly 3 inches. Its colour is dirty white, becoming darker on the back. The head is dark brown, very rough and horny; the three first segments are also horny on the dorsal surface. The rest of the body is very much softer, and is furnished with several horny tubercles, each of which emits a long bristle.

This larva is very lively when disturbed. It usually disgorges a large quantity of black juice from the mouth, biting meantime, in order no doubt to frighten its enemies. It feeds on the roots of various grasses.

The perfect insect appears in January, February and March, and is often extremely abundant at light.

APPENDIX.

BY FLORENCE W. HUDSON.

A BRIEF DESCRIPTIVE LIST OF THE PLANTS MENTIONED IN THIS WORK.

The following list of trees, shrubs, &c, has been prepared to assist entomologists in recognising the various food-plants mentioned in connection with the insects described in the foregoing pages. In order to meet the requirements of beginners, all botanical terms have been omitted. Those desiring precise scientific information on these plants, will of course consult works specially dealing with botany.

ACIPHYLLA SQUARROSA (Spear-grass). A plant often found on the sea-coast, or open hilly country, with long, very sharp spines instead of leaves. The flowers are very small, and are placed round a tall central shoot, which is also covered with spines.

ASCLEPIAS (Milkweed).

ASTELIA SOLANDRI. A plant found growing on the stems of large forest trees. It has very long, narrow, dark green leaves springing from the base of the plant, and lemon-coloured flowers arranged on a long stem. The berries are bright crimson.

ALECTRYON EXCELSUM (Titoki). A moderate-sized tree with leaves rather long, toothed, and light green. The fruit has a very remarkable appearance; it consists of a shining black seed, partially surrounded by a bright red fleshy covering.

APOCYNUM (the common Periwinkle).

ARISTOTELIA RACEMOSA (Wine-berry, New Zealand Currant, Makomako). A well-known tree, often found in clearings in the forest, where it usually takes the place of the original trees; in fact this plant seems to seize on every vacant space. Its leaves are pale green, the flowers are much like those of the garden

"flowering currant," and the berries are small and dark red.

BEILSCHMIEDIA TAWA (Tawa tree). A handsome tree, with very long, narrow, light green leaves, and smooth bark.

BRACHYGLOTTIS REPANDA (Wharangi). One of the early flowering shrubs, with large bunches of small, strong-scented, white flowers. The leaves are large and pale green, the under side being white.

CARMICHÆLIA, or New Zealand Broom. A genus of shrubs closely resembling the common broom, but with very small flowers, more or less streaked with blue or lilac.

CARPODETUS SERRATUS. A pretty shrub or small tree with rather small, serrated, bright green leaves and numerous clusters of small whitish fragrant flowers, followed by nearly globular hard green fruits.

CAREX SUBDOLA (Sedge).

COPROSMA. A genus of shrubs with small, generally rather dull green leaves, insignificant flowers, and bright, variously coloured berries. One common species, *Coprosma fœtidissima*, has a most objectionable odour when cut or bruised.

CORDYLINE AUSTRALIS (Ti-tri, or Cabbage tree, as it is usually called). This is one of the most remarkable-looking trees in New Zealand. It much resembles a palm in general appearance. The leaves are long and narrow, with parallel veins; the flowers are whitish, very numerous, growing in drooping clusters at the top of the tree.

CYATHEA DEALBATA (Silver tree fern). A large tree fern, growing from ten to forty feet high, with a slender black stem, and dark green fronds silvery underneath.

DISCARIA TOUMATOU (Wild Irishman, Tumatakuru). A straggling shrub, or small tree, often common in dry, open places. It is furnished with numerous long sharp spines, with several very insignificant flowers and leaves at the base of each spine.

DONATIA NOVÆZEALANDIÆ. A small Alpine plant, with very short stems, around each of which are placed numerous leaves. It has a superficial resemblance to a moss.

FAGUS CLIFFORTIOIDES (Mountain Beech, but more often known

as Birch or Black Birch). A very handsome forest tree, usually growing in somewhat elevated localities. It has small light green leaves, and black stems with very rough bark.

FUCHSIA EXCORTICATA (our native Fuchsia). A very common tree or shrub growing in the forest. The bark is pale reddish-brown; the leaves rather elongate, dark green, with pale underside. The flowers closely resemble those of the cultivated fuchsia, but are less brightly coloured. This plant partially sheds its leaves in winter.

GALINIA SETIFOLIA. A large, grass-like plant growing in clumps, with very long, dark green leaves, which cut the fingers unless the plant is carefully handled. A number of small, brown flowers is situated near the top of a tall stem, in the centre of each clump.

HALORAGIS ALATA. A herbaceous plant abundant on dry hills; the leaves are deeply indented, slightly rough, and arranged on opposite sides of the stem. The flowers are small and green; the fruit is a nut with small wings attached.

LEPTOSPERMUM SCOPARIUM (Manuka, Tea tree). A small tree, growing usually in poor soil. The leaves are very small and dull green, and the numerous star-like flowers are white, tinged with pink.

MELICOPE SIMPLEX. A somewhat straggling shrub with very small, roundish, light green leaves.

MELICYTUS RAMIFLORUS (Mahoe or Hinahina). A shrub or tree. The leaves are moderately toothed, bright green, and very pretty. The flowers are in clusters, hanging from the bases of the leaves; the fruit is violet-coloured with black seeds.

METROSIDEROS SCANDENS (White Rata). A common climbing shrub with small, roundish, glossy, dark green leaves and very numerous feathery white flowers. The seed has a powdery appearance, and is enclosed in a large capsule.

MUHLENBECKIA ADPRESSA. A common climbing plant, generally found near the edge of the forest. It has a very tangled growth. Leaves heart-shaped or broadly oblong; in young plants, three-lobed; spike, many-flowered.

MYOSOTIS ARVENSIS (Forget-me-not).

MYRTUS BULLATA (Ramarama). A remarkably pretty shrub with

reddish-brown or green leaves, much crinkled. The flowers are white, tinged with pink, and very much resemble those of the English myrtle. Berries about the size of currants, red or purple.

ŒNOTHERA BIENNIS (the Evening Primrose). This herb grows to the height of two or three feet. It has large, bright yellow flowers, opening towards evening. Found in sandy soil on the sea-coast.

OLEA APETALA (Maire, New Zealand Olive). A shrub or small tree with broad leaves, and insignificant flowers growing on opposite sides of the flower-stalk.

OLEARIA TRAVERSII (Ake-ake). A small tree or shrub with oval, very wavy, thick, pale green leaves, white underneath. The flowers are very small, yellowish-white and strongly scented. They do not appear till late in autumn.

PANAX ARBOREA. A small tree with bright, glossy green, compound leaves. Each leaf consists of five separate leaflets on distinct footstalks, connected with branch by a long, stout stem. The large bunches of black berries are very conspicuous in the autumn.

PENNANTIA CORYMBOSA. A small tree with oval, serrated, bright green leaves, and handsome clusters of sweet-scented white flowers.

PIPER EXCELSUM (Kawa-kawa). A small tree generally growing in damp places. The leaves are broad, heart-shaped, bright green, and nearly always riddled with holes.

PITTOSPORUM EUGENIOIDES (Tarata). A shrub or small tree, with rather elongate, pale green wavy leaves, and bundles of fragrant, small, yellow flowers.

PITTOSPORUM TENUIFOLIUM, var. NIGRESCENS (Matipo). A very ornamental shrub with small, shining, bright green leaves, and black stems. The flowers are dark purple, and rather buried among the foliage.

PLAGIANTHUS BETULINUS (South Island Ribbon Wood). A tree of moderate size. The leaves are rather light green, and doubly serrated. The flowers are small, white, with red anthers, and very numerous.

POA AUSTRALIS (Tussock). One of the common native grasses of New Zealand. It grows in large clumps, often about two feet in

height. It is especially common in open situations in the South Island.

POMADERRIS ERICIFOLIA (Tauhinu, or Cotton Wood). A shrub usually growing in rather exposed places. The leaves are very small, pointed, dull green above and white underneath. They are placed very closely on the stems, which are also white. The flowers are dull yellowish-white, and grow in clusters.

PTERIS INCISA. A soft, light green, straggling fern, growing in open places in the forest, and round decayed logs.

SCABIOUS ("Pincushion"). An introduced garden plant. The flowers are of many different colours—the name "pincushion," gives the best description of appearance. It is very attractive to insects.

SENECIO BELLIDIOIDES. A common mountain herb, with rather dark green leaves, and a small tuft of bright yellow daisy-like flowers.

SENECIO SCANDENS (called by settlers French Ivy). A common climbing plant having a superficial resemblance to ivy, but with much brighter green leaves, and yellow flowers.

SENECIO VULGARIS (Groundsel). A common garden weed.

SOLANUM AVICULARE (Poro-poro, or Potato Plant). A shrub, with very dark green, pointed leaves, purple underneath, and bright purple flowers resembling those of the potato.

TODEA HYMENOPHYLLOIDES. One of the "crape" ferns, growing in very shady places in the forest. It has soft, graceful, light green fronds.

URTICA FEROX ("Nettle Tree"). It has prickly, light green leaves, with very long thick spines; a row of these spines is situated along the midrib of each leaf. It grows in open situations.

URTICA INCISA (Ground Nettle). A herbaceous plant found in shady places amongst ferns. The leaves are covered with spines, which give a very sharp sting when touched.

VERONICA (Koromiko). A genus of shrubs, found commonly on the margins of forests, and on hill-tops. The leaves are rather long, smooth, and dark green, and the flowers are mostly purplish-white.

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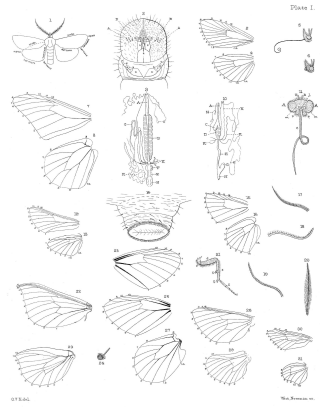
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PLATES AND EXPLANATIONS.

PLATE I.

ANATOMICAL.

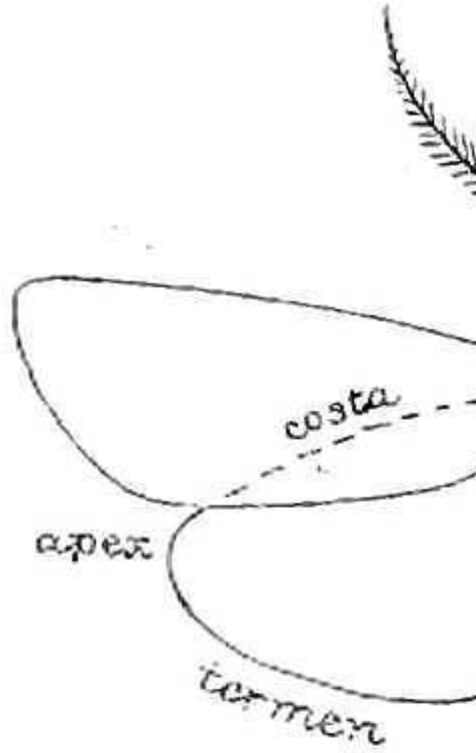


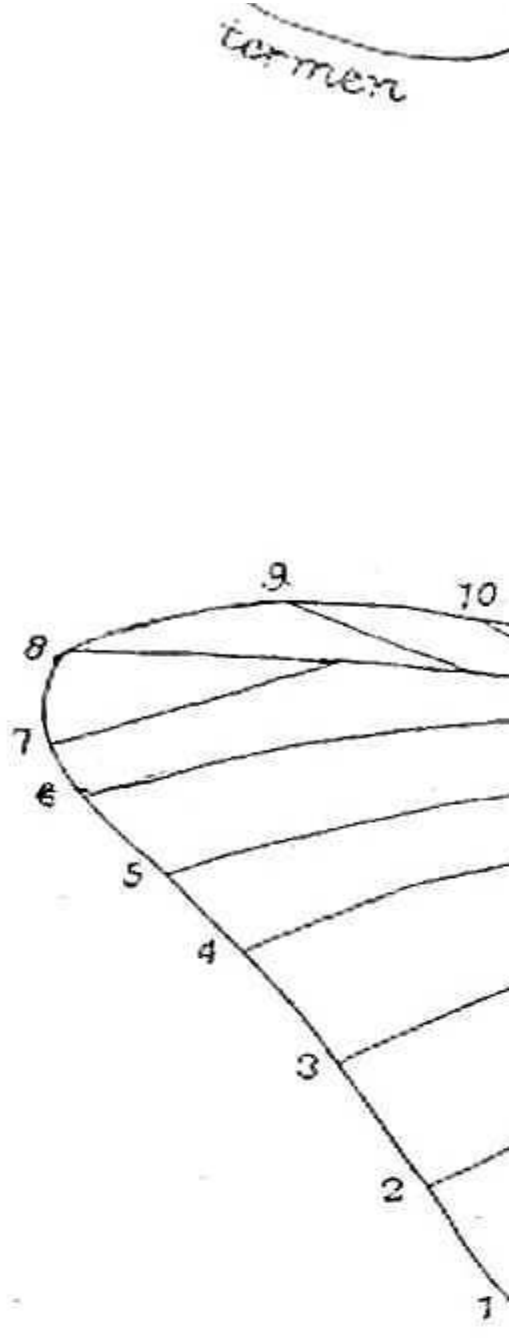
1. Outline of a Lepidopterous insect showing the terms employed in describing the various margins and angles of the fore- and hind-wings.
2. View of the under side of the head and first segment of the larva of a Lepidopterous insect. AA, eyes; BB, antennæ; 1, labrum; 22, mandibles; 33, maxillæ; 4, labium; 5, spinneret; *a*, coxa; *b*, trochanter; *c*, femur; *d*, tibia; *e*, tarsus; *f*, claw (highly magnified).
3. Assumed type of neuration of fore-wing of a Lepidopterous insect. (After Meyrick.)
4. Ditto of hind-wing. (After Meyrick.)
5. Side view of the head of *Vanessa gonerilla* with proboscis extended. (Imago, Plate XII., fig. 5.)
6. Ditto with proboscis coiled up. (In both these figures only the basal portions of the antennæ are shown.)
7. Neuration of fore-wing of *Anosia erippus*. (Imago, Plate XI., fig. 1.)
8. Ditto of hind-wing.

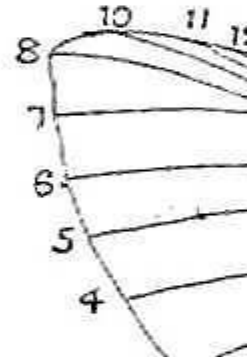
9. Digestive system of a Lepidopterous larva. A, œsophagus; D, ventriculus; F, clavate intestine; E, ilium; H, colon; K, biliary vessels; O, spinning vessels. (After Suckow.)
10. Ditto of perfect insect. N, salivary vessels; C, sucking stomach; G, cæcum. The rest as before. (After Herold.)
11. Front view of the head of *Vanessa gonerilla* with the labial palpi removed showing the organs of the mouth. AA, eyes; BB, antennæ (basal portion); *l*, labrum; *mm*, mandibles; *pp*, maxillary palpi; C, proboscis formed of elongated maxillæ (highly magnified).
12. Neuration of fore-wing of *Sphingidæ*. (*Deilephila*; after Meyrick.)
13. Ditto hind-wing. (After Meyrick.)
14. Proleg of caterpillar highly magnified.
15. Neuration of fore-wing of *Chrysophanus salustius*. (Imago, Plate XII., figs. 18-21.)
16. Ditto of hind-wing.

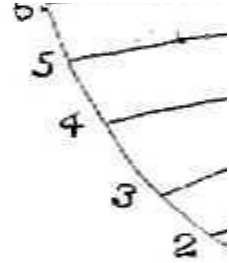
17. Fasciculate-ciliated antenna of *Chloroclystis plinthina*. (Imago, Plate VI., fig. 8.)
18. Serrate antenna of *Melanchra composita*. (Imago, Plate V., fig. 8.)
19. Pubescent antenna of *Epirranthis alectoraria*. (Imago, Plate VIII., figs. 42-47.)
20. Bi-pectinated antenna of *Nyctemera annulata*. (Imago, Plate IV., figs. 1, 2.)
21. Leg of *Agrotis ypsilon*. (Imago, Plate V., figs. 35, 36.) 1, coxa; 2, trochanter; 3, femur; 4, tibia; 5, tarsus; 6, claw; SS, spurs. (All these are highly magnified.)
22. Neuration of fore-wing of *Hepialus virescens*. (Imago, Plate XIII., figs. 16, 17.)
23. Ditto of hind-wing.
24. Head of ditto.
25. Neuration of fore-wing of *Erebia pluto*. (Imago, Plate XI., figs. 8-10.) Vein 11 absent.
26. Ditto, veins 11 and 12 concurrent.
27. Ditto of hind-wing.
28. Neuration of fore-wing of *Porina signata*. (Imago, Plate XIII., fig. 15.)

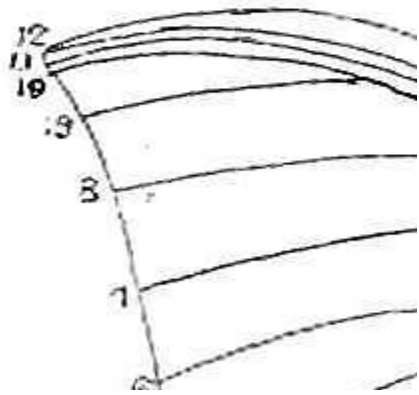
29. Ditto of hind-wing.
30. Neuration of fore-wing of *Œceticus omnivorus*. (Imago, Plate XIII., fig. 6.)
31. Ditto of hind-wing.

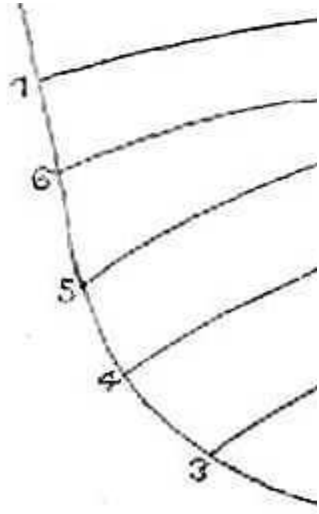

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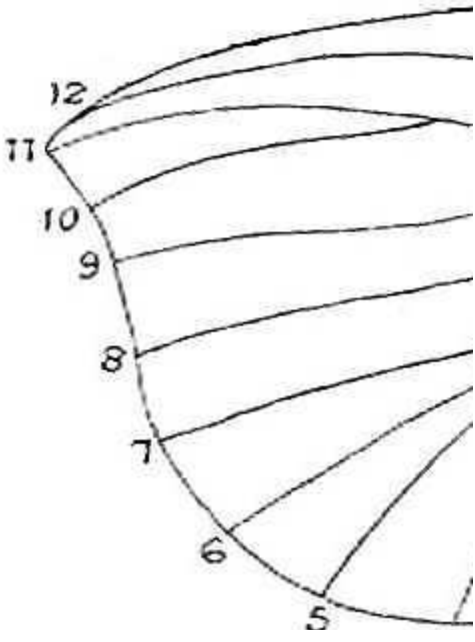

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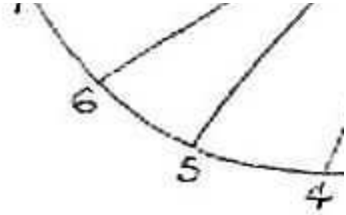

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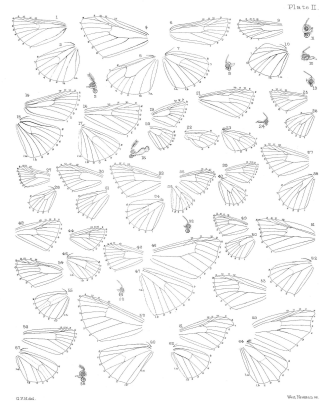


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PLATE II.

ANATOMICAL.

1. Neuration of fore-wing of *Metacrias erichrysa*. (Imago, Plate IV., fig. 5.)
2. Neuration of hind-wing of ditto.
3. Head of *Nyctemera annulata*. (Imago, Plate IV., figs. 1, 2.)
4. Neuration of fore-wing of ditto.
5. Neuration of hind-wing of ditto.
6. Neuration of fore-wing of *Mamestra mutans*. (Imago, Plate IV., figs. 34-36.)
7. Neuration of hind-wing of ditto.
8. Head of male of *Physetica cærulea*. (Imago, Plate IV., fig. 7.)
9. Neuration of fore-wing of *Erana graminosa*. (Imago, Plate V., figs. 24-25.)
10. Neuration of hind-wing of ditto.
11. Head of *Leucania nullifera*. (Imago, Plate IV., fig. 9.)
12. Head of *Dasypodia selenophora*. (Imago, Plate VI., fig. 4.)
13. Head of *Venusia verriculata*. (Imago, Plate VI., figs. 30-31.)
14. Neuration of fore-wing of *Plusia chalcites*. (Imago, Plate VI., fig. 3.)

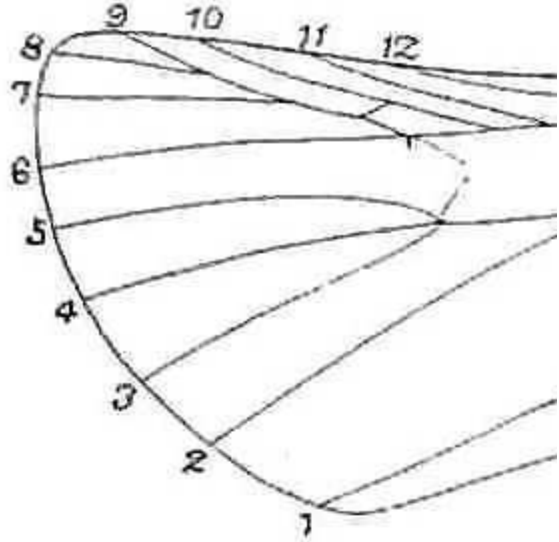


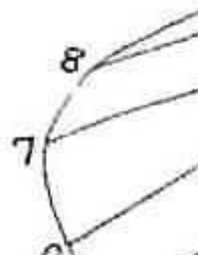
15. Neuration of hind-wing of ditto.
16. Neuration of fore-wing of *Rhapsa scotosialis*. (Imago, Plate VI., figs. 5-6.)
17. Neuration of hind-wing of ditto.
18. Head of ditto.
19. Neuration of fore-wing of *Chloroclystis bilineolata*. (Imago, Plate VI., figs. 9-10.)
20. Neuration of hind-wing of ditto.
21. Neuration of fore-wing of *Tatosoma agrionata*. (Imago, Plate VI., figs. 26-27.)
22. Neuration of hind-wing of male.
23. Neuration of hind-wing of female.
24. Head of ditto.
25. Neuration of fore-wing of *Venusia undosata*. (Imago, Plate VI., figs. 33-34.)
26. Neuration of hind-wing of ditto.
27. Neuration of fore-wing of *Paradetis porphyrias*. (Imago, Plate VI., fig. 36.)
28. Neuration of hind-wing of male.
30. Neuration of fore-wing of *Asthena pulchraria*. (Imago, Plate VI., figs. 37-38.)
31. Neuration of hind-wing of ditto.

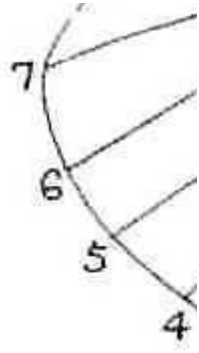
32. Head of *Hydriomena deltoidata*. (Imago, Plato VII., figs. 1-9.)
33. Neuration of fore-wing of ditto.
34. Neuration of hind-wing of ditto.
35. Neuration of fore-wing of *Asaphodes megaspilata*. (Imago, Plate VII., figs. 17-20.)
36. Neuration of hind-wing of ditto.
37. Neuration of fore-wing of *Xanthorhoe clarata*. (Imago, Plate VII., figs. 31-32.)
38. Neuration of hind-wing of ditto.
39. Neuration of fore-wing of *Lythria chrysopeda*. (Imago, Plate VIII., figs. 33-34.)
40. Neuration of hind-wing of ditto.
42. Neuration of fore-wing of *Dasyuris partheniata* (hind-wings as in *Xanthorhoe*). (Imago, Plate VIII., figs. 30-31.)
43. Neuration of fore-wing of *Notoreas brephos* (hind-wings also as in *Xanthorhoe*). (Imago, Plate VIII., figs. 20-23.)
44. Neuration of fore-wing of *Dichromodes petrina*. (Imago, Plate VIII., fig. 39.)

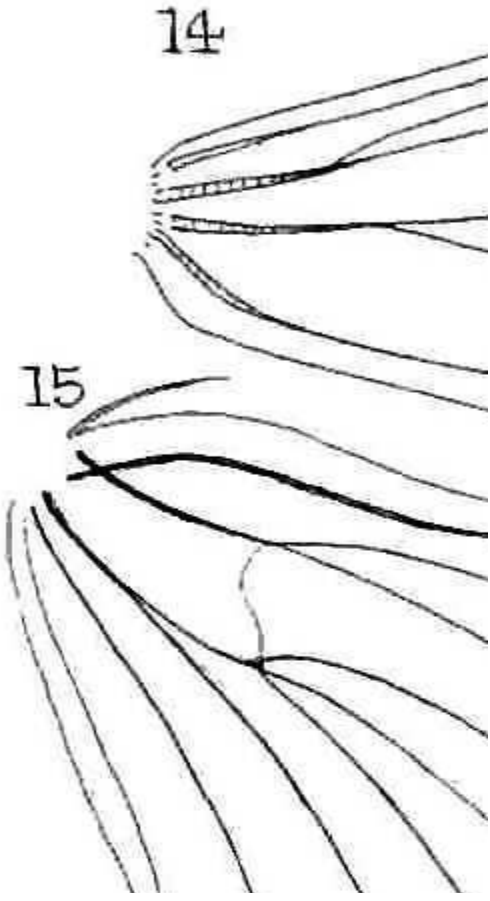
45. Neuration of hind-wing of ditto.
46. Neuration of fore-wing of *Epirranthis alectoraria*. (Imago, Plate VIII., figs. 42-47.)
47. Neuration of hind-wing of ditto.
48. Head of ditto.
49. Neuration of fore-wing of *Leptomeris rubraria*. (Imago, Plate VIII., fig. 37.)
50. Neuration of hind-wing of ditto.
51. Neuration of fore-wing of *Chalastra pelurgata*. (Imago, Plate IX., figs. 33-36.)
52. Neuration of hind-wing of ditto.
53. Neuration of fore-wing of *Sestra humeraria* (hind-wing as in *Selidosema*). (Imago, Plate X., figs. 1-2).
54. Neuration of fore-wing of *Azelina gallaria*. (Imago, Plate X., figs. 13-23.)
55. Neuration of hind-wing of ditto.
56. Neuration of fore-wing of *Declana floccosa*. (Imago, Plate X., figs. 39-47.)
57. Neuration of hind-wing of ditto.
58. Head of ditto.

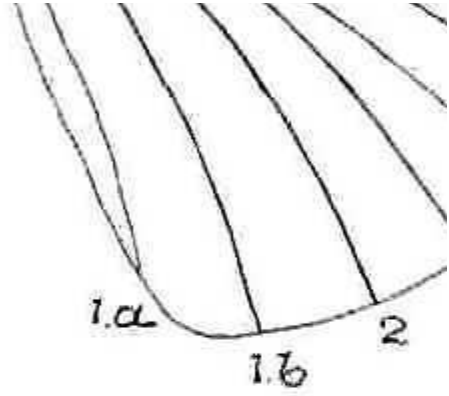
59. Neuration of fore-wing of *Selidosema dejectaria*. (Imago, Plate IX., figs. 19-24.)
60. Neuration of hind-wing of ditto.
61. Neuration of fore-wing of *Drepanodes muriferata*. (Imago, Plate X., figs. 7-12.)
62. Neuration of hind-wing of ditto.
63. Neuration of fore-wing of *Gonophylla nelsonaria*. (Imago, Plate X., figs. 3-6.)
64. Neuration of hind-wing of ditto.

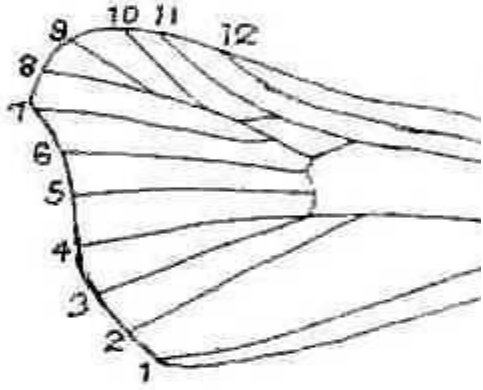

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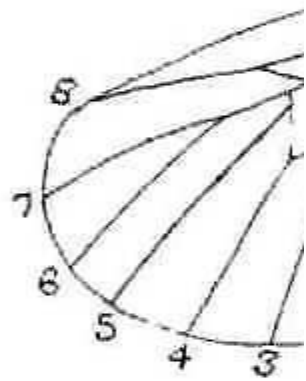

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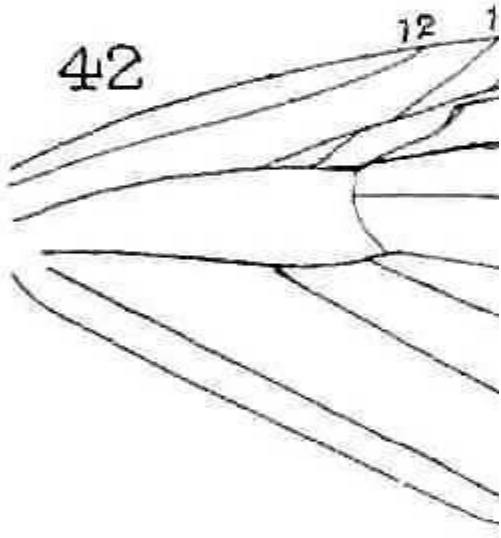

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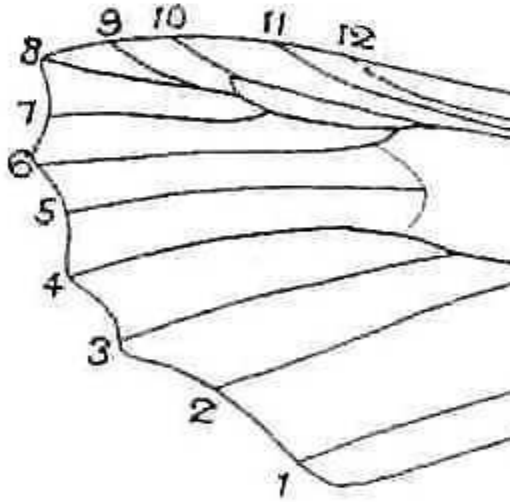

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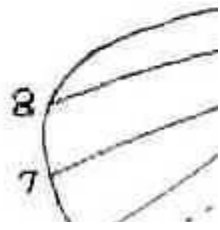

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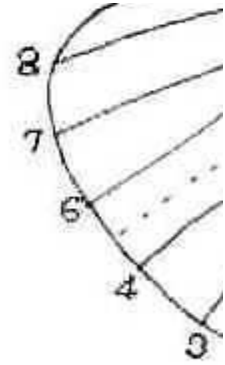

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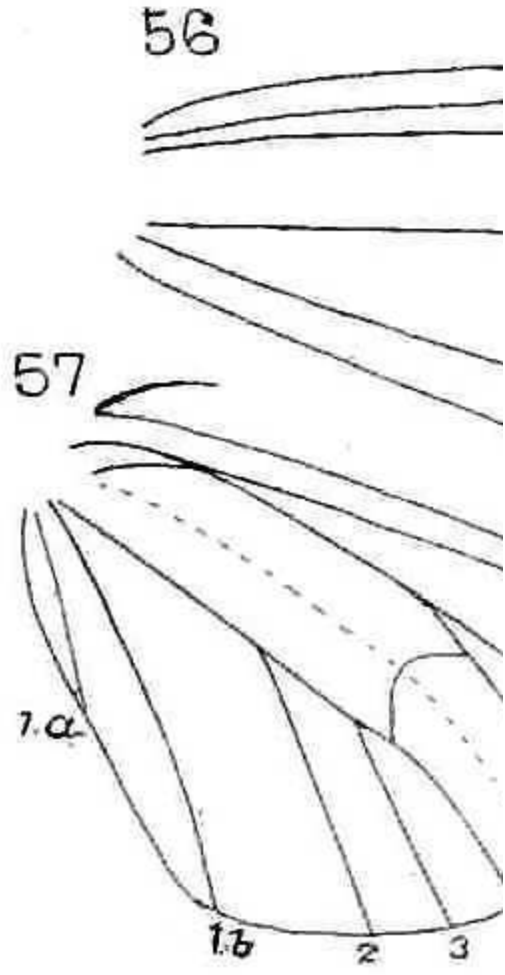

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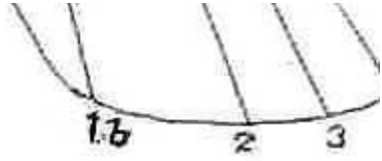

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PLATE III.

PREPARATORY STAGES.

FIG.		PAGE
1, 2.	Larvæ of *Vanessa gonerilla*. (Pupæ, figs. 31, 32; Imago, Plate XII., fig. 5.)	105
3.	Larva of *Anosia erippus*. (Pupa, fig. 27; Imago, Plate XI., fig. 1.)	102
4.	Larva of *Argyrophenga antipodum*. (Pupa, fig. 29; Imago, Plate XI., fig. 4.)	110
5.	Larva of *Dodonidia helmsi*. (Pupa, fig. 28; Imago, Plate XI., fig. 14.)	112
6.	Larva of *Porina signata*. (Imago, Plate XIII., fig. 15.)	134
7.	Larva of *Melanchra composita*. (Imago, Plate V., fig. 8.)	22
8.	Larva of *Erana graminosa*. (Imago, Plate V., fig. 24.)	28
9.	Larva of *Nyctemera annulata*. (Imago, Plate IV., fig. 1.)	2



10. Larva of *Melanchra homoscia*. (Imago, Plate V., fig. 7.) 21
11. Larva of *Orthosia comma*. (Imago, Plate V., fig. 27.) 7
12. Larva of *Selidosema dejectaria*. (Imago, Plate IX., fig. 21.) 86
13, 14. Larvæ of *Sphinx convolvuli*. (Imago, Plate XIII., fig. 1.) 99
15. Larva of *Melanchra mutans*. (Imago, Plate IV., fig. 34.) 18
16. Larva of *Melanchra vitiosa*. (Imago, Plate IV., fig. 42.) 20
17. Larva of *Selidosema aristarcha*. (Imago, Plate IX., fig. 17.) 85
18. Larva of *Declana atronivea*. (Imago, Plate X., fig. 33.) 95
19. Larva of *Epirranthis hemipteraria*. (Imago, Plate VIII., fig. 48.) 80

20. Larva of *Sestra humeraria*. (Imago, Plate X., fig. 1.) 89
21. Larva of *Chalastra pelurgata*. (Imago, Plate IX., fig. 34.) 88
22. Larva of *Selidosema productata*. (Imago, Plate IX., fig. 6.) 84
23. Larva of *Hepialis virescens*. (Pupa, fig. 30; Imago, Plate XIII., fig. 16.) 129
24. Larva of *Epirranthis alectoraria*. (Imago, Plate VIII., fig. 42.) 80
25. Larva of *Œceticus omnivorus* withdrawn from case. (Imago, Plate XIII., fig. 6.) 123
26. Larva of ditto in its case.
27. Pupa of *Anosia erippus*. (Larva, fig. 3; Imago, Plate XI., fig. 1.) 102
28. Pupa of *Dodonidia helmsi*. (Larva, fig. 5; Imago, Plate XI., fig. 14.) 112

29.	Pupa of *Argyrophenga antipodum*. (Larva, fig. 4; Imago, Plate XI., fig. 4.)	110
30.	Pupa of *Hepialus virescens*. (Larva, fig. 23; Imago, Plate XIII., fig. 16.)	129
31, 32.	Pupæ of *Vanessa gonerilla*. (Larva, figs. 1, 2; Imago, Plate XII., fig. 5)	105







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PLATE IV.

CARADRININA.

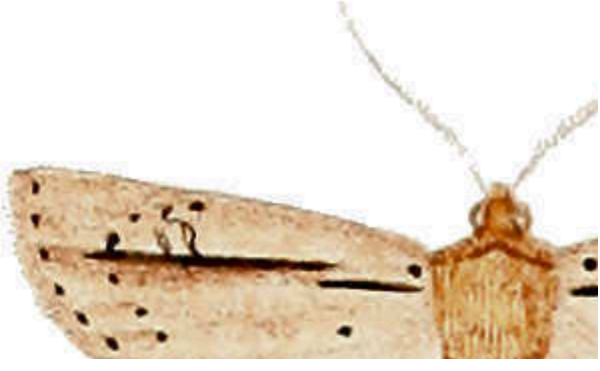
FIG.		PAGE
1.	*Nyctemera annulata* ♂ (Larva, Plate III., fig. 9.)	2
2.	" " ♀	
3.	*Utetheisa pulchella*	3
4.	*Metacrias strategica* ♂	4
5.	" *erichrysa* ♂	4
6.	" *huttonii* ♂	5
7.	*Physetica cærulea* ♂	8
8.	*Leucania griseipennis* ♀	9
9.	" *nullifera* ♀	9
10.	" *micrastra* ♂	12
11.	" *purdii* ♂	10
12.	" *atristriga* ♂	10
13.	" *propria* ♂	11
14.	" *acontistis* ♂	11
15.	" *phaula* ♂	11
16.	" *alopa* ♂	12
17.	" *unica* ♀	12
18.	" *arotis* ♀	12
19.	" *sulcana* ♂	13
20.	" " ♀	
21.	" *semivittata* ♂	13
22.	" " ♀	
23.	" *blenheimensis* ♀	13



24. " 13
unipuncta ♀
25. *Ichneutica* 14
ceraunias ♂
26. "
" ♀
27. " *dione*, 14
n. sp. ♂
28. *Melanchra* 15
paracausta ♂
28A. "
" ♀
29. " *insignis* 16
♂
30. " "
♀
31. " *maya*, 17
n. sp. ♀
32. " *plena* 17
♂
33. " *lithias* 17
♂
34. " *mutans*
♂
(Larva, Plate
III., fig. 15.) 18
35. " "
♀
36. " "
♂ variety
37. " *pictula* 19
♂
38. " 19
rhodopleura ♀
39. " *cœleno*, 26
n. sp. ♂
40. " 20
proteastis ♂
42. " *vitiosa*
♀
(Larva, Plate
III., fig. 16.) 20

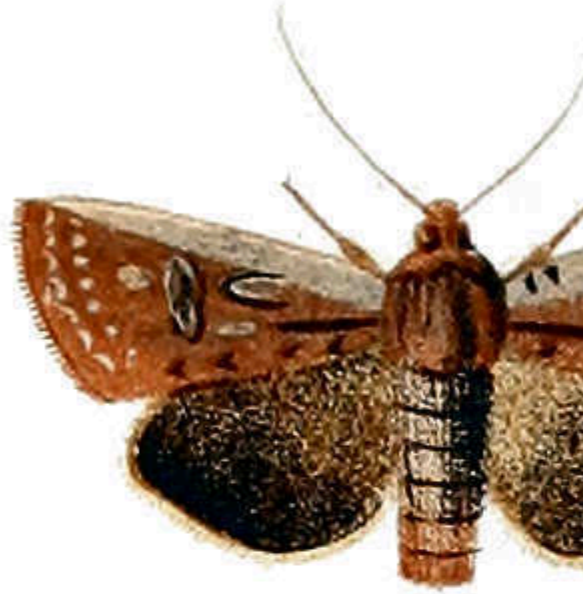


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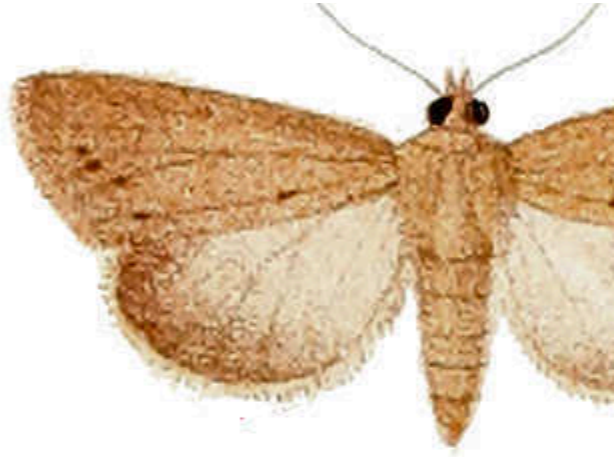


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PLATE V.

CARADRININA.

FIG.		PAGE
1.	*Melanchra octans*, n. sp.	25
2.	" *merope*, n. sp. ♂	19
3.	" *pelistis* ♂	19
4.	" " ♀	
5.	" *diatmeta* ♂	21
6.	" *tartarea* ♂	21
7.	" *homoscia* ♂ (Larva, Plate III., fig. 10.)	21
8.	" *composita* ♂ (Larva, Plate III., fig. 7.)	22
9.	" " ♀	
10.	" *steropastis* ♂	23
11.	" " ♀	
12.	" *infensa* ♀	23
13.	" *omoplaca* ♀	23
14.	" *alcyone*, n. sp. ♂	24
15.	" *asterope*, n. sp. ♀	24
16.	" *dotata* ♀	24
17.	" *stipata* ♀	25
18.	" *rubescens* ♂	25



19. " *lignana* ♂ 26
20. " *ustistriga* ♂ 26
20A. " " ♀
21. " *prionistis* ♂ 27
22. " *phricias* ♂ 27
23. " *cucullina* ♂ 27
24. *Erana graminosa* ♂ (Larva, Plate III., fig. 8.) 28
25. " " ♀
26. *Miselia pessota* ♂ 6
27. *Orthosia comma* ♂ (Larva, Plate III., fig. 11.) 7
28. " " ♀
29. " *immunis* ♂ 7
30. *Melanchra agorastis* ♀ 18
31. *Orthosia margarita* ♀ 6
32. *Xanthia purpurea* ♂ 8
33. *Bityla defigurata* ♂ 29
34. " *sericea* ♂ 29
35. *Agrotis ypsilon* ♂ 30
36. " " ♀
37. " *admirationis* ♂ 31
38. " *sericea* ♀ 31
39. " *innominata*, n. sp. ♂ 31

40. *Heliothis armigera* ♂ 32
41. " " ♀
42. *Melanchra omicron*, n. sp. ♂ 22
43. " *disjungens* ♂ 15







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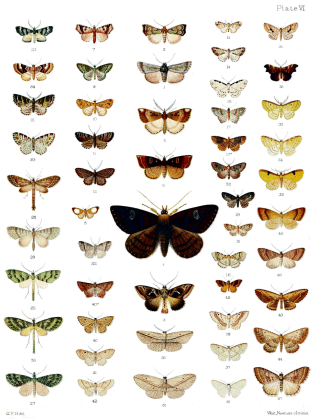
27





PLATE VI.

CARADRININA AND NOTODONTINA.



CARADRININA.

FIG.		PAGE
1.	*Agrotis carapachoides* ♂	32
2.	*Cosmodes elegans* ♀	33
3.	*Plusia chalcites* ♂	35
4.	*Dasypodia selenophora* ♂	35
5.	*Rhapsa scotosialis* ♂	36
6.	" " ♀	
7.	*Rhapsa octias* ♀	37
	NOTODONTINA.	
8.	*Chloroclystis plinthina* ♂	41
9, 10.	" *bilineolata* varieties	41
11.	" *nereis* ♀	43
12.	" *dryas* ♂	43
13, 14.	" *sphragitis* varieties	43
15, 16.	" *lichenodes* varieties	44
17.	" *indicataria* ♂	44
17A.	" " ♀	
18.	" *maculata*, n. sp.	44
19.	*Phrissogonus denotatus* ♂	45
20.	*Chloroclystis antarctica*, n. sp.	42

21.	" *aristias* ♂	42
22.	" " ♀	
23, 24.	*Elvia glaucata* varieties	46
25.	*Tatosoma lestevata* ♂	39
26.	" *agrionata* ♂	40
27.	" " ♀	
28.	" *timora* ♂	40
29.	" " ♀	
30.	*Venusia verriculata* ♂	53
31.	" " ♀	
32.	" *xanthaspis* ♂	54
33.	" *undosata* ♂	54
34.	" " ♀	
35.	*Euchœca rubropunctaria* ♀	51
36.	*Paradetis porphyrias* ♂	41
37.	*Asthena pulchraria* ♂	52
38.	" " ♀	
39-42.	*Asthena schistaria* varieties	52
43.	*Hydriomena gobiata* ♂	47
44.	" " ♀	

45, 46.	"	48
	subochraria varieties	
47.	"	47
	prionota	
48.	"	51
	siria	



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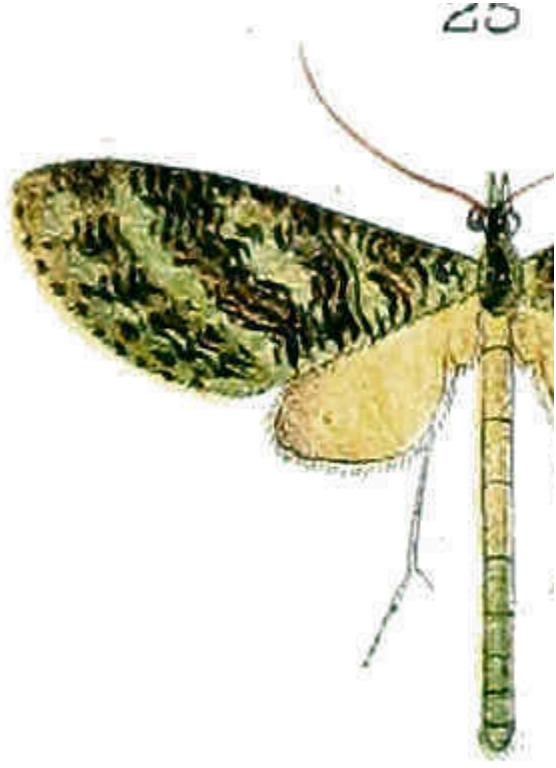


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PLATE VII.

NOTODONTINA.

FIG.		PAGE
1-9.	*Hydriomena deltoidata* varieties	47
10.	" *hemizona*	48
11.	" *rixata*	49
12.	" *purpurifera*	49
13.	" *callichlora*	50
14.	" *similata*	50
15.	" *arida*	50
16.	*Asaphodes siris* ♀	55
17-19.	" *megaspilata* ♂ varieties	55
19A, 20.	" " ♀ varieties	
21.	" *abrogata* ♂	55
22.	*Xanthorhoe rosearia* ♂	57
23.	" " ♀	
24.	" *orophylla* ♂	58
25.	" " ♀	
26.	" *semifissata* ♂	59
27.	" " ♀	
28.	" *chlamydota*	59
29.	" *stinaria* ♂	60
30.	" *præfectata* ♀	60



31. " 61
clarata ♂
32. "
" ♀
33. " 61
cataphracta
♂
34. "
"
♀
35. " 63
beata ♂
36. "
" ♀
37. " 64
ægrota ♂
38. " 64
lucidata ♂
39. " 60
mnesichola ♂
40. " 64
helias ♀
41. " 65
prasinias ♀
42. " 65
chionogramma
♂
43. "
"
♀
44. " 66
chorica
45. " 66
obarata
46. " 57
limonodes ♂
47. " 59
lophogramma
♂
48. "
"
♀
49. " 63
adonis ♂























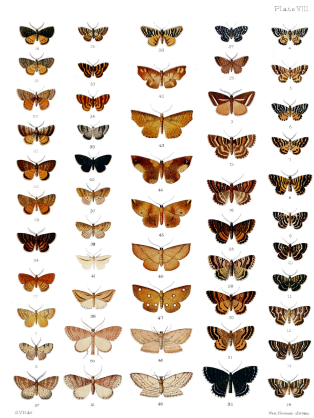
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PLATE VIII.

NOTODONTINA.

FIG.		PAGE
1.	*Xanthorhoe bulbulata* ♂	68
2, 2A.	" *cineraria* varieties	67
3.	*Notoreas insignis* ♂	71
4-8.	" *perornata* varieties	72
9-11.	" *mechanitis* varieties	72
12-14.	" *paradelpha* varieties	72
15.	" *strategica* ♀	73
16.	" *callicrena* ♀	73
17.	" *ferox* ♂	74
18, 19.	" *zopyra* ♂ varieties	74
20-23.	" *brephos* varieties	75
24.	" *vulcanica*	75
25.	" *omichlias* ♂	76
26.	" *simplex*, n. sp. ♀	74
27.	" *isoleuca* ♀	72
28.	*Dasyuris enysii* ♀	69
29.	" *anceps* ♂	69



30. " 70
partheniata ♂
31. " "
♀
32. " 70
hectori ♂
33. *Lythria* 68
chrysopeda ♂
34. " "
♀
35. " 68
euclidiata
36. *Samana* 76
falcatella ♀
37. *Leptomeris* 77
rubraria ♂
38. " " ♀
39. *Dichromodes* 78
petrina
40. " 78
nigra
41. *Theoxena* 79
scissaria
42-47. *Epirranthis* *alectoraria* varieties. (Larva, Plate III., fig. 24.) 80
48. " *hemipteraria* ♂ (Larva, Plate III., fig. 19.) 80
49. " "
♀

50. *Selidosema fenerata* ♂ 82
51. " " ♀



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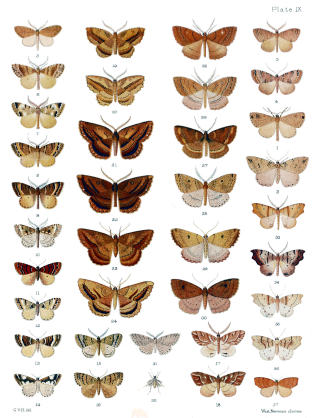
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PLATE IX.

NOTODONTINA.

FIG.		PAGE
1.	*Selidosema rudiata* ♂	82
2.	" " ♀	
3.	" *suavis* ♂	83
4.	" " ♀	
5.	" *humillima*, n. sp. ♂	83
6-10.	" *productata* ♂ varieties. (Larva, Plate III., fig. 22.)	84
11-14.	" " ♀ varieties	
15.	" *melinata* ♂	85
16.	" " ♀	
17.	" *aristarcha* ♂ (Larva, Plate III., fig. 17.)	85
18.	" " ♀	
19-22.	" *dejectaria* ♂ varieties. (Larva, Plate III., fig. 12.)	86
23, 24.	" " ♀ varieties	
25-28.	" *panagrata* ♂ varieties	87



29, 30. " " ♀ varieties
31. *Hybernia indocilis* ♂ 88
32. " " ♀
33, 34. *Chalastra pelurgata* ♂ varieties. (Larva, Plate III., fig. 21.) 88
35, 36. " " ♀ varieties
37. *Sestra flexata* ♀ 90











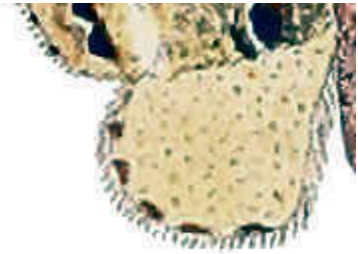


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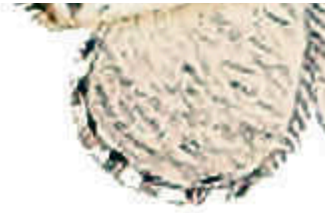


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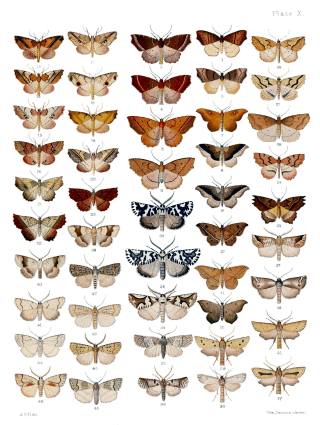
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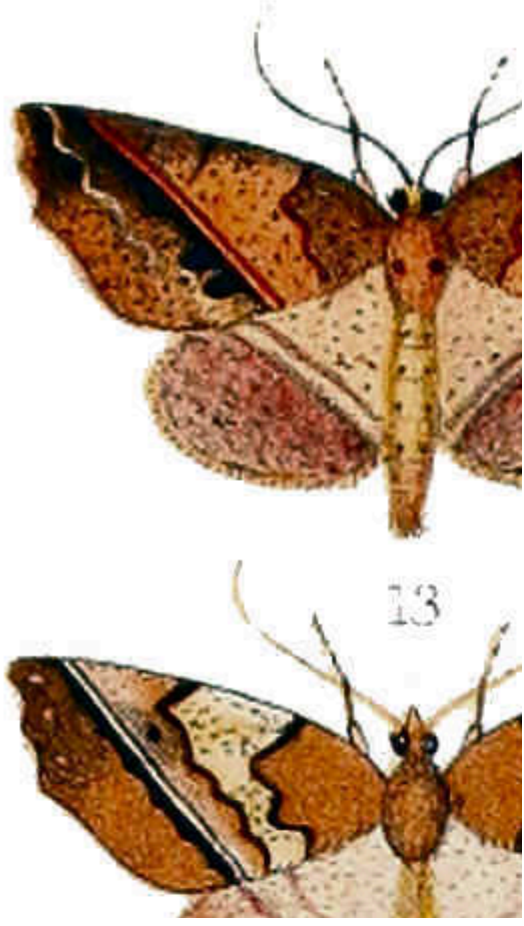
PLATE X.

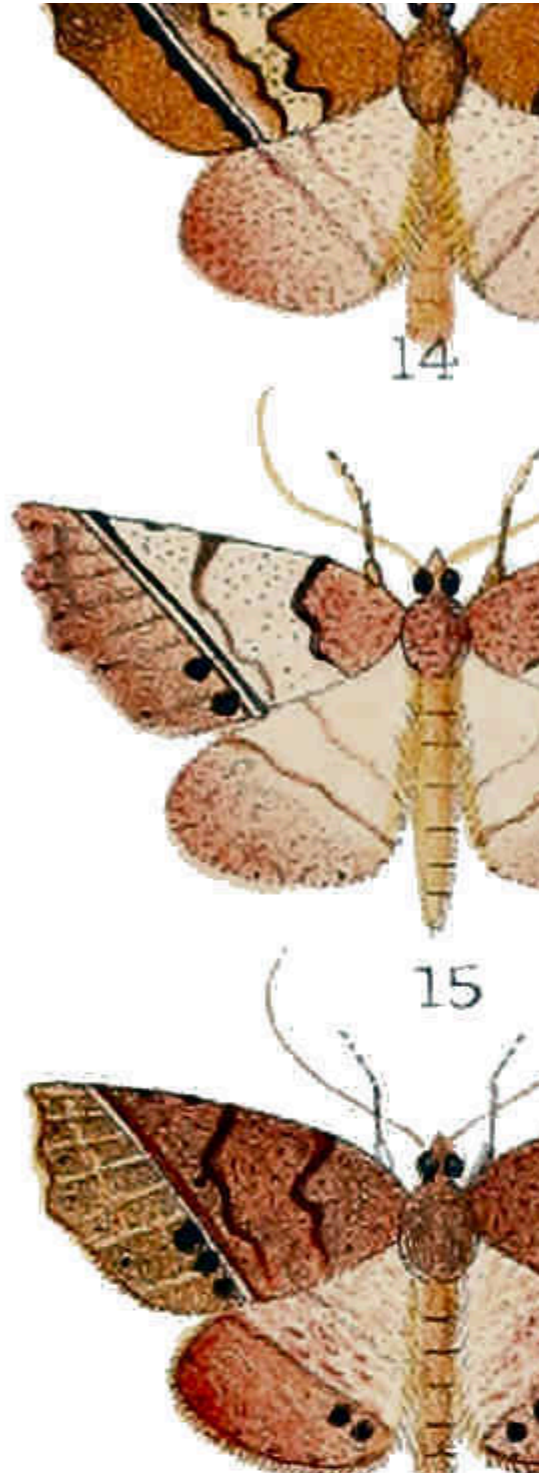
NOTODONTINA.

FIG.		PAGE
1, 2.	*Sestra humeraria* varieties. (Larva, Plate III., fig. 20.)	89
3, 4.	*Gonophylla nelsonaria* ♂ varieties	90
5, 6.	" " ♀ varieties	
7-10.	*Drepanodes muriferata* ♂ varieties	91
11, 12.	" " ♀ varieties	
13-20.	*Azelina gallaria* ♂ varieties	92
21-23.	" " ♀ varieties	
24.	" *fortinata* ♂	93
25.	" " ♀	
26.	" *ophiopa* ♂	93
27.	" " ♂ variety	
28.	" " ♀	
29, 31, 31A.	*Ipana leptomera* ♂ varieties	94
30.	" " ♀	



32.	*Declana griseata*, n. sp.	98
33.	" *atronivea* ♂ (Larva, Plate III., fig. 18.)	95
34.	" " ♀	
35.	" *egregia* ♂	96
36.	" *hermione*, n. sp. ♂	98
37.	" *junctilinea* ♂	98
38.	" " ♀	
39-43.	" *floccosa* ♂ varieties	96
44-47.	" " ♀ varieties	


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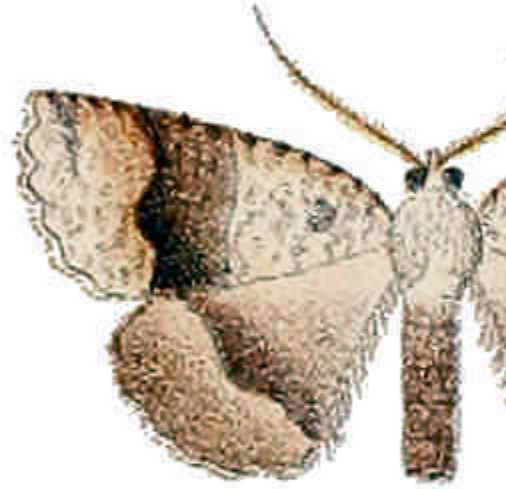
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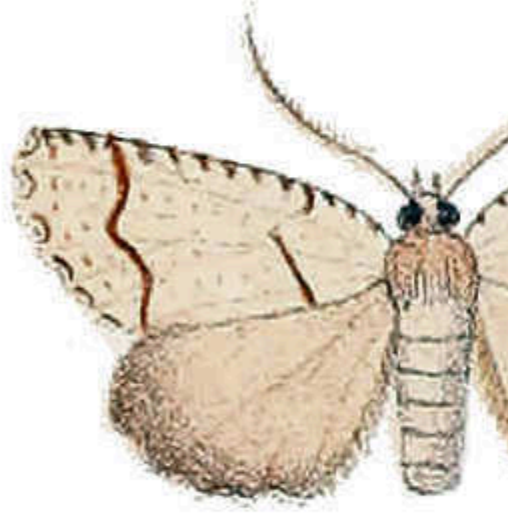
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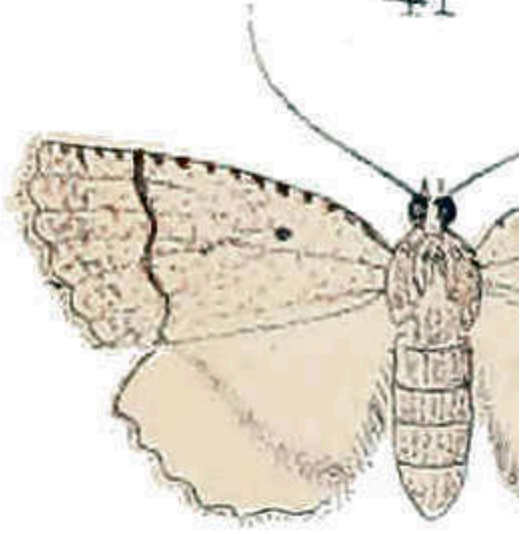


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PLATE XI.

PAPILIONINA.



FIG.		PAGE
1.	*Anosia erippus* ♀ (Larva, Plate III., fig. 3; Pupa, fig. 27.)	102
2.	" " under side.	
3, 4.	*Argyrophenga antipodum* ♂ varieties. (Larva, Plate III., fig. 4; Pupa, fig. 29.)	110
5.	" " ♀	
6, 7.	" " under sides.	
8.	*Erebia pluto* ♂	114
9.	" " ♀	
10.	" " under side.	
11.	*Erebia butleri* ♂	115
12.	" " ♀	
13.	" " under side.	
14.	*Dodonidia helmsi* ♂ (Larva, Plate III., fig. 5; Pupa, fig. 28.)	112
15.	" " under side.	
16.	*Junonia velleda*	109
17.	" " under side.	








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PLATE XII.

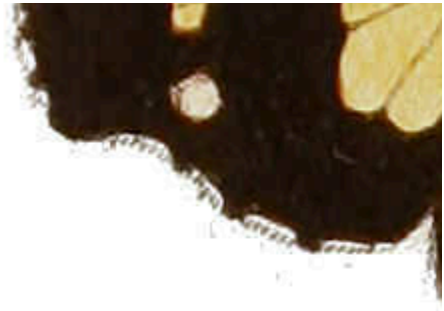
PAPILIONINA.

FIG.		PAGE
1.	*Vanessa cardui*	108
2.	" " under side.	
3.	" *itea*	107
4.	" " under side.	
5.	" *gonerilla*. (Larva, Plate III., figs. 1 and 2; Pupa, figs. 31, 32.)	105
6.	" " under side.	
7.	*Anosia bolina* ♂	104
8.	" " ♀	
9.	" " under side.	
10.	*Lycæna phœbe* ♂	119
11.	" " under side.	
12.	" *oxleyi*, under side.	119
13, 14.	*Chrysophanus boldenarum* ♂ varieties	118
15.	" " under side of ♂	
16.	" " ♀	
17.	" " under side of ♀	
18.	" *salustius* ♂	116
19.	" " ♀	
20.	" " under side	



21. " " under side of variety (upper side, Plate XIII., fig. 2.)
22. " 117 *enysii* ♂
23. " " ♀
24. " " under side.







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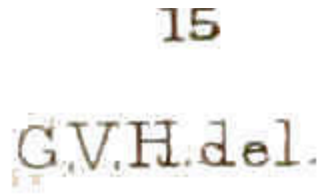
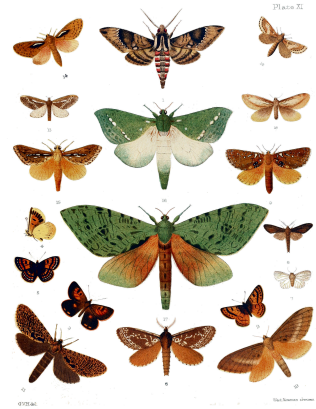


PLATE XIII.

NOTODONTINA, PAPILIONINA, PSYCHINA, AND MICROPTERYGINA.

NOTODONTINA.

FIG.		PAGE
1.	*Sphinx convolvuli.* (Larva, Plate III, figs. 13 and 14.)	99
	PAPILIONINA.	
2-5.	Varieties of *Chrysophanus salustius*	116
	PSYCHINA.	
6.	*Œceticus omnivorus* ♂ (Larva, Plate III., figs. 25, 26.)	123
7.	*Orophora unicolor* ♂	126
	MICROPTERYGINA.	
8.	*Porina dinodes* ♂	132
9.	" *enysii* ♂	133
10.	" " ♀	
11.	" *characterifera* ♂	133
12.	" *cervinata* ♂	133
13.	" *despecta* ♂	134
14.	" *umbraculata* ♂	134
15.	" *signata* ♂ (Larva, Plate III., fig. 6.)	134
16.	*Hepialus virescens* ♂ (Larva, Plate III., fig. 23; Pupa, fig. 30.)	129
17.	" ♀	



18. *Porina cervinata* 133
♀ variety







13









4



5







Notes.

[1]

This organ is termed the tongue by Mr. Meyrick. As many mandibulate insects possess a true tongue, and the proboscis of the *Lepidoptera* is not homologous with the tongue, but with the maxillæ, I think the term is very misleading.

[2]

For the examination of the wings taken from *dried* specimens, I have found that immersion in methylated spirits renders the veins visible after *partial* denudation with the camel's-hair brush. With recent specimens, however, the scales can easily be *entirely* removed.

[3]

I have found considerable difficulty and uncertainty in examining the neuration of undenuded specimens.

[4]
Entom. xxvi. 220.

[5]
Trans. N. Z. Inst. xxii. 218.

[6]
'British Moths,' 31.

[7]
Trans. N. Z. Inst. xxii. 217.

[8]
Trans. N. Z. Inst. xxii. 216.

[9]
Ibid.

[10]
Trans. N. Z. Inst. xix. 7.

[11]
Trans. N. Z. Inst. xix. 10.

[12]
Leucania aulacias, Meyr., is distinguished by having grey cilia to the hind-wings. The species was described from a single specimen taken at Dunedin and now in Mr. Fereday's collection. I have carefully examined this specimen, and find that the cilia, although considerably injured, are distinctly grey. As, however, I think it undesirable to characterize species so closely resembling each

other from such meagre material, I here regard it as a synonym of *Leucania arotis*.

[13]

Report of American Department of Agriculture, 1881, p. 93.

[14]

Mr. Philpott informs me that the larva of *M. paracausta* closely resembles that of *M. vitiosa*.

[15]

This species has been recently named by Mr. Meyrick, but a description of it has not yet been published.

[16]

The accurate ascertainment of the positions of the veins near the costa in this species is a matter of considerable difficulty owing to the extremely dense tuft of hairs there situated.

[17]

Trans. N. Z. Inst. xix. 29.

[18]

Newman's British Moths, 319.

[19]

Meyrick, Trans. N. Z. Inst. xix. 33.

[20]

Meyrick, Trans. N. Z. Inst. xix. 35.

[21]

Trans. N. Z. Inst. xix. 35.

[22]
Meyrick, 'Handbook of British Lepidoptera,' 159.

[23]
Trans. N. Z. Inst. xi. 300.

[24]
Ib. xix. 38.

[25]
Since this was written I find that Mr. Meyrick has created a new genus, *Hyperaucha*, for the reception of this insect. See 'Transactions of the Entomological Society of London,' 1897, 383.

[26]
N. Z. 'Journal of Science,' July, 1884.

[27]
N. Z. 'Journal of Science,' July, 1884.

[28]
A second specimen of this variety has since occurred in the neighbourhood of Nelson.

[29]
Trans. N. Z. Inst. xvi. 60.

[30]
Trans. N. Z. Inst. xvi. 60.

[31]
N. Z. 'Journal of Science,' July, 1884.

[32]
Trans. N. Z. Inst. xvi. 60.

[33]

Trans. N. Z. Inst. xviii. 208.

[34]
Ib. xvi. 71.

[35]
Ib.

[36]
Trans. N. Z. Inst. xvi. 78.

[37]
Trans. N. Z. Inst. xvi. 82.

[38]
Trans. N. Z. Inst. xvi. 83.

[39]
Trans. N. Z. Inst. xvi. 86.

[40]
In connection with these three species of *Notoreas* I should here mention that I have a number of specimens in my collection which appear to me to establish a complete transition between *N. mechanitis*, *N. paradelpha*, and *N. perornata*. From a careful study of these specimens I am led to believe that these three forms are really only varieties of one very variable species. Mr. Meyrick does not at present share this opinion, but I am disposed to think that this is chiefly due to the comparatively limited number of specimens he has had the opportunity of examining. In any case I do not regard the question of the specific or varietal values of these, or indeed of any other forms, as matters of great scientific importance, being, to a great extent, merely matters of individual opinion.

[41]
Trans. N. Z. Inst. xvi. 57.

[42]
Mr. Meyrick now includes these three species in the genus *Gonophylla*. (*See* Trans. Ent. Soc. Lond. 1897, 387.)

[43]
'Trans. N. Z. Inst.' xxii. 214.

[44]
'Catalogue of N. Z. Butterflies,' p. 21.

[45]
'Trans. N. Z. Inst.' x. 265.

[46]
'Cat. N. Z. Butterflies,' p. 22.

[47]
'Trans. N. Z. Institute,' x. 463.

[48]
Ibid. xviii. 205.

[49]
Since writing the above, I have been informed by Mr. Kingsley that one male specimen of *A. bolina* was taken at Wakapuaka, in 1896, and two others reported as seen at Collingwood and Nelson in March, 1897. Mr. A. P. Buller has also kindly informed me of the capture of a male specimen in perfect condition, at Ohau, Manawatu district, in March, 1898.

[50]

See notes by Mr. Stainton in the Ent. Mo. Mag., xxv. pp. 225, 268.

[51]
'British Butterflies and Moths,' p. 103.

[52]
'Entomologist,' xxii. 37.

[53]
'Trans. N. Z. Inst.' xxviii. 312.

[54]
'Trans. N. Z. Inst.' xv. 197.

[55]
Ent. Mon. Mag. iv. p. 53.

[56]
'Trans. N. Z. Inst.' ix. 460; x. 252.

[57]
'Trans. N.Z. Inst.,' vol. x. 259.

[58]
'Catalogue of N. Z. Butterflies,' 22.

[59]
'Catalogue of New Zealand Butterflies,' 18, 23, Pl. II., fig. 1.

[60]
Trans. N. Z. Inst. xvi. 550.

[61]
Stainton's 'British Butterflies and Moths,' 103, Pl. II., fig. 1.

[62]
Trans. N. Z. Inst. xvi. 550.

[63]
Stainton's 'British Butterflies and Moths,' 106.

[64]
Trans. N. Z. Inst. xvi. 550.

[65]
'Catalogue of N.Z. Butterflies,' 17, 23. Pl. IV., figs. 3, 4.

[66]
For further details on this subject see 'The Entomologist,' xiii. 245, and xviii. 159.

[67]
'Trans. N. Z. Inst.' x. (1877), 262.

[68]
'Entomologist,' xviii. 36.

[69]
Since writing the above I understand from Mr. Baunehr that he has met with several specimens of this species in forest on the Dun Mountain, Nelson, at an elevation of about 2,000 feet.

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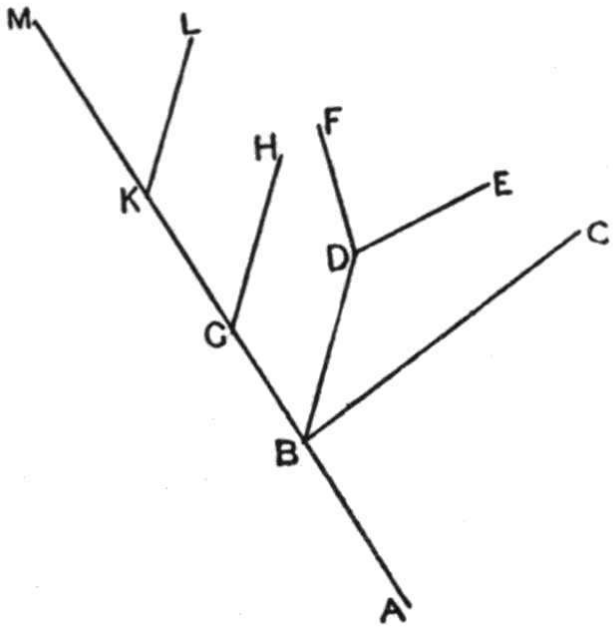
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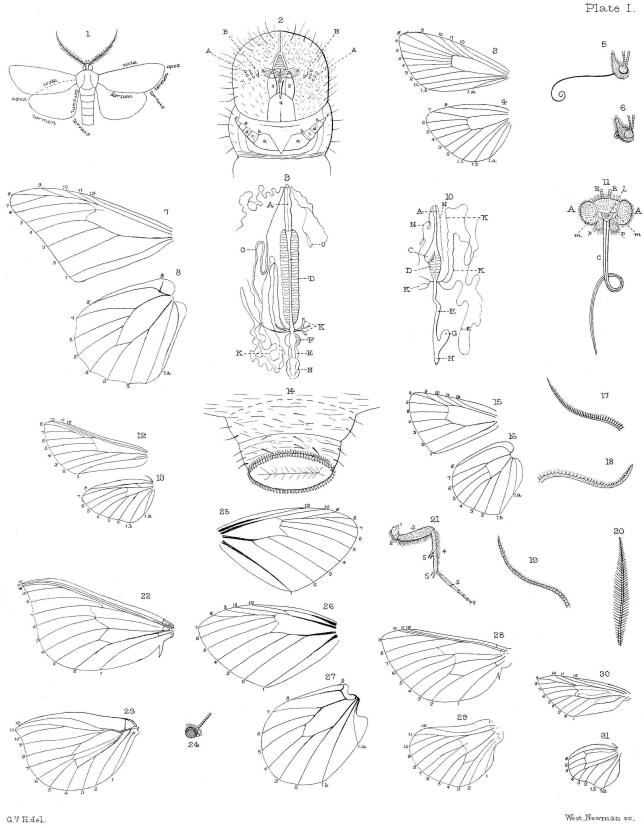
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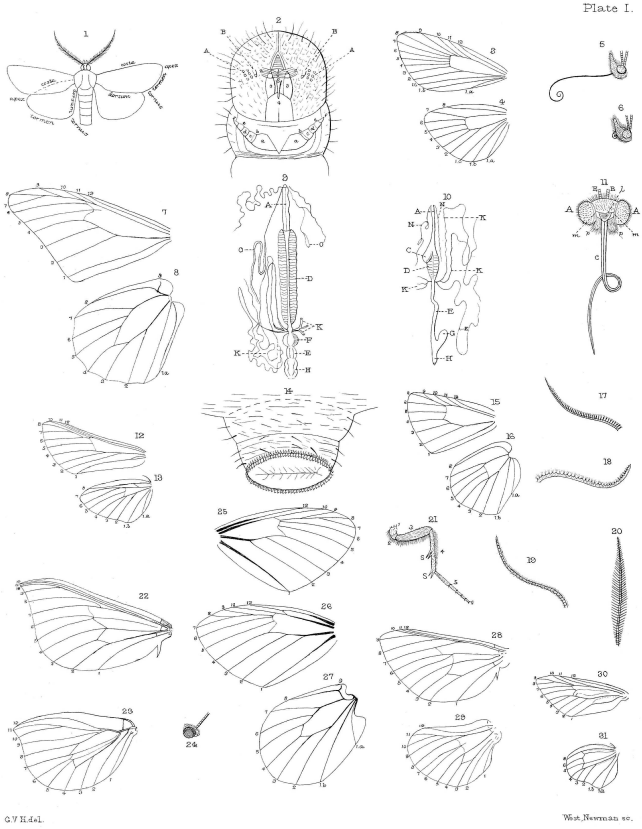
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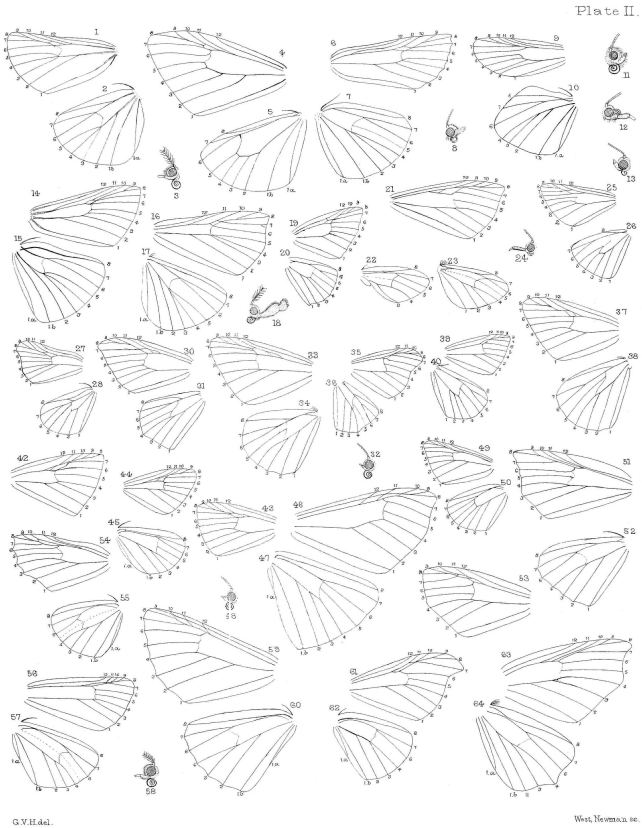
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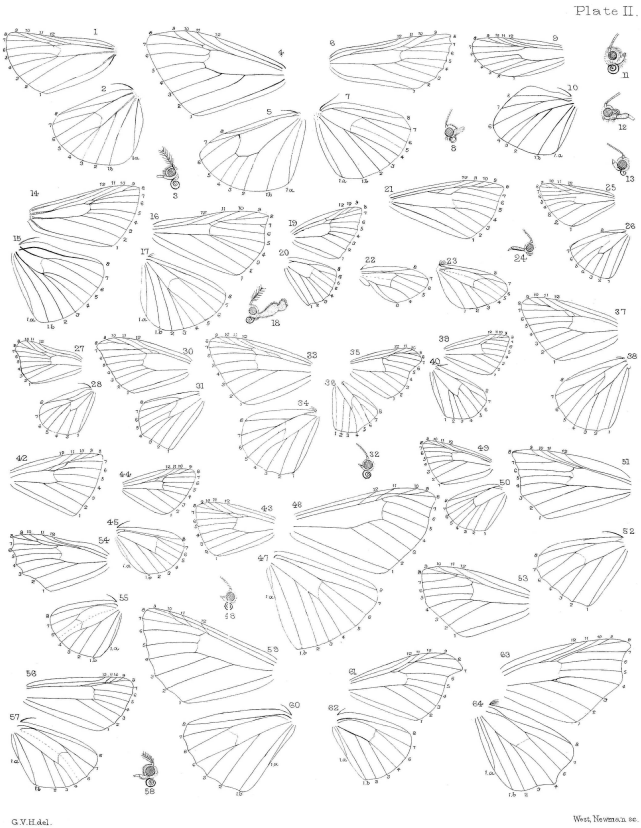
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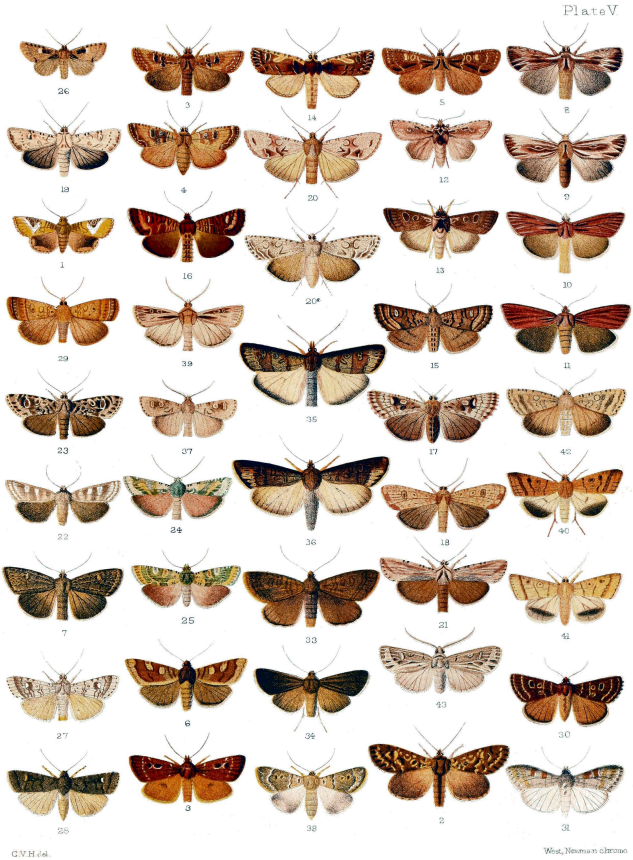
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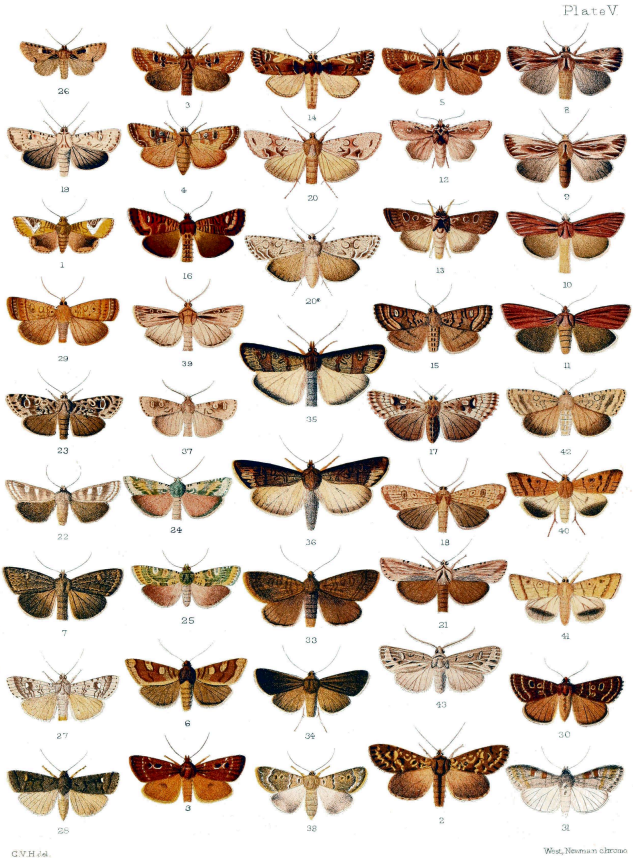
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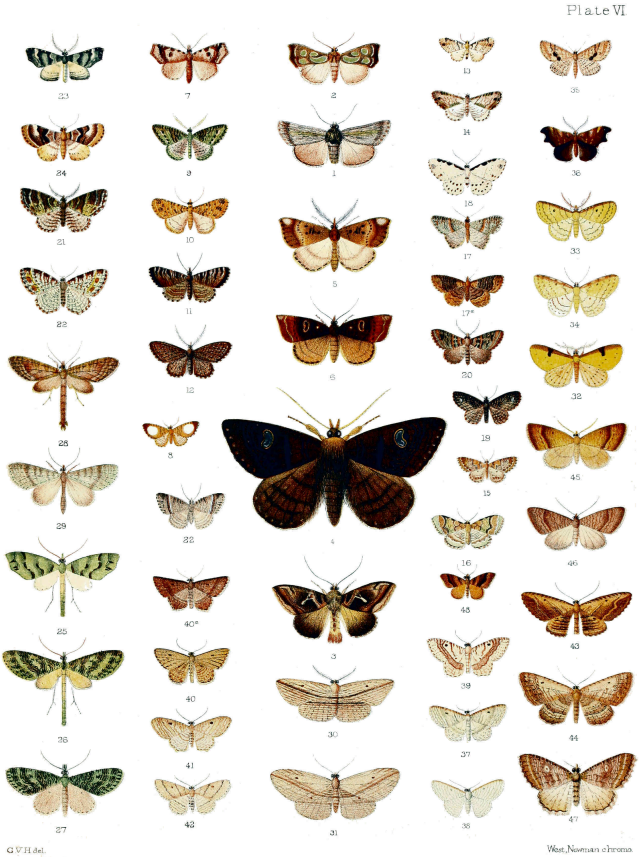
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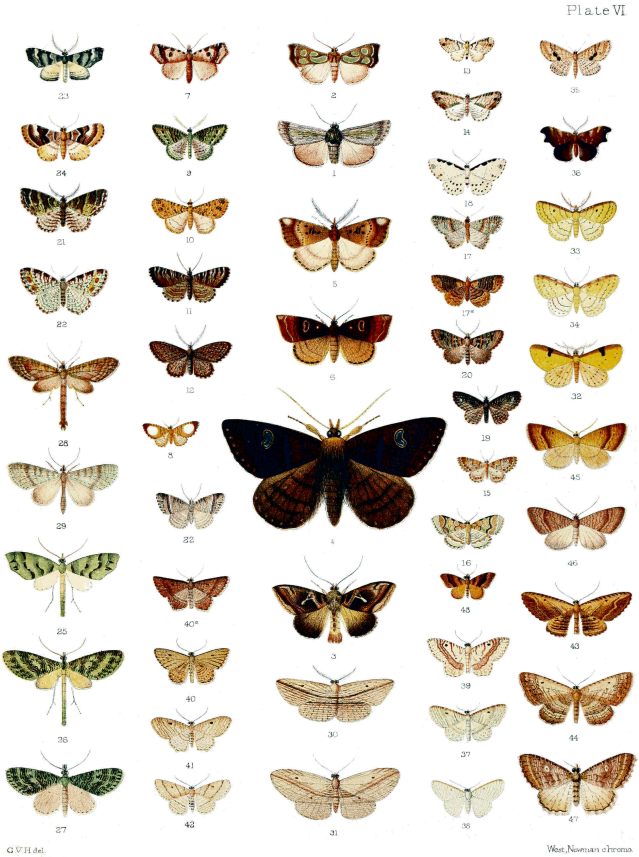
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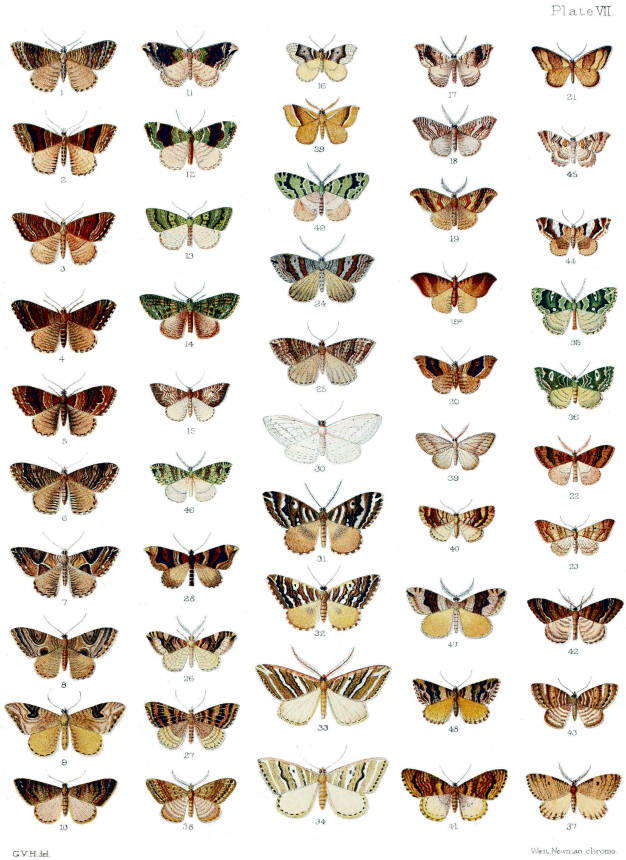
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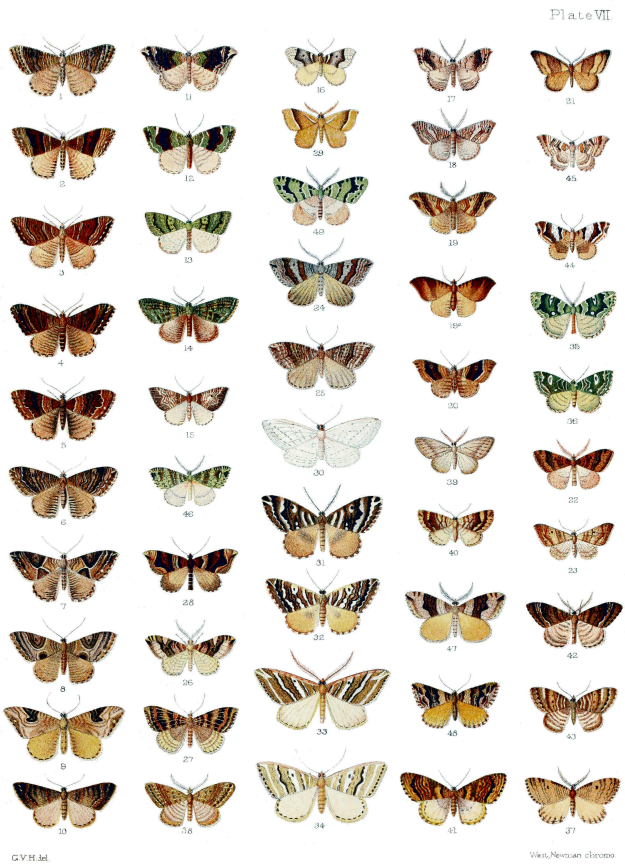
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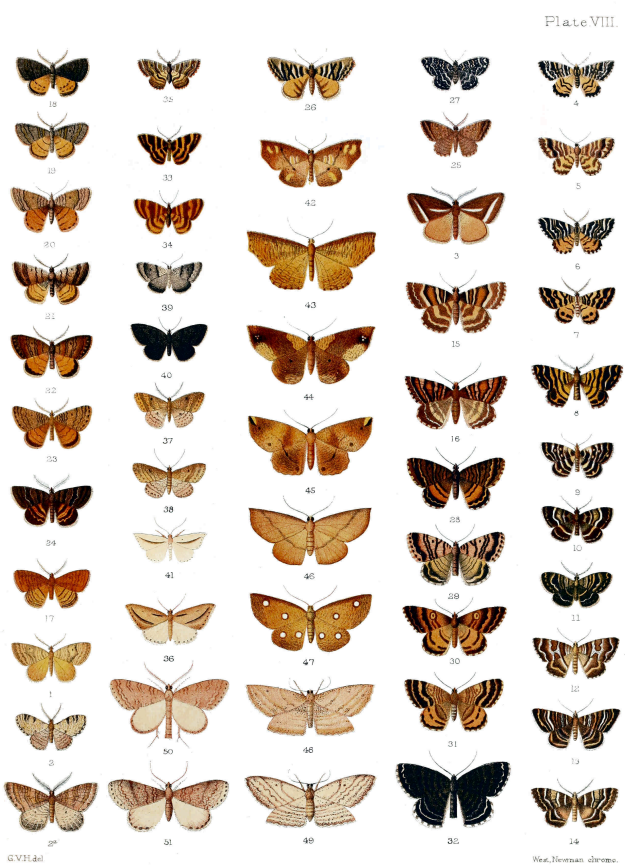
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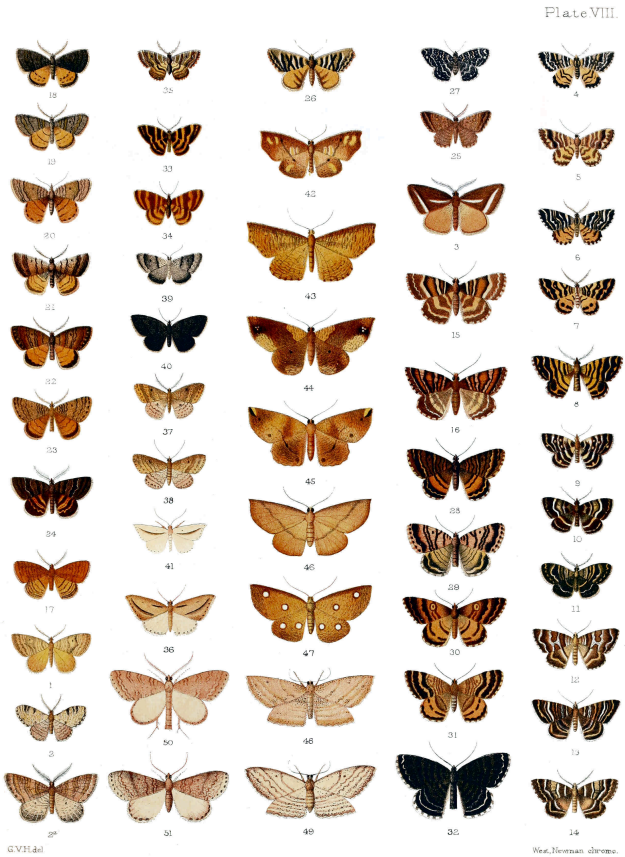
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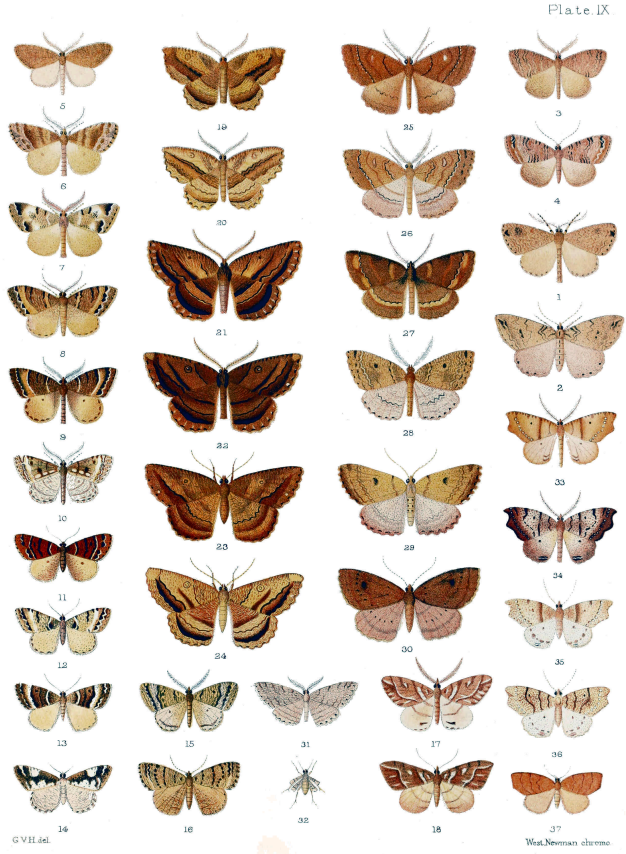
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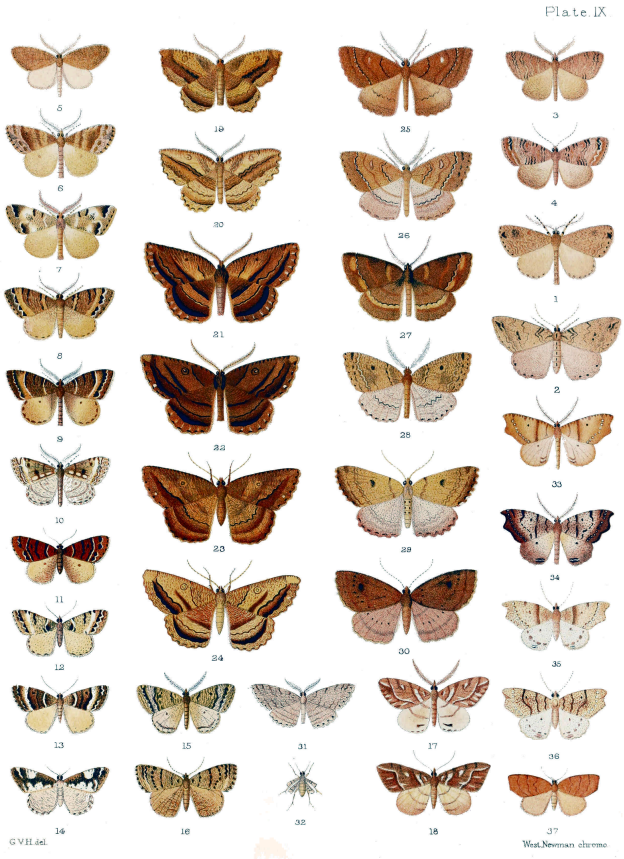
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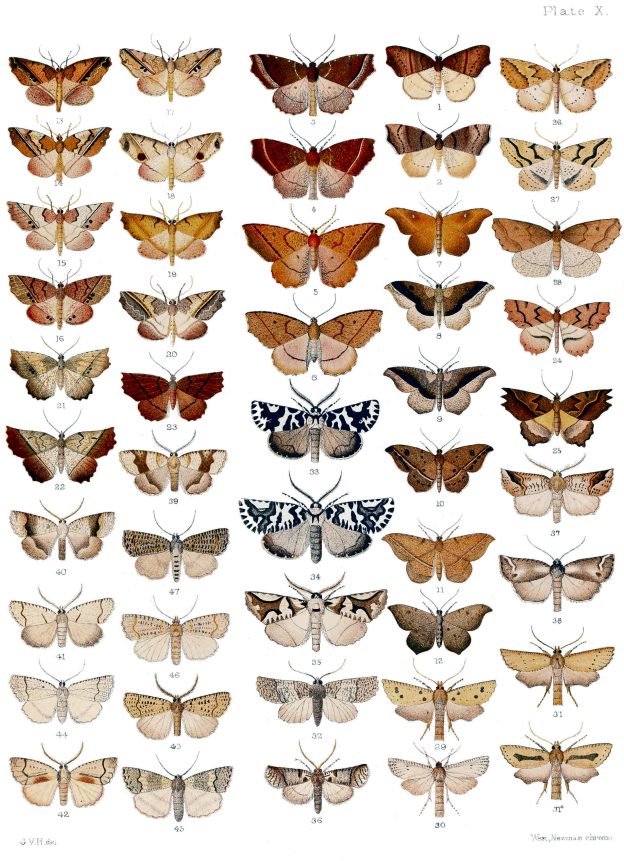
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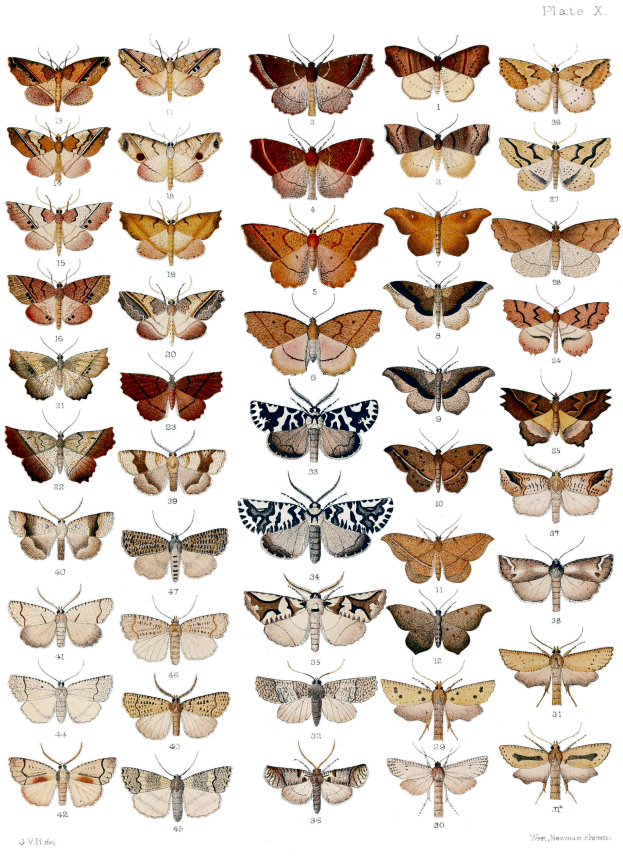
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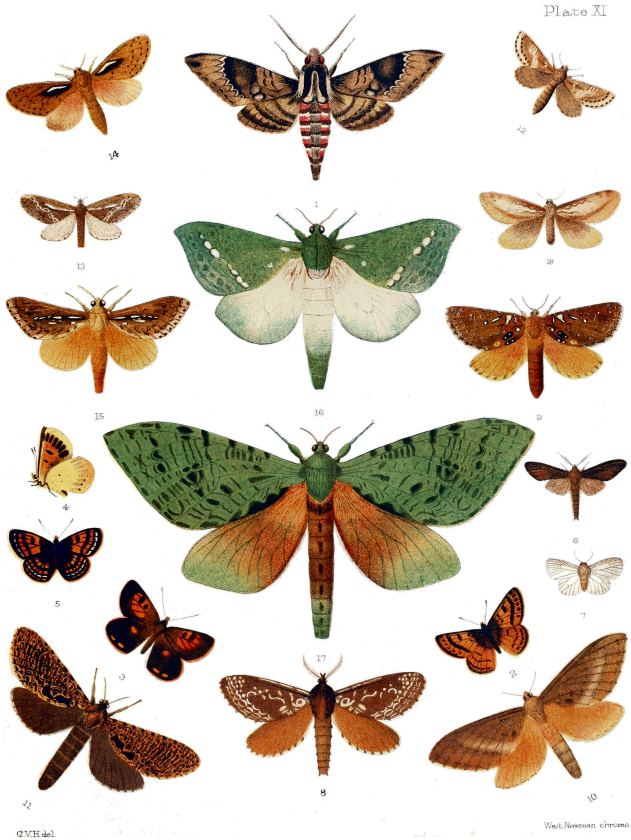
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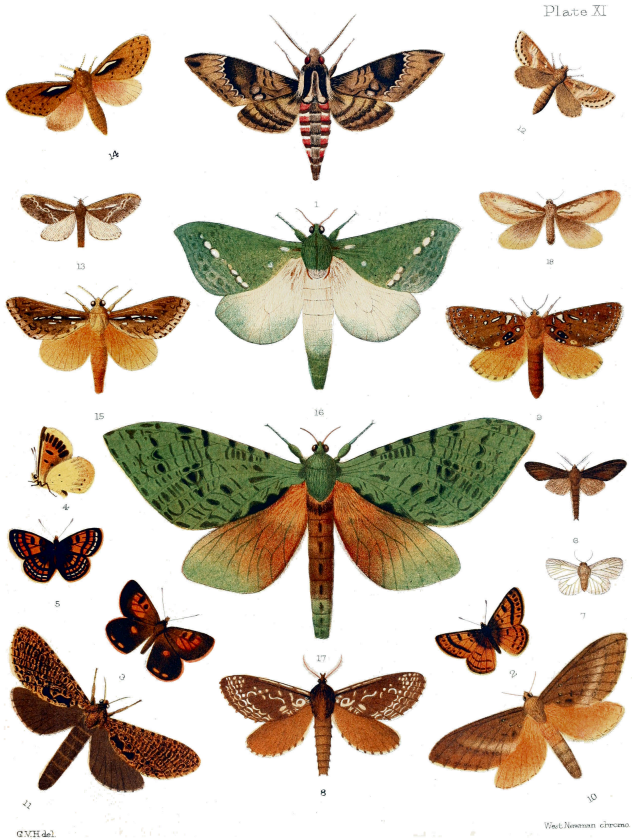
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