

ENTOMOLOGY OF THE AUCKLANDS AND OTHER ISLANDS SOUTH OF NEW ZEALAND: NEUROPTERA: HEMEROBIIDAE

By **K. A. J. Wise**¹

Abstract: *Micromus tasmaniae* (Walker, 1860) is recorded from Auckland Islands and Antipodes Islands.

Although no Neuroptera have been taken on Campbell Island, one species, *Micromus tasmaniae* (Walker, 1860), has been collected on Auckland Is and Antipodes Is, south of New Zealand. This is a widespread species which also occurs throughout New Zealand and on Chatham Is (Wise 1963).

Family HEMEROBIIDAE

Micromus tasmaniae (Walker, 1860)

AUCKLAND IS (Bishop Museum) Auckland I: Ranui, 1, 26.XII.1962, 1, 29-30.XII.1962, J. L. Gressitt. Ocean I: 1-18 m, *Dracophyllum*, 4, 29.XII.1962, 1-18 m, *Metrosideros*, 1, 29.XII.1962, 1-18 m, *Stilbocarpa*, 1, 29.XII.1962, 1-18 m, 2, 29.XII.1962, Gressitt; 6, 29.XII.1962, K. A. J. Wise. Enderby I: Sandy Bay, 1, 16.I.1963, Wise. (Canterbury Museum) Ocean I: in *Stilbocarpa Acaena*, 4, 29.XII.1962, P. M. Johns. Enderby I: 1, 17.I.1963, Johns.

ANTIPODES IS (Entomology Division) Antipodes I: Reef Pt., 3, 10.II.1969, *Poa foliosa*, 2, 6.II.1969, on *Poa litorosa* at night, 1, 14.II.1969, G. Kuschel; Stella Bay, tussock and *Senecio* on cliffs, 1, 20.II.1969, bluff above hut, tussock and fern at night, 1, 20.II.1969, P. M. Johns.

Some small Neuroptera larvae, presumed to be this species, were taken as follows.

AUCKLAND IS (Entomology Division) Auckland I: Ranui Cove, beating *Nothopanax simplex*, 5, 4.I.1963, Johns.

ANTIPODES IS (Entomology Division) Antipodes I: North Plain, 130 m, litter 69/45, 13, 14.II.1969, 100 m, litter 69/49, 1, 19.II.1969, Reef Pt, 1, 4.II.1969, Kuschel.

In addition to an early settlement about 1850-52, visits by sealers, shipwrecks, and the laying of depots for castaways, in the Auckland Is, both Port Ross (Ranui Cove) in the north and Carnley Hrbr in the south were bases for coast-watching groups for several years during World War II (1941-44). At the time of the 1962-63 expedition, *M. tasmaniae* was abundant on Ocean I, in Port Ross, where hay imported from New Zealand during World War II had been kept for a small flock of sheep. This could have been a source of introduction of the lacewings but the abundance there may have resulted from the presence of a suitable food supply, as aphids, which also could have been introduced with the fodder, were also present. Sealers visited the Antipodes Is from 1804 onwards and a castaway depot was stocked for many years after 1865 so introductions could also have been made there. However, natural dispersal by wind could account for the presence of the species on Auckland, Antipodes and Chatham Is.

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REFERENCE

Wise, K. A. J. 1963. A list of the Neuroptera of New Zealand. *Pacif. Ins.* 5(1): 53-58.

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ENTOMOLOGY OF THE AUCKLANDS AND OTHER ISLANDS SOUTH OF NEW ZEALAND: LEPIDOPTERA, EX- CLUDING NON-CRAMBINE PYRALIDAE

By J. S. Dugdale¹

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Abstract: This paper deals with all Lepidoptera, excluding the non-crambine Pyralidae, of Auckland, Campbell, Antipodes and Snares Is. The native resident fauna of these islands consists of 42 species of which 21 (50%) are endemic, in 27 genera, of which 3 (11%) are endemic, in 12 families. The endemic fauna is characterised by brachyptery (66%), body size under 10 mm (72%) and concealed, or strictly ground-dwelling larval life. All species can be related to mainland forms; there is a distinctive pre-Pleistocene element as well as some instances of possible Pleistocene introductions, as suggested by the presence of pairs of species, one member of which is endemic but fully winged. A graph and tables are given showing the composition of the fauna, its distribution, habits, and presumed derivations. Host plants or host niches are discussed. An additional 7 species are considered to be non-resident waifs.

The taxonomic part includes keys to families (applicable only to the subantarctic fauna), and to genera and species. Existing species and genera are redescribed, and where necessary, new combinations and synonymies are established. Two new genera, 9 new species and 4 new subspecies are described. Drawings of genitalia and other parts of all native species are given.

INTRODUCTION

This paper deals with all the New Zealand Subantarctic Lepidoptera except for the non-

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crambine Pyralidae (comprising 6–9 resident species of Scopariinae, 1 resident species of Nymphulinae, 1 resident, 1 vagrant species of Pyraustinae) which are discussed elsewhere in these volumes by Dr E. G. Munroe.

Although nine scientific expeditions have visited the New Zealand Subantarctic Is. between 1839 and 1907 (Chilton 1909: XIV–XXXV), the first Lepidoptera to be described were those collected by the 1907 Expedition organised by the Philosophical Institute of Canterbury, New Zealand. Since then, material has been collected by members of the 1941–1945 “Cape Expedition,” a coast watching operation during World War II, and later by the Danish “Galathea” Expedition in 1951, and from Antipodes I by Mr E. G. Turbott in 1950.

The “Cape Expedition” material is unique in that it includes adults of species collected during winter and spring, and which have never been collected by summer-based expeditions. In the decade 1960–70, collecting has been more systematic and at present Dominion Museum regularly receives specimens collected by Meteorological Office staff stationed all year at Campbell I.

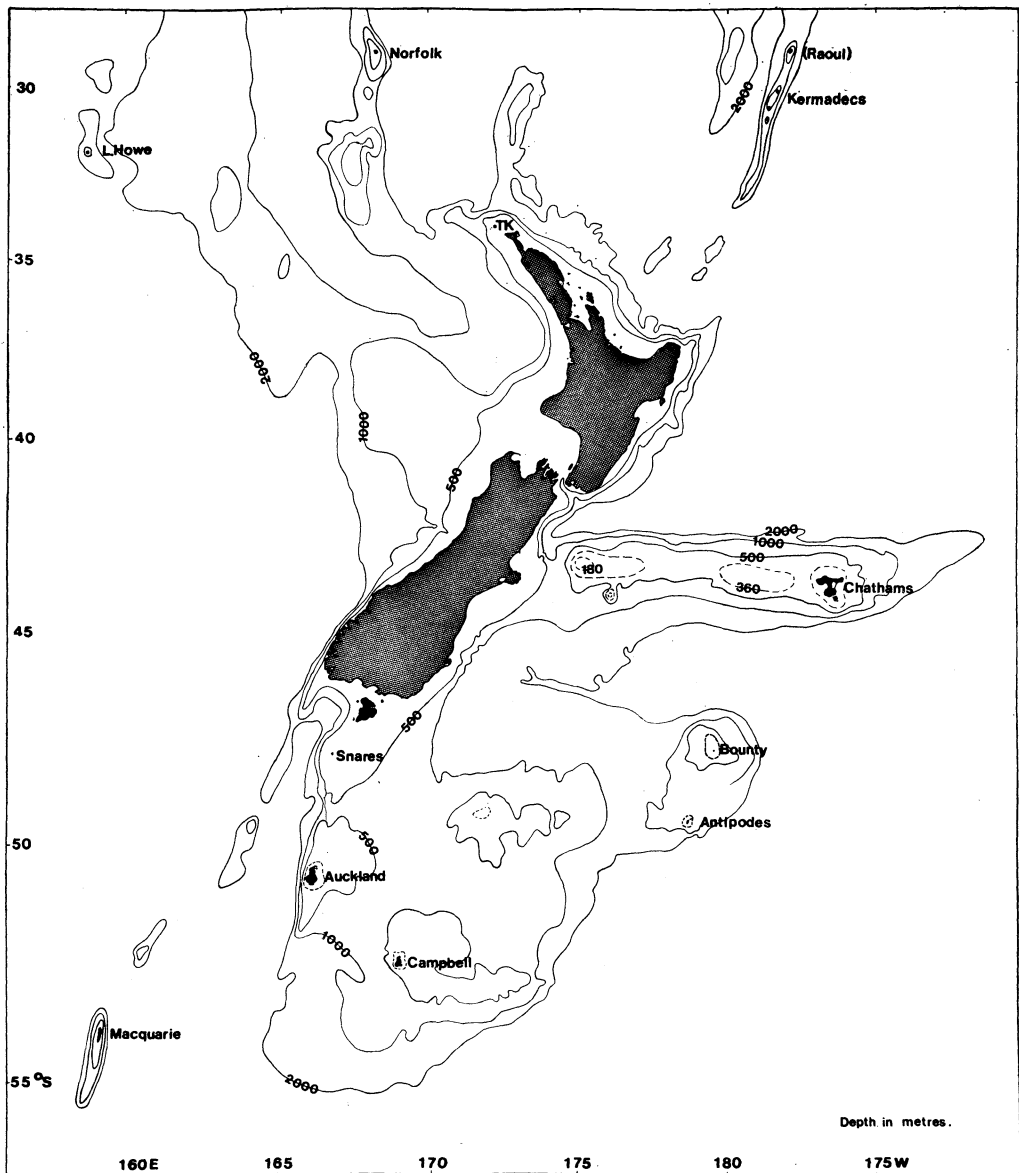
Messrs. G. V. Hudson and Edward Meyrick recorded 21 species, 12 of which were described as endemic, collected by the 1907 Expedition. J. T. Salmon and J. D. Bradley described a further 7 valid species from the Cape Expedition and Turbott material, while P. Viette described 1 species from the Galathea material. The present paper expands and continues those of Yano (1964) and Dugdale (1964) which were strictly concerned with Bishop Museum material collected from Campbell I.

Material has been examined from the 1907 Expedition, from the war-time “Cape Expedition,” and from collections made by Bishop Museum, Honolulu, Hawaii; Entomology Division, D.S.I.R., New Zealand; University of Canterbury, New Zealand; and Dominion Museum, New Zealand. Material collected by Dr H. Lemche during the Danish “Galathea” Expedition of 1950–52 was not examined.

All taxa from the Subantarctic Is (here taken as Snares, Bounty, Antipodes, Auckland, Campbell, Macquarie, see Map 1) have been compared with mainland and Chatham material, principally from collections at Entomology Division, D.S.I.R., Nelson, but also at Dominion Museum, Wellington and Forest Research Institute, Rotorua. Problem types have been examined for me by members of the British Museum (Natural History) London, or of Commonwealth Institute of Entomology, London.

The great wealth of material collected over the past 10 years includes excellent larval and pupal material and this has permitted many associations of mature and immature stages to be made. There has also been an increase in information on the mainland fauna, and this allows for a greater understanding of the elements that comprise the subantarctic fauna, their possible derivations and their broad ecologies. In this paper, 42 species are described as native and resident, of which 21 are endemic. Another 4 species are noted as being domestic species, and 7 species are regarded as vagrant, i.e. non-resident immigrants. There are 13 new taxa described (9 new species, 4 new subspecies). The nomenclature has been revised, and groups previously included under zoogeographically inapt generic names (e.g. *Melanchra*, *Xanthorrhoe*) are extensively discussed.

In Table 1, and in the taxonomic text, the terms Lowland (L), Upland (U), Subalpine (S) and Alpine (Al) are used sensu Burrows (1969: 212) in that lowland is usually under 500 m, upland is under 1300 m, subalpine is the transition forest zone between upland forest and alpine grassland, often with “subalpine scrub”, alpine is that grassland above the timberline, and extending to near the summer snowline, or base of the nival zone. In the tables, and throughout the text, A. = Auckland Is, Ant. = Antipodes I, BSC = Big South Cape I, C = Campbell I, Ch. = Chatham Is, N. = North I, S. = South I, Sn. = Snares I, St. = Stewart I.



Map 1. New Zealand and surrounding islands. Pleistocene sealevel depression has been estimated at 107 m or more (Fleming, 1962: 87). (500 m–2000 m bathymetry from Garner, D. M., 1967: "Oceanic Sound Channels around NZ" *N.Z. J. mar. Freshwat. Res.* 1: 3–15; Mernoo Bank-Chatham, and 360 m bathymetry from Brodie, J. W., 1964: Bathymetry of N.Z. Region, *DSIR Bull.* 161; and Knox, G. A. 1957. "General Account of Chatham Is Scientific Expedition 1954" *DSIR Bull.* 122.)

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FAUNAL COMPOSITION AND RELATIONSHIPS

General Remarks:

Exclusive of the non-crambine Pyralidae and the 4 domestic or horticultural cosmopolitan species (*Hoffmannophila*, *Endrosis*, *Tinea*, *Plutella*), there are 49 species recorded from the Subantarctic Is. Of these, 7 are here regarded as being windblown non-resident waifs, as they are indistinguishable from mainland specimens, and fulfill all or most of the following criteria:

1. There are no suitable hosts in the Subantarctic.
2. Samples from suitable Subantarctic hosts or niches did not yield larvae.
3. The Subantarctic is outside the climatic range of breeding populations.
4. Despite at least three major expeditions over 1907 to 1969, the species is represented by a single specimen.

Thus *Othreis materna*, a tropical species, fulfills criteria 1, 2, 3 and 4. *Pseudaletia separata* fulfills criteria 2 and 3 (southern breeding limit appears to be north of Lat. 43°S). *Agrotis ypsilon* and *Graphania omoplaca* fulfill criterion 2, and *Pasiphila fumipalpata*, *Coleophora* sp. indet and *Graphania homoscia* fulfill 2, and 4. As suitable niches that might yield *Crambus* larvae were not well sampled, all 3 *Crambus* species are regarded as being resident. *Graphania rubescens*, although apparently excluded by criteria 2 and 4, shows morphological differences, is from a poorly-collected locality, and is thus regarded as being resident.

The vagrant, or non-resident waif, element (Table 3) constitutes about 14% of the total Lepidopterous fauna, as is also the case on the Chatham Is. This element in the Subantarctic fauna shows that landfall by a species does not always imply colonisation and that oversea dispersal from New Zealand to high subantarctic latitudes continues. Fox (1969) has shown that there is a constant influx of trans-Tasman waifs into New Zealand, and it is clear that a similar process goes on between New Zealand and Chatham and the Subantarctic Is, the main difference being that whereas the trans-Tasman flow is west to east, the subantarctic flow is from north to south. Auckland I (Table 3) has 4 nonresident waifs, while Antipodes and Campbell have 2 each. *Agrotis ypsilon* is the only species common to 2 or more islands (Auckland, Campbell, Macquarie).

In the native resident Lepidopterous fauna (numbered families and species on Table 1), 12 families are represented. The Elachistidae, Geometridae, Psychidae and Tineidae have species on each island. Antipodes is distinctive in having Arctiidae, and lacking Tortricidae; Campbell is

Table 1. Distribution and assumed relationships of Subantarctic Lepidoptera

Taxon.	Distribution	N	S	St.	BSC.	Sn.	A.	C.	Ant.	Ch.	Body Length (mm)	
1. Arctiidae												
1. <i>Nyctemera annulata</i>		L	L	L					+	+	28.0	
2. Carposinidae												
2. <i>Campbellana attenuata</i>		(Carp. eriphylla grp)						+			5.5	
3. <i>Carposina epomiana philpotti</i>		(C. e. epomiana)					+				10.5	
Coleophoridae												
<i>Coleophora</i> sp. indet.			?V						?V		(7.0)	
3. Crambinae (pt. Pyralidae)												
4. "Crambus" <i>apicellus</i>		L-U	L-U	L-U			+			+	13.0	
5. " <i>flexuosellus</i>		L-U	L-U	L-U			+			(+)	13.0	
6. " <i>siriellus</i>		L-U	L-U	L-U					+	+	15.5	
4. Elachistidae												
7. <i>Cosmiotes laquaeorum</i>		Not Known				+				(?+)	6.5	
8a <i>Irenicodes g. galathea</i>								+			4.0	
8b " <i>g. antipodensis</i>		<i>thallophora</i> grp							+		3.9	
9. " <i>hookeri</i>		L-U	L-Al	L-S			+				6.5	
10. " <i>pumila</i>							+				3.1	
5. Geometridae: Ennominae												
11. <i>Gargaphia muriferata</i>		L-U	L-U	L-U	+		+			+	21.0	
Geometridae: Larentiinae												
12. <i>Asaphodes campbellensis</i>		<i>aegrota</i> grp						+			13.0	
13. <i>Asaphodes oxyptera</i>		L-U	L-U	n.r.			+				18.5	
14. <i>Austrocidaria similata</i>		L-U	L-U	L-U	+		+	+	±	±	A: 17.0 Ant: 12.0	
15. <i>Epiphryne charidema</i>		S	S-U	L-U	+		+	+			15.0	
16. <i>Helastia orophylloides</i>		(semifissata, L-S)		n.r.			+	+			14.0	
17. <i>Microdes epicryptis</i>		L-U	L	L					+	+	11.5	
<i>Pasiphila fumipalpata</i>		L-U	L-U	n.r.			V				—	
18. " <i>impudicis</i>		(inductata)						+			8.5	
19. " <i>inductata</i>		L-U	L-U	L-U	+		+	+			11.5	
20. " <i>nebulosa</i>		(dryas, L-U)		n.r.			+				14.0	
21. " <i>neris</i>		S-Al	U,S,Al	n.r.	+		+				10.0	
Hyponomeutidae												
<i>Plutella maculipennis</i>		Cosmopolitan on crucifers						+	+	+	+	—
6. Nepticulidae												
22. <i>Nepticula laquaeorum</i>		(fulva grp, L-U)				+					3.9	
7. Noctuidae:												
<i>Agrotis ypsilon anietuma</i>		L-U	L-U	L-U	n.r.		V	V		?+	—	
<i>Graphania homoscia</i>		L-U	L-U	n.r.			?V				—	

Taxon.	Distribution	N	S	St.	BSC.	Sn.	A.	C.	Ant.	Ch.	Body Length (mm)
23.	" <i>insignis pagaia</i>	(insignis, L-U)			(+)	+					21.0
24.	" <i>mutans erebia</i>	(mutans, L-U)					+			(+)	22.0
	" <i>omoplaca</i>	L-U	L-U	L			V				
25.	" <i>rubescens</i>	L-U	L-U	L-U	+		+				21.0
26.	" <i>ustistriga</i>	L-U	L-U	L-U	+				+	V	22.5
	<i>Pseudaletia separata</i>	L-U	L						V		—
	<i>Othreis materna</i>	V	V					V			—
8.	Oecophoridae										
27.	<i>Izatha oleariae</i>	(attactella grp, L-U)				+					10.0
28a	<i>Tinearupa s. sorenseni</i>	(Gymnobathra)						+			5.75
28b	" <i>s. aucklandica</i>	(omphalota, L-U)						+			5.25
9.	Psychidae										
29.	<i>Mallobathra campbellica</i>	(crataea grp, L-U)						+			6.5
30.	<i>Reductoderces aucklandica</i>						+				4.5
31.	" <i>fusciflava</i>	fragilis grp						+		(+)	4.5
32.	" sp. indet.	(L-U)							+		4.5
33.	Genus et sp. indet.	(similar larvae known)				+					4.0
10.	Pterophoridae										
34.	<i>Platyptilia aelodes</i>	(repletalis, L-U)			+		+	+		+	13.0
35.	" <i>falcatalis</i>	L-U	L-U	n.r.	n.r.			+		+	13.0
11.	Tineidae										
36.	<i>Monopis dimorphella</i>	L-U	L-U	L-U	+		+			(+)	9.5
37.	<i>Proterodesma byrsopola</i>		L-U	L-U	+	+	+	+		(+)	
38.	" <i>turbotti</i>								+		3.5
12.	Tortricidae										
39.	<i>Ericodesma melanosperma</i>	(+)	Al-U	L-U	+		+	+			10.0
40a	<i>Planotortrix s. syntona</i>	(conditana grp) n.r.					+				14.0
40b	" <i>s. laquaeorum</i>	L-U	L-U			+					14.3
41.	<i>Pyrgotis plagiata</i>	L-U	L-U	L-U	+		+	+			11.0
42.	<i>Sorensenata agilitata</i>	(? Catamacta)						+			9.5
Domestic Species											
Oecophoridae											
	<i>Endrosis sarcitrella</i>	+	+	+	+	+	+	+	+	+	
	<i>Hoffmannophila pseudospretella</i>	+	+	+	+	+	+	+	+	+	
Tineidae											
	<i>Tinea pellionella</i>	+	+	+				+		n.r.	

A: alpine zone; L: Lowland; U: Upland; S: subalpine sensu Burrows 1969: 212; applies only to N, S, St, Is).

n.r.: no record; V: Vagrant (i.e. non-establishing).

±: this population with a distinctive character.

(+): on Chatham I, this species represented by a related species from same mainland stock.

distinctive in its lack of Crambinae and Noctuidae. Only Auckland and Campbell have families (other than Pyralidae) represented by more than 2 species; Antipodes and Snares have 8 species in 7 families and 8 species in 8 families respectively (Table 5).

On the mainland, the largest families are Geometridae (260 spp), Pyralidae (230 spp), Oecophoridae (200 spp), Noctuidae (150 spp) and Tortricidae (ca. 140 spp). That the apparently numerical relationship between source size and subantarctic representation of Geometridae (10 spp) and Pyralidae (ca. 17 spp) is unreal is shown when the other families are considered (mainland: subantarctic species numbers in brackets) viz: Arctiidae (5:1); Carposinidae (20:2); Elachistidae (12:4); Nepticulidae (15:1); Noctuidae (150:4); Oecophoridae (200:2); Psychidae (25:5); Pterophoridae (15:2); Tineidae (56:3); Tortricidae (140:4).

Of the 27 native genera (Tables 1, 2), 3 are endemic to the Subantarctic, 12 are endemic to New Zealand, and at least 6 are shared with Australia. None of the genera endemic to New Zealand are exclusively alpine, although 7 have alpine species. Most genera have mainland species characteristic of lowland opencountry (i.e. non-rainforest) environments, and in nearly all cases it is these species that the Subantarctic species most closely resemble. The relationship between the Subantarctic species and the mainland alpine species is (except for *Pasiphila nereis*) indirect. As Table 1 shows, all endemic species can be plausibly related to mainland taxa.

Obviously the fauna of the Subantarctic is disharmonic—"clear sign that at least part of [a] fauna is the result of longdistance dispersal" (Carlquist 1966: 249). Carlquist also states (loc. cit.) "I believe that most groups on an old continental island, and especially on a remote one, can be

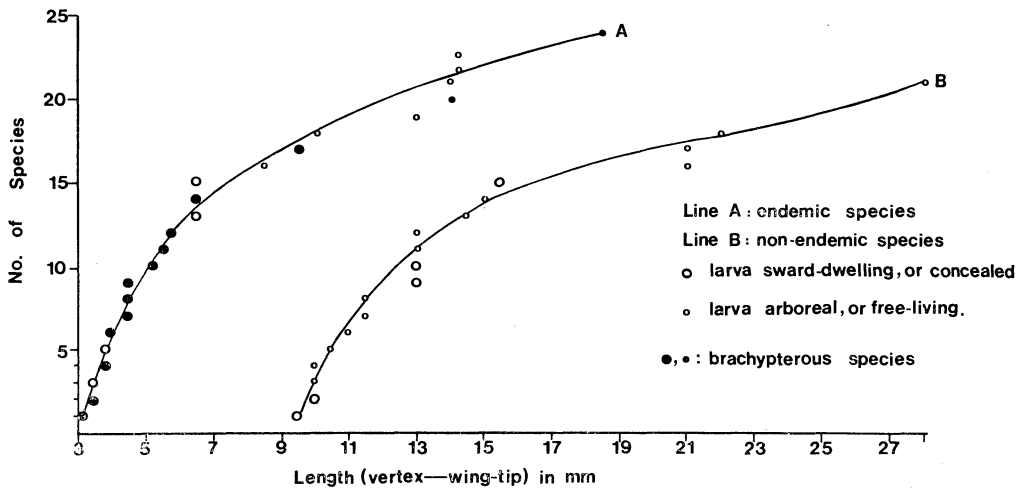
Table 2. Distribution of native subantarctic genera

	A.	C.	Ant.	Sn.	Ch.	NZ	Elsewhere; Remarks.
Nyctemera	—	—	+	—	+	+	Australia; Pacific
Campbellana*	—	+	—	—	—	—	
Carposina	+	—	—	—	—	+	?Australia, N. Guinea
Crambus	+	—	+	—	+	+	NZ endemic (Gaskin pers. comm)
Cosmiotes	—	—	—	+	+	+	?Australia
Irenicodes	+	+	+	—	—	+	relative on Falklands
Asaphodes	+	+	—	—	—	+	Australia
Austrocidaria	+	+	+	—	+	+	?Australia
Epiphryne	+	+	—	—	—	+	
Gargaphia	+	—	—	—	+	+	
Helastia	+	+	—	+	+	+	Australia, S.W. Pacific
Microdes	—	—	+	—	+	+	Australia
Pasiphila	+	+	—	—	?+	+	
Nepticula	—	—	—	+	—	+	Not known
Graphania	+	—	+	+	+	+	
Izatha	—	—	—	+	—	+	
Tinearupa*	+	+	—	—	—	—	
Mallobathra	—	+	—	—	—	+	
Reductoderces	+	+	+	—	+	+	
gen. indet.	—	—	—	+	—	+	
Platyptilia	+	+	—	—	+	+	Cosmopolitan
Monopis	+	—	—	—	+	+	"
Proterodesma	+	+	+	+	+	+	
Ericodesma	+	+	—	—	—	+	Australia
Planotortrix	+	—	—	+	+	+	
Pyrgotis	+	+	—	—	—	+	
Sorensenata*	—	+	—	—	—	—	

*Denotes endemic Subantarctic genera.

discriminated and that we should aim for such discrimination." The basis for such discrimination is the comparison of continental and oceanic islands, but this is not possible (at comparable latitudes) for Lepidoptera in the New Zealand subregion. At the same time, it is possible to deduce which Subantarctic elements are either pre-insular, assuming that the Campbell Plateau has sunk (which is uncertain) or alternatively pre-Pleistocene. It is currently considered that during some or all of the Pleistocene glaciations the woody vegetation was eliminated, or any that did survive was coastal and this is supported by evidence from the Lepidoptera.

In Graph 1, body-lengths of species have been plotted cumulatively. This graph shows that most endemics are brachypterous, under 10 mm long, and with larvae that either tunnel in moss, lichen or accumulations of litter, or feed concealed within the host at or below ground-level, or mine sedge or grass leaves, or live in stout tough cases. (The endemic geometrids, although free-living, are capable of sheltering in litter.) The non-endemic species are over 9.5 mm long, with most over 10 mm, all fully-winged, and most with free-living or arboreal larvae.



Graph 1. Adult body length plotted cumulatively for endemic species (Line A) and non-endemic species (Line B) in the subantarctic fauna. Note that all the brachypterous species and most of those with sward-dwelling or concealed larvae are endemic, and that most of the endemic species are under 10 mm in length.

If brachyptery, mode of larval life, and degree of resemblance to existing mainland groups are taken into account, the following taxa can be regarded as representing the survivors of the pre-Pleistocene Subantarctic fauna. *Tinearupa sorenseni* (under lichens); *Sorensenata agilitata* (probably grasses); all *Reductoderces* species (case bearers on lichens, algae); *Campbellana attenuata* (probably grasses, possibly dicotyledonous stolons or rosettes); *Proterodesma turbotti* (accumulations of dead vegetation) and the pyralids *Protyparcha* and *Exsilirarcha* (mosses, seedlings). All these taxa differ markedly (some in structure, others in larval life) from mainland groups assumed to be the closest relatives. All are brachypterous and some apparently emerge as adults during the colder part of the year (*Reductoderces*, *Campbellana*, *Sorensenata*).

The Pleistocene succession of glacials and interglacials affected all of New Zealand south of

Lat. 35°S, and it is assumed that plant cover on the Subantarctic Is was reduced to a fringe of lichens, mosses, algae, perennial herbs, subshrubs and possibly in the last one or two glacials, struggling, dwarfed *Hebe* shrubs. While it is tempting to try to correlate the taxonomic hierarchies (sister genera, sister species, sister subspecies) with the interglacial series, it would be unwise to do so since there is no evidence to suggest that evolutionary rates were constant between species. For instance, the fact that *Helastia orophylloides* is structurally uniform on Campbell and Auckland Is does not necessarily mean that its arrival in the Subantarctic was later than that of the stock which gave rise to *Asaphodes oxyptera* and *A. campbellensis*, even though these structurally are good species. It could be argued in view of speciation in these two genera on the mainland, that *Helastia* is slow to speciate and *Asaphodes* is fast.

It is clear, from the evidence afforded by *Proterodesma*, *Pasiphila* and *Mallobathra*, that Pleistocene dispersal over the sea took place and at least in one period or another led to establishment. Thus the following group of taxa could represent Pleistocene immigrants; those with sister species that established in the Holocene are marked with an asterisk; and those that were re-introductions of pre-Pleistocene stock with a double asterisk: *Asaphodes*; *Helastia*; *Pasiphila impudicis**, *P. nebulosa*, *Planotortrix*, *Cosmiotes*, *Irenicodes*, *Mallobathra*, *Proterodesma*** (and some *Witlesia***).

The position of *Nepticula* and *Izatha* is doubtful, and is bound up with the distribution of *Olearia lyalli*; obviously the presence of *Nepticula* and *Izatha* must post-date the development of *Olearia* in the Subantarctic.

After the Pleistocene, and within the present interglacial, 21 species are assumed to have established via over-sea dispersal. Some have recognisable subspecies, others have not. But again, it would be dangerous to suggest the taxonomic heirarchy is correlated with age; rather it could be correlated with opportunity to disperse. Chance dispersal is demonstrable within these 21 species—of the 4 resident noctuids, none occurs on more than one island. *Pasiphila* successfully dispersed again, so that on Campbell I we have the siblings *P. impudicis* (old stock) and *P. inductata* (new stock). Thus the following taxa are regarded as Holocene immigrants (those represented by subspecies marked*). *Nyctemera*; *Graphania* spp. (incl. *G. mutans**, *G. insignis**) *Austrocidaria*; *Epiphryne*; *Gargaphia*; *Microdes*; *Pasiphila inductata*, *P. nereis*; *Crambus* spp; *Ericodesma*; *Pyrgotis*; *Carposina epomiana**; *Monopis*, *Platyptilia*.

The last genus is puzzling. While *Platyptilia falcatalis* is an obvious mainland immigrant, *P. aelodes*, found in the Subantarctic, Big South Cape and Chatham Is is a sister species of *P. repletalis*, a uniform species found from North Cape to Bluff. It is difficult to see how a delicate, fairly large (11–13 mm) insect with an exposed larva could survive the last glaciation, which is why I include it at present in the post-Pleistocene category.

The hosts of the Subantarctic Lepidoptera are of the following major types: dead plant material; algae, lichens, mosses; ferns (esp. *Histiopteris*, *Polystichum*, *Phymatodes*); cushion vegetation; grasses (*Poa*, *Chionochloa*), sedges, rushes; Liliaceae (*Bulbinella*); Araliaceae (*Stilbocarpa*, *Pseudopanax*); Compositae (*Celmisia*, *Olearia*, *Pleurophyllum*, *Senecio*); Epacridaceae (*Dracophyllum*), Myrsinaceae (*Myrsine*); Myrtaceae (*Metrosideros*); Rubiaceae (*Coprosma*); Scrophulariaceae (*Hebe*); Urticaceae (*Urtica*).

1. Dead plant material: *Proterodesma* predominates, with *Monopis* possibly where remains of birds are included. Litter-inhabiting Oecophoridae absent.

2. Algae, lichens, mosses: All the Psychidae; *Tinearupa* on cliff lichen-alga communities; all Scopariinae, on mosses (and also browsing on seedlings); *Proterodesma* also present where there is plenty of dead tissue.

3. Ferns: *Histiopteris* defoliated by *Musotima* (Pyralidae); *Phymatodes* by *Gargaphia*; on the main-

land *Sestra*, *Azelina*, *Selidosema* (Geometridae) would predominate, with *Calicotis* and *Thylacosceles* on the sori.

4. Herbs, Cushion vegetation: Scopariinae predominate (probably as mosses are included); *Helastia* larvae (browsers on dicotyledonous cushion plants and herbs), *Graphania ustistriga*, *Platyptilia aelodes* on larger-leaved plants.

5. Grasses, sedges, rushes: *Crambus* spp amongst the tiller bases and browsing either on the leaves or on seedlings nearby; all Elachistidae (*Poa* on Snares, ?*Carex* on Auckland Is, probably *Poa* and *Chionochoa* on Campbell and Antipodes); *Graphania insignis* (*Poa*) on Snares; *Asaphodes* on *Chionochoa* and *Poa*; *Microdes* on rushes; *Platyptilia aelodes* on *Carex* fruiting heads; possibly *Sorensenata* and *Campbellana* have evolved a grass or sedge-eating habit, since this niche was relatively unexplored by collectors.

6. *Bulbinella* (Liliaceae): No records, apparently untouched.

7. Araliaceae: *Graphania mutans*, but no others recorded on *Stilbocarpa*; no records of *Pseudopanax* defoliators, whereas this genus is attacked by geometrids, pterophorids, gracillariids, tortricids, on the mainland.

8. Compositae: *Celmisia* probably supports *Pasiphila nereis* as it does on the mainland; *Olearia* foliage is mined by *Nepticula* or eaten by *Planotortrix*; dead twigs house *Izatha*; *Pleurophyllum* supports *Planotortrix*, *Graphania mutans*; *Senecio* supports *Nyctemera* on Antipodes. On the mainland, *Olearia* is defoliated by at least two species of Nepticulidae, by Geometrids, noctuids, other tortricids and by Glyphipterygids.

9. Epacridaceae: *Ericodesma*, *Pyrgotis*, *Epiphyryne* on foliage; possibly *Carposina* in fruits, but none collected. The glyphipterygids and other geometrids so characteristic of mainland *Dracophyllum* absent.

10. Myrsinaceae, Myrtaceae: *Pyrgotis*, *Pasiphila inductata*; possibly *Carposina* in fruits. *Myrsine* and *Metrosideros* have no phytophagous Lepidoptera known to be restricted to them.

11. Rubiaceae: *Coprosma* has *Austrocidaria similata* throughout its range, but none of the characteristic mainland phytophages are present (e.g. "*Eucymatoge*," *A. callichlora*, "*Asaphodes*" *parora* and allies, *Pasiphila sandycias*, "*Melanchna*" *vitosa*, *Aristotelia*, "*Tortrix*" *persecta*).

12. Scrophulariaceae: *Hebe* has *Platyptilia falcatalis*, *Pyrgotis*, *Pasiphila*, but not other *Hebe*-restricted *Platyptilia* spp. (e.g. *heliastis*, "*Stenoptilia*" spp), or *Pyrgotis* (*consentiens* group) or *Pasiphila* (*rubella* group), nor other characteristic mainland phytophages ("*Epirrhanthis*," *Selidosema*, *Prothelymna*, *Harmologa*, *Mecyna*).

13. Urticaceae: *Urtica* has *Mecyna antipoda*, but has none of the geometrids, noctuids or nymphalids characteristic of mainland *Urtica*.

It is obvious that the plant associations supporting the most Lepidoptera are those of cushion/moss/grasses/low herbs. Each scrub species has at the most 4 phytophagous species associated but only in *Hebe*, *Dracophyllum* and *Olearia* will most of these be restricted to that shrub species. *Hebe*, *Dracophyllum* and *Olearia* each have 2, *Coprosma* has one and the others have no species restricted to them. In all instances, shrub phytophages are fully winged and, of course, cannot have been in the Subantarctic longer than their hosts.

Comparisons between Islands (Tables 3–6)

Overall, 50% of the native Subantarctic species, but only 11% of the genera, are endemic. There are no endemic families. The rates of species endemism for each island are high, but only if one considers species endemic to the Subantarctic (Table 4). If the species endemic to an island are considered, then Auckland and Antipodes have low values (21% and 12%), whereas Campbell and Snares have high values (35% and 50%).

More species are shared between Auckland and Campbell Is (nine out of a total 20) than between either of these islands and other Subantarctic islands (Table 5). *Proterodesma* is the only ubiquitous genus, with Snares, Auckland and Campbell sharing one species, and Antipodes and Bounty sharing another. *Austrocidaria* is present wherever there is *Coprosma*, as are *Epiphyryne* and *Ericodesma* wherever

Table 3. Total Lepidoptera (excluding non-crambine Pyralidae) from NZ Subantarctic Is, arranged according to origin, and degree of relationship with NZ fauna

Category

1. Tramp & Domestic spp (4 spp)	
<i>Endrosia sarcitrella</i>	A, C, Ant, Sn.
<i>Hoffmannophila pseudospretella</i>	A, C, Ant, Sn.
<i>Plutella xylostella</i>	A, C, Ant.
<i>Tinea pellionella</i>	C.
2. Non-resident waifs (7 spp)	
<i>Agrotis ypsilon</i>	A, C.
<i>Coleophora</i> sp. indet.	Ant.
<i>Graphania homoscia</i>	A
" <i>omoplaca</i>	A
<i>Othreis materna</i>	C
<i>Pasiphila fumipalpata</i>	A
<i>Pseudaletia separata</i>	Ant.
3. Species in common with NZ (those with Subantarctic subspecies marked*) (21 spp)	
<i>Austrocidaria similata</i>	A, C, Ant.
<i>Carposinia epomiana</i>	A
<i>Crambus apicellus</i>	A
" <i>flexuosellus</i>	A
" <i>siriellus</i>	Ant.
<i>Epiphryne charidema</i>	A, C.
<i>Ericodesma melanosperma</i>	A, C.
<i>Gargaphia muriferata</i>	A
<i>Graphania insignis</i>	Sn.
" <i>mutans</i>	A
" <i>rubescens</i>	A
" <i>ustistriga</i>	Ant.
<i>Microdes epicryptis</i>	Ant.
<i>Monopis dimorphella</i>	A
<i>Nyctemera annulata</i>	Ant.
<i>Pasiphila inductata</i>	A, C.
" <i>nereis</i>	A
<i>Platyptilia aelodes</i>	A, C.
" <i>falcatalis</i>	C
<i>Proterodesma byrsopola</i>	A, C, Sn.
<i>Pyrgotis plagiatana</i>	A, C.
4. Endemic Spp in N.Z. genera (18 spp)	
<i>Asaphodes campbellensis</i>	C
" <i>oxyptera</i>	A
<i>Cosmiotes laquaeorum</i>	Sn.
<i>Irenicodes galathea</i>	C, Ant.
" <i>hookeri</i>	A
" <i>pumila</i>	A
<i>Helastia orophylloides</i>	A, C, ?Sn.
<i>Izatha oleariae</i>	Sn.
<i>Mallobathra campbellica</i>	C
<i>Nepticula laquaeorum</i>	Sn.
<i>Pasiphila impudicis</i>	C
" <i>nebulosa</i>	A
<i>Planotortrix syntona</i>	Sn, A.
<i>Proterodesma turbotti</i>	Ant, B.
Psychid gen. et sp. indet.	Sn.
<i>Reductodermes antipodensis</i>	Ant.

(Table 3. Continued)

- " *aucklandica* A
 " *fuscoflava* C
 5. Species in Endemic genera (3 spp)
Campbellana attenuata C
Sorensenata agilitata C
Tinearupa sorenseni A, C.

Distribution within the Subantarctic is given after each species. A: Auckland Is, Ant: Antipodes, B: Bounty, C: Campbell, Sn: Snares. This is the basis of Tables 4, 5, 6.

Table 4. No. of species present on Subantarctic Is, by categories as in Table 3, and with no. of species endemic to particular islands. Note the high number of species endemic to Snares

Category	Non-native spp.			Native spp.			Native total	No. spp. endemic to island	% island endemism	% Subant. endem.
	1	2	(1+2)	3	4	5				
Auckland	3	5	8	15	7	1	23	5	21%	34%
Campbell	4	2	6	8	6	3	17	6	35%	53%
Antipodes	3	2	5	5	3	0	8	1	(12%)	37%
Bounty	0	0	0	0	1	0	1	0	—	(100%)
Snares	2	0	2	2	6	0	8	4	50%	(75%)

Table 5. No. of native species (categories 3–5) shared between Islands in N.Z. Subantarctic

	A.	C.	Ant.	Sn.	B.
A.	23				
C.	9	17			
Ant.	1	2	8		
Sn.	2	1	0	8	
B.	0	0	1	0	1

Table 6. No. of native genera shared between Islands in N.Z. Subantarctic

	A.	C.	Ant.	Sn.	B.
A.	18				
C.	12	15			
Ant.	6	4	8		
Sn.	4	2	2	8	
B.	1	1	1	1	1

there is *Dracophyllum*. *Asaphodes* however is absent from Antipodes, even though apparently suitable grasses occur there. It would seem that, apart from the presumed relict *Proterodesma*, all the other Antipodes Lepidoptera arrived by over-sea dispersal.

The Snares I, which is on the same shallow shelf as, and about 120 km south of, Stewart I, has both Subantarctic and mainland elements; *Planotortrix* is representative of the former, and *Izatha*, *Nepticula* and the undescribed psychid, of the latter. As collecting on Snares is incomplete for Lepidoptera, little can be said except that the fauna there has 2 species with solely Subantarctic relationships and 5 with solely mainland relationships.

Auckland I, with its complex topography, large size and attendant islets has been collected intensively only in the southern area. What little collecting has been done in the north indicates that other species await detection. Despite the fact that the Auckland Is are further north than Campbell, and over five times as big, only 23 species have been reported as against 17 for Campbell I. The relationships of the Auckland group Lepidoptera lie most closely with Campbell I (Tables 5, 6) and future collecting will no doubt turn up Auckland I taxa comparable with *Campbellana* and *Sorensenata*. Already, two genera previously regarded as restricted to Campbell I, *Tinearupa* and *Reductodermes*, are now known from Auckland Is.

It is tempting to regard the Subantarctic Is as providing limits of dispersal. Crambinae apparently do not establish south of Auckland Is, with *C. apicellus* established on Adams I, but *C. flexuosellus* not south of Rose I. *Monopis* and the Noctuidae have not established south of Adams I, and *Izatha*, *Cosmiotes* and *Nepticula* not south of the Snares. In all these instances, apparently suitable hosts or host niches are present on islands further south.

Faunal List (by islands) of native N.Z. Subantarctic Lepidoptera.

Auckland Is (23 spp in 10 families)

- Carposinidae: *Carposina epomiana philpotti*
 Crambidae: '*Crambus*' *apicellus*
 " *flexuosellus*
 Elachistidae: *Irenicodes hookeri*
 " *pumila*
 Geometridae: *Asaphodes oxyptera*
 Austrocidaria similata
 Epiphryne charidema
 Gargaphia muriferata
 Pasiphila inductata
 " *nebulosa*
 " *nereis*
 Noctuidae: *Graphania mutans erebia*
 " *rubescens*
 Oecophoridae: *Tinearupa sorenseni aucklandica*
 Psychidae: *Reductodermes aucklandica*
 Pterophoridae: *Platyptilia aelodes*
 Tineidae: *Monopis dimorphella*
 Proterodesma byrsopola
 Tortricidae: *Ericodesma melanosperma*
 Planotortrix syntona syntona
 Pyrgotis plagiatana

Campbell I (17 spp in 8 families)

- Carposinidae: *Campbellana attenuata*
 Elachistidae: *Irenicodes g. galathea*
 Geometridae: *Asaphodes campbellensis*
 Austrocidaria similata
 Epiphryne charidema
 Helastia orophylloides
 Pasiphila impudicus
 Pasiphila inductata
 Oecophoridae: *Tinearupa s. sorenseni*
 Psychidae: *Mallobathra campbellica*

- Reductoderces fuscoflava*
- Pterophoridae: *Platyptilia aelodes*
 " *falcatalis*
- Tineidae: *Proterodesma byrsopola*
- Tortricidae: *Ericodesma melanosperma*
 Pyrgotis plagiatana
 Sorensenata agilitata.
- Antipodes I (8 spp in 7 families)
- Arctiidae: *Nyctemera annulata*
- Crambidae: '*Crambus*' *siriellus*
- Elachistidae: *Irenicodes galathea antipodensis*
- Geometridae: *Austrocidaria similata*.
 Microdes epicryptis
- Noctuidae: *Graphania ustistriga*
- Psychidae: *Reductoderces* sp. indet.
- Tineidae: *Proterodesma turbotti*
- Bounty Is (1 species)
- Tineidae: *Proterodesma turbotti*
- Snares Is (8 spp in 8 families)
- Elachistidae: *Cosmiotes laquaeorum*
- Geometridae: *Helastia orophyllioides* (not confirmed by later collecting, D. S. Horning, Jr., Pers. commun.)
- Nepticulidae: *Nepticula laquaeorum*
- Noctuidae: *Graphania insignis pagaia*
- Oecophoridae: *Izatha oleariae*
- Psychidae: gen. et sp. indet.
- Tineidae: *Proterodesma byrsopola*
- Tortricidae: *Planotortrix syntona laquaeorum*

Note: Unless otherwise stated, the scales by the figures indicate 1 mm. The abbreviations ED and WMu represent Entomology Division, DSIR, and Dominion Museum, Wellington respectively.

KEY TO FAMILIES OF SUBANTARCTIC LEPIDOPTERA

1. Adults fully winged.....2
 - Adults brachypterous, wings attenuated, or shorter than abdomen; hind femora thickened.....15
 2. Adult length (vertex-wing tip) over 27 mm; wings broad, black with white patches; abdomen black and yellow; larva black with brushes of barbed setae.....**Arctiidae** (*Nyctemera*)
 - Adults smaller; wings, abdomen and larvae not as above.....3
 3. Adults with maxillary palpi prominent, ascending, scale-tufted (Fig. 15, 17, 19), or forewing termen emarginate; usually slender moths over 10 mm but under 18 mm long; larva with 2 prespiracular (L) setae on prothorax, spiracles lateral on 8th abdominal segment**Pyralidae**
 - (a) Hindwing with cubital pecten (Fig. 1), ♂ genitalia with a strong gnathos, ♀ ovipositor lobes vertical, fused with sterigma; larva with seta SD₁ and L₁ on a line anterior to spiracle on 8th abdominal segment.....**Crambinae**
 - (b) Hindwing without cubital pecten, ♂ genitalia lacking a strong gnathos, ♀ ovipositor axial, never fused with sterigma; larva ground dwelling, with SD₁ and L₁ on a line posterior to 8th abdominal segment spiracle; or if from ferns, dorsal setae black, divergent, D₁ setae cruciate with preceding segment D₂ setae.....other **Pyralidae**
- Maxillary palpi concealed or drooping (Fig. 88), not scale-tufted, or microscopic, forewing termen entire or cleft; larva with 3 prespiracular prothoracic setae or, if with 2, then

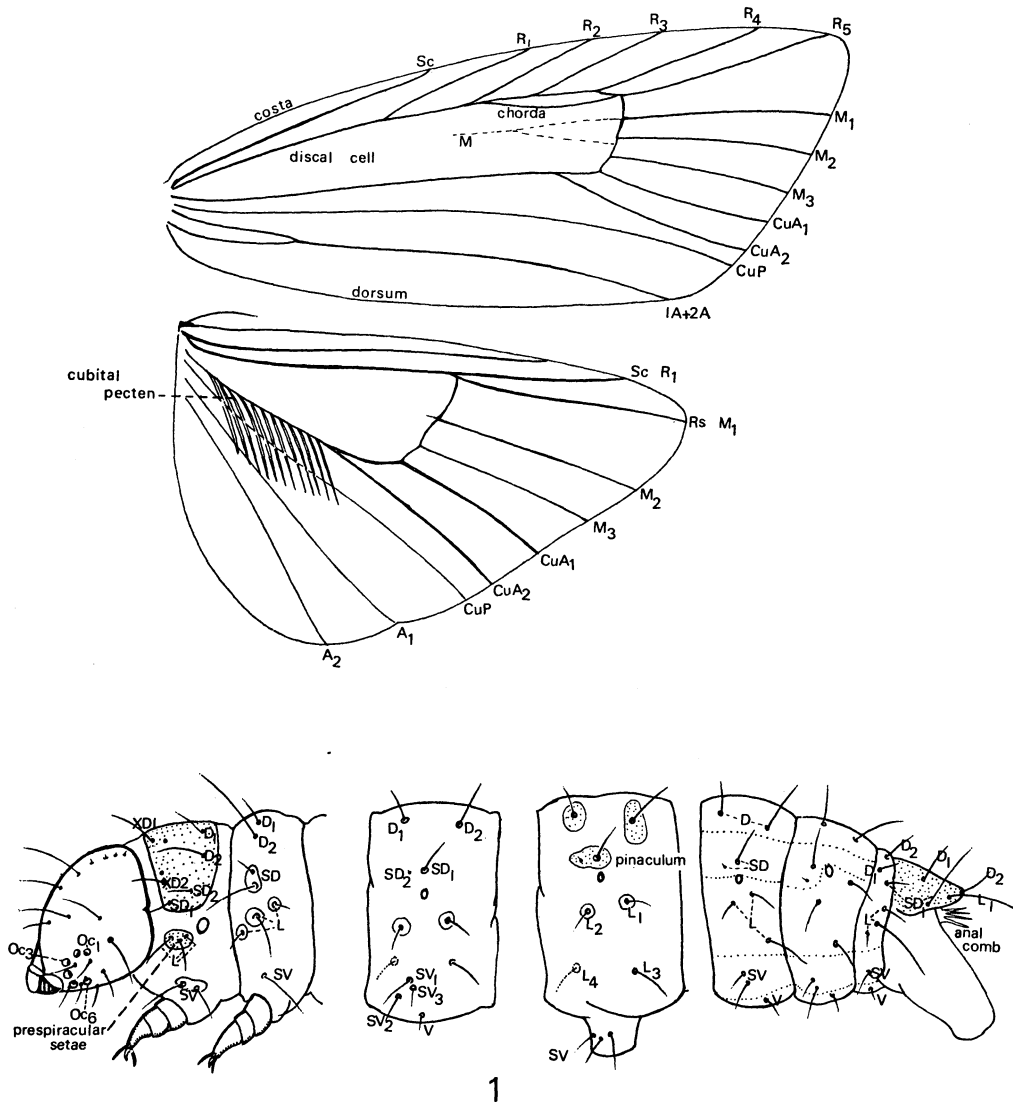


Fig. 1. Wing venation and larval chaetotaxy, diagrammatic. Oc 1, Oc 3, etc.—Ocellus 1, Ocellus 3, etc.

- spiracles dorsal on 8th abdominal segment.....4
- 4. Stout-bodied moths over 20 mm long; compound eyes setulose or, if nude, then foretibia with stout spines laterally; larva with all prolegs present, crotchets in a linear series.....
..... **Noctuidae**
- Narrow-bodied moths; compound eyes nude, fore-tibia lacking spines; larvae either lacking most prolegs or with crotchets in a circle, semicircle or penellipse.....5
- 5. Haustellum scaled on basal third; labial palpi slender, smooth, sickle-shaped, recurved over the head (Fig. 134).....6
- Haustellum nude basally; labial palpi never recurved over head, nor smooth-scaled.....8

6. Pallid, slender moths under 8 mm long; abdomen lacking dorsal spine-patches; larvae mining in grasses, pretarsal proleg setae capitate, longer than claw (Fig. 28).....**Elachistidae** (pt)
Abdomen with dorsal spine patches; larvae not leafmining, pretarsal proleg setae simple, not extending beyond claw.....7
7. Hindwings narrower than their scale-fringe; abdomen with pairs of dorsal spine patches (Fig. 14)**Coleophoridae**
Hindwings broader than their scale fringe; abdomen with a single spine patch on each segment**Oecophoridae** (pt)
8. Forewing cleft apically; hindwing trifid; spindly T-shaped moths; larva with short sparse setulae (Fig. 169) as well as normal setae; on fruits or in *Hebe* buds.....**Pterophoridae**
Wings entire: larva lacking setulae.....9
9. Broad-winged narrow-bodied moths, intricately patterned; ocelli absent, chaetosemata present; labial palpi never recurved; larva lacking prolegs on 3rd, 4th, 5th abdominal segments...
.....**Geometridae** (pt)
Narrow-winged moths, simply patterned, either chaetosemata and ocelli both present or both absent; labial palpi usually recurved, but if porrect or subascending, ocelli present; larva with full number of prolegs.....10
10. Haustellum absent, labial palpus not more than $1.25 \times$ eye diameter, head rough-scaled.....11
Haustellum present; labial palpus more than $1.5 \times$ eye diameter (or, if less, head smooth-scaled)12
11. Antennal scape expanded into an eye-cap (Fig. 88); head deflexed; larvae leaf-miners in Compositae**Nepticulidae**
Antennal scape not expanded; head not deflexed (often collapsed in dry specimens); winged ♀♀ with a large gold scale tuft around ovipositer; larva case-bearing (Fig. 150-153)...
.....**Psychidae** (pt)
12. Labial palpi appressed, porrect at least apically, lacking prominent bristle-scales; ocelli present or, if absent, wings with scale tufts; larva with anal comb but lacking mentum pits or with 2 prespiracular prothoracic setae and dorsal 8th abdominal spiracles.....13
Labial palpi divergent with prominent bristle-scales, apices incurved; or appressed but with apical segment reflexed; ocelli absent; larva lacking anal comb, 8th abdominal spiracle lateral14
13. Ocelli and chaetosemata present; forewings smooth-scaled, hindwings lacking a cubital pecten; larva with 3 prespiracular prothoracic setae and an anal comb, lateral 8th abdominal spiracles.....**Tortricidae** (pt)
Ocelli absent; forewing with scale-tufts, hindwing with cubital pecten; larva with 2 prespiracular prothoracic setae, dorsal 8th abdominal spiracles.....**Carposinidae** (pt)
14. Labial palpi appressed, with 3rd segment reflexed; head smooth, antennae held stiffly forward in repose; pupa pink-striped in a net cocoon; larva phytophagous on crucifers; setae black, apically blunt; prothorax black-spotted.....**Hyponomeutidae**
Labial palpi divergent; head rough-scaled; antennae held backwards; pupa unpatterned, cocoon debris-encrusted; larva saprophagous; prothorax not black-spotted; setae brown or pallid, apically sharp.....**Tineidae** (pt)
15. Body length over 11 mm; ♂♂ with feathery antennae, both sexes with acute long-triangular wings; larva lacking prolegs on segments 3-5.....**Geometridae** (pt)
Body length less than 11 mm; larva with full complement of prolegs.....16
16. Haustellum absent; ♀ apterous, with 1-segmented tarsi; larva case-bearing.....**Psychidae** (pt)
Haustellum present; ♀ brachypterous, tarsi 5-segmented; larva not case-bearing.....17
17. Maxillary palpi erect, scale-tufted, prominent, wings slender; larva in galleries in moss or under stones, unicolorous except for prominent black pinacula.....**Pyralidae** (pt)
Maxillary palpi drooping or minute; if larva in galleries then integument varicolored.....18

18. Labial palpi recurved, sickle-shaped.....19
 Labial palpi subascending, or porrect, appressed or divergent.....20
19. Abdomen lacking spine patches; wings pallid; larva leafmining in grasses, sedges...**Elachistidae** (pt)
 Abdomen with spine patches; wings dark; larva dark, speckled with white, under mosses
 and lichens; mentum with pits, anal segment with comb.....**Oecophoridae** (pt)
20. Length under 4 mm; labial palpi divergent; larva with less than 6 ocelli on each side...**Tineidae** (pt)
 Length over 5 mm; labial palpi subascending, appressed; larva with all ocelli present.....21
21. Adult with ocelli present; buff moths.....**Tortricidae** (pt)
 Adult with ocelli absent; dark brown moths.....**Carposinidae** (pt)

(1) ARCTIIDAE

New Zealand diurnal arctiids are large black moths with white or yellow markings, and with black larvae bearing long tufts of barbed setae. Of the 2 diurnal genera represented in New Zealand, only *Nyctemera* with fully-winged ♀♀ has invaded the Subantarctic.

Nyctemera Huebner, 1820

Huebner, J., 1820: Verzeichniss bekannter Schmetterlinge, sign. **12**: 178.

Nyctemera is an Oriental-Western Pacific genus (Seitz 1915: 266–74) with over 60 species. The *annulata* species group is anomalous on wing-pattern, the white zones being greatly reduced. Genitalia of the Niuean race of *N. baulus* Boisduval (closest to *N. b. samoensis* Tams) were compared with those of Australian, New Zealand and Antipodes specimens of the *annulata* group. Apart from color pattern differences (cf. Seitz 1915, pl 29 h—*amica*, *annulata* and pl 29 i, 30 a, h—*baulus* races), *N. baulus* differs in antennal characters and ♂ and ♀ genitalia considerably from the *annulata* species group. Adults of the genus are day-flying, and the larvae bear long tufts of barbed hairs arising on conspicuous pinacula; larvae of the *annulata* group defoliate herbaceous *Senecio* and related composite genera.

1. Nyctemera annulata (Boisduval 1835)

Boisduval, 1835. Voyage...de l'Astrolabe, Pt I (Lepidopt.) **5**: 197; pl 5, fig. 9l—Doubleday 1843, *In* Dieffenbach, Travels in N.Z. **2**: 284 (*Leptosoma*).

antipodea Salmon, 1956. *Rec. Dominion Mus.* **3**: 64, fig. 5, 6 (as subspecies). Holotype ♂, "Antipodes I. 1950, E. G. Turbott" (AMu).

doubledayi Walker, 1854. List Lepidopt. Ins. Brit. Mus. **2**: 392 (*Leptosoma*).

External characters: Color pattern as in Hudson (1928, pl 6, fig. 3). Wings with marginal scales black; white areas variable, base of vein Rs with an orange spot.

♂ *genitalia* (Fig. 2): Tegumen plano-convex dorsally, square-shouldered, longer in midline than uncus; uncus swollen, strongly decurved, parrot-beaked; valval costa straight, or strongly irregularly emarginate; valval width/costal length ratio 1:1.55 or greater (i.e. saccular area long); aedeagus slender, length 15–17 × width, and with an apical thorn.

♀ *genitalia* (Fig. 3): Lamella postvaginalis as a pair of transverse lunate sclerites; lamella antevaginalis U-shaped, deep, massive, bordered laterally by (but free of) the broad, subtriangular pleural extensions of the lodix, and ventrally by the emarginate posterior lodix margin. Ductus bursae rudimentary, collicular area slender, 1/5 width of ostium and scarcely longer than lamella antevaginalis is wide; corpus bursae ovate-globose, signum shield-shaped, scobinate-serrate. Ductus seminalis arising on ductus bursae, swollen at mid-length into a fusiform bulla seminalis; spermathecal duct spirally twisted on basal 1/3, swollen on mid 1/3, apically filamentous.

Larva (Fig. 4): Integument scobinate, blackened, with orange-red mid-dorsal and spiracular stripes; D, SD, L₁, L₂, L₃ and SV pinacula shining blue-black and bearing numerous erect long, stiff barbellate setae; thoracic pinacula lacking modified excessively long or thickened setae.

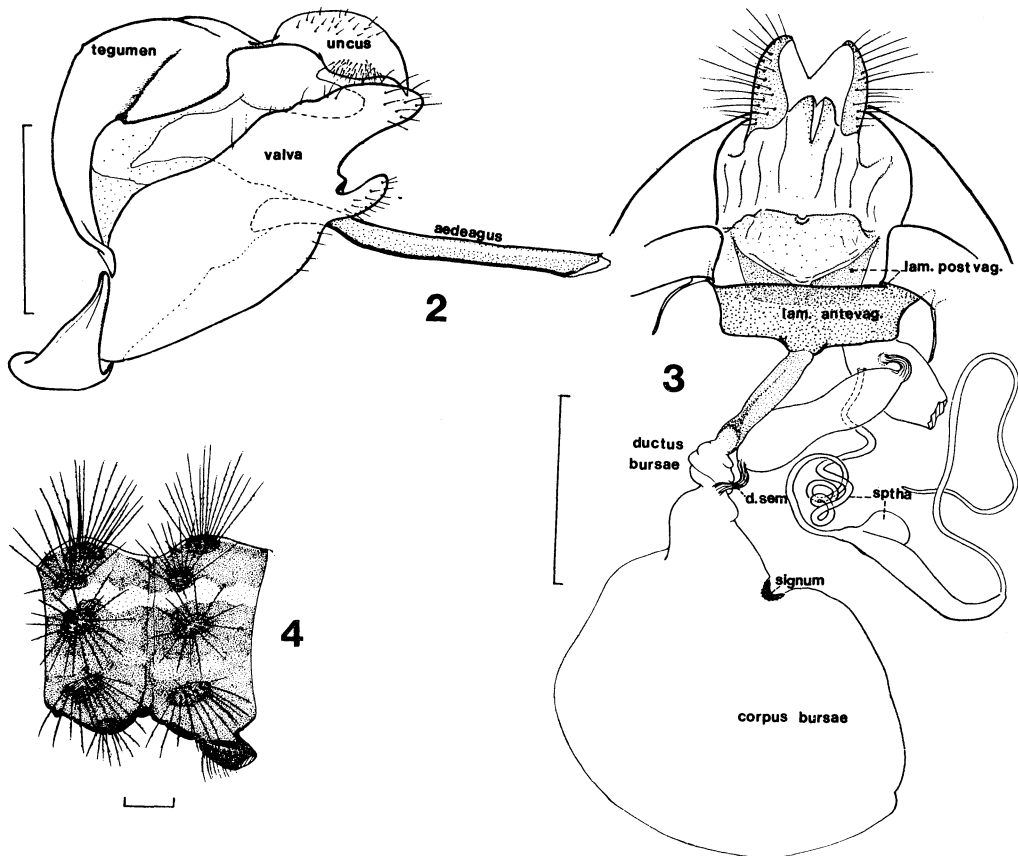


Fig. 2-4. *Nyctemera annulata*. 2, ♂ genitalia, sideview, Antipodes I; 3, ♀ genitalia, ventral view, Nelson (lam. antevag.: lamella antevaginalis. lam. postvag.: lamella postvaginalis); 4, larva, abdominal segments 2, 3, Antipodes I. Scales beside figures represent 1 mm.

Type locality: "Nouvelle Zelande" (Boisduval 1835).

Distribution: Kermadec Is (Hudson 1928: 45); North, South, Stewart, Codfish, Chatham, Antipodes Is.

Host Plants: *Senecio* spp.; *Brachyglottis*.

ANTIPODES I: 14 ♂♂, 7 larvae ex *Senecio antipodus*, Reef Point, Kuschel; 3 ♂♂, 1 ♀, 13 larvae, Stella Bay, ex *Senecio*, Johns.

South Island: 1 ♂♂, 8 ♀♀, Nelson, various dates. *Chatham Is*: 1 ♀, Waitangi, Feb. 1967 JSD; 1 ♀, Pitt I, Jan. 1944 E. S. Gourlay; 1 ♂, Flowerpot Bay, Pitt I, Feb. 1967 JSD;

Remarks: The Australian *N. amica* White, 1841, differs in having pallid marginal scales, more pallid areas on the body, a stouter aedeagus, a more convex tegumen, a shorter saccular area, and less sclerotised ♀ genitalia. Tillyard (1926: 440) found the Australian and New Zealand species to be interfertile, the progeny (now in the ED collection) being intermediate in color pattern. A comparison of both species with *N. baulus* suggests that *N. annulata* and *N. amica* might be better considered as allopatric subspecies, but other Australian species need to be examined.

The darker coloration and greater degree of sclerotisation in *N. annulata* may be a response to increasing latitude or to lower average T⁰ and higher average RH% than are characteristic for Australian sites. Many New Zealand specimens seen both from the mainland and from Antipodes resembled the Australian specimens in body coloration, but only the Antipodes specimens consistently had large, *amica*-type wing-spots.

The Antipodes I population (at 49°S) is the southernmost limit of *Nyctemera* in the Pacific.

N. annulata is restricted to herbaceous or semi-woody *Senecio* species and has adapted to introduced *Senecio* species also. *Brachyglottis repanda* is attacked, but only where it is stunted and growing in exposed situations. *Olearia* species are not attacked. *N. annulata* may represent a young Australian (sens. Fleming 1962) element, successful partly because of its great vagility as demonstrated by its presence on Kermadecs and Chatham Is. It is strictly a lowland insect, not succeeding above 600 m.

N. annulata and *N. amica* differ from *N. baulus* in antennal structure (weak subapical setae on each pectination, these setae strong in *N. baulus*), ♂ genitalia (the tegumen collar-like and shorter than the porrect uncus, the sacculus "thumb" rudimentary, sacculus apex elongate, acute, aedeagus stout and lacking a thorn in *N. baulus*) and ♀ genitalia (lodix apex produced, truncate; lamella postvaginalis longitudinally aligned, colliculum massive, stout, and corpus bursae with a basal strap-like sclerite and a ventral scobinate patch in *N. baulus*).

(2) CARPOSINIDAE

The Carposinidae are represented in New Zealand by over 20 species, up to now included in three genera (*Carposina* auct., *Paramorpha* Meyrick, *Glaphyrarcha* Meyrick) to which must now be added *Campbellana* Salmon & Bradley from Campbell I. In New Zealand, carposinids are found commonly up to the alpine zone. Larvae feed on flowers and fruits of gymnosperms and/or angiosperms, or in callus tissue on woody stems around wounds or in galls. An undescribed, relatively gigantic species common north of the Auckland isthmus has been reared from dead *Leptospermum scoparium* stems (Forest Res. Inst. records). Two species, one of economic importance in berry-fruit horticulture, are restricted to Rosaceae. Other species that attack fruits are present commonly on podocarps, Epacridaceae, Ericaceae and Myrtaceae.

In the Subantarctic, the Carposinidae provide good evidence of pre- and post-glacial immigration. *Campbellana*, a *Carposina* derivative, is a pre-Pleistocene element that has persisted and been greatly modified; *Carposina epomiana* is a post-Pleistocene immigrant that has diverged to form a distinct subspecies on the Auckland Is. No other subantarctic islands have yielded carposinids.

The larvae of the two subantarctic carposinids are unknown.

KEY TO THE SUBANTARCTIC CARPOSINIDAE

1. Adults brachypterous; ♂ valva lacking costal teeth, ♀ sterigma unsclerotised, lacking processes.....**Campbellana attenuata**
- Adults fully winged; ♂ valva with 2 strong costal teeth, ♀ sterigma sclerotised, with dorsal and ventral long processes.....**Carposina epomiana philpotti** n. ssp.

Campbellana Salmon and Bradley

Salmon & Bradley, 1956. *Rec. Dominion Mus.* **3**: 68 (in Hyponomeutidae).

Type-species: *Campbellana attenuata* Salmon & Bradley (ibid: 69).

Additional characters: ♂ genitalia with valval costa simple, without spines; sacculus separate, triangular;

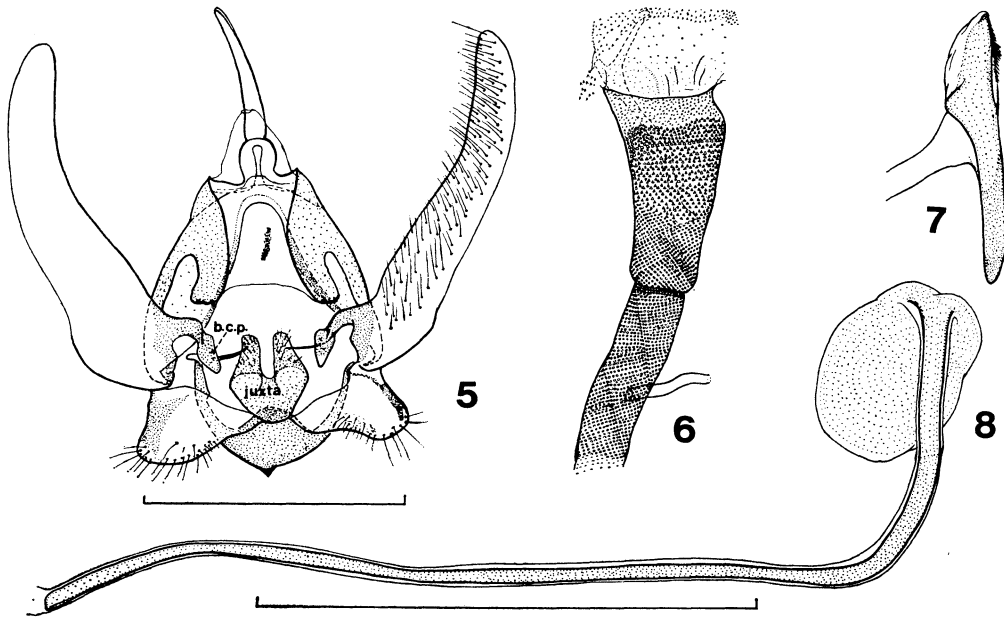


Fig. 5-8. *Campbellana attenuata*. 5, ♂ genitalia, ventral view, holotype (b.c.p. = basal costal process); 6, ♀ ostium, collicular area and part of ductus bursae, allotype; 7, ♂ aedeagus, lateral view, holotype; 8, ♀ rest of ductus bursae and corpus bursae, allotype. The dark internal structure may be a spermatophore. Scales represent 1 mm; Fig. 7 same scale as Fig. 5; Fig. 6 same as Fig. 8.

juxta with arms reduced, setose, broadly tapering at base; inner basal processes on valval costa with shovel apices; socii arms lightly sclerotised, apically nude, shoulders characteristically sharp. Aedeagus reduced, but with a distinct subapical group of short setae (Fig. 7).

♀ *genitalia*: With sterigma unsclerotised, lacking processes; collicular area broad, coarsely scobinate, ductus bursae narrower than collicular area, reticulated-scobinate; ductus seminalis arising on ductus bursae near collicular apex; rest of ductus bursae narrow, over $4 \times$ length of collicular area, joining the corpus bursae obliquely; corpus bursae globose, lacking a signum.

2. *Campbellana attenuata* Salmon & Bradley

Salmon & Bradley, 1956. *Rec. Dominion Mus.* 3: 69.

Characters as in generic description above, and in Salmon & Bradley (l.c.).

♂ *genitalia*: Fig. 5, 7.

♀ *genitalia*: Fig. 6, 8.

Remarks: Yano (1964: 258) records a further 4 ♂♂ from Campbell I, held by Bishop Museum, 1 taken in August, 3 in February.

The slides made by Salmon have been re-examined and re-figured (Fig. 5-8). *Campbellana* is here considered to be a relict derived from a stock that includes *Carposina eriphylla* Meyrick, not only because the valvae are unarmed in the ♂♂, but because the ♀♀ of both species lack sterigmal processes. A close study of the slide mounts of the holotype and allotype of *Campbellana* showed that, particularly in ♀, the preparations had been extensively "cleaned." Had the method of storage been different (e.g. in glycerol in minivials) and had the ♀ preparation been less drastically "cleaned," so that characters of ductus seminalis and spermatheca were still present, a better idea

of the relationships of *Campbellana* would have been gained.

While on ♂ genitalia it would be logical to group *Carposina eriphylla* in *Campbellana* (cf Fig. 5, and Philpott 1928, fig. 10) the ♀ genitalia of each species are widely different. At least the lamella postvaginalis is modified in *C. eriphylla*, which also has paired signa. The corpus bursae in each is quite different, and on these characters, as well as brachyptery, *Campbellana* is here restricted to *C. attenuata*.

Carposina Herrich-Schäffer, 1856

Diakonoff (1954: 116, 138) gives a discussion of characters and generic synonymy.

In New Zealand, the *Carposina* species may be put into 2 groups on some characters, but there is considerable overlap when other characters are taken into account. There is an apparent dichotomy, however, between species such as *C. eriphylla* Meyrick, *C. gonosemana*, *C. exochana* Meyrick, *C. adreptella* Walker, with no large costal teeth on the ♂ valva, and with the ♀ sterigma lacking a strong mesal process on the lamella antevaginalis, and *C. iophaea* Meyrick, *C. charaxias*, *C. epomiana*, *C. cryodana* with large costal teeth on the valva, and with a strong mesal process on the lamella antevaginalis. This latter group includes those species that possess a vitta on the aedeagus (Philpott 1928: 477, 478–9, fig. 4, 6–8).

Externally, New Zealand species of *Carposina* agree in having the forewing with veins R_3 and R_4 separate, and the hindwing with a cubital pecten. *C. eriphylla* is unusual amongst its congeners in that it is the only species known to bore into callus tissue around wounds or into plant galls, rather than flowers and fruits.

One species of this genus has subspeciated in the Auckland Is, and is redescribed below.

3. **Carposina epomiana philpotti** Dugdale, new subspecies

Carposina n. sp. Philpott, 1928b. *Trans. N.Z. Inst.* **59**: 477, 479: fig. 7.

Externally not differing from *C. e. epomiana* Meyrick.

♂ genitalia (Fig. 9): Aedeagus with apical tuft of cornuti including 2 obviously longer spines (spines evenly graded in *C. e. epomiana*); socii with longest spines as long as, or longer than a costal tooth (shorter in *C. e. epomiana*); juxta arms nude basally (setose basally in *C. e. epomiana*).

♀ genitalia (Fig. 10): Mesal process of lamella antevaginalis not longer than lateral processes of lamella postvaginalis (Fig. 10); ductus bursae about $3 \times$ length of collicular zone; otherwise as for *C. e. epomiana* (Fig. 11).

Type Locality: Carnley Hrbr, Auckland I.

Distribution: Auckland, Adams, Enderby, Ocean, Rose Is.

AUCKLAND IS: Holotype ♂, labelled "1" Hudson Register entry ("Subantarctic Is) "Camp Cove, Carnley Harbour 17–26.XI.'07," in Hudson Collection, WMu. Allotype ♀, same data; paratype ♂ same data (WMu); 1 ♀, Ranui Cove, Auckland I, 2 m., Wise; 4 ♀♀, Adams I. 21–31.I.1966, Wise; 1 ♂, Adams I, Kuschel; 1 ♂, Enderby I, Johns; 1 ♀, Ocean I, Gressitt; 1 ♀, 1 ♂, Rose I, Johns.

The larva is unknown; possibly it may be found on *Myrsine* fruits. It will be recognisable by its possession of 2 prespiracular (L) setae on the prothorax, and by the dorsal position of the spiracles on the 8th abdominal segment.

Remarks: This species, common in most parts of N. Z. below the alpine zone, was later synonymised by Meyrick (1911: 79) with *C. gonosemana* Meyrick. Philpott (1928b: 477, 478: fig. 1, 479: fig. 6) effectively re-validated it. Two subspecies are recognised, but only the subantarctic subspecies needs describing here. The ♀ genitalia of *C. e. epomiana* are shown in Fig. 11.

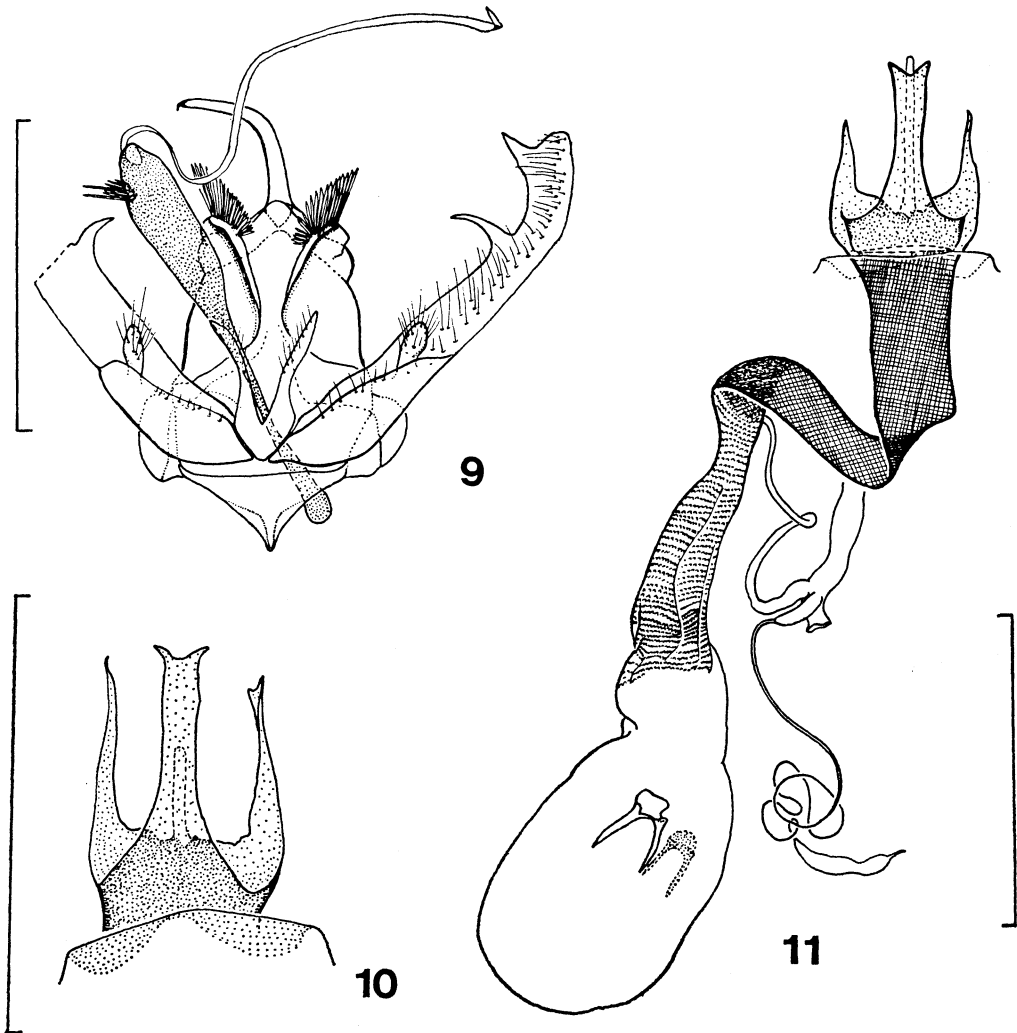


Fig. 9–11. *Carposina epomiana*. 9, *C. e. philpotti* ♂ genitalia, ventral view, holotype; 10, *C. e. philpotti* ♀, sterigma, allotype; 11, *C. e. epomiana* ♀, genitalia, Big South Cape I. Scales represent 1 mm.

COLEOPHORIDAE

From other families with slender pallid species in Gelechioidea, the Coleophoridae can be distinguished in New Zealand by the minute, porrect maxillary palpi which are not folded over the base of the scaled haustellum, by the lack of whorls of bristles on the hind tibia and/or tarsus, by vein R_2 in the forewing arising well before the apex of the discal cell, and the hindwing with Rs not axial, and the abdominal segments with pairs of spine patches.

Batrachedra species (Cosmopterygidae) have these spine patches also, but differ in having the first abdominal segment either with long patches, or uniformly spinose; in the *Coleophora* species mentioned below, the patches are very short (Fig. 14).

The ♂ genitalia, with the globose, grooved or spinose gnathos apex, absence of an uncus, and the tremendously elongate curved vesica, and the ♀ genitalia with the black-scobinate, watch-spring coiled ductus bursae are most distinctive. The 2 introduced species, *C. alcyonipenella* Kollar and *C. spissicornis* Haworth, have the antennae thickened with scales, and are dark, metallic greenish bronze moths whose ♀♀ have the signum single. An undescribed, pale grey species with a double signum has been recorded from Antipodes I and also from Winchmore, South Canterbury, in the South Island.

***Coleophora* sp. indet.**

Antennae white, ringed with fawn; labial palpi pale grey, with a fawn stripe on outer side; forewings pale grey, veins outlined in fawn. Hindwings, legs, abdomen uniformly pallid. ♂ genitalia of Winchmore specimen as in Fig. 13. ♀ genitalia and abdominal spinosity of Antipodes specimen as in Fig. 12 and 14. Body length (vertex—wing tip): 7.0 mm.

One ♀ was collected on 27 Feb. 1969 by P. M. Johns. The specimen is held at ED, as are 15 others collected by J. Wood, Department of Agriculture at Winchmore, South I, to a mercury-vapour light in Feb. 1970.

No *Coleophora* larvae were collected, and it is doubtful if this species is native to the Antipodes or indeed to New Zealand. Cocoons in birdseed harvested at Metnven (Canterbury, South I) yielded identical adults, and resemble cocoons of *C. musculella* Munlig as figured by Stoll (1962: fig. 97-99).

COSMOPTERYGIDAE

The species previously placed in this family has been re-assigned in Psychidae (see *Reductodermes*, p. 112).

(3) PYRALIDAE: CRAMBINAE only.

Crambinae may be recognised amongst Subantarctic Lepidoptera by the well-developed, ascending, tufted maxillary palpi and the strong cubital pecten on the hindwing. All the Subantarctic species have a longitudinal wing pattern, and all are at present left in *Crambus* sens. lat.

The Crambinae are extensively developed in New Zealand, with species in all biotopes, possibly excluding the nival zone. Three species are known from the Subantarctic of which 2 are on Auckland Is and 1 is on Antipodes. Only the last species shows structural differences from mainland populations. As the larvae live in galleries constructed amongst tiller bases of grasses, sedges and rushes, and as such habitats were not specifically examined, no larvae suitable for illustrating were collected. All 3 species are common in North, South, Stewart, and Chatham Is and thus have a high dispersal ability.

As a monograph on the subfamily is being prepared by Dr D. E. Gaskin, Guelph University, Canada, these 3 species are not fully dealt with here. The wing-pattern and head of each species is figured.

KEY TO SUBANTARCTIC CRAMBINAE

1. Labial palpi over 3 × as long as compound eye diameter; forewing with 2 brassy brown stripes; frons when denuded, conical (Ant).....***C. siriellus*** Meyrick
- Labial palpi less than 3 × as long as compound eye diameter, forewing with only 1 brown stripe, never brassy, frons flat.....2

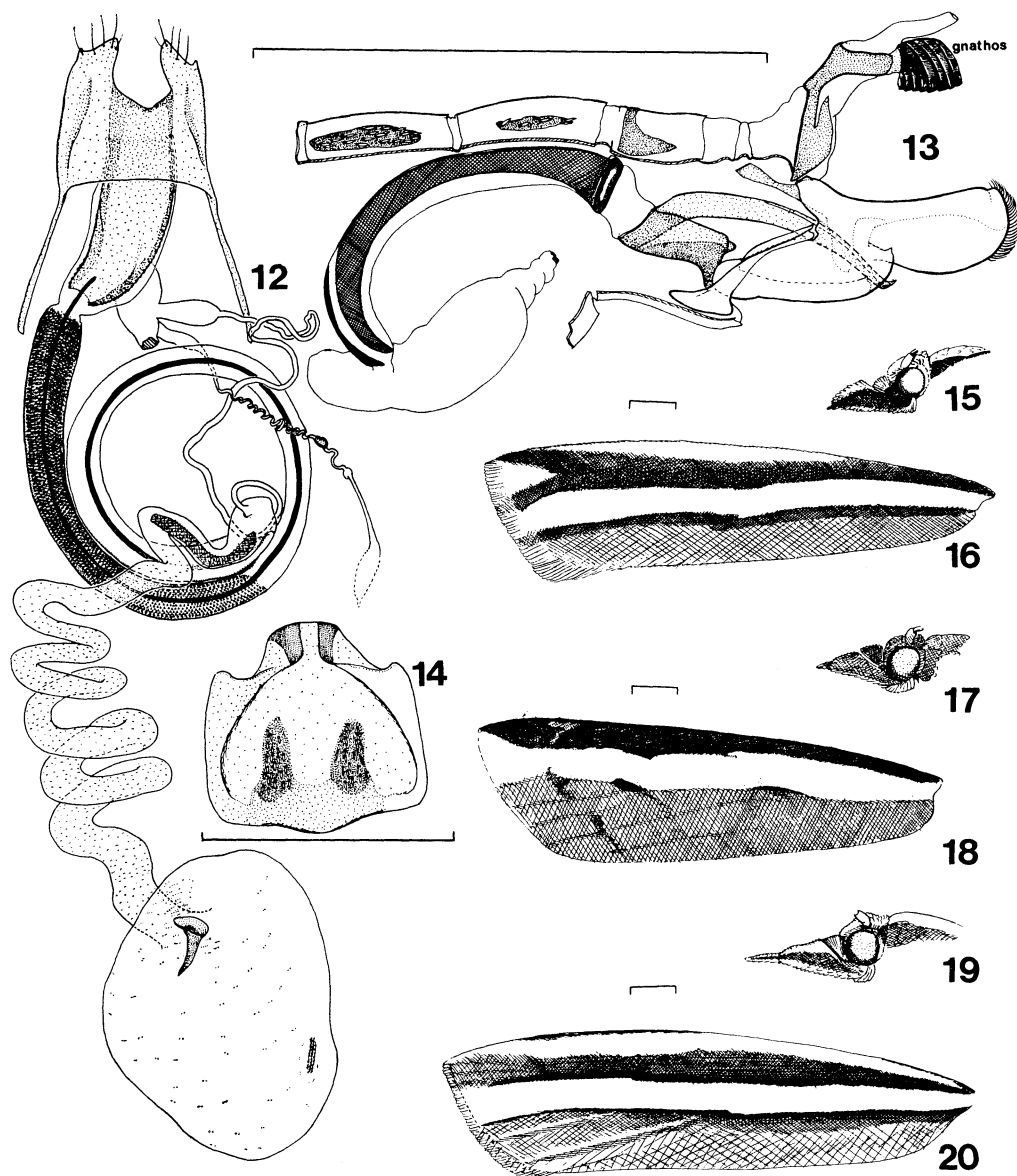


Fig. 12-14. Coleophoridae; Fig. 15-20: Pyralidae: Crambinae; 12, *Coleophora* sp. indet., ♀ genitalia, Antipodes I; 13, ditto, ♂ genitalia, side view, Winchmore, South I; 14, ditto, 1st abdominal segment dorsum, South I; 15, "*Crambus*" *apicellus*, head, Adams I; 16, ditto, forewing pattern; 17, "*Crambus*" *flexuosellus*, head, Rose I; 18, ditto, forewing pattern; 19, "*Crambus*" *siriellus*, head, Antipodes I; 20, ditto, forewing pattern. Scales represent 1 mm; Fig. 12, 13 to same scale.

2. Head, thorax, palpi all brown; subcostal stripe not bifurcate at apex (A).....**C. flexuosellus** Doubleday
 Head, thorax centre, margins of palpi white; sub-costal stripe bifurcate at apex (A).....**C. apicellus**

Crambus apicellus Zeller

Wing-pattern as in Fig. 16; head as in Fig. 15; length (vertex—wing tip): 11.0–12.5 mm.

Distribution: North, South, Stewart, Chatham, Auckland Is; swampy areas, pakihis.

AUCKLAND IS: 6 ♂♂, Adams I, to light, Wise, 2 ♂♂, Adams I, Kuschel; 3 ♂♂, Musgrave Pen., Adams I; 1 ♂, Ranui Cove, Auckland I, Gressitt.

Crambus flexuosellus Doubleday

Wing-pattern as in Fig. 18; head as in Fig. 17; length (vertex—wingtip): 11.5–13.0 mm.

Distribution: North, South, Stewart, Auckland Is; also Chatham Is (as *horistes* Meyrick).

AUCKLAND IS: 2 ♂♂, 2 ♀♀, on *Poa litorosa*, Rose I, Johns.

Crambus siriellus Meyrick

Wing-pattern as in Fig. 20; head as in Fig. 19; length (vertex—wingtip): 13.8–16.0 mm. ♂ genitalia with aedeagal apex rounded, not acute as in mainland specimens.

Distribution: North, South Stewart, Chatham, Antipodes Is.

ANTIPODES I.: 2 ♂♂, Reef Pt, Kuschel; 2 ♂♂, North Plain, 4 ♂♂, 1 ♀, Mt Galloway 350 m, Antipodes I, Kuschel; 3 ♂♂, North Plain, North Plateau, amongst tussock and ferns, Johns. One larva, from litter under *Poa*, *Blechnum*, sample 69/48; one larva from parakeet nest, sample 69/58, Kuschel.

(4) ELACHISTIDAE

The Elachistidae in New Zealand are represented by 13 described species; at least 5 undescribed species are known, mostly in the *thallophora* Meyrick complex on the mainland. From other narrow-winged New Zealand gelechioids, elachistids are distinguished by hindwing venation (vein Rs at or near the longitudinal axis) and hind-tibiae or hindtarsal structure (lacking median and terminal whorls of bristles). Elachistid larvae are miners, with most genera in sedges and grasses (Hering 1951: 182) but with some (e.g. *Swezeyula* Zimmerman & Bradley 1950: 191) in dicotyledonous plants. A recent revision by Braun (1948) of North American species indicates the inapplicability of *Elachista* sens. strict. to the New Zealand fauna.

The following species were not examined: *melanura* Meyrick, 1889, *ochroleuca* Meyrick, 1923, *stellata* Philpott, 1932. The rest of the fauna falls easily into 3 groups on genitalic structure, viz: *Cosmiotes* sens. lat. (N, S, Ch, Sn)—*archaeonoma* Meyrick, 1889; *exaula* Meyrick, 1889, *helonoma* Meyrick, 1889; *ombrodoca* Meyrick, 1889, *watti* Philpott, 1924; also *laquaeorum* n. sp., and an undescribed Chatham I sp. from *Festuca coxii* swards.

Irenicodes Meyrick (southern N, S, St, A, C, Ant)—*galatheae* Viette, *napaea* Philpott, 1930, *sagittifera* Philpott, 1927, *thallophora* Meyrick, 1889 (includes a group of species), *hookeri* n. sp., *pumila* n. sp. "gerasmia" group (N, S.)—*gerasmia* Meyrick, 1889.

The "gerasmia" group is not represented in the subantarctic; it is distinct in possessing a nude uncus, long-haired sacculus lobes, an evenly scobinate signum and a partly sclerotised, large bulla seminalis.

KEY TO NEW ZEALAND GENERA OF ELACHISTIDAE

1. Uncus lobes with an apical nude area; socii absent; juxta longer than broad, parallel-sided.
 Signum present, an oval plate with a large tooth at each apex.....**Cosmiotes** s. l.

Uncus lobes setose to apex, lacking an apical nude area; socii present, juxta not longer than broad, sides convex. Signum absent.....**Irenicodes**

In the Subantarctic, elachistid pupae may be recognised by their somewhat flattened appearance, the flanged head and abdomen, dorsal longitudinal crest on the abdomen, and triangular, apically nude cremaster. The larvae can be immediately recognised by the flattened head capsule bearing 3 dorsal and 3 ventral ocelli on each side, the longitudinally split prothoracic shield, the large prosternum, the capitate pretarsal setae that are far longer than the claws, and seta L absent from abdominal segments.

The following species are here recorded from the Subantarctic Islands:

Cosmiotes laquaeorum n. sp. (Snares)

Irenicodes g. galathea (Viette) (Campbell)

g. antipodensis n. ssp. (Antipodes)

hookeri n. sp. (Auckland Is)

pumila n. sp. (North Auckland I and islets)

Cosmiotes Clemens, 1860

Braun (1948: 89–90) gives synonymy and a redescription.

Diagnosis (N.Z. spp only): uncus lobes with a nude, incurved apex, lobes long-setose basally; gnathos apex typical for the family (a decurved disc with transverse series of spinules); juxta longer than broad, sides never convex, juxta often projecting headwards over the saccus; valva elongate, apically truncate, costa strong, sacculus apex acuminate, minutely free, sacculus lobe finger-like, apically short setose. Anellar structures; inner base of costa produced mesally, arms meeting and weakly fused on midline; upper part of sacculus base broadly meeting but not fused with anellar lobes (flexure zone at this margin): anellar lobes more or less triangular, setose; space between the lobes V-shaped. ♀: ovipositer lobes lacking outstanding groups of stout setae along ventral margin; sterigmatal sclerite narrow, V-shaped, or absent; limen of sterigma a narrow cup, forming a chamber longer than wide; signum an oval disc with 1–3 long teeth at either end.

Larva (based on *archaeonoma* and *?helonoma*): Prothorax with most anterior lateral setae (XD₂ SD₁, SD₂?) vertically aligned but not equidistant; seta XD₂ antero-dorsad of seta D₂; prosternal plate with posterior setal pair wider spaced than anterior pair; anal shield not wider than an anal proleg base, i.e. narrow.

Distinguished from *Irenicodes* and “*E. gerasmia*” group by the characters listed in the key; the N.Z. species here placed temporarily in *Cosmiotes* probably deserve a separate genus as socii are absent. One species is recorded from the Snares I. The mainland species are associated with grassland swards; *C. archaeonoma*, which, with *C. ombrodoca* may prove not to be congeneric with the others, has been reared from several introduced grass species in New Zealand (E. W. Valentine, pers. comm.), as well as the endemic *Microlaena avenacea*. The undescribed Chatham I species was collected only in a dense sward of *Festuca coxii*, an endemic (and now rare) grass characteristic of soft rock cliff-faces on those islands.

Cosmiotes as here applied is probably heterogeneous. *C. archaeonoma* and *C. ombrodoca*, superficially like *Cosmiotes aphantanta* (Turner) differ from this species which on ♀ genitalia is very similar to *helonoma*, *watti*, *laquaeorum* and the Chatham I species. The records of *Elachista archaeonoma* from Australia, Lord Howe and Norfolk Is by Bradley (1954: 152) may refer to *Cosmiotes aphantanta*, specimens of which were kindly made available by Dr I. F. B. Common.

7. **Cosmiotes laquaeorum** Dugdale, new species

Color: Head, thorax, hindwing, abdomen, legs and basal 2 antennal segments clothed in yellow-fawn scales, sometimes darker on vertex and mesonotum; fore and mid-tibia with a longitudinal dark dorsal stripe;

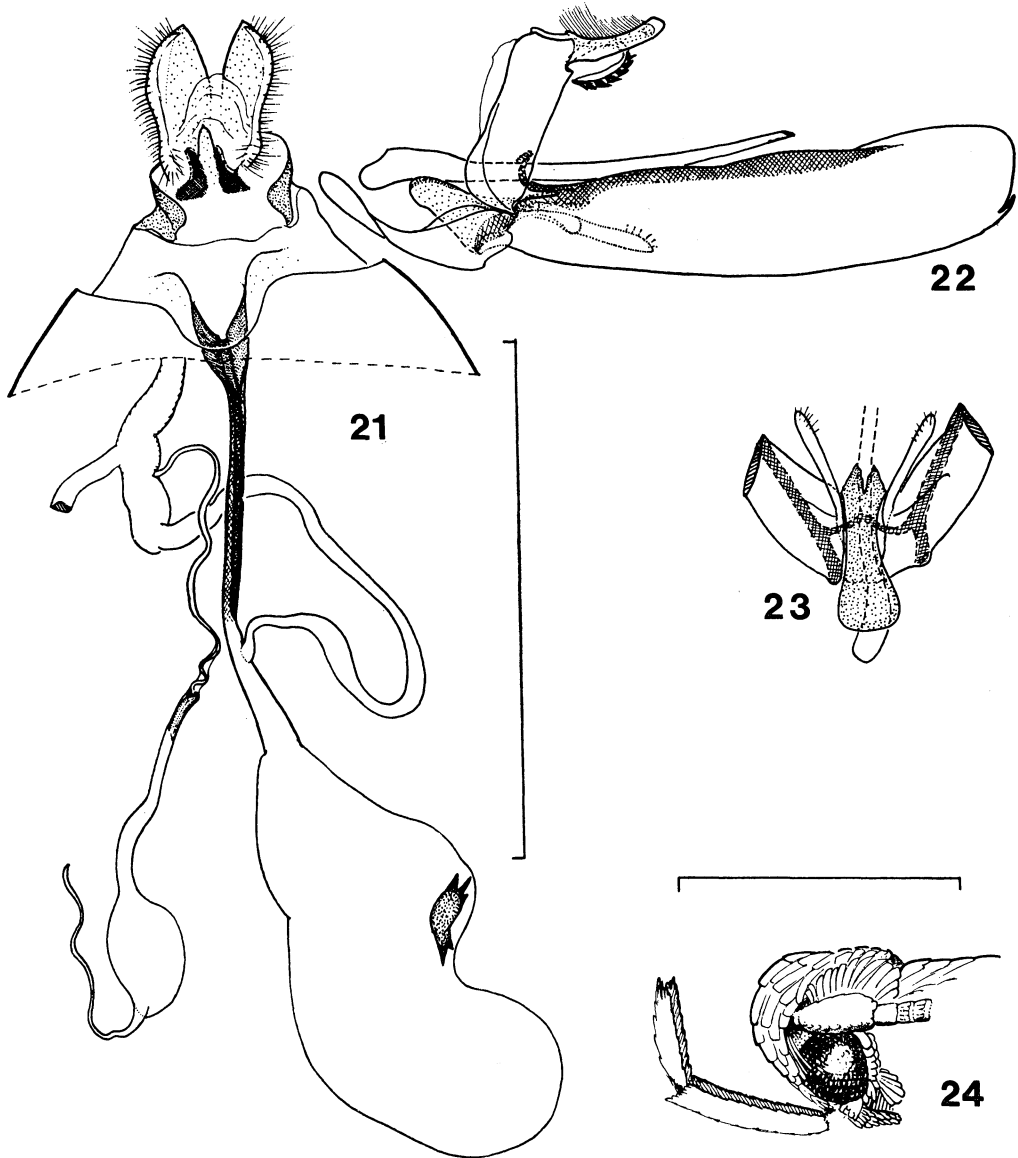


Fig. 21-24. *Cosmiotes laquaerum*. 21, ♀ genitalia, ventral view, Snares I; 22, ♂ genitalia, side view; 23, ♂ genitalia, basal valval and anellar structures; 24, ♂ head. Scales represent 1 mm; Fig. 23 same scale as Fig. 21, 22.

rest of antennal segments with pale scales basally, dark scales apically on each segment; forewings with yellow-fawn ground color, and with 2 brown or blackish brown stripes longitudinally, the first strong, from base along vein Cu and CuA1 to margin, the second weaker, sometimes interrupted, from wing center along vein m-Cu and fading before margin.

Structure: Head as in Fig. 24, antenna lacking pecten; hind-tibia lacking ventral crest of hair-scales.

Forewing gradually narrowed to slender acuminate apex; hindwing slender from base. Adult length (vertex to folded wing tip): 6.4–6.6 mm (both sexes).

♂ *genitalia* (Fig. 22, 23): Apex of each uncus lobe slightly expanded; uncus lobes with sparse erect setulae; gnathos apex greatly decurved; anellar lobes setose along dorsal margin; juxta over twice as long as broad, widening from junction with anellus lobe to base; valva with costa somewhat raised subapically, sacculus apex a free, sclerotised thorn; valvula apex rounded. Sacculus lobe 1/4 valval costa length, somewhat thickened apically.

♀ *genitalia* (Fig. 21): Ovipositer lobes with ventral margin bearing scattered single large setae; rest of segment dorso-laterally clothed in short erect setulae.

Sterigma as in Fig. 21; colliculum almost as long as corpus bursae; ductus seminalis arising at end of colliculum; corpus bursae ovoid; signum with 3 spines at 1 apex and 2 at other.

Type localities: Sinkhole Flat, Snares I.

Distribution: Snares I.

SNARES I: Holotype ♂, Sinkhole Flat, Snares I, P. M. Johns 5.I.1967, in collection, ED; ♀ allotype and 9 paratypes, Sinkhole Flat, Jan. 1967, P. M. Johns, beaten from *Poa tenmantiana*; 4 ♂♂, Station Point, Jan. 1967, P. M. Johns.

Remarks: *C. laquaeorum* is similar to *C. helonoma*, differing in having narrower uncus lobes, a wider saccus, the ventral floor of the sterigma not split basally, and the signum with more apical spines. It is also larger, and the color pattern is simplified. The pupa is unknown. (The pupa of *C. archaenoma* is enclosed in a flat silk cocoon on a leaf, and has transverse carinae on frons and vertex and also two weak tubercles on the vertex, the mesonotum has longitudinal ridges, and the abdominal spiracles are dorsal, and with long spines associated which project through the cocoon.

Irenicodes Meyrick

Meyrick, 1919. *Trans. N.Z. Inst.* **51**: 352.

Euproteodes Viette, 1954. *Ent. Medd.* **27**: 19. Type-species: *Euproteodes galathea* Viette, op. cit.: 21.

New Synonymy.

Type-species: *Irenicodes eurychroa* Meyrick, 1919, loc. cit.

♂ *genitalia*: Uncus lobes setose on inner face to apex, ovate, narrowed basally, and with the socii present as flanges at base of inner face more or less prominent; tegumen on dorsal mid-line usually shorter than width of an uncus lobe, or at most, not longer than uncus lobe length; gnathos apex typical, or the scobinate disc absent (as in *napeae*). Valvae elongate, sub-rectangular, costa strong, sacculus apex shortly free, acuminate, valvula apex subtriangular to ovate. Anellar structures: basal costal processes narrowly fused in mid-line; anellar lobes more or less quadrangular, approaching, but not fused with the upper part of the sacculus base; juxta broader than long, sides convex; saccular lobe stout, thumb-like. Saccus stout-triangular.

♀ *genitalia*: Ovipositer-lobes with groups of stout setae along ventral margin. Sterigma forming a shallow cup; colliculum not as long as corpus bursae; ductus seminalis arising at end of colliculum; ductus bursae very long; corpus bursae ovoid, lacking a signum.

Larva (galathea, hookeri): Prothorax with XD₂ SD₁, SD₂ vertically aligned, equidistant; XD₂ antero-ventrad of D₂; prosternal plate with posterior setae closer together than are anterior setae; anal shield broad, far wider than an anal proleg base in dorsal view, and narrowed to an obtuse apex.

Pupa: Fig. 36. At least 1 pair of abdominal spiracles ventral; anal proleg crotchets persisting, many, head with the posterior (vertex) carina developed, anterior (frontal) absent. No cocoon.

Distinguished from *Cosmiotes* and the *gerasmia* group by the characters listed in the key; there are no really consistent obvious external characters. *Irenicodes* was first recognized as an elachistid by Dr E. C. Zimmerman (in press) and I am grateful to him for his kind permission to use his results prematurely. Viette's *Euproteodes* is a synonym. Within the specimens usually identified

in collections as *E. thallopfora*, at least 3 good species can be distinguished, with one species present in *Chionochloa* communities in the Rakeahua Valley, Stewart I. No species were collected on Big South Cape I, however.

The subantarctic species are closest to the *thallopfora* group—small to large pallid species with long tapered wings and with longitudinal light and dark stripes. These differ from *I. napaea* in possessing a gnathos apex-pad (absent in *napaea*) and in the color pattern, which in *I. napaea* resembles that of *Cosmiotes ombrodoca*.

The present concept of *Irenicodes* excludes *I. holdgatei* Bradley (1965: 124–25) from Kidney I, E. Falkland Is in the Patagonian subregion of Kuschel's Austral Region (Kuschel 1964: 444, fig. 1). Although closely related to *Irenicodes* as here restricted, it differs in the following aspects (1) the gnathos apex is elongate, not oval or circular, (2) the socii are produced into punctate, stalked structures (3) the basal costal processes appear free in midline (Bradley, l.c., fig. 7) (4) the upper part of the sacculus base appears fused with the anellus. While the stalked socii and the fused sacculus/anellus are obvious differences, the species *holdgatei* resembles Holarctic *Elachista* sensu Braun (1948) and *Irenicodes* from New Zealand more than it does the Chilean *Elachista* species figured by Gates Clarke (1967: 6–7, fig. 4), and it is noteworthy that Dr Kuschel collected no elachistids on Juan Fernandez Is (Gates Clarke 1965).

Irenicodes differs from *Elachista* sensu Braun (1948) in its lack of a signum and modified ductus bursae in the ♀, and its fused inner costal processes in the ♂. *Irenicodes* differ in larval prothoracic chaetotaxy (*Elachista* as figured by Braun (1948, fig. 21) does not have setae XD₂, SD₁, SD₂ large and vertically aligned) and in pupal characters (all *Elachista* pupae figured by Braun have no ventral abdominal spiracles).

Larvae are known of *I. galathea* and *I. hookeri*; the larvae were beaten or swept from grasses, presumably when their mines were broken. Pupae, referable to *I. hookeri* (♂) and *I. pumila* (♀) are also known.

KEY TO SUBANTARCTIC IRENICODES SPECIES (ALL BRACHYPTEROUS)

1. Basal segment of antenna with pecten; length (vertex to wing tip): 2.9–3.3 mm; ♂: uncus lobe with dorsal margin straight; socii scarcely developed; ♀: sterigma conical, 7S scarcely emarginate at ostium region (Northern A).....**I. pumila** n. sp.
Basal segment of antenna lacking pecten; ♂: uncus lobes concave dorsally; socii well developed, conspicuously darkened, sometimes punctate; ♀: sterigma bowl or cup shaped; 7S distinctly to deeply emarginate around ostium.....2
2. Length over 4.5 mm, usually between 6.0–7.0 mm; ♂: uncus lobe with socii punctate, sub-triangular; ♀: sterigma deep, subrectangular, lacking lateral setulae (A).....**I. hookeri** n. sp.
Length between 3.0–5.5 mm, usually less than 4.5 mm; ♂: uncus lobe with socii not punctate; ♀: sterigma bowl-shaped, shallow, with lateral groups of setulae (C, Ant).....3
3. Gnathos apex circular, as wide as long; uncus lobes twice as long as wide; ♀: colliculum extending from ostium to near ductus seminalis junction (C).....**I. g. galathea** Viette
Gnathos apex oval, longer than wide; uncus lobes stouter, about 1.5 × as long as wide; ♀: colliculum reduced, not extending from ostium, but from some distance along ductus bursae (Ant).....**I. g. antipodensis** n. ssp.

8. *Irenicodes galathea*

This species is here considered to consist of 2 isolated subspecies.

8a. ***Irenicodes galathea galathea*** (Viette) (stat. nov.) comb. nov.

Viette, 1954. Ent. Medd. 27: 21.—Salmon & Bradley 1956: 70, fig. 17–19. (*Euprotesodes*, as species).

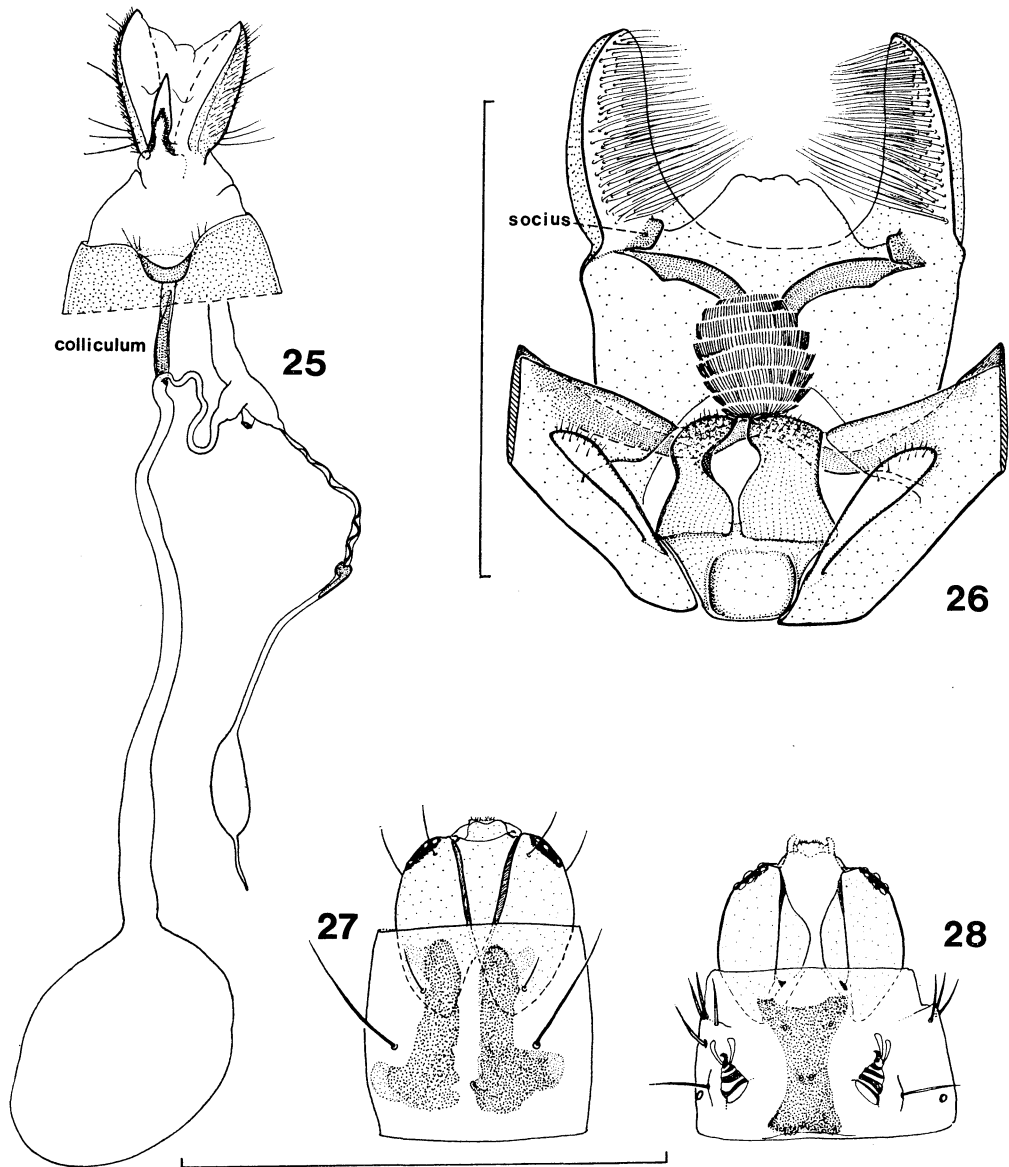


Fig. 25–28. *Irenicodes g. galathea*. 25, ♀ genitalia, Campbell I; 26, ♂ genitalia, ventral view, valvae and aedeagus omitted; 27, larva, head and pronotum, dorsal view; 28, ditto, ventral view. Scales represent 1 mm; Fig. 25 same scale as Fig. 27, 28.

Adult: As described by Salmon & Bradley (1956: 70); length (vertex to wing tip): 3.5–5.5 mm; ♀ with enlarged abdomen. Basal segment of antenna without a pecten.

♂ *genitalia* (Fig. 26): As described by Viette (l.c.) and Salmon & Bradley (l.c.); additional characters: socii more or less triangular, not punctate; uncus lobe twice as long as wide; gnathos apex as wide as wide as long, sacculus lobe as long as height of anellus.

♀ *genitalia* (Fig. 25): Ovipositor lobe rounded apically on lateral view, with a group of 3 strong setae subapically, and 3 strong setae basally; sterigma bowl-shaped, extending posteriorly beside lateral setulae; colliculum extending from sterigma base to near ductus seminalis.

Larva (Fig. 27, 28): Prosternum with anterior pair of setae obvious, and borne on sclerite; pronotum with sclerite split to and including caudal margin. Anal shield apex tumid, somewhat raised, shield longer than wide.

Type locality: Station L409, Campbell I.

Distribution: Campbell I.

CAMPBELL I: 18 ♂♂ 2 ♀♀, Beeman Camp; 2 ♂♂, Mt Lyall, 400 m, 3 ♂♂, Lookout Bay, Kuschel: 11 ♂♂, Beeman Camp, I.1969; 1 ♀ Tucker Cove, Johns. 1 larva, ex turf sample 69/11, Mt Lyall 350 m, matplants + moss, Kuschel.

8b. *Irenicodes galathea antipodensis* Dugdale, new subspecies

Adult: Differs from *g. galathea* in: ♂ *genitalia* (Fig. 29, 30)—uncus lobe broader, under twice as long as wide; gnathos apex longer than wide; sacculus lobe shorter than height of anellus; ♀ *genitalia* (Fig. 31): ovipositor lobe truncate apically, sterigma reduced and not extending beside the lateral setulae; colliculum reduced, not approaching sterigma.

Larva: Prosternum with anterior setal pair not borne on sclerite; pronotal sclerites united along caudal margin.

Type locality: Reef Point, Antipodes I.

Distribution: Antipodes I.

ANTIPODES I: Holotype ♂, Reef Point, 80 m, Antipodes I 13.II.1969, G. Kuschel, in type collection, ED, Nelson; allotype, 119 paratypes from Reef Point, Stella Bay, North plateau, coastal cliff-faces to 100 m, on *Poa litorosa*, *P. foliosa*, and grasses, and on rock faces, Kuschel: 37 ♂♂, 16 ♀♀, in alcohol, Reef Point, Stella Bay, Middle Plateau, coastal cliffs to 300 m, Johns; 1 larva, Reef Point, sweeping, Kuschel.

Remarks: *I. galathea* may be distinguished from *I. pumila* by its lack of a pecten on the basal antennal segment, and from *I. hookeri* by its impunctate socii in the male, and setulose sterigma in the female; while most *I. hookeri* are at least 2 mm longer than *I. galathea*, there is some overlap in size (see key). The Antipodes population (*I. g. antipodensis*) shows reduction in structures and is thus considered to have arisen from Campbell I (or Campbell Plateau) stock.

9. *Irenicodes hookeri* Dugdale, new species

Adult: Brachypterous; similar to *I. galathea*; color varying from greyish white to fawn, antennae clothed in dark grey scales. Adult length (vertex wing tip): 4.5–7.2 mm (both sexes); ♀ with abdomen broader, and antenna narrower than in ♂.

♂ *Genitalia* (Fig. 32, 33): Uncus lobes broad basally concave on margin, socii punctate; gnathos apex ovate, spinules not obviously grouped in rows; anellar lobes elongate; sacculus lobe longer than anellus height.

♀ *Genitalia* (Fig. 35): Ovipositor lobe acute apically, with groups of stout setae laterally and one stout seta apically; sterigma subrectangular, lacking setulae; colliculum extending from sterigma to ductus seminalis, sinuous.

Pupa (Fig. 36): Spiracles on second and third abdominal segments below the lateral flange (i.e. ventral), others dorsal. Antennal sheaths projecting beyond wing sheath apices; vertex carina not serrulate; cremaster as figured.

Larva: Prosternal setae minute, on sclerite; pronotum split on dorsal midline, anal shield apex not tumid or raised, anal shield not longer than wide. Length of last instar larva: 8.5–9.00 mm.

Type Locality: Fairchild's Garden, Adams I.

Distribution: Auckland Is: Adams I, Auckland I, 1–400 m; Enderby I, Ewing I, French I.

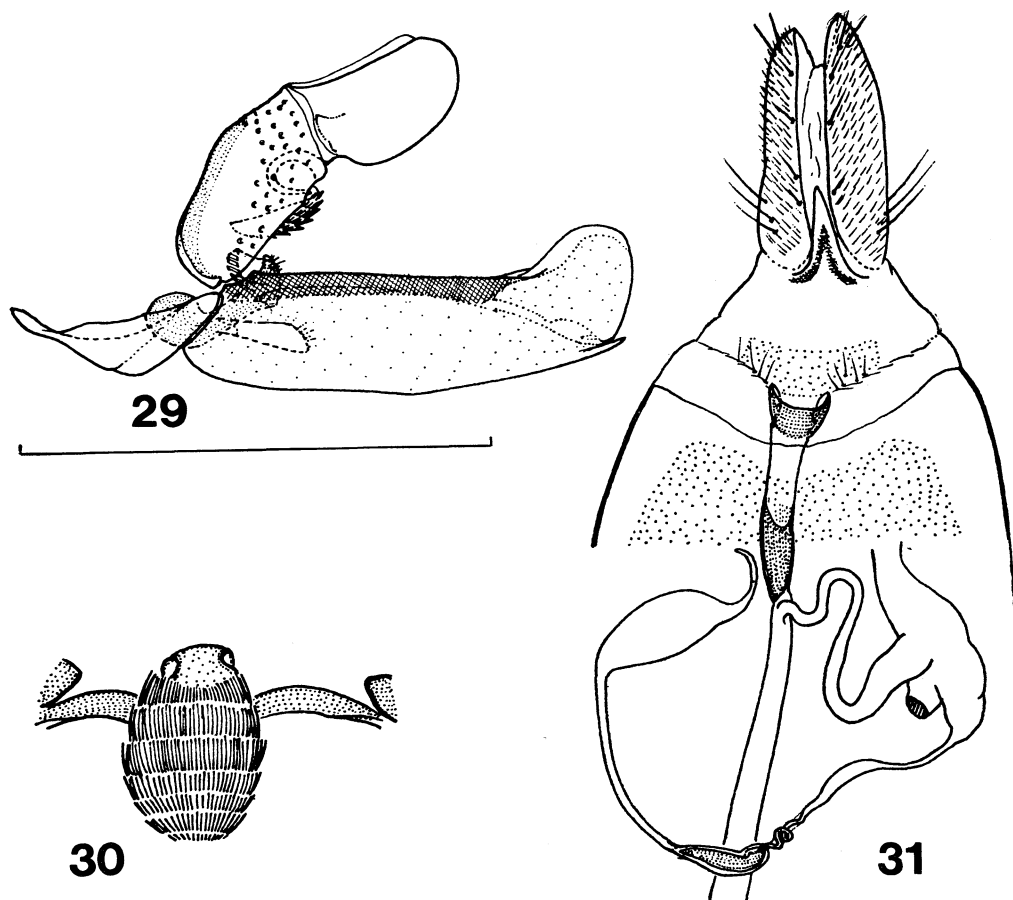


Fig. 29-31. *Irenicodes g. antipodensis*. 29, ♂ genitalia, side view; 30, ♂ genitalia, gnathos; 31, ♀ genitalia, ventral view; ductus bursae, corpus bursae omitted. Scale represents 1 mm; Fig. 30 drawn to twice scale.

AUCKLAND IS: Holotype ♂, "W. end of Adams I, Fairchild's Garden 22.I.1966, ex *Poa foliosa*, K. A. J. Wise," in type collection, ED; allotype, 2 ♂♂, 1 ♀ paratypes, Kuschel; 11 ♂♂ paratypes, Johns, 13 ♂♂ 1 ♀ paratypes, Wise, same data as holotype; also 1 ♂, Enderby I, Johns; 2 ♂♂, Crozier Point, Gressitt; 1 ♂, Tucker Point, Gressitt; 25 ♂♂, Bivouac Hill, 200-400 m, Gressitt, on "*Danthonia*" (*Chionochloa*); 1 ♂ Hooker Hills 90-300 m, Wise; 1 ♀, W. Coast below Stony Pk, Gressitt; 25 ♂♂, 3 ♀♀, Ewing I, Gressitt; 26 ♂♂, French I, Gressitt; 1 ♀, ditto, 8.X.1954, Gourlay; 1 ♂, French I, Johns; 2 last instar larvae, Ewing I, 1-10 m, on *Carex*; 1 ♂ pupa, Ewing I, Gressitt.

Remarks: *I. hookeri* is confined to the Auckland Is, and is distinguished from *I. pumila* there by its lack of a pecten on the basal antennal segment and by its larger size (see key). The long sacular process, the broad uncus lobes and the subrectangular sterigma also distinguish *hookeri* from its subantarctic congeners. The concave dorsal uncus lobe margin and non-serrulate anellar lobes distinguish it from southern South and Stewart I members of the *I. thallopheora* complex. This species is named in commemoration of Sir Joseph Hooker, the first biogeographer of the Austral Region.

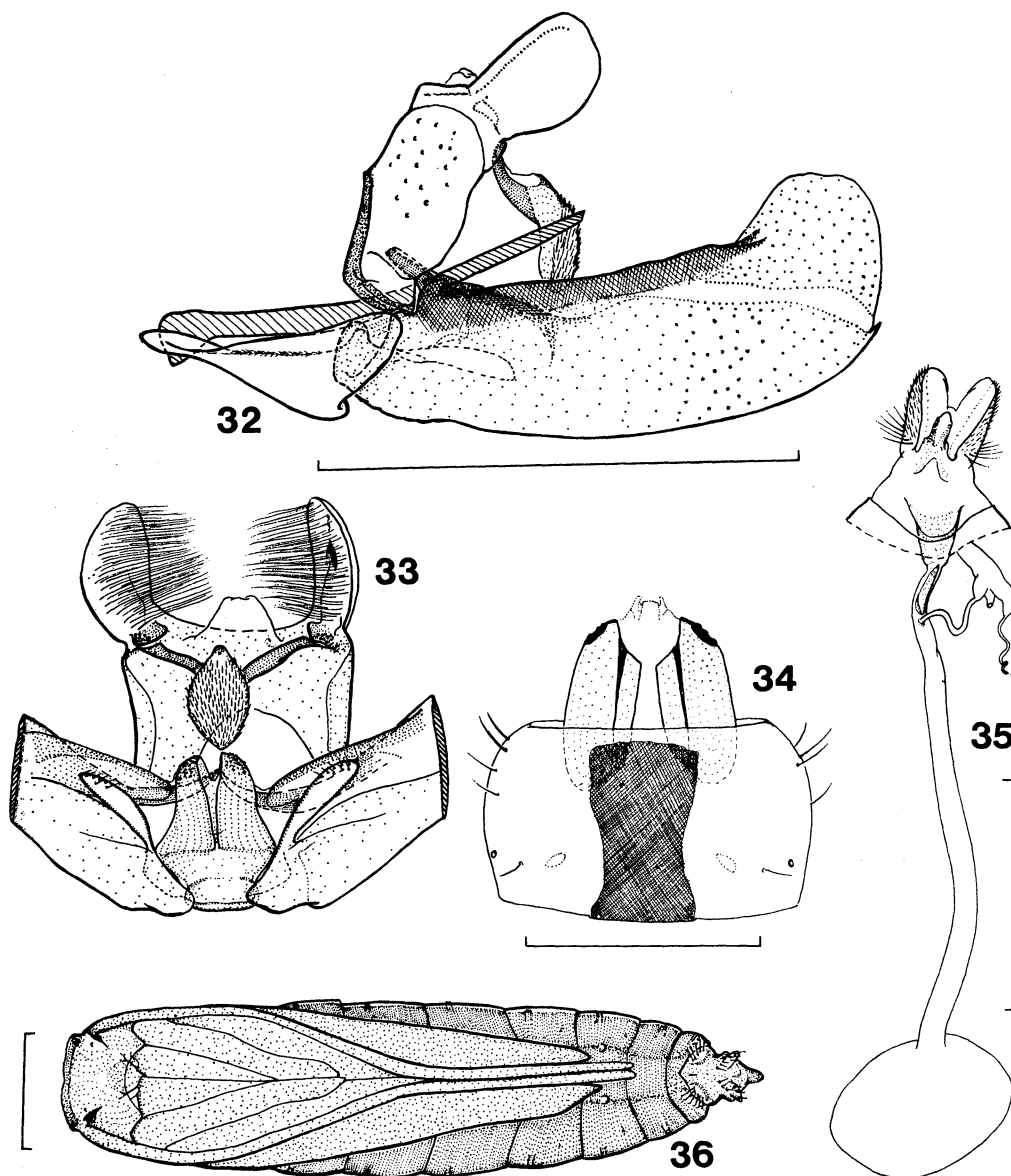


Fig. 32-36. *Irenicodes hookeri*. 32, ♂ genitalia, side view; 33, ♂ genitalia, ventral view, aedeagus and valvae omitted; 34, larva, head and prothorax in ventral view; 35, ♀ genitalia, ventral view; 36, pupa, ventral view. Scales represent 1 mm; Fig. 33 same scale as Fig. 32.

10. ***Irenicodes pumila*** Dugdale, new species

Adult: Brachypterous; antenna with a pecten of long scales on the basal segment (Fig. 38); wings rather broad for most of length and rather quickly reduced to the acuminate apex; length (vertex to wing tip): 2.9-3.3 mm. Body and wings yellowish white or fawn; integument pallid in lowland specimens, dark in

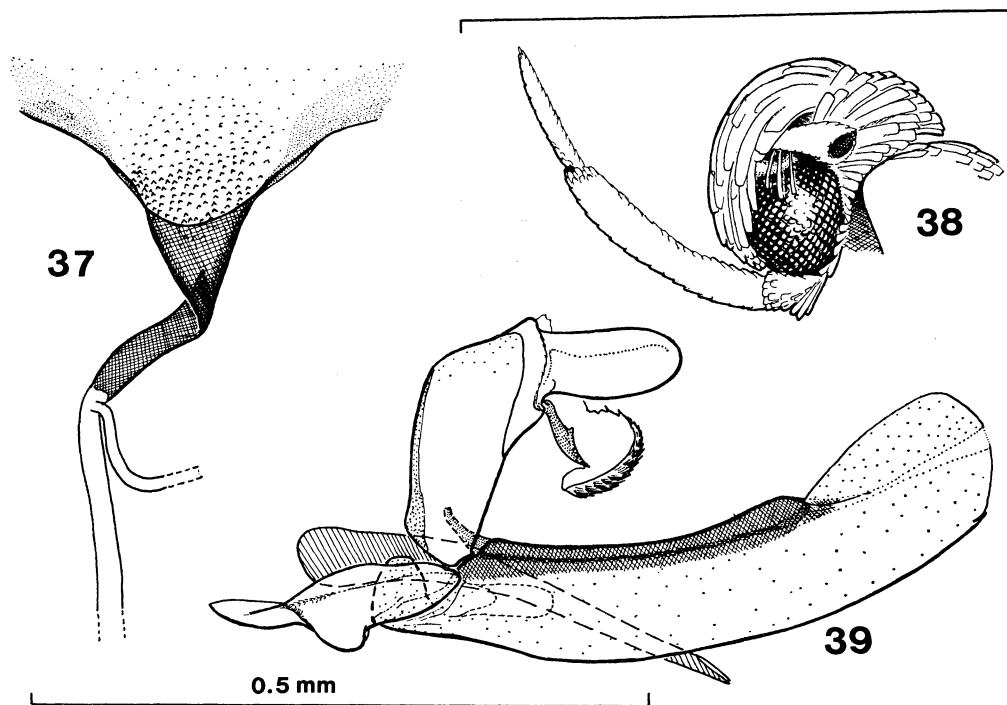


Fig. 37-39. *Irenicodes pumila*. 37, ♀ genitalia, sterigma and collicular area only; 38, ♂ head; 39, ♂ genitalia, side view. Scale by Fig. 38 represents 1 mm.

specimens from high peaks on main island.

♂ genitalia (Fig. 39): Uncus lobes straight dorsally; socii scarcely developed, gnathos apex wider than long; saccus apex suddenly acute, long or short; sacculus lobe thumb-like.

♀ genitalia (Fig. 37): Ovipositer lobe lacking prominent groups of setae; sterigma nude, cone-shaped; colliculum extending from sterigma to ductus seminalis, weakly sinuous; 7S scarcely emarginate at junction with ventral side of sterigma.

Pupa: Differs from *I. hookeri* in: vertex carinae serrulate; spiracle ventral on 3rd abdominal segment, dorsal on rest (2nd, 4th, 5th, 6th, 7th); wing sheath apices extending beyond antennal sheaths. Larva unknown.

Type locality: Bivouac Hill, northern Auckland I.

Distribution: Northern Auckland I (Bivouac and Hooker Hills), Ewing, French, Rose Is.

AUCKLAND IS: Holotype ♂, Bivouac Hill, 540 m, 14.I.1963, J. L. Gressitt, in type collection, ED; allotype ♀, 2 ♂♂ paratypes, same data as holotype; 1 ♂ Enderby I, Gressitt; 3 ♂♂, 1 ♀, on *Poa*, Gressitt; 4 ♂♂, on *Carex*, Gressitt; 2 ♂♂, on sedge, Gressitt; 1 ♂, Gourlay. 1 ♀ pupa, Bivouac Hill, sweeping, Gressitt.

Remarks: As pupae of both *I. hookeri* and *I. pumila* were collected by sweeping, it is reasonable to suppose that species of this genus (as with *Cosmiotes*) pupate on a leaf, but, unlike *Cosmiotes*, without a cocoon. *I. pumila* is distinguished from its subantarctic congeners by its possession of a pecten on the basal antennal segment. From similarly sized mainland species it is distinguished by its brachyptery and absence of longitudinal or transverse wing markings.

The distinctiveness of *I. pumila* suggests that 2 stocks of *Irenicodes* have invaded the subantarctic, one giving rise to *pumila*, the other to *hookeri* and *galathea*.

(5) GEOMETRIDAE

Of the 12 species of Geometridae here recorded for the subantarctic islands, 10 are resident, one is probably resident and one is probably a vagrant. Ignoring the 2 doubtfully resident species, the Snares may have one (shared with Auckland and Campbell Is), the Auckland Is have 7 (2 endemic), Campbell I has 6 (2 endemic) and Antipodes I has 2 (none endemic, but 1 species has an endemic color pattern). The two brachypterous species belong to a group that is extensively brachypterous in the South I. All but one species belong in the Larentiinae; despite the extensive development of Ennominae on the mainland, only *Gargaphia muriferata* in this subfamily is found in the subantarctic. Also, only on Antipodes I has a strictly lowland Larentiine, *Microdes epicryptis*, established (analogous to the arctiid, *Nyctemera annulata*). All the other species known from the subantarctic are found up to (some beyond) the subalpine zone on the mainland. Keys to the adults and larvae of subantarctic Geometridae are given below.

KEY TO ADULT SUBANTARCTIC GEOMETRIDAE (GENERA)

1. Brachypterous; palpi long, tapering, porrect (Auckland Is ♀♀, Campbell I ♂♂, ♀♀)...**Asaphodes** (2 spp)
Wings fully developed, twice as long as broad.....2
2. Forewings falcate, both wings with an unscaled patch at discal cell apex; hindwings with vein M_2 obsolete or absent (A).....**Gargaphia** (1 sp)
Forewings not falcate, no unscaled patch at discal cell apex, hindwing with vein M_2 present.....3
3. Forewings with vein R_1 fusing with vein Sc; ♂ with 8th abdominal segment long, and with a ventral sclerotised lyra (Fig. 68).....4
Forewings with vein R_1 separate from Sc; ♂ with 8th abdominal segment lacking a lyra.....5
4. Labial palpus over $4 \times$ length of eye (Fig. 63); forewing with vein R_1 arising before areole to fuse with Sc; slender, pallid moths with no black costal markings (Ant).....**Microdes** (1 sp)
Labial palpus $3 \times$ or less eye-length; forewing with R_1 arising on the areole to fuse with Sc; broad-winged, intricately patterned, brown, or greyish moths, often with black costal markings (A, C).....**Pasiphila** (5 spp)
5. Head with fronto-clypeal area directed more or less ventrally, palpi hidden in dorsal view, not longer than eye width; antenna and frons bright white, contrasting with dusky brown or orange head, body; wings broad, rounded at apex, pattern of straight lines or rows of dots on both wings; wing span 36–40 mm (A, C).....**Epiphryne** (1 sp)
Frontoclypeal area directed antero-dorsally; palpi conspicuous in dorsal view, longer than eye; antenna and frons not contrasting white; wings acute at apex; hindwings contrastingly patterned from forewings.....6
6. Broad-winged, blackish-green or green or reddish, intricately marked large moths, wings reddish-suffused underneath; metanotum with lateral crests (Fig. 50); ♂ antenna unpectinate (Auckland, Campbell—green or blackish; Antipodes—reddish).....**Austrocidaria** (1 sp)
Narrower winged, never green or reddish, wing markings simple or absent; metanotum smooth-scaled; ♂ antenna pectinate.....7
7. Forewing apex lacking a pallid diagonal mark; palpi porrect, tapering; ♂ antenna with pectinations arising from a convex basal strip (A, ♂♂).....**Asaphodes** (pt)
Forewing apex with a pallid diagonal mark (Fig. 57); palpi ascending, short, blunt; ♂ antennal pectinations concealed basally by apex of preceding segment; ♀ fully winged; (Sn, A, C).....**Helastia** (1 sp)

KEY TO LARVAE OF SUBANTARCTIC GEOMETRIDAE (SPECIES)

1. Abdominal segments with seta SV_3 present; seta SD_1 on 8th abd. segment very fine (Fig. 42);
on ferns (A).....**Gargaphia muriferata**
Abdomen without SV_3 seta; seta SD_1 on 8th abdominal segment not different from other setae.....2
2. Seta SV_2 absent on 1st abdominal segment; forelegs with apical pretarsal scale triangular,
longer and wider than claw-length; ocelli lacking black rims (Fig. 54); green and white
striped larvae on *Dracophyllum* (A, C).....**Epiphryne charidema**
Seta SV_2 present on 1st abdominal segment; foreleg pretarsal setae unmodified; ocelli black-
rimmed3
3. Head partly inserted under prothoracic shield; seta SD_1 on anal shield posterior to seta D_1 ,
(or if these setae in line, then shield not deflexed).....4
Head exerted; seta SD_1 anterior to seta D_1 on anal shield.....8
4. Anal proleg paraprocts greatly elongated, forming 2 tails; purple-striped larvae on rushes
(Fig. 59) (Ant).....**Microdes epicryptis**
Anal proleg paraprocts not forming 2 tails; larvae either on shrubs or internally in flowers
(*Pasiphila*)5
5. Integument granulose-scobinate, color pattern in integument (Fig. 77); on or in *Hebe* buds
(A)**Pasiphila nebulosa**
Integument with plate-like scobinations, color pattern partly formed by scobinations.....6
6. Spiracles on 7th, 8th abdominal segments larger than those on other segments; anal shield
with setae D_1 , SD_1 in line transversely; pallid larvae feeding internally on *Compositae*
capitula (A).....**P. nereis**
Only 8th segment spiracle larger than others; anal shield with seta D_1 posterior to seta SD_17
7. Anal shield apically deflexed (Fig. 76); body scobinations markedly convex, and of widely
diverse sizes, forming imbricating patterns (Fig. 72); larvae on all shrubs (A, C).....**P. inductata**
Anal shield not deflexed (Fig. 75); scobinations plano-convex, more homogeneous in size,
not imbricating (Fig. 71); larvae on *Hebe* (C).....**P. impudicis**
8. Anal shield with 4 pairs of marginal setae, shield with ventral apical pallid projection; body
setae long, tuberculate; abd. segments 3, 4, 5 each with a central, dorsal posterior white-
marked prominence (Fig. 53); on *Coprosma* (A, C, Ant).....**Austrocidaria similata**
Anal shield with 3 pairs of marginal setae, no ventral apical projection; body setae not tuber-
culate; no series of dorsal midline abdominal prominences; on grasses or herbs/mat
plants9
9. Anal shield with all setae on apical third, shield strongly deflexed along level of D_1 — SD_1 setae
(Fig. 58); body stout, flanged laterally, spiracles facing dorsally; larvae on herbs, mat
plants (Sn, A, C).....**Helastia orophylloides**
Anal shield with seta SD_1 well anterior to D_1 , at about 1/2 shield length; apex not deflexed;
body not flanged; larvae on grasses (A, C).....**Asaphodes campbellensis and oxyptera**

ENNOMINAE

Adults of Ennominae are recognised by their having vein M_2 in the hindwing non-tubular, i.e. obsolete. Larvae have seta SV_3 present but SV_2 absent on the 1st abdominal segment (Fig. 42).

Gargaphia Walker

Walker, 1862. List Lepidopt. Ins. Brit. Mus. **26**: 1634.

Type-species: *Gargaphia muriferata* Walker.

Diagnosis: Labial palpi subascending, longer than height of compound eye, apical segment 1/3 to 1/2 length of segment 2, almost hidden by apical scales of segment 2. Antenna in ♂ unpectinate, slightly thickened,

evenly and shortly setulose. Frons scales long, giving frons a pointed appearance. Thorax smooth-scaled, patagial scales extending to 1st abdominal segment. Fore tibia shorter than basal fore-tarsal segment, mid-tibia shorter than mid-femur, hind tibia in ♂ twice hind-femur length, inner face with a groove extending entire length, enclosing a hair pencil; ♀ hind tibia less than twice femur length, unmodified. Abdomen slender, 3S with a median transverse comb of 6 or more appressed setae.

Wings broad, forewings falcate, areole single, R_4 to costa, R_5 to termen, discal cell with vein m-m bearing a pair of unscaled patches between M_1 and M_2 , M_2 and M_3 ; hindwing with a similar spot on m-m at position of obsolete M_2 .

♂ *genitalia*: Uncus slender, capitate; juxta bifid, bearing 3 sinuous spines on each apex; valva ovate, costa expanded, sacculus scarcely differentiated; basal costal process broad, irregular, aedeagus tubular, acute apically; vesica bi-lobed, with a cornutus at apex of each lobe.

♀ *genitalia*: Vaginal lamellae membranous; colliculum split; ductus bursae widened beyond colliculum, sinuous, with 2 prominences: one by the ductus seminalis junction and one further towards the corpus bursae, and with a lateral swelling; ductus bursae sclerotised and longitudinally ridged beyond colliculum; corpus bursae elongate, tubular for greater length, ending as an irregular sac with a carinate ventral signum.

Larva: All setae single; seta L_1 excessively fine on 8th abdominal segment only; 6th abdominal segment proleg with 5 or more subprimary setae.

Gargaphia is monotypic, and is distinguished from other New Zealand Ennominae (*Sestra*, *Azelina*, *Declana*) within the Ennominae on larval and ♂ genitalic characters (Dugdale 1961), in particular chaetotaxy, and uncus, costal and juxtal structures; in the ♀, *Gargaphia* differs from the other genera in its unsclerotised vaginal lamellae, its short, weakly sclerotised ductus and the presence of a lateral swelling on the ductus bursae.

Meyrick (1917: 269) considered "a Venezuelan species" belonged in this genus, but it has not been examined. Superficially, *Gargaphia* resembles Central American species of *Drepanodes*, but on larval chaetotaxy is clearly related (Dugdale 1961) to the New Zealand genera *Sestra* and *Azelina*.

11. *Gargaphia muriferata* Walker

Walker, 1862. List Lepidopt. Ins. Brit. Mus. **26**: 1635 (*Gargaphia*).—Meyrick, 1883, *Trans. N.Z. Inst.* **16**: 107 (*Drepanodes*); 1917 *Trans. N.Z. Inst.* **49**: 269 (*Gargaphia*).

ephyraria Walker, 1862. op. cit.: 1761 (*Panagra*) syn. Meyrick 1884, *Trans. N.Z. Inst.* **16**: 107.

cookaria Felder & Rogenhofer, 1875. Reise der Osterreichischen Fregatte Novara, 2; pl cxxiii:fig. 26 (*Zanclopteryx*?): syn. Meyrick 1884, *ibid*.

haastaria Felder & Rogenhofer, 1875. op. cit., pl cxxiii: fig. 32 (*Zanclopteryx*?); syn. Meyrick 1884, *ibid*.

neoselena Meyrick, 1909. Subantarctic Islands of N.Z. **1**: 70, pl ii, fig. 13 (*Drepanodes*) **New Synonymy**.

Holotype ♀ *neoselena*, labelled "15". (Hudson Register (Subantarctic Is) entry: "15". Carnley Harbour, 22.XII.'07) in Hudson colln. WMuU.

External characters: Wing pattern and color as in Hudson 1928: pl 17, fig. 27, 34–36. Other characters as in generic description. Length (vertex-wing tip): 21.0 mm.

♂ *genitalia*: As in Fig. 41.

♀ *genitalia*: As in Fig. 40 (holotype *neoselena*); characters as in generic description; some variation in corpus bursae shape.

Larva: Instar I: proleg crotchets of equal size in complete meseries; body pallid with dorsal, sub-dorsal lateral and subventral pink stripes; dorsal stripe double only on prothoracic shield; no lateral stripe between L_1 and SV_1 on thorax; no lateral papilla on 6th abdominal segment; seta SV_1 , SV_2 on 1st to 5th abdominal segments widely separated; no groups of setulae. Instars II–V: proleg crotchets in broken meseries; body becoming brown with darker irregular subdorsal and lateral strips; setae V_1 , SV_1 , L_3 not in vertical alignment on 3rd to 5th abdominal segments; 6th abdominal proleg with 5–9 subprimary and secondary setae; seta L_1 on 8th abdominal segment longer and finer than on other segments (Fig. 42); seta CD_2 on anal proleg never ventrad of seta L_2 ; foreleg pretarsus with ventral apical setae expanded, one elongate, one truncate-ovate.

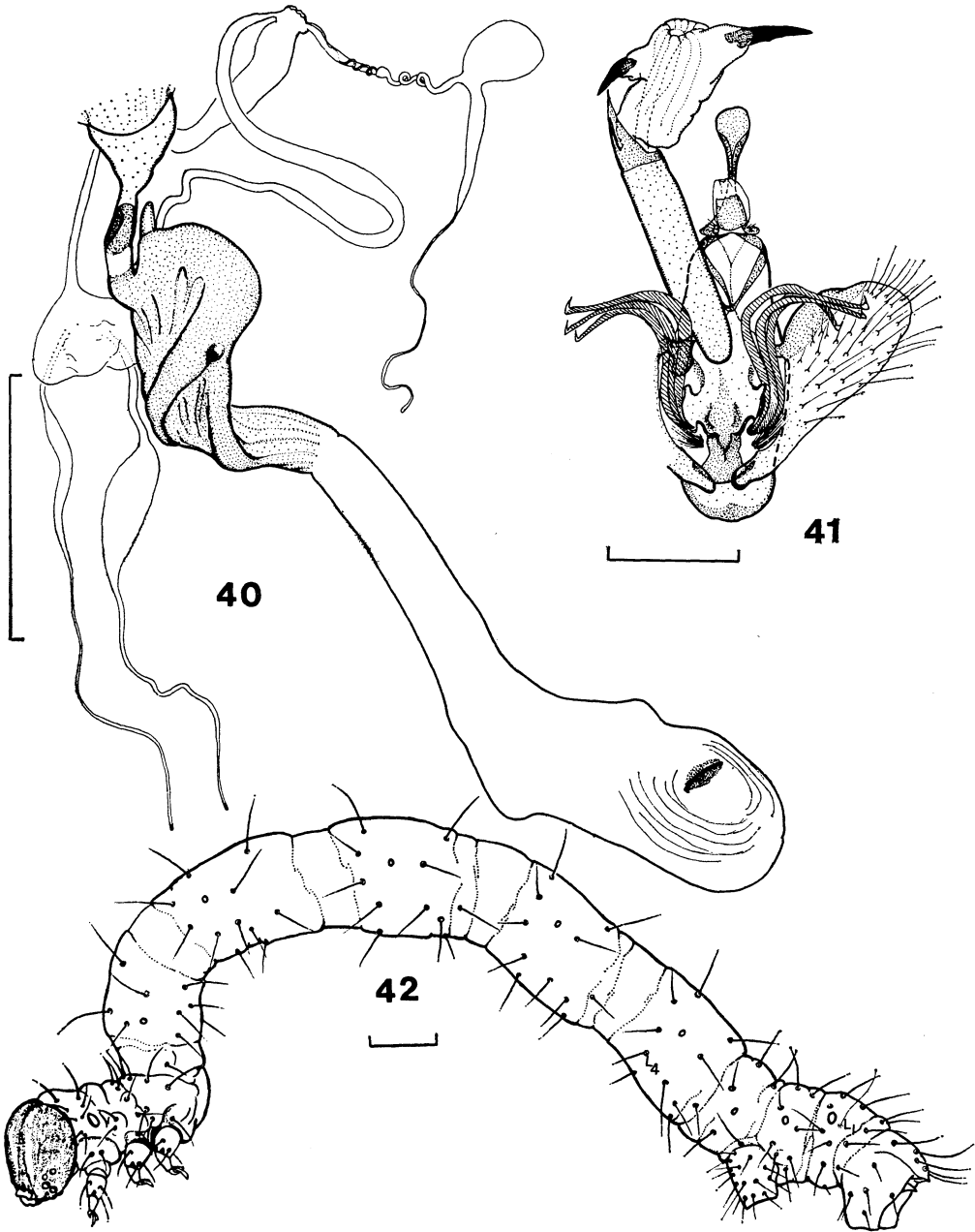


Fig. 40-42. *Gargaphia muriferata*. 40, ♀ genitalia, *neoselena* holotype; 41, ♂ genitalia, Nelson; 42, larva, side view, Auckland Is. Scales represent 1 mm.

Type Locality: "New Zealand."

Distribution: North, South; Stewart (South Cape); Chathams; Auckland Is. (Adults in December, Auckland Is; November, February, Big South Cape; February, Chathams).

Host Plants: *Phymatodes* (= *Polypodium*) spp (mainland, Auckland Is); ?*Dicksonia fibrosa* (Chatham Is).

AUCKLAND IS: *Holotype* ♀, *neoselena*, as given; paratype ♂ labelled "15" (DMu); 4 larvae ex *Polypodium*, Ranui Cove 12.I.1963, L. J. Dumbleton; 1 larva, Magnetic Cove, Adams I, 3.II.1966, G. Kuschel.

North I: Rotorua (larvae); Wellington (♂♂, ♀♀); *South I:* Dun Mtn, Nelson; Invercargill (♂♂, ♀♀); *Chatham Is:* 1 larva, ex *Dicksonia* and 2 ♂♂, 1 ♀, Awatotara Ck, Feb. 1967; *Stewart I:* 2 ♂♂, *Big South Cape I:* November; 1968, Feb. 1969.

Remarks: The Chatham I larva from *Dicksonia* need not have necessarily been feeding on that fern species. *G. muriferata* is the only N.Z. ennomine geometrid known from the subantarctic islands, despite the fact that *Azelina*, *Sestra*, *Declana* and *Selidosema* species inhabit mainland localities with a more hostile climate.

The ♀, ♂ and 5 larvae seen from the Auckland Is do not substantially differ from larvae or adults from Chatham Is or mainland localities, and I conclude that *G. muriferata* could well be a recent immigrant to Auckland Is.

Hudson (1907: 62) states of *G. muriferata*: "Four specimens of this large and striking insect were captured west of the large stream near Camp Cove, Carnley Harbour" in December. Only Meyrick's type ♀ is present in the Hudson collection, and is the only specimen Meyrick saw. One ♂, lacking a head, is in the Otago Museum, Dunedin, in the Benham collection. The other 2 specimens are neither in collections at WMu (R. G. Ordish, pers. comm.) or CMu nor are they mentioned in Hudson's collection Register.

LARENTIINAE

Adults of Larentiinae are recognised by their having vein M_2 of the hindwing tubular, i.e. fully developed. Larvae have seta SV_3 absent on first abdominal segment. (No Oenochromatinae (also with vein M_2 well developed) are known from the Subantarctic; on larval characters they differ from the other 2 subfamilies in that the 1st abdominal segment has setae SV_2 and SV_3 present).

Asaphodes Meyrick, 1886

Asaphodes Meyrick, 1886. *Trans. N.Z. Inst.* **18**: 184 (n. n. pro *Thyone* Meyrick, 1884: 61, non Oken, 1815: Echinodermata).

Xanthorrhoe (non Huebner 1825) Meyrick 1917: 258 (part).

Type-species: *Aspilates abrogata* Walker 1862, by original monotypy.

Antenna in ♂ bipectinate, pectinations on each segment basal and arising from a raised convex strip; ♀ antenna obscurely uni-pectinate. Forewing: areole single (vein R_1 arising from a common R_1 - R_4 stem) or double (R_1 arising on areole near apex); at least R_{2-4} on a common stem. Abdomen in ♂ with eversible lobes and scent tufts on 7th segment; in ♀ with 7th segment lacking a lodix.

♂ *genitalia*: Uncus slender, decurved; tegumen arms joined subbasally by a futura superior which may be weakly sclerotised mesally; labides lateral, elongate, erect to decurved, often acuminate; dorsal manica pad spinose or spinulose, ventral pad a sclerite; juxta acuminate, gutter-shaped, and basally with a reduced calcar which is non-capitate, broadest basally, never longer than thick, and often represented by 2 contiguous hairy mounds; valva with costa and sacculus apically free, sacculus smooth, apically with 1-2 spines or serrate, aedeagus apex triangular, decurved, acuminate; vesica short to scarcely developed with

apical arcs of long and short cornuti.

♀ *genitalia*: Ductus bursae as long as wide; vaginal lamellae fused and produced internally into a broad flat tube which extends to corpus bursae; corpus bursae reflexed, dorsad of ductus bursae; colliculum and signum absent. Ductus seminalis at ductus bursae—corpus bursae junction.

Of the 67 species of N.Z. Geometridae assigned by Meyrick (1917: 258–261) and Hudson (1928: 109–122; 1939: 410) to *Xanthorrhoe* auct., 32 are here assigned to *Asaphodes*. A further 15 species are discussed below under *Helastia* Guénée; 5 species are excluded altogether from either genus, and 8 species (see below) have not been examined.

Asaphodes (as *Thyone*) was erected by Meyrick in 1884 for the species *abrogata*; he later extended his concept to include all species with bipectinate ♂ antennae and the forewing areole undivided, thus sinking his genera *Homodotis* (originally as *Eurydice* Meyrick, 1884, type: *rufescens* Butler) and *Probolaea*, (originally as *Harpalyce* Meyrick, 1884, type: *megaspilata* Walker), and including 2 other species, *Probolaea parora* Meyrick and *A. stephanitis*. A study of the genitalia indicates that while *A. abrogata* and *A. stephanitis* are congeneric, *Homodotis* is a good genus, with *rufescens* and *megaspilata* as members; *Homodotis* is a derivative of *Helastia*. The species *parora*, however, lacks any affinity with any of these genera, and together with “*Xanthorrhoe*” *cedrinodes* Meyrick, “*X.*” *umbrosa* Philpott and “*X.*” *stricta* Philpott constitute a separate, as yet un-named genus with arboreal larvae restricted to *Coprosma* (Rubiaceae).

Within the other “*Xanthorrhoe*” species, “*X.*” *occulta* Philpott and “*X.*” *dissimilis* (Philpott) likewise show no affinity to the above-mentioned groupings. It is likely that their relationships lie with as yet unexamined parts of our fauna.

Species here placed in Asaphodes: *abrogata*; *adonis* Hudson, 1898, n. comb.; *aegrota* Butler, 1879, n. comb.; *albilineata* Philpott, 1915, n. comb.; *beata* Butler, 1879, n. comb.; *benedicta* Meyrick, 1914, n. comb.; *bryopsis* Meyrick, 1888, n. comb. (? = *cosmodora* Meyrick, 1888); *campbellensis*, n. comb.; *cataphracta* Meyrick, 1884, n. comb.; *chionogramma* Meyrick, 1884, n. comb.; *chlamydota* Meyrick, 1884, n. comb.; *cinnabaris* Howes, 1912, n. comb.; *clarata* Walker, 1862, n. comb.; *declarata* Prout, 1914, n. comb.; *dionysias* Meyrick, 1907, n. comb.; *exoriens* Prout, 1912, n. comb.; *helias* Meyrick, 1884, n. comb.; *imperfecta* Philpott, 1905, n. comb.; *limonodes* Meyrick, 1884, n. comb.; *mnesichola* Meyrick, 1888, n. comb.; *nephelias* Meyrick, 1884 (= *subflava* Howes 1917, syn. Hudson 1928), n. comb.; *obarata* Felder & Rogenhofer, 1875, n. comb.; *obscura* Philpott, 1921, n. comb.; *oraria* Philpott, 1903, n. comb.; *oxyptera*, n. comb.; *peripheraea* Meyrick, 1905, n. comb.; *prasinius* Meyrick, 1884, n. comb.; *prymnaea* Meyrick, 1911, n. comb.; *recta* Philpott, 1905, n. comb.; *sericodes* Meyrick, 1915, n. comb.; *stephanitis*; *stinaria* Guénée, 1868, n. comb.

Species not examined: *Xanthorrhoe citreana* Clarke, 1934; *X. clandestina* Philpott, 1921; *X. frivola* Meyrick, 1913; *X. glaciata* Hudson, 1925; *X. ida* Clarke, 1916; *X. nebulosa* Philpott, 1917; *Larentia subductata* Walker, 1862; *Philbalpteryx suppressaria* Walker 1862.

A. abrogata and the 33 species noted above are distinguished from other genera by their possession of a rudimentary calcar (often a pair of contiguous hairy knobs), of a smooth, unscobinate saccular appendage, a deflexed, strongly sclerotised, sharp aedeagus apex in the ♂, and in the ♀ by the ductus bursae being not longer than wide, and containing the internally prolonged and fused ostiolar lamellae. The corpus bursae is reflexed dorsad of the ductus bursae. As in *Helastia* species, the ductus seminalis arises on the corpus bursae by the corpus/ductus bursae junction.

Neither *Asaphodes*, *Helastia* or *Homodotis* resemble in ♂ or ♀ genitalia the type species of *Campptogramma* Stephens (*bilineata* L.) figured by Pierce 1914, pl 46, *Cidaria* Treitschke (*fulvata* Forster) (Pierce op. cit. pl 41), *Larentia* Treitschke (*clavaria* Haworth) Pierce, op. cit. pl 44, as *cervinata*) or *Xanthorrhoe* Huebner (*montanata* Borkhausen, Pierce, 1914, op. cit., plate 45). No Australian species or genera have been examined.

18 *Asaphodes* species are confined to the South I, 1 species to alpine Stewart I, 2 species to the subantarctic Is excluding Snares and Antipodes Is, and 12 species are common to North and South

Is. *Asaphodes* is absent from Chatham and Kermadec Is, contrasting with *Helastia* which has endemics on both. No *Asaphodes* species were collected by Dr J. C. Watt in October 1968 on Coppermine I (Hen and Chickens, 36°S), nor were any collected on Big South Cape (Long) I (47° 17'S) by Dr G. Kuschel and party in November 1968 or Mr J. McBurney and party in February 1969.

Asaphodes species on wing pattern and genitalia form 4 unequal species groups—the *aegrota* group with 15 named species, 12 restricted to the South I; the closely related *clarata* group with 4 *Chionochloa*—grassland inhabiting species, 3 restricted to the South I; the heterogeneous *abrogata/camelias* group with 11 species, 3 confined to the South I; and the vivid green *adonis* group, probably derived from *A. obarata* in the *camelias* group with 3 species, 1 confined to the South I. All species groups save the *adonis* group include species with reduced wings in the ♀, e.g. a population of *A. aegrota* in the Wairau (Marlborough) Valley; *A. bryopis* (*abrogata/camelias* group, alpine); *A. nephelias* (*aegrota* group, alpine) and *A. obscura* (*aegrota* group: intermontane/alpine).

No such trend is seen in *Helastia* species, and it is noteworthy that while the subantarctic *Asaphodes* species are brachypterous, the corresponding *Helastia* species is not. Salmon's opinion (1956: 62) that brachyptery may not be solely accounted for by climate and "that there must have been firstly in these moths a genetic tendency towards brachyptery" is a sound one in this instance.

The 2 subantarctic species are sister species and together form a sister group of *A. aegrota* and its lowland sisters; resemblances to the alpine *A. albilineata* (Stewart I), *A. sericodes* and *A. nephelias* are not borne out in genitalia, labial palpus structure, color pattern elements or larval structure.

KEY TO ADULT SUBANTARCTIC ASAPHODES SPP.

1. ♂ forewing about 3 × as long as wide; ♂, ♀ with a discal dot on upper side of wings; ♂ valva with costal process shorter than saccular process; ♀ with base of ductus bursae obliquely sclerotised (C).....**A. campbellensis**
 ♂ forewing about 2 × as long as wide; ♂, ♀ lacking a discal dot on upper side of wings; ♂ valva with costal process longer than saccular process; ♀ with ductus bursae evenly unsclerotised at base (A).....**A. oxyptera**

12. *Asaphodes campbellensis* (Dugdale) n. comb.

Dugdale, 1964. *Pacif. Ins. Monogr.* 7: 607–23 (*Xanthorrhoe*).

Additional characters: Wings pallid marginally, usually greyish or terra-cotta centrally, invariably a small black dot at apex of forewing discal cell, rarely a subterminal band; underside of both wings with discal dot; hindwing color pattern as in Fig. 45. Antennae, head, thorax and abdominal color pattern as in *A. oxyptera*, except that the black abdominal spots are absent. Wing span: 20–25 mm (both sexes), 1 specimen 30 mm; ♂ wing width: wing length 1:2.9; (♂ holotype lacking wings).

♂ *genitalia*: As figured by Dugdale 1964, fig. 15; additional characters: aedeagus, vesica, juxta and manica pads as in Fig. 43, 46; vesica with 7–8 cornuti, reclinate vesica arm unsclerotised apically; sacculus apex usually with 2 spines, rarely with 1.

♀ *genitalia*: As figured by Dugdale 1964, fig. 15.

Type locality and Distribution: Campbell I.

Host plant: Probably *Chionochloa*.

CAMPBELL I: (*Additional Material Examined*): 14 ♂♂, Lookout Bay, Kuschel; 1 ♂, Mt Lyall, 400 m, Kuschel; *Larva*: 1 larva, ? instar II or III, Tucker Cove, ex *Coprosma*, Gressitt.

Asaphodes oxyptera (Hudson) n. comb.

Hudson, 1909. Subantarctic Islands of N.Z. 1, 67, pl II, fig. 23, ♂ (*Xanthorrhoe*).

External characters: Color pattern and wing shape of ♂ as given by Hudson 1909, l.c.; ventral pattern

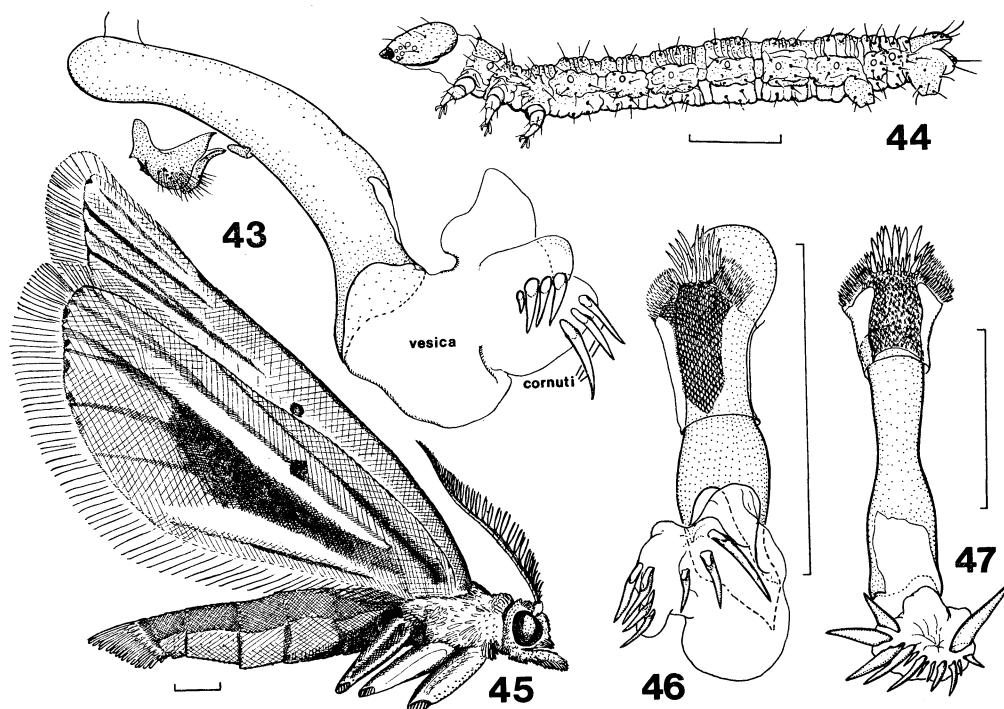


Fig. 43-47. *Asaphodes* species. 43, *Asaphodes campbellensis*, aedeagus in side view; 44, ditto, larva; 45, ditto, adult showing ventral wing pattern; 46, ditto, aedeagus and dorsal manica pads, dorsal view; 47, *Asaphodes oxyptera*, aedeagus and manica pads, dorsal view. Scales represent 1 mm; Fig. 43 same scale as Fig. 46.

similar to *A. campbellensis*, but lighter and discal dots absent; fore and hindwings concolorous, buff to greyish brown, with marginal scales, costal area and Cu stem vein paler; head, thorax and abdomen concolorous with wings, thorax with a central dark brown stripe, abdomen with a dorsal pair of black patches on each segment in ♂, with paired brown sclerotised zones in ♀. Antennae pallid-scaled, pectinations blackish brown. Labial palpi at least $2.5 \times$ as long as eye-width, porrect, tapering; eyes without a nude periorbital strip, finely faceted. Venation: forewing with areole divided.; ♂ wing span: 32-38 mm (♂♂); 36 mm (♀); ♂ wing width:wing length 1:2.1; ♀ wing width:wing length 1:4.5.

♂ *genitalia*: Valva as figured by Dugdale 1964, fig. 16; aedeagus, vesica and manica pads as shown in Fig. 47; sacculus apex usually with 1, rarely 2 apical spines; vesica with 11-12 cornuti and the reclinate arm obviously but faintly sclerotised apically.

♀ *genitalia*: Lamella postvaginalis unsclerotised apically; ductus bursae scarcely longer than wide, inner lamellar zone unsclerotised narrowly near ostiole; otherwise as in *A. campbellensis* (Dugdale 1964, fig. 19).

Type locality: Carnley Hrbr, Auckland I.

Distribution: Auckland Is: Adams I, Auckland I.

AUCKLAND IS: Holotype ♂; labelled "6", "Genitalia Preparation 121;" Hudson Register (subantarctic Is) entry: "6. North Arm, Carnley Harbour, 21.XI.07. Dorrien-Smith"; in Hudson Colln, WMu. 1 ♀, Port Ross, Auckland I, 1942, C. A. Fleming; 2 ♂♂ East Ridge, Magnetic Station Cove, Adams I, Johns; 1 ♂, ditto; 1 ♂, Auckland I, Bivouac-Mt Eden, 200-400 m, *Danthonia*, Gressitt.

Remarks: *A. oxyptera* and *A. campbellensis* differ in forewing proportions, *A. oxyptera* having broader wings (width:length ratio: 1:2.1) than *A. campbellensis* (ratio 1: 2/9). Both species share the long, porrect, tapering labial palpi, extensive manica pad, slender-shanked labides, short reclinate vesica arm which is never as long as the longest cornutus, and slender cornuti with southern populations of *A. aegrota*, a lowland, fully winged species which has narrow-winged populations, as at Onamalutu, Wairau Valley (Marlborough). All 3 species also have a narrowly brown-striped mesonotum, and 1 or 2 points on the sacculus apex. They differ from *A. imperfecta*, a Southland lowland species related to *A. aegrota*, in the labial palpus (short and ascending in *imperfecta*) and the sacculus which is bifurcate and flanged in *imperfecta*). The alpine species of the *aegrota* group, which have narrow wings (with brachypterous ♀♀ in *A. nephelias*, ♀♀ unknown in other species)—*A. nephelias*, *A. sericodes* and the Stewart I alpine *A. albilineata*—differ in their broadly brown mesonotum, short ascending palpi and in having a long reclinate vesica arm, and in having short, stout cornuti. Larvae probably of *A. albilineata*, collected from *Chionochloa pungens* on Table Hill, Stewart I in 1968, differ from those of *A. campbellensis* in having stouter, longer paraprot setae, and a slender acuminate, depressed anal shield apex.

Austrocidaria n. gen.

(from Latin: *auster*—south, *cidaria*—existing genus, gender feminine).

Type-species: *Cidaria similata* Walker, 1862.

Antenna in ♂ swollen but unpectinate, in ♀ simple. Labial palpus obliquely ascending, stout. Thorax with metanotal crests. Abdomen with 7T, 7S, and 8T, 8S reduced to narrow sclerites, and at rest partly enclosed by 6th abdominal sclerites; 7th abdominal segment with eversible lobes laterally bearing the spiracles and at least 2 groups of scent tufts.

Venation: Areole in forewing double, R₂-R₄ arising from a common stem beyond areole; M₁ arising basally or laterally from areole.

♂ *genitalia*: Uncus long, slender; tegumen arms narrow, parallel; futura superior as a bar or sclerotised fold joining tegmen arms; valva parallel-sided, sacculus weakly developed; costa strong, lacking a basal process, apically produced into a spine; labides erect, dorso-lateral; juxta plane, narrowly to broadly Y-shaped; manica pads unequal dorsal pad spinulose to spinose, ventral pad V-shaped, or rectangular, sclerotised. Vesica trifold, with at least 1 arm slender and not bearing cornuti, the other 2 either mound-like, or 1 mound-like, the second finger-like, and each bearing a patch of cornuti. End of the ductus ejaculatorius sclerotised.

♀ *genitalia*: Vaginal lamellae strongly sclerotised, deeply cleft, V or U-shaped; ductus bursae broad, usually folded transversely, sclerotised; colliculum lacking; ductus with a distinct lateral gutter, or with an unsclerotised diverticulum; corpus bursae ovoid with ductus seminalis arising apically or subapically on corpus.

Austrocidaria is erected for the following species, all placed by Meyrick (1917) and Hudson (1928, 1939) in *Hydriomena* sens. lat.

- Austrocidaria similata* (Walker, n. comb. (N. S, St, A, C, Aut., Ch), on *Coprosma* spp. (*Cidaria*)
 " *callichlora* Butler, 1879, n. comb. (N. S, St.), *Coprosma* spp. (*Cidaria*)
 " *haemophaea*, Meyrick, 1925, n. comb. (Ch); host unknown. (*Hydriomena*)
 " *prionota* Meyrick, 1884, n. comb. (S); on *Myrsine divaricata* (*Anachloris-Arsinoe*)
 " *lithurga* Meyrick, 1911, n. comb. (S); (N-Wellington, coastal cliffs) host unknown. (*Hydriomena*)

The last 2 species may prove synonymous, as may also "*Hydriomena* (or *Xanthorrhoe*)" *iolanthe* Hudson (1939: 407). The unicum of *H. canescens* Philpott, 1918 has not been examined.

With their trifold vesica, plane juxta, deep vaginal lamellae, and presence of a diverticulum on

the ductus bursae, *Austrocidaria* species are distinct from all other N.Z. species usually placed in *Hydriomena* auct. (non Huebner), and from *Dasyuris* Guénée (type species: *partheniata* Guénée). *Austrocidaria* shares the sclerotised or at least distinctly demarcated fultura superior, the lack of a colliculum, and the ductus seminalis arising on the corpus bursae with a group of 6 other N.Z. "Hydriomenas"—*Coremia deltoidata* Walker, 1862, *C. subrectaria* Guénée, 1857 (also in Australia), *Hydriomena exposita* Philpott, 1917, *Cidaria triphragma* Meyrick, 1884, *C. purpurifera* Fereday, 1884, and *C. rixata* Felder & Rogenhofer, 1875. *Austrocidaria* differs from this group in valval costal structure and juxta structure (valval costa tending complex, juxta bent out and over itself, like the calcar in *Helastia* Guénée (see below) in the deltoidata group) and ♀ genitalia (diverticulum absent, ductus bursae narrow, corpus bursae globose and vaginal lamellae not deeply cleft). *A. prionota* was originally placed in *Anachloris* Meyrick, 1886 (originally as *Arsinoe* Meyrick, 1884 (praeocc.) the type-species of which is *Anachloris subochraria* (Doubleday, 1843), common to Australia and N.Z.

Anachloris resembles *Austrocidaria* on valval structure, but lacks modified abdominal segments, fultura superior, trifold vesica, manica pads, Y-shaped juxta, cleft vaginal lamellae, wide sclerotised ductus bursae, and diverticulum. It is here restricted in the N.Z. fauna to *subochraria*.

Another "Hydriomena" species, originally described as *Cephalissa siria* Meyrick, 1884 and the type of its genus, has no manica pads, and the fultura superior is replaced by fused basal costal valval processes (as it is in *Fletcherana* Zimmerman, 1958), and no modified abdominal segments. No ♀♀ were available. With its scaled ♂ valva with a reduced costa, its basal costal processes and no manica pads, *Cephalissa* may well include two other N.Z. "Hydriomenas", *Hydriomena hemizona* Meyrick, 1897 and *Melanthia arida* Butler, 1879.

Possible Australian relatives (except for *Anachloris* and *Coremia subrectaria*) have not been examined and therefore it is possible that *Austrocidaria* could fall in synonymy with an Australian genus. My purpose in erecting this genus is to remove irrelevant Palaearctic names from the N.Z. biogeographic literature.

These names are: *Hydriomena* Huebner (type: *coerulata* Fabricius, Hulst, 1896), *Cidaria* Treitschke (type: *fulvata* Forster), and *Euphyia* Huebner (type either *picata* Huebner, or *unangulata* Haworth = *amniculata* Huebner). The ♂ and ♀ genitalia of the type species of these genera as figured by Pierce (1914) show none of the characters of *Austrocidaria* [cf. fig. 49, 51, 52, and Pierce 1914, pl 34 (*Euphyia*), pl 41 (*Cidaria*) and pl 43 (*Hydriomena*); also MacDunnough 1954, fig. 1–185 for Nearctic *Hydriomena*].

Fletcherana Zimmerman (type species: *insularis* Butler) differs from *Austrocidaria* in its possession of fused costal basal processes on the valva (also present in *Cephalissa*), and in the absence of a diverticulum on the ductus bursae (cf. Fig. 49 and Zimmerman 1958: fig. 141–145, 147).

14. *Austrocidaria similata* (Walker) n. comb.

Walker, 1862. List Lepidopt. Ins. Brit. Mus. 25: 1413 (*Cidaria*).

timarata Felder & Rogenhofer, 1875. Reise der österreichischen Fregatte Novara, pl. 132, fig. 19.

Color pattern: As in Fig. 50 (mainland), Fig. 48 (Antipodes I) (forewing only). Antipodes I adults with reddish, not green ground color; Auckland Is and Campbell I adults usually darker, sometimes blackish dark brown rather than green, but in all populations the median band towards the dorsum contrastingly colored. Wing span: Auckland Is: 32–35 mm; Antipodes I: 23–25 mm; Chatham Is: 30–36 mm; mainland: 25–36 mm (both sexes).

♂ *genitalia*: As described and figured by Dugdale (1964: 610, fig. 1–6); additional characters (Fig. 51, 52): aedeagus with dorsal sinuous sclerite, apex acuminate; vesica swollen, trifold, with 2 lateral slender arms (one with an elongate patch of cornuti, the other without cornuti) and a low, mound-like apical arm bearing a patch of longer cornuti. Dorsal manica pad densely spinulose, spinules stouter discally; ventral

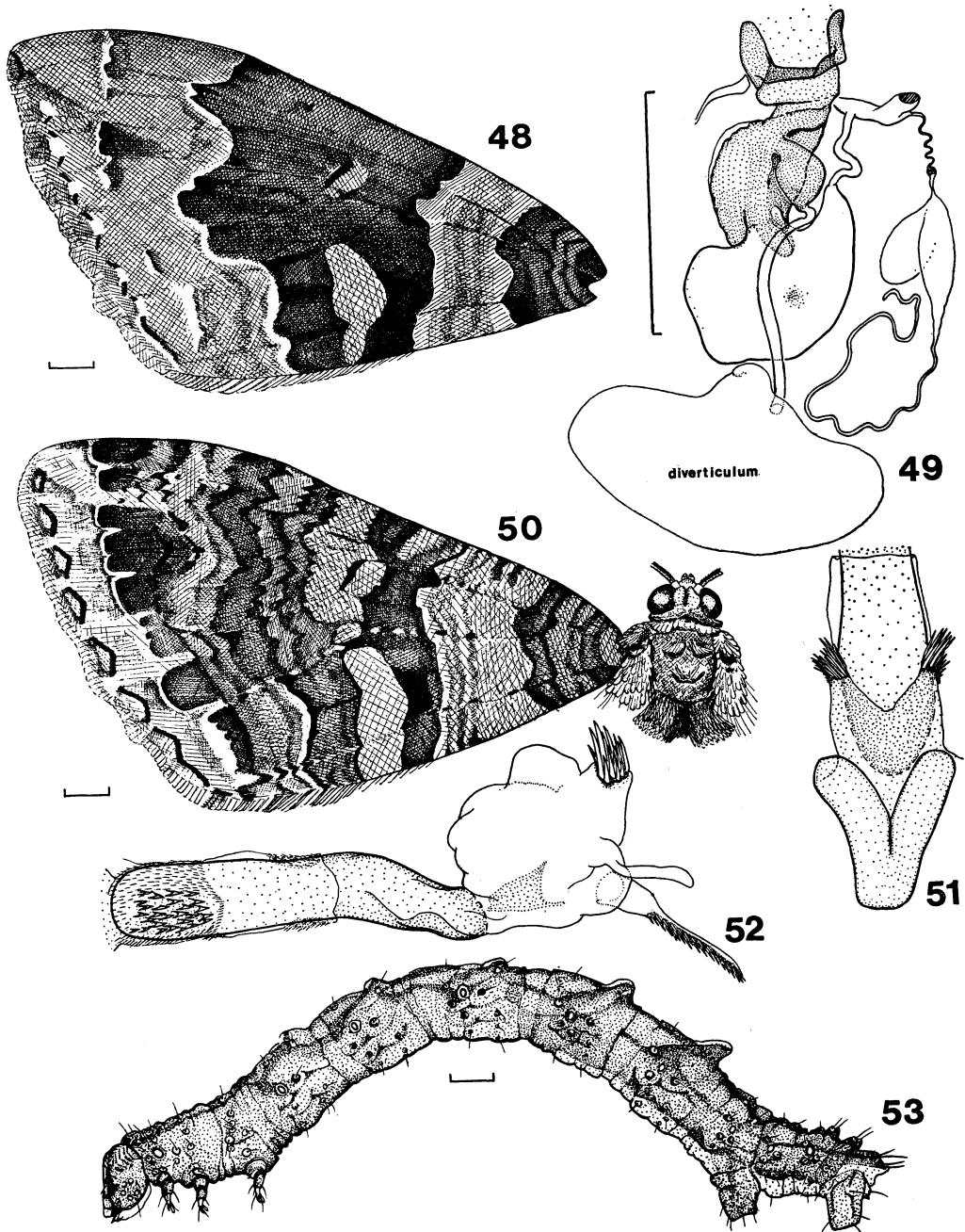


Fig. 48-53. *Austrocidaria similata*. 48, ♂ forewing pattern, Antipodes I; 49, ♀ genitalia, Auckland I; 50, ♂ forewing pattern, Invercargill, South I; 51, ♂, juxta and ventral manica pad, Auckland I; 52, ♂, aedeagus and dorsal manica pad, Auckland I; 53, larva, last instar, Auckland I. Scales represent 1 mm; Fig. 51, 52 same scale as Fig. 49.

pad V-shaped, lightly sclerotised, apices with tuft of short spines.

♀ *genitalia*: As described and figured by Dugdale (1964: 610, fig. 7, 8) except for interpretation of ductus seminalis; additional characters (Fig. 49): ductus bursae as figured; diverticulum basally flask-shaped and sclerotised, distally as narrow unsclerotised tube leading to a large globose or roughly cordate sac; ductus seminalis arising from apex of corpus bursae which is aligned at right angles to ductus bursae.

Larva: As described by Dugdale 1964: 610, 622, 623; see Fig. 53.

Type locality: "New Zealand."

Distribution: North, South, Stewart, Chatham, Auckland, Antipodes, Campbell Is.

Hostplants: *Coprosma* spp, throughout.

ANTIPODES I: 16 ♂♂, 3 ♀, Reef Point, Kuschel.

AUCKLAND IS: 1 ♀, Adams I at light, Wise; 1 ♂ Auckland I, Ranui Cove, light trap, Gressitt; 1 ♀ Adams I, Johns.

CAMPBELL I: 1 ♀, Beeman Camp, Kuschel.

Larvae: ANTIPODES I: 9 larvae, Reef Point, ex *Coprosma antipoda*, Kuschel.

North I: Specimens from Waipoua, Kauaeranga, Huiarau Range, Rotorua, Mamaku Forest, Kaimanawa North Forest Park, Pureora, Erua, Karioi, Tangowahine, Rukumoana, Mt. Egmont, Featherston, Mt Bruce, Ngaumu, Ashurst, Waitarere, Himatangi, Wellington.

South I: Nelson, Cobb Ridge, Pelorus Bridge, Opouri Valley, L. Rotorua, Tawhai, Birchfield, Reefton, Travers Valley, Franz Josef, Lewis Valley, Lower Clarence, Christchurch, Peel Forest, Tapanui, Conical Hills Forest, Brod's Bay (Te Anau), Ermedale Forest, Black Birch Gully, Blue Hills, Invercargill.

Stewart I: Ryans Ck; Rakeahua Valley. *Chatham Is*: 3 ♂♂, 1 ♀, Pitt I; 10 ♂♂, 3 ♀♀, 2 mile bush, Waitangi; 1 ♂, Waitangi; 1 ♂, Awatotara Ck. Chatham.

Remarks: *A. similata* shows external variation on Antipodes and Chatham Is. The Antipodes population is characteristically reddish in ground color and simpler in pattern, while the Chatham populations are characteristically green but with the wing pattern less definite than in other populations. One Auckland I ♀ is very dark (as is the Campbell I ♀) but other Auckland I specimens are no different from Invercargill specimens externally. Gressitt, Rennell & Wise (1964: 519, fig. 1b, 1c) figure Instar III (or younger) larvae from Campbell I.

Dr G. Kuschel (pers. comm.) observed on Antipodes I that shortly after sunset on misty, relatively calm nights the adults would walk about on top of the wind-sheared *Coprosma antipoda* bushes and that an hour or so later they would rise in groups to flutter 12–15 m above the ground. This habit could help to explain the wide distribution of *A. similata*.

Epiphryne Meyrick, 1884

(see Dugdale, 1964: 612 for synonymy; generic description).

One species has been recorded from the subantarctic.

15. **Epiphryne charidema** (Meyrick)

Meyrick, 1909. Subantarctic Islands of N.Z. **1**: 70, pl II, fig. 10 ♂, 11 ♀ (*Venusia*).—Dugdale 1964. *Pacif.*

Ins. Monogr. **7**: 613–16, fig. 9–14 (*Epiphryne*).

Additional characters: Antennae and frons white, contrasting with vertex and rest of head which is concolorous with wings and rest of body; these greyish brown (♂♂) to orange-brown (North I, NW South I ♂♂) or dull orange (♀♀). Wing pattern as in Meyrick 1909, l.c.

♂ *genitalia*: As figured in Dugdale 1964, fig. 3–13.

♀ *genitalia*: As figured in Dugdale 1964, fig. 14.

Larva (Fig. 54): As described in Dugdale 1964: 613.

Type locality: Auckland I.

Distribution: North I (south of 38°S); South I, Stewart, Big South Cape, Auckland, Campbell Is.

AUCKLAND IS: 39 ♂♂, 1 ♀, Ranui Cove, Dumbleton; 6 ♂♂, 2 ♀♀. Adams I, Kuschel; 2 ♀♀, No. 3 Station and Musgrave Pen., Cape Expdn; 1 ♀ Rose I; 1 ♂♂, 3 ♀♀, Auckland I, Adams I, Johns; 77 ♂♂, 22 ♀♀ Adams I, Auckland I, Enderby I, Ocean I, Wise, Gressitt, Bell. 12 larvae ex *Dracophyllum*, Adams I, Kuschel; 9 larvae, ex *Dracophyllum*, malaise trap, Gressitt, Wise.

CAMPBELL I: 5 larvae, ex *Dracophyllum*, Kuschel.

Stewart I: 2 ♂♂, 1 ♀, Table Hill, 305 m; 1 ♀ Port Pegasus, JSD. *Big South Cape I:* 2 ♂♂, 2 ♀♀, moor, 120 m. (ED).

Remarks: *E. charidema*, of which *E. autocharis* Meyrick may represent the North I population, is the most commonly collected geometrid in the Subantarctic. The host genus, *Dracophyllum* (subgenus *Oreothamnus*), is widely distributed in New Zealand south of 37°S, but *E. charidema* (with *E. autocharis*) is restricted to long-leaved species south of 39°S, and is upland and subalpine (in Burrow's sense) in North and South Is, descending to sea level with its host south of 47°S.

In the northern part of its range, *E. charidema* is less markedly sexually dimorphic in ground color. The mainland populations differ in 2 larval characters—head maculation and size of the pretarsal scale—from the Subantarctic Is populations, suggesting a period of isolation at present.

Gressitt, Rennell & Wise (1964: 519, fig. 1e) figure a last-instar larva from Campbell I.

Helastia Guénéé, 1868

Guénéé, 1868. *Ent. mon. Mag.* **5**: 94.

Epyaxa Meyrick, 1884. *Trans. N.Z. Inst.* **16**: 71 (type: *Cidaria rosearia* Doubleday, 1843).

Type-species: *Helastia eupitheciaria* Guénéé, 1868: 95.

Forewing with areole single or double; ♂ antennae bipectinate, pectinations basal on a segment, confluent basally (*eupitheciaria* group) or bases hidden by prolongation of preceding segment apex (*rosearia* type); ♀ antennae simple. ♂ abdominal segments 7 and 8 reduced, usually with scent tufts on eversible arms on 7th segment.

♂ *genitalia*: Calcar on juxta elongate, capitate, decurved; juxta apically emarginate or greatly produced, sclerotised, acuminate; aedeagus tubular, or bulbous with an acute apex; vesica without arms; dorsal manica pad never extensively spinose laterally. Fultura superior present, complete or incomplete. Valva with either costa or sacculus greatly developed; usually costa smooth, sacculus scobinate, or both smooth, but sacculus never with 1-2 apical thorns, nor bifurcate.

♀ *genitalia*: 7S very large, sometimes sclerotised and sculptured, forming a lodix; bursa copulatrix straight, corpus bursae not reflexed over the ductus bursae. Vaginal lamellae shallowly to deeply U or V shaped, free of or partially fused with colliculum, which is either short or elongate; ductus bursae longer than wide; ductus seminalis arising on corpus bursae; corpus bursae globose (rarely) or elongate ovate.

Helastia here includes the 20 species listed below; specimens approximating to the descriptions of *maoria* appear indistinguishable on genitalia from *cymozeucta*, as do similar specimens of *lophogramma* to *semifissata* and *homolocyma* and *subductata* to *rosearia*, but as none of these names are relevant to the subantarctic fauna the possible synonymies are not examined further here.

Species here included in *Helastia*: *eupitheciaria*; *bulbulata* Guénéé 1868, n. comb.; *chlorocapna* Meyrick, 1910, n. comb.; *cinerearia* Doubleday, 1843, n. comb.; *cymozeucta* Meyrick, 1913, n. comb. and *maoria* Hudson, 1939, n. comb.; *farinata* Warren, 1896, n. comb.; *lucidata* Walker, 1862, n. comb.; *officiosa* Meyrick, 1910, n. comb.; *orophylla* Meyrick, 1884, n. comb.; *orophylloides* Hudson, 1909, n. comb.; *plumbea* Philpott, 1915, n. comb.; *rosearia* Doubleday, 1843, n. comb. (and *homolocyma* Meyrick, 1902, n. comb., possibly *subductata* Walker, 1862); *semifissata* Walker, 1862, n. comb.

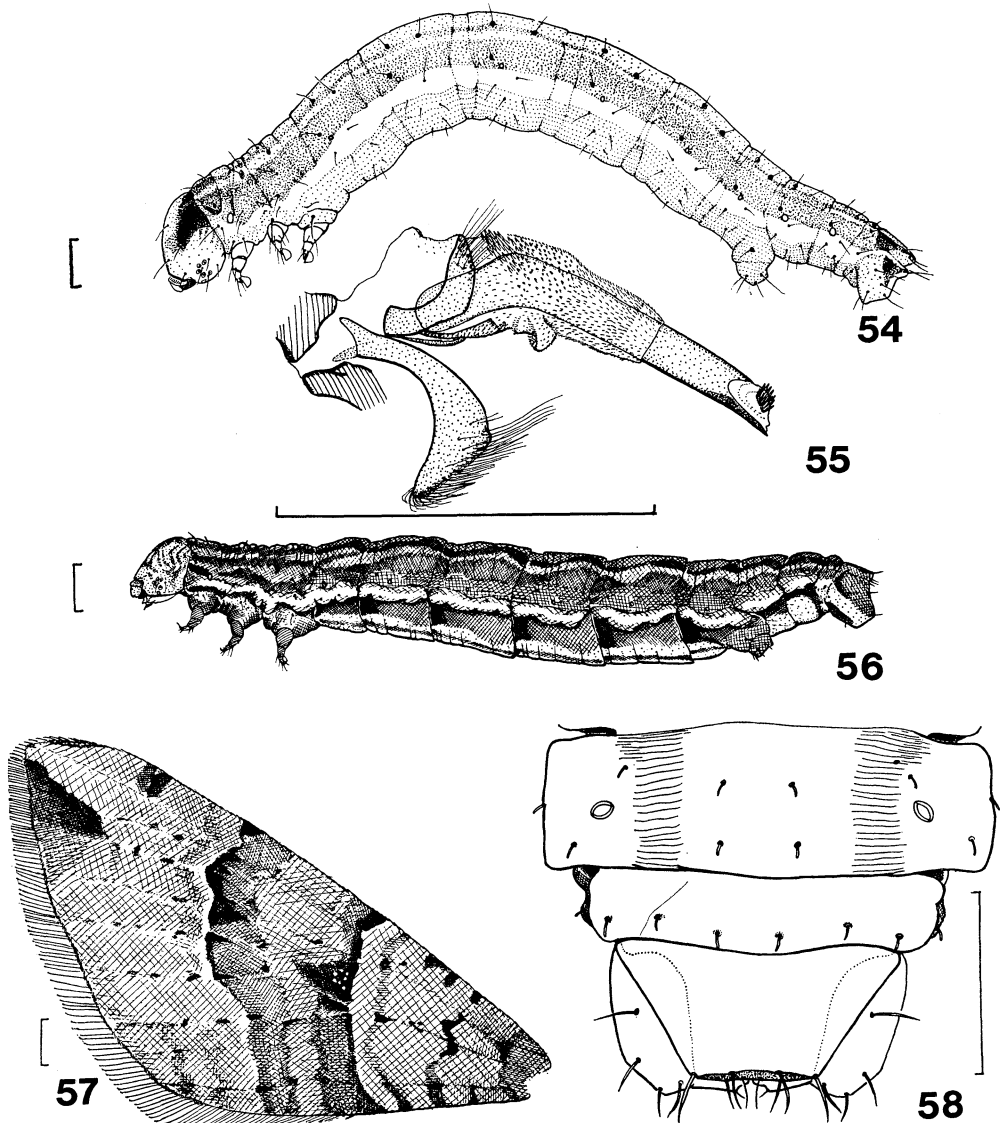


Fig. 54-58. *Epiphryne* and *Helastia*. 54, *Epiphryne charidema*, larva, Adams I; 55, *Helastia orophylloides* ♂; 56, ditto, larva, last instar, Campbell I; 57, ditto, ♂ forewing pattern, Auckland I; 58, ditto, larva, 8-10th abdominal segments, dorsal view, Auckland Is. Scales represent 1 mm.

(and specimens probably of *lophogramma* Meyrick, 1897); *semisignata* Walker, 1862, n. comb.; *subobscurata* Walker, 1862, n. comb.; *venipunctata* Walker, 1862, n. comb.

Helastia species differ from *Asaphodes* in their possession of a distinct, capitate calcar on the juxta, and by having the ductus bursae longer than wide and the corpus bursae not reflexed over the ductus bursae. In the ♂, the antennal pectinations do not arise from a raised convex transverse strip.

Helastia is not as homogeneous a unit as *Asaphodes*. The distribution of the species is in direct contrast to that of *Asaphodes*, *Helastia* having endemic species on Kermadec and Chatham Is, and with some species (e.g. *H. venipunctata*, *H. rosearia*, *H. semisignata*, *H. cinerearia* group) present coastally on North and South Is and on off-shore islands, e.g. Hen and Chickens (36°S) and Big South Cape I (46° 17'S) as well as on Chatham Is (44°S). Only 3 species (*H. orophylla*, *H. subobscurata*, *H. semifissata* as *lophogramma*) are alpine, 2 species are restricted to the South I (*H. orophylla*, *H. bulbulata*) and 1 is restricted to the subantarctic. No species show brachyptery, and those of which life histories are known are associated with mat plants, low herbs or mosses, and none appear restricted to forest localities.

Although on ♂ antennal characters there are two clear groups in *Helastia*, species such as *H. cymozeucta* have intermediate ♀ genitalia between the *eupitheciaria* type and the *semifissata* type, while *H. rosearia*, the type species of *Epyaxa*, is similarly intermediate in ♂ and ♀ genitalia. It is tempting to regard *Asaphodes* as being mostly cold tolerant and having suffered little species-loss over the Pleistocene, and *Helastia* as being mostly cold intolerant and suffering a correspondingly greater loss. All that can be safely said at present is that there is greater diversity of structure in *Helastia* than there is in *Asaphodes*.

16. *Helastia orophylloides* Hudson, 1909

Hudson, 1909. Subantarctic Islands of N.Z. 1: 68, pl II, fig. 12 (♂) (*Xanthorrhoe*).

subantarctica Salmon, 1956. *Rec. Dominion Mus.* 3(1): 80, fig. 31, 32 (*Xanthorrhoe*) (syn. Dugdale 1964: 618).

Additional characters: Antennal pectinations in ♂ concealed basally; color pattern as in Fig. 57, ground color not as blue as in Hudson (1909, l.c.); usually fawn or brownish grey. Forewing in ♀ slightly cate. Wing span: 26–28 mm (♂♂), ♀: 28 mm.

♂ *genitalia*: Manica pad, aedeagus and reduced vesica as in Fig. 55; other structures as in Dugdale 1964, fig. 17, 18. 7th abdominal segment with eversible lobes and scent tufts.

♀ *genitalia*: As figured in Dugdale 1964, fig. 20.

Larva: Length of fullgrown larva 16 mm; color pattern and shape as in Fig. 56; body dorsoventrally flattened, laterally flanged. Integument regularly and closely scobinate, scobinations round, convex, and of 2 sizes—large scobinations set amongst a regular cobblestone effect of smaller ones. All setae stout, blunt; abdominal setae reclinate, and not longer than twice height of a spiracle. Anal shield truncate triangular, apex strongly deflexed, with only setae SD₁ and D₁ dorsal and visible from above, and in line transversely; setae L₁ and D₂ upcurved, on deflexed shield (Fig. 58).

Type locality: Auckland I.

Distribution: Auckland Is, Campbell I, Snares I.

Hostplants: Mat plants and low herbs.

AUCKLAND IS: Holotype *orophylloides* ♂ labelled "14", "Genitalia Preparation 124", entry in Hudson Register (Subantarctic Is) "Carnley Harbour 21.XI.07 Dorrien-Smith," in Hudson Colln, WMu. 1 ♂, Cloudy Peak, Johns. CAMPBELL I: holotype *subantarctica*; 1 ♂ Mt Azimuth, tussock, Johns. 8 larvae, St Col Pk, 300 m, and 1 larva, St Col Ridge, 200 m, matplants-moss samples 69/15. 69/14. 21.I.1969, Kuschel and Taylor; 7 larvae, Puiseaux Pk, 390 m, matplants and moss samples 69/16. 69/17, Kuschel and Taylor; 12 larvae (last instar, 1 prepupal) Mt Lyall, 350 m, matplants-moss sample 69/11, Kuschel; 1 larva, Mt Honey, 360 m, matplants sample 69/12, Kuschel and Taylor; 1 larva Lookout Bay, litter sample 69/8, 16.I.1968, Kuschel.

SNARES I: 1 ♂, "Snares, 15.IX.07," in the Hudson Colln, WMu. (Unsubstantiated).

Remarks: *H. orophylloides* and *H. semifissata* share a non-spinulose, rough-scobinate stout valval costa and a sacculus that is as long as the costa, and stoutly spinulose dorsal manica pad in the ♂; *H. orophylla* has a spinulose slender valval costa, a reduced sacculus and a finely spinulose manica.

The ♀ *H. orophylloides* has a shorter ductus bursae and colliculum than have *H. orophylla* and *H. semifissata* and its vaginal lamellae are also reduced in comparison (*H. semifissata* is intermediate in vaginal lamellae size). From both mainland species, the *H. orophylloides* ♀ may be distinguished by its lack of a signum; this is a stellate spine cluster at the ductus bursa corpus bursae junction in *H. orophylla* and *H. semifissata*.

H. orophylloides is a sister group of the *H. orophylla*—*H. semifissata* group; it shares more characters with *H. semifissata* and is therefore considered to be not of alpine origin.

Microdes Guénée, 1857

Guénée, 1857. Histoire naturelle des Insectes: Species general des Lepidoptères (Paris: Roret). **10**: 297.

Type-species: *Microdes villosata* Guénée, 1857. op. cit., p. 297. (Australian).

♂ antenna incrassate or slender, unpectinate. Forewings with vein R_1 fusing with Sc before the areole; areole single, M_1 arising from crossvein r-m.

♂ *genitalia*: 8th abdominal segment as in *Pasiphila*, lyra present; uncus absent; valval costa with a dorsal hook-like arm and an inner basal process, often complex; sacculus sclerotised, long; juxta not hour-glass shaped; only the dorsal manica pad developed; aedeagus tubular.

♀ *genitalia*: Lodix present. Limen deep cup-shaped; colliculum irregular, ductus bursae many times longer than wide, sometimes irregular; corpus bursae globose or pear-shaped, lacking a signum; ductus seminalis arising at apex of ductus bursae, or at corpus bursae/ductus bursae junction.

The possible relationships of *Microdes* are briefly mentioned under *Pasiphila*, below. The 2 N.Z. species are very distinct: *M. quadristrigata* is a sister species of the Australian *M. villosata* (having a slightly reduced lyra, lacking an outer thorn on the complex basal valval process, and with a slightly different arrangement of folds and scales in the hindwing “crater”) while *M. epicryptis* has no hindwing “crater”, nor any forewing deformation, and superficially, with its long palpi, slender wings and buff coloration, resembles a pyraloid. *M. epicryptis* is now recorded from Antipodes I; it is also common in lowland North, South and Stewart Is and on the Chatham Is amongst Juncaceae.

17. Microdes epicryptis Meyrick

Meyrick, 1897. *Trans. Ent. Soc. Lond.*: 384 (*Microdes*).

External characters: Labial palpi porrect, over $4 \times$ as long as eye-width; thorax uncrested. Body and wings buff, darker shaded along forewing costa, and with small black spots arranged in curved lines (Fig. 63); forewings with the termen angulated in both sexes, hindwing with termen angulated in ♂. 8th abdominal segment enclosing genitalia in ♂, lyra as in Philpott 1927: 93, fig. 7. Wing span: 20–23 mm (both sexes).

♂ *genitalia* (Fig. 60, 62): Valva as figured; sacculus smooth, strongly developed, costa with long hook-like dorsal process and stout, smooth, ovoid inner process. Dorsal manica pad broad, juxta strap-like; vesica with 1 cornutus.

♀ *genitalia* (Fig. 61): Lodix emarginate. Ductus bursae $3 \times$ length of vaginal lamellae, colliculum wider than long; apical part of ductus bursae expanded, contorted, and with internal spines in a small patch; corpus bursae globose.

Larva: Head capsule posteriorly covered by prothoracic shield. Color pattern, as in Fig. 59, of longitudinal stripes. Integument scobinate, scobinations plate-like, irregular, rugose. Chaetotaxy as in Fig. 59; anal shield with seta D_1 , at $1/2$ shield length, shield as long as 8th and 9th abdominal segments, apically truncate. Paraprocts extending beyond shield, forming 2 conspicuous “tails”.

Type locality: Wellington.

Distribution: North, South, Stewart, Chatham, Antipodes Is.

Hostplants: Juncaceae (Hudson 1939: 402).

ANTIPODES I: 1 ♂ Reef Point, Kuschel; 1 ♂ ditto, Johns. 5 larvae, Reef Point, Kuschel.

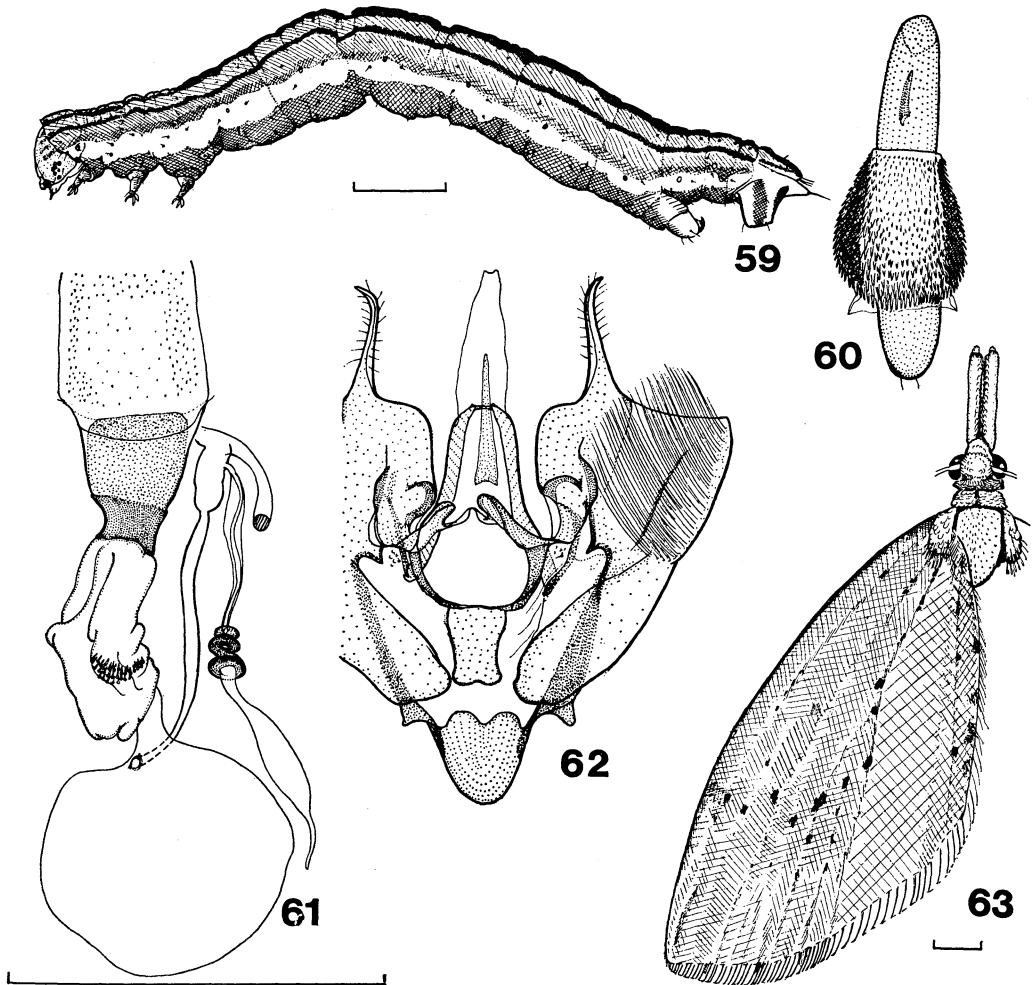


Fig. 59–63. *Microdes epicryptis*. 59, larva, side view, colour pattern and chaetotaxy, Antipodes I; 60, ♂, aedeagus, dorsal view, Antipodes I; 61, ♀ genitalia, ventral view, Antipodes I; 62, ♂ genitalia, ventral view, Rotorua; 63, ♂, head and forewing pattern, Chatham I. Scales represent 1 mm; Fig. 60, 62 same scale as Fig. 61.

North I: ♂, Woodhill, Auckland; ♀ Rotorua; *South I*: ♂ Nelson; *Stewart I*: ♂, Oban; *Chatham I*: ♂, Waitangi, ♀ Awatotara Valley.

Remarks: The ♀ collected by Mr E. G. Turbott was recorded by Salmon (1956: 64) as *Scoparia elaphra*. In its habit of tucking the wings under the body, and in its long palpi and longitudinal color pattern, *M. epicryptis* does resemble some N.Z. pyralids.

The larvae collected by Dr Kuschel do not show the oblique markings noted by Lindsay (in Hudson 1939: 402), but none of the larvae may have been full-grown. The larva of *M. epicryptis* can be distinguished from *Pasiphila* larvae by its greatly produced paraprocts.

Pasiphila Meyrick

Meyrick, 1884. *Trans. & Proc. N.Z. Inst.* **16**: 66.

Type-species: ?*Eupithecia bilineolata* Walker, 1862: 1246.

♂ antenna unpectinate, or each segment with 2 equal pairs of pectinations. Forewing with R_3 fused with Sc from the areole; areole single, diamond-shaped; Sc + R_1 , R_2 , sometimes R_3 more or less thickened apically; forewings held flat in repose, never longitudinally folded; costa unmodified. ♂ octavals (sclerotisations of 8S) or lyra (Philpott 1927b: 91–92) scythe-shaped, apices obsolete or strong and acute.

♂ *genitalia*: Uncus unsclerotised, elongate triangular or short, always shorter than anal tube or the short-setulose stripe-like gnathos. Anal tube sparsely long-setulose laterally. Transtilla (fultura superior + basal costal process) basically H-shaped, comprising the labides (dorsal) and the ventral arms; labides erect, arising dorsad of aedeagus, setose outwardly, nude inwardly, parallel or divergent; ventral arms curving round aedeagal complex, each ending in a setose mound. Transtillar fusion with valval costa broad; with inner margin of valva knob-like. Juxta hourglass-shaped, the “waist” flanked by the apices of the transtillar ventral arms, dorsal part of juxta oblong, to cup-shaped, ventral portion always longer and wider, triangular to rounded. Vinculum flat mesally, angulated laterally; saccus weak. Aedeagus complex consisting of dorsal and ventral manica pads variously spined or setose, surrounding the aedeagus; this cylindrical, widest basally; vesica tri-lobed, one arm directed anteriorly; a basal and/or apical sclerite present, and at least one arm bearing a cornutus; ductus ejaculatorius sometimes sclerotised apically. Valva lacking costal and saccular ornamentation, base of valvula produced ventrally as a low triangular setulose mound.

♀ *genitalia*: Lamella ante- and postvaginalis sclerotised, subtriangular, orifice transverse, slit-like. Colliculum present, ductus seminalis arising on corpus-ductus bursae junction, lacking a bulla, ending on vagina ventrally beside the spermathecal duct; ductus bursae always shorter than corpus, usually not longer than lamellae; corpus bursae globose, or pear-shaped, sometimes with an apical caecum; corpus bursae with a dorsal concave spinose signum, and 1–2 ventro-lateral or dorso-lateral thorn patches.

Pasiphila includes those species in the New Zealand fauna previously placed in *Chloroclystis* auct. They are here excluded from *Chloroclystis* Huebner (type species: *rectangulata* Linnaeus) because the anellus structures lack a strong caudal projection present in *C. rectangulata*, the vesica is large (weak in *C. rectangulata*) the aedeagus is not conical, and in the ♀, the ductus seminalis arises beyond the colliculum (between the colliculum and ostium in *C. rectangulata*) and ends at a common spermatheca-ductus papilla (these systems entering separately in *C. rectangulata*) on the vagina. Both *Chloroclystis* and *Pasiphila* have the areole single, and Sc + R_1 are fused from the areole. I am greatly indebted to Mr D. S. Fletcher (BMNH) who compared my material of *bilineolata* with the type, and who generously provided material of *C. rectangulata*.

In *Eupithecia* Curtis (type species: *linariata* Fabricius), Sc and R_1 are separate and the ♀ has a well-developed appendix bursae in nearly all Nearctic (MacDunnough 1949) and European (Pierce 1914) species. *Eupithecia* species also have a long papilla at the apex of the ventral transtillar arms (these ending as a low setose mound in *Pasiphila* and *Chloroclystis*).

Gymnoscelis Mabilie (type species *pumilata* Huebner) differs from *Pasiphila* in possessing an appendix bursae, and greatly modified valval and juxtal structures and in lacking median spurs on the hind tibia.

Within the New Zealand fauna, the monotypic *Elvia* Walker is closely related but lacks a stem vein between the areole and M_1 , lacks a basal valvular prominence, has lateral, not dorsal labides, a cumuloid not trifold vesica, a signum reduced to scattered spines, wings that are folded longitudinally, and ♂ antennae with unequal pectinations on each segment.

The Australian genus *Phrissogonus* Butler (type species: *laticostatus* Walker) is represented in New Zealand by 2 doubtfully congeneric species, which differ from *Pasiphila* in having either a bifid

corpus bursae, dimorphic coremata, a knobbed lyra, long papillae on the ventral anellar arms and no labides (*testulatus*) or a distinct appendix bursae, toothed lamellae, ductus seminalis on a long projection from upper corpus bursae, and greatly modified and distorted lyra, valva and coremata bases (*laticostatus*). In both species, the ♂♂ have gross costal or radial vein modifications.

Microdes Guénée, another primarily Australian genus, is represented by 2 species in New Zealand (*quadririgata* Walker, *epicryptis* Meyrick) but differs from *Pasiphila* in having vein Sc fused with R₁ before the areole, in lacking an uncus, in having the valval costa separate and produced into a long hook, the ductus bursae elongate (irregularly swollen and thickened in *M. epicryptis*) and the colliculum weakly developed.

Pasiphila and *Elvia* are N.Z. representatives of the Eupitheciini, a tribe extensively developed in the Holarctic and extending to Hawaii where the relationships lie with Holarctic rather than Pacific stocks (Zimmerman 1958: 150). The New Zealand Eupitheciini are remote from any Hawaiian stock.

Pasiphila is restricted to North, South, Stewart and the Subantarctic Is. It is doubtfully present indigenously on Chatham I, and absent from the Kermadecs, where it is replaced by *Phrissogonus*. *Pasiphila* species inhabit lowland, upland, subalpine and alpine environments, and as with Nearctic *Eupithecia* (MacDunnough 1949, MacGuffin 1958) the larvae are usually associated with the flowers and fruit of their host plants. Some *Hebe*-restricted *Pasiphila* species have bud-boring larvae, and *P. nereis* larvae live entirely within the inflorescence of the host composites.

In the subantarctic, except for *P. nereis*, all species are more closely related to non-alpine species than to alpine species. *P. nereis* tolerates subalpine and upland environments, descending with its hosts to low levels in southern South and Stewart Is. The resident status of *P. fumipalpata* is uncertain, as it has only once been recorded from the subantarctic.

KEY TO SUBANTARCTIC PASIPHILA SPECIES

1. ♂ antenna pectinate, ♀ antenna with setulae as long as segment is wide, ♂ vesica with a basal spinose patch.....2
 - ♂ antenna evenly thickened, unpectinate; ♀ antennal setula shorter than segment width, ♂ vesica lacking a basal spinose patch.....3
2. Pale moths with contrasting black palpi, forewing costa and forelegs; ♂ vesica with one apical cornutus; labides with erect apices; ♀ signum with one ventrolateral and two dorsal elements (N, S, A).....**P. fumipalpata**
 - Dark grey moths, forewing, palpi and forelegs not contrasting; ♂ vesica with an apical comb of 4-5 cornuti, labides with inflexed apices; ♀ signum with one strong element only, a basal dorsal spinose plate (A).....**P. nebulosa** n. sp.
3. Body integument black; head and thorax clothed in grey and white scales (N, S, St,A).....**P. nereis**
 - Integument pallid; head and thorax scales never just grey and white.....4
4. ♂ lyra reduced, coremata exposed; dorsal manica pad elongate V shaped, ventral pad with the two big spines widely separated basally and their apices simple; ♀ signum with dorsal element only, this prong-like (C).....**P. impudicis**
 - ♂ lyra normal, coremata hidden to at least half length; dorsal manica pad short V-shaped, ventral pad with the two big spines contiguous basally and their apices knobbed; ♀ signum with a serrate dorsal element and two ventral spine bands (A, C).....**P. inductata**

Pasiphila fumipalpata (Felder & Rogenhofer)

Felder & Rogenhofer, 1875. Reise der Österreichischen Fregatte Novara, 2: pl. cxxxi, fig. 33 ♂ (*Eupithecia*).

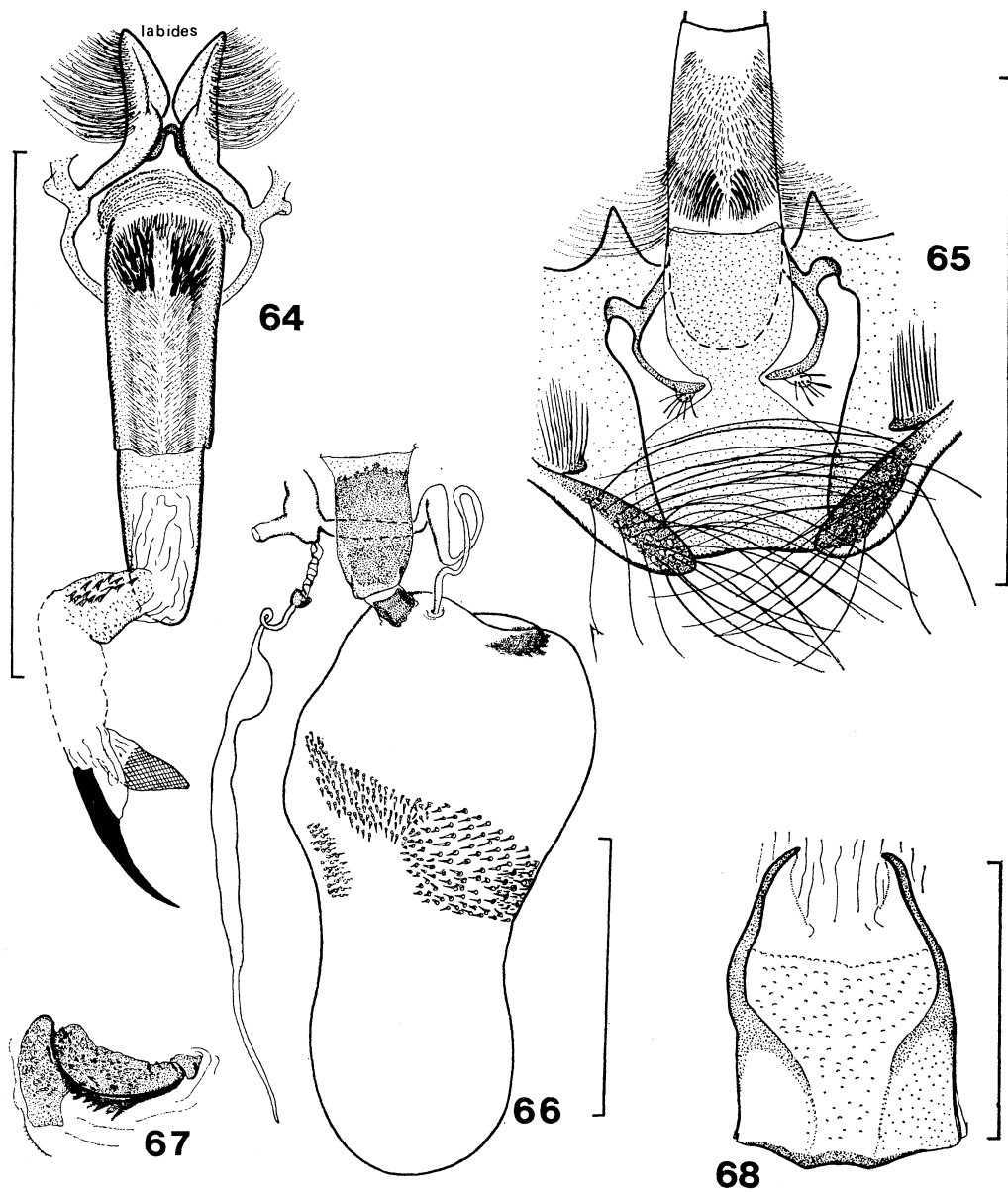


Fig. 64-68. *Pasiphila fumipalpata*. 64, ♂ aedeagus, labides, dorsal manica pad, Mt Cook, South I; 65, ♂ basal valval and anellar structures, ventral manica pad; 66, ♀ genitalia, ventral view, Mt Cook, South I; 67, ♀ signum, magnified, Mt Cook; 68, ♂ lyra (8th sternite), Enderby I. Scales represent 1 mm.

maculata Hudson, 1898. New Zealand Moths & Butterflies, 44, pl vi: fig. 18 ♀ (*Chloroclystis*); syn. Hudson 1928: 96.

External characters: ♂ antenna bipectinate to 3/5 antennal length. Labial palpi, clypeal area, apex of fore coxae, inner face of fore femur, tibia and tarsus black-scaled; postorbital scales arranged in alternating bands of black and white. Forewing pattern as in Hudson (1928: pl xi, fig. 28). Wing span: 20–22 mm.

♂ *genitalia* (Fig. 64–65, 68): Valva, uncus, subscaphium as in *P. nebulosa* (Fig. 83). Lyra (Fig. 68) with convergent sinuous apices. Vesica of aedeagus with a basal patch of spinules, a subapical paddle-shaped cornutus, and apical spine-like cornutus. Dorsal manica pad (Fig. 64) longer than ventral pad (Fig. 65). Labides erect, apices divergent. Sacculus darkened basally.

♀ *genitalia* (Fig. 66, 67): Vaginal lamellae longer than broad; colliculum shorter than broad; ductus bursae scarcely longer than colliculum, and expanded and merged with the corpus bursae into a pear-shaped sac beyond colliculum; ductus seminalis swollen towards vagina; corpus bursae with a basal dorsal sclerotised thorny signum (Fig. 69) and an extensive transverse spine band ventrally at 1/2 corpus length, and a left-lateral smaller spine-field dorsad of this.

Type Locality: New Zealand.

Distribution: North I, south of 38°S; South I, Auckland Is.

AUCKLAND IS: 1 ♂, Enderby I, 28.XI.1943, no collector (WMu).

North I: ♂♂, ♀♀ Kaimanawa North Forest Park; *South I*: ♂♂, ♀♀, Nelson; Hooker Valley; Queenstown. (ED).

Remarks: *P. fumipalpata* was placed by Hudson (1928: 96) in his "Section C" in N.Z. *Chloroclystis*, characterised by the ♂ antenna being shortly and evenly ciliated. Neither *P. fumipalpata* nor *P. malachita* Meyrick (cf. Hudson 1928: 95) agree with this description, and should be regarded as part of Hudson's "Section B." The resident status of *P. fumipalpata* is uncertain on the Auckland Is. If the present specimen is a stray, then it is an indication that the subantarctic Islands still receive mainland species.

18. *Pasiphila impudicis* (Dugdale) n. comb.

Dugdale, 1964. *Pacif. Ins. Monogr.* 7: 620, fig. 22, 23, 27, 30. (*Chloroclystis*).

Additional characters: Wing span: 15–17 mm.

♂ *genitalia*: Vesica of aedeagus and manica pads as in Fig. 69, 70.

Larva: Color pattern as in Fig. 75, dorsal stripe single, spiracular stripe pallid, weakly interrupted; chaetotaxy as in *P. inductata*; integument scobinations not forming imbricating patterns, and more regular in size (Fig. 71); anal shield (Fig. 75) not apically deflexed.

Type Locality: Beeman Camp, Campbell I.

Distribution: Campbell I.

Hostplant: *Hebe elliptica*.

Remarks: The following additional material was seen:

Larvae: 1 ultimate instar, Beeman Camp, Campbell I. 13.I.1969, G. Kuschel; 1 ultimate instar, 1 instar IV, one instar II, ex *Hebe elliptica*, Beeman Camp, Kuschel (ED). *Adults*: 1 ♀, Beeman Camp, Kuschel (ED).

19. *Pasiphila inductata* (Walker)

Walker, 1862. List Lepidopt. Ins. Brit. Mus. 25: 1322 (*Coremia*).

subitata Walker, 1862. op. cit., 25: 1362 (*Scotosia*) (syn. Meyrick 1917: 253).

semialbata Walker, 1863. op. cit., 26: 1708 (*Eupithecia*) **New Synonymy.**

indicataria Walker, 1862. op. cit., 26: 1708 (*Eupithecia*) (syn. Meyrick 1917: 253, for *semialbata* Walker).

semilineata Felder & Rogenhofer, 1875. Reise der Österreichischen Fregatte Novara, 2: pl cxxx, fig. 36 ♀ (*Cidaria*) (syn. Meyrick 1917: 253).

("sp. near *suffusa* Hudson" Dugdale 1964. *Pacif. Ins. Monogr.* 7: 618, fig. 21, 24–26, 28, 29 (*Chlorochystis*)).

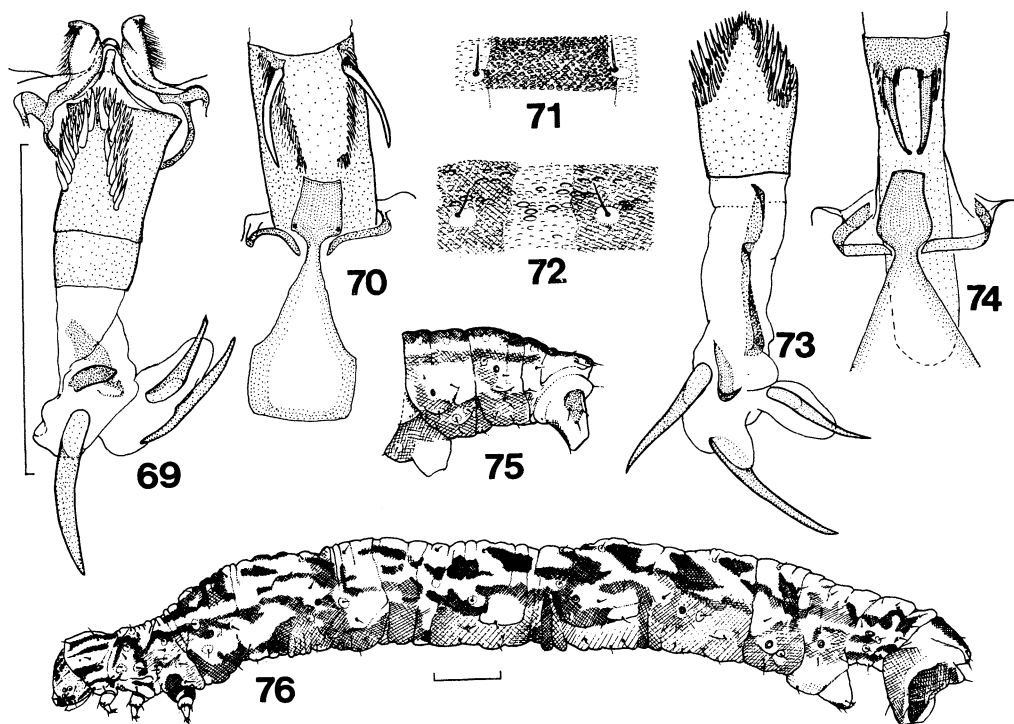


Fig. 69-76. *Pasiphila impudicis*, *P. inductata*. 69, ♂ *P. impudicis*, labides, dorsal manica pad, aedeagus; 70, ♂ ditto, juxta and ventral manica pad; 71, larva, *P. impudicis*, dorsum of 1st abdominal segment, magnified; 72, larva, *P. inductata*, ditto; 73, ♂, *P. inductata* aedeagus and dorsal manica pad; 74, ♂ ditto, ventral manica pad and juxta; 75, *P. impudicis*, larva, abdominal segments 7-10, color pattern and chaetotaxy; 76, *P. inductata* larva, color pattern and chaetotaxy. Scales represent 1 mm; Fig. 73, 74 same scale as Fig. 69, 70; Fig. 75 same scale as Fig. 76.

Holotype *inductata*, ♂, labelled "New Zeal.", Geometridae genitalia slide No. 5466, in good condition, in BMNH.

subitata: ♀, labelled "New Zeal.", Geometridae genitalia slide No. 5467, left hindwing missing, in BMNH.

semialbata, ♂, labelled "Auckland, N. Zeal." Geometridae genitalia slide No. 5376; abdomen glued, probably not of this species, in BMNH.

indicataria ♂, labelled "New Zeal." lacking abdomen, in BMNH.

semilineata ♀, labelled "Nova Zeelandia," lacking abdomen, in BMNH.

External characters: Labial palpi 2.10-2.50 (Campbell I), 1.60-2.90 (Auckland Is) 1.40-2.80 (North and South Is) times as long as width of an eye; ♂ antenna setulose ventrally, dorsally clad in appressed, longitudinally aligned strap scales; antennal setulae 1/3-2/3 as long as segment is thick, Campbell and Auckland Is populations consistently with longer setulae, mainland populations with shorter or longer setulae. Color pattern as illustrated by Hudson (1909, pl 11, fig. 20-22) for Auckland I population, by Dugdale (1964: fig. 29 ♀) for Campbell I, and Hudson (1928: pl xi, fig. 5 ♂, 6 ♀ ♂) for part of mainland population; some specimens with transverse bands lacking outer irregularities and appearing straighter (*inductata*-type); ground color usually greenish but grey, pale brownish or buff in *inductata*-type specimens; often a dark suffusion between inner and outer median bands, or entire discal area white. Wing span: 17-24 mm (Campbell

I) 18–24 mm Auckland Is).

♂ *genitalia*: As figured by Dugdale (1964: fig. 28). Additional characters (Fig. 73, 74): vesica 4-armed, 3 arms with an apical sharp cornutus (one sinuous), 4th arm with a rounded flange-cornutus; vesica with an irregular internal sclerite twice length of flange cornutus; manica pads as in Fig. 73, 74; dorsal pad short-V shaped, each half formed of 2 to many rows of spines; ventral pad with the 2 large spines contiguous or separated by about the diameter of a spine base, spine apices weakly capitate.

♀ *genitalia*: As figured by Dugdale (1964: fig. 24–26). Mainland populations vary in signum teething and in number of spines on the spine bands.

Larva: Integument (Fig. 72) with mound-like scobinations imbricate and of mixed sizes dorsally; anal shield with seta D_2 directed ventro-posteriorly, and apex of anal shield deflexed; seta SD_1 , antero-dorsad of seta L_1 . Body flanged laterally, color pattern as in Fig. 76.

Type Locality: "New Zealand."

Distribution: North, South, Big South Cape Is; Auckland Is (Auckland, Adams, Enderby, Ewing, Ocean Is); Campbell I.

AUCKLAND IS: 3 ♀♀, Magnetic Cove Stn, Kuschel; 3 ♂♂, 1 ♀, same locality, Wise; 2 ♂♂, 2 ♀♀, same locality, Johns; 1 ♂ E. ridge above Magnetic Cove, Wise; 1 ♂, L. Turbott, Wise; Auckland I: 1 ♂ 1 ♀, Grey Duck Ck, Laurie Hrbr, sweeping, Wise; 3 ♀♀, Ranui Cove, 2 m, Wise; Enderby I: 1 ♀, 1–50 m, Gressitt; 1 ♂, 7 ♀♀, Ranui Cove, Gressitt; 1 ♂, 1 ♀, Webbing Bay, Wise; 2 ♂♂, 5 ♀♀, Adams I, Wise; 1 ♂, Ewing I, 1–10 m, sweeping *Bulbinella* and sedge, Gressitt; Ocean I: 1 ♂, 1 ♀, 1–18 m, Gressitt; Enderby I: 1 ♀, Gressitt; 3 ♂♂, 3 ♀♀ Adams I, Johns; 3 ♂♂, 3 ♀♀, Musgrave Pen., Auckland I; 2 ♂♂ Camp Cove, Auckland I., Johns; 4 ♂♂, 2 ♀♀, Enderby I, Johns; 3 ♂♂, 2 ♀♀, Carnley Hrbr, Auckland I, Hudson; 1 ♀, Musgrave Pen., in pond, Turbott (WMu).

Larvae: 2 larvae: Adams I: Magnetic Cove from rata, Kuschel. Ocean I: 1 ♀ 18 m, lichen on log, Gressitt. Auckland I: Crozier Pt, 1–20 m, swept ex *Myrsine*, Gressitt.

North I: Specimens from Waipoua, Silverdale, Tapu, Kauaerenga, Rotorua, Kaimanawa North Forest Park, Karori (Wellington), Mt Messenger, Mt Egmont. *South I*: 35 specimens from Nelson, Opouri Valley, (Marlborough Sds), Mt Arthur, Cobb Valley, Banks Pen., Arthur's Pass, Longwoods Range, Invercargill, Bluff. *Big South Cape I*: 3 ♂♂, 1 ♀, Nov. 1968 JSD.

Remarks: I am greatly indebted to Mr D. S. Fletcher, BMNH, for his comparison of the types involved in a study of this species.

As *P. inductata* has been reared from *Pinus radiata* shoots and strobili, *Sophora*, *Quercus*, *Olearia colensoi*, and *Acacia* flowers, and beaten from *Myrsine divaricata* and *Metrosideros umbellata*, the species may be considered to be polyphagous, with a tendency to eat out the reproductive parts of the host plant.

The species is also polymorphic in color pattern and ♂ antennal setula length; there is sexual dimorphism in labial palpus length (relative to eye diameter (mainland ♂♂: range \times 1.4–2.2; ♀♀: range \times 1.6–2.9). There is geographic variation between the mainland and the subantarctic Islands in color pattern, antennal setula length and labial palpus length.

The mainland populations (including Big South Cape I off the SW tip of Stewart I) have shorter labial palpi (mean: ca. \times 1.96 eye diameter), and may be either predominantly green with complex markings (*indicataria*-type), or predominantly grey-brown with simple markings (*inductata*-type) in ♂♂, the antennal setulae may be 2/3 or 1/3 as long as the antenna is thick, and in ♀♀, there may be many, or less than 6 spines in the corpus bursae spine bands, independently of the color pattern and ground color. A population may apparently consist of the one color form (e.g. Waipoua Forest, October, 1967), or more usually, both forms; for either form, the discal area of the forewing may be completely white.

The Auckland I population has large labial palpi (mean: ca. \times 2.13 eye diameter) and is grey-brown or tan in ground color. ♂♂ antennae are always long-setulose, but ♀♀ vary in signum dentation and spine-number. On Campbell I, the few specimens available (11) indicate an even longer labial palpus (mean: ca. \times 2.21 eye diameter), but are otherwise similar to the Auckland I population. Also on Campbell I is *P. impudicis* Dugdale, a sister species of, and now secondarily sympatric with *P. inductata*. This species has very long labial palpi (mean: ca. \times 2.55 eye diameter), grey or grey-brown ground color, and simpler markings than has *P. inductata*; some genitalic structures are reduced (♂ octavals, ♀ vaginal lamellae and signum). The ♂ antennae are long setulose, and the larva has the anal shield not deflexed apically, and the integument is evenly scobinate. The absence of this species group on Antipodes may be related to the absence of suitable genera of conspicuously flowering shrubs (e.g. *Myrsine*, *Dracophyllum*).

20. *Pasiphila nebulosa* Dugdale, new species

External characters: ♂ antenna bi-pectinate to 4/5 length. Body, palpi and legs clothed in dark grey scales; wing pattern as in Fig. 78, sometimes forewing broadly pallid or faintly orange discally, pattern elements poorly defined, hazy (hence name). Wing expanse: 24–28 mm (both sexes).

♂ *genitalia* (Fig. 79, 82, 83): Uncus and subscaphium setose, as in *P. bilineolata*; lyra (Fig. 79) with slender, incurved apices; valva slightly widened apically, sacculus angulated subapically; labides with pincer-like incurved apices; lower annellar lobes reduced; aedeagal vesica with one long reclinate lobe and two mounds, one bearing 4–5 cornuti arranged in a short comb, vesica with a basal patch of short spines; manica pads as in Fig. 82, 83; juxta neck 1/2 as wide as apical portion.

♀ *genitalia* (Fig. 80, 81): Ovipositor lobes as long as lamella antevaginalis; vaginal lamellae together as long as wide, ductus bursae arising to right of mid-line; entire ductus bursae length equal to corpus bursae length, colliculum at mid-point of ductus bursae, longer than wide, sclerotised in 2 sections; ductus bursae widened beyond colliculum, with a group of spines to the right, and exit of ductus seminalis to the left; corpus bursae more or less oblong, spine-field reduced to a short arc of blunt spines, or absent; dorsal signum (Fig. 81) belt-like, twisted, sinuous, with 2 large and 2 or 3 smaller teeth.

Larva: Cuticle evenly and finely rugose, never scobinate; ultimate/penultimate instar color patterns as in Fig. 77; anal shield with D_2 horizontal, not depressed, SD_1 level with L_1 ; abdominal segment somewhat flanged laterally; ex *Hebe* spp.

Type Locality: Adams I.

Distribution: Auckland Is: Auckland, Ewing, Adams, French, Ocean Is.

AUCKLAND IS: Holotype ♂, labelled "Auckland Is. W end of Adams I. 22.I.1966 at light. K. A. J. Wise." in collection, ED. ♀ allotype, 1 ♂ paratype same data as holotype. Adams I: 1 ♀ paratype, 1 ♂ paratype, W. shore of Musgrave Pen., 31.I.1966, at light, Wise: 11 ♂♂, W. end, 22.I.1966 at light, Wise. Auckland I, 2 ♂♂, 1 ♀, Ranui Cove, 2 m; 2 ♂♂, 18.I.1963, malaise trap, Gressitt; Ocean I: 1 ♂, netted, 1–18 m, 2.I.1963, Gressitt; French I: 1 ♀, swept off Hebe, 2.I.1963, Gressitt; Ewing I: 1 ♂, 3.XII.1943; Auckland I: 1 ♂, Port Ross, 1943, R. A. Falla ("*semialbata*" "D.M. genitalia preparation 133"); 1 ♂ same locality data ("*P. dryas*").

Larva: 2 larvae, Magnetic Cove Stn 4.II.1966, Adams I, ex *Hebe elliptica*, Kuschel; 1 larva same locality, 19.I.1966, beating, Kuschel. 1 larva, Auckland I, Crozier Pt, *Hebe*, 28.XII.1962, Gressitt. 1 larva, Auckland I, Crozier Pt, kelp on beach, 28.XII.1962, Gressitt; 1 larva, same locality, *Hebe*, Gressitt; 2 larvae, French I, 2.I.1963, *Hebe*, Gressitt.

Remarks: The nocturnal *P. nebulosa* is most similar to *P. dryas* Meyrick, specimens of which were seen from the Meyrick collection (♂ genitalia only, BMNH slide Geom. 5380), and from Waioeka Gorge, Bay of Plenty (North I) and Stewart I; *P. dryas* differs in having a single apical vesical cornutus, normal labides apices, a shorter ductus bursae, a differently sclerotised colliculum,

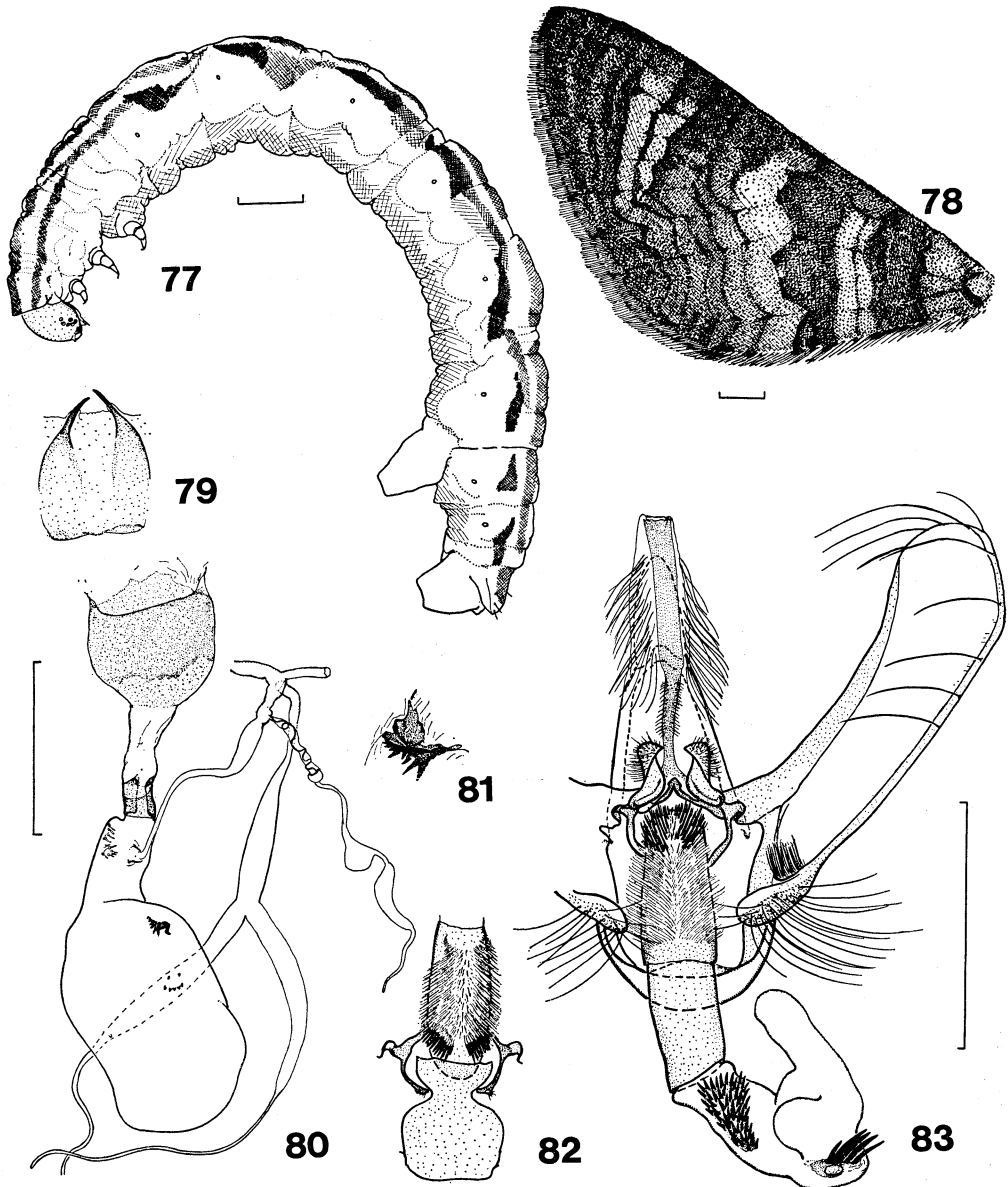


Fig. 77-83. *Pasiphila nebulosa*. 77, larva, color pattern only; 78, ♂ forewing pattern; 79, ♂ lyra (8th sternite); 80, ♀ genitalia, ventral view; 81, ♀ genitalia, signum magnified; 82, ♂ ventral manica pad and juxta; 83, ♂ genitalia, left valva omitted. Scales represent 1 mm.

and extensive spine-fields on the corpus bursae. *P. dryas* lacks internal spines in the ductus bursae.

Other species associated with *Hebe* (*P. rubella* Philpott and allies) that resemble *P. nebulosa* superficially in their lack of green coloration, differ in the same ways that *P. dryas* differs. Also

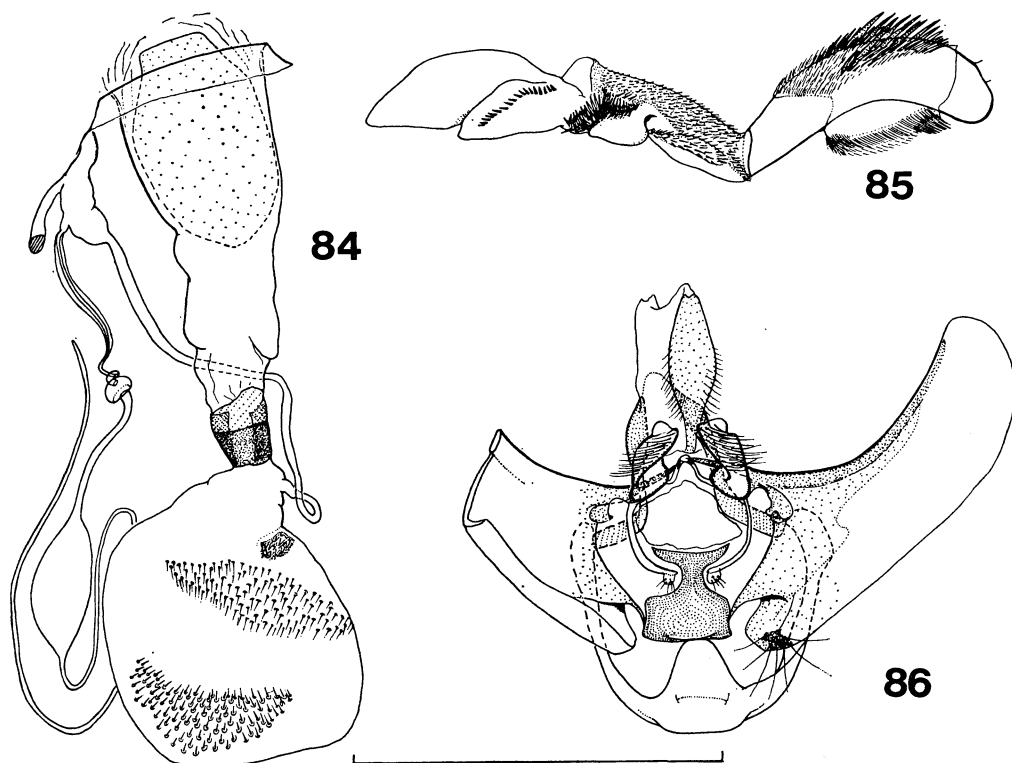


Fig. 84–86. *Pasiphila nereis*. 84, ♀ genitalia, ventral view, Auckland I; 85, ♂ aedeagus, side view, Iron Hill, South I; 86, ♂ genitalia, left valva omitted. Scale represents 1 mm.

these species (but not *P. dryas*) have the ductus bursae greatly reduced and partially invaginated into the corpus bursae; unlike *P. dryas*, they are alpine or subalpine, not lowland species. *P. nebulosa* is here regarded as a lowland species derived from (and a sister species of) the lowland *Hebe*-restricted *P. dryas*.

21. *Pasiphila nereis* Meyrick

Meyrick, 1888. *Trans. N.Z. Inst.* **20**: 51 (*Pasiphila*).

minima Hudson, 1905. *Trans. N.Z. Inst.* **37**: 356 (*Chloroclystis*); syn. Hudson 1928: 96.

External characters: Color pattern as in Hudson (1928: 96, pl xi, fig. 16), ♂ antennae unpectinate, setulae on unscaled zone 1/2 as long as segment width. Eyes reduced, greatest depth (viewed from above) less than 3/4 length, coarse-faceted; periorbital strip lined with white scales; palpi broad, apex of 3rd segment white-scaled. Forewings broader in relation to length than in other *Pasiphila* spp, color pattern dark and light (sometimes pale bluish) grey. Hindwings brownish grey, with pattern elements strongest towards the dorsum, fading discally. Wing span (both sexes) 13–24 mm; of Auckland I specimen (♀): 18.8 mm.

♂ *genitalia* (Fig. 85, 86): Subscaphium setose; vinculum prolonged, prolongation fused with valval costa, heavily sclerotised; sacculus base blackened. Labides erect, of even thickness, apices obliquely truncated. Juxta with base more or less square, apex narrow-lunate; dorsal and ventral manica pads with apical 2/3 long-pilose, basal 1/3 with divergent patches of stout spines; vesica: basal 1/3 completely spinulose-scobinate, spinules longest on right side, forming an oval patch; a group of 10–12 cornuti at mid-length, beyond

this a low mound-like lobe with a central file of spines, and a (usually reflexed) long finger-like lobe.

♀ *genitalia* (Fig. 84): Lamella postvaginalis unsclerotised (Auckland Is) or sclerotised, longer than wide; lamella antevaginalis sub-triangular; ductus bursae at least 1/2 as long as expanded corpus bursae; colliculum at 2/3 ductus bursae length, with a light and a dark zone of sclerotisation; ductus bursae wide beyond colliculum; ductus seminalis arising laterally from this widened portion; corpus bursae ovoid, basal (dorsal) signum an oval depressed spinose plate; spine fields strip-like, 2, 1 obliquely ventrolateral, 1 obliquely dorso-lateral. Ovipositor protrusible, greatest length as long as 7S; ovipositor lobes longer than wide, apices acute (in lateral view).

Larva: Integument scobinate; thoracic segments with mound-like scobinations of more or less even size, abdominal segments with truncate-conical, scobinations visible at $\times 48$, set amongst very small spine-like scobinations, and darkest either side of dorsal mid-line, and in an oblique band from anterad of seta D_1 to caudad of, and level with seta SD_1 . All setae on dark pinacula, setae erect, always twice as long as spiracle diameter on any segment; anal shield with setae D_1 and D_2 in line longitudinally; setae on 8th and 9th abdominal segments on tubercles. Spiracles on 7th and 8th abdominal segments larger than on other abdominal segments, and subequal with prothoracic spiracle. Prothoracic and anal shields heavily sclerotised. Body stout, fusiform, arched. Larvae are internal feeders in large composite inflorescences.

Distribution: North I, South I, Big South Cape I, Auckland Is.

AUCKLAND IS: 1 ♀, Auckland I, Bivouac Hill, 540 m, 6.I.1963, Wise.

North I: 29 examples from Kaweka Range, Desert Road, Mt Ruapehu, Mt Egmont; *South I*: 91 from Tasman Mts, Mt Owen, Mt Starveall, Mt Chrome, Gordons Knob, Victoria Range, above Lewis Pass, Island Pass, L. Tennyson, Arthurs Pass, Mt Cook, Crown Range, Flagstaff, Mt Maungatua, Old Man Range, Key Ridge, Humboldt Range, Hunter Mts, Hump Ridge, *Big South Cape I*: 2 ♂♂ coll. 10.XI.1968 JSD; Larvae from Kaweka Range and Upper Hollyford Valley.

Remarks: Adults of *P. nereis* are diurnal, both sexes having reduced, coarse-faceted eyes. On the mainland the larval host plants are *Celmisia* spp., the larva feeding internally within the inflorescence. The occurrence of *P. nereis* larvae on other genera has been noted, e.g. in *Haastia* and *Leucogenes* (rarely) and *Craspedia* (once). There is great size range within a population which may reflect the host inflorescence size.

P. nereis is our broadest-winged *Pasiphila*, resembling *Xanthorhoe*, *Notoreas* or *Dasyuris* species more than *Pasiphila* species on wing-shape. The reduced eyes and broad wings distinguish the adult from other subantarctic *Pasiphila* adults, the larval anal shield chaetotaxy (D_1 , D_2 in line) and the type of integument scobinations serve to distinguish it from *P. impudicis* and *P. inductata*. Possibly the host on Auckland I is *Celmisia vernicosa*, but *Pleurophyllum* may prove to be an alternative.

HYPONOMEUTIDAE (Yponomeutidae)

Plutella Schranck (1802)

Plutella maculipennis Stainton (*Plutella xylostella*) sensu Bradley

Adult, larval and pupal characters are given in the key to families. This tramp species, restricted to host plants in Cruciferae, is practically world-wide. It is here recorded from Campbell I (adults); Adams I (adults, larvae, pupae), Auckland I (adults), Enderby I (adults, larvae) in Auckland Is; and from Antipodes I (larvae).

(6) NEPTICULIDAE

The Nepticulidae are easily distinguished from other Subantarctic Lepidoptera by the small size (under 4 mm in length), the antennal scape broadened to form a large eye cap, the lack of

a haustellum and the incomplete vein CuA stem in both fore and hindwing. All are leafminers in dicotyledonous plants; for 7 out of the 13 N.Z. species host plants are known (Watt 1921, 1924; Hudson 1928, 1930). Five species mine the leaves of Compositae (*N. ogygia* Meyrick, *N. fulva* Watt in *Olearia*, *N. oriasta* Meyrick in *Celmisia*, *N. perrissopa* Meyrick in *Brachyglottis*, *N. erectitus* in *Erichtites*) 1 is restricted to *Nothofagus menziesii* (*N. lucida* Philpott), 1 to *Sophora* (*N. sophorae* Hudson) and 1 other species, adults of which are as yet unknown, on *Hoheria*. All N.Z. species are at present included in *Nepticula*.

One species is found amongst *Olearia lyalli* scrub on Snares I, but at present is known only from the adult.

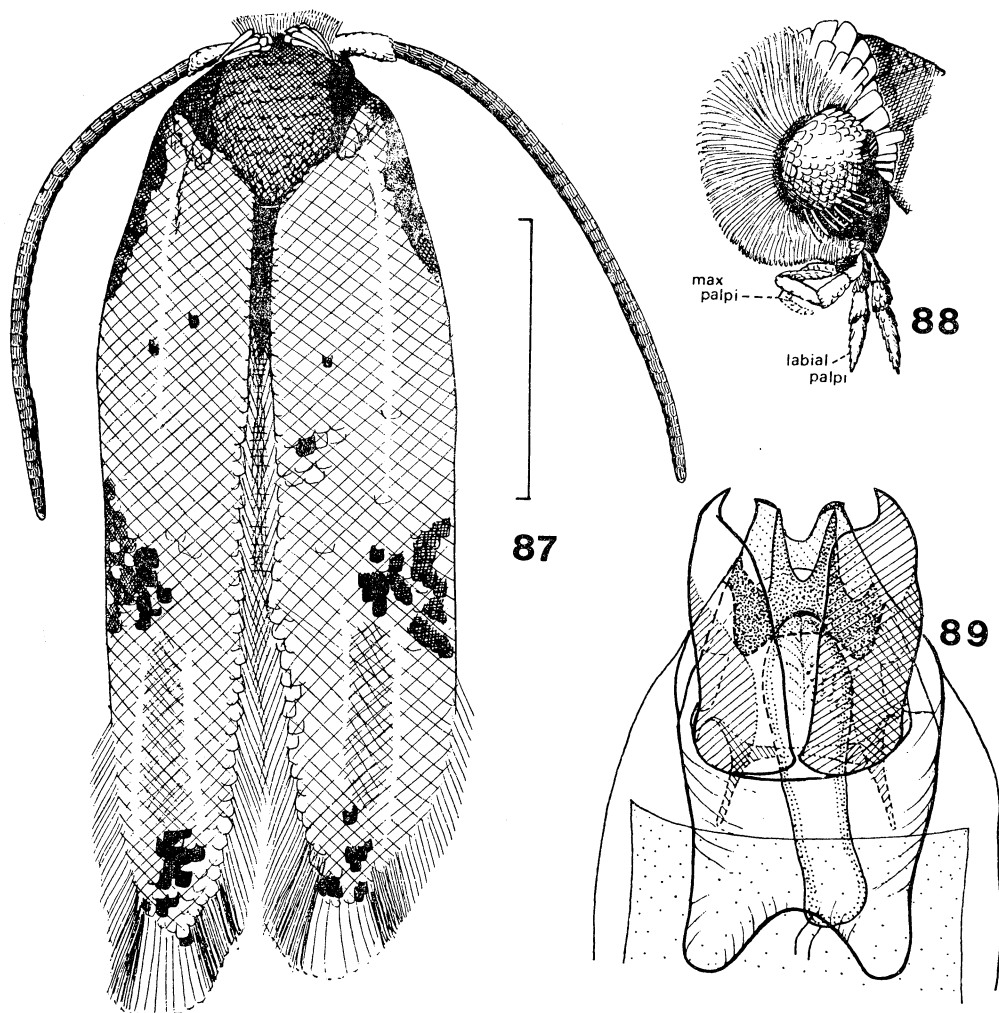


Fig. 87-89. *Nepticula laquaeorum*. 87, ♂, dorsal view showing color pattern; 88, ♂ head. (max palpi: maxillary palpi); 89, ♂ genitalia, ventral view. Scale represents 1 mm (Fig. 87, 88); Fig. 89 drawn to four times larger than scale.

22. *Nepticula laquaeorum* Dugdale, new species

Description: Venation as for *N. fulva* (Watt 1921: 198, lower fig. 1) (Fig. 87). Head (Fig. 88) with white or yellowish vertex scales, whitish frontal scales; antennal scape white-scaled with pecten, antennae buff-scaled. Color pattern (Fig. 87): patagia black basally, buff apically; forewing buff, shading to yellowish buff apically costa black scaled on basal 1/4; usually a group of black scales on dorsum at 1/3; discally a larger patch of black scales at 1/2, with a diffuse broad patch of grey scales between it and the costa; apically, a group of black scales, beyond which is the long, pale fringe; elsewhere on the wing the fringe is pale grey; hindwings, abdomen and underside of forewings dark grey; hindwings with apical fringe scales pallid, rest dark grey. Length (vertex-wingtip): 3.9–4.0 mm.

♂ *genitalia:* As shown in Fig. 89.

♀ unknown: *Larva* unknown; *host* probably *Olearia lyalli*.

Type Locality: South Ridge, Snares I.

Distribution: Snares I.

SNARES I: Holotype ♂ "South Ridge, *Olearia lyalli*, day flying, 26.I.1967, P. M. Johns," in type collection, ED. and 3 paratype ♂♂, same data as type.

Remarks: *N. laquaeorum* differs from *N. fulva* (which it resembles in wing venation, with R_2 arising from the middle of a strong bend in Rs on the forewing, and in color pattern) in that the costa is basally black, and there are no linear black scale patches on the discal cell area. Future work is needed to elucidate geographic variation in our *Nepticula* species, particularly those mining leaves of Compositae species. *N. fulva* and *N. insignis* (which also lacks a blackened costa) are the most similar species to *N. laquaeorum* which, of course, cannot have colonised Snares I before its probable host, *Olearia lyalli*. No specimens of *N. fulva* were available for genitalic comparison.

(7) NOCTUIDAE

Nine species of Noctuidae have been recorded from the New Zealand Subantarctic Is and of these 4 are resident, 3 are demonstrably non-resident and 2 are probably non-resident. Snares and Antipodes each has a resident species, while the Auckland group has 2. Neither Campbell I nor Macquarie I has resident species.

Agrotis ypsilon and *Pseudaletia separata* have been recorded as adults from the subantarctic, but as no larvae were collected there is no evidence of breeding. The single specimen of *Othreis materna* from Campbell I is an obvious vagrant, and probably a joke.

The other species are all here placed in the genus *Graphania* as re-defined below and are either subspecifically distinct populations of common mainland species, or virtually indistinguishable from southern populations of such species. On the mainland, the parent species extend up to (and 2 extend into) the alpine zone. As no 2 subantarctic islands share the same *Graphania* species, it is concluded that colonisation by noctuids has been haphazard and represents chance dispersal.

KEY TO GENERA OF SUBANTARCTIC NOCTUIDAE

1. Fore-tibia with spines (Fig. 90); compound eyes bare; larval integument with irregular groups of plate-like scobinations (Noctuinae).....**Agrotis**
- Foretibia without spines; compound eyes haired; larvae without groups of plate-like scobinations (Hadeninae).....2
2. Setulae on eyes shorter than antennal segment width (Fig. 91).....**Pseudaletia**
- Setulae on eyes longer than antennal segment width (Fig. 92).....**Graphania**

Agrotis ypsilon aneituma (Walker) Fig. 90.

Common (1958: 73–75) gives synonymy, descriptions and figures of genitalia and distribution.

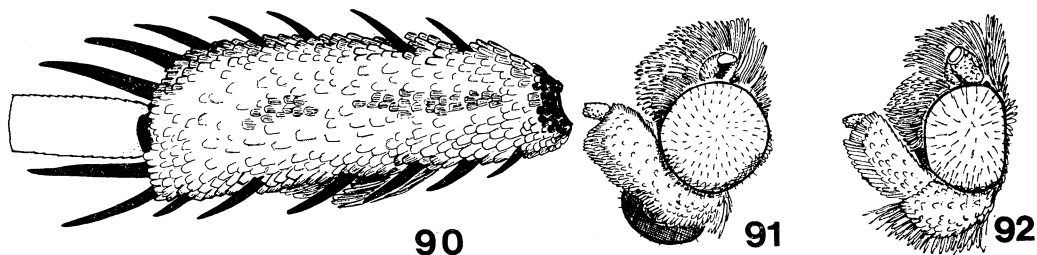


Fig. 90-92. Noctuidae. 90, *Agrotis ypsilon* fore tibia, showing lateral spines; 91, *Pseudaletia separata*, head showing short eye setulae; 92, *Graphania ustistriga* head, showing long eye setulae.

A. y. ypsilon Rottemburg, the Palaearctic-Oriental subspecies is replaced by the darker hind-winged *A. y. aneituma* in New Guinea, Australia, New Hebrides (Aneityum I is the type locality) islands of the SW Pacific to Easter I, and New Zealand.

A. y. aneituma does not differ from *A. y. ypsilon* in genitalia (Common, 1958). There is no evidence of it breeding further south than Foveaux Strait, although adults have been recorded from Macquarie I (54°S) (Common 1962: 976, "several specimens"), Campbell I (52°S) (Yano, 1964: 259, 12 specimens in Feb., March, Dec.), and Auckland Is (50°S) (Salmon 1956: 63, 1 specimen). Brown (1964) does not record it from Heard I. Larvae were not found in the otherwise suitable samples taken by Dr Kuschel and others on Adams I (Auckland Is), Campbell or Antipodes Is. The subantarctic adult records are here considered to indicate that *A. ypsilon* is windblown from New Zealand (lack of other characteristic Australian species precludes Tasmania as a more likely source) while lack of larval records indicates that establishment has been impossible.

In case larvae may be found, a diagnostic character of *Agrotis* larvae is given in the key above to distinguish them from Hadenine larvae.

Graphania Hampson

Hampson, 1905. Catal. Lepidopt. Phalaena Brit. Mus. **5**: 468.

Alysia Cockerell, 1913. *Entomologist* **46**: 15 (nom. nov. pro *Alysia* Guénée, 1868, *Ent. mon. mag.* **5**: 3, praecoc.

Alysia Latrielle, 1804, Hymenoptera). Type-species: *Alysia specifica* Guénée, l.c. = *Agrotis nullifera* Walker, 1856. op. cit. **9**: 742; syn. Meyrick, 1887. *Trans. N.Z. Inst.* **19**: 7).

Leucania auct (non Ochsenheimer, 1816) syn. Meyrick, 1887: 7.

Maoria Warren, 1912. In Seitz, *Macrolepidoptera of the World, II. Indo-Australian Fauna* **11**: 76. Type-species: *Erana plena* Walker, 1865. op. cit., suppl. **23**: 744 **New Synonymy**.

Type-species: *Heliophobus disjungens* Walker, 1858.

Diagnosis: Compound eyes with setulae longer than width of antennal segment; labial palpi with 2nd segment longest, subascending, 3rd segment short or slender and clavate; ♂ antennal segments evenly swollen, subbipectinate or strongly bipectinate, apical segments never pectinate; basal segment in both sexes with a strong scale tuft; thorax scales giving either a furry or sculptured appearance; abdominal tergites 2, or 2-4 strongly to obsoletely crested. Basal abdominal segments with or without narrow scent tufts in eversible pouches.

♂ *genitalia*: Aedeagus apex most deeply cleft ventro-laterally, right side with or without a thorn; vesica bearing a strip or elongate patch of uniform cornuti, and at least as long as aedeagus, but never over twice as long; cornutal strip never bifid at vesica apex. Valva with digitus and ampulla well-developed, clavus usually weakly developed; costa of valva bent weakly to strongly beyond ampulla, sacculus shallowly to deeply emarginate, thus demarcating the cucullar lobe which is ovate to triangular.

♀ *genitalia*: Lamella postvaginalis un sclerotised, appendix bursae broad basally, curved apically or

(rarely) conical; apical 1/3 or at least the zone around exit of ductus seminalis unsclerotised. Signum absent or represented by 1 or 2 feebly scobinate strips or a minute peg.

Relationships: *Graphania* here includes at least 30 species of the 68 previously placed in *Melanchra* by Meyrick (1912) or subsequently by Hudson (1928, 1939, 1950), as well as at least 1 species previously placed in *Aletia* auct. by Meyrick. *Melanchra* Huebner and *Aletia* Huebner are based on Palaearctic species and are by now sunk in the synonymy of other genera. The continued use of these names for members of the New Zealand fauna is both invalid and biogeographically confusing.

Graphania differs from *Melanchra* Huebner, 1820 (type: *persicariae* L) in gnathos, claval and valval ♂ structures (cf. Pierce 1909, pl. xi) and in its possession of a distinct, massive appendix bursae—absent in *M. persicariae*—and its lack of many strap-like signa (these present in *M. persicariae*, cf. Pierce 1942, pl. v.). Herbulot (1963: 44) synonymises *Melanchra* with *Miselia* Ochseneimer. As for *Mamestra*, Meyrick (1912: 99) states “The use of this name is not practicable; it is founded on Guénée’s use, but on a misapprehension of it.”

For *Aletia* Huebner, 1821, Moore (1881: 333) had selected *vitellina* Huebner as type species, but Meyrick (1912: 97) gives *conigera* Fabricius as type. Pierce (1952: 21) placed *conigera* in *Mythimna* Ochseneimer (not of Treitschke, an Agrotine genus), with *turca* as type. *Graphania* differs from both *Aletia* (i.e. *vitellina*), *Mythimna* (i.e. *turca*, *conigera*) and *Eriopyga* Guénée (type: *turca* L) in ♂ and ♀ genitalia (cf. Pierce 1909, pl VI, VII, and Pierce 1942, pl I, II).

Erana Walker (1857: 605, type *graminosa* Walker), *Meterana* Butler, 1877 (type: *Melanchra meyricki* Hampson, 1911, as *Dianthoecia pictula* non White, 1855), *Maoria* Warren, *Alysina* Cockerell and *Graphania* are all based on New Zealand species. *Erana* and *Meterana* form a homogeneous group on ♂ and ♀ genitalia, differing from *Graphania* and its synonyms in having the vesica extremely long, with dimorphic cornuti, and the appendix bursae also long, slender and coiled, or looped and coiled. *Graphania* larvae are ground dwellers (at least by day) whereas *Erana* and *Meterana* larvae are arboreal.

The question as to whether *Erana* (monotypic, cross vein r-m absent in fore and hind wing and hence reniform mark irregular, scent tufts on forewing) and *Meterana* (cross vein r-m present but vestigial and hence reniform regular, scent tufts on thorax and/or abdomen) are synonymous is not gone into here as no members of this group are known from the subantarctic. As a possible guide for other workers the position of 52 of the 68 N.Z. “*Melanchra*” species recognised by Hudson (last reviser, 1928, 1939, 1950) and examined by me are listed below.

“*Erana*” group (slender long vesica, dimorphic cornuti; slender coiled appendix bursae, larvae arboreal): *alcyone* Hudson, *asterope* Hudson, *coeleno* Hudson, *dotata* Walker, *exquisita* Philpott, *graminosa*, *grandiosa* Philpott, *levis* Philpott, *ludibunda* Philpott, *merope* Hudson, *meyricki* Hampson, *ochthistis* Meyrick, *octans* Hudson, *pansicolor* Meyrick, *pascoi* Howes, *pauca* Philpott, *praesignis* Howes, *rhodopleura* Meyrick, *stipata* Walker, *tartarea* Butler, *vitiosa* Butler.

Graphania (stout shorter vesica, uniform cornuti, stout C-shaped appendix bursae, larva not strictly arboreal): *agorastis* Meyrick, *averilla* Hudson, *beata* Howes, *bromias* Meyrick, *chlorodonta* Hampson, *chryserythra* Hampson, *cyanopetra* Meyrick, *disjungens* (type), *furtiva* Philpott, *homoscia* Meyrick, *infensa* Walker, *insignis* Walker, *lignana* Walker, *lithias* Meyrick, *maya* Hudson, *mollis* Howes, *morosa* Butler, *mutans* Walker, *nullifera*, *olivea* Watt, *oliveri* Hampson, *omoplaca* Meyrick, *paracausta* Meyrick, *phricias* Meyrick, *plena* Walker, *prionistis* Meyrick, *rubescens* Butler, *scutata* Meyrick, *sequens* Howes, *ustistriga* Walker, *xanthogramma* Meyrick. [All *Graphania* spp comb. nov. except *disjungens*].

As only “*Aletia*” *nullifera* is the type of a genus, none of the other New Zealand “*Aletia*” species were examined.

The differences between *Graphania* and the *Erana-Meterana* group have been dealt with. *Graphania* differs from *Persectania* Hampson (type: *Noctua* (?*Xylophasia*) *ewingi* Westwood, Australian) as restricted by Common (1954) and *Physetica* Meyrick (type: *Agrotis caerulea* Guénée) in its well developed appendix bursae and its numerous vesical cornuti which are arranged in a strip (appendix vestigial, and vesica with a patch of 15 or less cornuti in *Persectania* and *Physetica*). *Physetica* ♂♂ have a modified labial palpus.

Tmetolophota Hampson (type: *Leucania propria* Walker) forms a natural group of endemic species usually placed in either *Persectania* (not of Common, 1954) or *Leucania* auct. They differ from *Persectania* in the same characters as do *Graphania* and the "Erana" group, and none resemble species currently placed in *Leucania* Ochseneimer 1816 as defined by Rungs (1953), Viette (1962), Herbulot (1965) or Calora (1966). True *Leucania* is represented by a species of *L. (Acantholeucania)*, found on the Kermadec Is and in the west and extreme north of the North I but of doubtful resident status south of the Auckland isthmus. The N.Z. species resembles *L. (A.) loreyimima* Rungs (1953: 139) from Vietnam (Cochin China) and Java. Calora (1966: 668) however notes that Phillipine *L. (A.) loreyi* Duponchel were genitally variable.

Graphania differs from the "*Tmetolophota*" group (including *Dipaustica* Meyrick, type: *epiastra* Meyrick) chiefly on ♂ characters: in *Tmetolophota* and *Dipaustica* the cornutal strip on the vesica is bifid apically, and the aedeagus apex is more prominently, and differently, sclerotised. In the ♀, the C-shaped appendix bursae is smooth and heavily sclerotised, not largely membranous and wrinkled as in *Graphania*. *Dipaustica* also is distinct in having a bifurcate process on the frons.

Ichneutica Meyrick (type: *ceraunias* Meyrick) differs from *Graphania* (and the "Erana" group) in having the ♂ antenna pectinate to the apex, and resembles some "*Tmetolophota*" group species in having a short cornutal strip and the digitus transversely ridged. The ♀ of *I. ceraunias* has extremely small genitalia, with a well developed lamella postvaginalis. The *ceraunias* larva resembles superficially those of the "*Tmetolophota*" group.

Distribution: *Graphania* is endemic, and restricted to North (and off-shore), South, Stewart, Chatham and Subantarctic Is. It is absent from Raoul I (30°S) and Campbell I (52°S); the fauna is impoverished south of Big South Cape I (47° 17'S). Although intensive collecting in the North I has lessened the apparently high degree of South I endemicity noted by Hudson (1928) (Dr K. J. Fox, pers. comm.) there are more species in the South I than in the North. There are no endemic subantarctic species, but there are subspecifically distinct populations of *G. mutans* (Auckland Is), *G. insignis* (Snares I) and externally distinguishable populations of *G. rubescens* (Auckland Is) and *G. ustistriga* (Antipodes I) resident in the subantarctic. The resident status of *G. omoplaca* and *G. homoscia* is doubtful largely because larvae have not been found and partly because there is no difference between adults collected in the subantarctic and in southern South I localities.

All species known from the subantarctic have litter-sheltering larvae and all are found in New Zealand at least south of 38°S, in a wide variety of climates and biotopes; all tolerate upland (sensu Burrows 1969) conditions. All 4 presumed resident species are either extremely variable (*G. rubescens*, *G. ustistriga*), or are members of highly variable groups. *G. mutans* has northern (*G. averilla*), southern (*G. beata*), alpine (*G. furtiva*) and Chatham (*G. bromias*) sibling species; except for *G. bromias*, the others are sympatric in part with *G. mutans*. *G. insignis* has a distinctive population (similar to *G. i. pagaia*) on Codfish and Big South Cape Is, and on the mainland has *G. xanthogramma* and *G. scutata* (at least) as siblings.

KEY TO SUBANTARCTIC GRAPHANIA SPECIES

1. Thoracic scales hair-like; ♂ antennal pectinations finger like, 3 × longer than segment width.....2

- Thoracic scales bifid or multifid, expanded apically; ♂ antennal pectinations triangular, not longer than segment is wide.....3
2. Antenna dark; ♂ digitus setose at base; ♀: lamella antevaginalis evenly sclerotised, smooth; 8T lacking dark scobinations visible at × 100 magnification.....**G. mutans erebia**
- Antenna testaceous or pallid; ♂ digitus nude at base; ♀: lamella antevaginalis irregularly sclerotised, creased; 8T with dark scobinations visible below × 100 magnification.....**G. insignis pagaia**
3. Wing span under 35 mm; thorax furry, rounded in outline, body and wings dusky grey, forewing veins marked in light and dark grey dashes (A).....**G. homoscia**
- Wing span over 35 mm; thorax sculptured, angular; forewings not marked as above.....4
4. Thorax with prominent median crest, anterior margin deeply concave either side of mid-line, concavity contrastingly pallid, bounded above by a discrete dark line; forewing costal area ochreous basally; orbicular elliptic, oblique, transverse pattern markings distinct, closely and uniformly zig-zag (A).....**G. omoplaca**
- Thorax lacking prominent crest, anterior margin not so shaped or colored; forewing not contrastingly pale basally, orbicular differently arranged, transverse pattern obsolete or absent5
5. Pallid ochreous moths with obscure tan or purplish tan markings; forewing with reniform contrastingly dark, orbicular with an anterior black speck; ♂ antennal pectinations shorter than segment width, ♀ antenna brown (A).....**G. rubescens**
- Dark grey (♀) or reddish-grey (♂) moths with darker grey or purplish markings; forewing with reniform not darkened; orbicular diamond-shaped, lacking a speck; ♂ antennal pectinations as long as segment width, ♀ antenna black (Ant).....**G. ustistriga**

Graphania homoscia (Meyrick) n. comb.

Meyrick, 1887. *Trans. N.Z. Inst.* **19**: 21 (*Mamestra*).

External characters: Wing pattern nebulous, dark grey, as in Hudson, 1928, pl ix, fig. 23. Antennal segments darkened; ♂ subjectinate, ♀ simple. Thoracic scales bifid, grey on shank, black subapically, white apically. Thorax "furry," dusky grey in general appearance. Basal abdominal scent tufts absent. Wing span 32 mm (Auckland I ♂), 32–40 mm (mainland, both sexes).

♂ *genitalia* (Fig. 94): Cucullus triangular, with an apical ventral slender process bearing a spine; sacculus apex produced, triangular; valval costa scarcely bent opposite digitus and ampulla; digitus straight, ampulla ovate, apically setose; vesica longer than aedeagus, but cornutal strip not longer than aedeagus and apical cornuti longer than basal cornuti.

♀ *genitalia* (Fig. 93), mainland specimen: Lodix (Fig. 95) as in *E. m. erebia*; lamella ante-vaginalis unsclerotised, 8T lobes extending inwards and fusing to form a parallel-sided trough. Ductus bursae transversely creased; appendix bursae ventral, broadly triangular, deeply and irregularly crinkled but not twisted; corpus bursae lacking a signum.

Larva (Fig. 96, based on mainland specimens): Body chaetotaxy as in *E. m. erebia* except that all setae far longer than their pinacula, as long as a fore-leg, or 1/2 head capsule width, and not spatulate. Ocelli 1–4 evenly spaced. Setal pair V gradually further apart on 7th, 8th and 9th abdominal segments (setal pair V equally far apart on 7th and 8th segments, twice as widely apart on 9th in *ustistriga*, *erebia*, *pagaia*.) *Color pattern* (instar III): dorsal line double: 6 stripes present between level of seta D, and level of spiracle; spiracular stripe pallid, irregular; SV area marbled, venter with a mid-line dark stripe. *Later instars*: Head capsule color pattern resembling *G. ustistriga* (Fig. 125) but frontal zone paler basally. Body color pattern (Fig. 96) in black and yellowish or greenish brown, variegated. Dorsal area longitudinally, darkly marbled, seta D₁ on a small, and D₂ on a large white patch, the D₂ patch connected with a prominent pallid subdorsal line; zone between this and spiracle longitudinally marbled; spiracle on a dark patch, subspiracular line broadest behind, narrowest just in front of spiracle; subventral and ventral zones pallid, obscurely marbled; ventral line obscure to prominent.

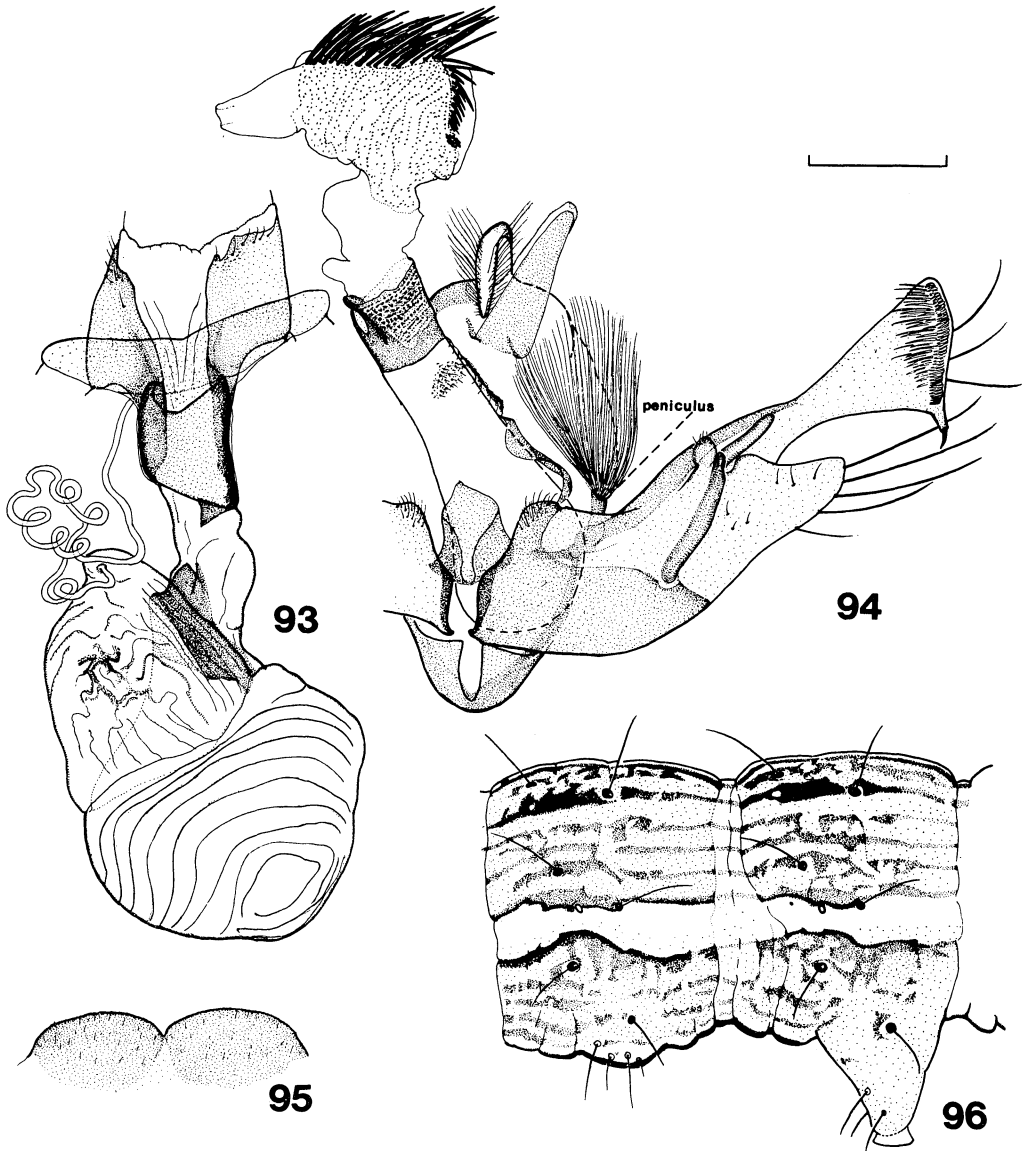


Fig. 93-96. *Graphamia homoscia*. 93, ♀ genitalia, Auckland Is; 94, ♂ genitalia, Invercargill, South I; 95, ♀ lodix (7th sternite); 96, larva, instar III, abdominal segments 2, 3, showing chaetotaxy and color pattern. Scale represents 1 mm.

Type locality: Wellington, North I.

Distribution: North, South, Auckland Is: Adams I.

Hostplants: *Cassinia vauwilliersi*, *C. fulvida*, *C. leptophylla*.

AUCKLAND IS: 1 ♂ Adams I, Station Cove, 18.I.1966, Kuschel.

North I: 1 ♂, Wellington; South I: 1 ♀. West Plains, Invercargill, 1 larva, Mt Luxmore.

Remarks: The Adams I ♂ is no different in external and genitalic characters from mainland specimens. Although *Cassinia* is present on Auckland Is (the type locality for *C. vauwilliersi*), no larvae were collected. While the lack of differences between the Adams I ♂ and mainland ♂♂, and the lack of larvae suggest that *G. homoscia* may not be resident on Auckland Is, these points do not preclude the possibility that larvae were overlooked by collectors. Residen status for *G. homoscia* in the subantarctic is therefore doubtful.

23. ***Graphania insignis pagaia*** (Hudson) n. comb., n. stat.

Hudson, 1909. Subantarctic Islands of N.Z. 1: 67 (*Leucania*, as species).

External characters: Wing pattern as in Hudson 1909, fig. 9. Antennal segments pallid to light brown; ♂ pectinations over twice as long as segment width (greatest = $\times 3$); thoracic scales hair-like; abdomen lacking basal scent-tufts. Wing span: 37–39 mm (both sexes).

♂ *genitalia* (Fig. 97, 98, 100): Peniculus in lateral view decurved, anteriorly setose; digitus smooth

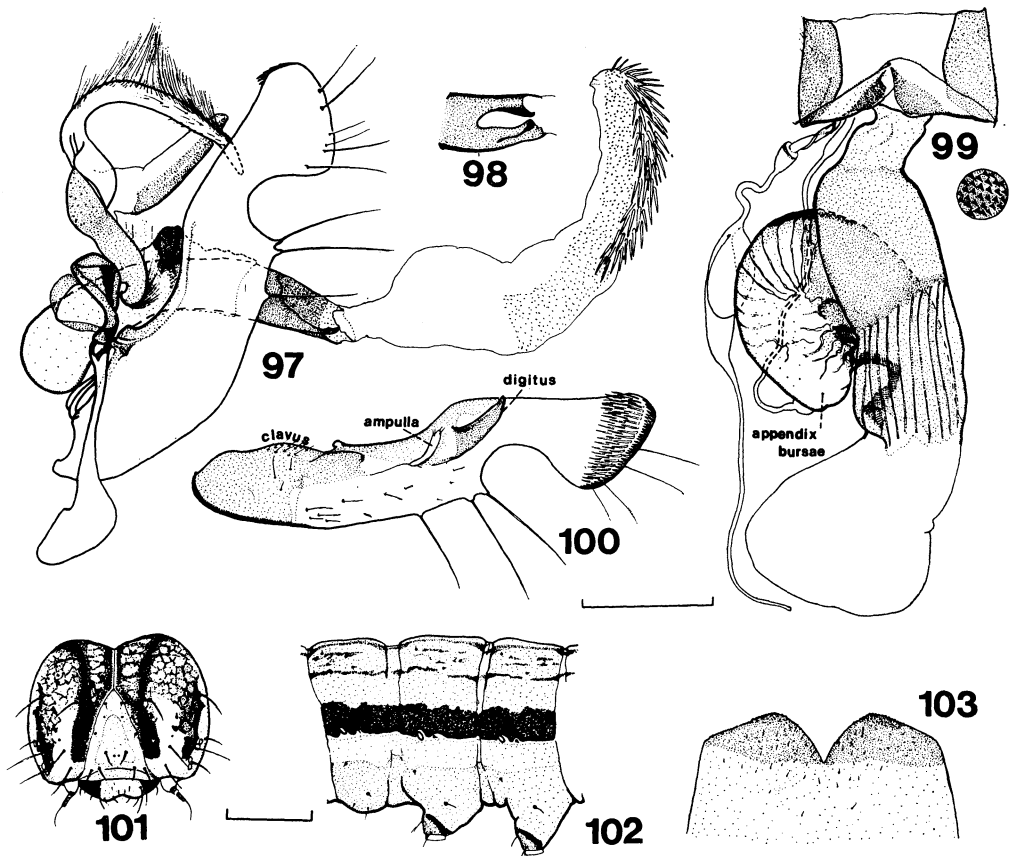


Fig. 97–103. *Graphania i. pagaia*. 97, ♂ genitalia, side view; 98, ♂ aedeagus, ventral view of apex; 99, ♀ genitalia, ventral view (insert: scobinations on 8th tergite); 100, ♂ genitalia, right valva, inner face; 101, larva, head capsule color pattern and chaetotaxy; 102, larva, abdominal segments 2–4, showing color pattern and chaetotaxy; 103, ♀ genitalia, lodix (7th sternite). Scales represent 1 mm.

basally, cucullus lacking a ventral apical spine; saccular setae tuberculate; cornutal strip on vesica not longer than aedeagus.

♀ *genitalia* (Fig. 99): Ductus bursae not narrowed at junction with corpus bursae; ductus bursae with many, close-set striae; lamella antevaginalis lightly, irregularly sclerotised, creased mesally; lodix apices (Fig. 103) subtriangular, marginally rugose; 8T with triangular, black scobinations (see Fig. 99, insert) visible at $\times 64$ diameters.

Larva (last 2 instars only): Ocelli 1 and 2 closer together than ocelli 3 and 4. Body chaetotaxy as in *E. m. erebia* except that SD_2 on 2nd to 8th abdominal segments slightly anterodorsad of spiracle. Color pattern (Fig. 102): dorsal line double, zone between this and the level of seta D_2 marbled, bounded ventrally by a continuous dark narrow band; then a very pale, narrow (?white) stripe; the zone from seta SD_1 level to 1/2 spiracle height level, dark, marbled ventrally, including seta SD_2 but emarginate round each spiracle; rest of body pallid, not marbled, prolegs with an oblique dark patch dorso-caudad of the SV setal group. Head capsule (Fig. 101) with pallid zone around setae A_2 , A_3 , extending as a stripe to apex of adfrontal area.

Type locality: Snares I.

Distribution: Snares I; adults in Jan., Nov.

Host plants: *Poa astoni*.

SNARES I: Holotype ♂, labelled "1" Hudson Register (Subantarctic Is) entry. "1. *Leucania pagaia*. Snares I., 15.XI.07, Benham", in Hudson Colln (Subantarctic Is), WMu; 15 ♂♂, 2 ♀♀, 8 larvae, Station Point, Snares I, Johns.

Remarks: *G. i. pagaia* is distinguished from *G. i. insignis* by its longer antennal pectinations and lack of a ventral cucullar spine. *E. i. insignis* is common throughout North and South Is. A possibly subspecifically distinct population occurs on Big South Cape I differing from *G. i. insignis* and *G. i. pagaia* in antennal and genitalic characters; the larva feeds nocturnally on *Poa foliosa*. The pupa of the Big South Cape populations differs from that of the *G. mutans* group in having the 5th abdominal segment centrally, as well as anteriorly, punctate.

While it may be that *pagaia* could better be associated with *G. scutata* (which also lacks a cucullar spine), the mainland *G. mutans* and *G. insignis* complexes need detailed study to clarify the poorly defined taxa involved.

24. **Graphania mutans erebia** (Hudson) n. comb., n. stat.

Hudson, 1909. Subantarctic Is of N.Z. **1**: 68 (*Melanchra*, as species).

oceanica Salmon, 1956. *Rec. Dominion Mus.* **3**(1): 78-79 (*Melanchra* as species) **New Synonymy**.

External characters: Wing pattern as in Hudson 1909, fig. 15, Salmon 1956, fig. 33, 34. Antennal segments dark brown to black; in ♂, pectination length exceeds twice segment width (greatest: $3 \times$ segment width). Thoracic scales uniformly slender, simple or irregularly bifid apically. Basal abdominal scent-tufts absent. Wing span: 38-42 mm (♂♂), 35-46, (♀♀).

♂ *genitalia* (Fig. 104-b, 108): Ampulla slender, apically setose; digitus with a basal setose tubercle. Vesica with cornutal strip less than $1.5 \times$ aedeagus length; aedeagus apex with left process slender, shorter than the broad right process, scobinate ventrally.

♀ *genitalia* (Fig. 107, 109): Corpus bursae lacking a signum; ductus bursae width at junction with corpus bursae equal to 1/4 length of ductus bursae; appendix bursae unsclerotised on outer margin, apex recurved, acute. Lodix apices (Fig. III) truncate; 8T without scobinations.

Larva: Instar I: All headcapsule, XD prothoracic, all foreleg and SV, V setae normal; all D, SD and L setae spatulate. Prothorax: XD setae proclinate, D_1 , D_2 , SD_2 , erect. Meso- and metathorax: D_1 erect, D_2 proclinate, SD_1 reclinate, SD_1 , L_2 proclinate, each seta as long as its pinaculum is wide. Abdomen: on all segments, D_1 , SD_1 , L_2 proclinate and D_2 , L_1 , reclinate; 1st abdominal segment with SV_2 absent, 1st-8th abdominal segments with SD_2 absent; anal shield with D_1 decurved, D_2 , SD_1 recurved and only L_1 spatulate; proleg crotch numbers: 6, 8, 10, 12, 12. Forelegs: pretarsus with ventral apical seta longer than claw, flattened, elongate oval. No color pattern. *Instar II*: Seta SD_2 anterodorsad of spiracle on 1st abd. segment,

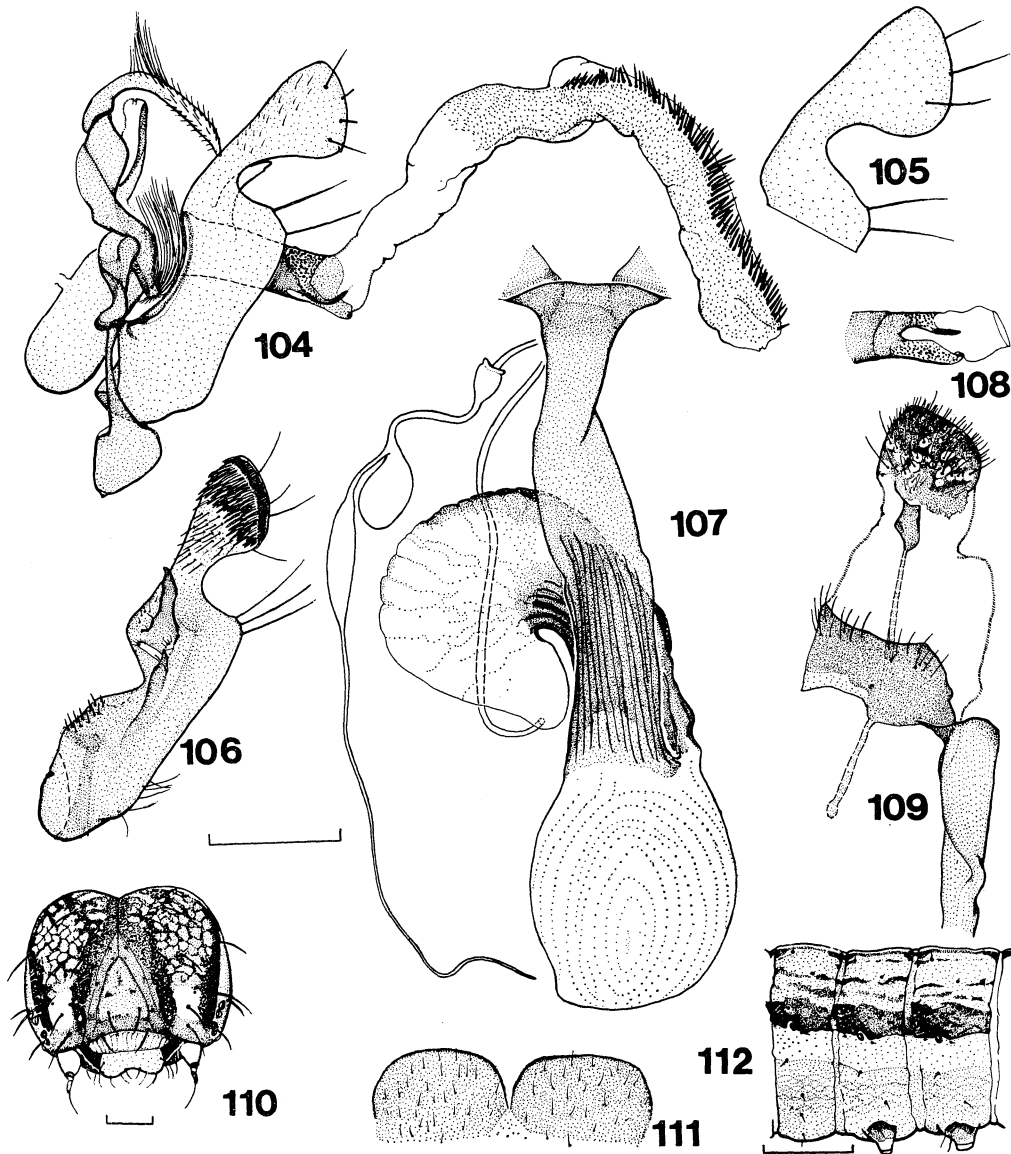


Fig. 104-112. *Graphania m. erebia*. 104, ♂ genitalia, Adams I; 105, ♂ valva apex, paratype *oceanica* Salmon; 106, ♂ valva, inner face, Adams I; 107, ♀ genitalia, Adams I; 108, ♂ genitalia, aedeagus apex, ventral view; 109, ♀ genitalia, side view of ovipositer, 8th tergite and sterigma; 110, Larva, head capsule showing color pattern, chaetotaxy; 111, ♀, lodix (7th sternite); 112, Larva, abdominal segments 2-4, color pattern and chaetotaxy. Scales represent 1 mm.

directly anterior to spiracle on 2nd-8th segments; seta SV_3 on prolegs equidistant from and dorsal to SV_1 , SV_2 . Proleg crotchet numbers: 8, 10, 12, 12, 13. Head capsule unpatterned, body obscurely striped (preserved specimens). Ocelli 1 and 2 closer together than to ocelli 3 and 4. *Instars III-ultimate*: Color pattern: dorsal line double, thickened anteriorly and posteriorly on each segment, region between setae D_1 , D_2 marbled;

a narrow pallid crenulate line below D_2 ; zone between D_2 and SD_1 extensively marbled; between SD_1 and spiracle a broad solid-color stripe which may or may not be emarginate around each spiracle; below this a conspicuous pallid stripe (earlier instar) or vaguely pale zone (later instars) shading to a lightly to heavily marked venter. Last instar larva with the SD (dark) stripe obliquely obsolete anteriorly so that the stripe is present as a line of parallelograms (Fig. 112).

Head capsule (Fig. 110): Patterned from Instar III, pallid ground color overlain with dark brown reticulations, thickest along dorsal part of each parietal lobe from seta A_1 to the P series, and laterally; a conspicuous pallid area around setae A_2 , A_3 . Prothorax dark, with a pallid central dorsal stripe; both prothorax and anal shield with a pallid SD stripe; proleg setal pinacula sometimes, foreleg and thoracic SD_2 pinacula always, dark.

Pupa: Abdomen nearly twice as long as wing case, 5th abdominal segment with 4–5 irregular rows of punctures anterior to the spiracle.

Type locality: Erebus Cove, Auckland I.

Distribution: Auckland Is—Auckland, Adams, Ewing, French, Rose. Adults in Jan., Aug., Oct., Nov., Dec.

Hostplants: *Pleurophyllum criniferum*, *Carex*, *Stilbocarpa*; found on or amongst *Chionochloa antarctica*, *Poa* litter, *Urtica aucklandicus*, *Pseudopanax* (*Neopanax*) *simplex*.

AUCKLAND IS: Holotype ♀, "13", Hudson Register (Subantarctic Is) entry "13, Erebus Cove, Port Ross, 29.X.104, Brown," in Hudson Colln, WMU. Holotype ♂, *oceanica* labelled "Ocean Isd, 23.10.43. *Melanchnra oceanica* det J. T. Salmon 1954. Type" in WMU. (Adults) 1 ♂, "*M. oceanica*, paratype" same data as holotype ♂: 1 ♂ Auckland Is. 1 ♂, 1 ♀ Port Ross, Auckland I; 1 ♀, Station, Ranui Cove, Auckland I, Turbott; 2 ♂♂, Auckland Is, R. W. Balham. 3 ♂♂, 2 ♀♀, 1 pupa, Magnetic Station Cove, Adams I, Johns; 2 ♂♂, 1 ♀, Magnetic Cove, Adams I, 1 pupa ex larva reared from *Pleurophyllum* flowerheads, Adams I, Kuschel; 2 ♀♀, Magnetic Cove, Adams I, Wise; 1 ♀, Ocean I, Gressitt. (Larvae) 1 last instar, Fairchild's Garden, Adams I, Kuschel; 6 larvae (dark) ex Flowerhead of *Pleurophyllum criniferum*, Magnetic Cove, Adams I, Kuschel; 3 larvae, beating, Magnetic Cove, Adams I, 19.I.1966, Kuschel; 3 larvae (pallid) ex *Stilbocarpa* roots, Ocean I, 29.XII.1962, Wise; 1 larva, same loc, Gressitt; 5 larvae, *Stilbocarpa*, and 1 larva, *Poa* Litter, French I, 1–5 m; Gressitt; 1 larva swept ex *Urtica aucklandicus*, and 1 larva, no host, Ewing I, Wise; 4 larvae, Ewing I, 4–6.I.1963 Gressitt; 1 larva, Rose I, dead *Carex* leaves, Gressitt; 2 larvae (no host), same loc, Gressitt; 4 larvae, Magnetic Cove, Adam I, Wise; 3 larvae, feeding on *Carex* at night, Magnetic Cove, Adams I, Wise; 1 larva, swept *Neopanax simplex*, Lookout Point, 50–100 m, Wise; base of *Chionochloa antarctica*, Magnetic Cove, Adams I, Wise.

Remarks: *G. m. erebia* differs from *G. m. mutans* (Walker) in its simplified adult color pattern, longer ♂ antennal pectinations (these less than twice segment width in *m. mutans*) lobate, not triangular peniculus, shorter cornutal strip, and in aedeagus structures, lack of a signum, in lodix shape and appendix bursae sclerotisation. The pupa of *G. m. mutans* has a comparatively shorter abdomen and has 2 rather than 5, rows of punctures on the 5th abdominal segment anterior to the spiracle.

Adult color pattern of *G. m. erebia* is variable both in boldness of markings and in ground color. Some specimens resemble *G. i. pagaia* but can be distinguished by their black antennae. The 3 specimens listed by Salmon (1956: 63) as "*Leucania pagaia*" from Auckland Is are *G. m. erebia*.

All larvae collected on Auckland Is are referable to *E. m. erebia*; the larva is polyphagous, feeding nocturnally and concealed amongst litter during the day.

Graphania omoplaca (Meyrick) n. comb.

Meyrick, 1887. *Trans. N.Z. Inst.* **19**: 24 (*Mamestra*).

umbra Hudson, 1903. *Trans. N.Z. Inst.* **35**: 243, pl 30, fig. 7–9 (*Melanchnra*). (Syn. Meyrick 1911).

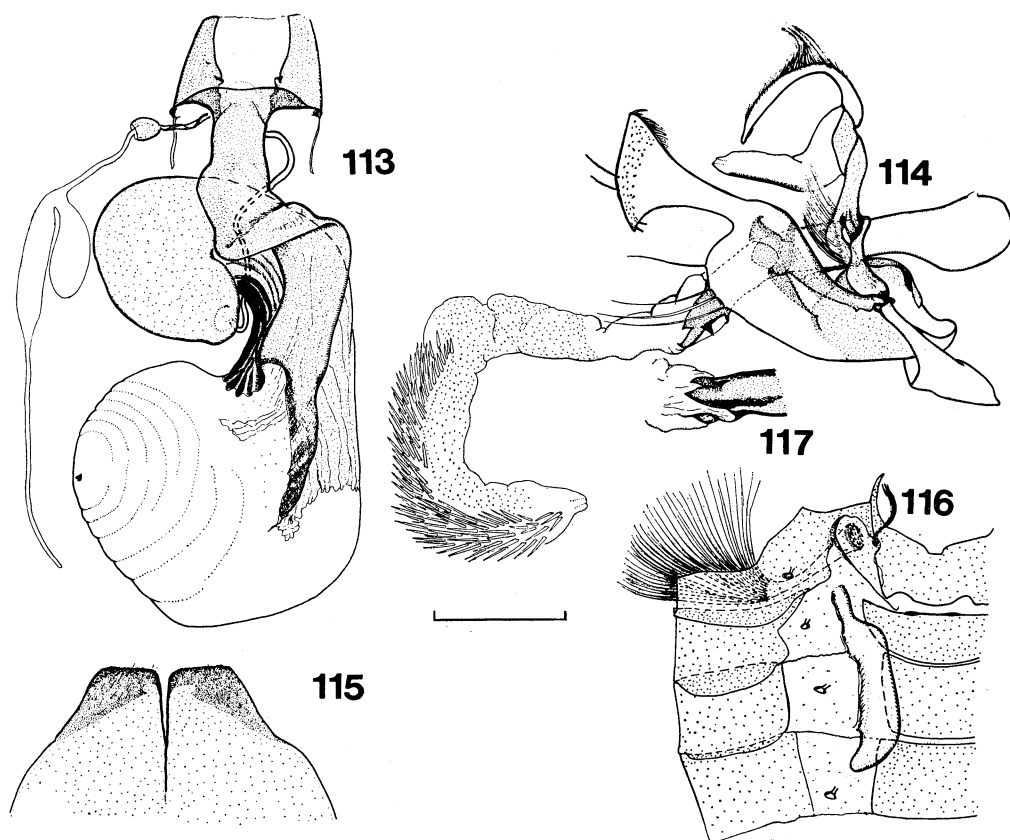


Fig. 113–117. *Graphania omoplaca*. 113, ♀ genitalia, ventral view, Auckland Is; 114, ♂ genitalia, side view, Gore, South I; 115, ♀ lodix, (7th sternite); 116, ♂, basal abdominal segments cut open to display scent tufts (semidiagrammatic); 117, ♂, aedeagus apex in ventral view. Scale represents 1 mm.

External characters: Color pattern as in Hudson 1903 (a more accurate representation than Hudson 1928, pl. VIII: fig. 26–27). Thorax scalloped anteriorly, with a mid-line double anterior crest, purplish; patagia with a contrasting sprinkling of ash-grey scales; fore-tibia, basal forewing costa, and basal tarsal segments conspicuously buff-colored; ♂ antenna subpectinate, black. 2nd abdominal sternite with 2 pairs of scent tufts (Fig. 116). Wing span: 34–40 mm (both sexes).

♂ *genitalia* (based on mainland specimens) (Fig. 90, 114, 117): Cucullus apex acute, the most ventral coronal spine projecting beyond it; digitus and ampulla strongly sclerotised, digitus incurved, ampulla finger-like, tapering; sacculus apex acute (northern South I) populations or rounded (southern South I); aedeagus with a stout thorn on right side of apex; cornutal strip as long as aedeagus, multiseriate at base.

♀ *genitalia* (Fig. 113): Ventral margin of 8T with an anterior scobinate prominence; lamella antevaginalis sinuate marginally; ductus bursae evenly broad, creased at 1/3 length; appendix bursae C-shaped, evenly sclerotised. Corpus bursae subglobose (southern South I) or transverse, ovoid (northern South I); signum a pair of minute pegs. Lodix (Fig. 115) deeply cleft, lobes truncate.

Type locality: Lake Coleridge, South I.

Distribution: North, South, Auckland Is.

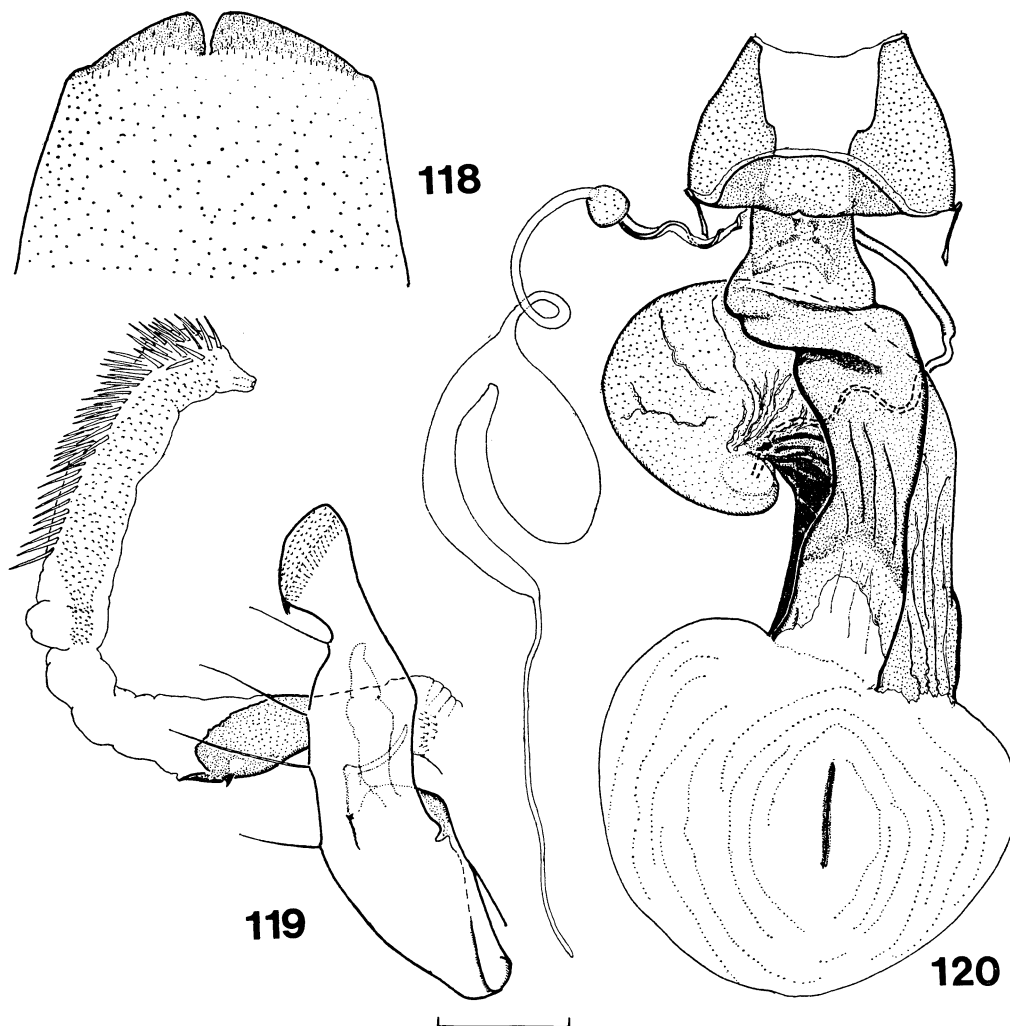


Fig. 118–120. *Graphania rubescens*. 118, ♀, lodix (7th sternite), Stewart I; 119, ♂ genitalia in side view, Enderby I; 120, ♀ genitalia, ventral view, Stewart I. Scale represents 1 mm.

AUCKLAND IS: 1 ♀, Ranui Cove, Dec. 1962, Gressitt; 1 ♀, Ranui Cove, Jan. 1963, Wise (BISHOP).

South I: ♂♂, ♀♀ Mt Cedric, L. Rotorua and Cobb Valley, Nelson; 1 ♂, 1 ♀, Gore; also specimens from central North I to Southland seen.

Remarks: In view of the regional differences in *G. omoplaca* in the South I, the lack of differences between Southland and the Auckland I ♀♀, as well as the lack of larvae in collections, the resident status of *G. omoplaca* in the subantarctic is uncertain.

G. omoplaca is a common species from at least Rotorua in the North I to Southland. Little is known of its biology, except that an adult was reared from a pupa found under weeds in soil in a *Pinus radiata* stand at Eyrewell Forest, Canterbury (F.R.I. records)

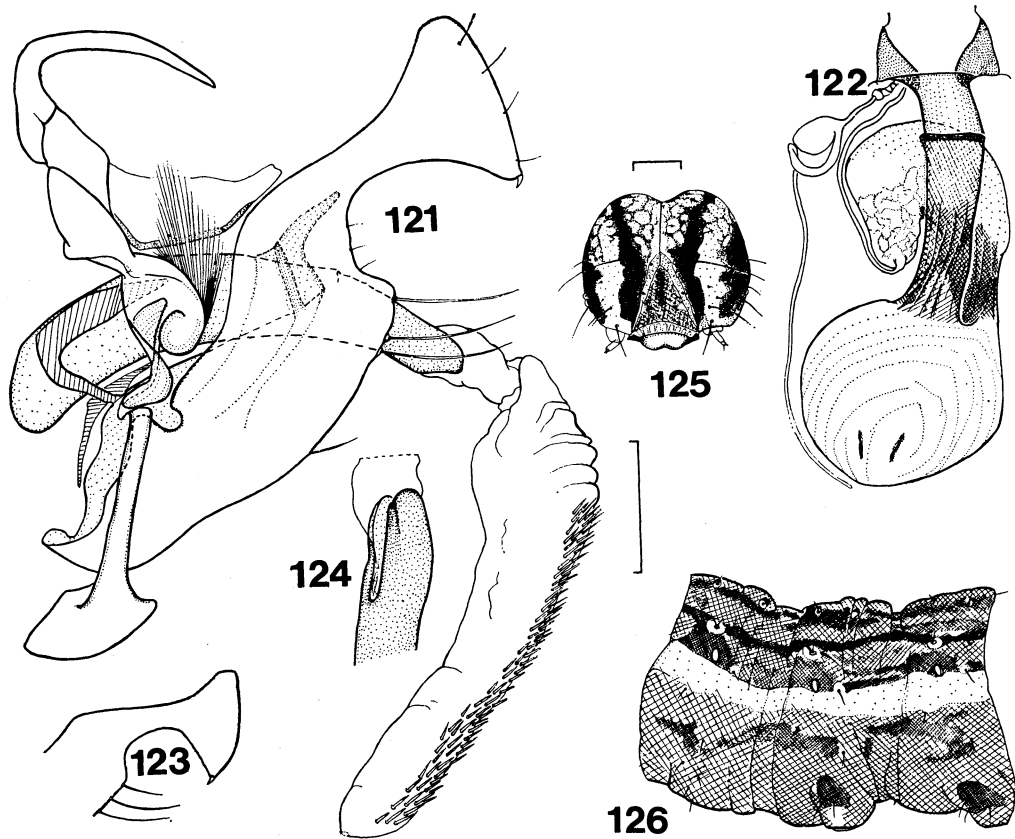


Fig. 121–126. *Graphania ustistriga*. 121, ♂ genitalia, side view, Antipodes I; 122, ♀ genitalia, ventral view, Antipodes I, 123, ♂ valval apex, Antipodes I, showing variation (cf Fig. 121); 124, ♂ aedeagus apex, ventral; 125, larva, head capsule showing color pattern, chaetotaxy; 126, larva, abdominal segments 2–4, showing color pattern, chaetotaxy. Scales represent 1 mm; Fig. 126 same scale as Fig. 125.

25. ***Graphania rubescens*** (Butler) n. comb.

Butler, 1879. *Cist. Ent.* 2(22): 489 (*Xylophasia*).

External characters: Color pattern as in Hudson (1928: plate IX, fig. 4, 5). Antennal pectinations in ♂ shorter than segment width, ♀ antenna brown; ♀ forewing sometimes blotched irregularly with purplish brown. Wing span: 34 mm (♂ Enderby I) 34–45 mm (both sexes, N, S, St).

♂ *genitalia* (Fig. 119): Valva in N, S, St Is specimens slender, cucullus sharply angled dorsally and ventrally, ampulla stout, finger-like and uncus stout in mid-length; in Enderby I. ♂: valva with cucullus arm short, broad and cucullus itself reduced, rounded, ampulla slender, uncus evenly tapered from base to apex. All specimens with vesica scobinate zone as long as aedeagus, cornuti uni-seriate on basal third, multiseriate thereafter; aedeagus with a ventral thorn on right side.

♀ *genitalia* (Fig. 120): Posterior margin of lamella antevaginalis convex; ductus bursae gradually narrowed to corpus bursae; corpus bursae globose, symmetrical; signum a sclerotised laterally scobinate fold; appendix bursae dorsal (as in *E. mutans*), apical 1/2 faintly sclerotised; lodix (Fig. 118) subtriangular, with a “keyhole” midline cleft.

Type locality: Otago.

Distribution: Central North I, South I, Stewart I, Auckland Is (Enderby).

AUCKLAND IS: 1 ♂, Enderby I, Sandy Bay, at light, 1–50 m 16.I.1963, Wise.

South I: 1 ♂, 1 ♀, Mt Arthur; Stewart I: 2 ♂♂, 2 ♀♀, Rakeahua Valley, Feb. 1968.

Remarks: The atypical Enderby I ♂ may represent a subspecies, but there is insufficient material on which to arrive at a conclusion. While the genitalia show reduction of some structures, external characters are within the range of variability found in mainland collections. Enderby I, has not been well explored, and until larvae (and more adults) have been collected, the status of *G. rubescens* is that of a probable resident there.

G. rubescens on the mainland is amongst the most ubiquitous species collected south of 38°S and away from improved pasture lands, whether in intermontane grassland, in podocarp forests or in pure *Nothofagus* forest, and (as adults) at altitudes up to 1400 m.

26. **Graphania ustistriga** (Walker) n. comb.

Walker, 1857. List Lepidopt. Ins. Brit. Mus. **11**: 630 (*Xylina*).—Meyrick 1887. *Trans. N.Z. Inst.* **19**: 26 (*Mamestra*).—Hampson 1905. Catal. Phalaenae Brit. Mus. **5**: 377 (*Morrisonia*).—Meyrick 1912. *Trans. N. Z. Inst.* **44**: 100 (*Melanchnra*).

lignisecta Walker, 1857. List Lepidopt. Ins. Brit. Mus. **11**: 631 (syn. Meyrick 1887, l.c.) (*Xylina*).

External characters: Color pattern as in Hudson (1928: pl. VIII, fig. 16, 17). Antenna black in both sexes, ♂ pectinations knife-like, as long as segment width; ♀ unpectinate, each segment with lateral setae at midlength. Thorax scales bifid or multifid; Antipodes ♂♂ more brown suffused than mainland species, ♀♀ darker grey than on mainland. Abdominal segment 2 with a pair of pouch scent tufts in ♂. Wingspan: 44–50 mm (both sexes).

♂ *genitalia* (Fig. 121, 123–4): Cucullus with a ventral apical spine, distance between dorsal and ventral apices either greater (mainland specimens) or smaller (Antipodes I, Fig. 121, 123) than length of expanded zone; sacculus apex either rounded (mainland) or rectangular (Antipodes). Digitus and ampulla at right angles to each other, both slender. Vesica cornutal strip as long as aedeagus.

♀ *genitalia* (Fig. 122): Lodix deeply to shallowly cleft; ductus bursae with collicular area sclerotised, narrow, widening towards the unsclerotised fold between collicular zone and cestum-zone of ductus bursae, ductus bursae thence of even width, obliquely striate, corpus bursae with 2 long signa; appendix bursae C-shaped, wrinkled and unsclerotised apically, smoothly sclerotised elsewhere.

Larva: *Instar I:* Chaetotaxy as in *E. m. erebia*, except that no setae are spatulate, and all setae far longer than their pinacula are wide; no color pattern; headcapsule with a blotch at each setal base; crotchets on prolegs 6, 6, 10, 12. *Instar II:* Setae long; color pattern: zone between the D_2 setae a pale narrow line, then a broad darker stripe darkest intersegmentally, bounded ventrally by the spiracle and seta L_1 . Below this, a pallid zone, darkened slightly below the level of seta SV_1 . *Instar III:* As above, but with venter (zone between SV_1 setae) darker; head capsule with coarse dark reticulations as well as basal blotches by setae. *Instar IV—ultimate:* Ocelli 1–4 evenly spaced. All setae short (i.e. not much longer than pinaculum base); dorsal line double, dark brown, area between D_2 setae brown, marbled, usually darker and cloudy in mid-segment; D_2 setae on white pinacula marked mesally by a black arc; immediately ventrad is a narrow white stripe usually interrupted intersegmentally and anteriorly on each segment; below this stripe a broad marbled dark zone, darkest on ventral 1/2, almost enclosing the spiracles and bounded below by a narrow white line, between this line and seta L_2 is a paler zone, and ventral of L_2 a darker, marbled zone (Fig. 126). Head capsule (Fig. 125) with dorsal and lateral dark stripes separated by coarse reticulations. Ultimate instar body length: ca 50 mm.

Type locality: “New Zealand.”

Distribution: North, South, Stewart, Big South Cape, Antipodes Is.

Host plants: *G. ustistriga* is polyphagous (based on records at Forest Research Institute, Rotorua, N.Z.).

ANTIPODES I: 2 larvae, Reef Point, Kuschel; 19 ♂♂, 2 ♀♀, Reef Point, Kuschel, Johns.

Remarks: The 2 larvae from Antipodes I are generally marbled dorsad of the spiracles and pallid ventrally; also there are differences in ground color and ♂ genitalic proportions between Antipodes and "mainland" adults. As such differences are not as pronounced as those between *G. i. insignis*/*G. i. pagaia* or *G. m. mutans*/*G. m. erebia*, subspecific status is not warranted for Antipodes *G. ustistriga*.

G. ustistriga is, next to *G. mutans*, the most ubiquitous noctuid in New Zealand, having adapted to urban, horticultural and agricultural environments. The larva is capable of living arboreally for the first 3 instars, thence concealing itself in litter during the day in succeeding instars. Arboreal larvae show reverse countershading, i.e. the venter is darker than the dorsum and this coupled with the bright lateral stripe makes the small larva difficult to see amongst foliage.

The record by Lindsay (1930) from Pitt I has not been substantiated by later collecting.

***Pseudaletia separata* (Walker)** Fig. 91.

Common (1965: 14-17) describes and figures genitalia, and discusses distribution. Franclmont (1951: 57-58) gives synonymy. In New Zealand, *Ps. separata* is called "the Northern Armyworm" and is injurious to pastures north of 42°S. The stubby, short setulae on the compound eyes, and lack of a large scale tuft on the basal antennal segment distinguish adults of this species from subantarctic *Graphania*.

ANTIPODES I: Antipodes I: 2 ♂♂, Reef Point, Kuschel; 1 ♀, Stella Bay, Feb. 1969, Kuschel.

Distribution: Oriental-eastern Pacific, Fiji, Australia, New Zealand (Common 1965: 14); Kermadec Is, North I, South I north of 42°S; adults on Antipodes I (49°S). Absent from Chatham Is (44°S).

Remarks: The scarcity of breeding *Ps. separata* in New Zealand south of 42°S makes it unlikely that this species breeds on Antipodes I. It was not recorded in Feb. 1967 on Chatham Is, nor in Nov. 1968 or Feb. 1969 on Big South Cape I, nor in Feb. 1968 on Stewart I. It is noteworthy that the 1968/69 summer was characterised by massive movements of Australian Lepidoptera across the Tasman (Gibbs 1969; Fox 1969; Dugdale 1969).

Larvae were not collected in apparently suitable samples taken by Dr Kuschel and P. M. Johns on Antipodes I.

***Othreis materna* L.**

1 ♂ was collected in the Beeman Camp Hostel in late summer, 1967. The possibility that this tropical moth was taken there from the naval supply ship "Endeavour" is fairly strong. *O. materna* is often found in New Zealand usually collected sheltering in banana shipments from the Pacific, but occasionally collected at light in sparsely populated areas.

(8) OECOPHORIDAE

The Oecophoridae is well represented in New Zealand, with over 200 species, of which most feed on plant detritus (e.g. *Borkhausenia*, *Atomotricha*) or dead wood (*Izatha*, *Gymnobathra*, *Barea*), some on lichens and algae (*Trachypepla*, "*Cryptolechia*") and a few on living tracheophyte tissue (*Heliosibes*, *Proteodes*, "*Cryptolechia*" *rhodobapta*, *Nymphostola*). The family is virtually absent from Chatham Is (*Barea* present, but this genus can be introduced with timber), absent from Kermadec Is and yet is strongly represented on such off-shore islands as Coppermine, Stewart, Cod-fish, Big South Cape, Stephens Is. In the Subantarctic, there are 2 genera. *Tinearupa* with 1 endemic brachypterous species on Auckland and Campbell I; and *Izatha* with 1 endemic fully winged species on Snares I.

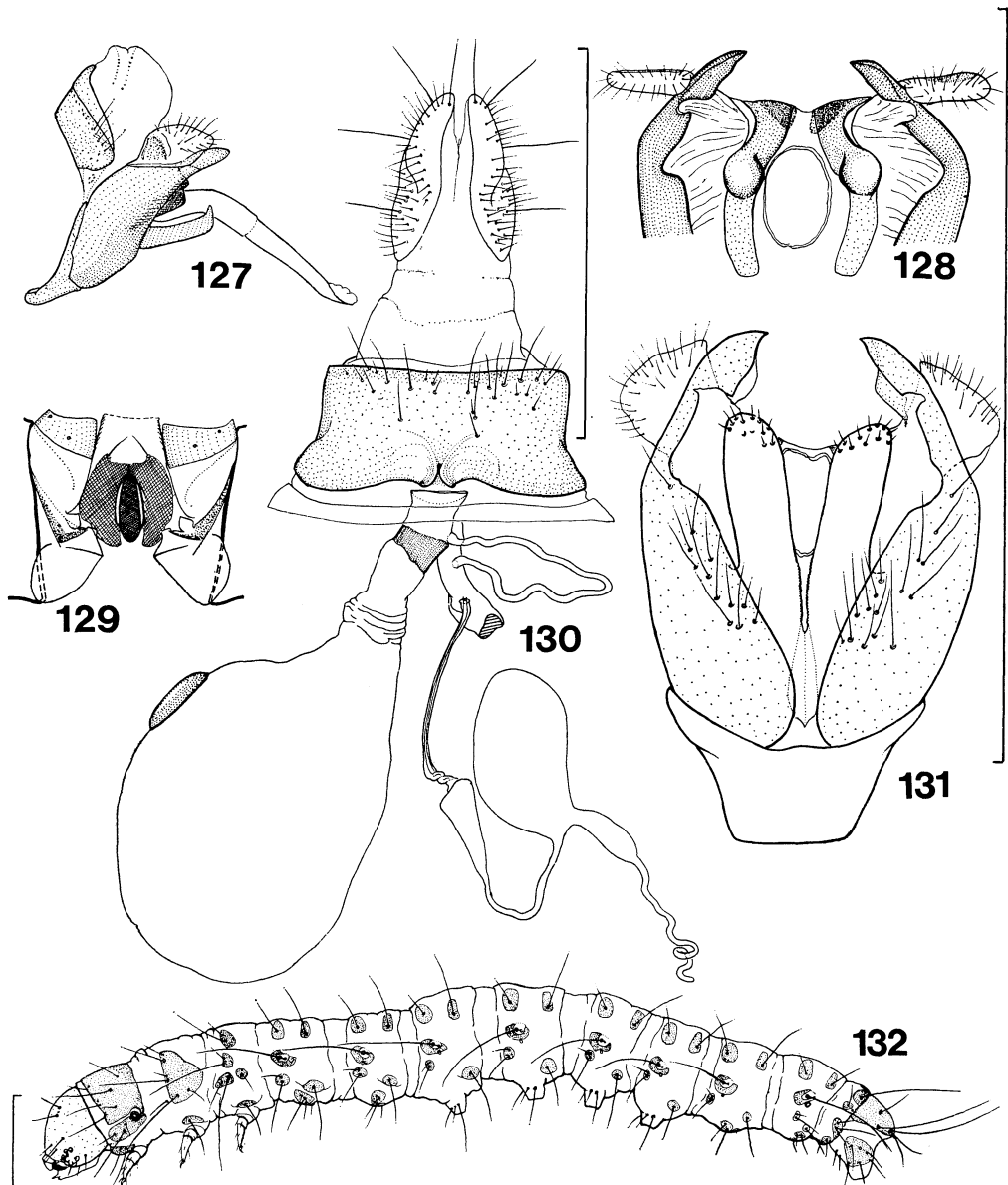


Fig. 127–132. *Izatha oleariae*. 127, ♂ genitalia, side view; 128, ♂ genitalia, basal costal structures; 129, larval head capsule mentum structures; 130, ♀ genitalia, ventral view; 131, ♂ genitalia, ventral view; 132, larva, chaetotaxy and pigmentation. Scales represent 1 mm; Fig. 129 not to scale.

Oecophoridae are distinguished by their curved, slender labial palpi, scaled haustellum, minute, mesally directed maxillary palpi, smoothly scaled heads and hindwings with veins Rs and M_1 parallel, never stalked or divergent, and with vein CuP present. The larvae resemble tortricids in that setae L_1 , L_2 are borne on a common pinaculum on the abdominal segments, but may be distinguished from tortricids by the characteristic pits on the submentum and the chaetotaxy of the prolegs and the 9th abdominal segment.

KEY TO SUBANTARCTIC OECOPHORIDAE

1. Adults brachypterous, blackish; larvae under lichens, integument dark with white patches... **Tinearupa**
Adults fully winged, pallid; larvae in twigs and branches, integument unpigmented..... **Izatha**

Izatha Walker

Walker, 1864. List Lepidopt. Ins. Brit. Mus. **29**: 786.

Semiocosma Meyrick, 1882. *Proc. Linn. Soc. N.S. Wales* **7**: 424; type-species *Izatha peroneanella* Walker (syn. Meyrick 1915: 215).

Type-species: *Izatha attackella* Walker, op. cit: 787.

Additional generic characters: ♂ genitalia with uncus weakly developed, tegumen weakly developed, obsolete laterally; valva, juxta, aedeagus strongly developed, heavily sclerotised, costal base of valvae with mesally directed ornate processes. ♀ genitalia: 8th sternite fused with lamella postvaginalis, ductus seminalis lacking a bulla, arising at one side of collicular area; cestum weak or absent, corpus bursae with a plate-like or folded signum.

Philpott (1927d: 103–104, fig. 4–11, 106, fig. 12–18) described ♂ genitalia.

Izatha species are wood-borers and are found from the coast to the alpine scrublands. A group of species has the juxta enlarged and the abdominal tergites with spine-scales, and it is to this group that the Snares species shows the most obvious similarity.

27. ***Izatha oleariae*** Dugdale, new species

Adult fully winged; eyes not reduced; frons and vertex planoconvex, maxillary palpi minute, porrected, labial palpi with apical segment untufted at 1/2 length but with a band of black scales. Head, thorax, forewings grey, forewings with markings in brownish grey, viz: an oblique mark on the costa basally, a 2nd at 1/3, connecting a diffuse blotch on the discal cell; another distinct spot at the apex of the discal cell; costal apex, and termen with an interrupted marginal series of black scales. Hindwings and abdomen dark grey. ♀ similar, but generally more pallid. Antenna in ♂ setulose in whorls, setulae longer than segment width. Body length (vertex—wing tip) 8.5–9.5 mm (both sexes).

♂ *genitalia* (Fig. 127, 128, 131): Uncus length less than that of tegumen dorsally; sacculus and other valval structures as in Fig. 131; basal costal process directed ventrally, arms surrounding aedeagus (Fig. 128); aedeagus narrow, tubular, basally bent, apically blunt, orifice dorsal, cornuti absent.

♀ *genitalia* (Fig. 130): Lamella postvaginalis bi-concave, mesally produced; lamella antevaginalis weak, narrow; colliculum scarcely sclerotised, ductus seminalis arising on right side, just above short, weak cestum; corpus bursae with a single convex round signum; spermatheca with duct shortly spiralled, thence evenly bowed to oviduct.

Larva: Head capsule with ocellar seta 7 between and below Ocelli 3 and 4; submentum as in Fig. 129, sclerotised "arms" to mentum setae scarcely produced; prothorax with most posterior L seta closer to middle L seta than is the anterior one; abdominal segments with SD pinaculum G-shaped, reclinate, 9th abdominal segment with setae D_1 , SD_1 , on separate pinacula. Chaetotaxy as in Fig. 132.

Type locality: Station Point, Snares I.

Distribution: Snares I.

Hostplant: *Olearia lyalli* (twigs, branches).

SNARES I: Holotype ♂ "Station Point, Snares I, Jan. '67 P. M. Johns" in type collection, ED. Allotype ♀, 9 ♂♂, 3 ♀♀ paratypes, same data. 1 larva, beaten from *Olearia*, Johns (ED).

Remarks: *I. oleariae* in wing pattern resembles the group of species to which *I. milligani* Philpott and *I. balanophora* belong, but on genitalia and abdominal spine-scaling resembles more the *I. attactella* group. From all other *Izatha* species *I. oleariae* is distinguished by its planoconvex vertex (conical in those species with a spine-scaled abdomen) and long-setulose ♂ antennae.

The larva is presumably a wood-borer, and will probably be found in the suppressed dead twigs and branches of *Olearia lyalli*. It can be readily distinguished from the larva of the far commoner *Proterodesma byrsopola* by the presence of setae L_1 , L_2 on a common pinaculum on the abdomen (these setae on separate pinacula in *Proterodesma*) and by the presence of long pits on the mentum (these absent in *Proterodesma*).

Tinearupa Salmon & Bradley, 1956

Salmon & Bradley, 1956. *Rec. Dominion Mus.* **3**: 66.

Type-species: *Tinearupa sorenseni* Salmon & Bradley, 1956, l.c.

Additional generic characters: Compound eyes elliptic; abdominal tergites evenly spinose-scaled in both sexes; head lacking ocellus, somewhat flattened (Fig. 134, 135); ♀ hindwing with frenulum single.

♂ *genitalia:* Uncus apex laterally compressed; gnathus U-shaped, arms stout; aedeagus reduced; juxta and ventrolateral anellar structures fused to form a complex supporting (? and intromittant) structure, dorsal anellar structures as 2 setose pads between which is everted the vesica; valvae broadly ovate, costa and sacculus simple, basal costal process directed downwards, fingerlike.

♀ *genitalia:* Lamella postvaginalis mesally split into 2 sclerotised setose and punctate pads; lamella antevaginalis quadrangular, colliculum a ventral plate fused to lamella antevaginalis; ductus bursae kinked from end of colliculum, thence a long, straight, evenly widened tube passing indistinctly into the corpus bursae; no signum; ductus seminalis arising beyond the colliculum, bulla seminalis ovoid, with a narrow blind anterior filament; spermatheca reduced.

Larva: Anal comb present; submentum with a pair of narrow pits; 4–5 SV setae on abdominal prolegs; SV on meso- and metathorax single; L pinaculum on prothorax not broadly abutting ventral edge of shield; D pinacula on meso- and metathorax unevenly pigmented; SD pinacula on abdominal segments enclosing spiracle, SD_1 close to spiracle, separated by distance about equal to $3 \times$ spiracle width.

Tinearupa, endemic to Auckland and Campbell Is, externally resembles *Gymnobathra omphalota* Meyrick, but differs in minor gnathos, aedeagal, ♀ genital and body vestiture characters. The gnathos is weak, thin and V-shaped, the aedeagus is strongly developed (and the juxta is small) (Philpott 1927a: fig. 11), the ductus seminalis arises close to the sterigma and lacks a bulla, and the spermatheca is large in *G. omphalota*. The New Zealand species usually placed in *Heliostibes* resemble *Tinearupa* in abdominal spinosity, but the larval chaetotaxy and adult genitalic characters are greatly different. Also, our "*Heliostibes*" species have ocelli (crammed between the cranium edge and the compound eye margin), which are absent in *Tinearupa* and *Gymnobathra*.

The similar head, body coloration, and ♂ genitalic specialisations in *Tinearupa* and *Gymnobathra* suggest that *Tinearupa* represents a relict of an early oecophorid invasion, able to persist because of the mode of larval life and the not unusual development of brachyptery (*Borkhausenia*, *Oxythecta*, *Atomotricha*, *Proteodes* are other oecophorid genera where brachyptery has arisen in New Zealand). Most *Gymnobathra* larvae are wood-borers in decaying twigs and branches, whereas *Tinearupa* larvae live in galleries amongst moss and lichen.

Tinearupa, previously known only from Campbell I, has now been found on Adams I, Auckland Is. The two populations are extremely close and may be regarded as subspecifically distinct. Both are rock-crevice, cliff-haunting insects of extremely localised distribution on each island.

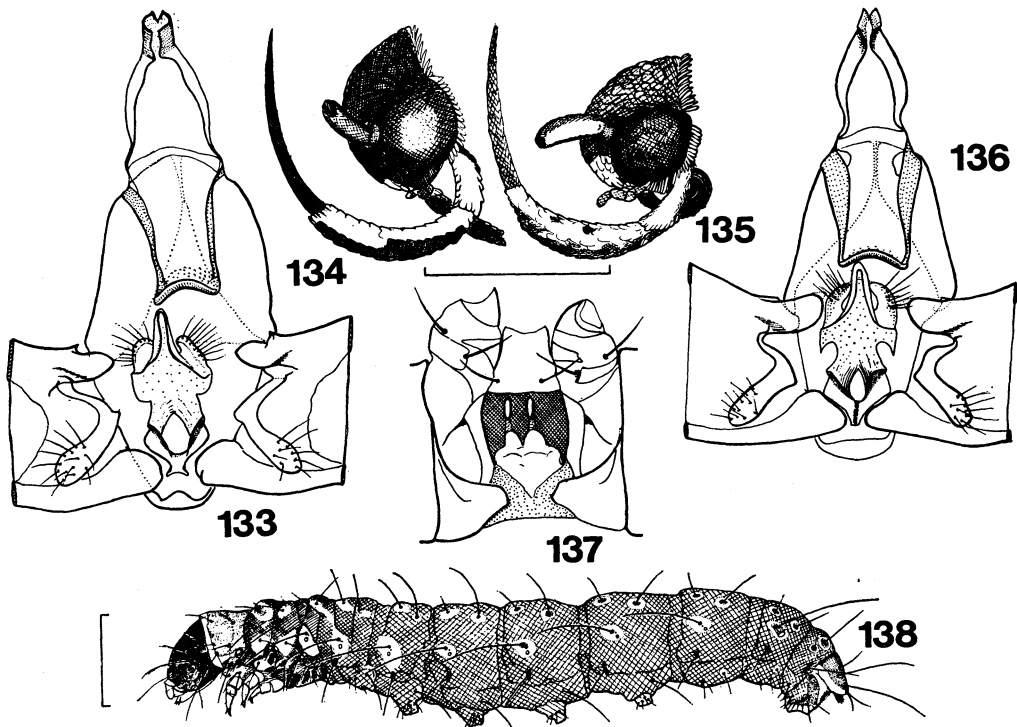


Fig. 133–138. *Tinearupa sorenseni*. 133, *T. s. sorenseni* ♂ genitalia, valvae omitted; 134, ditto, ♂ head; 135, *T. s. aucklandica*, ♂ head; 136, ditto, ♂ genitalia, valvae omitted; 137, larva, head capsule mentum structures; 138, larva, *T. s. aucklandica* showing chaetotaxy color pattern. Scales represent 1 mm; Fig. 133, 136 same scale as Fig. 128, 131.

28a. ***Tinearupa sorenseni sorenseni*** Salmon and Bradley, 1956

Salmon & Bradley, 1956. *Rec. Dominion Mus.* 3: 66–68, fig. 10–15 (as species).

Body length (vertex—wing tip): 5.1–7.00 mm; apical labial palp segment over twice as long as a compound eye (Fig. 134).

♂ *genitalia*: As figured by Salmon & Bradley (1956: fig. 12); details of valvae base, vinculum and aedeagus-anellar structures as in Fig. 133.

♀ *genitalia* (Fig. 139): Lamella postvaginalis plates setose laterally, punctate mesally; lamella antevaginalis about as wide as long; colliculum longer than lamella; ductus bursae as figured; spermatheca with chamber reduced; bulla seminalis greatly enlarged, post-bulla section of ductus seminalis arising centrally; ductus bursae (scobinate zone) length twice that of corpus bursae (unscobinate zone).

Larva: As for Auckland I (see below), differing in having the pinacula white, and the dorsum with 3 white stripes.

Type locality: Courrejolles Peninsula, Campbell I.

Distribution: Campbell I (North Cape; Rocky Bay; Courrejolles Pen.).

CAMPBELL I: 3 ♂♂, Courrejolles Pt, 200 m, ex moss bank, 1962, Clark; 8 ♂♂, 1 ♀, Courrejolles, on rockwall, Johns; 7 ♂♂, 8 ♀♀, 4 larvae North Cape, lichens on cliff, Johns; 1 ♂, Rocky Bay, Johns.

28b. ***Tinearupa sorenseni aucklandica*** Dugdale, new subspecies

Externally, differs from *T. s. sorenseni* in body length (4.2–5.0 mm); apical segment of labial palpus

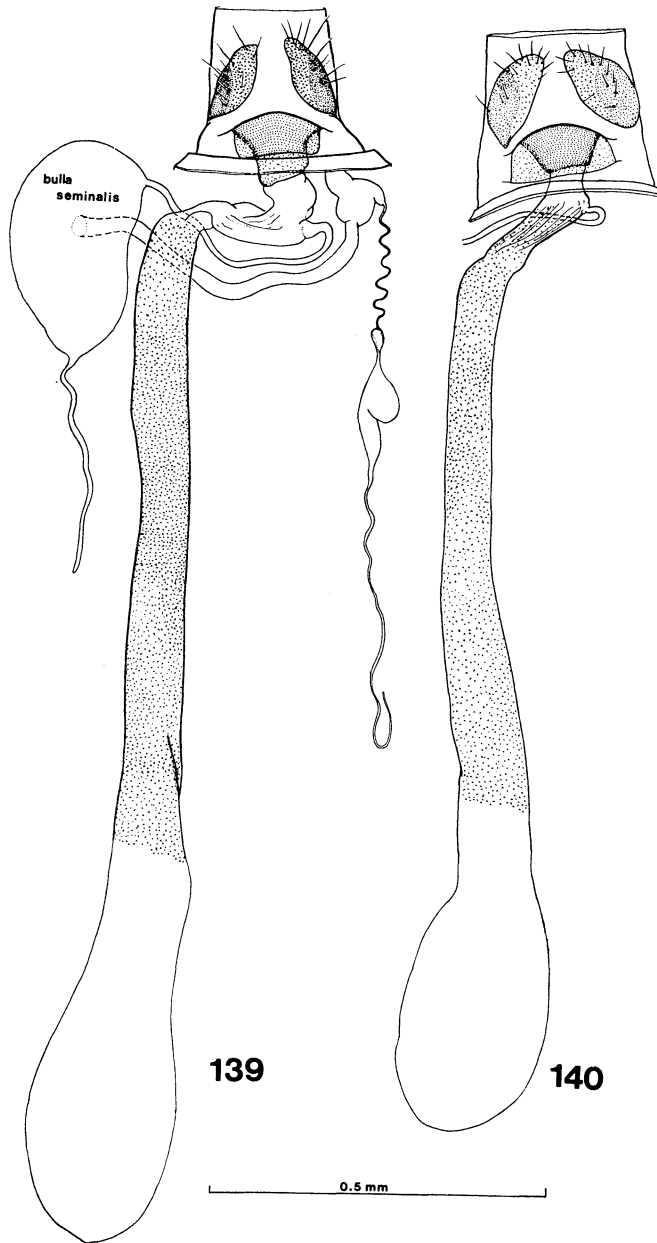


Fig. 139–140. *T. sorenseni*, ♀ genitalia. 139, ♀ genitalia, *T. s. sorenseni*; 140, ♀ genitalia, *T. s. aucklandica*. Scale represents 0.5 mm.

less than twice as long as compound eye (Fig. 103); frons broadly white-scaled; ground color of wing and body scales lighter grey than in *T. s. sorenseni*.

♂ *genitalia* (Fig. 134): Uncus strongly narrowed basally; juxta base tapering (uncus base not strongly narrowed basally, juxta base wide, truncate apically in *T. s. sorenseni*).

♀ *genitalia* (Fig. 140): Sternite 7 with sclerotised zone emarginate on caudal margin; colliculum shorter than lamella antevaginalis; ductus bursae (scobinate zone) length 1.5 that of corpus bursae (unscobinate zone).

Larva (Fig. 137, 138): Head and prothoracic shield with reticulate microsculpture, dark brown to black; submentum (Fig. 137) entire, sclerotised, with 2 black-rimmed oval pits on a Y-shaped heavily sclerotised area; mentum unsclerotised. Pretarsal setae unmodified. Integument finely granulose-scobinate, darkened dorsally, pinacula pallid, D and SD meso- and metathoracic pinacula longitudinally infusate. Crochets biordinal, in a circle. SV setal group single on meso-metathorax and on 7th, 8th, 9th, abdominal segments, bi-setose on 1st abdominal segment, 5-setose on prolegs. D pinacula on abdominal segments circular. Ninth abdominal segment with setae D₁, D₂, SD, all on separate pinacula, setae and pinacula D₁, SD, very small. Anal shield blackened, apical setae decurved, divergent, not longer than D₁ setae; anal comb an oval plate with 7 radial teeth.

Type Locality: Adams I: Lake Turbott, on rock faces.

Distribution: Adams I, Auckland Is.

Hostplant: ?lichens, mosses.

AUCKLAND IS: Holotype ♂ "on rock face, L. Turbott, Adams I., 27.I.1966, K.A.J. Wise" in collection, ED. Allotype ♀, 12 paratypes, 2 last instar larva, same data.

Remarks: The 2 subspecies are readily distinguished from each other by the relative length of the apical labial palp segment (shorter in *T. s. aucklandica*), the uncus shape (narrowed basally in *T. s. aucklandica*) and 7th sternite sclerotisation (straight caudally in *T. s. sorenseni*, caudally emarginate in *T. s. aucklandica*). The larva of *T. s. sorenseni* has 3 conspicuous dorsal stripes and other white pinacular areas are larger than in *T. s. aucklandica*. *T. s. sorenseni* is known from rock faces on Courrejolles Pen. (from the splash zone to 220 m), Monument Hrbr, Davis Point, Smoothwater Bay, and from Mt Azimuth above 350 m. At present *T. s. aucklandica* is known only from one locality on Adams I but will no doubt be found on suitable rockfaces elsewhere in the Auckland group.

Endrosis Huebner

Endrosis sarcitrella (Linnaeus)

This domestic tramp species, a world-wide pest of stored products is established at Beeman Camp, Campbell I (Yano 1964: 258, as *E. lacteella* Denis & Schiffermueller) and in the storehouse at Ranui Cove, Auckland I. One adult was reared from larvae in a tin of dried peas by K.A.J. Wise.

Hoffmannophila Spuler, 1910

Hoffmannophila pseudospretella (Stainton)

This domestic tramp species, a world-wide pest of stored cereals and plant and animal fibres is not recorded from Campbell I, but is established in the hut on Snares I, in the depot hut on Antipodes I, and in the boat-shed on Enderby I.

(9) PSYCHIDAE

All N.Z. Psychidae have case-bearing larvae; adults are distinguished from other Subantarctic moths by their absence of a haustellum, absence of an eye-cap or pecten on the antennal scape and in the ♀ by the presence of a scentgland tuft of silky hair-like scales on the 7th abdominal segment.

The larvae have the spiracle and the pre-spiracular pinaculum on the prothorax incorporated in the prothoracic shield and the abdominal prolegs have uniordinal crotchets arranged in a lateral penellipse.

The N.Z. fauna is poorly known, with most species known only from ♂♂. The best-known species are those in the Psychinae, large species with immobile legless ♀♀, placed in *Oiketicus* Guilding and *Orophora* Fereday. These 2 genera are absent from the Subantarctic. The Taleporinae (or Psycheodinae) are more numerous (21 described species) but mostly known from ♂♂; ♀♀ are either fully winged or apterous, and the tarsi are either 5- or 1-segmented. Species have been placed in *Narycia* Stephen, *Taleporia* Huebner (both Palaearctic genera), *Mallobathra* Meyrick, *Scoriodyta* Meyrick and *Reductoderces* Salmon & Bradley.

Comparison of adults and larvae of the N.Z. species included in *Taleporia* with the figures given by Kozhanchikov (1956: 222–235) for Palaearctic species clearly show that *Taleporia* cannot include our species. Although the unique specimen (stated to be a ♀) of *Narycia petrodoxa* Meyrick was not examined, Hudson's figure (1928: pl 49, fig. 26) resembles a *Mallobathra*, and it is unlikely that *Narycia* is represented in New Zealand. Kozhanchikov (1956: 219, 224) also doubted the validity of *Narycia* and *Taleporia* outside the Palaearctic. (I am indebted to Dr J. C. Watt for a translation.) As little is known of Australian Taleporinae no conclusions can be drawn regarding the degree of similarity between either N.Z. and Australia or N.Z. and the Palaearctic.

Five species are present in the Subantarctic of the 4 endemic genera recognised here (*Mallobathra*, *Scoriodyta*, *Reductoderces*, gen. indet.). Only *Scoriodyta* is absent from the Subantarctic. The undetermined genus, of which larvae only are known, is not found south of Snares I., and appears to be strictly arboreal, whereas the other 2 genera are found in litter and on rockfaces, tree trunks or branches. *Mallobathra*, *Reductoderces* and *Scoriodyta* on the mainland are found from the coasts to the alpine zones, and thus, with their wide tolerance of sites and climate, at least *Mallobathra* and *Reductoderces* could well survive a glacial epoch, probably living in plant communities on the coastal rocks and cliffs. The apparent absence of *Reductoderces* on Snares I is possibly unreal, and may be the result of less intensive collecting.

KEY TO SUBANTARCTIC PSYCHIDAE

1. Larval case (Fig. 153) curved, truncate-conical; larva with pretarsus of metathoracic leg longer than tibia (Fig. 161), metasternum with sclerotised sharp anterior apices, mesal pairs of setae equally spaced (Fig. 161); anal proleg with 3 strong posterior setae (Fig. 162); anal shield with setae D₂ on tubercles (Sn).....gen. et sp. indet.
Larval case straight, truncate or pointed; larval pretarsus not longer than tibia; metasternum with anterior apices rounded, unsclerotised; anal proleg with 1 or 2 strong posterior setae; seta D₂ not tuberculate on anal shield (A, C, Ant).....2
2. ♀ fully winged or with 5 tarsal segments; ♂ genitalia with gnathos arms present, anellus conical, sheathing aedeagus. Larval case subcylindrical, apex open, no flap, formed of long debris, usually arranged in herring-bone pattern; larva with crotchets decreasing in size and number from front to back on each successive segment (Fig. 144); anal proleg with 2 strong curved posterior setae (Fig. 143); mesothoracic shield including SD setae (C).....
.....***Mallobathra campbellica*** n. sp.
- ♀ apterous, tarsi 1-segmented; ♂ lacking a gnathos, anellus not conical, not sheathing aedeagus. Larval case elongate conical, flattened, flanged laterally, with a long apical flap, formed of granular debris, sometimes with plates of debris; larva with all proleg crotchets uniform (Fig. 145); anal proleg (Fig. 158) with 1 strong straight posterior seta; mesothoracic

- shield not including SD setae (*Reductoderces*).....3
3. Larva with 7th and 8th abdominal segments bearing setae V_1 on separate pinacula; posterior metasternal setae over twice as far apart as anterior setae; ♂ uncus unmodified laterally (♀ unknown).....**Reductoderces fuscoflava** S. & B.
Larva with V_1 pinacula fused on 7th and 8th abdominal segments; posterior metasternal setae less than twice as far apart as anterior setae.....4
4. Larva with setal pair V_1 on a common pinaculum on 2nd abdominal segment (Fig. 154); ♂ uncus with lateral flaps (♀ unknown) (A).....**Reductoderces aucklandica** n. sp.
Larva with each V_1 seta on a separate pinaculum on 2nd abdominal segment (Fig. 159); (adults unknown, Ant).....**Reductoderces** sp. indet.

Mallobathra Meyrick

Meyrick, 1888. *Trans. N.Z. Inst.* **20**: 102.

Type-species: *Mallobathra crataea* Meyrick (1888: 102), designated Meyrick 1915: 240.

♀ with tarsi 5-segmented; fully winged or apterous; ♂♂ with all veins present, R_4 and R_5 long-stalked. ♂ genitalia with sacculus and costal arms broadly confluent, not twisted; gnathos arms present; apices of uncus distant, i.e. uncus truncate; anellus conical, sheathing aedeagus.

Larva with 2 strong curved posterior anal proleg setae; mesothoracic shield including L setae; abdominal prolegs with crochets diminishing in size and number on each successive segment.

The following species are here included: *M. crataea*; *Taleporia aphrosticha* Meyrick; *M. cana* Philpott, *M. fenwicki* Philpott, *M. homalopa* Meyrick, *M. memotuina* Clark; *M. obscura* Philpott, *M. perriseuta* Meyrick, *Taleporia scoriotata* Meyrick, *M. subalpina* Philpott, *M. strigulata* Philpott, *M. tonnoiri* Philpott.

The above concept of *Mallobathra* gathers together those species with a gnathos, a sheathing, conical anellus and ♀♀ that are either fully winged or apterous but which have 5-segmented tarsi, and long 7th segment scent-gland "hairs." Some species are common in forest or scrub, with trunk-haunting or litter-dwelling larvae, while others are found on lichen-encrusted cliffs. The only member of the genus known from the Subantarctic is a litter-dwelling species. Winged ♀♀ of *Mallobathra* species are reluctant to fly (conversely, ♂♂ are brisk fliers) and drop to the ground when disturbed.

29. **Mallobathra campbellica** Dugdale, new species

♀ (wings and thorax worn): Head with slender yellow scales; forewings with patches of yellowish scales on a purplish brown, slightly iridescent ground, hindwings dark grey, abdomen dark grey, scent gland scales long, hair-like, crimped at mid-length, pale yellow. Length (vertex to wing tip): 7.4 mm.

♀ genitalia (Fig. 141): Lamella antevaginalis with a central prominence; ductus bursae lacking a distinct colliculum, twisted, broad; corpus bursae irregular, cumuloid, signum absent; ductus seminalis short, arising ventrally at about 1/3 length of ductus bursae from sterigma; spermatheca as figured, only one terminal chamber.

Larva (Fig. 142-144): Chaetotaxy as in Fig. 144; D setae on 1st abdominal segment on two pinacula D_1 (anterior, D_1 , D_2 posterior); SV group tri-setose above each proleg; metathoracic posterior sternal setae closer together than anterior setae (Fig. 142).

Type Locality: Beeman Camp, Campbell I.

Distribution: Campbell I.

CAMPBELL I: Holotype ♀: "Beeman Camp, 12.I.1969, G. Kuschel" in type collection, ED; 24 1st instar larvae, Lookout Bay, Campbell I, ex litter sample 69/22, Kuschel.

Remarks: *M. campbellica* differs from the species found on Big South Cape I in its lack of a signum, and in having a median projection on the lamella antevaginalis (the lamella is emarginate in the Big South Cape species, which on ♂ genitalia resembles *M. crataea* and *M. strigulata*). The

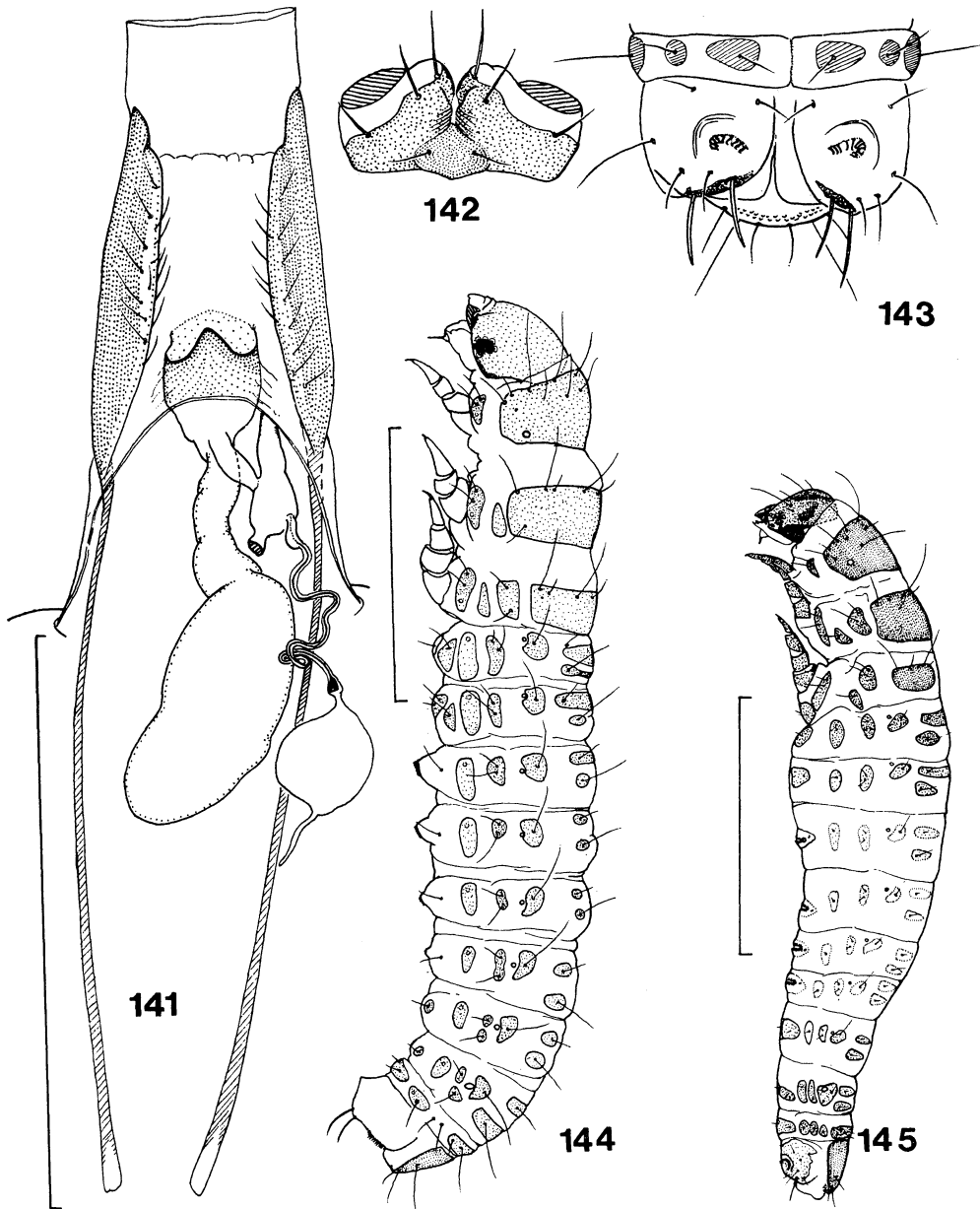


Fig. 141–145. Psychidae (*Mallobathra*, *Reductoderces*). 141, *Mallobathra campbellica*, ♀ genitalia; 142, ditto, larval metasternum; 143, ditto, larval abdominal segments 9, 10, ventral view; 144, ditto, larva, chaetotaxy and pigmentation; 145, *Reductoderces fuscoflava* larva, chaetotaxy, pigmentation. Scales represent 1 mm; Fig. 142, 143 same scale as Fig. 141.

larva of *M. campbellica* differs from the Big South Cape species in having the D_1 and D_2 setal pairs on separate pinacula, not fused into a shield as in the Big South Cape and some mainland species. Only 1st instar larvae were available.

M. campbellica ♂♂ should be about in December in sheltered clearings amongst scrub.

Reductoderces Salmon and Bradley

Salmon & Bradley, 1956. *Rec. Dominion Mus.* **3**: 69.

Type-species: *Reductoderces fuscoflava* Salmon & Bradley, op. cit: 70, textfig. 1, fig. 22.

♀ apterous, tarsi 1-segmented, scent-gland scales short, waved, pallid. ♂: antenna with slender clavate segments, wing venation either complete or with at least a branch of M, occasionally also of R absent, chorda strongly developed, CuP present. ♂ genitalia with sacculus and costal arm broadly to narrowly confluent, costa always dorsal and longer than sacculus; anellar structures never tube-like or sheathing; uncus long and broad, gnathos absent. Larva with pretarsus not longer than tibia; anal proleg (Fig. 158) with 1 strong, straight, posterior seta; abdominal prolegs with equally developed crotchets, mesothoracic shield not including L setae. Case somewhat fusiform, flattened, flanged, and with a posterior dorsal flap.

The following described species are here included in this expanded concept of *Reductoderces*: *R. fuscoflava*, "*Mallobathra*" *araneosa* Philpott, *Taleporia cawthronella* Philpott, "*Mallobathra*" *fragilis* Philpott, "*M*" *illustris* Philpott, "*M*" *metrosema* Meyrick, *Taleporia microphanes* Meyrick. Thus those species with ♂♂ with slender antennal segments, no gnathos, and with uncontorted valval structures, are gathered together. This assemblage excludes *Scoriodyta* Meyrick (type species: *S. conisalia* Meyrick) which has complete venation, short stout antennal segments, a reduced uncus and large setose peri-anal plates and a contorted valva. From *Mallobathra*, *Reductoderces* is distinguished by its 1-segmented ♀ tarsi, reduced venation, absence of gnathos areas and lack of a sheathing anellus in the ♂, and in the larva readily by the presence of 1 straight posterior seta on the anal proleg, not 2 curved setae as in *Mallobathra*.

Reductoderces species appear to be lichen or alga-browsers; the long, flanged cases are often found in immense aggregations on cliff-faces, tree trunks or stones.

Reductoderces is represented by 3 species, one each on Auckland, Campbell and Antipodes Is. Larvae have been abundantly collected, but only 2 adults have been recorded. Autumn or early spring collecting may yield adults.

30. **Reductoderces aucklandica** Dugdale, new species

Description: Wings slender, attenuated apically, hind legs long, femora stout. Body and wings pale brown, wings obscurely patterned below the pallid costa with darker flecks; fore tibia conspicuously pale; antenna with pallid whorls of long setulae. Length (vertex—wing apex): 4.5 mm.

♂ *genitalia* (Fig. 146, 147): Uncus apices porrect, lateral margins of uncus roughened, margins produced ventrally; valva with sacculus apex spine-like, free for 1/3 sacculus length.

Larva: As in *R. fuscoflava*, but (Fig. 154, 155) with posterior metasternal mesal setae less than twice as far apart as anterior pair; V_1 setal pair on 2nd abdominal segment on a common pinaculum, and V setae on 7th and 8th abdominal segment on fused pinacula. Length of case (Fig. 150) (mature): 8.0–9.5 mm.

Type Locality: Camp Cove, Auckland I.

Distribution: Adams, Auckland, Ewing, Rose Is.

AUCKLAND IS: Holotype ♂, "Camp Cove, Auckland I, PM Johns 24.I.1966, in *Metrosideros* forest," in type collection, ED; and 4 larvae, Camp Cove sample 66/80, rata forest litter, Johns; Auckland I; larvae: Adams I: 1 larva, sample 66/75, litter under *Polystichum* and *Dracophyllum*, Kuschel; 16 larvae, sample 66/77, litter accumulated in dry rivulet, Kuschel; 1 larva, sample 66/79, 300–400 m, moss, Kuschel; 5 larvae, samples 66/81, 66/84, 66/89, 66/92, rata forest litter,

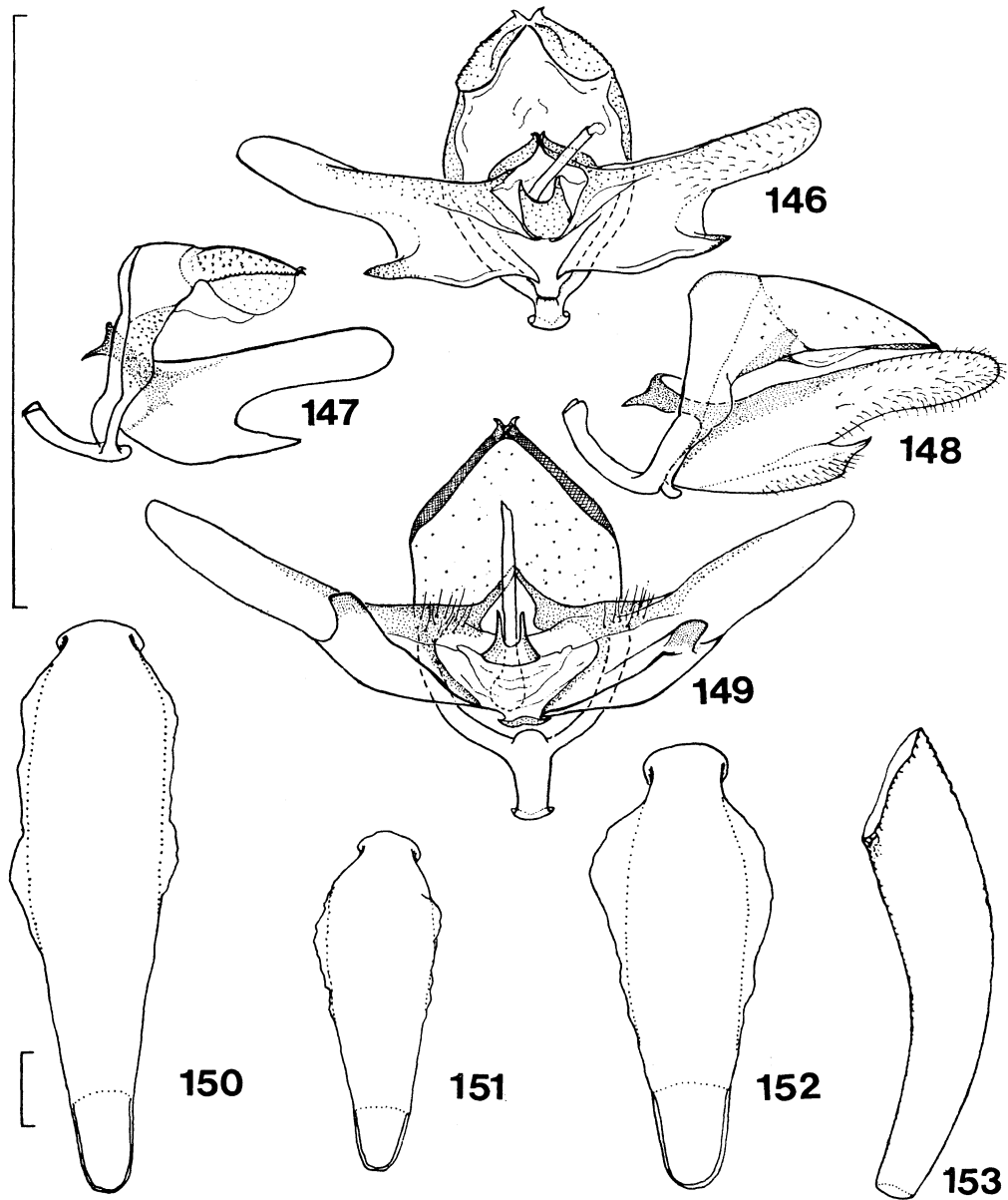


Fig. 146–153. *Reductodermes* and gen. et sp. indet. (Psychidae). 146, *Reductodermes aucklandica* ♂ genitalia, ventral view; 147, ditto, side view; 148, *R. fuscoflava*, ♂ genitalia, side view; 149, ditto, ventral view, 150, *R. aucklandica* larval case; 151, *R. fuscoflava* larval case; 152, *R. sp. indet.*, larval case, Antipodes I; 153, gen. et sp. indet., larval case, Snares I. Scales represent 1 mm.

Kuschel; 1 larva, sample 66/88, nest of *Procellaria*, Kuschel; 23 larvae, sample 66/91 Mt Dick, 550 m, moss, Kuschel; 54 larvae, samples 66/94, 66/95, sifted litter and vegetation, Fairchild's Garden, Kuschel; 1 larva, ex *Coprosma foetidissima*, Magnetic Station Cove; 5 larvae ex *Metrosideros*, ditto, 3 larvae, beating, ditto, Kuschel; 5 larvae, L. Turbott, on rock face; 7 larvae Magnetic Cove, Wise.

Auckland I: 1 larva under sooty fungus on *Dracophyllum*; 2 larvae, swept, Ranui Cove, Dumbleton; 1 larva Crozier Pt, 1 larva Ranui Cove, Wise; 2 larvae, ex leafmold, Port Ross, Ordish. Ewing I: 5 larvae, Ordish; Rose I: 7 larvae, ex *Metrosideros*, Dumbleton.

Remarks: *R. aucklandica*, with its attenuated and weakly patterned wings is easily distinguished from *R. fuscoflava* which has fully formed wings with a bold pattern. The larva is readily distinguishable (see key) and has been recorded from shrubs, tree trunks, rock walls and litter. On larval characters, the 3 species are evenly and closely related and this suggests that each island or island group has its own resident species derived from an old "Campbell Plateau" fauna.

31. *Reductoderces fuscoflava* Salmon and Bradley

Salmon & Bradley, 1956. *Rec. Dominion Mus.* **3**: 70, fig. 1.

Description: As given in Salmon & Bradley (l.c.).

♂ *genitalia* (Fig. 148, 149): Uncus apices decurved, uncus laterally straight; valva with sacculus apex free for apical 1/5, blade-like.

Larva (Fig. 145, 156, 157): All pinacula darkened; seta SD₂ on prothorax posteroventral of seta SD₁. D pinaculum of 9th abdominal segment widely fused on mid-line, and shield broader than long; metasternum (Fig. 156) with posterior pair of mesal setae over twice as wide apart as anterior pair; 7th and 8th abdominal segment (Fig. 157) with setae V₁ pinacula separate. Case (Fig. 151) flanged, widest subapically. Length of case: 7.5–8.0 mm (mature).

Type locality: Campbell I.

Distribution: Campbell I.

CAMPBELL I: Holotype ♂ (not ♀), "Campbell I, 1943, J. H. Sorensen," in WMu. 15 larvae, Mt Lyall, 180 m and 350 m, Kuschel; 1 larva on *Epilobium*, Beeman Pt; 8 larvae on cliffs, Rocky Bay; 4 larvae, lichen on rock walls, Courrejolles Pen. 11 larvae, lichens on cliff, North Cape, 4 larvae beaten from ferns and *Dracophyllum*, North Cape, Johns.

Remarks: *R. fuscoflava* is distinguished from the other 2 species by larval structure; in particular, the posterior metasternal setae are most wide apart in *R. fuscoflava*. From the Auckland I and Antipodes I species it is distinguished by the separated V pinaculum on the 7th and 8th abdominal segments. Also, the ♂ of *R. fuscoflava* is less brachypterous than the Auckland I species.

32. *Reductoderces* sp. indet. (adults unknown)

The Antipodes I population is known only from larvae. The Antipodes larva resembles that of *R. fuscoflava* in that setal pair V₁ on the 2nd abdominal segment has paired pinacula (Fig. 159), but resembles *R. aucklandica* in that the anterior metasternal mesal setae (Fig. 159) are further apart than in *R. fuscoflava*, and that on the 7th and 8th abdominal segment (Fig. 160), the V setal pairs are on fused pinacula. The case (Fig. 152) is broadly flanged.

The population is not named, being known only from immatures. Should adults be found to be intermediate in genitalia between *R. fuscoflava* and *R. aucklandica*, then lowering each to subspecific rank would be warranted.

ANTIPODES I: 5 larvae, Hut Cove, lichens on cliffs, Johns; 9 larvae, Reef Pt, on cliff faces, Kuschel.

33. *Gen. et sp. indet.* (adults unknown)

Larvae in curved, tubular, smooth, unflanged cases (Fig. 153) composed of granular debris.

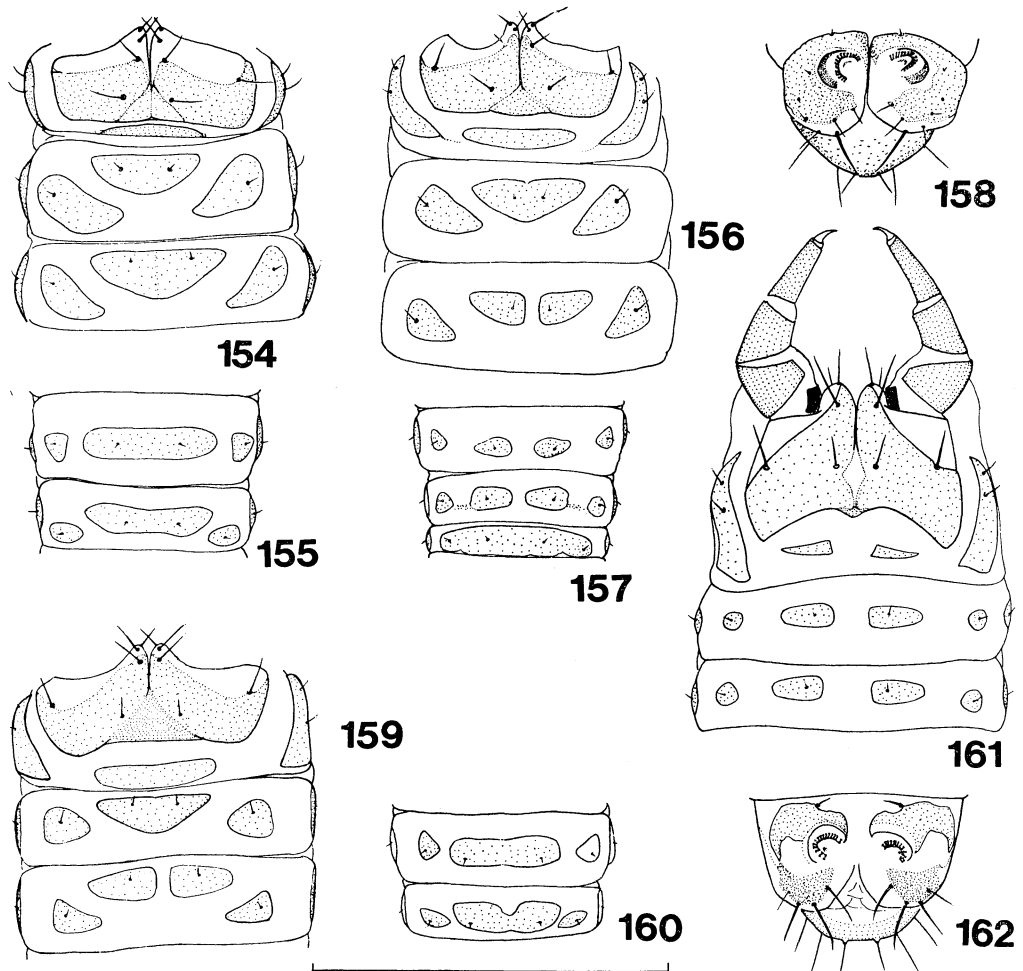


Fig. 154–162. Psychidae, larvae. 154, *Reductoderces aucklandica*, larval metasternum and abdominal segments 1, 2, ventral; 155, ditto, segments, 7, 8, ventral; 156, *R. fuscoflava*, metasternum and abdominal segments 1, 2, ventral; 157, ditto, segments 7–9, ventral; 158, ditto, anal proleg and shield, ventral; 159, *R. sp. indet.*, metasternum and abdominal segments 1, 2, ventral (Antipodes I); 160, ditto, abdominal segments 7, 8, ventral; 161, Gen. et sp. indet., metathoracic legs, sternum and abdominal segments 1, 2, ventral (Snares I); 162, ditto, anal prolegs and anal shield, ventral view. Scale represents 1 mm.

Larva with pretarsus longer than tibia, smooth, straight, slender (Fig. 161); prothorax with L setae equidistant (at least 1 seta distant from others in *Mallobathra* and *Reductoderces*); metasternal setae (Fig. 161) equally far apart. Abdominal segments with all D setae on separate pinacula; anal shield with D_2 (apical setae) on tubercles, and proleg with 3 strong posterior setae, the middle one curved (Fig. 162).

Distribution: Snares I (but similar larvae known from mainland localities).

SNARES I: 12 larvae, ex *Hebe elliptica*, Station Pt; 6 larvae, on *Poa astoni*, Johns; 2 larvae ex

Olearia lyalli leaves, Knox.

Remarks: The larva, quite distinct in chaetotaxy, morphology and case construction is not congeneric with either *Mallobathra* or *Reductodermes*. Hudson's illustrations (1928: pl 3, fig. 33; pl 37, fig. 12) of *Scoriodyta* cases shows that this larva cannot be included in *Scoriodyta*. Similar larvae, with similar cases, are known from North, South and Stewart Is (Hudson 1939: 474, pl 54, fig. 27).

(10) PTEROPHORIDAE

The Pterophoridae may be distinguished from other Subantarctic Lepidoptera by the cleft forewings, trifold hindwings, spindly fragile body and legs, and by the T-shaped posture adopted at rest. Larvae have the body clothed in capitate setulae.

This family is poorly represented in New Zealand, less than 20 species having been recorded. Most species are in *Stenoptilia* auct. (hosts: dicotyledonous herbs, shrubs) and *Platyptilia* Huebner (hosts: herbs, grasses, shrubs) in the Platyptiliinae. A few species best included in *Aciptilia* Huebner feed on forest-zone Araliaceae and Pittosporaceae and one species in "*Alucita*" is found in lowland-upland pasture. Both *Stenoptilia* and *Platyptilia* include alpine and heathland species, with several associated with *Hebe* species; these have bud-boring larvae. The other Platyptiliines have larvae that attack flowers and fruits of their hostplants, a habit that Yano (1963: 203) notes as being common in the family. Philpott (1928c: 645-648) figured ♂ genitalia and it is clear that in N.Z. there is no distinction between our "*Platyptilia*" and "*Stenoptilia*".

One genus, *Platyptilia*, is present in the Subantarctic Is.

KEY TO THE SUBANTARCTIC PTEROPHORIDAE

1. Adult labial palpi scarcely twice as long as diameter of compound eye (Fig. 168); tibial spurs dark basally and apically, pallid in middle (Fig. 164); larva in buds of *Hebe*.....**Platyptilia falcatalis** (Walker)
- Adult labial palpi at least 3 × as long as compound eye diameter (Fig. 167); tibial spur largely pallid, dark apically (Fig. 163); larva on herbs.....**Platyptilia aelodes** Meyrick

Platyptilia Huebner, 1826

Yano (1963: 105) gives synonymy, references and a complete generic diagnosis.

Type-species: *Alucita gonodactyla* Denis & Schiffermueller.

Hudson (1928: 207-9; 1939: 429; 1950: 103) includes 6 species in N.Z. *Platyptilia: aelodes* Meyrick, *campsisistera* Meyrick, *deprivatalis* Walker, *falcatalis* Walker, *heliastis* Meyrick, *hokowhitalis* Hudson. To these must be added *P. repletalis* Walker, which Fletcher (1926: 605-6) shows to be a good species, and *P. epotis* Meyrick which Philpott (1928c: 646) shows to be very close to *P. repletalis* (which he calls *aelodes*).

Platyptilia as conceived by Yano (1963: 105-37) would appear to be a mixed group, from which those species with the valva ending in a decurved spine, with the juxta base produced ventrally and with stout hair-like scales, with the ostium asymmetrical (opening on right side of the lamella antevaginalis) and the ductus seminalis arising on the ductus bursae well away from the ductus bursae—corpus bursae junction, could well be removed. The features noted above are common to a group that includes *P. acanthodactyla* (Huebner), *P. punctidactyla* (Haworth) (see Pierce & Metcalfe 1938: 46-47, pl. 26), *P. jezoensis* Matsumura, *P. bella* Yano, *P. japonica* Yano (see Yano 1963: 122-26, fig. 42-43), *P. repletalis*, *P. falcatalis*, *P. aelodes*, and (for ♂ genitalic characters) other N.Z. *Platyptilia* and "*Stenoptilia*" species. Since the species *acanthodactyla* is the type-species of

Amblyptilia Huebner 1826, further investigation is warranted.

Of the 2 *Platyptilia* (sensu Yano) species present in the Subantarctic Is, one is common to those islands, Big South Cape and to Chatham, with a sister species on the mainland, and the other is common throughout the N.Z. subregion wherever large-budded *Hebe* species occur (e.g. *H. elliptica*, *H. stricta*, *H. salicifolia*, *H. speciosa*).

34. *Platyptilia aelodes* Meyrick

Meyrick, 1902. *Trans. ent. Soc. Lond.*: 278 (*Platyptilia*).

Labial palpi over $3 \times$ as long as compound eye diameter (Fig. 167); hind-tibia with spurs basally pallid (Fig. 163), inner spical apur longer than median inner spur; other external characters as in Meyrick (1902) and Hudson (1928: 207-8, pl. 23: fig. 14).

♂ genitalia (Fig. 165): Uncus and valval apices black-tipped; uncus curved, slightly swollen centrally; subsaphial area a broad spinulose patch; valva with apex decurved, ending in a hooked spine; costa sinuous,

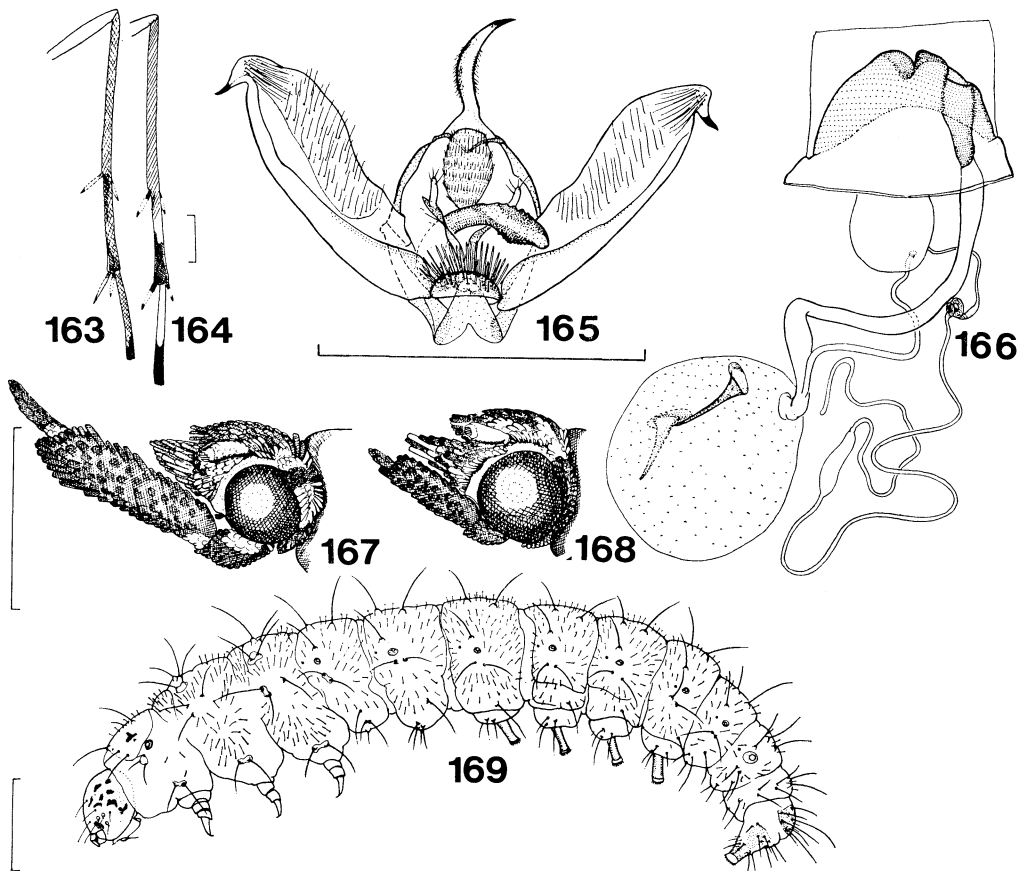


Fig. 163-169. Pterophoridae. 163, *Platyptilia aelodes*, hind tibia and 1st tarsal segments, Auckland I; 164, *P. falcatalis*, ditto, Nelson, South I; 165, *P. aelodes*, ♂ genitalia, Campbell I; 166, *P. aelodes* ♀ genitalia, Chatham I; 167, *P. aelodes* ♂ head, Chatham I; 168, *P. falcatalis*, ♂ head; 169, Larva, chaetotaxy, Campbell I. Scales represent 1 mm; Fig. 166 same scale as Fig. 165.

sacculus simple; juxta complex, with 2 dorsal arms ending in finger-like papillae; juxta base produced ventrally into a low mound covered in strap-like firmly attached scales; aedeagus stout subapically, dorsally and ventrally coarsely dentate, narrowed to a truncate apex.

♀ *genitalia* (Fig. 166): Lamellae fused, apically obliquely cleft, with ostium on right-hand side; colliculum sclerotised, fused with sterigma, obviously widened at ostium, narrowed at ductus bursae junction; ductus bursae unsclerotised, more or less sinuous, ductus seminalis arising at 7/8 length of ductus bursae, bulla seminalis absent; spermatheca as figured.

Larva (Fig. 169): Integument evenly scobinate, scobinations rounded, cobbled. Meso, metathorax, and abdominal segments 1–7 with evenly distributed capitate short black setulae; these restricted to the mesal part of the shield on prothorax, to around the spiracular area on the 8th abdominal segment, and to around the D setae on 9th abdominal segment. Anal shield with no basal setulae. SV groups on abdomen bi-setose on segments 1 and 7, trisetose on 2–6, single on segments 8 and 9. SD₂ minute, anterodorsad of spiracle on all abdominal segments except on 8th, where it is directly anterad; margin of spiracle on 8th segment stouter than on other segments.

Type Locality: Chatham I.

Distribution: Chatham Is; Big South Cape I; Auckland Is; Campbell I.

Host Plants: Dicotyledonous herbs.

AUCKLAND IS: 2 ♂♂, 2 ♀♀, Auckland I., No 3 station, Musgrave Peninsula, Ranui Cove Cape Expdn, 1 ♀ Carnley Hrbr, 1907, Hudson; 1 ♀, Ranui Cove, Gressitt.

CAMPBELL I: 1 larva, ex herb, Beeman Camp, Godley.

Chatham Is: 3 ♂♂, 3 ♀♀, Waitangi, Hapupu, Mangahou Ck, Feb., 1967, Chatham I; *Big South Cape I*: 1 ♀, on moor, 120 m, November 1968 (ED).

Remarks: Yano (1964: 258) records 1 ♂, while Salmon & Bradley (1956: 62) record 15 specimens. *P. aelodes* is superficially indistinguishable from *P. repletalis* (which replaces it on North and South Is). On genitalia the 2 are distinguished by the aedeagus structure (thickened subapically in *P. aelodes*, of even diameter in *P. repletalis*) and colliculum shape (flask-shaped in *P. aelodes*, of even diameter in *P. repletalis*). Specimens of *P. repletalis* (type locality: Auckland) were examined from Waipoua, Nelson, Pelorus Bridge (Marlborough), Hollyford Valley (Fiordland), Invercargill and Bluff. All, consistently, were different from the island specimens; it may well be that *aelodes* might better be considered a subspecies of *P. repletalis*, but there is not enough biological information available for a critical comparison.

The presence of *P. aelodes* on Big South Cape I suggests that this species is a southern form which has invaded Chatham Is from the south. All Hudson's references to *P. aelodes* (Hudson 1928: 207; 1939: 419; 1950: 103) from North and South Is refer to *P. repletalis*, a species that on genitalia is extremely hard to distinguish from *P. jezoensis* and *P. acanthodactyla*.

35. *Platyptilia falcatalis* (Walker)

Walker, 1864. List Lepidopt. Ins. Brit. Mus. **30**: 931 (*Platyptilia*).—Meyrick 1885. *Trans. N.Z. Inst.* 0: 00 (*Platyptilia*).—Philpott 1929. *Trans. N.Z. Inst.* **59**: 646, fig. 3, ♂ genitalia (*Platyptilia*). Holotype ♂, labelled "type" by T. B. Fletcher in BMNH.

isoterma Meyrick, 1909. *Trans. N.Z. Inst.* **41**: 10 (*Platyptilia*).

pulverulenta Philpott, 1923. *Trans. N.Z. Inst.* **54**: 149 (*Platyptilia*).

ferruginea Philpott, 1923. *ibid*: 150 (*Platyptilia*).

Type Locality: Auckland, N.Z.

Distribution: North, South, Chatham, Stewart, Campbell I.

Hostplants: *Hebe* spp, especially large-leaved spp; *H. elliptica*, *H. salicifolia*, *H. speciosa*, *H. stricta*.

Larvae bore centers of buds, damaging the growing apex and inducing scrubby growth.

Remarks: The species is not redescribed here; the head with its short labial palpi (Fig. 168),

and the basally blackened hind tibial spurs (Fig. 164) are figured here to distinguish this species from *P. aelodes*. On genitalia, *P. falcatalis* has ovate valvae, many setae on the juxta lobes, and the signa on the corpus bursae are larger than the colliculum, which characters serve to distinguish it from *P. aelodes* and *P. repletalis* which have narrower valvae, few juxta lobe setae, and signa that are not longer or broader than the colliculum.

No specimens from the Subantarctic were seen, but as Yano (1964: 259) records 6 specimens from widely separated localities on Campbell I, and as *P. falcatalis* is readily distinguishable, it is reasonable to assume that this species is resident on Campbell, even though no adults or larvae were collected by the 1969 Expedition.

It is possible that future collecting will yield this species from Auckland Is.

(11) TINEIDAE

The islands of the southern oceans support 3 genera of Tineidae sens. str.—*Pringleophaga* on Crozet and Kerguelen, *Monopis* (*Blabophanes*) on St. Paul and New Zealand, and *Proterodesma* on the New Zealand group. *Pringleophaga heardensis* Brown, which differs from other *Pringleophaga* species on adult maxillary palpus characters and larval pretarsal, ocellar and chaetotactic characters (see Brown 1964), is not a tineid (see Common 1970b). Another species originally included in Tineidae, *Gracillaria strassenella* Enderlein from New Amsterdam I (latitude 42°S), is congeneric—if not conspecific—with *Opogona* (*Hierozestis*) *omoscopa* Meyrick in Lyonetidae on the basis of Enderlein's figures of venation, palpi and larvae (Enderlein 1903: 251, fig. 22–25, 27, 28). Viette (1959: 23) reached a similar conclusion; Bradley (1954: 160) states that *O. omoscopa* “belongs to a group characteristic of South Africa and the Madeiras.” Meyrick (1892: 567) presumed that this species was spread by man to Australia and New Zealand: Here, *O. omoscopa* is present on the Kermadec Is (lat. 30°S), throughout lowland North I and northern South I, but absent from Chatham Is (44°S), Stewart I and Big South Cape I (47°S).

The New Zealand genus *Proterodesma* shows no close structural affinity with *Pringleophaga* from Kerguelen and Crozet; the genera occupy similar niches on their respective island groups. *Pringleophaga* tunnel the roots of *Pringlea antiscorbutica* (Enderlein 1909: 424) and in mats of *Acaena*, *Azorella* and *Cotula* (Brown 1964: 37), but neither author makes it clear whether *Pringleophaga* is a detritus-feeder or not. *Proterodesma* species in the Subantarctic are detritus-feeders; larvae are found in litter, debris accumulations in shrubs and in decaying wood, where (as does *Pringleophaga*) they construct stout, silk-lined refuge tunnels of frass and debris.

Monopis species develop on feathers, fur, or plant debris (Petersen 1957) and each species tends to be restricted to either bird, mammal or plant fibre. *M. ptilophaga* (Enderlein) from St. Paul I (latitude 40°S) in the South Indian Ocean is allied to an undescribed species found by Dr J. C. Watt to be abundant in petrel burrow linings on the Kermadecs (latitude 30°S), and not to the species group, endemic to North, South, Stewart, Chatham and the Subantarctic Is, described below. Viette (1959: 23) considered that *M. ptilophaga* is probably a synonym of the western palaeartic *M. ferruginella*.

KEY TO GENERA OF NEW ZEALAND SUBANTARCTIC TINEIDAE

1. Adult: forewing with veins M_3 and CuA1 separate; larva with 5 functional ocelli, meso and metathorax with 1 SV seta.....**Proterodesma**
- Adult: forewing with veins M_3 and CuA1 on a common stalk; larva with 1 functional ocellus, meso and metathorax with 2 SV setae (Fig. 175).....**Monopis**

Monopis Huebner, 1825

Huebner, 1825. Verz. bek. Schmett. (Augsburg) Sign. 26: 401 (Generic synonymy given by Fletcher (1929), Petersen (1957: 163–64).

Type-species: *Tinea rusticella* Huebner, 1796 (West palearctic).

Diagnosis (N.Z. species only): Maxillary palpi 5-segmented, drooping, 4th segment longer than combined lengths of segments 1 to 3; labial palpus with apical segment not longer than eye-diameter. Basal antennal segment with a pecten. Venation: Forewing with Cu and M₃ stalked; apex of discal cell distorted, with or without a patch of hyaline scales; Rs and R₁ forked from near base, Rs often vestigial or absent from fork to near apex of cell. M₁ to forewing apex.

♂ *genitalia*: Saccus elongate, rod-like; vinculum slender, arc-like; gnathos present, apices free.

♀ *genitalia*: Spermatheca with 2 coils, colliculum tubular, sclerotised or unsclerotised; corpus bursae with a complete band of long or short scobinations.

Within the N.Z. fauna, *Monopis* is distinguished externally by its distorted forewing apical cell, with Rs usually rudimentary, and by the presence of a gnathos in the ♂ genitalia. *Endopthora*, *Crypsitricha* and the cosmopolitan *Acedes fuscipunctella* have similar ♂ genitalia but quite different forewing venation; in the first 2 genera the gnathos is lacking. *Monopis* spp. are narrow moths 5–12 mm in length, usually black or dark brown and with a contrastingly pale-scaled head, thorax and broad dorsal streak on the forewing. The apex of the forewing discal cell often bears a patch of pale or hyaline scales; the costal margin towards the forewing apex may also be speckled with paler scale patches.

There are 6 species recorded from the New Zealand subregion: *M. crocicapitella* Clemens, a palaeartic species now found also in North America and Hawaii; the larva feeds on plant fibre (Petersen 1957: 168); *M. ethelella* Newman, an Australian species now common throughout New Zealand, especially in pastoral areas and collected by the "Novara" Expedition as *Blabophanes namuella* Felder & Rogenhofer; the larva feeds on fur; *M. dimorphella* n. sp. which extends down to Auckland Is (larva unknown); *M. ornithias* Meyrick in North and South Is (larva in birdnests); *M. typhlopa* Meyrick, a relative of *M. dimorphella*, restricted to Chatham Is; and an undescribed species from petrel burrows on the Kermadecs, resembling *M. ptilophaga* Enderlein from St Paul I.

Dr Klaus Sattler (pers. comm.) informs me that *Blabophanes namuella* Felder & Rogenhofer agrees in wing venation with *Monopis ethelella* Newman, as does also *Tinea rectella* Walker from Tasmania. For the information of future revisers, the condition of the type (a ♀) of *namuella* is "reasonable"; an abdomen has been glued on. The type bears the following labels: "Holotype" (round BMNH type label), "Type" (ditto)—"354" (handwritten)—"Novara CXL f. 44, *Blabophanes namuella* n. N. Seeld. ♀? "(?original handwritten label)—"Felder Coll., Rothschild 1913–86" (printed)—"Holotype ♀, *Blabophanes namuella* Feld. & R., teste K. Sattler, 1969."

Larvae of *Monopis* (Fig. 175) may be distinguished from *Proterodesma* by

- (i) presence of 2 (not 1) SV setae on meso- and metathorax;
- (ii) setae SD₁, SD₂ vertically aligned on abdominal segments 1–7,
- (iii) only 1 functional ocellus on each side of the head, not 5.

Since *Monopis* spp. are usually present as mixed series in most collections all species known from N.Z. are keyed below. Only *M. dimorphella* n. sp. is described here.

KEY TO MONOPIS SPP. OCCURRING IN N.Z. SUBREGION

1. Forewings with R₄, R₅, M₁, all separate.....2
- Forewings with R₄, R₅ (Fig. 174), or R₅ + M₁ stalked.....4

2. Rs vestigial between junction with R_1 and apical quarter of discal cell; CuA stem angulated; Rs apically appressed to R_1 and swollen; CuA2 arising before apex of discal cell (δ : aedeagus vesica lacking spinulose scobinations; ♀ : corpus bursae with a few scattered broad spines) (Cosmopolitan).....**M. crocicapitella**
 Rs well-developed over entire length; CuA stem straight, Rs not appressed to R_1 at apex of discal cell; CuA2 arising beyond apex of discal cell (δ : aedeagus vesica with spinulose scobinations; ♀ : corpus bursae with a band of regular, slender spines or spinules).....3
3. Color pattern virtually uniform, black or dark brown, head and thorax faintly paler-scaled, forewing with discal cell apex perpendicular (δ : saccus \times 1-1/4 longer than valva; uncus deeply cleft apically; ♀ : colliculum unsclerotised, lamella antevaginalis emarginate, lacking gold pubescence, corpus bursae spinules not longer than ductus bursae width) (N, S).....**M. ornithias**
 Color pattern contrasting, black or dark brown with head, thorax and forewing dorsum strongly pale fawn to buff; forewing with discal cell oblique at apex (δ : saccus not longer than valva; uncus not cleft apically; ♀ : colliculum sclerotised at limen, lamella antevaginalis not emarginate, apically clad in gold pubescence; corpus bursae spines longer than ductus bursae width (Kermadec Is).....**M. sp. indet.**
4. Forewing with $R_5 + M_1$ stalked, stalk shorter than width of discal cell at apex (δ : gnathos apices simple; ♀ : lamella antevaginalis lacking gold pubescence) (Australia, N, S)...**M. ethelella**
 Forewing (Fig. 123) with $R_4 + R_5$ stalked, stalk longer than width of discal cell at apex (δ : gnathos apices capitate; ♀ : lamella antevaginalis with gold pubescence apically).....5
5. CuA stem in forewing straight (δ : uncus triangular; saccus less than \times 2 valva length; ♀ : corpus bursae spines short; colliculum length shorter than lamella antevaginalis width at limen) (Ch).....**M. typholopa**
 CuA stem in forewing angulated (δ : uncus parallel-sided, apex acute; saccus \times 2 valva length; ♀ : corpus bursae spines long; colliculum length as long as lamella antevaginalis width at limen) (N, S, St, BSC, A).....**M. dimorphella**

36. **Monopis dimorphella** Dugdale, new species

Description: Labial palpus pallid on inner surface, segment II darkened apically, segment III dark-scaled on basal 1/3; basal antennal segment dark-scaled ventrally except for extreme apical area; normally, head with vertex, occiput and frons scales pale buff to fawn or faintly suffused with a brick-red tinge (all populations) (Fig. 176). Thorax dorsally similarly colored; forewing black, with dorsum concolorous with head/thorax; hyaline spot at discal cell apex small to absent; forewing costal area basally speckled, apically broadly suffused with fawn to warm-buff scales. Some specimens completely black. Hindwings pale grey, abdomen pallid.

Venation (Fig. 174): In forewing, Rs well-developed from junction with R_1 to apical part of discal cell; $R_4 + R_5$ stalked, stalk length greater than apical cell width; CuA stem angulated at 4/5 length, CuA from beyond discal cell.

δ *genitalia* (Fig. 171-173): Gnathos capitate, apex rugose. Uncus (Fig. 172) more or less parallel-sided, apices suddenly acute; saccus twice length of valva, aedeagus (Fig. 171) with a spinulose vesica.

♀ *genitalia* (Fig. 170): Lamella antevaginalis with apical area covered in short gold pubescence. Colliculum sclerotised, longer than width of lamella antevaginalis, subsinuate. Corpus bursae signum spines tridentate, in 3-4 series, encircling corpus bursae. Spermatheca with 2 coils.

Type locality: Big South Cape I (Long I, or Taukihepa, off SW Stewart I).

Distribution: North I, South I, Stewart I, Big South Cape I, Auckland Is.

AUCKLAND IS: 1 ♀ Magnetic Station Cove, Adams I, on *Metrosideros* scrub at night, 16. I.1966, Johns; 1 ♂ , ditto, 18.I.1966, Kuschel; 4 ♂♂ , 1 ♀ , Adams I at light, 16-29.I.1966, Wise; 2 ♂♂ , 2 ♀♀ , Ranui Cove, Auckland I, 2 m, 30.XII.1962-2.I.1963, Gressitt; 1 ♂ , Fleming, 2 ♀♀ Ranui Cove, III.1944, Turbott.

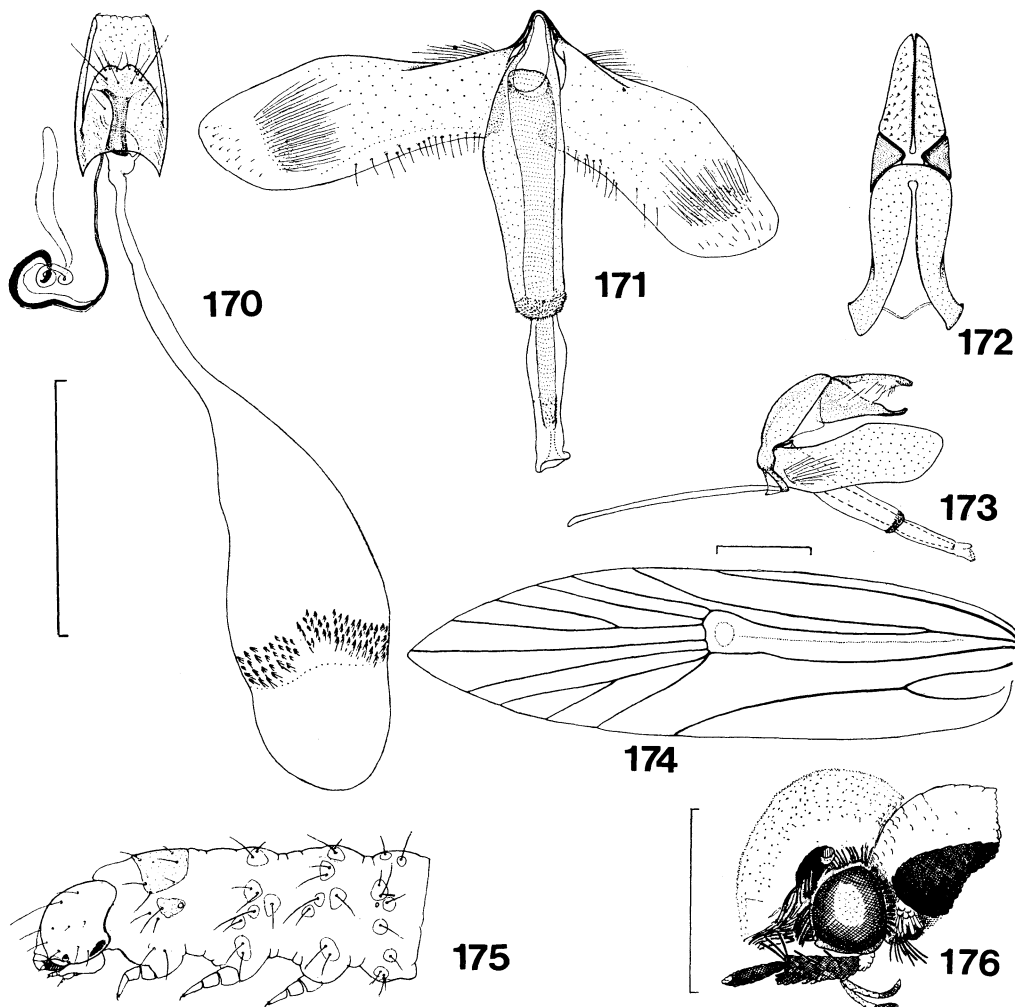


Fig. 170–176. *Monopis* spp. 170, *Monopis dimorphella* ♀ genitalia, ventral view, Auckland I; 171, ditto ♂ genitalia, uncus and tegumen omitted, Auckland I; 172, ditto, ♂ dorsal, view of uncus and tegumen; 173, ditto, ♂ genitalia in side view; 174, ditto, forewing venation; 175, *Monopis* sp. larva, Kermadec I; 176, *M. dimorphella* ♂, head. Scales represent 1 mm; Fig. 173 same scale as Fig. 170; Fig. 171, 172 twice scale of Fig. 170.

North I: 1 ♀, Waipoua S.F. 15.X.1967, J.S.D.; *South I*: 1 ♂, 1 ♀, Pelorus Bridge, Marlborough, 20.IX.1967, J.S.D.; 1 ♂, Flora River, Mt Arthur, 3500 ft 22.II.1924, A. Philpott; 1 ♀, Bluecliff, S. Canterbury, 2.I.1917; 2 ♂♂, West Plains, Invercargill, no date; 1 ♀, Bluff, 29.I.1914; 1 ♂, Longwoods, 5.XII.1913; 3 ♀♀, Longwoods Range, 500 ft, 15.XI.1965, J.S.D. *Stewart I*: 1 ♀, Oban, 7.II.1968, J.S.D.; 1 ♂, Twilight Cove, Port Pegasus, 22.II.1968; J.S.D.; 1 ♀, Rakeahua V., II.1968, J.S.D.; *Long I*: 1 ♂ (melanic) N.E. Long I, in hut 6.XI.1968, J.S.D.; 8 ♀♀, N.E. Long I, in bush, to light, XI.1968, J.S.D. (E.D.).

Location of Type: Holotype ♂, labelled "N.E. Long I. (Big South Cape I), moor, 120 m

13 Nov. 68, to light, J. S. Dugdale, Long I. Expdn. 1968" in colln ED.

Remarks: Adults of *M. dimorphella* can be readily distinguished from those of *M. ethelella* on venation (cf. Fig. 174 and Common 1970, fig. 36.20D) and genitalia. Distinctions between *Monopis* species likely to be encountered are given in the key.

The *M. dimorphella*—*M. typhlopa* species group (which excludes *M. sp. aff. ptilophaga* and *M. ornithias*) is closely related to but cannot be derived from *M. ethelella*. The latter species has too many derived (apomorphic) characters; the N.Z. species group has a less specialised forewing venation (Rs less vestigial), but is close to *M. ethelella* on genitalia. The Australian and N.Z. species groups are sister groups in that they share similar derived characters in genitalia and, to a slight extent, in venation. *M. dimorphella* has not reached, or not persisted, on Campbell, Antipodes or Snares Is: until more is known of its habits both on Auckland Is and on mainland N.Z., little can be said of its status in the Subantarctic fauna.

Proterodesma Meyrick, 1909

Meyrick, 1909. Subantarctic Islands of N.Z. **1**: 74.

Antipodesma Salmon & Bradley, 1956. *Rec. Dominion Mus.* (Type species: *Antipodesma turbotti* Salmon & Bradley, op. cit: 65. **New Synonymy.**

Type-species: *Proterodesma byrsopola* Meyrick, 1909. loc. cit., 74.

Diagnosis: Maxillary palpi long, folded, 5-segmented, 4th segment never longer than combined length of segments 1–3; labial palpi more or less horizontally outcurved, segment 3 half length of segment 2, latter segment with apical and outer lateral sparse series of erect, long stiff scales. Haustellum as long as labial palpi. Ocelli absent. Head rough-scaled, unkempt; antennal segments thickened in ♂. Wings with most or some radial veins partly vestigial apically. Male with 8T and 8S unmodified, ♀ with 8T shallowly and lamella antevaginalis deeply emarginate posteriorly.

♂ *genitalia:* Uncus developed, with rudimentary to well-formed socii; gnathos arms well developed, free apically; vinculum and tegumen narrowly free; saccus broadly V-shaped, not longer than valva; juxta reduced; valva broad, with costal process diverging, one angular arm directed anteriorly, the other, rounded directed posteriorly, flanking the aedeagus and fused with juxta. Aedeagus lacking cornuti, apically sclerotised laterally only.

♀ *genitalia:* Anal papilla apodemes at least 1.5 × length of bursa copulatrix. Ostium in cleft of lamella antevaginalis, limen appressed, ceiling unsclerotised and lamella postvaginalis absent; colliculum present; ductus bursae widening to ovate-elongate corpus bursae. Spermatheca with 3 arms, one transversely ridged; duct entering oviduct via a stout chamber; ductus seminalis lacking a bulla, entering oviduct at base of the stout chamber.

Larva: Ocellus 6 rudimentary, ventral; ocelli 1 and 2 contiguous, 3, 4, and 5 ditto. Prothorax with prespiracular setae as in Fig. 193, 194; SD setae on abdominal segments double, SD₂ anterior to spiracle and on a separate pinaculum on 2–8, posterodorsad of spiracle and on common pinaculum with SD₁ on segment 1. SV group 3-membered on segments 1–6, SV₂ absent on segments 7 and 8, SV₂, SV₃ absent on segment 9. D₁, D₂, SD₁, SD₂ on common pinaculum, L₁, L₂ on a common pinaculum, and L₃ separate on segment 9 (Fig. 194).

Proterodesma includes 3 species, 1 on the Chathams, 1 on Antipodes and Bounty Is, and 1 on South, Stewart, Snares, Auckland Is and Campbell I. Larvae are found in injured, dying or dead plant tissue, and even in the splash zone alga, *Enteromorpha*. Characteristically, larvae construct a refuge tunnel of silk, frass and debris, pupating in a stout, thick walled fusiform cocoon.

Philpott (1927c: 93–101) figures all genera of N.Z. Tineidae; *Proterodesma* is the only genus of that group with a broad saccus (including *Prothinodes*, *Trithamnora*) that also has a well developed gnathos. From austral *Monopis* spp, *Proterodesma* is immediately distinguished by its separate CuAl and M₃ veins, its shorter 4th maxillary palp segment and far longer labial palpi; in ♂ *Proterodesma*

the saccus is broad V-shaped, while in *Monopis* the saccus is a greatly elongated rod.

Antipodesma was erected for the brachypterous *A. turbotti*, but is here synonymised with *Proterodesma* as (i) the larva are separable only by minor chaetotactic characters and (ii) the genitalia similarities are considered strong enough, in comparison with the other N.Z. Tineoid fauna. From *Pringleophaga* as described and figured by Enderlein (1909: 422-24, fig. 67-70, 74-78, 80-85) and Viette (1948: 7, fig. 7), *Proterodesma* as here defined differs in its maxillary palpus structure (4th segment not as long as combined length of other segments), venation (vestigial Rs, at least, in *Proterodesma*), in ♀ 8T structure and apodeme origin, and in larval chaetotaxy where the D₁ setae on abdominal segments 1-8 are on separate right and left pinacula, and the SV group of setae on segments 7-9 is bisetose in *Proterodesma*.

KEY TO SPECIES OF PROTERODESMA

1. Brachypterous; length of adult under 5 mm; ♂: valva lacking a costal hook; ♀: ductus bursae with a lunate cestum; larva: prothoracic prespiracular setal pinaculum not emarginate posteriorly, spiracle circular (Ant, Bounty).....**P. turbotti**
- Fully winged; length of adult over 8 mm; ♂: valva with costal hook in line with valva, posterior basal costal process strong, convex; aedeagus scobinate; ♀: lamella antevaginalis emargination deeply U-shaped; ductus lacking a cestum; larva: prothoracic prespiracular setal pinaculum excavate posteriorly, spiracle oval and seta SD₂ on same pinaculum and D₁, D₂, SD₁ on ninth segment (except on Snares) (S, St, B.S.C., A, C, Sa).....**P. byrsopola**

37. *Proterodesma byrsopola* Meyrick

Meyrick, 1909. Subantarctic Is. of N.Z. **1**: 74; pl. II: fig. 180, 19♀♀ (*Proterodesma*).

mysticopa Meyrick, 1915. *Trans. N.Z. Inst.* **46**: 115 (*Tinea*) **New Synonymy**.

Adult: Fully winged; Campbell, Auckland, Snares and Southern South I populations with narrower, more pointed wings. *Color pattern*: Head as in Fig. 185. Forewings ochreous to dark brown, subantarctic populations with streak obscure, dorsum broadly paler than rest of wing, and with scattered whitish irregular spots, especially towards costa and termen. *Venation* (Fig. 178, 179): Forewing: M cross veins not vestigial except in hindwing; costal zone ("pterostigma"), where R₁, R₂ and R₃ disappear, about 1/8 width of wing. Wing span: 12-20 mm.

♂ *genitalia* (Fig. 177, 180, 181): Socii prominent, pointed, densely setose; valva apex broadly triangular, costa of valva ending in a long curved hook longer than uncus and more or less projecting beyond apex of valva; aedeagus sinuous, scobinate.

♀ *genitalia* (Fig. 182-4): Emargination of lamella antevaginalis U-shaped, arm length not greater than base-length. Limen plane, tapering to ductus bursae; colliculum present; cestum absent; entire length of bursa copulatrix × 3 length of 8S. Spermathecal duct sinuous, not coiled.

Larva (Fig. 192, 194): Abdominal segment 9 with setae D₁, D₂ closer to one another than SD₁. Integument with pinacula inconspicuous, not darkened. Prothoracic spiracle oval; on an excavate pinaculum.

Type locality: Auckland I.

Distribution: South I, Stewart I, Big South Cape I, Snares I, Auckland Is, Campbell I.

Host plants: Plant debris, dead bark, dead wood.

SNARES: 7 ♂♂, 9 ♀♀, Station Pt, 1 ♂, cliffs E. of Sinkhole, Johns; 3 larvae, amongst *Olearia* leaves, Sinkhole Flat, Snares I, Knox; 3 larvae under *Olearia* bark, Johns.

AUCKLAND IS: Paratype *byrsopola*, "Auckland I."; Adams I: 2 ♂♂, Magnetic Station Cove, Johns; 2 ♂♂, 3 ♀♀, West End, Adams I; Ewing I: 4 ♂♂, 4 ♀♀, Johns; 9 ♂♂, 2 ♀♀, Gressitt; French I: 1 ♀, Supralittoral, Johns; Ocean I: 1 ♂, 1 ♀ in *Stilbocarpa/Acaena* Johns; 5 ♂♂, 1 ♀, Gressitt; 1 larva, Enderby I; 1, Port Ross, under stones and logs, Wise; 1, Ranui Cove, under log in Rata forest, Gressitt; 1, Port Ross, Terror Cove, Wise 1, Grey Duck Ck, Laurie Hrbr, under rotting wood,

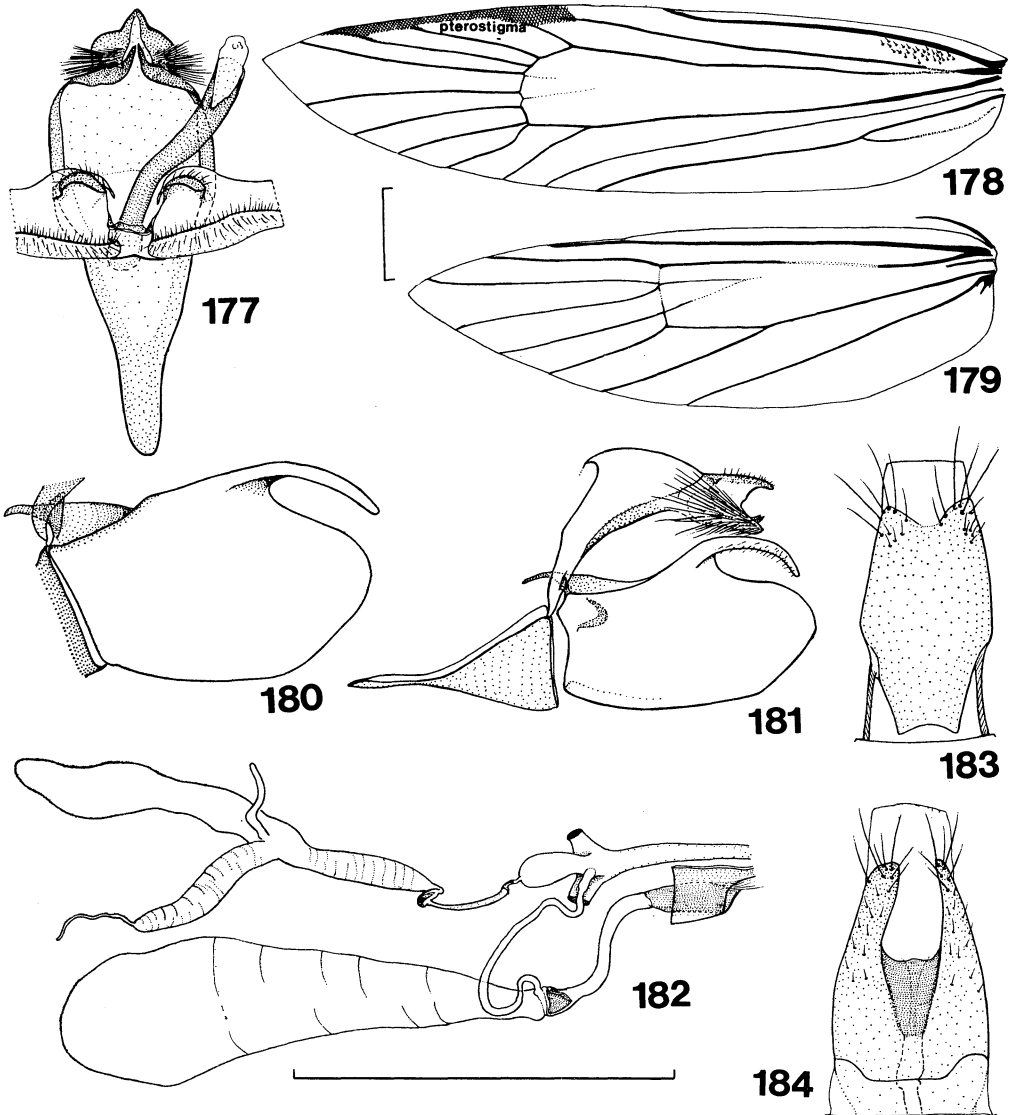


Fig. 177-184. *Proterodesma byrsopola*. 177, ♂ genitalia, ventral view, Snares I; 178, ♂ forewing, Auckland I; 179, ♂ hindwing; 180, ♂ valva, Auckland I; 181, ♂ genitalia, side view, Snares I; 182, ♀ genitalia, side view, Snares I; 183, ♀, 8th tergite, dorsal view; 184, ♀, lamella antevaginalis, ventral view. Scales represent 1 mm.

Wise; 1, Rose I, in dead wood, 8.I.1963, Gressitt.

CAMPBELL I: 1 ♀, Beeman Camp 16.I.1969, Kuschel; 1 ♀, Beeman Point, 10.I.1969, Johns.

South I: 1 ♂, Pelorus Bridge, ex *Coprosma robusta*, Watt; 1 ♂, 1 ♀, Mt Arthur, 1350 m, Philpott; 1 ♂, Waitati, 8 ♂♂, Tisbury Philpott (paratypic *mysticopa*); 1 ♀, Knife and Steel, Philpott; 1 ♂

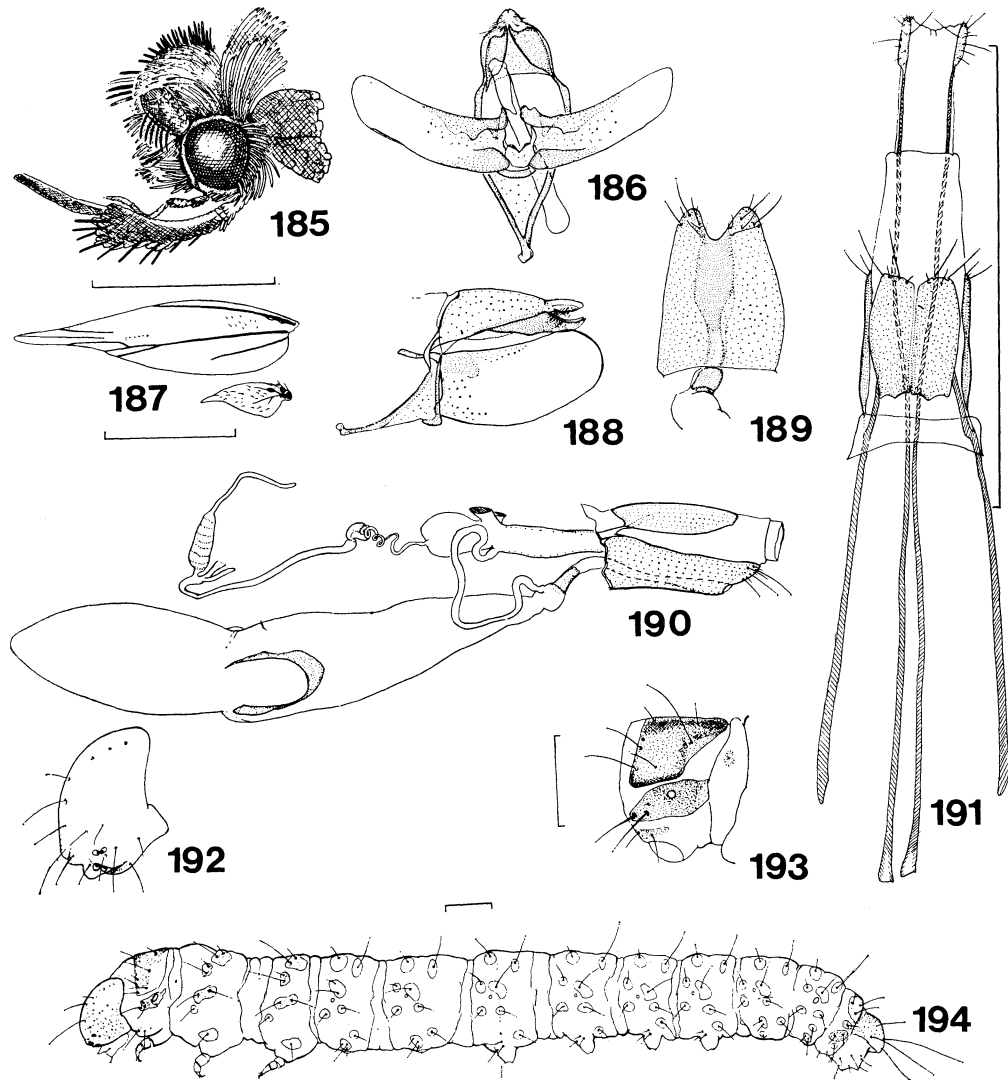


Fig. 185-194. *Proterodesma* spp. 185, *P. byrsopola*, ♂ head, Auckland I; 186, *P. turbotti*, ♂ genitalia, ventral view; 187, ditto, fore and hindwing; 188, ditto, ♂ genitalia side view; 189, ditto, ♀, lamella antevaginalis; 190, ditto, ♀ genitalia, side view; 191, ditto, ♀ ovipositor and 8th sternite, dorsal view; 192, *P. byrsopola*, larval head capsule, side view, Adams I; 193, *P. turbotti* larval prothorax; 194, *P. byrsopola* larva, chaetotaxy and pigmentation (Campbell I). Scales represent 1 mm; Fig. 186, 188-190 same scale as Fig. 191.

Cleughern, Philpott: 1 ♂ 1 ♀ West Plains, Philpott; 1 ♂ Longwoods, Philpott; 1 ♂, Waihopai, Philpott.

Stewart I: 1 ♀, Twilight cove, Port Pegasus, Dugdale.

Big South Cape (Long) I: 12 examples, NE Long I, Dugdale: 1 larva, ex flax debris, NE Long I, McBurney; 1 ♂, reared ex old *Stephanorhynchus* workings in *Olearia grandis*, NE Long I, Dugdale.

Remarks: With their generally pale coloring, narrower wings and bulkier bodies, the Subantarctic populations of *P. byrsopola* could be considered a good subspecies, leaving *mysticopa* as a name for the Stewart and South I populations with their broader wings, narrower bodies and generally darker color. Yet the populations intergrade in color pattern, and, as in specimens from Tisbury and Longwoods, in body shape and wing proportion. On genitalia, *byrsopola* is likewise not separable into subspecies (Yano's 1964 figure is of an aberrant ♂). In the South I (there are no records from the North I) *P. byrsopola* has been found in lowland to subalpine forest localities. On Big South Cape I and the Subantarctic islands, *Proterodesma byrsopola* occupies the niches that on the mainland are occupied by *Izatha*, *Barea*, *Borkhausenia* (Oecophoridae), *Lysiphragma* (Tineidae) and *Isonomeutis* (Copromorphidae). These genera are plant detritus feeders (*Borkhausenia*) or wood/bark feeders (other genera). On Chatham Is, *P. chathamica* Dugdale is a wood borer (Dugdale 1971).

38. ***Proterodesma turbotti*** (Salmon and Bradley) n. comb.

Salmon & Bradley, 1956. *Rec. Dominion Mus.* 3(1): 65. (*Antipodesma*). Genitalia and wings mounted on slides No. 19/53, 19/54, respectively.

Description: As in Salmon & Bradley, l.c., and their fig. 7–9; brachypterous. Population variable in color, ranging from pure creamy-white or fawn to almost black in both sexes; forewing discal streak present or absent. Venation: Forewings (Fig. 187) R₄, R₅ present apically only; one M, and one CuA branch present, CuA stem strong; discal area setose basally; hindwing (Fig. 187) broadly triangular, sparsely setose, Sc and Cu stems present; body length: 2.75–4.00 mm.

♂ *genitalia* (Fig. 186, 188): Tegumen plano-convex, socii reduced, not covering gnathos; valva lacking hook, posterior costal process strong; saccus weakly sclerotised discally, strongly so laterally so that it appears as a V-shaped sclerite; aedeagus straight smooth (Fig. 186).

♀ *genitalia*: Lamella antevaginalis (Fig. 189) weakly bilobed; basal spermathecal duct (Fig. 190) strongly coiled; ductus bursae with a lunate cestum (Fig. 190). 8T and ovipositor as in Fig. 191.

Larva: Prespiracular pinaculum strong, not excavate behind, and spiracle circular (Fig. 193); SV setae on 1st and 2nd abdominal segments tending to be in a straight line; integument with conspicuously darkened pinacula; D₁, D₂, SD₁ on 9th abdominal segment equidistant.

Distribution: Antipodes I, Bounty I.

Host Plants: Plant detritus (amongst *Pucciniella*, *Stilbocarpa*, *Coprosma*; also *Marchantia*, and salt-spray alga *Enteromorpha*).

ANTIPODES I: 158 adults; 40 + larvae ex lichens, moss, plant detritus from splash zone to upper peaks, Antipodes I. (Kuschel, Johns).

Remarks: *P. turbotti* is brachypterous, and may be distinguished from other *Proterodesma* spp also on genitalic characters (♂ genitalia lacking a costal hook, ♀ with coiled (i.e. "normal") spermathecal tube, ductus bursae with a cestum), but is difficult to separate on larval characters. Wing reduction, venation loss, and ♂ hook loss are fore-shadowed in other *Proterodesma* species. *P. turbotti* is considered to be a very old segregate of the genus, stranded on the Antipodes—Bounty region.

Tinea Linnaeus

Tinea pellionella Linnaeus

Petersen (1957: 145, fig. 109, 14C, fig. 110) gives synonymy and descriptions of this cosmopolitan domestic pest of animal fibres. 1 ♂ was collected in the bedding store, Beeman Camp, by K.A.J. Wise (BISHOP).

(12) TORTRICIDAE

All the Subantarctic Tortricidae are resident; Auckland and Campbell share 2 species, Auck-

land and Snares share 2, and there is 1 brachypterous species endemic to Campbell I. Antipodes and Bounty Is lack tortricids. The subantarctic tortricids are either members of mainland species (2), or of a particular species group in a mainland genus (1) or derivable from a mainland genus (1), within the tribe Archipini in Tortricinae.

As tortricid larvae lead concealed lives on or within their hostplant, they presumably escape many effects of a rigorous climate which may in part explain their success in the alpine biotope to which over half the N.Z. species, and several of the genera (e.g. *Ascerodes*, *Gelophaula*) are endemic (Dugdale 1966: 742). Of the subantarctic species, one is restricted to *Dracophyllum* (as it is on the mainland), another polyphagous on dicotyledonous shrubs (as on the mainland) and the third is found most commonly on *Pleurophyllum* and is a subantarctic endemic, like its favored host. The fourth species is known only from 4 brachypterous ♂♂ collected amongst tussocks in winter by members of the Cape Expedition, and may be related to a lowland mainland species restricted to *Cortaderia*, a monocotyledonous host.

The Tortricinae outnumber Eucosminae in New Zealand, except on Raoul I (29°S) which, for Lepidoptera, has little faunal affinity with New Zealand. Within the Tortricinae, only on Chatham I does the "*Epiphyas*"-group of genera outnumber the "*Epichorista*"-group. In the Subantarctic Is, as on the mainland, the "*Epichorista*"-group predominates. Where Chatham and Subantarctic Is share genera, different species groups are involved. In *Planotortrix*, the species group that has colonised southern off-shore islands and northern off-shore and outlying islands (south of 34°S) does not occur in the Subantarctic despite the presence of suitable hosts, e.g. *Olearia lyalli* (Snares), *Pleurophyllum* and *Stilbocarpa* (throughout).

From superficially similar adult subantarctic Carposinids and Geometrids, archipine tortricids can be distinguished by their possession of ocelli. From Pyralidae they differ in lacking conspicuous, tufted maxillary palpi. The porrect labial palpi and the naked haustellum serve to distinguish tortricids from Gelechioidea in general; Tineidae and Hyponomeutidae, which have a naked haustellum are readily distinguished by their angulated, ascending labial palpi, and Nepticulidae differ in having large antennal eye-caps.

Tortricid larvae are distinguished from those of other Subantarctic groups by their possession of a comb-sclerite under the anal shield but above the anus itself, and by the absence of submentum pits (cf. *Tinearupa* in Oecophoridae).

KEY TO SUBANTARCTIC TORTRICIDAE

Note: The condition of setal pinacula SD₁ and D₂ on the 9th abdominal larval segment is useless when applied to mainland specimens.

1. Adults brachypterous, hindwings vestigial; ♂ antenna with whorls of long black setulae (♀, larva unknown; C).....**Sorensenata agilitata**
 Adults either fully winged, or, if forewings reduced, hindwings not vestigial; ♂ antennae without whorls of long setulae; larvae on aerial parts of host plant.....2
2. Adults slender, pale grey; labial palpi less than twice as long as diameter of compound eye; ♂ forewing lacking a costal fold; larva in young shoots of *Dracophyllum*; abdominal segment 9 with seta D₁ pinacula separate from SD₁ pinacula (Fig. 201); seta SD₁ anterodorsad of spiracle on abdominal segments 3-6; pupal integument blackened (A, C, also S, St).....**Ericodesma melanosperma**
 Adults never pale grey; labial palpi always longer than twice compound eye diameter; ♂ forewing with a costal fold; larva with seta D₁ pinacula fused with SD₁ pinacula on abdominal segment 9, seta SD₁ directly dorsad of spiracle on abdominal segments 3-6; integument of pupa tan or brown.....3

3. Wings held roof-wise in repose, forewing with veins R_4 , R_5 stalked; pattern intricate, transverse; larva on shrubs, headcapsule seta O_2 posteroventrad of Ocellus 1, foreleg pretarsus with apical scale seta acuminate; 9th abdominal segment with D_1 pinaculum irregular, width less than twice length; SD_1 and D_2 pinacula fused, narrowly or broadly, rarely narrowly separate (A, C, also N, S, St).....**Pyrgotis plagiatana**
- Wings held flat in repose, forewings with veins R_4 , R_5 separate, pattern simple, longitudinal or absent; larva usually on *Pleurophyllum*, headcapsule seta O_2 directly posterior to ocellus 1, foreleg pretarsal scale seta rounded apically widest subapically; 9th abdominal segment with D_1 pinaculum rectangular, width twice length (A, Sn).....**Planotortrix syntona**
- (a) Forewings reduced; veins M_3 , CuA1 stalked (A).....**P. s. syntona**
- (b) Forewings normal; veins M_3 , CuA, separate (Sn).....**P. s. laquaeorum**

Ericodesma Dugdale new genus

(Gr: erica: heath; desme: alliance, feminine).

Type-species: *Tortrix melanosperma* Meyrick, 1916: 414.

Antenna in ♂ subserrate, setulose, setula length less than twice segment width; labial palpus length less than $1.5 \times$ diameter of compound eye; eye globose, lacking a broadly nude periorbital strip. Maxillary palpi with apical segment unequally bifid. Thorax smooth-scaled; hind tibia with a central dorsal brush of hair-scales. Forewings smooth-scaled, costal fold absent in ♂; veins R_4 , R_5 arising separately in forewing. Abdomen in ♂ with modified 8th tergite and sternite, tergite expanded into an oblong hood, sternite a very narrow strip, with a posterior, paired mensis ventralis associated.

♂ *genitalia*: Uncus with neck elongate, apex securiform; socii short, either hairy pads or minute setose tubercles; gnathos arms slender, fused apically into a slender hook; tegumen halves meeting broadly in midline. Vinculum lacking a saccus, unsclerotised in ventral midline. Valva triangular, costal sclerite projecting into valvular area; sacculus with ventral margin with at least 2 prominences; valvula lacking an apical finger-like prominence. Aedeagus longer than valva, apex with or without a thorn, orifice oblique, dorsal to dextral; vesica with one or many deciduous needle cornuti.

♀ *genitalia*: Sterigma wider than deep, bowl-shaped or reniform; colliculum split ventrally, cylindrical; ductus bursae sinous or kinked between colliculum and ductus seminalis; thereafter kinked, curved or twisted; cestum present, posterior apex acuminate; corpus bursae globose, signum capitate, capitulum peg-like, nearly as long as the dagger.

Pupa: Vein M shortly forked; chorda arising by vein R_3 .

Included species: *Tortrix aerodana* Meyrick, 1881; *Tortrix argentosa* Philpott, 1924; *Tortrix cuneata* Clarke, 1926; *Tortrix maculosa* Philpott, 1927; *Tortrix melanosperma*; *Tortrix scruposa* Philpott, 1924; *Tortrix subdola* Philpott, 1924.

Ericodesma is a distinctive group of small grey tortricids associated with heathland *Pimelea* (*E. cuneata*, *E. maculosa*, *E. scruposa*), *Cyathodes* (*E. aerodana*), *Gleichenia* (undescribed North Auckland and Chatham species) and *Dracophyllum* (s.g. *Oreothamus*) (*E. melanosperma*, *E. argentosa*, *E. subdola*). None are forest-inhabiting. Specimens at ED labelled "*Tortrix indigestana*," "*T. liquidana*" and "*T. concordana*" from Australia are congeneric; the latter 2 show the aedeagal tooth that is a characteristic of the *melanosperma* species group, while *indigestana* is extremely similar to our *E. aerodana*. From other archipine tortricids with triangular ♂ valva, *Ericodesma* is distinguished by the shape of the valval costal sclerite in the ♂, and in the ♀, by the presence of a cestum (absent in *Epiphyas* Turner and *Merophyas* Common), and a signum (absent in *Eurythecta*, *Merophyas*, and an undescribed genus).

Ericodesma melanosperma is chosen as type species because it has the widest geographic range and is the only tortricid known to be associated with *Dracophyllum* within that range. *E. melanosperma* is the only species of the genus found in the Subantarctic islands; it is not known from Chatham Is.

39. **Ericodesma melanosperma** Meyrick n. comb.

Meyrick, 1916. *Trans. N.Z. Inst.* **48**: 414 (*Tortrix*).—Hudson 1928. *Butterflies & Moths N.Z.*, 227, pl. 47, fig. 4 ♂.

Color pattern: Head (Fig. 198), thorax dark grey, head scales narrowly tipped with pale grey; abdomen and hind wings buff, forewings brownish or dark grey, costa narrowly black from base to about 1/4 length; costal area thickly overlain by white or buff scales to near wing apex; a black speck at apex of discal cell, elsewhere a sparse scattering of small groups of black scales; sometimes an obscure buff stripe along long axis of discal cell ending at the black speck; termen without a pallid inner margin. Fore and middle leg blackish grey, hind leg buff except for apex of basal tarsal segment and rest of tarsus.

Structure: ♂ antenna with erect setulae ventrolaterally, appressed setae dorsally; segments sub-serrate, labial palpi (Fig. 198) with 2nd segment porrect, 3rd drooping, almost hidden in apical scales on 2nd; length of palpus under $1.5 \times$ diameter of compound eye. Maxillary palpus lacking a strong dorsal spine on 2nd segment, 3rd segment slender, constricted subapically, longer than 2nd in Subantarctic specimens, subequal in South I specimens. Forewings with costa weakly revolute basally, wing width about 1/3 length, termen oblique, termen/dorsum angle very oblique, rounded.

Length (both sexes); 10.5–12.0 mm.

♂ *genitalia* (Fig. 195, 196): Uncus apex wider than width of tegumen at “shoulders”; sacculus with inner margin straight; dorsal margin of valva at least $1.25 \times$ as long as distance from valval articulation to tegumen shoulder; gnathos arms straight, fused apices only recurved. Aedeagus with a ventro-apical appressed thorn that is 1/40–1/90 length of aedeagus, northern specimens with longer (Fig. 195), southern specimens with shorter (Fig. 196) thorn.

♀ *genitalia* (Fig. 197): Lamella antevaginalis straight, i.e. orifice oblong; entire sterigma trough-like, anterior lateral apices somewhat produced, sterigma not sclerotised to the collicular area. Cestum length $2.4 \times$ length of an anal papilla lobe; capitulum of signum cylindrical or teat-shaped.

Larva: Integument granulose-scobinate, darker dorsally; head-capsule (Fig. 200) shining, genal stripe absent, each parietal lobe obscurely darkened centrally, frons with a longitudinal obscure dark stripe, head capsule seta O_2 ventrad of Ocellus 1. Prothorax and anal shield irregularly pigmented.

Foreleg pretarsal setae flattened, apex oblique. Chaetotaxy as in Fig. 199, 201. Abdominal segments 1–9 with D, SD and L pinacula unmarked, distinct, D_1 , D_2 pinacula circular on abdominal segments 1–8, D_2 pinacula larger than D_1 pinacula on 8th segment. Setae D_2 , SD_1 on separate pinacula and the D_1 common pinaculum emarginate mesally either on caudal or anterior margin; abdominal segments 1–7 with SD pinaculum not including spiracle; spiracular area scobinate; SD_1 posterodorsad of spiracle on 1st, anterodorsad of spiracle on 2nd–7th segments. SV setae on 1st segment in a straight line, triangular on 2nd. V setae on segments 7, 8 closer together than on 9th segment. Anal comb with 5–6 teeth.

Pupa: Forewing with M forked at 9/10 length in discal cell; integument blackened.

Type locality: Arthur's Pass, South I.

Distribution: South I, Stewart I, and its islets; Auckland, Campbell Is; subalpine N of 45°S, to sea level S of 45°S.

Host plants: *Dracophyllum longifolium* and allies.

AUCKLAND IS: 3 ♂♂, Adams I, Kuschel, Wise; 3 ♂♂ Adams I, Johns; 21 ♂♂, 2 ♀♀, Adams I, Wise, Bell; 8 ♂♂, 3 ♀♀, N. Auckland I, Gressitt; 1 ♂, Auckland I, Johns; 2 ♂♂, 1 ♀, Ocean I, Gressitt; 2 instar IV larvae, Adams I, Kuschel (ED).

South I: 1 ♂, Mt Owen, 1200 m; 2 ♂♂, Lochnagar Ridge, Paparoa Range 1070 m; 7 ♂♂, 2 ♀♀ (including paratypic material), Arthur's Pass, 920 m; 2 ♂♂, 2 ♀♀, Waitati and Flagstaff, Dunedin (ED); Stewart I: 1 larva, ex *Dracophyllum longifolium*, sea level, Pt Pegasus (ED); Big South Cape I: 3 ♂♂ (2 reared), 2 larvae ex *Dracophyllum longifolium* sea level (ED).

Remarks: Yano (1964: 258) records 1 ♂ specimen from Campbell I. *E. melanosperma* is a larger, greyer insect than the northern *E. argentosa* which has the forewings more extensively white-scaled,

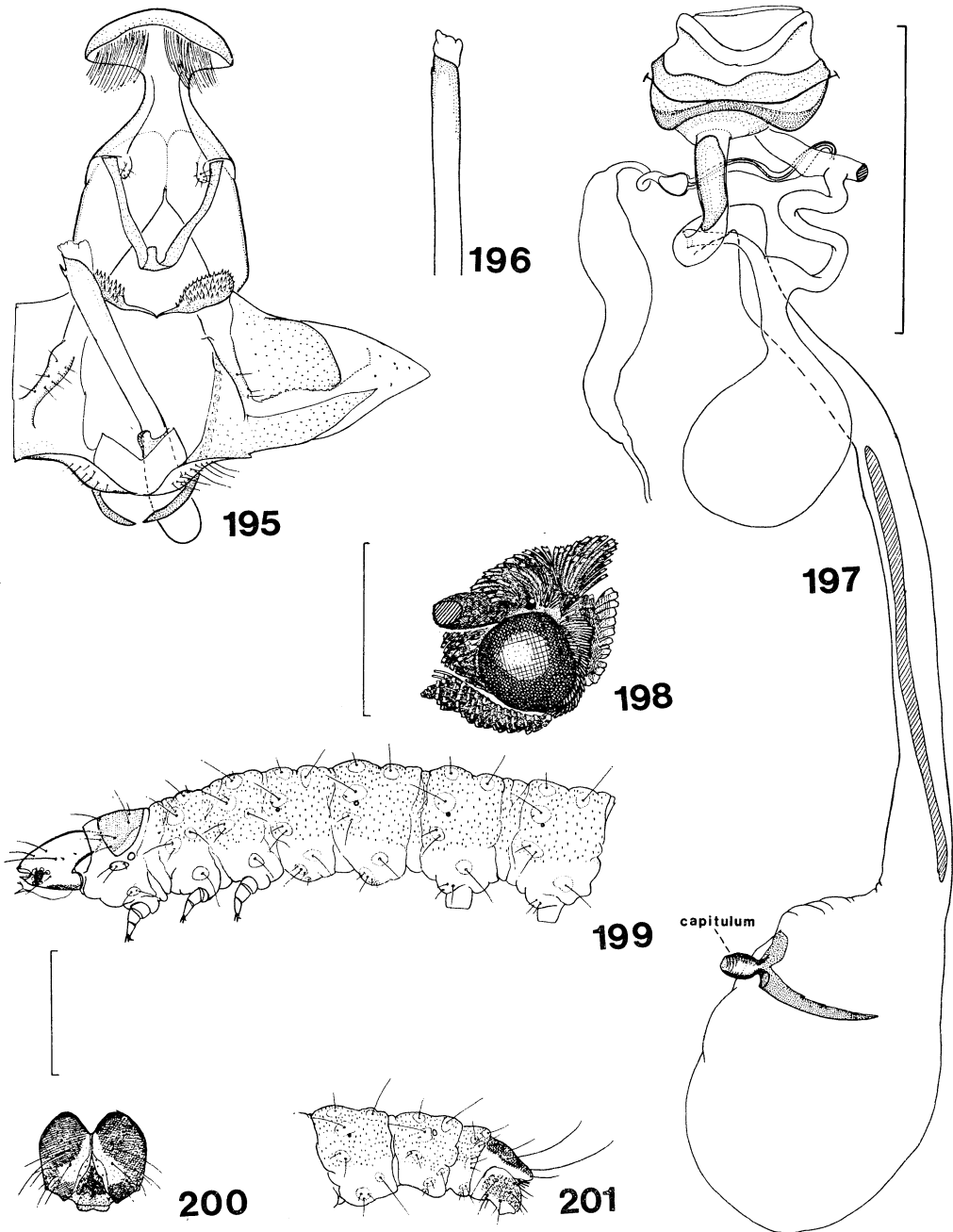


Fig. 195–201. *Ericodesma melanosperma*. 195, ♂ genitalia, paratype, Arthurs Pass, South I; 196, ♂, aedeagus, Campbell I; 197, ♀ genitalia, paratype, Arthurs Pass, South I; 198, ♂ head, Adams I; 199, larva, head, thorax, abdominal segments 1–4, Adams I; 200, larval head capsule, pigmentation; 201, larva, abdominal segments 7–10. Scales represent 1 mm; Fig. 195, 196 same scale as Fig. 197.

the uncus apex narrower, the aedeagal thorn longer, the cestum shorter and the capitulum tapered and skewed. The larva has the D_2 setal pinaculum on the 8th abdominal segment smaller than the D_1 pinacula. *E. argentosa* is indistinguishable from *E. subdola*, and is known from Dun Mtn (type locality of *argentosa*) and Mt Chrome (Nelson); Fields Hut, Tararua Range; subalpine scrub and upland *Dracophyllum*—covered frost flats around Waimarino (type locality of *subdola*) and Ruapehu; and northwards to around Mt Pureora.

E. melanosperma is associated with *Dracophyllum* spp, particularly the complex of species including *D. longifolium*. *E. argentosa* is also found amongst *D. subulatum* in the North I, and a low bushy *Dracophyllum* species on Dun Mtn and Mt Chrome, and unlike *E. m. melanosperma*, flies readily by day. The larva of *E. melanosperma* binds the leaves, destroys the shoot apex and scours out the inner surfaces on new growth of *Dracophyllum*; *D. longifolium*, with its vigorous, broad-leaved young shoots is sometimes heavily attacked, leading to the production of multiple side-shoots. Except in the Subantarctic, *E. melanosperma* competes with a carposinid and a glyphipterygid for this niche. This tortricid, and the geometrid *Epiphryne charidema* (with an almost identical distribution) are the only 2 species out of a possible 6 lepidopterous species to invade the Subantarctic along with *Dracophyllum*.

Planotortrix Dugdale

Dugdale, 1966. *N.Z. J. Sci.* 9(2): 392.

Type-species: *Planotortrix excessana* (Walker).

Generic characters and a list of included species are given by Dugdale (1966: 392–98). In the pupa, vein M is long-forked, and the chorda (vein R-R) arises under vein R_1 .

Further study has indicated that within *Planotortrix* there are on ♀ genitalia, 2 distinct groups (a) those with a long cestum e.g. *P. excessana*, *P. notophaea* (Turner), *P. charactana* (Walker), and (b) those with a short barrel-like cestum e.g. *P. spatiosa* (Philpott), *P. conditana* (Walker). The subantarctic species belongs to the 2nd group, which is otherwise confined to the North and South Is, where the species are characteristic of lowland to upland forest. The *P. excessana* group, which has colonised all off-shore islands, the outlying Chatham and Three Kings Is, the rigorous alpine biotope and mangrove swamps, is absent South of Big South Cape I, and yet, in view of its success on mainland and island situations, would have been expected to occur in the Subantarctic.

The *P. spatiosa* group, with apparently limited dispersal ability despite the presence of suitable hosts, replaces the *P. excessana* group as defoliators, bud-borers and flower destroyers on the showy composite genus *Pleurophyllum* which is currently regarded as being most closely related to the showy southern *Olearia* species, *O. lyalli*, *O. grandis* and *O. angustifolia* (Drury 1968).

40. *Planotortrix syntona* (Meyrick) n. comb.

This species exists as 2 isolated, morphologically distinct populations, one on Auckland Is, the other on Snares.

40a. *Planotortrix syntona syntona* (Meyrick)

Meyrick, 1909. Subantarctic Is of N.Z. 1: 73–74 (*Cacoecia*, as species).

Dimensions and color pattern as in Meyrick (l.c.) and Hudson (1928: 229–230, pl XXIV, fig. 46, as ♀). Additional characters: Forewing with veins M_3 and CuA_1 stalked; labial palpus length 3-1/2 times length of compound eye.

♂ genitalia (Fig. 203, 204): Uncus base square-shouldered, gnathos arms bent upwards, subscaphium sclerotised; socii arms pendent, with a setose prolongation to membrane supported by gnathos. Basal costal process triangular, with 2 irregular spine series; valva with sacculus broad, cylindrical, ending in a curved flange. Aedeagus stout, orifice dorso-dextral; vesica with 1 large and 3 smaller cornuti.

♀ *genitalia*: None available.

Larvae: Integument evenly scobinate, scobinations dark, conical. Head capsule obscurely patterned or pallid, genal stripe obsolete, head capsule seta O_2 posterior to ocellus 1. Foreleg pretarsal dorsal scale-setae flattened, apically rounded, widest subapically. Abdominal chaetotaxy (Fig. 207, 208): segments 1–8 with D setae on circular pinacula, D_2 pinacula subequal with D_1 pinacula. SD_1 pinacula truncate oval, not wider than D_2 pinacula, width about 1/3 height, basally distinctly demarcated from spiracular area; seta SD_1 central on pinaculum, i.e. closer to dorsal margin of pinaculum than to spiracle. D_1 pinaculum on 9th abdominal segment fused broadly with SD pinaculum. Anal comb present, no. of rays variable. Ultimate body length: 14–16 mm.

Distribution: Auckland Is: Adams, Auckland, Ewing Is.

Host plants: *Pleurophyllum* spp.

AUCKLAND IS: Paratype ♂ (WMu); larvae: 6 instar VI, 1 instar IV, Magnetic Cove Stn, Adams I, 27.I.1966, G. Kuschel, ex flowering heads *Pleurophyllum*; 1 instar VI, ex sample 66/74, litter amongst *Pleurophyllum*, *Anisotome*, etc. Adams I, Kuschel; 1 instar IV, with reduced integumental scobinations, Ewing I, Ordish; 1 instar VI, 1 instar III, Auckland I (North), Bivouac Hill, 540 m, Gressitt; 1 instar III, Magnetic Cove, Adams I, moss on tree-trunks, 29.I.1966, Wise.

40b. *Planotortrix syntona laquaeorum* Dugdale, new subspecies

Color pattern: Head, thorax, abdomen, forewings, straw-colored or warm buff, sometimes pale in ♀; forewings immaculate in ♀, usually patterned in ♂, with or without a brown discal longitudinal stripe; hindwings whitish buff, with cubital and anal groups of grey irregular spots, wing apex dark-margined. Rarely ♂♂ have faint transverse reddish brown irregular bands. ♀ abdomen with black pleural stripes.

Structure: ♂ antennae stout, each segment nude ventrally and laterally scaled dorsally, and with basal and apical whorls of setulae that are not longer than depth of a segment, each segment also with short, sparse coating of setulae. Venation: forewings with R_4 and R_5 connate or shortly stalked, M_3 and CuA_1 approximated, connate, or shortly stalked. Head with labial palpi porrect, elongate, length over $4 \times$ compound eye diameter. Wing span: 25–29 mm, both sexes.

♂ *genitalia* (Fig. 205, 206): As in *P. s. syntona*, except that uncus lacking a raised median portion, socii broad at apex, not slender, basal costal process with fewer, larger teeth; sacculus narrower, and apex not upturned; aedeagus slender with 1 very long, slender cornutus and 3 short stout ones.

♀ *genitalia* (Fig. 202): Ovipositor lobes narrow (width approximately 1/5 length); sterigma a shallow cup, lamella postvaginalis unsclerotised in mid-line; colliculum irregular, roughly gutter-shaped, ductus seminalis arising over anterior end of colliculum, and with a pedicellate bulla seminalis; ductus bursae not longer than corpus bursae, with a tumid posterior portion that is faintly sclerotised, and a shorter heavily sclerotised, anterior, truncate conical cestum; corpus bursae ovoid, signum with a short dagger and a truncate, inclined (almost decurved) capitulum.

Larva: As for *P. s. syntona* except that head capsule is darker, the genal stripe is distinct, and the head-capsule seta O_2 is close to and more ventrad of ocellus 1 than in *P. s. syntona*.

Type locality: Station Point, Snares I.

Distribution: Snares I.

Host plants: *Olearia lyalli*, (polyphagous, Dr D. S. Horning, Jr., pers. commun.)

SNARES I: Holotype ♂, "Station Point, January 1967, P. M. Johns," in collection, E.D.; ♀ allotype, 3 ♂♂, 1 ♀ paratypes, same data as holotype; 1 ♀ paratype, Hoho Bay, Snares I, 31.I.1967, 1 ♂, beating *Senecio*, Mannering; 1 ♂, 1 ♀, paratypes on *Olearia lyalli* at night, 26.I.1967, Johns.

Larva: 1 instar III, Station Point, Snares I, beating *Olearia*, 7.I.1967, Johns.

Remarks: *Planotortrix syntona* superficially resembles *R. conditana* from the North and South Is, but differs in that the ovipositor lobes are narrower, the cestum is longer and conical, not cylindrical, the signum is truncate, not finger-like, the dagger is shorter, the gnathos is erect, not reclinate, the basal half of the sacculus is unflanged, and the uncus base shoulders are angulated,

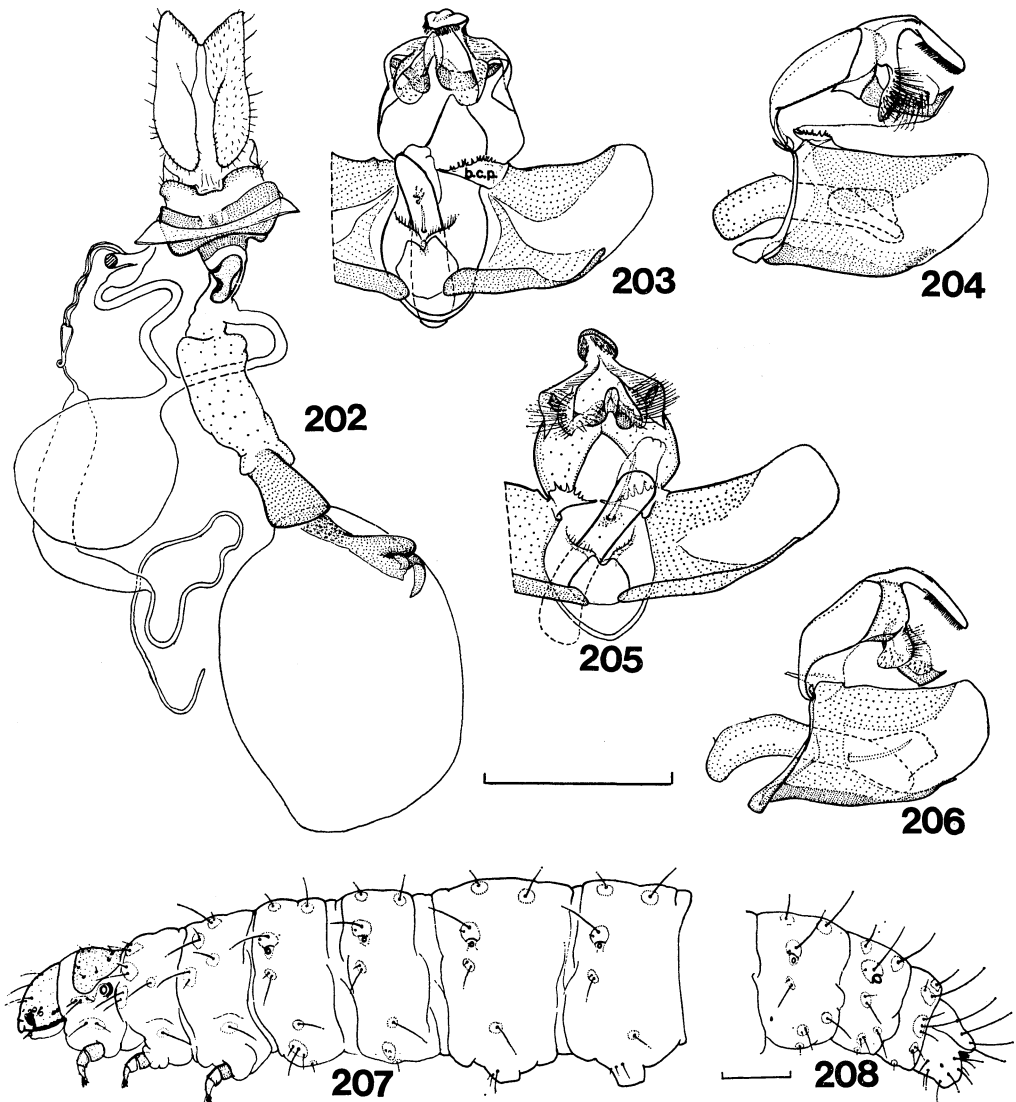


Fig. 202-208. *Planotortrix syntona*. 202, *P. s. laquaeorum*, ♀ genitalia, ventral view; 203, *P. s. syntona* ♂ genitalia, ventral view (b.c.p. = basal costal process); 204, ditto, side view; 205, *P. s. laquaeorum* ♂ genitalia, ventral view; 206, ditto, side view; 207, *P. s. syntona*, larva, head, thorax, abdominal segments 1-4; 208, ditto, segments 7-10. Scales represent 1 mm.

not evenly sloping.

Adults of an undescribed *Planotortrix* sp. of the *excessana* group which is also found on *Olearia colensoi grandis* and *O. angustifolia* on islands of Stewart I, differ in having an intricate, transverse color pattern, and the larvae have strongly patterned head capsules, and have the SD pinacula far larger than the D₂ pinacula.

Pyrgotis Meyrick

Meyrick, 1881. *Proc. Linn. Soc. N.S.W.* **6**(3): 439–40.

Type-species: *Conchylis plagiata* Walker, 1863; designated Fernald 1908: 42.

Small moths (20 mm or less in wing span), wings held roof-wise in repose; antennae in ♂ subserrate; compound eyes with or without a nude periorbital zone; labial palpi over twice as long as compound eye diameter, 2nd segment sinuous, expanded with scales dorsally to apex, 3rd segment basally enveloped in apical scales of 2nd segment, short. Thorax with median mesonotal (large) and mesoscutal (small) crests. Forewings with $R_4 + R_5$ stalked, ♂ costal fold narrow, extending for 1/3 wing length, interior of fold with glistening short narrow scales on upper and lower surfaces, and a narrow band of hair-like scales along the crease.

♂ *genitalia*: Uncus truncate or spatulate, uncus neck stout, scarcely narrowed to base (i.e. bull-necked); gnathos arms approximated mesally well before fused apex; socii drooping, 1/2 to as long as gnathos arms; basal costal processes elongate triangular, either narrowly fused or separate mesally, dorsally with 2 to several series of spines or spinules; valvae rectangular, straight or weakly curved; aedeagus pistol-shaped, orifice an elongate dextral split; cornuti needle-like, many.

♀ *genitalia*: Lamellae fused to form a sterigma, the anterior (ventral) margin produced mesally, i.e. roughly W-shaped, lamella postvaginalis deeply concave; colliculum split, angled under sterigma, ductus seminalis arising some distance from colliculum; ductus bursae many times longer than corpus bursae, slender, sinuous, cestum present; corpus bursae globose, signum with a peg-like erect capitulum, and a dagger but no strap-like sclerite joining signum with ductus bursae/corpus bursae junction.

Pupa: Vein M unforked, chorda (R-R) arising by Vein R_1 .

Included Species: *Capua arcuata* Philpott, 1915; *Catamacta calligyrsa* Meyrick, 1926; *Catamacta chrysomela* Meyrick, 1914; *Pyrgotis consentiens* Philpott, 1916; *Pyrgotis eudorana* Meyrick, 1881; *Pyrgotis humilis* Philpott, 1930; *Pyrgotis plagiata*; *Pyrgotis plinthoglypta* Meyrick, 1892; *Pyrgotis pyramidias* Meyrick, 1901; *Catamacta transfixa* Meyrick, 1924; *Pyrgotis zygiana* Meyrick, 1883.

Pyrgotis is distinguished from *Catamacta* (which also has forewing veins R_4 and R_5 stalked) by its wing-position at rest (roofwise in *Pyrgotis*, flat in *Catamacta*) its shorter labial palpi, in its W-shaped lamella antevaginalis (evenly curved in *Catamacta*), and laterally split aedeagus (dorsally split in *Catamacta*). The Australian "*Pyrgotis*" *insignana* Meyrick (1881) is now placed in Epitymbiini (Common, pers. comm.); on genitalia it resembles New Guinea species of *Rhomboceros* Meyrick as figured by Diakonoff (1953: 52). *Pyrgotis* is now regarded as an endemic New Zealand genus, and is known from North, South, Stewart, and the Subantarctic Is.

Pyrgotis species fall in 3 groups on larval chaetotaxy and host plant type—the *consentiens* group feeding on upland and alpine *Hebe odora* in Otago, Southland and Stewart I, the poorly known *arcuata* group restricted to forest *Podocarpus* species in North and South Is, and the *plagiata* group, on conifers and dicotyledonous trees and shrubs. This last group is the most ubiquitous, being present in the Subantarctic, and, on the mainland, also in the alpine biotope on both islands. Two species (*P. eudorana*, monophagous on *Muehlenbeckia australis*, *P. pyramidias* oligophagous on *Nothofagus*, *Cyathodes* and some other "hard-leaved" dicotyledons—rarely on introduced conifers) do not stray from the mainland, nor into the alpine biotope, but the group of species (mostly undescribed) centred around *P. plagiata* are polyphagous on conifers and shrub dicotyledonous plants in all biotopes. *P. plagiata* is present in the Subantarctic.

41. *Pyrgotis plagiata* (Walker 1863)

Walker, 1863. List Lepidopt. Ins. Brit. Mus. **28**: 370 (*Conchylis*).—Meyrick 1881. *Proc. Linn. Soc. N.S.W.* **6**(3): 441 (*Pyrgotis*).—Meyrick 1911. *Trans. N.Z. Inst.* **43**: 82 (*Capua*).—Hudson 1928. Butterflies & Moths N.Z., 222, pl 24, fig. 13–19, 45 (*Capua*).—Philpott 1928. *Trans. N.Z. Inst.* **59**: 452, 467: fig. 70 (*Capua*).

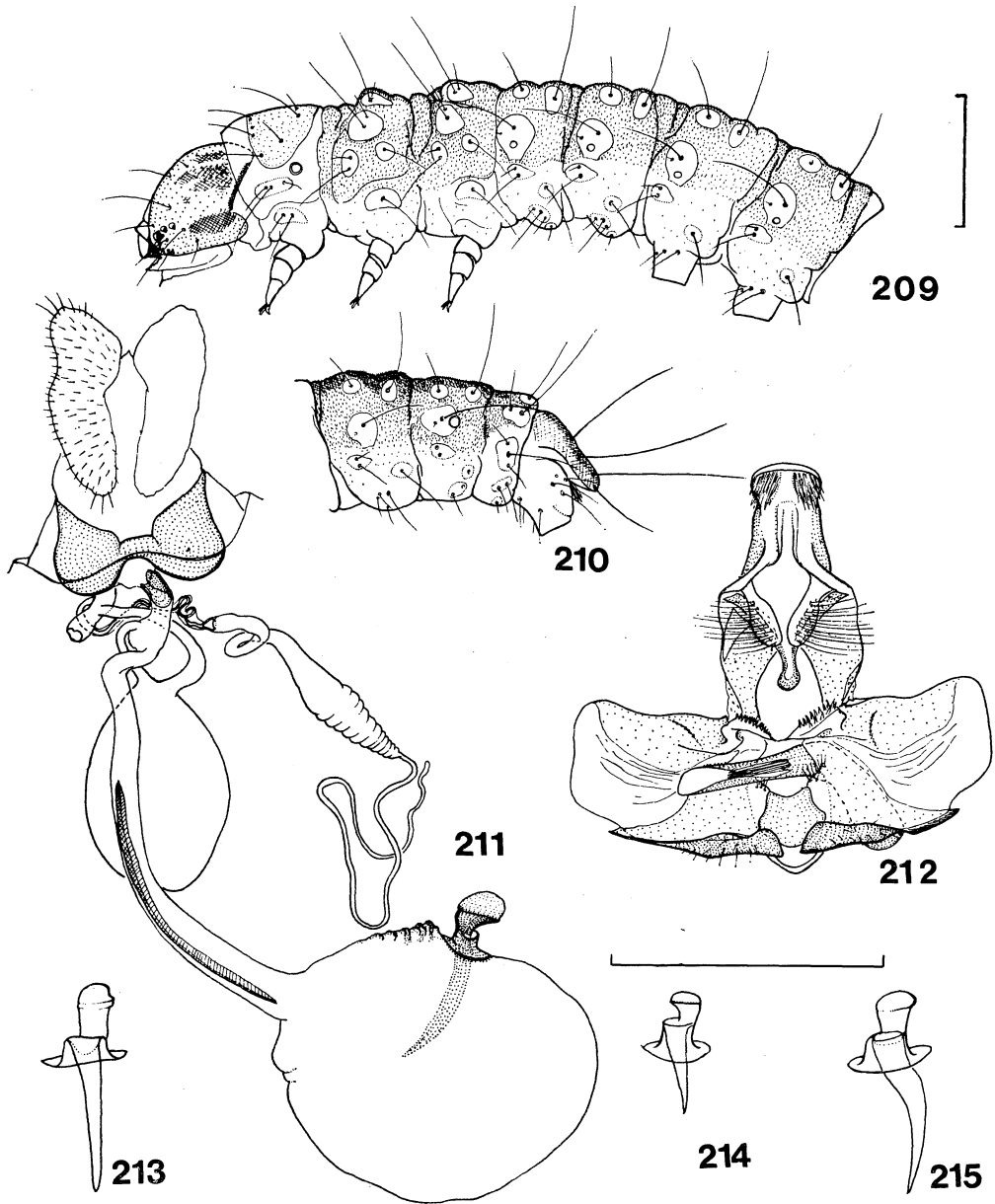


Fig. 209-215. *Pyrgotis plagiata*. 209, larval head, thorax, abdominal segments 1-4, Auckland Is; 210, ditto, abdominal segments 7-10; 211, ♀ genitalia, ventral view, Invercargill; 212, ♂ genitalia, ventral view, Auckland I; 213, ♀, signum, Campbell I; 214, ditto, Auckland I; 215, ditto, *Epagoge parallela* type specimen. Scales represent 1 mm; Fig. 210 same scale as Fig. 209.

- Holotype ♂, without abdomen, "Auckland, New Zealand, Oxley," in BMNH.
- recusana* Walker, 1863. *ibid*: 371 (*Conchylis*). ♂, "New Zeal" BMNH slide 8516. Syn. Meyrick, 1881: 441.
- luciplagana* Walker, 1863. *ibid*: 381 (*Paedisca*). ♀, "Auckland, New Zealand" BMNH slide 7809. Syn. Meyrick, 1881: 441.
- punana* Felder & Rogenhofer, 1875. *Reise der Novara 2*, pl 137, fig. 43 (*Grapholitha*). ♂, "Nova Seelandica." Syn. Meyrick 1881: 441.
- xylinana* Felder & Rogenhofer, 1875. *ibid*, fig. 44 (*Grapholitha*). ♀, "Nova Seelandica," abdomen missing. Syn. Meyrick, 1881: 441.
- trichroa* Meyrick, 1901. *Trans. ent. Soc. Lond.*: 578 (*Adoxophyes*). ♀, "Whangarei, New Zealand 19.XII.85 E.M." BMNH slide 10553. **New Synonymy.**
- tornota* Meyrick, 1907. *Trans. N.Z. Inst.* **39**: 114 (*Pyrgotis*). ♂, Invercargill, VIII.05 Philpott" BMNH slide 8528. Syn. Meyrick, 1911: 83.
- parallela* Salmon & Bradley, 1956. *Rec. Dominion Mus.* **3**(1): 72 (*Epagoge*). ♀ "in house, 22.X.44"? Auckland

I. New Synonymy.

Color Pattern: As figured by Hudson (1909: pl II, fig. 3-4; 1928: pl 24, fig. 13-19, 45), usually elements obscure in Subantarctic and Big South Cape specimens, mainland populations often with some individuals with longitudinal color pattern.

Structure: Antenna subseriate in ♂, each segment scaled dorsally (pallid basal and black apical scales), with latero-ventral setulae as long as to longer than segment diameter; labial palpi as in generic description, 1.8-2.0-2.5 × as long as compound eye diameter; compound eye without a broad periorbital strip. Forewings sexually dimorphic, in ♂ rather triangular, apex subfalcate, termen sinuous but not so oblique; hindwing normal (i.e. no cubital pecten). Length (vertex to wing apex): 10.0-10.4 mm (Big South Cape); 7.5-10.6 mm (Auckland Is), 7.3-8.9 mm (Campbell I) mainland populations range from 8.0-11.5 mm.

♂ **genitalia** (Fig. 212): Uncus variable in width, apex rounded or squared, neck stout, arched; socii elongate oval, 1/2-2/3 length of gnathos arms, drooping; gnathos descending, apex lacking a heel. Valvae rectangular, costal apex rounded to subrectangular to acute, costa straight or concave; sacculus flanged, apex narrowly free, ending at 3/4-4/5 valval length. Juxta variable, but as wide as long. Aedeagus pistol-shaped, both portions equal in length; orifice a dextral split, cornuti many, needle-like; aedeagus with a group of short spinules dorsally just before apex, which is oblique.

♀ **genitalia** (Fig. 211, 213-215): Sterigma shallowly W-shaped, lamella postvaginalis sinuous laterally, wider than long, emarginate irregularly in mid-line; colliculum length about 1/3 that of lamella postvaginalis; ductus seminalis arising distant from colliculum, bulla 1/2 length of corpus bursae; spermatheca as figured; ductus bursae curved, cestum narrow, gutter-like, length 2/3 that of ductus bursae, and 2.5 × sterigma width; corpus bursae globose, signum (Fig. 211, 213-215) with peg-like convex-topped capitulum and single dagger set in a circular plate; often a faint band of sclerotised patches fading towards corpus/ductus bursae junction.

Larva (Fig. 209, 210): Integument darkly scobinate dorsally to near spiracular level, scobinations turbinate with an apical spine. Head capsule obscurely to distinctly patterned, genal stripe faint or strong; head capsule seta O₂ posteroventrad of ocellus 1. Prothoracic and anal shields irregularly pigmented. Foreleg pretarsal dorsal setae flattened, apically acuminate. Abdominal segments 1-8 with D and SD setal pinacula conspicuous; D₁ pinacula circular, D₂ pinacula oblong, transverse; SD₁ pinacula including spiracle, seta SD₁ directly dorsad of spiracle on segments 1-7; on segment 9, D₁ common pinaculum oblong to irregular; D₂ and SD₁ on a common pinaculum (Subantarctic (Fig. 210) and some mainland specimens) or on very unequal separate pinacula (Big South Cape and most mainland specimens), D₁ always closer to SD₁ than to D₂. SV setae on abdominal segments 1, 2 arranged in a triangle.

Distribution: North, South, Stewart Is, coastal to subalpine; Big South Cape, Snares (?), Auckland, Campbell Is.

Host plants (subantarctic only): *Coprosma*; *Hebe*, *Cassinia*, *Pleurophyllum*; polyphagous on small-leaved arboreal dicotyledons, and on *Podocarpus*, *Dacrydium* on mainland.

SNARES I: 1 ♀, 15.XI.1907, Hudson Colln (WMu). (Unsubstantiated).

AUCKLAND IS: 10 ♂♂, Adams I, Auckland, I, French I, Kuschel, Dumbleton, Gourlay; 17 ♂♂, Adams I, Auckland I, Johns; 44 ♂♂, 13 ♀♀, Adams I, Auckland I, Ewing I, Gressitt, Wise; 21 ♂♂, Auckland I, Sorensen; holotype ♀, *Epagoge parallela* S & B; 4 ♂♂, 3 ♀♀, Auckland I, Hudson.

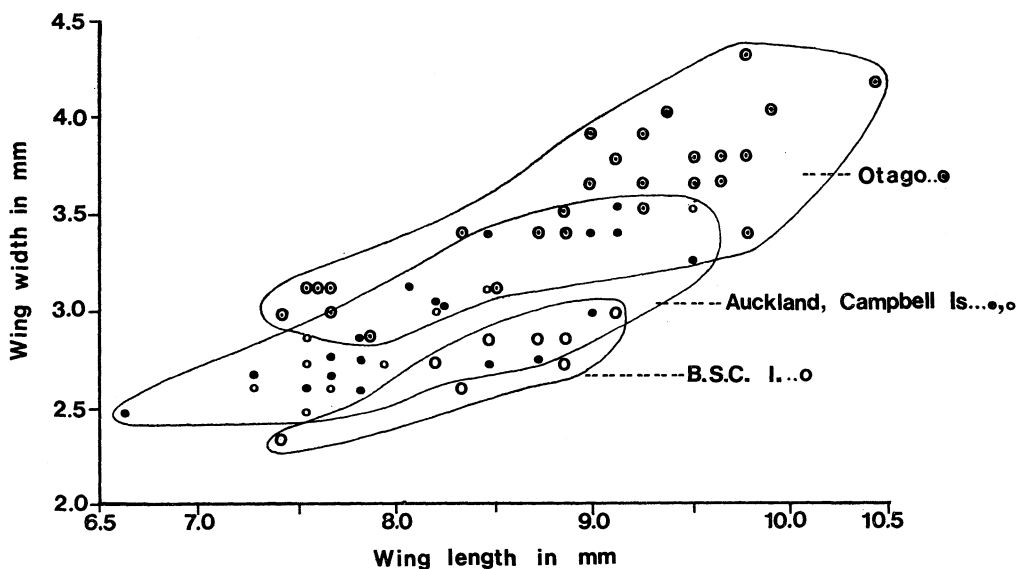
CAMPBELL I: 4 ♂♂, 1 ♀, Kuschel; 8 ♂♂, 4 ♀♀, Sorensen, Turbott.

Larvae (Subantarctic only): Auckland Is: 8 larvae, 19.I.1966, 2 larvae 26.I.1966, 1, ex *Hebe elliptica*, 3.II.1966, Kuschel, Adams I; 1 ex *Coprosma foetidissima* 26.I.1966, Johns, Adam I.; 2 Crozier Pt, ex *Hebe* and kelp, Gressitt, Auckland I; 1 ex *Cassinia*, Enderby I, Gressitt. Campbell I: 2 Mt Lyall, 400 m, Kuschel, 1 St Col Pk, 300 m, 1 ex *Coprosma*, Lookout Bay; 1 ex *Pleurophyllum* 70 m; 1 Tucker Cove, ex *Coprosma*, Gressitt.

North I: 140 ♂♂, 144 ♀♀; South I: 64 ♂♂, 70 ♀♀; Stewart I: 1 ♀♀, 8 ♂♂; Big South Cape I: 8 ♂♂, November 1968 Dugdale.

Remarks: *P. plagiata* on genitalia and color pattern resembles *P. calligypha* and a group of undescribed alpine species; from all of these *P. plagiata* is distinguished on color pattern by the form of the discal dark V mark which extends to the dorsum in this species, but not in the others. *P. plagiata* has longer cornuti in the vesica and an oblique aedeagal apex with subapical spinules; the other species have shorter cornuti, with the aedeagus smooth dorsally and the apex not oblique. In *P. plagiata* the lamella postvaginalis is wider and shorter than in the others, which also lack the lateral sinuosity of *P. plagiata*.

The seemingly consistent differences between the Subantarctic and mainland populations are: uncus width, capitulum shape (Fig. 213–215), larval chaetotaxy (Fig. 210) and adult color pattern and ♂ wing proportions. All Subantarctic characters can be matched in a few mainland specimens, however, with the exception of capitulum shape; this structure is reduced and sometimes deformed in subantarctic specimens especially those from Campbell I. Wing width/length for ♂♂ (Graph 2) show that Subantarctic ♂♂ tend to have narrower wings than do mainland ♂♂, and also that Big



Graph 2. Scatter-diagram of forewing width: forewing length ratios in *Pyrgotis plagiata* (Walk.), from Otago-Southland, Auckland Is, Campbell I, and moors on Big South Cape I. There is a tendency for wings to become narrower in relation to length in specimens from exposed localities.

South Cape I ♂♂ are more like Subantarctic than mainland ♂♂. On genitalia, and larval structure however, Big South Cape specimens agree better with mainland specimens. The stout uncus is also found in Southern South I (and sporadically in northern South I) but not in North I ♂♂. The fused SD₁-D₁ pinaculum on abdominal segment 9, characteristic of Subantarctic larvae, are either narrowly fused or narrowly separate in mainland larvae. There is no point in maintaining subspecific or specific distinctiveness for Subantarctic *P. plagiatana*.

This extraordinarily variable (and ubiquitous) species, with its capacity for utilising both moor and forest is associated principally with Myrtaceae and conifers. It could only have succeeded in the Subantarctic after the advent of *Metrosideros*; the larva is arboreal, and on the mainland is absent above the forest edge. It is replaced in the alpine zone by two related species which can exist on low-growing shrubs.

Sorensenata Salmon and Bradley

Salmon & Bradley, 1956. *Rec. Dominion Mus.* 3(1): 73.

Type-species: *Sorensenata agilitata* Salmon & Bradley, *ibid.*

Additional generic characters: Forewing costa with a regular series of erect, pallid strap-like scales; costal fold absent. Venation (Fig. 216): chorda (veins r-r) strong; veins R₄, R₅, M₁ arising from a common stalk; M stem vestigial in discal cell, unforked, CuA₂ from 7/8 length of discal cell; CuP vestigial. Hindwing with venation greatly reduced—Sc R₁ tubular, CuA tubular, but R_s, M₁ vestigial; M₂, M₃ recognisable, CuA branches absent, anal veins absent. Maxillary palpus ? 1-segmented, haustellum not longer than labial palpus; labial palpus with 2nd segment bearing a sparse series of out-curved slender scales.

♂ genitalia (Fig. 217, 218): Socii reduced (not absent); uncus as in Fig. 148; basally stout (bull-necked), curved, concave laterally, apex flattened, oblong; gnathos apex plate triangular, gnathos arms connecting with plate mesally; transtilla (fused basal costal process + fultura superior) lacking spines; sacculus of valva

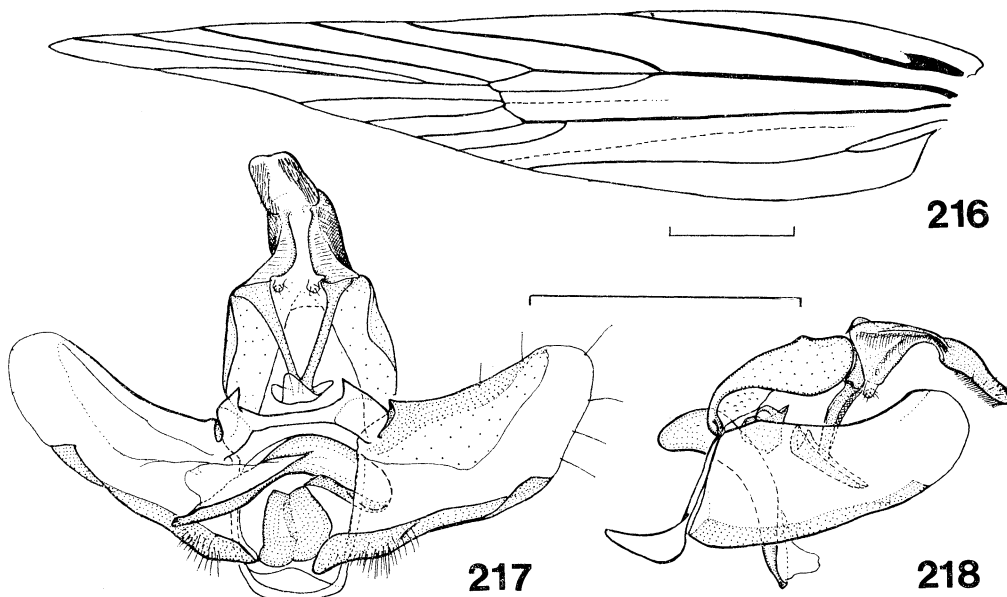


Fig. 216–218. *Sorensenata agilitata*. 216, Forewing, paratype; 217, ♂ genitalia, paratype, ventral view; 218, ditto, side view. Scales represent 1 mm.

with a sub-basal setulose prominence beyond which is a shallow, emarginate zone; aedeagus with a dorsal to obliquely dextral split, lacking a thorn; juxta as in Fig. 217.

Remarks: The above description is based on a re-examination of the holotype and 2 paratypes (one head-less) at WMu. The genitalia and right wings of the head-less paratype were prepared. No further specimens have been collected, and no larvae collected can be associated confidently with *S. agilitata*.

The relationships of *Sorensenata* are difficult to establish as no ♀♀ have been collected. Superficially, *Sorensenata* resembles a group of species (mostly undescribed) from lowland-upland and alpine grasslands in the South I, including "*Eurythecta*" *leucothrinca* Meyrick, in that the labial palpi are slender and porrect, the antennae have whorls of long black setulae, and the color pattern is longitudinal, or entirely buff. *Sorensenata* differs from the narrowest-winged of these species in that none have a costal series of hair-like scales, nor stalked veins in the forewing, nor vein CuA₂ arising so close to the apex of the discal cell. Also in these genera, the aedeagus is ventrally to sinistrally split, and has a prominent thorn; ♂♂ of "*E*" *leucothrinca* also have a large costal fold on the forewing.

From "*Epichorista*" *persecta* Meyrick (an isolated taxon with a complicated larval life-history on *Coprosma* species), which has variable forewing venation, *Sorensenata* differs in the smooth basal costal process (spinose in "*E*" *persecta*), lack of cornuti and in juxta shape, but resembles "*E*" *persecta* in chorda development, and in the tendency in "*E*" *persecta* for veins R₄, R₅, and M₁ to have a common origin. While the gnathos has a heel in both groups, the socii and uncus are different.

Another similar isolated species, *Ascerodes prochlora* Meyrick, also has a heeled gnathos apex, and like *Sorensenata* lacks spines on the basal costal process and cornuti in the aedeagus. *Ascerodes*, is however, an extremely modified high alpine species, whose larvae bore into rootstocks of *Aciphylla* and *Senecio lyalli* and whose other characters do not agree with *Sorensenata*.

While *Sorensenata* resembles "*E*" *persecta* in some characters, it resembles the *Catamacta*—*Pyrgotis* group in others: the stalked R₄ + 5 forewing veins, the bull-necked uncus, socii reduction, the *Catamacta*-like long palpus, and, in degree, antennal characters (segments with whorls of moderately long setulae in *Catamacta*). *Pyrgotis* species, with a short labial palpus, also have a series of outcurved slender scales on segment 2. *Catamacta lotinana* Meyrick, a lowland species restricted to *Cortaderia* grasses, resembles *Sorensenata* in wing-pattern and uncus structure, but ♂♂ have a forewing costal fold.

Whether *Sorensenata* is related to *Catamacta* or *E. persecta*, it represents a stock that has not invaded the Subantarctic islands, as neither of the possible relatives occur south of Big South Cape I. As *Sorensenata* larvae have not been collected by methods previously employed, there is the strong possibility that careful dissection of tussock tillers may yield them; J. H. Sorensen observed that *Sorensenata* "was confined to *Poa litorosa* on which it leaped quickly from stem to stem with great agility" (Salmon & Bradley 1956: 73).

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Note:

Snares I, Lepidoptera

I am indebted to Dr and Mrs D. S. Horning, Jr. for notes on and material of additional Snares I Lepidoptera, from the summer 1970–1971 Expedition. New records, all of South I derived species are as follows: *Simaelnis* sp. (Glyphipterygidae, on *Olearia*), *Scoparia* sp. nr *halopis* Meyrick, *Wittesia* sp. nr *Sabulosella* Walker (Pyralidae). Neither *Pyrgotis plagiatana* nor *Helastia orophylloides* were collected either as adults or larvae.