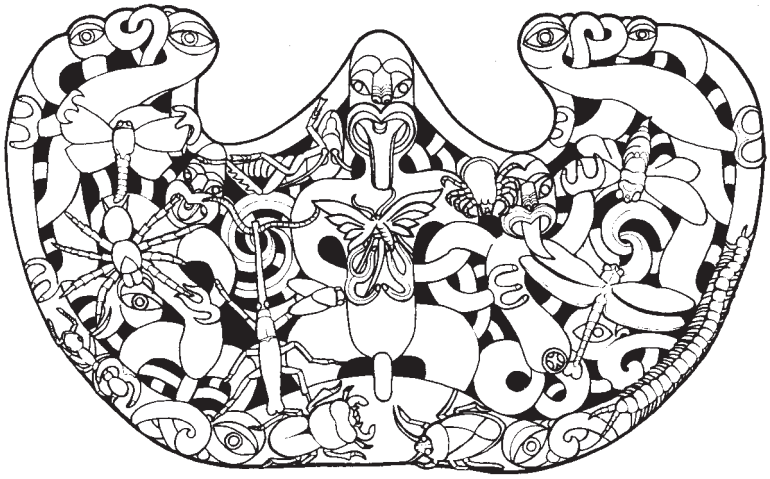

Fauna of New Zealand

Ko te Aitanga Pepeke o Aotearoa

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Number / Nama 80

Noctuinae
(Insecta: Lepidoptera: Noctuidae)
part 2: *Nivetica*, *Ichneutica*

by
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Auckland, New Zealand
2019

Cataloguing in publication

Hoare, R. J. B.

Noctuinae (Insecta: Lepidoptera: Noctuidae). Part 2, *Nivetica*, *Ichneutica* / by R.J.B. Hoare ; with colour photographs by B.E. Rhode. -- Lincoln, N.Z. : Landcare Research NZ, 2019.

1 online resource

(Fauna of New Zealand, ISSN 1179-7193 (online) ; no. 80 = Ko te Aitanga Pepeke o Aotearoa ; nama 80)

ISBN 978-0-947525-68-2 (online)

ISBN 978-0-947525-67-5 (print)

1.Lepidoptera -- New Zealand. I. Title. II. Rhode, B.E. III. Landcare Research New Zealand Ltd.

UDC 595.786(931)

Suggested citation:

Hoare, R.J.B. 2019. Noctuinae (Insecta: Lepidoptera: Noctuidae) part 2: *Nivetica*, *Ichneutica*. Lincoln, N.Z. : Landcare Research.

https://doi.org/10.7931/J2/FNZ.80

Prepared for publication by Zhi-Qiang Zhang and the authors using computer-based text processing, layout, and printing at Manaaki Whenusa - Landcare Research, Private Bag 92170, Auckland, New Zealand.

To access on-line extracts from this series visit:

http://fnz.landcareresearch.co.nz/

Published by Manaaki Whenusa - Landcare Research, P.O. Box 40, Lincoln, Canterbury, N.Z.

Website: http://www.landcareresearch.co.nz/

Printed by 3A

Cover design: Birgit Rhode

Date of publication 9 December 2019

Publication of the Fauna of New Zealand series is supported by Core funding for Crown Research Institutes from the Ministry of Business, Innovation and Employment's Science and Innovation Group, for the Defining New Zealand's Land Biota research programme.

POPULAR SUMMARY

Class **Insecta**

Order **Lepidoptera**

Superfamily **Noctuoidea**

Family **Noctuidae**

Owlet moths

The family Noctuidae is one of the largest moth families in the world with around 12,000 known species. Moths belonging to this group are sometimes known as 'owlets' because of their nocturnal habits and their camouflage wing patterns, which often feature eye-like markings. Most noctuids are relatively robust, medium-sized to large moths, with a strong fast flight; a number of them are well-known migrants that are able to travel large distances in the search for new breeding grounds. They feed actively from flowers of many kinds, and are known to be significant pollinators. Like most other moths, 'owlets' usually lay their eggs on living plants, and the caterpillars feed on the leaves, flowers or fruit or, in some species, inside the stem. Many owlet species have caterpillars that are able to utilise a wide range of plants as food, and some of these species have become serious pests of agriculture or horticulture. On the other hand, some species are restricted to specific habitats and foodplants and are very local or rare. The caterpillars and foodplants of many species are still unknown, especially in the tropics. New Zealand has a relatively small fauna of Noctuidae, with about 160 known species, but most of these (around 140 species) are endemic to the country, occurring nowhere else. The number of exotic species established or regularly migrating here is slowly increasing. The Noctuidae, though recognised as a very important moth family, have not been especially well studied in New Zealand, and around 10% of the known species have not even been scientifically named. Many others are poorly known, and much confusion exists over the identification of these moths, which can be extremely variable in their colours and wing patterns.

This volume is the second part of a major review of the New Zealand noctuids, and treats the 87 species of the genus *Ichneutica*; 19 species are described here as new to science. This expanded definition of *Ichneutica* makes it the largest known genus of Lepidoptera in New Zealand. A new genus *Nivetica* is also described here for the distinctive small alpine species *N. nervosa*, formerly placed in *Ichneutica*. The caterpillars of most species of *Ichneutica* feed on low-growing herbaceous plants; a number of species specialise on grasses or on rushes and sedges. Most species are not restricted to a single host-plant, but many species are restricted to particular habitats or regions of New Zealand. Some of our commonest moths belong in this group, including *Ichneutica mutans* (formerly *Graphania mutans*), whose caterpillars can be a minor pest in orchards. Amongst the unusual new species described here, *Ichneutica subcyprea*, whose larvae feed on fork-ferns (*Tmesipteris*), is our only exclusively fern-feeding noctuid. Several species are restricted to offshore islands (*Ichneutica erebia* on the Auckland Islands and Campbell Island, *I. pagaia* on the Snares, *I. rufistriga* on the Antipodes, and *I. bromias*, *I. seducta* and *I. thalassarche* on the Chatham Islands). A number of species have declined greatly as a result of human impacts on the environment. The most critically endangered is perhaps *Ichneutica stulta*, which was found rarely in Southland in the early 20th century by Alfred Philpott and Robert Gibb, and has not been seen for over 100 years; it may possibly be extinct.

Te Pēpepe Owlet

Ko te whānau Noctuidae tētahi o ngā whānau pēpepe nui katoa i te ao, kei tōna 12,000 nei ōna momo e mōhiotia ana. Ko ngā pēpepe o tēnei karangatanga ka kīia i ōna wā he 'owlet', nā tā rātou haere pō me ngā tauira kirihuna i ō rātou parirau, me te karu te rite o te nuinga. Ko te nuinga o ngā noctuid he ruarangi tonu, he āhua rahi ētahi, ko ētahi he rahi tonu, ka mutu he kaha, he tere te rere; ko ētahi momo he pēpepe heke, ka rere ki tawhiti tonu ki te kimi wāhi whakaputa uri. Ka kimi kai rātou i ngā momo putiputi maha tonu, ka mutu e mōhiotia ana tō rātou pai ki te kawe hae. Pērā i ētahi atu pēpepe 'owlet', ka whānauhia atu ā rātou hua ki te tipu ora, kia pai ai te kai a te anuhe i te rau, i te pua, i te hua rānei, ko ētahi atu momo ka whānauhia atu ngā hua ki roto rawa i te tā o te tipu. Ko ngā anuhe a ētahi momo owlet maha tonu e āhei ana ki te kai i ētahi momo tipu nui tonu, me te noho anō ki te whakararu i te ao ahuwhenua, me te ao whakatipu kai. Tērā anō hoki ētahi momo e whāiti mai ana ki ētahi wāhi motuhake, ki

ētahi tipu motuhake, ka mutu he momo kāore e whānui te kitea. Kāore e mōhiotia ana te āhua o te anuhe me ngā kai a ētahi momo o te pēpepe nei, ko ngā momo noho whenua pāruru ēnei. Kāore i maha ngā momo Noctuidae kei Aotearoa nei, kei tōna 160 pea e mōhiotia ana, engari ko te nuinga o ēnei (āhua 140 momo) nō Aotearoa taketake ake, arā kāore e kitea i whenua kē. Kei te piki haere te nui o ngā momo nō whenua kē kua rarau te noho ki konei, e heke mai ana rānei ki konei. Ahakoa te noho hira o te pēpepe Noctuidae i Aotearoa nei, kāore anō i āta mātaitia, ka mutu kāore anō i tapaina tētahi 10% o ngā momo e mōhiotia ana ki tētahi ingoa pūtaiao. Ko ētahi momo kāore e tino mōhiotia ana, kāore hoki e taea ētahi momo te āta tohu i te tāupe o ngā tae me ngā tauira i ngā parirau.

Ko tēnei pukapuka te wāhanga tuarua o tētahi titiro hou nui tonu ki ngā noctuid o Aotearoa. Ka kōrerohia ngā momo e 87 o te puninga *Ichneutica*; 19 ngā momo e whakaahuatia ana i konei, e hou ana ki te ao pūtaiao. Nā tēnei tautuhinga whānui ake o ngāi *Ichneutica*, kua noho ko ia te puninga nui katoa e mōhiotia ana o ngā Lepidoptera i Aotearoa. Kei te whakaahuatia hoki tētahi puninga hou, a *Nivetica*, mō te wāhi ki tētahi momo motuhake pakupaku, noho maunga, ko *N. nervosa* te ingoa; i noho mai tērā i mua ki ngā *Ichneutica*. Ko ngā torongū o te nuinga o ngā momo *Ichneutica*, he kai i ngā tipu māotaota popoto; arā ētahi momo ka kai i ngā pātītī, ngā wīwī, tae atu ki ngā kamu me ngā momo pūreirei. Ko te nuinga o ngā momo, kāore e noho whāiti ki tētahi tipu kotahi, engari he maha ngā momo ka noho whāiti ki tētahi nōhanga kotahi, ki tētahi rohe kotahi rānei o Aotearoa. Ko ētahi o ngā pēpepe e mōhio nuitia ana, kei tēnei rōpū, tae atu ki a *Ichneutica mutans* (ko *Graphania mutans* tōna ingoa pūtaiao i mua). E kīia ana ōna torongū e ētahi he riha mātāmuri i ngā māra huarākau. Ko tētahi o ngā momo hou āhua korokē nei e tautuhia ana i konei, ko *Ichneutica subcyprea*. Kai ai āna torongū i ngā 'huruwhenua tokomanga' (*Tmesipteris*), ka mutu koia anake te noctuid o Aotearoa he huruwhenua anake tāna kai. He maha ngā momo kua noho mōriroriro ki ngā moutere o waho (ko *Ichneutica erebia* ki Maunga Huka me Motu Ihupuku, ko *I. pagaia* ki Tini Heke, ko *I. rufistriga* ki Motu Mahue, ā, ko *I. bromias*, ko *I. seducta* me *I. thalassarche* kei Wharekauri). Arā ētahi momo kua tino paheke i ngā pānga a te tangata ki te taiao. Ko te mea mōrearea katoa pea, ko *Ichneutica stulta*. I kitea ruaruatia e Alfred Philpott rāua ko Robert Gibb i Murihiku i te wāhanga tuatahi o te rautau 20, engari kua 100 tau e huna ana i te tirohanga kanohi; māna, kua korehāhā kē pea.

Contributor **Robert Hoare** was born in Winchester in the south of England. He was educated at Eton, and then attended Oxford University where he completed a degree in Classics (Latin and Greek literature and philosophy). He followed this, logically enough, with a degree in Biological Sciences at Exeter University. An early interest in butterflies was fostered by his father Ian, who painstakingly reared many species through from egg to adult. The acquisition of a Robinson pattern mercury vapour moth trap at a formative point in life transformed him instantly into a mothman, after which he progressed inexorably towards the study of smaller and smaller moths, culminating in his PhD thesis on the Nepticulidae of Australia at the Australian National University in Canberra (nepticulids are the smallest moths of all). Since joining Landcare Research in 1998, Robert has concentrated his research efforts on slightly less tiny moths, especially those of the family Xyloryctidae, but retains a broad interest in all Lepidoptera, particularly leaf-miners and detritus-feeders. He is currently engaged in a major study of the New Zealand Noctuidae. From 2000 to 2010 he lectured annually on systematic entomology at the University of Auckland, and he often gives talks to primary school children about moths and other insects. In 2014, he produced a popular guide to New Zealand moths and butterflies through New Holland Publishers, with photographs of living moths by Olivier Ball. He aims to foster a wider interest in moths throughout New Zealand so that we can learn much more about these neglected creatures, so many of which are endemic to this country and perform a significant role in our unique ecosystems.

I whanau mai te kaituhi, a **Robert Hoare** i Winchester, ki te taha tonga o Ingarangi. I whai ia i te mātauranga i Eton, ka haere ki te Whare Wānanga o Oxford, ki te whakatutuki ana i tana tohu mātauranga Classics (ngā pukapuka kōrero a te Rātini me te Kariki, me te wānanga whakaaro). Nō muri ka whāia e ia tana tohu mātauranga Pūtaiao Koiora i te Whare Wānanga o Exeter. I tōna ohinga ka oho tana ngākau ki te pūrerehua, ka atawhaitia tēnei āhua e tana matua, a Ian, ko tāna nei mahi he āta whakatipu i ētahi momo pūrerehua maha tonu, mai i te hua, ā pūrerehua rawa. E ohi tonu ana ia ka whiwhi ia i tētahi tāwhiti whai rama tākohu konuoi nō te tauira a Robinson, whakakau ake ko te tangata pēpepe. Whai muri mai ka tahuri ia ki te mātai pēpepe iti, ka moroiti kē atu, ka moroiti kē atu ngā pēpepe i mātaihia e ia. Ko te hua o ēnei mahi ko tana Tohu Kairangi e pā ana ki te Nepticulidae o Ahitereira i te Australian National University i Kānapera (ko te nepticulid ngā pēpepe iti katoa). Mai i tana

hononga mai ki Manaaki Whenua i te tau 1998, kua arotahi ngā mahi rangahau a Robert ki te pēpepe kāore i tino moroiti, me te aro nui ki te whānau Xyloryctidae, engari e ngākaunui tonu ana ia ki ngā Lepidoptera katoa, me te aro nui ki ēra momo he kai pūtautau rau te iro, me nga mea kai popo. I tēnei wā e mātai ana ia i ngā Noctuidae o Aotearoa. Mai i te 2000 ki te 2010 i kauhau ia tau a ia mō te mātai pepeke nahanaha i te Whare Wānanga o Tāmaki-makau-rau, ka mutu he rite tonu tana kōrero ki ngā tamariki kura tuatahi mō te pēpepe me ētahi atu pepeke. I te tau 2014 ka puta i a ia tana tānga mō ngā pēpepe me ngā pūrerehua o Aotearoa, i tāia nei e New Holland Publishers. Ko ngā whakaahua o ngā pēpepe ora nā Olivier ball. Ko tana whāinga ko te whakaoho i te ngākau tangata ki ngā pēpepe o Aotearoa, kia ako ai tātou mō ngā pepeke nei, ko te maha atu nō tēnei whenua taketake ake, ka mutu he wāhi nui kei a rātou ki te tiaki i ā tātou pūnaha hauropi.

Māori translation by Te Haumihiata Mason & Hēni Jacob

ABSTRACT

In this second part of the revision of the New Zealand Noctuinae *sensu lato*, two endemic genera are treated: *Nivetica* **new genus** with a single species, and *Ichneutica* Meyrick, 1887, with 87 species here included. There are 6 new synonymies at the genus level and 13 new synonymies and one reinstated synonymy at the species level. Nineteen (19) new species are described in *Ichneutica*, there is one new replacement name, and two species are resurrected from synonymy. There are 62 new combinations in *Ichneutica* and one in *Meterana* Butler, 1877 (a genus not further treated here). *Ichneutica*, *Nivetica*, and all included species are fully described / redescribed and diagnosed. Adults and male and female genitalia are illustrated for all species (where known). Details of life histories are given where known, including brief descriptions of larvae for a number of species; a few larvae are illustrated. Known distribution by New Zealand subregion is summarised and mapped.

Nivetica is a monotypic genus erected to accommodate *Ichneutica nervosa* Hudson, 1922; its unique combination of characters in the male and female abdomen and genitalia precludes its assignment to any of the named genera, although it shares several characters in common with *Physetica* Meyrick, 1887. *Nivetica nervosa* is a small alpine species locally distributed in the South Island; the life history is unknown.

The concept of *Ichneutica* is here greatly expanded, and the following genera are subsumed as synonyms: *Graphania* Hampson, 1905 **new synonymy**, *Tmetolophota* Hampson, 1905 **new synonymy**, *Dipaustica* Meyrick, 1912 **new synonymy**. The following names also pass into the synonymy of *Ichneutica* (formerly treated as synonyms of *Graphania*): *Alysia* Guenée, 1868 (*nec* Latreille, 1804) (junior homonym) **new synonymy**, *Maoria* Warren, 1912 (*nec* Laporte, 1868) (junior homonym) **new synonymy**, *Alysina* Cockerell, 1913 (objective replacement name for *Alysia* Guenée) **new synonymy**. The total number of species now recognised in *Ichneutica* is 87, with 62 new combinations (not listed in full here: see Checklist of Taxa). The following 19 species are described as new: *Ichneutica eris* **n. sp.**, *I. schistella* **n. sp.**, *I. subcyprea* **n. sp.**, *I. dundastica* **n. sp.**, *I. naufraga* **n. sp.**, *I. peridotea* **n. sp.**, *I. barbara* **n. sp.**, *I. cornuta* **n. sp.**, *I. theobroma* **n. sp.**, *I. haedifrontella* **n. sp.**, *I. lyfordi* **n. sp.**, *I. prismatica* **n. sp.**, *I. seducta* **n. sp.**, *I. emmersonorum* **n. sp.**, *I. inscripta* **n. sp.**, *I. mustulenta* **n. sp.**, *I. supersulcana* **n. sp.**, *I. rufistriga* **n. sp.** and *I. thalassarche* **n. sp.** The following two species are reinstated from synonymy: *Ichneutica skelloni* (Butler, 1880) **n. comb., sp. rev.** (removed from synonymy with *insignis* Walker, 1865) and *I. sapiens* (Meyrick, 1929) **n. comb., sp. rev.** (removed from synonymy with *micrastra* Meyrick, 1897). *Ichneutica lindsayorum* **new name** is a replacement name for *Graphania lindsayi* Dugdale, 1988, which becomes a junior secondary homonym of *Ichneutica lindsayi* Philpott, 1926 when transferred to *Ichneutica*. There are 13 **new synonymies** as follows (original genus combinations given below, all species now in *Ichneutica*): *Ichneutica lindsayi* Philpott, 1926 is a junior synonym of *I. dione* Hudson, 1898; *Aletia empyrea* Hudson, 1918 and *Ichneutica homerica* Howes, 1943 are junior synonyms of *Ichneutica cana* Howes, 1914; *Aletia lata* Philpott, 1915 is removed from the synonymy of *I. cana* as a junior synonym of *Aletia fibriata* Meyrick, 1913; *Aletia argentaria* Howes, 1945 is a junior synonym of *Aletia panda* Philpott, 1920; *Melanchra beata* Howes, 1906 is a junior synonym of *Hadena skelloni*; *Aletia dentata* Philpott, 1923 is a junior synonym of *Aletia cuneata* Philpott, 1916; *Agrotis mitis* Butler, 1877, *Spaelotis inconstans* Butler, 1880, *Aletia munda* Philpott, 1917, *Aletia gourlayi* Philpott, 1921, *Melanchra cyanopetra* Meyrick, 1927 and *Aletia lacustris* Meyrick, 1934 are all junior synonyms of *Eumichtis sistens* Guenée, 1868 (*munda* and *gourlayi* formerly treated as synonyms of *mitis*). There is one **reinstated synonymy**: *Hyssia hamiltoni* Hampson, 1913 is treated as a junior synonym of *Hyssia falsidica* Meyrick, 1911, rather than as a subspecies. *Melanchra tetrachroa* Meyrick, 1931 (currently in *Graphania*) is transferred to *Meterana* as *Meterana tetrachroa* (Meyrick) **n. comb.** but the species is not redescribed here.

Ichneutica is divided for convenience into 10 informal species groups, based mainly on characters of the male abdomen and genitalia; three of these are further subdivided into subgroups.

http://www.zoobank.org/urn:lsid:zoobank.org:pub:371D4628-CC5F-4B1B-9E4B-B37563F04A34

Accepted by Zhi-Qiang Zhang: 12 Nov. 2019; published: 9 Dec. 2019

CHECKLIST OF TAXA

CONTENTS

ACKNOWLEDGMENTS

This revision effectively began in autumn 2009, when I visited the late Michael Fibiger at his home in Sorø, Denmark. In spite of pain and illness, Michael was extremely generous with his time in teaching me dissecting techniques for Noctuidae and characters of taxonomic significance. His help kick-started this project and his kindness and the hospitality of his family will not be forgotten; I am pleased and relieved that the substantial work whose tentative beginnings he oversaw has now come to fruition.

The most extraordinary and patient contribution to this volume has come from Birgit Rhode (Manaaki Whenua—Landcare Research), whose has demonstrated exceptional dedication over the last 10 years to the massive task of photography, image-editing and plate-making involved in this revision of 88 species. She was especially busy in the last year of the project; my deep thanks to her for the superb work she has accomplished. Amongst other colleagues at Manaaki Whenua, I am very grateful to André Larochelle and Marie-Claude Larivière for their kindness and support, and for many useful discussions relating to taxonomic problems and approaches to the complexities of the New Zealand fauna. Marie-Claude very generously allowed me to reproduce her special New Zealand map template to show regional diversity of *Ichneutica* (Map 89, totals for each region filled in by Birgit Rhode). Both before their departure from New Zealand in 2017 and on my visits to the U.K. since, Alan and Kath Emmerson have showed me endless hospitality, and I greatly enjoyed looking after their former property (and sheep) in Redvale, Albany AK on the occasions when they were away. Important specimens for this revision were collected at this property by Alan and/or myself, including the holotype and several paratypes of the new species *Ichneutica peridotea*. Alan's and Kath's friendship is acknowledged here in the species name of *Ichneutica emmersonorum*.

Several entomologists have made a major contribution in the last 50 years to our understanding of the New Zealand Noctuinae fauna through their industrious collecting, rearing, survey work, research and publication. Without their efforts, the current revision (incomplete as it is) would have been far less complete, and probably far more straightforward to accomplish! Notable among these (in alphabetical order) are John Dugdale, the late Kenneth Fox, Neville Hudson, Nicholas Martin, Brian Patrick, Brian Lyford and the late Graeme White. I am especially grateful to Brian Patrick for sharing his notes and records relating to life histories of noctuid species, many of which have poorly known biologies. Nicholas Martin has reared several noctuid species with poorly documented life histories, and I am indebted to him for allowing me to reproduce his photographs of the larvae of *Ichneutica purdii* and *I. subcyprea* and of the larva and pupa of *I. arotis*. Brian Lyford kindly donated specimens of the new species he discovered in the Von Valley OL to NZAC; this species is named after him here (*Ichneutica lyfordi*). I have also received valuable material from Eric Edwards (Wellington).

The following curators have generously allowed me to borrow and dissect important material in their care for this revision, and have hosted me during visits to their institutions: John Early at AMNZ, Ricardo Palma and Phil Sirvid at MONZ, John Marris at LUNZ, Cor Vink at CMNZ, Cody Fraser and Emma Burns at OMNZ. Martin Honey assisted me greatly during my visits to the NHMUK (London) to study type material of New Zealand Noctuidae in 2009 and 2012. I thank Ewen Cameron (Auckland Museum Herbarium) for identifying the native

grass from which *Ichneutica lignana* was reared. Eric Edwards and family, Brian Patrick, John Dugdale, Neville Hudson, Alan Emmerson, Rebecca Bennik, Shaun Forgie, Peter Johns, Rich Leschen, Thomas Buckley, Dave Seldon, Grace Hall, Olly Ball and Cor Vink have all accompanied me in the field on moth-collecting excursions (invariably featuring noctuids) in various parts of the country, and I am very grateful for their help and enthusiasm. I would also like to acknowledge the hospitality of Brian Rance and family, who allowed the author and Alan Emmerson to stay for free at their apartment in Otatara SL in December 2011 and collect moths; valuable material from this trip included fresh specimens of *Ichneutica sapiens*. My partner Jeannie Zhao enrolled as a volunteer at NZAC in 2016 in order to help me with field work, and I deeply thank her for her company, patience and support on many trips since.

This manuscript was expertly reviewed by Dr Matt Medeiros and Dr Alberto Zilli, and I am extremely grateful to them for their many helpful comments and suggestions, which have much improved the final publication.

This work was funded by Core funding for Crown Research Institutes from the Ministry of Business, Innovation and Employment's Science and Innovation Group.

INTRODUCTION

Hoare (2017) gave an overview of the family classification and diversity of Noctuoidea in New Zealand, along with historical notes on the study of the New Zealand fauna. See under *Ichneutica chryserythra* in the species accounts below for a correction to one part of that overview. In the following sections, I briefly highlight some of the issues relating to species-level taxonomy and conservation arising from the current revision of *Ichneutica*, New Zealand's largest genus of macro-moths.

Taxonomic issues in *Ichneutica*

Ichneutica has proved to be a very difficult genus to revise satisfactorily and some taxonomic problems remain unresolved. *Ichneutica insignis* and *I. plena* appear to belong to a complex that is in an active state of speciation. These two species do not differ consistently in male or female genitalia, and 'forms' that may plausibly be regarded as intermediate in colour pattern are common. Pheromone research (Frérot *et al.* 1993) and larval characters (Bejakovich & Dugdale [1998]) suggest that more than two species are involved in this complex, but for reasons discussed in the species accounts, no further species are recognised here. Likewise, there is evidence from pheromones (Frérot & Foster 1991) that more than one species is confused under the name *Ichneutica mutans*, but this could not be confirmed within the constraints of the current revision. The largely alpine species *Ichneutica ceraunias* presents another problem: it shows multiple colour forms, and has several known allopatric populations where females are brachypterous and flightless. Again, active speciation is suspected, but in a complex where genitalia are reduced and conservative, and variation extensive, it has not been possible to address this issue adequately within the context of a review of all 87 species of this genus. Even distinctions from the closely related *I. dione* are subtle and less clear-cut than previously thought. A third species that seems to be in a process of speciation is *Ichneutica arotis*: one externally distinctive and geographically localised new species is here distinguished from *arotis*, but differences in genitalia are slight. Other possible *arotis* segregates exist in collections, as discussed in the species account, but these do not seem to offer consistent morphological characters for diagnosis, so they are treated as 'forms' for the time being.

The lesson is that this revision (even more so than others) cannot be regarded as more than a step forward in research on this difficult group of moths. It must be treated as a stimulus to further detailed research, rather than a definitive work. Adult morphology was often, in practice, the only character field available for study, and I am deeply aware of the limitations this has created for an understanding of this genus: the problems encountered in some groups appeared intractable. Great advances have been made in the understanding of northern hemisphere noctuid faunas with the advent of rapid DNA sequencing and the use of the DNA 'barcode' (a 658 base pair section of the mitochondrial COI gene) as a taxonomic tool (e.g., Troubridge 2008; Lafontaine & Schmidt 2010). It is regretted that resources and time were not sufficient in the context of this revision to integrate barcoding work into the taxonomic methodology. But, as emphasised by Lafontaine and Schmidt (2010: 7), this is only one tool and

needs to be interpreted in the context of all other character systems available. In the context of the New Zealand Noctuidae, I believe that the key will be to incorporate sequencing of DNA barcodes with further studies not just of adult morphology, but also phenology (seasonality), life history/ecology and morphology of immature stages. Phenological data has been used in this work to back up the recognition of two new species, *Ichneutica peridotea* and *I. theobroma*, as distinct from their close allies, and without life history data, the subtle morphological distinctions between *I. chlorodonta* and *I. subcyprea* would likely not have been recognised. There is a huge amount still to be discovered in these fields; I hope this revision will highlight the great need for deeper study of this important moth family in New Zealand.

Species of *Ichneutica* of conservation concern

Only two species treated in the present work were listed by Hoare *et al.* (2017) in their assessment of the threat status of New Zealand Lepidoptera; note that this assessment was made in 2015 but publication was delayed. One of these species, *Aletia cyanopetra* (listed as Data Deficient), is here synonymised with *Ichneutica sistens*, which is currently regarded as not threatened (see Remarks under *I. sistens*). The other, *Ichneutica blenheimensis* (as *Tmetolophota blenheimensis*), was listed in the category 'At Risk: Naturally Uncommon'. This assessment still seems appropriate for the species at the time of writing (2019).

In this section, I briefly discuss 14 further species of *Ichneutica* that have restricted ranges or are known from very few specimens. All of these are considered priority species for targeted searches to determine their current range and conservation status. They are also species likely to be in need of future monitoring, and most, if not all, require further study of their life history and preferred host-plants. Nine of these 14 species are newly described in this work.

Ichneutica stulta has the highest conservation priority of all species treated here. This species had come to be confused with *I. acontistis*, but is definitively diagnosed as a separate species in this revision. It appears that *I. stulta* has not been collected for over 100 years: only 6 specimens are known, all from the vicinity of Invercargill SL. At least one further specimen existed (the male from Tuturau illustrated by Philpott (1905)) but is lost. Native habitats around Invercargill have been much modified and many have disappeared, along with their specialist moths (Patrick 1994a). An intensive survey of likely remnant habitats (wetlands or native grasslands) in the spring is needed to determine if this moth still survives.

The following three species are only known from a single restricted locality. *Ichneutica schistella* n. sp. is known from one specimen collected in November 1969, and a short series collected in December 1994, all from the Rock and Pillar Range CO. *Ichneutica lyfordi* n. sp. is only known from the Von Valley OL, where a series of male specimens has been taken. The Von appears to be an area of narrow-range endemism, as the recently described *Arctesthes titanica* Patrick, Patrick & Hoare, 2019 (Geometridae) also appears to be restricted to this valley system (Patrick et al. 2019). *Ichneutica dundastica* n. sp. is known from a number of specimens of both sexes collected in the region of Dundas Hut, Tararua Ranges WN; it is likely to be more widespread in these ranges, but further survey is needed to confirm this.

Three further species with restricted ranges are known from more than one locality; they are all likely to have monocot host-plants but further research is needed. *Ichneutica emmersonorum* n. sp. is known from a number of localities in and around Tongariro National Park TO, but not elsewhere. The life history and exact habitat requirements of this moth, which has been found in the Rangipo Desert as well as in much wetter habitats to the west, need to be elucidated. *Ichneutica prismatica* n. sp. is a very local tussock grassland moth, partly diurnal in habit, and almost restricted to Central Otago, with two known localities in the Otago Lakes district. An understanding of the life history will be needed to help conserve its populations. *Ichneutica supersulcana* n. sp. is only known from a few specimens from subalpine localities above 1100 m in the North Island, in Tongariro National Park and the Tararua Ranges.

The remaining 7 species considered to be of conservation significance are offshore island endemics. Most of these species are probably relatively common at the time of writing within their island homes, but given their restriction to small and vulnerable areas, their status will need to be monitored in future, especially in light of the growing impacts of climate change. *Ichneutica rufistriga* n. sp. is endemic to the Antipodes Islands (AN), where it appears to be very common and is likely to benefit from the recent eradication of mice. *Ichneutica erebia* is likewise very common and widespread on the Auckland Islands (AU) and has also been recorded from Campbell

Island (CA). Both of these species have been seen in numbers on recent visits to the subantarctic by staff from Manaaki Whenua–Landcare Research, Dunedin (B. Anderson, pers. comm. 2018). *Ichneutica pagaia*, endemic to the Snares (SN), was very common when surveys were made in the 1970s; there has been very little recent Lepidoptera sampling on these islands. Although there is no *prima facie* reason to believe that the species has declined, a renewed survey is very desirable. The same applies to *I. naufraga* n. sp., only known from Big South Cape Island off Stewart Island (SI): this species was common in 1968, several years after the invasion of the island by ship rats, and is likely to remain secure, though not searched for in recent years.

The last three species are endemic to the Chatham Islands (CH), where survey work has been intermittent, but more frequent than on the uninhabited subantarctic islands. *Ichneutica bromias* appears to be common and widespread on the islands. *Ichneutica seducta* n. sp. seems to be much more local and, if the association suggested here with *Dracophyllum arboreum* is correct, may be restricted to areas where this tree is still common. *Ichneutica thalassarche* n. sp. is the least known of the three species, but may have been under-recorded due to its habit of flying in winter. As a relative of *I. ustistriga* from the mainland, it is plausible that *thalassarche* has a moderately polyphagous larva and will not be restricted in range by host-plant; however, this assumption certainly needs checking.

Genus placement of *Melanchra tetrachroa* Meyrick, 1931

Melanchra tetrachroa was described by Meyrick (1931) from a single female collected by G.V. Hudson at Waimarino (National Park village) TO and now in the NHMUK. Dugdale (1988: 205) placed *tetrachroa* in *Graphania*, without comment and without indicating that this was a new combination, but I cannot trace an earlier publication of this combination. The holotype was dissected during the course of the current revision, and the female genitalia (BMNH slide 21719) were found to have the enormously elongated, narrow appendix bursae characteristic of the genus *Meterana*. There are series of specimens resembling *tetrachroa* in NZAC and other collections; these have either been identified as *tetrachroa* or as an unnamed species. The male genitalia of a specimen in NZAC have been examined (slide Noct. 221) and also conform to *Meterana* in the extremely long narrow vesica with cornuti of varying sizes, and the strongly bent S-shaped valva. All of these *tetrachroa*-like specimens differ somewhat from the holotype in their less strongly defined wing pattern. The holotype has the green fascia beyond the postmedian line broken into horizontal bars, especially well demarcated towards the tornus; there are no such bars in the other specimens, which also differ in the straight (rather than curved) anterior margin of the reniform stigma and the short, curved (rather than long and straight) white section of the subterminal line near the tornus. It is possible that the holotype may be conspecific with the other specimens, e.g. an aberrant specimen with an unusually clearly marked ('eulegnic') forewing pattern, or a representative of a well-defined local colour form (I am not aware that any specimens have been collected at the type locality since). Alternatively, the holotype is indeed unique and the *tetrachroa*-like species in New Zealand collections is undescribed (cf. Hoare *et al.* 2017). The problem is beyond the scope of this revision, and the female genitalia have not yet been critically compared. Based on the holotype dissection, *tetrachroa* is hereby transferred to *Meterana*:

Meterana tetrachroa (Meyrick, 1931) **new combination**

METHODS AND CONVENTIONS

Collection and Dissection

Most noctuid moths collected during the course of this study were killed in fumes of ammonia, pinned on standard no. 3 entomological pins and set on balsa wood setting boards using a 'setting bristle' to brace the wing-bases as the wings were brought forward (cf. Worthington-Stuart 1951), and tracing paper to hold the wings in place. (The balsa was glued to a layer of plastazote to provide sufficient depth to take the pins and most boards used for noctuids have a 9 mm-wide groove.) Moths were left on the boards for three weeks before removal.

Genitalia dissection followed the techniques described by Fibiger (1997: 14–17), with the following modifications: the abdomen was transferred straight to 70% ethanol after maceration in KOH; scales were removed

with a fine paintbrush, and the whole abdomen and genitalia of both sexes were stained after cleaning by (initially) very brief immersion (ca 10 seconds) in a 0.5% solution of Chlorazol Black E in 70% ethanol (with further staining as needed). The abdomen was opened up along one side by gentle pulling with two pairs of forceps. In earlier dissections, following standard practice for Noctuidae, the bulbus ejaculatorius was removed along with the portion of the ductus ejaculatorius lying outside the phallobase in order to facilitate the insertion of the syringe for vesica inflation. However, in later preparations, I found it possible to retain the bulbus ejaculatorius, where necessary making a slight tear with forceps at the point of entry into the phallobase for insertion of the syringe; the basal portion of the ductus ejaculatorius was removed as before. The bulbus is not illustrated for most species of *Ichneutica* (as it is very long), but the very short bulbus diagnostic of the new genus *Nivetica* is shown in Fig. 1e (be). Again, in earlier preparations, the female genitalia were inflated as described by Fibiger (1997: 16–17), without removal of the spermatophores. However, I have found this technique unsatisfactory, since the reduced signa of some species are easily obscured by the partially macerated spermatophores in the corpus bursae. Therefore in later preparations, any spermatophores were removed through a small slit in the dorsal membrane of the corpus bursae made by pulling with forceps, and the interior of the corpus and appendix bursae cleaned as far as possible without greatly enlarging the slit. This technique usually precludes inflation, but I believe it offers better results for most groups of New Zealand Noctuidae, especially for slides to be photographed.

Wing venation preparations followed the methods described by Common (1990).

Terminology and descriptions

Morphological terminology follows Hoare (2017) and the references cited therein. One structure forming part of the composite 'trifine brush organ' (TBO) at the base of the male abdomen, and not mentioned by Hoare (2017), is noted here as being of some taxonomic importance. This is the A3 apodeme (Fig. 2m: a3a), a sclerite that runs along an anterior invagination of the third abdominal sternite on each side, providing an attachment point for the muscles operating the lever (cf. Birch 1972; Zilli & Di Giulio 1996). The apodeme lies behind (interior to) the lever on each side (when the lever is present), and is usually about half as long as the lever; the lever has an expanded central portion that is roughly level with the base of this sclerite. The A3 apodemes are almost invariably retained even when the rest of the secondary sexual structures (Stobbe's glands, brushes, pockets and levers) are lost; only in *Nivetica* and a few *Ichneutica* species (e.g. *I. cana*) do they seem to be entirely absent. In one case (*Ichneutica chlorodonta* vs. *I. subcyprea*), the length of the A3 apodeme seems to be of some value in distinguishing closely related species.

The presence or absence of Stobbe's glands is rarely commented on in the descriptions, since they seem to be almost invariably present when brushes are present, and absent when these are absent or vestigial. However, vestigial Stobbe's glands (lacking hairs) are present in *Ichneutica inscripta*, where the brushes are strongly reduced, helping to confirm the distinctness of this new species from the closely related *I. infensa*, where brushes and Stobbe's glands are well-developed.

The species descriptions have been drawn up using a standard list of characters, so that they are as far as possible fully comparative. For selected species, additional characters that aid diagnosis from close relatives (e.g., measurements of female genitalia) are included; these additional characters are placed in parentheses.

Interpretation of primary type material

My treatment of the primary type material of the species redescribed here often differs from that of Dugdale (1988). I have taken a strict interpretation of ICZN Articles 73.1.3 and 74.5; i.e., when there is clear evidence that a species was described from more than one specimen, I regard all specimens in the type series as syntypic unless there is clear mention of a 'Type' or 'Holotype' (as opposed to 'types') in the original description, and in such cases I do not regard the labelling of a specimen as 'Holotype', even by the author of the name, as a valid holotype or lectotype designation. In practice, all specimens recognised here as primary types are the same as those recognised by Dugdale (1988), but in many cases the specimen he regarded as a holotype is here treated as, or designated as, lectotype.

When John Dugdale visited the NHMUK in 1980–1981, many New Zealand specimens in the collection were labelled as lectotypes, but the designation was unpublished: where Dugdale (1988) refers to a lectotype designated 'by an unknown designator', I have regarded Dugdale as the designator, under Article 74.5.

Repository of specimens and label data

The following acronyms are used for collections where specimens are held:

AMNZ: Auckland Museum, Auckland, New Zealand

BLNZ: Brian Lyford private collection, Queenstown, New Zealand

BMNH: British Museum (Natural History), London, UK (currently NHMUK) [This acronym is maintained here for older slide preparations that are still in the BMNH series]

BPNZ: Brian Patrick private collection, Christchurch, New Zealand

CMNZ: Canterbury Museum, Christchurch, New Zealand

EENZ: Eric Edwards private collection, Wellington, New Zealand

LUNZ: Entomology Research Museum, Lincoln University, New Zealand

MONZ: Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

MSUC: Michigan State University Collection (Albert J. Cook Arthropod Research Collection), East Lansing, Michigan, U.S.A.

NHMUK: Natural History Museum, London, UK (historically BMNH)

NZAC: New Zealand Arthropod Collection, Manaaki Whenua—Landcare Research, Auckland, New Zealand

OMNZ: Otago Museum, Dunedin, New Zealand

SMNZ: Southland Museum, Invercargill, New Zealand [M.O. Pasco collection: specimens salvaged from this collection are now all in NZAC, but some are lost].

Data for primary types are quoted (where possible) exactly, from the top label down, the data on separate labels being segregated by slashes [/]. For some primary types, it has not been possible to examine or re-examine labels during the course of this revision; in these cases the data are quoted from the museum notebooks of J.S. Dugdale in NZAC and annotated '[per JSD]'. This applies especially to material in the NHMUK; I examined almost all relevant specimens and genitalia slides during two brief visits in 2009 and 2012, but had insufficient time to transcribe or photograph the labels on all primary types. I have relied on J.S. Dugdale's notebooks (from his visit to NHMUK in 1980) for transcriptions of these labels; it is likely that some minor inaccuracies result from my interpretation of these notes, but it is improbable that these will affect future recognition of the affected specimens as types. If locality data for primary types is derived from literature (e.g. for lost specimens, or NHMUK specimens with labels not fully transcribed by myself or J.S. Dugdale) these are enclosed in square brackets. Paratype label data are given as far as possible in standard format rather than verbatim.

Two-letter codes for collecting localities within New Zealand follow Crosby *et al.* (1998), and are presented in roughly north to south order within each of the main islands. In the lists of codes given under 'Distribution' for each species, the main islands and island groups are separated by slashes ('/'); absence from North or South Islands is indicated by an em-dash ('—') in place of any Crosby codes. For readers unfamiliar with the codes and their associated regions, a list is provided here:

North Island. ND: Northland; AK: Auckland; CL: Coromandel; WO: Waikato; BP: Bay of Plenty; TK: Taranaki; TO: Taupo; GB: Gisborne; HB: Hawkes Bay; RI: Rangitikei, WI: Whanganui; WA: Wairarapa; WN: Wellington.

South Island. SD: Marlborough Sounds; NN: Nelson; BR: Buller; WD: Westland; MB: Marlborough; KA: Kaikoura; NC: North Canterbury; MC: Mid Canterbury; SC: South Canterbury; MK: Mackenzie; OL: Otago Lakes; CO: Central Otago; DN: Dunedin; FD: Fiordland; SL: Southland.

Stewart Island. SI.

Offshore islands. TH: Three Kings; CH: Chathams; SN: Snares; AN: Antipodes; AU: Aucklands; CA: Campbell.

See the Maps for further clarification of geography and distribution.

Species concept and order

The species concept adopted here is a morphological one, i.e. I have treated as separate species only those entities showing constant and easily definable morphological differences at least in one sex, with particular weight being given to genitalic characters (cf. Hoare 2005, 2010), though male antennal characters are also regarded as especially significant in this group. Morphological separation is taken to be indicative of reproductive isolation, as per the Biological Species Concept. Biological information, such as host-plant choice and seasonality, where

known, is used as supporting evidence in a few cases for species delimitation. Some groups of New Zealand Noctuidae are taxonomically problematic, and there are signs of very recent or incipient speciation, leading to confusing complexes of species.

The large genus *Ichneutica* is divided into 10 species groups, three of these with further subgroups. The taxonomic status of these groups is further discussed in the Remarks under the genus description. The type species (*ceraunias*) is placed first, and the order of species groups in general follows a series from simplified to more complex characters of the male genitalia. It is probable that evolution has worked in both directions at different times (towards increased complexity and towards simplification), and degree of complexity has been assessed intuitively, without any attempt at quantification. Therefore, in the absence of phylogenetic evidence, the series proposed is somewhat arbitrary and very likely flawed: it is presented only as a convenient, rough framework for curation and for further more detailed studies of the genus. Within species groups / subgroups, species are treated alphabetically by species name, except that species that are very similar and closely related are kept together to aid comparison in descriptions and figures.

In a departure from previous *Fauna of New Zealand* volumes, each species is numbered, and the species number doubles as a figure number for all associated images. Figures for any given species are then lettered alphabetically (a, b, c, etc.) (except for the W and L series: see below). All figures of set adults are kept together, likewise all figures of male abdomens and genitalia for all species, all figures of female abdomens and genitalia for all species, so that the figure series 1–88 is repeated in full three times (except for the missing male genitalia of *Ichneutica stulta* and the missing female genitalia of *I. schistella* and *I. lyfordi*). There are also four incomplete series of plates showing diagnostic characters of some species (prefixed D), structural characters of the abdomen (S), wing venation (W) and larvae and pupae (L); again each figure has the designated species number.

New species names

In naming new species, I have generally avoided patronymics and attempted to find euphonious Greek or Latin epithets that describe some distinctive feature of the animal (appearance, geographical range, etc.). Gender agreement is rather unproblematic in New Zealand Noctuidae, as there is a strong tradition of feminine genera. Many collectors deserve recognition for their contribution to the study of New Zealand Noctuidae, as noted in the Acknowledgements, but in the few cases where I have used patronymics, I have chosen to honour living entomologists and colleagues who have not hitherto had New Zealand Lepidoptera named after them.

Identification

Some species of *Ichneutica* have a characteristic appearance and vary very little: these species are easily identified, even in the field, on the basis of wing pattern alone. Examples are *Ichneutica brunneosa* (Fox), *I. disjungens* (Walker), *I. maya* (Hudson), *I. oliveri* (Hampson), *I. paracausta* (Meyrick), and *I. purdii* (Fereday). However, the genus contains several difficult species-pairs that require collection and careful examination of specimens to achieve a certain identification: examples are *Ichneutica ceraunias* Meyrick / *I. dione* Hudson; *I. chlorodonta* (Hampson) / *I. subcyprea* n. sp., *I. morosa* (Butler) / *I. mustulenta* n. sp.; *I. averilla* (Hudson) / *I. mutans* (Walker) (females especially); *I. insignis* (Walker) / *I. skelloni* (Butler); *I. micrastra* (Meyrick) / *I. sapiens* (Meyrick); *I. acontistis* (Meyrick) / *I. stulta* (Philpott); and *I. epiastra* (Meyrick) / *I. haedifrontella* n. sp.

The colour plates in this volume should facilitate at least a tentative identification for most specimens of *Ichneutica*; but, except for clear-cut species such as those listed above, these figures should always be used carefully in conjunction with the diagnoses under the species accounts to ensure a correct identification. Male antennal pectinations are often of great importance in diagnosing species. In some instances, especially in the case of worn or damaged individuals, or those belonging to critical species-pairs, dissection of genitalia may be necessary. As an additional aid to identification, a key to species of *Nivetica* and *Ichneutica* is included, based largely on external characters; some caveats of using this are noted in the introduction to the key.

Plant names

Scientific names of plants follow the New Zealand Plant Conservation Network website http://www.nzpcn.org.nz/ (NZPCN 2019), which should be consulted for the authorship of the names.

SYSTEMATICS

Physetica genus group

Diagnosis (updated from Hoare 2017). Eyes with dense rather long surface hairs, without curved 'lashes'. Male genitalia: Dorsal membrane of manica finely spinulose or scobinate, without papillae; vesica scobinate only, without cornuti (*Nivetica*) or with prominent more or less continuous strip or 'crest' of rather uniform cornuti (other genera; cornuti reduced in some species, strip interrupted in some *Ichneutica,* including *unica* species-group). Female genitalia: dorsal wall of antrum curved ventrad, and lateral margins of antrum and posterior part of ductus curved dorsad (i.e. C-shaped in cross-section) and forming sclerotised lateral grooves; a dorsal desclerotised area at posterior end of each groove; appendix bursae usually large and well differentiated (less so in *Nivetica* and *Physetica*).

Included genera (updated from Hoare 2017). *Nivetica*; *Physetica*; *Ichneutica*; *Feredayia*; *Meterana*.

Remarks. The genera *Dipaustica*, *Graphania* and *Tmetolophota*, listed as belonging to this genus group by Hoare (2017) are synonymised with *Ichneutica* below; *Nivetica* is a newly described monotypic genus. The tribal placement of the *Physetica* group remains unresolved, as discussed by Hoare (2017), but, as noted there, there is a plausible suggestion of a close relationship with Leucaniini.

Key to adults of *Nivetica* and *Ichneutica* species

Note. External characters common to both sexes have been employed as far as possible in creating this key to maximise the chances of keying out specimens of either sex without dissection. Wing pattern should be viewed under magnification, as some of the characters used in the key are not easily observable by the naked eye (e.g., presence or absence of white line along lower edge of forewing discal cell, Key A). The best diagnostic characters in most difficult species groups are in the male antennae and genitalia; these characters are also included where necessary. Wing pattern characters are variable in this genus (extremely so in some species), and perceptions of colour may differ between users of the key, so it should be treated as a guide only, and specimens should always be checked against colour plates and especially against the diagnoses in the main text, which deal in detail with differences between similar species. Because of this variability, and to account for some possible differences in interpretation, a number of species key out in more than one place. Characters given in square brackets are additional to the main key characters; these are not usually diagnostic on their own (e.g., comparative characters, geographic distribution), but may be helpful in arriving at an identification.

It should be borne in mind in using this key that *Nivetica* and *Ichneutica* are not the only genera of hairy-eyed Noctuidae in New Zealand, and that currently *Physetica* (with 9 species treated by Hoare (2017)), as well as the unrevised genera *Feredayia* Kirkaldy, 1910, *Leucania* Ochsenheimer, 1816, *Meterana*, *Mythimna* Ochsenheimer, 1816 and *Persectania* Hampson, 1905 are recognised as additional genera. All the latter are monotypic (in New Zealand) except the endemic *Meterana* (with 23 described and at least 3 undescribed species recognised as valid by the author). No key to genera is offered here as the genus classification still requires further revision, and any such key would rely almost entirely on characters of the genitalia, and so be inaccessible to many users. All described members of these genera are depicted on the Larger Moths of New Zealand website (Hoare *et al.* 2011), which should be consulted in case of doubt. *Meterana* species tend to show much less intraspecific variation in forewing pattern than *Ichneutica* species, making them in general considerably easier to identify, though some are distinctly sexually dimorphic (e.g. *M. praesignis* (Howes), *M. ochthistis* (Meyrick)). The species most likely to be mistaken for members of *Ichneutica* are the ochreous-coloured *Meterana pansicolor* (Howes) and *M. pascoi* (Howes), which could potentially be confused with *Ichneutica rubescens*, *I. lignana* and/or *I. mollis*; differences are treated in the Diagnoses under those species in the main text.

Key A

1 Lower margin of forewing discal cell clearly highlighted with white line for at least part of its length; no black speckling in white line ..... **Key B**

— Lower margin of forewing discal cell not highlighted with white, or with white line speckled black 2

2(1) Forewing with at least some green scaling in ground colour or in markings ..... **Key C**

— Forewing without green scaling (may have yellowish or bronzy yellow scaling that gives greenish appearance in combination with other colours) 3
3(2) Forewing with postmedian line replaced by a series of unconnected black dots (usually one per vein, but sometimes only 1–3 distinct dots) ..... **Key D**
— Forewing postmedian line continuous (may include black dots on veins) or line absent and no black dots in this position 4
4(3) Forewing ground colour with distinct rusty, reddish, pink or purplish tinge (may be pale or dark) ..... **Key E**
— Forewing ground colour lacking any rusty, reddish, pink or purplish tinge 5
5(4) Forewing ground colour ochreous to dark brown (n.b., may be grey along veins) ..... **Key F**
— Forewing ground colour whitish grey, pale to dark grey or bluish grey 6
6(5) Forewing with distinct dark basal streak ..... **Key G**
— Forewing without distinct dark basal streak 7
7(6) Prothorax with distinct dark transverse bar, and/or thorax distinctly patterned or variegated ..... **Key H**
— Prothorax without dark transverse bar; thorax more or less unicolorous, unpatterned ..... **Key I**

Key B

1 Mesothorax centrally whitish, contrasting with dark inner margin of tegulae; [small species, 28–35 mm wingspan; male antennae bipectinate to apex; forewing bright yellow-brown with black patches]...(Figs 1a, b) ..... *Nivetica nervosa*
— Mesothorax not white centrally, or if whitish, colour not contrasting strongly with inner margin of tegulae 2
2 Thorax and forewing with much olive-green scaling; reniform stigma large, leaden-coloured; termen with large subapical leaden spot...(Figs 21a, b) ..... *Ichneutica oliveri*
— Thorax and forewing lacking green scaling; reniform not as above; termen lacking leaden spot 3
3 Reniform and orbicular stigmata distinct, separate, each with black outline and pale inner lining...(Figs 19a–d) ..... *Ichneutica disjungens*
— Reniform and orbicular stigmata not as above 4
4 Prothorax without any trace of dark transverse bar 5
— Prothorax with dark transverse bar (may be broken in middle) 12
5 Forewing discal cell containing elongate black streak; pale streaks along M3 and CuA1 reaching wing margin and hardly tapering distally; male antennal pectinations no more than 4x flagellum width, not reaching antennal apex...(Fig. 56a) ..... *Ichneutica lyfordi*
— Forewing discal cell without black streak; pale streaks along M3 and CuA1, if present, tapering distally and not reaching wing margin; male antennal pectinations up to *ca* 8x flagellum width and reaching antennal apex 6
6 Females (antennae simple) 7
— Males (antennae strongly bipectinate) 8
7 Forewing with dark subterminal line (may be broken)...(Figs 3h, i) ..... *Ichneutica dione*
— Forewing with at most scattered dark scales in position of subterminal line...(Figs 2g–l) ..... *Ichneutica ceraunias*
Note. Distinctions between females of *Ichneutica ceraunias* and *I. dione* require confirmation; the diagnosis offered here is tentative. Currently known brachypterous females (see text) are all assigned to *I. ceraunias*.
8 Forewing discal cell not filled with pale scaling, ending in discrete pale Y-shaped mark...(Figs 3a, b) ..... *Ichneutica dione* (part)
— Forewing discal cell more or less filled with pale scaling, Y-shaped mark at apex, if present, not discrete 9
9 Forewing terminal area pallid, with postdiscal pale forewing streaks not extending into pallid area (separated by band of dark scaling)...(Figs 3c, d) ..... *Ichneutica dione* (part)
— Forewing termen concolorous with ground colour, or, if pallid, with postdiscal forewing streaks extending into pallid area 10
10 Pale streak along forewing CuP extending beyond base of reniform stigma...(Figs 2b–f) ..... *Ichneutica ceraunias* (part)
— Pale streak along forewing CuP not reaching base of reniform stigma 11
11 Male genitalia: valva with dorsal margin strongly convex; ampulla a minute lobe with 1 or 2 setae...(Figs 3k, n) ..... *Ichneutica dione* (part)
— Valva with dorsal margin straight to weakly convex; ampulla a very small lobe with more than 2 setae...(Fig. 2n) ..... *Ichneutica ceraunias* (part)
12 Thorax and forewing ground colour dark brownish, strongly patterned; tegulae with strong dark lateral lines 13
— Thorax and forewing ground colour paler ochreous brown; tegulae lacking dark lateral lines or with weak lines .....

..... 14

13 Forewing postmedian line represented by series of dark dots; forewing termen with dark dots; tegulae with at least some white scaling...(Figs 71a–c)..... *Ichneutica similis*

— Forewing postmedian line absent; terminal dots absent; tegulae without white scaling...(Figs 52a, b)..... ..... *Ichneutica emmersonorum*

14 Forewing costa arched; dark longitudinal streak between M3 and CuA1 present, broken by oblique fine pale line; [hindwing underside with discal spot and without dark lines along veins]...(Figs 53a, b, D53c)..... *Ichneutica stulta*

— Forewing costa straight; dark longitudinal streak between M3 and CuA1 absent, or if present, unbroken (Fig. D51e); [hindwing underside lacking discal spot and/or with dark lines along veins]..... 15

15 Prothorax with dark transverse bar not or only weakly white-edged above; male with antennae distinctly bipectinate, pectinations up to 1x flagellum width [South Island]...(Figs 51a–d)..... *Ichneutica acontistis*

— Prothorax with dark transverse bar distinctly white-edged above; male with antennae subpectinate, pectinations up to 0.3x flagellum width [North or South Island]..... 16

16 North Island species; forewing veins in distal half of wing distinctly blackish-lined; forewing with reddish ochreous tinge; [more robust-bodied, broader-winged species, nocturnal]...(Figs 57a–c)..... *Ichneutica paraxysta*

— Southern South Island species; forewing veins in distal half of wing at most weakly lined in greyish; forewing lacking reddish ochreous tinge; [lighter-bodied, narrower-winged species, often diurnal]...(Figs 58a–d)..... ..... *Ichneutica prismatica*

Key C

1 Forewing deep magenta / purplish with borders of all three stigmata, subterminal line, and subbasal patch before antemedian line distinctly picked out in green..... 2

— Forewing not as above..... 4

2 Larger species (wingspan over 36 mm); forewing usually with some orange scaling in reniform stigma and just beyond claviform stigma...(Fig. 40n)..... *Ichneutica skelloni s.l.* (*chlorodonta*-like form)

— Smaller species (wingspan up to 36 mm); forewing without orange scaling in reniform or beyond claviform..... 3

3 Hindwing pale coppery at base; forewing underside pallid at least basally; [no green on thorax]...(Figs 29a–c, D29d)..... *Ichneutica subcyprea*

— Hindwing dark brown without coppery base; forewing underside dark to base; [often some green scaling on thorax]...(Figs 28a–f, D28g, h)..... *Ichneutica chlorodonta*

4 Forewing extensively suffused blackish, termen strongly oblique; subbasal patch and subterminal line dull green (fading to yellowish in older material); [thorax deep magenta to blackish; forewings narrow; male antennal pectinations up to *ca* 4x flagellum width]...(Fig. 39d)..... *Ichneutica sericata* (Stewart Island form)

— Forewing not extensively suffused blackish; termen rounded; markings not as above..... 5

5 Thorax and forewing rusty reddish / cinnamon; claviform stigma very large, V-shaped; male antennal pectinations up to 4x flagellum width; [hindwing with large discal spot before middle of wing, most visible on underside]...(Figs 39b, c, f, D39h)..... *Ichneutica sericata*

— Forewing not rusty / cinnamon (but may be pinkish–tinged); claviform stigma moderate-sized; male antennal pectinations no more than 3x flagellum width; [hindwing discal spot at most moderate-sized]..... 6

6 Either forewing predominantly green (both sexes) (Figs 33a–e, i–l; 37a–c), or male with costa extensively green (Figs 33f–h); female with rather broad green area associated with subterminal line (Figs 33l, m) and/or with bluish/slaty tinge to forewing (Figs 33n–p)..... 7

— Forewing predominantly pinkish brown, pinkish grey or grey; male costa not green (may be partly greenish-tinged); female lacking distinct green area associated with subterminal line and lacking bluish/slaty coloration... 8

7 Tegulae with distinct dark lateral lines; thoracic scales broader-lamellate, mostly 4- to 7-pointed; [male reniform stigma including orange scales]...(Figs 33a–p)..... *Ichneutica plena*

— Tegulae without dark lateral lines; thoracic scales narrower-lamellate, mostly 2- to 4-pointed; [male reniform stigma without orange scales]...(Figs 37a–c)..... *Ichneutica peridotea*

8 Forewing weakly marked with dark edging to subterminal line near tornus most prominent marking; orbicular large, very close to reniform (within 0.5x width of orbicular)...(Figs 40c–f, j)..... *Ichneutica skelloni* (*beata* form)

— Forewing rather strongly marked; distance of orbicular stigma from reniform at least 0.5x width of orbicular 9

9 Male antennal pectinations no more than 1.5x flagellum width; male valval costa angular with corona of over 50 elements...(Figs 32a–g, D32h, 32j)..... *Ichneutica insignis**

— Male antennal pectinations up to *ca* 2–3x flagellum width; male valval costa sinuous with corona of (usually) 45 elements or fewer..... 10

10 Uncus strongly expanded subapically, more or less diamond-shaped; [usually darker, more variegated species; Northland to Stewart Island]...(Figs 36a–c, e, h) ..... *Ichneutica pelanodes**

— Uncus hardly expanded subapically; [usually paler and/or less variegated species; Wellington to Stewart Island]...(Figs 40a, b, g–i, k–m, r, t, w, z)..... *Ichneutica skelloni**

***Note.** See main species accounts for a discussion of distinctions between *I. insignis*, *I. pelanodes* and *I. skelloni*; some females may be impossible to identify with certainty.

Key D

1 Forewing postmedian line very incomplete, with only 1–3 black dots; [characteristic straw-coloured species with forewing apex sharply pointed, hindwing deep blackish brown] 2

— Forewing postmedian line with series of dots more or less complete..... 3

2 S2 brushes of male present; clasper longer (Figs 83e, f); line of cornuti twisting around vesica basally (Fig. 83g) [black forewing dot between bases of M3 and CuA1 usually distinct; throughout North, South and Stewart Islands]...(Figs 83a–d)..... *Ichneutica sulcana*

— S2 brushes of male absent; clasper shorter (Figs 84d, e); line of cornuti not twisting around vesica basally (Fig. 84f); [black forewing dot between bases of M3 and CuA1 usually minute; subalpine North Island only]..... .....(Figs 84a–c)... *Ichneutica supersulcana*

3 Forewing with long black basal streak, reniform moderately distinct and underlined by second dark streak...(Figs 68a–e)..... *Ichneutica propria* (part)

— Forewing not as above 4

4 Forewing fringe entirely blackish, contrasting strongly with pale ochreous forewing ground colour...(Figs 75a, b).. ..... *Ichneutica blenheimensis*

— Forewing fringe concolorous with forewing, paler than forewing, or chequered..... 5

5 Reniform stigma including, and/or edged distally with, orange scales (best seen under magnification), rest of thorax and forewing smooth dull pinkish to purplish brown...(Figs 73a–d)..... *Ichneutica alopa*

— Reniform stigma without orange scales, or, if with orange scales, orange also present elsewhere on forewing 6

6 Forewing termen with series of dark dots 7

— Forewing termen lacking dark dots..... 10

7 Lower margin of reniform stigma with white scaling as 1 or (usually) 2 small white flecks (highlighted by surrounding black scales); hindwing usually with distinct dark dashes along termen; frons with pair of prominences (frons needs descaling to observe)...(Figs 64a–d; 65a, b; D64e, D65c) 8

— Reniform without white scaling (or white present as a distinct bar, not as small flecks); hindwing without dark dashes along termen; frons without paired prominences. 9

8 Frontal prominences long, sharply pointed (Fig. D64e) ..... *Ichneutica epiastra*

— Frontal prominences shorter, blunt (Fig. D65c)..... *Ichneutica haedifrontella*

9 Forewing yellow-ochreous; hindwing pale (especially towards costa and anal margin), with veins showing up darker; [North, South and Stewart Islands, also Three Kings]...(Figs 70a–c) ..... *Ichneutica semivittata*

— Forewing reddish ochreous, brownish ochreous or greyish ochreous; hindwing dark, with veins not contrasting; [Chatham Islands only]...(Figs 69a–c)..... *Ichneutica seducta*

10 At least some dots in forewing postmedian line highlighted by white scales distally; 3 white obliquely aligned dots also present in antemedian area of wing at 1/4 wing length...(Figs 48a–c)..... *Ichneutica phaula*

— No white dots in antemedian or postmedian areas of forewing. 11

11 Forewing beyond postmedian line unicolorous or bicoloured, i.e. veins often lined black but not highlighted by surrounding whitish scales; [smaller species, wingspan 32–36 mm]...(Figs 50a, b, d)..... *Ichneutica unica*

— Forewing beyond postmedian line tricoloured, i.e. veins lined dark and highlighted by whitish scaling above and below, and ground colour present as streaks or wedges between highlighted veins; [usually larger species, wingspan 31–46 mm]..... 12

12 Forewing beyond postmedian line with all interneural streaks of ground colour parallel with veins, uninterrupted; [male antennae strongly bipectinate; prothorax and tegulae unmarked]...(Figs 44a–c, D44d)..... *Ichneutica cornuta*

— Forewing beyond postmedian line with some interneural streaks interrupted by pale oblique lines, forming wedge-like marks; [male antennae without distinct pectinations; prothorax often with dark transverse bar; tegulae often with trace of dark inner line]...(Figs 54a–l, D54m) ..... *Ichneutica arotis*

Key E

1 Forewing deep purplish red, unmarked except for large pale dark-edged boot-shaped reniform stigma, faint adjacent orbicular, and dark-edged pale basal streak; male antennal pectinations up to *ca* 8x flagellum width...(Fig. 3g) ..... *Ichneutica dione* (rare form with reduced markings)

— Forewing not as above; male antennal pectinations no more than 4x flagellum width 2

2 Forewing with large dark reniform in shape of boot or inverted anvil; mesothorax with narrow central orange stripe (may include white scales); [distinctively and strongly patterned subalpine to alpine species]...(Figs 60a–c) ..... *Ichneutica maya*

— Reniform not as above; mesothorax without pale stripe or with broad central white area 3

3 Mesothorax broadly white centrally; forewing deep pinkish with orbicular and reniform stigmata orange (stigmata sometimes confluent)...(Figs 14a–d) ..... *Ichneutica purdii*

— Thorax and forewing not as above 4

4 Forewing with long black basal streak below disc, reaching to claviform stigma; stigmata rather distinct; [costa usually pallid and contrasting with pinkish ground colour]...(Figs 74a–e) ..... *Ichneutica atristriga*

— Forewing without long basal streak below disc (but may have short streak not reaching claviform), or, if with long streak, stigmata absent or indistinct 5

5 Orbicular stigma with black basal dot; reniform stigma with double dark outline; area beyond subterminal line with clouds of reddish brown to dark brown at tornus and below apex...(Figs 62a–d) ..... *Ichneutica rubescens*

— Orbicular and reniform stigmata not as above; area beyond subterminal line more or less unicolorous, unpatterned (apex may be paler) 6

6 Forewing deep pinkish to lilac with conspicuous creamy (not orange) outer edge to reniform stigma (thicker than inner edge); [mesothorax (in fresh specimens) with white-tipped anterior crest] 7

— Forewing, if pinkish, with reniform indistinct or evenly pale-edged, or with more or less thickened orange outer edge; [mesothorax with or without anterior crest] 8

7 North Island species; male antenna with longest pectinations less than 1x flagellum width; forewing usually with strong lilac tinge...(Figs 9a–c) ..... *Ichneutica hartii*

— South Island species; male antenna with longest pectinations slightly over 1x flagellum width; forewing deep pinkish, lacking strong lilac tinge...(Figs 8a–d) ..... *Ichneutica agorastis*

8 Forewing reniform stigma with (usually thickened) outer edge orange, with one or two white flecks below orange section; forewing otherwise smooth and unmarked except for faint postmedian line...(Figs 73a–d) ..... *Ichneutica alopa*

— Forewing not as above 9

9 Thorax with strong admixture of white hairlike scales, especially on rear of prothorax; male antennae bipectinate to apex; hindwing with distinct dark bars along termen; forewing antemedian and postmedian lines usually complete, dark...(Figs 18c, d, f–h) ..... *Ichneutica marmorata* (reddish forms)

— Thorax without white scales or with at least some lamellate scales; male antennae not bipectinate to apex; if hindwing has distinct dark bars along termen, antemedian and postmedian lines of forewing absent or indistinct 10

10 Prothorax without dark transverse bar 11

— Prothorax with dark transverse bar (may be reduced or broken) 19

11 Forewing without distinct stigmata 12

— Forewing with at least reniform stigma distinct or with partial pale outline to reniform and orbicular 15

12 Forewing pale ochreous tinged pinkish, unmarked except for black and white speckling along veins...(Figs 45a–c) ..... *Ichneutica lissoxyla*

— Forewing not as above 13

13 Species from Auckland Islands or Campbell Island; forewing lacking white specks in area of reniform stigma; no white speckling along forewing veins; male antennae strongly bipectinate (pectinations up to *ca* 4.5x flagellum width)...(Figs 24a–g) ..... *Ichneutica erebia*

— Species from North or South Island; forewing with 1–2 white specks representing lower edge of reniform stigma; white speckling present along veins; male antennae at most weakly bipectinate (pectinations up to just under 1x flagellum width) 14

14 Hindwing underside termen unmarked; male antennae subpectinate (pectinations up to 0.3x flagellum width); longer-winged species; [North Island]...(Figs 46a, b, D46c, d) ..... *Ichneutica micrastra*

— Hindwing underside termen with series of dark dashes; male antennae bipectinate (pectinations up to just under 1x flagellum width); shorter-winged species; [central North Island and southern South Island]...(Figs 47a, b, D47c, d)

..... *Ichneutica sapiens*

15 Forewing subterminal line absent or very indistinct; male antennae not pectinate; offshore island species (Chathams or Antipodes Islands) 16

— Forewing subterminal line distinct at least towards tornus (may be broken); male antennae bipectinate; South Island species 17

16 Chatham Islands species; forewing brick-red with large pale oblique reniform stigma; claviform absent...(Fig. 69b) ..... *Ichneutica seducta* (reddish form)

— Antipodes Islands species; forewing dull reddish brown; reniform C-shaped and only distinct on inner edge; claviform a dark V...(Figs 85a–c) ..... *Ichneutica rufistriga*

17 Bright rusty red species with complete subterminal line; claviform stigma distinct, large and pale...(Figs 39b, c, f). ..... *Ichneutica sericata* (red forms)

— Dark red-brown to deep violet-red species with broken subterminal line; claviform either small and indistinct or larger and black-edged 18

18 Broad-winged species; reniform stigma S-shaped; stigmata and subterminal line edged dark reddish, not black; [male antennal pectinations reaching to *ca* 5–8 segments short of apex]...(Figs 10a–g)..... *Ichneutica chryserythra*

— Narrower-winged species; reniform C-shaped; stigmata and subterminal line with distinct black edging; [male antennal pectinations reaching to *ca* 13–15 segments short of apex]...(Figs 31a, b)..... *Ichneutica fenwicki*

19 Forewing with black basal streak below disc 20

— Forewing lacking black basal streak below disc 24

20 Reniform stigma distinct, weakly C-shaped, lacking white speck; male antennae bipectinate 21

— Reniform stigma indistinct, S-shaped, including white speck at outer edge; male antennae non-pectinate..... 22

21 Forewing pale pinkish brown, weakly patterned; tegulae without whitish scaling; subterminal line lacking distinct W-shaped evagination...(Figs 22a, b)..... *Ichneutica averilla* (male)

— Forewing dark purplish grey to deep purplish brown, rather strongly patterned; tegulae with whitish scaling; subterminal line with distinct W-shaped evagination...(Figs 36a, b)..... *Ichneutica pelanodes*

22 Forewing with dark brown to black, more or less club-shaped streak in lower part of discal cell; wing-base without distinct subcostal white streak; [larger, broader winged species, wingspan 32.5–45.5 mm]...(Figs 82a–d) .... *Ichneutica steropastis*

— Forewing lacking dark streak in discal cell; wing-base with distinct white subcostal streak; [smaller, narrower-winged species, wingspan 33–39 mm]..... 23

23 Forewing subterminal line rather pronounced and contrasting with an irregular, more or less V- or U-shaped dark pinkish brown marking on its inner margin; male S2 with brushes strongly reduced; clasper short, blunt; [North Island]...(Fig. 77a)..... *Ichneutica inscripta*

— Forewing subterminal line weakly marked, no contrasting darker markings on inner margin; male S2 with well-developed brushes; clasper long, digitate; [North and South Islands]...(Figs 76a–d)..... *Ichneutica infensa*

24 Forewing bright rust-reddish; stigmata large, outlined yellow-brown...(Figs 27a–c) ..... *Ichneutica brunneosa*

— Forewing and stigmata not as above 25

25 Forewing with at least some lilac-grey or purplish grey shading before antemedian line, between postmedian and subterminal lines, and along termen; [male antennae bipectinate] 26

— Forewing lacking lilac-grey shading; [male antennae non-pectinate] 27

26 Smaller species, wingspan 30–37 mm; male antennae with shorter pectinations up to *ca* 3x flagellum width; [widespread species known from North Island, South Island and Stewart Island]...(Fig. 36c)... *Ichneutica pelanodes*

— Larger species, wingspan 38.5–45 mm; male antennae with longer pectinations up to *ca* 5x flagellum width; [only known from subalpine shrubland in Tararua Range WN]...(Figs 30a–d)..... *Ichneutica dundastica*

27 Reniform stigma rather distinct, pale-margined, blackish in dorsal half, lacking distinct white fleck; pallid postmedian line more or less distinct, especially between CuA2 and 1+2A; [smaller, narrower-winged species, wingspan 33–38 mm]...(Figs 80a–c)..... *Ichneutica mustulenta*

Note. Some reddish-tinged specimens of *Ichneutica morosa* may key out here; see main text for distinctions between these two species.

— Reniform stigma very indistinct, including distinct white fleck on outer edge; postmedian line absent or very indistinct; [larger, broader winged species, wingspan 42–48 mm]...(Figs 55a, b) ..... *Ichneutica theobroma*

Key F

1 Forewing with dark basal streak below disc, or with dark-edged pale streak along CuP 2
— Forewing without dark basal streak or dark-edged pale streak 12
2 Reniform stigma absent, absorbed into pale streak in the discal cell, or present as very large pale V at end of disc; forewing lacking intricate pattern of longitudinal dark streaks 3
— Reniform stigma at least vaguely indicated, not in form of large pale V, and/or forewing with intricate pattern of longitudinal dark streaks 4
3 Forewing termen lacking dark line or dashes, concolorous with bases of cilia [smaller species, wingspan 31–39.5 mm, not brachypterous; reniform absent; male antennal pectinations up to *ca* 1x flagellum width]...(Figs 51a–d).... ..... *Ichneutica acontistis*
— Forewing with dark line or dark dashes along termen, contrasting with pale bases of cilia; [larger species, wingspan 35–51 mm, or brachypterous female, 29–31 mm; reniform usually absorbed into pale streak in discal cell, or present as very large pale V at end of disc, sometimes absent; male antennal pectinations up to 8x flagellum width] ..... *Ichneutica ceraunias* or *I. dione*: go to **Key B couplet 6**
4 Forewing densely streaked; reniform stigma S-shaped, indistinct, with tiny white dot at outer edge...(Figs 82a–d).. ..... *Ichneutica steropastis*
— Forewing not as above 5
5 Basal streak long, reaching to orbicular stigma; a second more or less distinct dark streak in disc, running through base of reniform stigma...(Figs 68a–e)..... *Ichneutica propria*
— Basal streak short, not reaching to orbicular; no second streak in disc..... 6
6 Reniform and orbicular stigmata large, approximated, at least partly outlined in black 7
— Stigmata not as above..... 8
7 Forewing basal streak reaching antemedian line; [antemedian line strongly zigzag; male antenna not pectinate]...(Figs 66a–c)..... *Ichneutica lindsayorum*
— Forewing basal streak reaching less than half way to antemedian line; [antemedian line weakly curved to sinuous, not zigzag; male antenna with pectinations up to just under 1x width of flagellum]...(Figs 67a, b)..... ..... *Ichneutica olivea*
8 Costa of forewing pallid only at base above basal streak...(Figs 81a–f)..... *Ichneutica omoplaca*
— Costa of forewing not pallid, or pallid for entire length 9
9 Thorax unmarked or with indistinct darker lines laterally on tegulae; species from Big South Cape Island or Snares Islands 10
— Thorax with distinct dark lines exteriorly on tegulae; North or South Island species 11
10 Snares Islands species; forewing narrow with strongly oblique termen; reniform strongly C-shaped...(Figs 35a–f).. ..... *Ichneutica pagaia*
— Big South Cape Island species; forewing broader with termen less oblique; reniform at most weakly C-shaped...(Figs 34a–d) ..... *Ichneutica naufraga*
11 Forewing subterminal line lacking distinct W-shaped evagination [Fiordland or Westland; male antennal pectinations up to 2.5x flagellum width]...(Figs 26a, b)..... *Ichneutica petrograpta* (male)
— Forewing subterminal line with distinct W-shaped evagination [North Island, or eastern South Island; male antennal pectinations up to 4x flagellum width]...(Figs 38a–c, f–h, D38i)..... *Ichneutica scutata*
12 Forewing under magnification with dense rather even speckling of yellowish scales; male antennal pectinations up to *ca* 7–8x flagellum width, reaching apex; [local South Island alpine species]...(Figs 7a–c)..... *Ichneutica notata*
— Forewing without dense speckling of yellowish scales; male antennal pectinations, if present, no more than 4x flagellum width and not reaching apex 13
13 Very large species, wingspan 47 mm or over 14
— Smaller species, wingspan under 45 mm 15
14 Wingspan 53–77 mm; hindwing unpatterned; forewing subterminal line without dark marks on inner side; mainland New Zealand only...(Figs 16a–d) ..... *Ichneutica nullifera*
— Wingspan 47–50 mm; hindwing patterned, with termen pallid; forewing subterminal line with distinct dark dashes on inner side; Chatham Islands only...(Fig. 86a) ..... *Ichneutica thalassarche* (male)
15 Forewing orbicular stigma absent; reniform absent or indistinct; transverse elements of forewing pattern absent or reduced to dark spots on veins 16
— Orbicular and reniform stigmata both present (may be indistinct); forewing with at least traces of antemedian, postmedian and/or subterminal lines present between veins 18
16 Forewing unicolorous brownish, unmarked...(Fig. 50c)..... *Ichneutica unica* (plain form)

— Forewing with at least some darker markings 17
17 Forewing postmedian line present as dots on veins, dark lines along veins discontinuous if present [widespread species from TO to SL]...(Figs 50a, b, d)..... *Ichneutica unica* (typical forms)
— Forewing postmedian line absent; veins with continuous blackish lines, at least beyond disc [only known from MK, CO]...(Figs 49a–c)..... *Ichneutica toroneura*
18 Forewing dark; stigmata conspicuously outlined white; fringe distinctly chequered...(Figs 17a–c)..... *Ichneutica lithias*
— Forewing not as above; fringe not distinctly chequered 19
19 Thorax unmarked or with indistinct darker lines laterally on tegulae; mesothorax lacking anterior scale-crest..... 20
— Thorax with distinct dark lines exteriorly on tegulae and/or with distinct mesothoracic scale-crest 22
20 Species from South Island; forewings deep brownish with indistinct reddish-tinged stigmata and crosslines; subterminal line just above tornus smoothly curved; clasper of valva rather broad, straight...(Fig. 39a) ..... *Ichneutica sericata* (dark Fiordland form; may occur elsewhere in South Island)
— Species from Big South Cape Island or Snares Islands; if forewings deep brownish then markings pale ochreous to whitish, not reddish-tinged; subterminal line just above tornus (if visible) weakly to distinctly V-shaped; clasper of valva rather narrow and/or curved 21
21 Snares Islands species; forewing narrow with strongly oblique termen; reniform strongly C-shaped...(Figs 35a–f).. ..... *Ichneutica pagaia*
— Big South Cape Island species; forewing broader with termen less oblique; reniform at most weakly C-shaped...(Figs 34a–d) ..... *Ichneutica naufraga*
22 Claviform stigma distinct, strongly outlined blackish 23
— Claviform stigma indistinct or outlined pale..... 24
23 Head, thorax and forewing pale ochreous brown [male antennae not pectinate; widespread species]...(Figs 78a, b). ..... *Ichneutica lignana*
— Head, thorax and forewing mid-brown, appearing darker because of blackish speckling [male antennae with pectinations up to 2.5x flagellum width; Westland and Fiordland only]...(Figs 26a, b)..... *Ichneutica petrograpta* (male)
24 Reniform stigma indistinct, lacking dark inclusion; hindwing patterned, with pale anal margin and pale postmedian line [forewing narrow and pointed; fringe scalloped]...(Figs 88a–c)..... *Ichneutica mollis*
— Reniform stigma with at least some interior dark scaling; hindwing unicolorous, not patterned as above..... 25
25 Forewing subterminal line with distinct W-shaped evagination and dark scaling basad above tornus; [more patterned species; male with long antennal pectinations up to *ca* 4x flagellum width]...(Figs 38d, e, D38i) ..... *Ichneutica scutata*
— Subterminal line without distinct W-shaped evagination, without dark shading basad above tornus; [plainer species; male antennae non-pectinate]...(Figs 79a–e)..... *Ichneutica morosa*

Key G

1 Reniform and orbicular stigmata large, at least partly edged black, approximated..... 2
— Reniform and orbicular stigmata not as above..... 4
2 Forewing basal streak long, reaching antemedian line; [antemedian line rather distinct, strongly zigzag]...(Figs 66a–c)..... *Ichneutica lindsayorum*
— Forewing basal streak short; reaching less than half way to antemedian line; [antemedian line weakly curved to sinuous or indistinct]..... 3
3 Smaller species (wingspan under 36 mm); antemedian line very indistinct, not contrasting with grey ground colour; subterminal line with distinct W-shaped evagination above tornus...(Fig. 40o)..... *Ichneutica skelloni s.l.* (grey form, MC)
— Larger species (wingspan 38 mm or more); antemedian line distinct, pale; subterminal line lacking distinct W-shaped evagination...(Figs 67a, b)..... *Ichneutica olivea*
4 Basal streak very long, reaching beyond antemedian line into claviform stigma...(Figs 61a–e)..... *Ichneutica paracausta*
— Basal streak short, not or barely reaching antemedian line..... 5
5 Costa pallid, almost or completely unmarked; [reniform stigma conspicuous, white; subterminal line edged with reddish brown on inner side above tornus]...(Figs 38g, h)..... *Ichneutica scutata* (female)
— Costa not pallid, or pallid but with distinct markings; [reniform white or not; subterminal line above tornus edged black or brown] 6

6 Forewing with long narrow black streak from subterminal line above tornus, reaching postmedian line; [subterminal line without distinct W-shaped evagination]...(Figs 25a–e) ..... *Ichneutica mutans*

— Forewing with shorter narrow black streak from subterminal line above tornus, not reaching postmedian line, or streak absent; [subterminal line with or without W-shaped evagination] 7

7 Forewing pale grey (to pinkish grey), weakly marked; short dark streak basad of subterminal line above tornus, not reaching postmedian line; [subterminal line without distinct W-shaped evagination]...(Figs 22c, d)..... ..... *Ichneutica averilla* (female)

Note. A few females of *I. mutans* may key out here (i.e., those corresponding to Butler's *debilis* with the streak from the subterminal not reaching the postmedian line). They can usually be distinguished from *I. averilla* by the more strongly marked tegulae, with distinct dark lines on inner and outer edges (tegulae in *averilla* usually lack the inner dark line) and by the lack of silvery suffusion along the forewing dorsum (dorsum suffused silvery in most grey *averilla* females).

— Forewing darker grey or, if pale grey, subterminal line edged dark, but edging not extended basally into streak; [subterminal line with or without W-shaped evagination] 8

8 Ground colour of forewing blackish; area between postmedian and subterminal lines suffused whitish, or at least paler grey than ground colour; [Chatham Islands]...(Figs 23a–c)..... *Ichneutica bromias*

— Ground colour of forewing pale to dark grey; area between postmedian and subterminal lines not suffused whitish or grey; [South Island]...(Figs 40h, k–m)..... *Ichneutica skelloni* (grey forms, OL, CO, DN, FD)

Key H

1 Forewing subterminal line with distinct dark scaling forming wedge or blotch on inner side above tornus 2

— Forewing subterminal line lacking distinct concentration of dark scaling above tornus (may be more or less irregularly dark-edged along inner side) 5

2 Forewing postmedian line with near-horizontal section below reniform, usually strongly dark-edged...(Figs 87a–d) ..... *Ichneutica ustistriga*

Note. In a very rare weakly marked form of *I. ustistriga* (Fig. 87e) the postmedian line is not dark-edged, but it is still near-horizontal.

— Postmedian line oblique (not near-horizontal) below reniform (may or may not be dark-edged) 3

3 Mesothorax with anterior crest; forewing termen rather oblique, fringe scalloped [brownish grey species with indistinct stigmata]...(Figs 88b, c)..... *Ichneutica mollis* (female)

— Mesothorax lacking distinct crest; forewing termen rounded; fringe not distinctly scalloped 4

4 Inner side of subterminal line with dark mark extended basad into wedge...(Figs 25c–e)..... ..... *Ichneutica mutans* (female)

— Inner side of subterminal line with dark mark blotch-like, not extended into wedge...(Figs 40g) .... *Ichneutica skelloni* (part)

5 Forewing orbicular and reniform stigmata white, contrasting rather strongly with grey ground-colour 6

— Forewing stigmata greyish, not strongly contrasting with ground-colour 8

6 Forewing with area between postmedian and subterminal lines suffused whitish, showing up as broad indistinct pale fascia [south-west South Island only]...(Figs 26c, d) ..... *Ichneutica petrograpta* (female)

— Area between postmedian and subterminal lines not suffused whitish, no fascia 7

7 Antemedian and postmedian lines conspicuous, strongly black-edged; hindwing somewhat patterned, with more or less distinct postmedian line [male with long antennal pectinations, up to 4x flagellum width]...(Figs 18a, b, e) .... *Ichneutica marmorata* (grey forms)

— Antemedian and postmedian lines indistinct, not strongly dark-edged; hindwing unicolorous, lacking postmedian line [male with short antennal pectinations, up to 1.5x flagellum width]...(Figs 13a–c, f) .... *Ichneutica panda* (strongly marked forms)

8 Forewing with area between reniform stigma and postmedian line smooth unicolorous bronzy brownish, faintly darker than area between orbicular stigma and dorsum 9

— Area between reniform and postmedian line not unicolorous, or not darker than area between orbicular and dorsum 10

9 Anal tuft of male yellowish, contrasting with greyish abdomen; claspers as in Fig. 41d [South Island]...(Figs 41a, b) ..... *Ichneutica barbara*

— Anal tuft of male mottled greyish, concolorous with abdomen; claspers as in Fig. 42d [North Island]...(Figs 42a, b) ..... *Ichneutica omicron*

Note. The difference in male anal tuft colour between *omicron* and *barbara* cited here is based on rather few specimens and ideally needs confirmation.

10 Larger, broader-winged species (wingspan 37–44 mm); male antennae with longer pectinations, up to 2x flagellum width...(Figs 11a–g) ..... *Ichneutica falsidica*

— Smaller, narrower-winged species (wingspan 28–41 mm); male antennae with shorter pectinations, up to 1.5x flagellum width 11

11 Forewing under magnification with suffused patches of yellowish scales bordering reniform and in subterminal line; male antennae with pectinations up to 1.5x flagellum width...(Figs 13d, e, g) ..... *Ichneutica panda* (weakly marked forms)

— Forewing lacking suffused patches of yellowish scales in these positions; if with pallid scales, these form sharply defined markings; male antennae with pectinations up to 0.5x flagellum width...(Figs 59a–j) ..... *Ichneutica sistens*

Key I

1 Hindwing distally dark brown, cilia contrasting yellowish, without cilia-line 2

— Hindwing not as above 3

2 Forewing reniform stigma infilled with dark grey or blackish; hindwing basally pale with distinct discal spot...(Figs 63a–d) ..... *Ichneutica cuneata*

— Reniform stigma not infilled, all or partly concolorous with forewing; hindwing hardly paler basally, and with discal spot absent...(Figs 20a–d) ..... *Ichneutica moderata*

3 Forewing weakly marked, with a strong bluish rock-like sheen, extreme base of forewing white [large species, wingspan 42–54 mm; South Island alpine zone]...(Figs 15a–c) ..... *Ichneutica nobilia*

— Forewing not as above 4

4 Very large robust species (wingspan 53–77 mm); forewing almost unicolorous sandy brown to dark grey-brown; postmedian line (when visible) strongly converging with antemedian and closest to it at dorsum...(Figs 16a–d) ..... *Ichneutica nullifera*

— Smaller species (wingspan 53 mm or less); forewing postmedian line not converging strongly with antemedian, or if converging, closest above dorsum 5

5 Forewing postmedian line strongly scalloped; longest male antennal pectinations 4x flagellum width or more; [hindwing usually patterned, with distinct lighter area towards termen and median / postmedian line present] 6

— Forewing postmedian line not scalloped or only weakly scalloped; longest male antennal pectinations no more than 2x flagellum width 10

6 Forewing under magnification with dense rather even speckling of yellowish scales...(Figs 7a–c) ..... *Ichneutica notata*

— Forewing with yellowish scaling, if present, confined to discrete patches, e.g. near reniform stigma 7

7 Smaller species (wingspan 33–38 mm); forewing antemedian and postmedian lines strongly converging below orbicular stigma, and diverging between there and dorsum [Rock and Pillar Range CO only]...(Figs 6a, b) ..... *Ichneutica schistella*

— Larger species (wingspan 37–55 mm); antemedian and postmedian lines not strongly converging below orbicular stigma 8

8 Darker, more strongly patterned species; forewing under magnification with patches of yellow scales at least around reniform...(Figs 4a–f) ..... *Ichneutica cana*

— Paler, more unicolorous species; forewing brownish grey without patches of yellowish scales 9

9 Frons pale buff, contrasting with grey vertex; forewing stigmata not edged with black scales...(Figs 5a–d) ..... *Ichneutica eris*

— Frons grey or brownish, concolorous with vertex; orbicular and reniform stigmata at least partly edged blackish...(Figs 12a–c) ..... *Ichneutica fibriata*

10 Forewing subterminal line (under magnification) with patches of orange / pinkish scales [forewing veins speckled black and white; South Island only]...(Figs 43a–c) ..... *Ichneutica sollennis*

— Subterminal line without orange / pinkish scaling 11

11 Forewing with distinct dark wedge on inner side of subterminal line above tornus, reaching to postmedian line; postmedian line strongly dark-edged along near-horizontal section below reniform stigma...(Figs 87a–d) ..... *Ichneutica ustistriga*

— Inner side of subterminal line lacking dark wedge (may have smaller dark patch in this position not extending to postmedian line); postmedian line below reniform not dark-edged, not near-horizontal 12

12 Hindwing strongly patterned; forewing subterminal line with series of short dark wedges on inner side [large species, wingspan 47–50 mm; Chatham Islands]...(Figs 86a, b) ..... *Ichneutica thalassarche*
— Hindwing not strongly patterned; forewing subterminal line not as above 13
13 Forewing orbicular and reniform stigmata white, contrasting rather strongly with grey ground-colour...(Figs 13a–c, f) ..... *Ichneutica panda* (strongly marked forms)
— Forewing stigmata greyish, not strongly contrasting with ground-colour 14
14 Forewing (under magnification) lacking patches of yellowish, greenish or bronzy scaling associated with lines and stigmata; male antennae with pectinations short, up to 0.5x flagellum width...(Figs 59a–j)..... *Ichneutica sistens*
— Forewing with at least some patches of yellowish / greenish or bronzy scaling associated with lines and stigmata; male antennae distinctly bipectinate (pectinations up to 1.5–2x flagellum width), or pectinations very short (up to 0.25x flagellum width) 15
15 At least some scales of thorax and forewing (under magnification) with an olive-green hue, reflective; male antennae with very short pectinations, no more than 0.25x flagellum width...(Figs 72a–d)..... *Ichneutica virescens*
— Thorax and forewing lacking reflective olive-green scaling; male antennae distinctly bipectinate 16
16 Larger species, wingspan 37–44 mm; male antennal pectinations longer, up to 2x flagellum width; uncus robust [hindwing usually with distinct dark dashes along termen]...(Figs 11a–g) ..... *Ichneutica falsidica*
— Smaller species, wingspan 31–41 mm; male antennal pectinations shorter, up to 1.5x flagellum width; uncus slender [hindwing without dark dashes along termen or with indistinct dashes]...(Figs 13d, e, g) .... *Ichneutica panda* (weakly marked forms)

Genus *Nivetica* new genus

Figs 1a, b (adults); 1c–e (male abdominal base and genitalia); 1f–h (female S7 and genitalia); S1i, j (whole abdominal cuticle), W1 (wing venation).

Type species: *Ichneutica nervosa* Hudson, 1922, here designated.

Diagnosis. Thorax entirely clothed in hairlike scales. Abdomen T3–7 in male with zone of reduced sclerotisation centrally; T8 not stirrup-shaped; female T3 with anterior sclerotised strip interrupted medially. Tegumen of moderate length, without distinct 'step'. Transtilla in form of two sinuous straps with sharply pointed apices. Valva with sacculus extended apically into free lobe; cucullus not differentiated, rounded; corona absent; separate robust spine at dorsal apex of cucullus absent. Phallus: subbasal sclerite of vesica absent; vesica bulbous at base, tapering, short, with basal diverticulum only, lacking tubular basal portion in line with phallobase; cornuti absent; bulbus ejaculatorius rather short. Female genitalia: ductus bursae moderately sclerotised, not scobinate; appendix bursae not well differentiated from corpus bursae, present as a posterior lobe from which ductus seminalis arises; corpus bursae oblong, without signa.

Description. *Adult*. Head: Labial palpi short (ca 1x eye diameter) and very weakly sinuous in male, with segments 1–2 weakly upcurved and segment 3 weakly angled down, very short (less than 1x eye diameter) and almost porrect in female; in both sexes, segments 1–2 with erect scales beneath (including many dark hair-like scales); segment 3 short (ca 0.5x length of segment 2), narrow, unmodified. Eyes with dense surface hairs; without 'lashes' (but with bordering hair-scales that do not curve over eye). Antennae filiform, cylindrical with minute erect ciliations in female, bipectinate with minute erect ciliations in male. Thorax: entirely clothed in hairlike scales; mesothorax without anterior scale-crest. Wing venation (Fig. W1): forewing with R3 and R4 stalked, separate from *ca* 1/3 length of R4; areole present at cell apex subtending veins R2, R3+4 and R5; hindwing cross-vein at end of cell distinctly curved inwards towards wing-base, not strongly angled, running from junction of Rs+M1 to base of M3 very near base of CuA1. Male frenulum with 1, female frenulum with 3 bristles. Forewing pattern (Figs 1a, b): pallid, veins marked in white, with pattern of black interneural spots; crosslines absent except broken subterminal line; stigmata absent except slight indication of reniform. Legs: tibiae without spines; inner tibial spurs *ca* 1.5–2x as long as outer spurs; each tarsus with 3 rows of spines. Abdomen without tergal scale-tufts.

Male abdomen and genitalia (Figs 1c, d, e, S1i): abdominal base lacking any elements of the trifine brush organ (no Stobbe's glands, brushes, levers, A3 apodemes or pockets). S2 apodemes long and straight. S8 with sclerotisation uninterrupted, without anterior 'groove'. T3–7 each with zone of weak sclerotisation centrally; T8 broadly sclerotised anteriorly and laterally (not stirrup-shaped), a zone of weaker sclerotisation posteriorly in centre of tergite. Uncus flattened, rectangular; with dense semi-erect setae throughout most of length dorsally and

ventrally, except in central naked strip. Subscaphium membranous. Tegumen of moderate length, a truncate triangle, without distinct 'step'. Paratergal sclerite short, very weakly sinuous, apex not striate. Dorsal membrane of manica finely spinulose / scobinate, without papillae. Transtilla (basal costal processes of valva) in form of two sinuous straps with sharply pointed apices (Fig. 1d: ta). Juxta teardrop-shaped. Valva rather short; sacculus extended apically into blunt free lobe; clasper well developed, elongate, broad-based and tapering to sharp apex, without spinules on dorsal surface; ampulla absent; cucullus not differentiated, rounded; corona absent; apical / subapical field of setae not spine-like; separate robust spine at dorsal apex of cucullus absent. Phallus: phallobase short, without subapical tooth; subbasal sclerite of vesica absent; vesica lacking tubular basal portion in line with phallobase, bulbous basally then tapering, very short, with single short basal diverticulum; cornuti absent, but vesica finely and evenly scobinate except on diverticulum. Everted vesica more or less at right angles to phallobase. Bulbus ejaculatorius short (shorter than phallobase) (Fig. 1e: be).

Female abdomen and genitalia (Figs 1f, g, h, S1j): S7 distinctly indented caudally. T3 with anterior sclerotised strip interrupted medially; T7 with sclerotisation interrupted basally. Terminal segments somewhat extensible, with well-developed finely rugose intersegmental membrane between segments 8 and 9. Ovipositor lobes very short, with scattered long setae throughout and dense short setae apically. Ostium moderately narrow, broadening slightly to antrum and ductus bursae. Antrum a sclerotised cylinder, not spinulose; dorsal wall of antrum weakly curved ventrad, and lateral margins of antrum / posterior part of ductus weakly curved dorsad (i.e. C-shaped in cross-section) but not forming distinct lateral grooves or pockets; dorsal desclerotised ridges of ostium very indistinct, present as minute scobinate folds. Ductus bursae very short, not differentiated from antrum, moderately sclerotised, not distinctly scobinate. Appendix bursae not well differentiated from corpus bursae, interpreted as the rugose lateral / distal portion of the corpus, from apex of which ductus seminalis arises; corpus bursae oblong, weakly rugose, not spinulose, without signa.

Larva and pupa. Unknown.

Biology. Life history unknown.

Distribution. Endemic to New Zealand: South Island only.

Etymology. The genus name is derived from the Latin *nix* (genitive *nivis*) meaning 'snow' (cf. 'nival' in English) and refers to the alpine habitat of the moth as well as the white markings on the thorax and forewings. The ending *-etica* is borrowed from the closely related genus *Physetica*, so that three related genera endemic to New Zealand (*Ichneutica, Nivetica, Physetica*) have names with the same suffix.

Remarks. The placement of *nervosa* in *Ichneutica* was based on a single superficial character: the male antennae, which are bipectinate to the apex, as in the type species of *Ichneutica* (*I. ceraunias*) and other species that were assigned to the traditional, narrow definition of that genus (see Remarks under *Ichneutica* below). However, a study of abdominal and genital characters of both sexes gives strong evidence that this placement was erroneous. *Nivetica* differs from *Ichneutica* and other genera in the *Physetica* genus group in the following characters: male labial palpi unmodified (modified in all *Physetica* except *P. homoscia* (Meyrick)); tergites 3–8 in male with central membranous zone (tergites complete in all other genera) and tergite 3 in female with anterior sclerotised strip interrupted medially (strip complete in other genera); uncus broadly rectangular (paralleled only in *Ichneutica lithias*; narrow or spatulate in all other *Ichneutica*, *Feredayia*, *Meterana*, *Physetica*); ampulla of male valva absent (present in all other genera, though may be minute in some *Ichneutica*); sacculus extended into free lobe (no free lobe in other genera except *Physetica*); apices of transtilla processes sharply pointed (blunt in other genera); vesica without cornuti (cornuti present in all species of other genera, though may be very small in some *Ichneutica*); vesica lacking elongate tubular portion in line with phallobase (tubular portion present in *Ichneutica* and *Meterana*); vesica with basal but without lateral diverticulum (basal and lateral diverticula present in *Physetica*; variably developed basal and subapical lateral diverticula in *Ichneutica*); appendix bursae poorly differentiated from corpus bursae and no curved sclerotised connection between them (appendix bursae well differentiated and subtended by curved sclerotised zone in other genera except *Physetica*).

Nivetica shares several characters with *Physetica*: the presence of a sacculus free lobe; the lack of a tubular basal portion of the vesica in line with the phallobase; the similar conformation of the appendix bursae in relation to the corpus bursae; and the lack of signa on the corpus. The significance of these characters cannot be objectively assessed without a phylogenetic analysis, which is beyond the scope of the current revision. It is possible that *N. nervosa* could represent a highly autapomorphic species of *Physetica*, but it is excluded from that genus here

because of the divergent characters noted above, some of which, e.g., the reduced degree of sclerotisation of the male and female abdomen, are unparalleled within this genus group. Inclusion of *N. nervosa* in *Physetica* would weaken the concept of the latter genus, which in its current definition seems very likely to be monophyletic.

1. *Nivetica nervosa* (Hudson, 1922) new combination

Figs 1a, b (adults); 1c–e (male abdominal base and genitalia); 1f–h (female S7 and genitalia); S1i, j (whole abdominal cuticle), W1 (wing venation).

Ichneutica nervosa Hudson, 1922. *Entomologist's Monthly Magazine 58*: 196.

Diagnosis. This species is easily distinguished from all other New Zealand noctuids by its small size and very constant patterning of pallid veins on a bright yellow-brown background interspersed with broken blackish markings.

Description. Adult (Figs 1a, b). Wingspan 28–32 mm (male); 35 mm (female). Male antenna with pectinations up to *ca* 4x width of flagellum, pectinations reaching to apex. Head and prothorax yellowish brown; mesothorax centrally and on tegulae yellowish brown or whitish, central pale area margined with blackish. Forewing yellowish brown, veins marked in cream streaks, streaks thickest at base of M3, CuA1 and CuA2; blackish spots basally above and below base of discal cell; short blackish streaks above and below base of 1A+2A and above this vein before it reaches tornus; blackish area around apical part of disc, interrupted by the streaks along the veins; blackish subterminal fascia, broken into spots by the streaks; cilia basally cream, apically yellowish. Hindwing grey-brown, cilia paler brownish. Underside: forewing dark greyish with variable indications of the pale upperside streaks, terminal area pallid; hindwing whitish with distinct discal spot, indistinct postmedian line and dark line around termen. Abdomen pale ochreous. Male abdomen and genitalia (Figs 1c, d, e, S1i): as described for genus. Female S7 as in Fig. 1f. Female abdomen and genitalia (Figs 1g, h, S1j): as described for genus.

Type material. Holotype: male, [Bold Peak, L. Wakatipu, Dec 1910, F.S. Oliver], not located (cf. Dugdale 1988: 206).

Note. Dugdale (1988: 206) indicates 'ST [syntype] series not located' but the species was described from a single specimen (Hudson 1922, 1928). The only specimen of *N. nervosa* now in the Hudson collection in MONZ is from the Freehold Range, Lake Ohau MK, and was collected by S. Lindsay on 31 Dec 1935. Other type material of Lepidoptera collected by F.S. Oliver is also missing (e.g., the holotype of *Hydriomena iolanthe* Hudson (Geometridae)). Hudson's description and later illustration (Hudson 1928: plate L fig. 1) leave no doubt about the application of this name, and there is no evidence of more than one species with this distinctive wing pattern, so there is no need to designate a neotype.

Distribution. (Map 1). Alpine zone of the South Island, widespread but very local.

— / NN, MB, MC, MK, OL, CO, FD.

Biology. Unknown. The species is associated with alpine wetlands, where adults are occasionally found at rest by day, as well as coming to light traps (B. Patrick, pers. comm.).

Flight period. December, January.

Remarks. Most specimens of *Nivetica nervosa* in collections are from Central Otago and the Otago Lakes district, especially the Remarkables Range, though it occurs widely in scattered populations through the South Island alpine zone. Only a single specimen has been seen from the north-west Nelson district, a female in NZAC from Mt Arthur Tableland collected by Alfred Philpott on 10 Dec 1928. Further investigations of the life history and ecology of this moth are now especially desirable given its placement in a monotypic genus.

Genus *Ichneutica* Meyrick, 1887

Figs 2a-88c (adults); 2m-88f (male abdominal base and genitalia); 2p-88i (female S7 and genitalia); S46k (whole abdominal cuticle); S83k, l (male S8 and T8); W2, 19, 68 (wing venation); L14–78b (live larvae); L25–87 (preserved larvae); L54pu (pupa).

Ichneutica Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 13. Type species *Ichneutica ceraunias* Meyrick, 1887, by original monotypy.

Alysia Guenée, 1868. *Entomologist's Monthly Magazine 5*: 3. Type species: *Alysia specifica* Guenée, 1868 (a junior subjective synonym of *Agrotis nullifera* Walker, 1857) by original monotypy. Junior homonym, preoccupied by *Alysia* Latreille, 1804 (Hymenoptera). **New synonymy.**

Graphania Hampson, 1905. *Catalogue of the Lepidoptera Phalaenae in the British Museum Vol. 5*: xiv, 468. Type species: *Heliophobus disjungens* Walker, 1858, by original designation. **New synonymy.**

Tmetolophota Hampson, 1905. *Catalogue of the Lepidoptera Phalaenae in the British Museum Vol. 5*: xiv, 470. Type species: *Leucania propria* Walker, 1865, by original designation. **New synonymy.**

Dipaustica Meyrick, 1912. *Transactions and proceedings of the New Zealand Institute 44*: 98. Type species: *Leucania epiastra* Meyrick, 1911, by original monotypy. **New synonymy.**

Maoria Warren, 1912 *in* Seitz, A. *The Macrolepidoptera of the World Vol. 11*: 76. Type species: *Erana plena* Walker, 1865, by original designation. Junior homonym, preoccupied by *Maoria* Laporte, 1868 (Coleoptera). Synonymised with *Graphania* Hampson (subjective replacement name) by Dugdale (1971: 118). **New synonymy.**

Alysina Cockerell, 1913. *The Entomologist 46*: 15. Type species: *Alysia specifica* Guenée, 1868 (a junior subjective synonym of *Agrotis nullifera* Walker, 1857), by monotypy (of *Alysia* Guenée). Objective replacement name for *Alysia* Guenée (preoccupied). Synonymised with *Graphania* by Dugdale (1971: 118). **New synonymy.**

Diagnosis. Thorax entirely clothed in hairlike scales, or with admixture of hairlike and lamellate scales, or entirely clothed in lamellate scales. Abdomen T3–7 in male continuously sclerotized, T8 continuously sclerotised or stirrup-shaped; female T3 with anterior sclerotised strip uninterrupted. Tegumen of moderate length, with or without distinct 'step'. Transtilla in form of two sinuous straps with bluntly truncate apices. Valva with sacculus not extended into free lobe; cucullus not differentiated to well differentiated; corona present or absent; separate robust spine at dorsal apex of cucullus present or absent. Phallus: subbasal sclerite of vesica absent; vesica not distinctly bulbous at base, with variously developed basal diverticulum displaced distad by tubular basal portion of vesica in line with phallobase, often with lateral subapical diverticulum; cornuti present; bulbus ejaculatorius long. Female genitalia: ductus bursae sclerotised, not scobinate; appendix bursae well differentiated from corpus bursae, lying dorsad of ductus bursae, subtended by sclerotised strip at junction with corpus bursae; corpus bursae round to oblong, signa present (1–4, usually 2) or absent.

Description. *Adult* (Figs 2a-88c). Head (Figs D64e, D65c): Labial palpi moderately short (ca 1–1.5x eye diameter) and weakly sinuous, with segments 1–2 weakly upcurved and segment 3 weakly angled down; segments 1–2 with erect scales beneath (with at least a few dark hair-like scales); segment 3 short (ca 0.5x length of segment 2), narrow, unmodified. Eyes with dense surface hairs; without 'lashes' (but with bordering hair-scales that do not curve over eye). Antennae filiform, cylindrical with minute semi-erect ciliations in female, filiform, subpectinate or bipectinate with minute erect ciliations in male. Thorax: entirely clothed in hairlike scales, or with mixture of hairlike and lamellate scales, or scales all lamellate; mesothorax with or without anterior scale-crest. Wing venation (Figs W2, 19, 68): forewing with R3 and R4 stalked, separate from *ca* 1/8 to 3/8 length of R4; areole present at cell apex subtending veins R2, R3+4 and R5; hindwing cross-vein at end of cell barely curved to distinctly curved inwards towards wing-base, sometimes angled, usually running from junction of Rs+M1 to base of M3 very near base of CuA1 (but Rs+M junction displaced distad in *ceraunias* group so that cross-vein starts well before this point). Male frenulum with 1, female frenulum with 3 bristles (occasionally 4 in *ceraunias* group). Forewing pattern: very variable, from near unicolorous without distinct crosslines or stigmata to strongly patterned with typical noctuid markings well developed. Legs: tibiae without spines; inner tibial spurs *ca* 1.5–2x as long as outer spurs; each tarsus with 3 rows of spines (sometimes a more or less distinct fourth row on tarsomeres 2–4). Abdomen with or without tergal scale-tufts on segments 1–3.

Male abdomen and genitalia (Figs 2m-88f, S46k, S83k, l): abdominal base either with all elements of trifine brush organ (Stobbe's glands, brushes, levers, A3 apodemes and pockets), or with some or none of these; often, when TBO reduced, A3 apodemes alone present (e.g., Fig. 2m: a3a). S2 apodemes moderately short, straight or curved. S8 with sclerotisation interrupted in anterior central zone, where usually a dense concentration of hair-scales arising from more or less distinct shallow groove. T3–7 continuously sclerotised; T8 either continuously sclerotised, or with central membranous zone and more or less stirrup-shaped. Uncus usually narrow, tapered, subcylindrical to more or less flattened, rarely spatulate to subrectangular; with dense semi-erect setae throughout most of length dorsally and fewer, less dense setae ventrally, central naked strip only distinct in species with broader flattened uncus. Subscaphium with paired strips of sclerotisation laterally at base. Tegumen of moderate length, with or without distinct 'step'. Paratergal sclerite moderately short to long, weakly to strongly sinuous, apex sometimes striate. Dorsal membrane of manica finely spinulose / scobinate, without distinct papillae. Transtilla (basal costal processes of valva) in form of two sinuous straps with bluntly truncate apices (Fig. 7e: ta). Juxta

teardrop-shaped. Valva elongate; sacculus not extended apically into free lobe; clasper well developed, variable in form, sometimes lamellate or papillate, without spinules on dorsal surface (claspers asymmetrical in shape in *unica* group); ampulla present, usually more or less digitate; cucullus not differentiated to well differentiated with distinct 'neck', variable in shape; corona present or absent; apical / subapical field of spine-like setae present; separate robust spine at dorsal apex of cucullus present or absent. Phallus: phallobase short to long, often with subapical 'tooth'; subbasal sclerite of vesica absent; vesica more or less cylindrical, short to long, with variously developed basal diverticulum displaced distad by tubular basal portion of vesica in line with phallobase, often with subapical lateral diverticulum; cornuti present, variable in size, usually in single uninterrupted strip, sometimes strip interrupted or bifurcating into two groups apically. Everted vesica more or less looping back towards phallobase, often forming complete loop. Bulbus ejaculatorius long (much longer than phallobase).

Female abdomen and genitalia (Figs 2p-88i): S7 slightly to distinctly indented caudally. T3 with anterior sclerotised strip complete; T7 with sclerotisation not interrupted basally. Terminal segments somewhat extensible, with well-developed finely rugose intersegmental membrane between segments 8 and 9. Ovipositor lobes short to moderately long, with scattered long setae throughout and dense short setae apically. Ostium narrow to broad, usually constricted slightly into antrum and broadening into ductus bursae. Antrum C-shaped in cross section, with weakly to strongly spinulose dorsal wall bulging ventrad, and lateral margins curved dorsad, usually forming distinct lateral grooves or pockets; dorsal desclerotised ridges of ostium / antrum usually distinct, more or less raised. Ductus bursae short to moderately long, differentiated from antrum, sclerotised and anteriorly rugose, not distinctly scobinate. Appendix bursae large, well differentiated from corpus bursae, lying dorsad of ductus bursae, variably sclerotised, connected to corpus bursae by sclerotised longitudinally rugose strip; corpus bursae round to oblong, variably rugose (usually less so in mated specimens), not spinulose, usually with a pair of scobinate ridged signa dorsally and ventrally, dorsal signum often larger; sometimes one dorsal signum only or signa absent; rarely 3 or 4 signa.

Larva (Figs L14–78b (live larvae); L25–87 (preserved larvae)). (Preserved larvae examined of *I. erebia*, *I. insignis*, *I. moderata*, *I. mutans*, *I. nullifera*, *I. purdii*, *I. scutata*, *I. skelloni*, *I. sistens*, *I. ustistriga*). Coloration cryptic. Cuticle not spinulose. T1 with L group bisetose (L2 hairlike and often hard to observe, setae arranged vertically), SV group bisetose; T2 and T3 with SV unisetose. Crochets uniordinal. Pinacula small and inconspicuous, unmodified, except SD1 pinaculum on T2 and T3 and usually A9 well sclerotised, round to oblong, with variably developed ventral pit and short to long hairlike seta. **Note.** In *Ichneutica moderata*, A9 has the SD1 pinaculum deep and enlarged, with a sclerotised rim.

Pupa (Fig. L54pu). (Preserved pupae / exuviae examined of *I. ceraunias*, *I. lignana*, *I. marmorata*, *I. propria*, *I. purdii*, *I. sistens*, *I. steropastis*, *I. unica*). Thorax not pitted but irregularly rugose. Abdominal segments 1–3 moderately rugose, sometimes with few anterior round depressions; segments 4–7 each with anterior band of round depressions in region where segments telescope, depressions deeper centrally on dorsum (depressions fewer and sometimes smaller on A4; in *I. sistens*, A4 with two very large deep depressions only; in *I. marmorata*, A4–7 each with raised sclerotised rugose ridge overlying band of depressions); apex of A10 short (*I. lignana*, *I. sistens, I. propria, I. steropastis*) or elongate (*I. marmorata*, *I. purdii*), sometimes almost star-shaped (*I. ceraunias*), weakly to strongly longitudinally (not transversely) rugose, or with raised ridges forming tessellated depressions (e.g. *I. lignana, I. propria, I. unica*); cremaster of 2 robust and (usually) 2 or 4 less robust curled setae with smooth apices.

Biology. Larvae feed on a wide range of herbaceous plants, with some species and species-groups (e.g., species formerly assigned to *Tmetolophota*) specialising on monocots. Many species are probably or certainly polyphagous on herbaceous plants. Few species (e.g., *I. lithias*, *I. lindsayorum*) have arboreal larvae; this is in contrast to the related genus *Physetica*, where most species are probably or certainly shrub-feeding. A single fern-feeding species is known: *Ichneutica subcyprea* n. sp. has been reared from the epiphytic fork-fern *Tmesipteris tannensis* (Psilotaceae), growing on trunks of silver fern (*Cyathea dealbata*).

Distribution and regional diversity. Endemic to New Zealand and occurring throughout the country, including the Chatham Islands and the vegetated subantarctic islands (Antipodes, Snares, Auckland Islands and Campbell Island). There is a single record of *Ichneutica insignis* from the Kermadecs (specimen in MONZ: Dugdale 1988) but there is no evidence that the genus is resident there.

The regional diversity of *Ichneutica* is shown in Map 89. Diversity is concentrated in the South Island. The North Island has 58 recorded *Ichneutica* species, of which only 10 are endemic to that island; the South Island has

70 species, with 23 endemics. Stewart Island has 29 recorded species, of which only *I. naufraga* (from Big South Cape Island) is endemic. Within the North Island, diversity is concentrated towards the centre and south: the northern 'kauri kingdom' (Northland (ND), Auckland (AK) and Coromandel (CL) regions) has a total of only 26 species, whilst the richest areas are TO (Taupo) with 46 recorded species, followed by TK (Taranaki) with 37 and WN (Wellington) with 35. Areas with fewer than 15 known species (WO, GB, RI, WI, WA) are undoubtedly severely under-recorded. Diversity seems to be more evenly spread in the South Island, though the richest known areas are in the south: OL (Otago Lakes) with 55 species and FD (Fiordland) with 52. A number of areas have between 44 and 50 species recorded (NN, WD, NC, MC, MK, CO, DN, SL). Areas that are probably notably under-recorded are SD (Marlborough Sounds, 14 species only), KA (Kaikoura, 34 species) and SC (South Canterbury, 26 species). The more distant offshore islands have a very depauperate fauna of *Ichneutica*: the Three Kings (TH) and Chathams (CH) have 5 species each, but of these only the Chathams has endemic species (3 of the 5 occur nowhere else: see Introduction, under 'Species of *Ichneutica* of conservation concern'). The Snares (SN) and Antipodes (AN) each have a single endemic species as their only *Ichneutica*. The Auckland Islands (AU) have 3 species: *I. erebia*, which they share with Campbell Island (CA), and *I. rubescens* and *I. omoplaca*, shared with the mainland.

Note on Synonymy. *Ichneutica* is here expanded in concept to include all species referred to *Ichneutica*, *Graphania*, *Dipaustica*, *Tmetolophota* and *Aletia* by Dugdale (1988), with the following exceptions: (1) the '*Aletia*' and '*Graphania*' species transferred to *Physetica* by Hoare (2017), (2) *Ichneutica nervosa*, transferred to the new genus *Nivetica* above; (3) *Graphania tetrachroa*, transferred to *Meterana* above (see Introduction). This change may seem drastic to some, as many new combinations are thus introduced for species formerly assigned to *Graphania* and *Tmetolophota*, and the well-known pest species *mutans* is amongst these. The justification for this change is as follows. All species here referred to *Ichneutica* share an essentially similar conformation of the vesica in the male and relationship of the corpus and appendix bursae in the female genitalia. The everted vesica has an elongate tubular basal portion in line with phallobase, beyond this, it is strongly recurved back towards the phallobase (often forming a complete loop) and bears an elongate crest of relatively homogeneous spinose cornuti (sometimes reduced); the only lateral diverticulum is a variously developed subapical bulge. Correspondingly, the appendix bursae is represented by a C-shaped chamber lying posterior to the corpus and dorsad of the ductus bursae, at least the interior of the C-curve being sclerotised and longitudinally rugose. This set of characters contrasts with *Physetica*, where the everted vesica lacks an elongate tubular basal portion in line with the phallobase, has at least one distinct lateral diverticulum well before the apex, and is usually aligned more or less at right angles to the phallobase (more recurved in some species); in the *Physetica* female the appendix bursae is a rugose lateral evagination of the corpus bursae and there is no C-curve or posterior displacement. The biology of the genera largely conforms to this division: *Ichneutica* larvae are almost all feeders on herbaceous plants; *Physetica* are mostly associated with woody shrubs. See also the Diagnosis and Remarks under *Nivetica*, above.

The historical separation of the genera *Tmetolophota*, *Graphania* and *Dipaustica* from *Ichneutica* is considered untenable, since, when the species are viewed together in series (see especially the male genitalia figures in this volume), the differences are seen to form part of a continuum. Some groups within this continuum are very easily defined and probably monophyletic (for example the *unica* group of species with their asymmetrical claspers in the male), but the erection of a separate genus for such groups would almost certainly leave a paraphyletic 'residue' that could not be readily defined by apomorphic characters. Therefore a more inclusive genus concept is preferred here.

Remarks. As redefined here, *Ichneutica* becomes the largest genus of Lepidoptera in New Zealand, with 87 named species. Two genera in particular are likely to rival this figure once they are critically revised: *Tingena* Walker in Oecophoridae (currently with 81 named species) and *Eudonia* Billberg in Crambidae (currently with 60 named species but with many likely to be transferred in future from *Scoparia sensu lato*). Whether or not it retains its position as the most diverse genus, *Ichneutica* represents a major endemic radiation with approximately 5% of the named Lepidoptera species of New Zealand. The Introduction to this volume deals more fully with issues related to taxonomy and identification of species in this huge genus, and discusses conservation, monitoring and other priorities for future work.

Species groups. *Ichneutica* is here divided into 10 species groups for convenience, based on an intuitive assessment of characters of the male abdomen and genitalia, as detailed in the diagnosis for each group (cf. Hoare

2010). As noted above, the series starts with the type species and proceeds very roughly in a sequence from simple to more complex male genitalia. The groups are tentative and no claim for monophyly is made for any multi-species group, although some, e.g. the *unica* group (q.v.), may well be monophyletic. Nonetheless, the groupings clarify a number of relationships obscured by the former classification, which, for example, placed the sister-species *agorastis* and *hartii* in separate genera. Three groups showing a slightly greater diversity of abdominal and/or genitalia traits, the *nullifera*, *propria* and *unica* groups, are divided into subgroups.

The groups and subgroups are in each case named after their first described included species.

I. *Ichneutica ceraunias* group

Diagnosis. Male abdominal base without brushes, levers or pockets; A3 apodemes present. Uncus spatulate; valva oblong, not sinuous; cucullus not differentiated; claspers symmetrical, broad, with transverse lamellae; apical setae of valva not forming distinct 'crest'; dorso-apical hooked seta of corona absent; vesica not strongly elongated; cornuti reduced, cornutal strip not interrupted.

Remarks. This group of two currently recognised, essentially alpine species needs further study. *Ichneutica ceraunias* as here delimited is an extremely variable taxon and may well be in a state of active speciation as discussed below. Molecular and life-history studies of the various populations that differ in wing pattern and female wing development may help decide whether *ceraunias* represents a species complex; the genitalia appear to be conservative, but may offer some clues with further study. Even *I. dione* shows only very minor differences in male genitalia from *ceraunias* and none that have been observed in the female genitalia; the wing pattern of this species is here shown to be more variable than hitherto thought, making separation from *ceraunias* on external characters difficult.

In the following descriptions of forewing pattern, the ground colour is taken to be the colour at the base of vein CuA2 where it arises from the discal cell (in female *dione*, there is a pale streak along this vein; this is likewise taken to be the ground-colour as it is the predominant colour of the forewing).

2. *Ichneutica ceraunias* Meyrick, 1887

Figs 2a–l (adults); 2m–o (male abdominal base and genitalia); 2p–r (female S7 and genitalia); W2 (wing venation).

Ichneutica ceraunias Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 13.

Diagnosis. The typical pattern of pale streaks along veins M1, M3 and CuA1 radiating from the discal cell of the forewing (which is itself pallid), along with the pale streak along CuP, is usually diagnostic of this species. However, some forms of *Ichneutica dione* approach this pattern very closely, and in both species the post-discal streaks may be obscure or absent, though the CuP streak is nearly always present. In the male, three external characters may be used as a guide to diagnose *I. dione*, though in some cases a certain identification may require dissection: (1) in the 'typical' form of *dione*, the pale infill of the forewing disc is reduced or absent, leaving a rather distinct Y-shaped marking at the end of the disc, representing the fused orbicular and reniform stigmata; this form is not known to occur in *I. ceraunias*; (2) specimens with the termen pallid and the postdiscal forewing streaks not extending into this pallid area but separated from it by dark scaling (forming a near-complete dark subterminal line) are probably all *I. dione*; (3) specimens with the streak along CuP extending beyond the base of the reniform stigma (and often beyond the distal edge of the stigma) are probably all *I. ceraunias*. Specimens with a shorter CuP streak are probably mostly *I. dione*, but this form is also known to occur in *I. ceraunias* so the short streak is not diagnostic of *dione*. In series, the forewing of male *dione* generally appears to have a more acute apex and more oblique termen than that of *ceraunias*, but this difference may not be reliable. In the male genitalia, there are two small characters that separate the species: (1) *I. dione* has the dorsum of the valva rather strongly convex, whereas it is straight to weakly convex in *I. ceraunias*; (2) on the valva of *I. dione*, the ampulla is reduced to a minute narrow lobe with a single seta (rarely 2 setae); on *I. ceraunias* the ampulla is larger (though still small), with several apical setae.

In the female, the presence of a visible (though interrupted) dark subterminal line on the forewing is probably diagnostic of *I. dione*; in *I. ceraunias*, the line is obsolete or represented by a few dark scales only. However, it should be noted that rather few females have been confidently assigned to *I. dione* in collections, so the full range of variation is unknown. In these females, most forewing veins bear pale streaks, giving a more contrasting pattern than in female *ceraunias*; also, the terminal area of the forewing appears as a broad pale fascia, contrasting with the

adjacent dark interneural areas; this effect does not appear to be present in female *ceraunias*, which tend to be weakly marked and lacking in contrast.

Description. Adult (Figs 2a–l). Wingspan 35–46 mm (male); 38.5–51 mm (female, fully winged forms); 29–31 mm (brachypterous forms, figs 2k, l). Male antenna with pectinations up to *ca* 8x width of flagellum, pectinations reaching to apex. Head and thorax pale sandy brown to dark reddish brown. Forewing pale sandy brown to pale reddish brown, grey brown or chocolate brown, costa paler; basal area not distinctly overlain by silvery scales (but may be weakly paler); stigmata not developed; discal cell of male filled with a contrasting cream to yellowish streak (less contrasting in female); a concolorous streak along fold (vein CuP) dark-edged above and below (more or less well developed in female); similar dark-edged streaks beyond disc along veins M1, M3 and CuA1 present or absent (often indistinct in female); terminal area not distinctly paler than ground-colour; cilia white with indistinct brownish line. Hindwing white, finely mottled grey to brownish grey (sometimes densely), veins brownish; cilia white with indistinct brownish line. Underside: forewing grey to brownish with forewing markings showing through more or less indistinctly; hindwing whitish mottled grey to brownish grey. Abdomen whitish ochreous, mottled grey (often appearing darker in museum specimens due to grease). Male abdominal base (Fig. 2m) without brushes, levers or pockets, but with A3 apodemes. Male genitalia (Fig. 2n): uncus moderately to broadly spatulate; dorsum of valva straight or barely convex, so that valva usually broadens smoothly towards the apex (except in some specimens and populations, e.g. Swampy Summit DN, where valva is rather narrow apically); ampulla small, thumb-like, usually broader than in *dione*, apically with 4 or more setae which may be raised on papillae (but Swampy Summit population has narrow ampulla with one seta as in *dione*); phallus (Fig. 2o) subapical tooth absent; vesica forming complete loop when everted; vesica with cornuti in single uninterrupted band, cornuti short (but slightly longer and denser than in *dione*). Female S7 as in Fig. 2p. Female genitalia (Figs 2q, r): ovipositor lobes large, truncate, blunt (some setae on lobes very long); segment 8 a narrow sclerotised band with patch of short to medium-length setae laterally and scattered medium-length setae dorsally; ostium cup-shaped, very finely and evenly scobinate ventrally; dorsal desclerotised ridges inconspicuous and weakly raised, lateral pockets weakly developed; ductus bursae weakly constricted at about 1/3 way to corpus bursae, and more strongly at junction with corpus, where weakly rugose; appendix bursae membranous and strongly rugose on outer curve, sclerotised and sparsely rugose on inner curve; corpus bursae small, forming C-shape with appendix bursae; signa absent.

Type material. *Ichneutica ceraunias*: Holotype: male, 'Lectotype [round label] / Mt Arthur New Zealand 4700ft 16/1/86 / Ichneutica ceraunias Meyr. 5/5 E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, not dissected).

Note. Only one specimen was mentioned by Meyrick (1887) in the original description, so the lectotype label was added in error.

Distribution. (Map 2). Central North Island south throughout the South Island in the alpine zone, descending to sea level in the far south.

TK, TO, WN / NN, BR, WD, MB, KA, NC, MC, SC, OL, CO, DN, FD, SL / SI.

Biology. The larva feeds on *Chionochloa* spp. (snow-grass) and *Festuca* (fescue) (Poaceae) (Patrick 1991; Bejakovich & Dugdale ([1998]); White 2002), but no detailed observations have been published: Bejakovich and Dugdale (*loc. cit.*) state that the presence of the larva is indicated by copious frass pellets amongst tillers of the host-plant. Brian Patrick (pers. comm. 2017) found a larva (33 mm long) in a cocoon under a rock in a dense sward of *Poa colensoi* in the Rock and Pillar Range CO on 28 Nov 1982, the adult emerging on 16 Dec; *Poa* is very likely a further host-plant. A female *I. ceraunias* was photographed on Mt Ruapehu in January 2017 by Marie MacDonald (Department of Conservation, Ohakune), ovipositing on *Dracophyllum recurvum*; it is not known whether this tough-leaved plant is an alternative host. There is apparently no full description of the larva, but some diagnostic characters are given in the key by Bejakovich and Dugdale ([1998]: 20, fig. 60) as follows: 'Mandibles with biting edge an even carina, and inner tooth / ridge absent; spiracles on segments A1–8 with thick rims... and opening grey or buff; anal shield with paired membranous mounds and prominent dorsal brown stripes'. Adults occasionally fly by day in hot sunshine (Hudson 1928), but more usually at night, when they are attracted to light.

Flight period. October to February.

Remarks. As defined here, *Ichneutica ceraunias* is a common, widespread and variable moth, though restricted throughout most of its range to the subalpine and alpine zones. The variation in wing pattern and male

genitalia has been alluded to in the diagnosis above. Some populations (e.g., Rock and Pillar Range CO, Hunter Mountains FD and Mt Anglem SI) are remarkable in having brachypterous, flightless females. Interestingly, the form of wing reduction varies: Rock and Pillar Range females (Fig. 2l) are moderately stenopterous (narrow-winged), but retain a more or less distinct termen and tornus on the forewing, whereas the females from the Hunter Mountains and Mt Anglem (Fig. 2k) have strongly stenopterous, subelliptical forewings, that lack a distinct termen or tornus. Such variation in degree of brachyptery within a single species has been recorded overseas in *Coscinia libyssa* (Püngeler, 1907) (Erebidae: Arctiinae) (Sattler 1991) and in *Thyrocopa apatela* (Walsingham, 1907) (Xyloryctidae) (Medeiros 2009). The population of *I. ceraunias* from Swampy Summit DN (males in NZAC and both sexes in OMNZ) has rather invariable bright reddish-buff males and paler buff females, and shows a conspicuous narrowing of the apex of the valva, with corresponding reduction of the field of spinose setae. None of these local forms have been taxonomically distinguished here, because of the apparent complexity and variability of the species as a whole and the need for more detailed study, and sampling of further isolated populations.

It is interesting that this locally common and very widespread species has so seldom been reared and that no complete description or image of the larva is available.

3. *Ichneutica dione* Hudson, 1898

Figs 3a–i (adults); 3j–o (male abdominal base and genitalia); 3p–r (female S7 and genitalia).

Ichneutica dione Hudson, 1898. *New Zealand moths and butterflies (Macro-lepidoptera)*: 14; pl. IV fig. 27.

Ichneutica lindsayi Philpott, 1926. *Transactions and proceedings of the New Zealand Institute 56*: 387. **New synonymy.**

Diagnosis. Differences from *Ichneutica ceraunias* are described under the Diagnosis for that species, above. Hudson (1928) suggested that the antennal pectinations of male *dione* were shorter than those of *ceraunias*; I have not observed any distinct difference in this character.

Description. Adult (Figs 3a–i). Wingspan 37–47 mm (male); 43–47 mm (female). Male antenna with pectinations up to *ca* 8x width of flagellum, pectinations reaching to apex. Head and thorax dull ochreous (female) to reddish brown or chocolate brown (male). Forewing dull reddish brown to chocolate brown (male) or pale ochreous (female), costa paler; basal area sometimes distinctly overlain by silvery scales; markings representing orbicular and reniform stigmata often developed as a cream to yellowish short streak and a V-shaped mark respectively in disc, these sometimes confluent, discal cell either filled with a pale (yellowish) streak as in *ceraunias* or streak absent or not reaching wing base; a concolorous streak along CuP dark-edged above and below (distinct in all females seen), not extending beyond reniform stigma; similar streaks beyond disc along veins M1, M3 and CuA1 present or absent in male, present in female, which also has more or less distinct streaks along veins from R5 to 1A+2A giving more contrasting pattern than in *ceraunias*; terminal area distinctly paler than ground-colour in male, concolorous with pale ground-colour in female but contrasting with dark interneural areas; both sexes with subterminal line represented by more or less incomplete dark suffusion demarcating the ends of the postdiscal streaks (cf. *ceraunias* where apices of streaks are not surrounded by dark scaling and extend into terminal area); male sometimes with subterminal area suffused with pale scales, and/or with conspicuous patch of pale silvery scales just before tornus; cilia white with line of darker scales. Hindwing suffused greyish brown; cilia white with indistinct darker line. Underside: dark brownish, hindwing slightly paler; pale line along base of cilia on both wings. Abdomen greyish ochreous, more brownish at sides in male. Male abdominal base (Figs 3j, m) without brushes, levers or pockets, but with A3 apodemes. Male genitalia (Figs 3k, l, n, o): as described above for *I. ceraunias*, except: dorsum of valva moderately convex, so that middle of valva at level of clasper is broadest part; ampulla minute, tending to be smaller than in *ceraunias*, a single tiny lobe with one or two setae; cornuti usually slightly shorter and less dense than in *ceraunias*. Female S7 as in Fig. 3p. Female genitalia (Figs 3q, r): not distinguished from those of *I. ceraunias*, except overall appearing slightly smaller.

Type material. Holotype: male, '318a' [Mt Arthur NN, 4,400 ft, C.W. Palmer] (MONZ) (not examined, but photograph seen and identity not in doubt).

Note. *Ichneutica dione* was described from a single male (Hudson 1898).

Ichneutica lindsayi: Holotype: male, 'Hunter Mts 4000 ft 5/1/23 / Ichneutica lindsayi Philp. Holotype ♂ / Collection Lindsay / HOLOTYPE [pink label]' (CMNZ) (examined, dissected, genitalia on slide).

Note. *Ichneutica lindsayi* was described from 'several examples' taken by S. Lindsay and C.E. Clarke in the Hunter Mountains in January 1923 (Philpott 1926). There are four paratypes in AMNZ (AMNZ database nos

1691–1694), collected by C.E. Clarke on the same date as the Holotype, and one in CMNZ collected on 7 Jan 1923. The two specimens in CMNZ taken on 31 Dec 1922 should probably be excluded from the type series, as Philpott does not mention December as a month of capture and may not have seen them when he made the description.

Note on synonymy. *Ichneutica lindsayi* was described from dark specimens from Fiordland lacking the pale streaks along veins M1, M3 and CuA1 beyond the disc. The holotype of *I. lindsayi* (Fig. 3e) has been dissected for this revision and it corresponds in male genitalia to *dione* in having a reduced ampulla and a convex dorsum to the valva, with the valva broadest at the middle rather than the apex. It is clear from other dissections made that the '*lindsayi*' wing pattern occurs both in *I. ceraunias* (Fig. 2e) and in *I. dione* as defined here, and is not on its own a character of diagnostic value.

Distribution. (Map 3). Alpine zone of the South Island, widespread but local.

— / NN, WD, NC, MC, FD

Biology. Unknown, but presumed to feed as a larva on *Chionochloa, Poa* and/or *Festuca* spp. from its close relationship to *I. ceraunias*.

Flight period. December to February.

Remarks. *Ichneutica dione* is very closely related to *I. ceraunias.* Until now, it has generally been distinguished externally from that species based on the reduction of the pale streak filling the disc of the forewing, leaving a distinct whitish dash and V-shaped mark (the orbicular and reniform stigmata, which are sometimes confluent) (Figs 3a, b) (cf. Hudson 1950: 73–74). However, the male genitalia indicate that some specimens which have the pale streak in the discal cell (and which have hitherto been attributed to *ceraunias* or sometimes *lindsayi*) are in fact referable to *dione*, so the species is rediagnosed here to take this into account (see Figs 3c–f, and Diagnosis under *I. ceraunias*). As noted above, dark specimens with the post-discal pale streaks absent, and hitherto referred to *I. lindsayi*, occur in both *ceraunias* and *dione*. The male and female figured by Hudson (1950: plate VI, figs 10, 10a) as dark forms of *Ichneutica ceraunias* from Homer Tunnel are almost certainly specimens of *I. dione*, based on dissections of similar specimens collected by Salmon at this locality.

This species is more restricted in range than *I. ceraunias* and far less commonly collected. In common with that species, it can sometimes be found flying by day in its alpine habitat (Hudson 1928).

II. *Ichneutica cana* group

Diagnosis. Male abdominal base without brushes, levers or pockets; reduced A3 apodemes present or absent. Uncus spatulate or strap-like; valva oblong, not or weakly sinuous; cucullus barely differentiated; claspers symmetrical, very broad, without transverse lamellae; apical setae of valva not forming distinct 'crest'; dorso-apical hooked seta of corona absent; vesica not strongly elongated; cornuti not reduced, cornutal strip not interrupted.

Remarks. The taxonomy of this group of species has been subject to considerable confusion. Howes (1943) misinterpreted his own species *Ichneutica cana* and redescribed it 30 years later as *I. homerica*. Philpott (1915) described '*Aletia*?' *lata* from a male and female that are not conspecific. The male, here designated as lectotype, is a specimen of *Ichneutica fibriata* (Meyrick). The species that has been wrongly placed under the name *cana* in collections (and to which the female paralectotype of *Aletia lata* belongs) is thus without a name and is described here as *I. eris* n. sp. Salmon (1946) incorrectly synonymised *lata* with *cana* based on Howes' misinterpretation of the name *cana*. Salmon (*loc. cit.*) created further confusion by designating a female *marmorata* as a syntype of his new species *notata*. See below for further discussion.

4. *Ichneutica cana* Howes, 1914

Figs 4a–f (adults); 4g–l (male abdominal base and genitalia); 4m–o (female S7 and genitalia).

Ichneutica cana Howes, 1914. *Transactions and proceedings of the New Zealand Institute 46*: 96.

Aletia empyrea Hudson, 1918. *Entomologist's Monthly Magazine 64*: 61. **New synonymy.**

Ichneutica homerica Howes, 1943. *Transactions and proceedings of the New Zealand Institute 72*: 371–372. **New synonymy.**

Diagnosis. *Ichneutica eris* is a similar species, but may be distinguished from *cana* by its predominantly pale brownish coloration (*cana* is grey to blackish grey). The postmedian forewing line is more strongly and deeply scalloped in *eris* than in *cana*, and the claviform stigma is absent (usually present though often indistinct in *cana*).

The forewing of male *I. eris* generally has a more pointed apex and oblique termen than that of *cana*; this is most pronounced in larger specimens.

Description. Adult (Figs 4a–f). Wingspan 42–47 mm (male); 46–55 mm (female). Male antenna bipectinate to penultimate segment; antennal pectinations up to *ca* 6x flagellum width. Head and thorax with admixture of white and dark grey scales. Forewing dark grey, outlines of stigmata and antemedian and postmedian lines more or less distinctly picked out in whitish; antemedian line without distinct evagination in middle (cf. *I. eris*); postmedian weakly and evenly scalloped; reniform stigma transverse, not S-shaped; claviform present, often indistinct; subterminal line more or less indistinct; area basad of antemedian line and distad of postmedian line sometimes patchily suffused whitish; often some pale yellowish scales around stigmata and in subterminal line; veins dark; fringe chequered grey and whitish. Hindwing grey, paler around indistinct postmedian line and terminally; fringe grey, weakly chequered. Underside whitish, suffused grey in basal 2/3 of forewing; forewing with reniform and postmedian line variably distinct; hindwing with discal spot and postmedian line usually distinct. Abdomen ochreous, mixed grey–brown. Male abdominal base (Figs 4g, j) without brushes, levers or pockets; A3 apodemes absent. Male genitalia (Figs 4h, k): uncus distinctly spatulate; valva sinuous, apex bluntly rounded to truncate, sometimes with sharp-angled point at dorsal end of cucullus; cucullus not clearly differentiated; corona absent, but dense field of spinose setae present, not forming costal 'crest'; clasper robust, very slightly curved, not reaching near valva apex; ampulla short, thumb-like; phallus (Figs 4i, l) with subapical tooth absent; vesica with cornuti moderately short, in single uninterrupted band. Female S7 as in Fig. 4m. Female genitalia (Figs 4n, o): ovipositor lobes large, bluntly squared off (longest setae very long); segment 8 with very sparse medium-length setae laterally and medium-length to long setae dorsally forming distinct very narrow caudal band; ostium very shallow, cup-shaped, dorsal desclerotised ridges obsolete, but minute scobinations in this position; lateral pockets very weakly developed; ductus bursae short, smoothly sclerotised except in anterior 1/5 where a few well-spaced rugae; appendix bursae smooth and membranous on outer curve, sclerotised and rugose on inner curve where joins corpus bursae; corpus bursae small, not rugose, signa absent.

Type material. *Ichneutica cana*: Holotype: male, 'Garvie Mts 20.11.10 / C.E. Clarke Collection / AMNZ 21949 AUCKLAND MUSEUM NEW ZEALAND / HOLOTYPE ♂ (?) Ichneutica cana Howes, 1914 det. J. Early 1992 [red label] / Genitalia ♂ on slide R. Hoare prep. May 2011' (AMNZ).

Note. *Ichneutica cana* was described from a single male (Howes 1914a). Dugdale (1988: 205) did not find the holotype in MONZ, but it has subsequently been located in AMNZ (Early & Gilbert 1993). The label data do not correspond completely with the description, which gives the locality as the adjacent Hector Mountains and the date of capture as 20 November 1911. However, the specimen is confidently identified as the holotype as it matches the description in wingspan and colour pattern, and in particular in the 'short' cilia of the forewing (in fact worn); the locality and date in the description can be presumed to be minor errors.

Aletia empyrea: Lectotype (designated by Dugdale (1988: 199)): female, 'Routeburn 25/12/14 / Aletia empyrea Huds. Type ♂ / C.E. Clarke Collection / AMNZ 21739 AUCKLAND MUSEUM NEW ZEALAND' (AMNZ) (examined, not dissected).

Note. *Aletia empyrea* was described from an unspecified number of specimens. There is one female paralectotype in AMNZ, collected by Clarke at Ben Lomond, OL on 19 Dec 1914 (AMNZ 38872).

Ichneutica homerica: Lectotype: male (here designated), 'Homer 1-1-42 / ICHNEUTICA HOMERICA ♂ TYPE / G. HOWES COLLECTION' (MONZ) (examined, not dissected).

Note. *Ichneutica homerica* was described from an unspecified number of specimens of both sexes: Howes indicated that 'types and co-types' were deposited in his own collection. There is no mention of a holotype so the type series must be regarded as syntypic (ICZN Article 73.1) and neither the mention of a holotype by Dugdale (1988: 206) nor by Palma *et al*. (1989: 40) constitutes a valid lectotype designation (ICZN Article 74.5). The specimen hitherto regarded as the holotype is here designated lectotype to avoid possible confusion in the future.

Note on synonymy. (1) *Aletia empyrea*. Hudson (1918) believed that he had both sexes of *empyrea* when he made his description, but the lectotype and paralectotype in AMNZ are both female. Of course, both of these lack antennal pectinations, so it is not surprising that Hudson placed the species in *Aletia* (as then circumscribed) and failed to take into account its similarity to *Ichneutica cana*. White (2002) pointed out that *empyrea* belonged within the narrow definition of *Ichneutica* (i.e., *ceraunias*-group and *cana*-group of this work) based on the

submoniliform antennae. The type specimens clearly fall within the range of variation of *Ichneutica cana*, so *empyrea* is reduced to synonymy.

(2) *Ichneutica homerica*. *Ichneutica homerica* was described by Howes (1943) without comparison to similar species. It is clear that at some time between the description of *cana* and that of *homerica*, Howes and others had come to apply the former name incorrectly to the pale brownish species with sinuous reniform and no claviform here described as *Ichneutica eris* (see below). The holotypes of *cana* and *homerica* certainly belong to the same (usually) dark grey and white taxon, and they are synonymised here.

Distribution. (Map 4). Eastern and southern South Island, extending to Fiordland in the south west.

— / MB, KA, NC, MC, SC, MK, OL, CO, FD

Biology. The life history is unknown. The males fly in hot sunshine by day, and later both sexes come to light.

Flight period. December, January.

Remarks. *Ichneutica cana* is a common and widespread species in the alpine zone of the South Island, but appears to be absent from the north-west, where *I. eris* is present. As with many alpine noctuids, further investigations of the life history and larval host-plants are much needed.

5. *Ichneutica eris* new species

Figs 5a–d (adults); 5e–g (male abdominal base and genitalia); 5h–j (female S7 and genitalia).

Diagnosis. For differences between *Ichneutica eris* and *I. cana*, see under that species above. *Ichneutica fibriata* (Meyrick) is another very similar species: it may be distinguished by the lack of contrast between the colour of the frons and the rest of the head and thorax (frons conspicuously pale in *eris*), by the much less distinct pallid scaling along the dark antemedian and postmedian lines of the forewing (at most the postmedian line has white specks at the apices of the scallops in *fibriata*, whilst both lines are distinctly pale-edged in *eris*), and, less reliably, by the very indistinct subterminal line (subterminal line usually rather distinct and pale in *eris*, but sometimes indistinct).

Description. Adult (Figs 5a–d). Wingspan 37–46 mm (male); 43–51 mm (female). Male antennae with pectinations to 2–3 segments short of apex; pectinations up to *ca* 5x width of flagellum. Head and thorax with scales grey-brown at base, whitish at tip, appearing pale greyish (whitish grey on frons). Forewing pale brownish grey, outlines of stigmata and antemedian and postmedian lines more or less distinctly picked out in whitish; antemedian with distinct M-shaped evagination in middle (towards postmedian line); postmedian strongly and distinctly scalloped; reniform stigma transverse to weakly S-shaped; claviform absent; area distad of subterminal line occasionally suffused whitish, paler than rest of wing; yellowish scales absent; veins weakly darkened; a series of more or less distinct greyish dots or dashes along termen; fringe grey, weakly chequered whitish. Hindwing grey, with very indistinct suffused postmedian line and slightly paler area beyond; line along termen very pale and indistinct; fringe greyish white. Underside: whitish, suffused brownish grey especially in basal 2/3 of forewing; forewing with reniform and postmedian line variably indistinct; hindwing with discal spot and postmedian line usually rather distinct. Abdomen pale ochreous to ochreous mixed grey-brown (often appearing darker in collections due to grease). Male abdominal base (Fig. 5e) without brushes, levers or pockets; reduced A3 apodemes present. Male genitalia (Fig. 5f): uncus very weakly spatulate; valva near rectangular (costa convex towards apex, dorsum straight), apex bluntly rounded; cucullus not differentiated; a weakly developed corona of *ca* 30 elements, elements not strongly differentiated from adjoining narrow field of spinose setae, especially in dorsal half of corona, spinose setae not forming costal crest (and less dense than in *cana*); clasper robust, curved, not quite reaching apex of valva; ampulla very long, robust, digitate, weakly spatulate; phallus (Fig. 5g) without subapical tooth; vesica with cornuti in single uninterrupted band, cornuti rather short. Female S7 as in Fig. 5h. Female genitalia (Figs 5i, j): ovipositor lobes rather small, bluntly squared off (longest setae moderately long); segment 8 with group of medium-length setae laterally, dorsal setae absent or few, not forming caudal band; ostium funnel-shaped, dorsal desclerotised ridges small, weakly raised; lateral pockets short, weakly developed; ductus bursae short, smoothly sclerotised except in anterior 1/3 where finely rugose; appendix bursae smooth and membranous on outer curve, sclerotised and rugose on inner curve where joins corpus bursae; corpus bursae small, not or very weakly rugose, signa absent.

Type material. Holotype: male (Fig. 5a): 'Homer Tunnel 2/2/46 J.T. Salmon / Photographed by B. Rhode [green label] / genitalia ♂ on slide R. Hoare prep.' (MONZ). Paratypes: 7 males, 1 female, as follows: 4 males,

same data as holotype, but not dissected or photographed (all MONZ); 3 males, OL: Remarkables, Rastus Burn 1650 m, light trap, 14–20 Nov 1987, B.M. Lyford (NZAC); 1 female (Fig. 5b), FD: Darran Mts, Tutoko Bench 1020 m, 9–15 Jan 1977, J.S. Dugdale, K. J. Fox (NZAC).

Distribution. (Map 5). Widespread in the South Island.

— / NN, MB, NC, MC, MK, OL, CO, FD

Biology. The life history has not been documented, but Dugdale (1967) briefly mentions the collection of pupae of '*Ichneutica lata*' along with those of *I. notata* and *I. ceraunias* in 'depleted swards' in alpine Canterbury. Voucher material is in FRNZ; in a mixed series under the name *Ichneutica cana*, a male and a female of this species were found with pupal exuviae pinned beneath. The female, from Temple Basin, is labelled as reared from a pupa in bare soil by P.S. Crowhurst; the male has no collecting data, just a small printed label with the name '*Ichneutica lata*', but presumably the pupa was collected together with that of the female.

Flight period. November to February.

Etymology. This species, which has sown chaos and confusion amongst lepidopterists, is named after Eris, the Greek goddess of strife and discord.

Remarks. *Ichneutica eris* has consistently been placed in collections under the name *I. cana*, a longstanding misinterpretation of that name (see under *cana* above). It overlaps in distribution with *I. cana*, and is likewise an alpine moth, but appears to be in general more restricted and localised, though it occurs in the Nelson mountains, where *cana* is so far unknown.

It would have been possible to avoid naming this species as new, by designating the female syntype of *Aletia lata* Philpott (Fig. 5c) as lectotype, since that specimen belongs to this species and there has been no valid lectotype designation until now (see below, under *Ichneutica fibriata*). However, the male syntype (a specimen of *I. fibriata*) has been treated as the primary type of *Aletia lata* in the literature and in databases, and a good deal of confusion surrounds the name *lata* because of the mixed type series and the incorrect synonymy with *cana* by Salmon (1946). There is also another *lata* in this genus: *Melanchra lata* Philpott, a synonym of *Ichneutica olivea* (q.v.). Therefore I have preferred to designate the male *A. lata* syntype as lectotype (making this name a synonym of *fibriata*) and to name a new species for *cana* of authors (*nec* Howes 1914).

6. *Ichneutica schistella* new species

Figs 6a, b (adults); 6c–e (male abdominal base and genitalia).

Diagnosis. *Ichneutica schistella* is distinguished from *Ichneutica cana* by the smaller size (under 40 mm wingspan, usually 42 mm or more in *cana*), the lack of a distinct claviform stigma on the forewing, and especially by the presence of strong blackish dashes along the forewing and hindwing termen. The dark grey forewing coloration as well as the dark termen dashes also distinguish this species from *I. eris*, which is paler brownish grey with less distinct dashes in this position. The smallest males of *I. eris* overlap in wingspan with the largest *I. schistella*, but *schistella* is almost invariably a much smaller species.

Description. Adult (Figs 6a, b). Wingspan 33–38 mm (male); female unknown. Male antennae with pectinations to 2–3 segments short of apex; antennal pectinations up to *ca* 5x width of flagellum. Head and thorax with mixed white and dark grey scales, appearing grey to dark grey, often with traces of diffuse darker lines exteriorly on tegulae (frons whitish). Forewing suffused white and dark grey; antemedian line scalloped, white, edged black distally; postmedian line scalloped, white, edged black basally; antemedian and postmedian converging above dorsum and sometimes confluent on fold; outlines of stigmata more or less distinctly picked out in whitish; reniform stigma transverse to weakly S-shaped; claviform absent; area distad of subterminal line usually suffused whitish, paler than rest of wing; a few scattered yellowish scales mostly around stigmata; veins hardly darkened; a series of very distinct blackish dashes along termen; fringe grey, weakly chequered whitish. Hindwing grey, with very indistinct suffused postmedian line and slightly paler area beyond; line along termen distinct, grey, broken into dashes; fringe greyish white. Underside: both wings greyish, white in terminal area of forewing; forewing reniform and postmedian line present, rather indistinct; hindwing with discal spot and postmedian line variably distinct; dark dashes along termen of both wings rather distinct. Abdomen greyish mixed with whitish. Male abdominal base (Fig. 6c) without brushes, levers or pockets; reduced A3 apodemes present. Male genitalia (Fig. 6d): as described for *I. eris*, except valva narrower apically beyond slight concavity in costa;

dorsum of valva tending to be convex; vesica (Fig. 6e) with strip of cornuti shorter than in *eris*. Female genitalia: unknown.

Type material. Holotype: male, 'New Zealand CO Rock and Pillar Ra. 1220 m 17 Dec 1994 B.H. Patrick / IV42557 / genitalia ♂ on slide RJBH prep. IV 42557' (OMNZ). Paratypes: 3 males, same data as holotype, with OMNZ database numbers IV42555, 42556 and 42558 (42556 with genitalia preparation on slide).

Distribution. (Map 6). Rock and Pillar Range, Central Otago, only.

— / CO

Biology. Unknown.

Flight period. December.

Etymology. The species name *schistella* derives from the forewing coloration, similar to that of the schist tors for which the Rock and Pillar Range is named. The diminutive ending *–ella* refers to the species' small size compared to its relatives.

Remarks. In its dark grey and white coloration, *Ichneutica schistella* resembles *I. cana*, but details of wing pattern and genitalia show that it is much more closely related to *I. eris*. This Rock and Pillar Range population is accorded species status separate from *Ichneutica eris* based on minor differences in the male genitalia, and more substantial differences in the wing pattern and size as compared to known populations of *eris*. The Rock and Pillar Range is a significant area of narrow-range endemism for Lepidoptera: a large, undescribed species of *Pseudocoremia* (Geometridae: Ennominae) and an undescribed species of *Dasyuris* (Geometridae: Larentiinae) are both known only from this mountain range (specimens in NZAC, OMNZ).

7. *Ichneutica notata* Salmon, 1946 E

Figs 7a–c (adults); 7d–f (male abdominal base and genitalia); 7g–i (female S7 and genitalia).

Ichneutica notata Salmon, 1946. *Dominion Museum (New Zealand) records in entomology 1*: 1–3.

Diagnosis. The greenish tinge to the forewing caused by the very even scattering of yellowish scales distinguishes *Ichneutica notata* externally from *I. eris* and *I. marmorata* (see also under *I. marmorata*), and from most specimens of *I. cana*. Some *Ichneutica cana* have a greenish hue, but these lack the distinct pale claviform stigma that is present in *I. notata*.

Description. Adult (Figs 7a–c). Wingspan 34–41 mm (male); 47 mm (female). Male antennae with pectinations to apex, pectinations up to *ca* 7–8x width of flagellum. Head and thorax with admixture of blackish brown and whitish scales, often appearing greenish grey to naked eye; tegulae often paler. Forewing appearing greenish brown, outlines of stigmata and scalloped antemedian and postmedian lines more or less distinctly picked out in yellowish white; reniform stigma transverse; claviform present, distinct; area distad of postmedian line often suffused whitish, especially along veins; yellowish scales scattered evenly over entire wing; veins not darkened; fringe brownish, weakly chequered whitish. Hindwing grey, with indistinct postmedian line and weak pale line beyond; a pale dash at tornus parallel to wing margin; fringe greyish, very indistinctly chequered. Underside: dark greyish brown, paler towards forewing termen and on hindwing; forewing with reniform indistinct, pale-outlined, postmedian line distinct only towards costa; hindwing with distinct discal dot and postmedian line. Abdomen ochreous variably mixed grey-brown. Male abdominal base (Fig. 7d) without brushes, levers or pockets; strongly reduced A3 apodemes present. Male genitalia (Fig. 7e): As described above for *I. cana*, but valva apex with smaller field of spinose setae, clasper more strongly curved, phallus (Fig. 7f) considerably smaller, vesica much shorter and with shorter strip of cornuti. Female S7 as in Fig. 7g. Female genitalia (Figs 7h, i): ovipositor lobes very large, elongate dorso-ventrally, bluntly squared off (longest setae medium length); segment 8 with very few medium-length setae dorsally in single row, forming indistinct caudal band; ostium very shallow cup-shaped, dorsal desclerotised ridges obsolete, no scobinations in this position observed; lateral pockets apparently absent (but only preparation examined is inflated, so may be obscured); ductus bursae short, more or less smoothly sclerotised to junction with appendix + corpus bursae; appendix rugose and membranous, sclerotised and rugose where joins corpus bursae; corpus bursae small, rugose, signa absent.

Type material. Lectotype (here designated): male, 'MT PEEL (NELSON) 28/12/12 / Museum Coll. Coll. A. Hamilton / Ichneutica notata Det. J.T. Salmon ♂ Type [a red dot affixed to upper right hand corner of this label]' (MONZ) (examined, not dissected).

Note. In his description of *notata*, Salmon (1946) notes that a male *Ichneutica* collected by A. Hamilton on Mt Peel in 1910 was incorrectly identified as *lata* in the Dominion Museum collection and subsequently depicted and described as the male of that species by Hudson (1928: p. 51 and pl. VI fig. 23). He describes *notata* based on this male and a female specimen captured by himself at Homer FD. The Mt Peel specimen was treated as the holotype by Dugdale (1988: 206), who incorrectly gave the sex as female, and by Palma *et al.* (1989) who correctly gave it as male. However, no holotype designation was made in the original paper, so the specimens are syntypic. The male from Mt Peel hitherto regarded as holotype is designated lectotype here to stabilise nomenclature and avoid the need to erect a new name, in view of the fact that the female syntype from Homer is a specimen of *I. marmorata*. *Ichneutica notata* is only known from the centre and north-west of the South Island and not from Fiordland.

The date of capture of the male given in the original description by Salmon is 28 Dec 1910. The final digit of the date on the label is in fact ambiguous: it appears that a '0' and a '2' have been superimposed, but it is hard to tell which was written first. I have given 1912 as the year, since the superimposed digits have both been written in ink over an earlier version of the date in pencil, and the latter appears to read '12'.

Distribution. (Map 7). Apparently very local; perhaps overlooked, but only recorded from north-west Nelson, the Paparoa Range (Buller), the Rainbow ski-field area on the border of Nelson and Marlborough, and the Craigieburn Range, Canterbury (see Remarks below).

— / NN, BR, MC

Biology. The life history has not been documented, but Dugdale (1967) briefly mentions the collection of pupae of *Ichneutica notata* in 'depleted swards' together with those of *I. ceraunias* and '*I. lata*' (i.e. *I. eris*). Voucher material is in FRNZ: there are 4 males and 3 females, all reared from pupae in bare soil collected at Camp Creek, Craigieburn Range MC by P.S. Crowhurst from 5–8 Dec 1966.

Flight Period. Late November to early January.

Remarks. This alpine species appears to be very restricted in distribution and is poorly represented in collections. *Ichneutica notata* is perhaps the north-western counterpart of *I. cana*; the male genital capsule is very similar in these two species. However, *notata* has a much smaller phallus and shorter vesica.

III. *Ichneutica nullifera* group

Diagnosis. Male abdominal base without brushes, levers or pockets; A3 apodemes present, often reduced. Uncus strap-like (*nobilia* only) or pointed; valva oblong to strongly sinuous; cucullus barely differentiated; claspers symmetrical, narrow to broad, without transverse lamellae; apical setae of valva not forming distinct 'crest'; dorso-apical hooked seta of corona absent; vesica not strongly elongated; cornuti not reduced, cornutal strip not interrupted.

Remarks. This group may well represent a paraphyletic assemblage of species with character combinations intermediate between the traditional concepts of *Ichneutica* and *Graphania*.

Ichneutica agorastis subgroup

Diagnosis. Apex of valva very narrow, moderately rounded, lacking spinose setae, lacking corona; peniculus lobes rather deep, angular, causing tegumen to appear more or less hexagonal.

Remarks. The very close relationship of *Ichneutica agorastis* and *I. hartii* has been overlooked previously, and their former placement in separate genera was highly misleading. Indeed, even their recognition as separate species is perhaps debatable, as there seems to be some overlap of characters in the central North Island. There is a large male (wingspan *ca* 38 mm) in NZAC matching *I. agorastis* in the form of the uncus (not diamond-shaped) and valval costa (slightly convex): this was collected in the frost-flats 10 km SE of Rangitaiki TO on 11–12 Dec 1985 by J.S. Dugdale (NZAC genitalia slide Noct. 291). In antennal characters and wing colour the specimen is typical of *I. hartii*, and it has been placed very tentatively under *hartii* in NZAC in view of the lack of other records of *agorastis* from the North Island. Further sampling of this population is desirable to investigate its taxonomic status.

8. *Ichneutica agorastis* (Meyrick, 1887) new combination

Figs 8a–d (adults); 8e–g (male abdominal base and genitalia); 8h–j (female S7 and genitalia).

Mamestra agorastis Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 18.

Diagnosis. This species is very similar to the closely related *I. hartii* (only known from the North Island): differences are given below, under that species. It is also sometimes confused with *Ichneutica alopa* in collections. The male of *I. agorastis* (usually a smaller species than *alopa*) can be easily distinguished from that of *alopa* by the distinctly bipectinate antennae; the antennae are ciliate but not bipectinate in *I. alopa*. In both sexes of *I. alopa*, the antennal base is creamy white with scattered pinkish scales, and contrasts strongly with the head colour; in *I. agorastis*, there is a much denser concentration of pinkish scales on the antennal base that tend to form bands; because the head also has pale scales, the contrast between head and antenna is much less marked than in *I. alopa*. The forewing of *I. agorastis* has more distinct and paler crosslines than that of *alopa*, and the reniform stigma and subterminal line especially are much more distinct in *agorastis*. In specimens of *I. agorastis* in fresh condition, the mesothoracic crest is distinct and usually has at least some white scaling; in *I. alopa*, the thorax is almost unicolorous and there is no distinct crest. On the forewing underside, *I. agorastis* usually has the terminal area (beyond the subterminal line) distinctly demarcated and paler than the rest of the wing; there is no such demarcation in *I. alopa*.

Description. Adult (Figs 8a–d). Wingspan 32–41 mm (male); 29.5–37 mm (female). Male antennae bipectinate to *ca* 13–15 segments short of apex, pectinations up to just over 1x width of flagellum. Head and thorax chestnut to violet-red, with scales mostly unicolorous, some (especially in centre on mesothoracic crest) bicoloured, with broader white tips, rest narrow lamellate. Forewing pale to deep violet-reddish, many scales white-tipped; antemedian and postmedian lines rather indistinct, white, dark-edged mesally, scalloped; claviform stigma absent or present as U-shaped chestnut mark; orbicular and reniform stigmata outlined chestnut brown, with yellowish white inner border; area between antemedian and postmedian lines not darkened; subterminal line very indistinct, pale brown; terminal area occasionally slightly lighter than ground colour; series of dark subtriangular marks along termen present; fringe mottled light and dark brown. Hindwing grey brown, unmarked; dark line along termen absent; fringe pale brown with dark line. Underside: forewing dark brown, paler towards termen (the demarcation corresponding to subterminal line on upperside), reniform indistinct, with series of small dark subtriangular marks along termen; hindwing brownish white, mottled darker towards costa and termen, with distinct discal spot; postmedian line variably distinct. Abdomen pinkish grey; hair-scales at base paler; apically with yellow and pinkish mottled scales in both sexes. Male abdominal base (Fig. 8e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 8f): uncus rather narrow, pointed, hooked; valva oblique, strongly sinuous, apex bluntly rounded without spine-like setae, without corona, but with a few scattered, long setae arising from distinct sockets; clasper very robust, weakly curved, usually overlapping valval dorsum; ampulla usually digitate, sometimes shorter, subtriangular; phallus (Fig. 8g) with subapical tooth absent; vesica forming complete loop; cornuti moderately long and in a single band basally, becoming distinctly shorter about 2/3 of way along band, beyond this weakly divided into two strips with rather longer cornuti in one strip, with very small fine cornuti between. Female S7 as in Fig. 8h. Female genitalia (Figs 8i, j): ovipositor lobes blunt, subtriangular; segment 8 with very fine rather short setae dorsally, forming indistinct band; ostium with dorsal desclerotised ridges rather short and inconspicuous; lateral pockets short; ductus bursae long, smoothly sclerotised to near junction with corpus bursae where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve more weakly sclerotised, rugose; corpus bursae with pair of elongate scobinate signa; ventral signum small and inconspicuous, barely ridged, dorsal signum much larger and distinctly ridged.

Type material. Lectotype: male, 'Lectotype [yellow-ringed circular label] / L. Guyon New Zealand R.W.F. 3/71 / agorastis Meyr. / Mamestra agorastis Meyr. 5/1 E. Meyrick det. in Meyrick Coll. / lectotype ♂' [per JSD] (NHMUK) (examined, not dissected).

Note. *Mamestra agorastis* was described from three specimens of both sexes from Lake Guyon and Akaroa in the collection of R.W. Fereday (Meyrick 1887); no holotype was designated in the description so the series is syntypic. The lectotype designation mentioned by Dugdale (1988: 202) by 'an unknown designator' is apparently unpublished and therefore not valid; Dugdale is taken to have designated the lectotype under ICZN Article 74.5. The two paralectotypes appear to be lost: they were not found in NHMUK or in Fereday's collection in CMNZ.

Distribution. (Map 8). Throughout the South Island and Stewart Island; not confirmed from the North Island (see Remarks).

— / NN, BR, WD, MB, NC, MC, SC, MK, OL, CO, DN, FD, SL / SI

Biology. The life history is unknown.

Flight period. January to April.

Remarks. *Ichneutica agorastis* is a widespread and often common species of South Island tussock grasslands and other open habitats, chiefly in the subalpine zone, but occurring down to sea level in Southland. White (2002) notes that in the Ben Ohau Range MK the species was particularly common at a string bog site. Hudson (1928) records the species from Wellington, but I have not seen specimens from this region and the record requires confirmation, since the very similar *I. hartii* was only known to Hudson from the type specimen (Hudson, *loc. cit.*; pl. IX fig. 16) and he had not seen the larger forms of *hartii* from the central North Island that closely approach *I. agorastis* in coloration and size. See also Remarks on the *I. agorastis* subgroup above.

9. *Ichneutica hartii* (Howes, 1914) new combination

Figs 9a–c (adults); 9d–f (male abdominal base and genitalia); 9g–i (female S7 and genitalia).

Leucania hartii Howes, 1914. *Transactions and proceedings of the New Zealand Institute 46*: 95.

Diagnosis. *Ichneutica hartii* is very similar to its close relative *I. agorastis*. Most populations can be distinguished by their smaller size (33 mm wingspan or less, cf. 32–39 mm in *agorastis*) and the more distinctly purplish or lilac rather than reddish tinge to the forewing (caused by an overlay of silvery white scales), but some central North Island specimens of *hartii* approach *agorastis* in size and colour. The pectinations on the male antennae are slightly shorter in *I. hartii* (less than 1x width of flagellum, cf. over 1x in *I. agorastis*) and usually stop further from the antennal apex (15–20 segments short of apex, cf. 13–15 in *agorastis*). In the male genitalia, *I. hartii* is distinguished by the broad diamond-shaped uncus (uncus narrow in *agorastis*) and by the shape of the valval costa, which is concave or straight beyond the costal bend (gently convex in *agorastis*); in the female genitalia the signa are distinctly smaller than in *agorastis*. The two species are currently thought to be allopatric, but this requires confirmation (see Remarks on *agorastis* subgroup above).

Description. Adult (Figs 9a–c). Wingspan 29–33 (central North Island 34–38) mm (male); 32.5 mm (female). Male antennae weakly bipectinate to *ca* 15–20 segments short of apex, pectinations up to just under 1x width of flagellum. Head and thorax deep violet-reddish, with scales mostly bicoloured, some (especially in centre) with broader white tips, rest narrow lamellate. Forewing deep violet-red, with more or less intense overlay of white scales giving lilac shade; antemedian and postmedian lines indistinct, weakly scalloped, picked out in violet-red against whiter background; claviform stigma weak, U-shaped, or absent; orbicular and reniform stigmata picked out in darker scales, somewhat indistinct, but orbicular ringed interiorly with pale scaling and reniform with distinct whitish outer curve; area between antemedian and postmedian lines sometimes weakly darkened, especially between orbicular and reniform stigmata; subterminal line very indistinct; terminal area not paler than ground colour; indistinct series of dark subtriangular marks along termen; fringe violet-brown, paler basally. Hindwing grey-brown, with weak discal spot and otherwise unmarked; dark line along termen present, sometimes only weakly darker than rest of wing; fringe brown, sometimes reddish-tinged. Underside: forewing greyish, often paler towards termen (the demarcation corresponding to subterminal line on upperside), reniform and postmedian line towards costa usually moderately distinct; a series of dark subtriangular marks along termen; hindwing whitish mottled grey and often suffused pinkish towards costa and termen, discal spot distinct, postmedian line variably distinct. Abdomen whitish brown, mottled with violet-grey or silver-grey scales, and tipped with reddish-tinged scales. Male abdominal base (Fig. 9d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 9e, f): uncus strongly broadened at mid-length, tapering to blunt apex, not hooked; valval costa tending to be straight to slightly concave towards apex; otherwise not distinguished from those of *I. agorastis*, q.v. Female S7 as in Fig. 9g. Female genitalia (Figs 9h, i): very similar to those of *I. agorastis*, q.v., except dorsal signum of corpus bursae shorter than in *agorastis* and ventral signum further reduced and almost obsolete.

Note. Males from some parts of the central North Island (Tongariro National Park and Rangitaiki frost flats; wingspan measurements in brackets) are distinctly larger than those examined from elsewhere.

Type material. Holotype: male, 'Cape Egmont lighthouse TK, 20 Apr 1911, S. Hart' (data from Early & Gilbert 1993: 70) (AMNZ) (examined, not dissected).

Note. Howes (1914a) described *Leucania hartii* from a single specimen, stated to be female (cf. Dugdale 1988: 209). Hudson (1928: 54 and plate IX fig. 16) redescribed and figured the species from the type specimen,

lent to him by Howes; Hudson gave the sex as male. The specimen was presumed lost by Dugdale (1988: 209), who could not locate it in MONZ, but it was later rediscovered in AMNZ (Early & Gilbert *loc. cit.*). It is indeed a male; the date on the label does not conform exactly with that in the original description (20 Mar 1911), but there is no doubt from Hudson's figure and from the collector and locality that this is the holotype.

Distribution. (Map 9). North Island only; widespread and probably under-recorded.

ND, AK, BP, TK, TO, RI, WN / —

Biology. Unknown.

Flight period. Mostly February to March, with a single January record from the Orongorongo Valley WN.

Remarks. Until recently, *I. hartii* was poorly represented in collections, but since 2000 it has been found quite commonly in late summer in lowland native forest in the eastern Auckland district (Albany and Hunua Ranges), and many specimens were light-trapped by A. Forbes in February 2011 in the eastern Ruahine Range RI (near Moorcock Saddle) at *ca* 800 m a.s.l. It is also known from west Auckland (Titirangi), Mt Te Aroha BP and the central North Island (Tongariro National Park and surrounding areas). Recent specimens from all these localities are in NZAC. Only a single Northland specimen is known: this is a specimen from Waipoua Forest collected on 4–5 Feb 1975 by R. Blank, and now in LUNZ.

Ichneutica purdii subgroup

Diagnosis. Apex of valva moderately narrow, rounded, spinose setae and/or corona present; peniculus lobes usually rather shallow and rounded, tegumen more or less triangular to trapezoidal.

10. *Ichneutica chryserythra* (Hampson, 1905) new combination

Figs 10a–g (adults); 10h–j (male abdominal base and genitalia); 10k–m (female S7 and genitalia).

Morrisonia chryserythra Hampson, 1905. *The Annals and Magazine of Natural History (seventh series) 15*: 452.

Diagnosis. *Ichneutica chryserythra* is rather distinctive in the violet-reddish coloration of the thorax and forewing (fading to tawny in older museum specimens), and in the lack of dark edging to the forewing cross-lines and stigmata. Dark forms of *chryserythra* may resemble some forms of *I. marmorata* but *marmorata* always has distinct dark edging to these forewing markings. Antennal pectinations in male *chryserythra* reach to *ca* 5–8 segments short of the apex; in *marmorata* they reach to 2–3 segments from the apex. *Ichneutica sericata* is often similar in forewing colour to *chryserythra*, but is a smaller species and has much larger stigmata (often including a large V-shaped claviform), and a conspicuous W-shaped evagination in the subterminal line. *Ichneutica fenwicki*, usually a darker species, also has larger stigmata than *chryserythra*, and these are dark-edged; *fenwicki* is also distinguished by the rather strong blackish spotting along the subterminal forewing line and by the male antennae, whose pectinations reach only to 13–15 segments short of the apex.

Description. Adult (Figs 10a–g). Wingspan: 40–43 mm (male); 48–49 mm (female). Male antennae bipectinate to *ca* 5–8 segments short of apex; pectinations up to *ca* 4x width of flagellum; a tuft of white scales beneath base of antenna and anterior scaling of first few segments white. Head and thorax violet-reddish, with many scales tipped white, scales very narrow lamellate. Forewing violet-reddish (fading to tawny in older specimens), sometimes infuscated dark greyish around disc and along vein 1+2A; antemedian line whitish, irregular; claviform present as a very small V- or U-shaped black mark; orbicular round, outlined black or tawny brown and with interior outline of whitish; reniform C-shaped to weakly S-shaped, pattern as for orbicular; postmedian line zigzag, white, but often very indistinct; broken subterminal line of black or brown interiorly, white exteriorly, often indistinct; terminal area often slightly darker than ground colour; termen unmarked; fringe concolorous with wing, not chequered. Hindwing pale yellowish brown to greyish brown, unmarked. Underside: uniform blackish grey, tinged reddish towards costa of both forewing and hindwing, unmarked except for faint pale indication of reniform stigma on forewing. Abdomen yellow-brown, diffuse transverse bands of violet-reddish; basally with many whitish pink hair-scales. Male abdominal base (Fig. 10h) without brushes, levers or pockets; strongly reduced A3 apodemes present. Male genitalia (Fig. 10i): uncus blunt, not hooked, somewhat broadened in middle; valva upright, not sinuous, with costa moderately straight towards apex, apex bluntly rounded with corona not differentiated from broad field of spinose setae; clasper moderately robust, weakly curved and not reaching edge of valva; ampulla short, narrow, digitate; phallus (Fig. 10j) without subapical tooth; vesica with cornuti moderately short, in a single uninterrupted band. Female S7 as in Fig. 10k. Female genitalia (Figs 10l, m):

ovipositor lobes blunt, squared off; segment 8 with a few medium-length lateral setae, dorsally with rather long setae forming band along caudal margin; dorsal desclerotised ridges of antrum elongate, weakly raised, centrally finely scobinate; lateral pockets short; ductus bursae moderately short, smoothly sclerotised to *ca* 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve membranous, not or barely rugose; corpus bursae with pair of elongate, ridged, scobinate signa, ventral signum shorter.

Type material. Holotype: male, 'Type [circular label, ringed red] / N. Zealand Dunlop 1905-110 / Morrisonia chryserythra Hmpsn Type ♂ / Agrotidae genitalia slide 269' [per JSD] (NHMUK) (examined, including slide).

Note. Hampson (1905b) described both sexes of *I. chryserythra*, but clearly designated only the male as 'type', and stated that the female was in the Dunlop collection. The type locality is Orepuki SL, according to the original description. Hoare (2017: 12) incorrectly implied that the description of *chryserythra* is in vol. 5 of Hampson's *Catalogue of the Lepidoptera Phalaenae in the British Museum* (Hampson 1905a); it is in fact in *The Annals and Magazine of Natural History* (Hampson 1905b: see above). The correct reference is also omitted from Dugdale's (1988) catalogue.

Distribution. (Map 10). Southern South Island only.

— / WD, SC, MK, OL, CO, DN, FD, SL

Biology. The life history is unknown. An attempt to rear the species from eggs laid by a female caught in the Catlins, Southland, in December 2014 failed; young larvae were offered a range of small herbs from the forest floor but died within a few days without apparently having fed. It may be a monocot feeder.

Flight period. November to January.

Remarks. *Ichneutica chryserythra* is another local species, often of open habitats at higher elevations, but occurring down to sea-level in Southland at Orepuki (the type locality), Tiwai Peninsula and in the Catlins. It may be common in certain localities in the Dunedin, Southland and Fiordland districts, for example Mt Cargill DN, but is absent from many drier areas, e.g. it was not recorded by White (2002) during his Mackenzie Basin tussock grassland surveys, and there are few records from Central Otago. Brian Patrick (pers. comm.) notes a possible association with copper tussock (*Chionochloa rubra cuprea*) grassland, but the moth also occurs inside dense podocarp forest in the Catlins. The female is poorly represented in collections, and the female wingspan range is probably much greater than that given here from the few specimens examined.

11. *Ichneutica falsidica* (Meyrick, 1911) new combination

Figs 11a–g (adults); 11h–l (male abdominal base and genitalia); 11m–o (female S7 and genitalia).

Hyssia falsidica Meyrick, 1911. *Transactions and proceedings of the New Zealand Institute 43*: 70.

Hyssia hamiltoni Hampson, 1913. *The Annals and Magazine of Natural History (eighth series) 12*: 594. Synonymised by Hudson (1928: 56), treated as subspecies of *Aletia falsidica* by Dugdale (1988: 199). **Reinstated synonymy.**

Diagnosis. *Ichneutica falsidica* closely resembles the more strongly marked forms of *I. panda* in its usually variegated forewing pattern, but *panda* has shorter pectinations on the male antennae (1.5x flagellum width, cf. 2x in *falsidica*). In *I. falsidica*, there is usually a series of dark dashes along the hindwing termen; these are absent or very indistinct in *I. panda*. In the male genitalia, the robust uncus of *I. falsidica* is a good diagnostic character; *panda* has the uncus about half the width of that in *falsidica*. *Ichneutica panda* is usually a distinctly smaller species than *I. falsidica* (especially in the male), but there is some overlap in wingspan in the females.

Description. Adult (Figs 11a–g). Wingspan 37–42 mm (male); 40–44 mm (female). Male antennae bipectinate to *ca* 8–13 segments short of apex, pectinations up to *ca* 2x width of flagellum. Head and thorax variably whitish brown to greyish, with scales bicoloured or tricoloured, hairlike to very narrow lamellate; prothorax often with distinct yellowish brown tinge; dark transverse bar usually absent or indistinct, occasionally fairly distinct. Forewing silvery grey to variegated black and silvery white; antemedian line irregular with strong indentation basad on vein 1A+2A; postmedian line rather regularly scalloped; claviform stigma present or absent; orbicular stigma round, usually infilled whitish; reniform more or less S-shaped, often with inner border of dark scales; area between antemedian and postmedian lines patchily darkened and contrasting with exterior areas in variegated specimens; terminal area silvery whitish and more or less strongly contrasting with adjacent dark subterminal area; series of dark subtriangular marks along termen; fringe chequered light and dark brown; in some specimens forewing with suffusion of yellow scales giving greenish tinge. Hindwing grey, with indistinct postmedian line and pale area beyond; dark line along termen present or absent; fringe pale brownish white.

Underside: forewing pale ochreous to grey or dark grey with terminal area and dorsum paler; reniform and costal half of postmedian line faint to moderately distinct; hindwing pale ochreous to whitish or greyish ochreous, irrorated darker towards costa and with more or less distinct discal spot; postmedian line usually distinct at least in costal half, but sometimes very faint. Abdomen pale brown, contrasting with greyer thorax. Male abdominal base (Fig. 11h) without brushes, levers or pockets; reduced A3 apodemes present. Male genitalia (Figs 11i, k): uncus moderately robust, pointed, very weakly hooked; valva upright, weakly sinuous, cucullus not differentiated, apex bluntly rounded with weak corona of ca. 15–17 elements in a single row, no field of spinose setae (setae hairlike); clasper moderately robust, gently curved; ampulla long, digitate; phallus (Figs 11j, l) with or without minute subapical tooth; vesica with cornuti moderately long, in single uninterrupted band. Female S7 as in Fig. 11m. Female genitalia (Figs 11n, o): ovipositor lobes blunt, squared off; segment 8 with few to numerous medium-length setae laterally, setae either very sparse dorsally and not forming caudal band or forming narrow caudal band; ostium with long raised dorsal desclerotised ridges and moderately short lateral pockets; ductus bursae long, smoothly sclerotised to near junction with corpus bursae where rugose; inner curve of appendix bursae moderately well sclerotised and rugose, outer curve more or less membranous and strongly rugose; corpus bursae variably rugose, without signa.

Type material. *Hyssia falsidica*: Holotype: female, 'Type [circular label, ringed red] / Mt Arthur New Zealand GVH 2.10 / falsidica Meyr. / Holotype ♀ / Hyssia falsidica Meyr. 4/4 E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Hyssia falsidica* was described from a single female specimen (Meyrick 1911).

Hyssia hamiltoni: Lectotype: male (here designated), 'Type [circular label, ringed red] / New Zealand, Wellington 8.II.1910 1912-226 / Hyssia hamiltoni Hmpsn Type ♂ / Agrotidae genitalia slide no. 357' [per JSD] (NHMUK) (examined, including slide).

Note. *Hyssia hamiltoni* was described from one male and one female. Dugdale (1988: 199) gives 'HT ♂ designated by Hampson', but there is no such designation in the original description. Hampson used the term 'type' in the singular after stating the number of specimens of each sex on which his descriptions were based, and so no valid holotype designation can be construed from his descriptions of multiple specimens (ICZN Article 73.1). The male is designated as lectotype here, since this specimen has been treated as the primary type and has been dissected. The type locality is the Tararua Range WN, not Wellington as stated on the label and in the description by Hampson (cf. Hudson 1928: 56; Dugdale 1988: 199).

Note on synonymy. *Hyssia hamiltoni* has been treated variously as a synonym of *falsidica* (Hudson 1928) or as a North Island subspecies *falsidica hamiltoni* (Dugdale 1988). Few specimens from the type locality are available for study, but from an examination of the male genitalia of the holotype, it appears to differ from 'typical' *falsidica* only in the narrower valvae. This form of variation also occurs within South Island populations assigned to *falsidica*, and most other species in this subgroup (i.e. *Ichneutica fibriata*, *I. panda* and *I. purdii*, qqv.) also vary in valva width. Since no other characters in the wing pattern or antennae support the recognition of an additional species, the valva character is not accorded any weight here, and *hamiltoni* is regarded as a synonym of *falsidica*.

Distribution. (Map 11). In the North Island, Mt Taranaki and Tararua Ranges only; widespread in the South Island, predominantly in the west.

TK, WN / NN, WD, MB, NC, MC, OL, CO, FD

Biology. The life history is unknown. The adults sometimes fly in sunshine by day (Hudson 1928); later they come to light at night, sometimes in numbers.

Flight period. January to March.

Remarks. This is often a common species in the alpine zone of the South Island, but never appears to have been reared. It shows considerable variation in forewing colour and patterning. In the North Island, it is well known from the Tararua Ranges WN, but not from the central volcanic plateau (TO: Tongariro National Park and environs). Fox (1970a) did not record this species from Mt Taranaki (TK) despite extensive collecting of Noctuidae there, but there is a single female in NZAC labelled 'Egmont 28.2.30' and this record is accepted here. Likewise, White (1991, 2002) did not record this species at all in his extensive light-trapping studies in Canterbury and Mackenzie tussock grasslands.

12. *Ichneutica fibriata* (Meyrick, 1913) new combination

Figs 12a–c (adults); 12d–i (male abdominal base and genitalia); 12j–l (female S7 and genitalia).

Aletia fibriata Meyrick, 1913. *Transactions and proceedings of the New Zealand Institute 45*: 22.

Aletia fibrata Meyrick, 1914. *Transactions and proceedings of the New Zealand Institute 46*: 101. Unjustified emendation.

Aletia (?) lata Philpott, 1915. *Transactions and proceedings of the New Zealand Institute 47*: 192. **New synonymy.**

Diagnosis. *Ichneutica fibriata* can usually be recognised at a glance by its large size and rather uniform dull grey colour, lacking in the variegated lichen-like patterning of, e.g., *I. falsidica* and *I. panda*. In the male, the antennae have very long pectinations (up to 4 times the width of the shaft) and only the last 3–4 segments non-pectinate; this is diagnostic within this species group. Differences from the very similar *Ichneutica eris* are given under that species, above. In the male genitalia, the strong field of apical spine-like setae that tend to obscure the corona is diagnostic amongst the greyish species of this subgroup.

Description. Adult (Figs 12a–c). Wingspan 38–46 mm (male); 46–48.5 mm (female). Male antennae bipectinate to 3–4 segments short of apex, pectinations up to *ca* 4x width of flagellum. Head and thorax light to dark brownish grey, with scales bicoloured, very narrow lamellate. Forewing dark grey to brownish grey, paler in female; antemedian line rather distinct, black, irregular (edged pale basally only in male from Lochnagar Ridge, Paparoa Range); postmedian line distinct, black, zigzag; claviform stigma very indistinct or absent; orbicular stigma indistinct to moderately distinct, small to large, round, outlined black; reniform indistinct to distinct, outlined black; area between antemedian and postmedian lines not darkened; subterminal line very indistinct; terminal area not paler than ground colour (except in male from Lochnagar Ridge, Paparoa Range); series of dark subtriangular marks along termen present; fringe concolorous. Hindwing greyish (paler than forewing), sometimes paler basally, either unmarked or with moderately distinct postmedian line and pale area beyond (especially in female); dark line along termen present; fringe greyish. Underside: forewing pale to mid-grey, postmedian line usually distinct, dark; reniform stigma indistinct; hindwing whitish more or less densely mottled grey, with distinct discal spot and postmedian line. Abdomen mottled whitish and brownish grey, paler basally (including hair-scales at base). Male abdomen (Figs 12d, g) without brushes, levers or pockets; A3 apodemes present, reduced (but see Remarks below). Male genitalia (Figs 12e, h): uncus broad, tapering to very blunt slightly hooked apex; valva rather oblique, weakly sinuous, apex / cucullus bluntly rounded with well developed corona of ca. 15–19 elements poorly differentiated from field of spinose setae; apico-dorsal strong hooked seta separate from corona absent; clasper robust, weakly curved; ampulla rather short, digitate to thumb-shaped; phallus (Figs 12f, i) without subapical tooth; vesica with cornuti of moderate size, in single uninterrupted band. Female S7 as in Fig. 12j. Female genitalia (Figs 12k, l): ovipositor lobes blunt, rounded off; segment 8 with numerous medium to long setae laterally and more scattered setae dorsally, not forming distinct caudal band; ostium with dorsal desclerotised ridges rather short and narrow; lateral pockets short; ductus bursae of moderate length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve weakly sclerotised, rugose; corpus bursae without distinct signa but with indistinct scoboinate patch anteriorly.

Type material. *Aletia fibriata*: Lectotype (designated by Dugdale (1988: 199)): male, 'Lectotype [yellow-rimmed circular label] / Mt Richmond New Zealand FGG 4500′ 12.05 / fibrata Meyr. / Aletia fibrata Meyr. 5/1 E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Aletia fibriata* was described from two males (Meyrick 1913). The label data of the lectotype are quoted from John Dugdale's NHMUK notebooks in NZAC rather than from his catalogue (Dugdale 1988: 199), which gives a slightly different version (i.e., '*fibriata*' for '*fibrata*' and omitting the '*fibrata* Meyr.' accession label). The male paralectotype in NHMUK has the same locality data, collector and date, but this specimen has been dissected and bears the 'Agrotidae' genitalia slide number 363; this slide was examined by the author.

Note on nomenclature. Meyrick clearly intended the name of this species to be *Aletia fibrata*, and stated (Meyrick 1914: 101) that *fibriata* was a misprint; this correction is maintained by Hudson (1928: 55) who spells the name *fibrata*. However, according to ICZN Article 32.5.1, for an original spelling to be deemed incorrect, evidence of an inadvertent error must be contained in the original publication itself. Incorrect latinization or use of an inappropriate connecting vowel are not to be considered inadvertent errors: the insertion of the extra 'i' in '*fibriata*' would seem to fall into one (or both) of these categories. Any corrigendum by an author must be contained in the same volume of a work issued in parts or a journal (Article 32.5.1.1), which is not the case here; Meyrick's correction was published in the following volume. The name *fibrata* is therefore an unjustified emendation

according to ICZN Article 33.2. According to Article 33.2.3.1, when an unjustified emendation is in prevailing usage and attributed to the original author and date, it is to be deemed a justified emendation. However, since *fibriata* is the spelling adopted in Dugdale's (1988) New Zealand Lepidoptera catalogue, as well as in subsequent publications (e.g., Hoare 2010b) and in New Zealand collections and databases, this is considered the spelling in prevailing usage and maintained here. Dugdale (1988: 199) implies that *fibrata* was the original, misprinted spelling; this is incorrect.

Aletia lata: Lectotype (here designated): male, '7 10 [small rectangular printed label] / [red circular label] / HOLOTYPE [pink rectangular label] / Aletia lata, Ph. ♂ type / genitalia ♂ on slide R. Hoare prep. / fibriata Meyrick det. R. Hoare 2018' (MONZ) (examined, including genitalia). The uppermost printed label is of unknown significance.

Note on synonymy. *Aletia lata* was described from three specimens, a male and female from Vanguard Peak collected by H. Hamilton and F.S. Oliver in January, and a female from Bold Peak collected by C.C. Fenwick in December (Philpott 1915). Philpott stated that the Vanguard Peak specimens were in the Dominion Museum (now MONZ), but did not give a repository for the Fenwick specimen. Since he also stated 'Types (♂ and ♀) in coll. Dominion Museum', it can be reasonably assumed that the Fenwick specimen should be excluded from the syntype series (ICZN Article 72.4.6).

The male 'type' of *lata* was treated as the holotype by Dugdale (1988) and by Palma *et al.* (1989), and indeed bears a pink printed Holotype label; however, since no holotype was designated in the original description, which mentions two 'types', a male and a female (see above), these must be interpreted as syntypes (ICZN Article 73.1) and the mention of a holotype by Dugdale does not constitute a valid lectotype designation (Article 74.5). The two specimens are not conspecific: the male was dissected for this revision and shown to be a specimen of *Ichneutica fibriata*. The female (Fig. 5c) belongs to the species that has been incorrectly referred to as *cana* since the misinterpretation of that name by Howes (1943), described above as the new species *Ichneutica eris*. The male is designated lectotype here, since it has twice been treated as the primary type of *Aletia lata*—in publications by Dugdale (1988) and by Palma *et al*. (1989)—and appears as such on the MONZ online searchable database (https://collections.tepapa.govt.nz/). See also above, under *I. eris*.

Aletia lata was incorrectly synonymised with *Ichneutica cana* by Salmon (1946: 1), and this synonymy has been accepted since. Dugdale (1988: 205), while following the synonymy, states that it was arrived at without examination of the type material: this needs qualifying, since Salmon (*loc. cit.*) explicitly states that he examined the types of *lata* in the then Dominion Museum (MONZ). On the other hand, he surely did not see the type of *cana*, which he would probably have recognised as identical to *homerica*. Neither Salmon nor Dugdale recognised that the type specimens of *lata* belonged to two different species.

Hudson (1928: 51) stated that he was figuring the type specimens of *Ichneutica lata* on his plate VI, but the male he figures (fig. 23) is a specimen of *Ichneutica notata* Salmon (see under that species above; cf. Hudson 1950) and does not correspond with the lectotype of *I. lata* at all. His figure of the female (fig. 24) matches the paralectotype of *lata* well, so represents *I. eris*. Later Hudson (1950: 75, under *Ichneutica cana*) stated that this female was in poor condition and that his figure should be cancelled; he provided a new figure from a specimen lent to him by Howes (*loc. cit.*: pl. VIII, fig. 6). However, the paralectotype of *lata* is in fact in almost perfect condition apart from some wear along the veins, and the new figure does not seem to represent the same species, but perhaps a variety of *I. cana* (i.e. *homerica* in the sense of Hudson); the illustrated specimen has not been located in MONZ.

Distribution. (Map 12). Mainly from the eastern South Island, with a single record from the west (Paparoa Range BR: see Remarks below). The lectotype of *Aletia lata* is the only specimen known from the Otago Lakes district; the record is tentatively accepted here, but in view of the lack of a locality label on the specimen, there is a possibility that the locality is in error.

— / BR, MB, KA, NC, MC, SC, MK, OL

Biology. The life history is unknown.

Flight period. November to January.

Remarks. *Ichneutica fibriata* is a little known alpine species that is rare in collections. There is variation in the shape of the valva and in the form of the ampulla (Figs 12e, h) in the few specimens dissected. In particular, the single specimen from Lochnagar Ridge, Paparoa Range BR has a rather broad valva and broader ampulla (see Fig.

12e) than other specimens (including the paralectotype male in the NHMUK), and seems to have the A3 apodemes at the base of the abdomen less strongly reduced (Fig. 12d). This specimen also has a more variegated wing pattern than others, as detailed in the description above. Without further material to assess the range of variation, I have identified this specimen as *fibriata* based on the male antennal characters and the features of the valval apex, which provide an inclusive definition of the species.

13. *Ichneutica panda* (Philpott, 1920) new combination

Figs 13a–g (adults); 13h–m (male abdominal base and genitalia); 13n–p (female S7 and genitalia).

Aletia panda Philpott, 1920. *Transactions and proceedings of the New Zealand Institute 52*: 42.

Aletia argentaria Howes, 1945. *Transactions of the Royal Society of New Zealand 75*: 66. **New synonymy.**

Diagnosis. Differences from *Ichneutica falsidica* are given under that species, above.

Description. Adult (Figs 13a–g). Wingspan 31–36 mm (male); 30–41 mm (female). Male antennae bipectinate to *ca* 10–13 segments short of apex, pectinations up to *ca* 1.5x width of flagellum. Head and thorax pale to dark greyish, with scales mostly bicoloured, very narrow lamellate; prothorax often with distinct yellowish tinge posteriorly and with more or less distinct dark transverse bar (cf. *falsidica*); tegula with (strongly marked form) or without (weakly marked form) dark edging. Forewing silvery grey, variegated black and with variable admixture of yellow scales, more extensive towards dorsum where present; antemedian and postmedian lines indistinct to distinct, pale silvery grey; claviform stigma variably developed as a round to oblong silvery mark, bordered black, sometimes absent; orbicular and reniform stigmata either very distinct, clear silvery white, outlined blackish, and sometimes including an inner border of yellowish scales, or less distinct, silvery grey; usually a rather distinct serrate dark median line crossing wing tangential to reniform; toothed subterminal line picked out in alternating patches of silvery and yellowish scales, variably distinct; terminal area greyish to silvery whitish and more or less strongly contrasting with adjacent dark subterminal area; series of dark subtriangular marks along termen, often indistinct or absent; fringe grey to brown, more or less distinctly light-chequered. Hindwing grey, without distinct markings, dark dashes along termen absent or indistinct. Underside: forewing pale silvery grey, unmarked; hindwing whitish, variably sprinkled brown exteriorly, with faint to distinct discal dot. Abdomen pale brown to greyish brown, contrasting with greyer thorax. Male abdominal base (Figs 13h, k) without brushes, levers or pockets; strongly reduced A3 apodemes present. Male genitalia (Figs 13i, l): uncus narrow, pointed, not hooked; valva upright, sinuous, apex bluntly rounded to weakly angled with variably distinct corona of ca. 8–18 elements in a single row; field of spine-like setae absent; apico-dorsal strong hooked seta separate from corona absent; clasper moderately robust, weakly curved; ampulla moderate to long (reaching to near costa, to costa or beyond), digitate (not or weakly curved); phallus (Figs 13j, m) with subapical tooth absent or present, very reduced; vesica with cornuti rather long, in single uninterrupted band. Female S7 as in Fig. 13n. Female genitalia (Figs 13o, p): ovipositor lobes blunt, squared off; segment 8 without lateral setae, dorsally with setae of various lengths forming band in caudal half; dorsal desclerotised ridges of antrum elongate; lateral pockets short; ductus bursae moderately short, dorsoventrally sinuous, smoothly sclerotised to *ca* 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve weakly sclerotised, rugose; corpus bursae without signa.

Type material. *Aletia panda*: Lectotype: male (here designated), '894a / Aletia panda ♂ type' [corresponding entry in Hudson register: 'Mt Earnslaw Jan 1914'] (MONZ) (examined, not dissected).

Note. Philpott (1920) described *Aletia panda* from two specimens, a male and a female. The male collected by Hudson on Mt Earnslaw has been regarded as the holotype (Dugdale 1988: 200). The female (from Routeburn, collected on 19 Dec 1918) is in NZAC and was labelled 'Allotype' by Philpott. However, there is no mention of a holotype in the original description, so the specimens must be regarded as syntypes (ICZN article 73.1), and Dugdale's mention of a 'holotype' does not constitute a valid lectotype designation (ICZN article 74.5). The species is not listed in the catalogue of primary types in MONZ by Palma *et al.* (1989), and the male was not photographed by John Dugdale during his attempt to catalogue and image all primary types of New Zealand Lepidoptera, but nonetheless it is present in the Hudson collection, where it is the only specimen under this name (pers. obs. 2018). I here designate the male as lectotype to prevent confusion and preserve stability of nomenclature.

Aletia argentaria: Holotype: male, 'Wilderness 5/1/41 / ALETIA ARGENTARIA TYPE G. HOWES / MONZ Noctuidae genitalia ♂ on slide RJBH prep. 2013' (MONZ) (examined).

Note on synonymy. *Aletia argentaria* was described from a single male from The Wilderness, Southland (Fig. 13e). This was dissected during the course of this revision. Externally and in genitalia, this specimen is indistinguishable from specimens collected more recently from Mt Cook Village (NZAC, BLNZ) and Godley River MK (NZAC, BPNZ). The name *panda* refers to larger specimens with a more strongly variegated forewing pattern from the alpine zone of Fiordland and Otago Lakes (Figs 13a–c, f); the *argentaria* form is on average smaller and has a more unicolorous forewing with a less contrasting pattern. However, the wingspan range of the two forms overlaps, and there are no observable constant differences in male or female genitalia or in antennae. The forewing pattern is also variable and does not provide sufficient characters for recognising two species; therefore *argentaria* is here synonymised with *panda*.

Distribution. (Map 13). Central and southern South Island.

— / WD, NC, MK, OL, CO, FD, SL

Biology. The life history is unknown.

Flight period. December to February.

Remarks. *Ichneutica panda* appears to be a very locally common species of subalpine and alpine shrublands, including river terrace shrublands. Only two specimens have been seen from Canterbury (both in NZAC, from Arthur's Pass and nearby Bealey River, collected in 1958 and 1959), and it has not been rediscovered at The Wilderness SL, where the holotype of *Aletia argentaria* was taken in 1941.

14. *Ichneutica purdii* (Fereday, 1883) new combination

Figs 14a–d (adults); 14e–i (male abdominal base and genitalia); 14j–l (female S7 and genitalia); L14 (larva).

Leucania purdii Fereday, 1883. *Transactions and proceedings of the New Zealand Institute 15*: 195–196.

Diagnosis. Although somewhat variable, *Ichneutica purdii* is an unmistakeable species: the combination of deep pinkish forewings with orange markings, usually including a conspicuous orange streak along the fold, white centre of the thorax and blackish brown hindwings, is diagnostic.

Description. Adult (Figs 14a–d). Wingspan 39–50 mm (male); 45–55 mm (female). Male antennae subpectinate / weakly bipectinate to *ca* 22–28 segments from apex, pectinations up to *ca* 0.5x width of flagellum. Head and thorax bright orange to deep pinkish or purplish brown, centre of mesothorax white, bordered brown anteriorly and laterally, with scales unicolorous, narrow lamellate. Forewing purplish or pinkish brown, with dusting of white scales along main veins; base of costa sometimes orange; antemedian and postmedian lines absent; claviform stigma absent; orbicular and reniform stigmata orange, orbicular elongate, or both stigmata obscured by a broad orange streak in disc; more or less well defined and extensive orange streak along fold from base; other markings absent; fringe brown, paler distally. Hindwing dark grey-brown to blackish brown, unmarked; dark line along termen weakly indicated; fringe concolorous, paler basally. Underside: forewing blackish brown, usually suffused orange to pinkish brown along costa, otherwise unmarked; hindwing pale greyish, darker exteriorly, sometimes suffused pinkish towards costa, sometimes with discal spot and postmedian line rather faintly indicated. Abdomen grey brown, laterally and terminally yellow-brown. Male abdominal base (Fig. 14e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 14f, h): uncus slender, pointed, weakly hooked; valva upright to oblique, weakly sinuous, apex bluntly rounded with weak corona of ca. 12–20 elements poorly differentiated from field of spinose setae; clasper very robust, more or less broad-ended, curved (reaching near end of valva); ampulla long, digitate; phallus (Figs 14g, i) with small subapical tooth present; vesica forming complete loop; cornuti long, in continuous strip forking into two apically. Female S7 as in Fig. 14j. Female genitalia (Figs 14k, l): ovipositor lobes blunt, squared off; segment 8 with scattered groups of medium-length setae laterally, numerous medium-length setae dorsally forming wide caudal band; ostium bursae with dorsal desclerotised ridges well developed, elongate and scobinate; lateral pockets short; ductus bursae long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae moderately sclerotised and rugose, outer curve moderately sclerotised, weakly rugose; corpus bursae with a pair of scobinate ridged signa, dorsal signum longer.

Type material. Holotype: male, '16 [small square printed label] / Fereday Collection / HOLOTYPE ♂ Leucania purdii Fereday teste Dugdale / 2007.222.2493' (CMNZ) (examined, not dissected).

Note. *Leucania purdii* was described from a single specimen from Fairfield, Dunedin (Fereday 1883).

Distribution. (Map 14). Throughout the main islands of New Zealand.

ND, AK, CL, HB, TK, TO, WA, WN / NN, WD, MB, KA, NC, MC, SC, MK, OL, DN, FD, SL / SI

Biology. Larvae feed on the leaves of *Astelia* spp. (tank lilies) (Asteliaceae), including *A. hastata* (formerly assigned to *Collospermum*). Howes (1914b: 98) described the full-grown larva as follows: "about 48 mm in length... general colour ochreous with a pink flush. A double fuscous line dorsally, a fuscous line from base of eye [stemmata], marked with deep-fuscous marks at each segment." This description more or less corresponds with the larva shown in Fig. L14 (photograph by N.A. Martin, reared specimen in NZAC), which appears to have the pinkish coloration concentrated in a lateral line and around the intersegmental membranes. Howes noted that larvae feed at night, and have a habit of cutting out a portion of leaf and then clinging in the gap to feed, where their camouflage makes them hard to detect. The damage to *Astelia* leaves is often conspicuous. Pupation is in a slight cocoon in the soil (Howes, *loc. cit.*; Gaskin 1966a).

Flight period. October to March.

Remarks. This very distinctive moth is found throughout New Zealand from sea-level to over 1200 m. It seems relatively local and seldom common in northern forests, but has undoubtedly been overlooked in many areas; further south and at higher altitudes it is more frequent. The male genitalia appear to be quite variable in the width of the valva, the shape of the valval apex and the position of the ampulla, as can be seen from Figs 14f (a specimen from Fiordland) and 14h (a specimen from Taranaki). However, dissected males from Dunedin DN and Dart Hut OL (NZAC slides Noct. 529, 530) show intermediate characters, and the apparent difference in the ampulla position may be an artefact of preparation. There is no clear evidence that more than one species has been confused under this name.

Ichneutica nullifera subgroup

Diagnosis. Apex of valva broad, bluntly rectangular, spinose setae and corona present; peniculus lobes moderate to rather deep, angular, tegumen appearing more or less hexagonal.

15. *Ichneutica nobilia* (Howes, 1946) new combination

Figs 15a–c (adults); 15d–f (male abdominal base and genitalia); 15g–i (female S7 and genitalia).

Aletia nobilia Howes, 1946. *Transactions and proceedings of the Royal Society of New Zealand 76(2)*: 144–145.

Diagnosis. Large specimens of this species are unmistakeable. Worn specimens of *Ichneutica virescens* are occasionally misidentified as small *nobilia*, but *virescens* has a rather distinct scalloped blackish median line on the forewing and three small patches of blackish scaling just basad of the pale subterminal line, discernible even in worn specimens; *nobilia* lacks blackish forewing scaling and has at most a very indistinct subterminal line. *Physetica caerulea* (Guenée), which often has a similar forewing colour, is usually a much smaller species (wingspan up to 45 mm) than *nobilia*, and in most of its forms can also be recognised by the extensive pale yellow scaling of the underside. As noted by Hoare (2017), the male of *nobilia* has a short, unmodified third labial palp segment (that of *P. caerulea* is large and swollen), and long ciliations arising from rounded transverse ridges on the underside of the antenna (antennae not ridged and with minute ciliations in *P. caerulea*). Both sexes of *Ichneutica nobilia* have conspicuous white hair-scales overlying most of the forewing base; in *P. caerulea*, there is at most a tuft of yellowish scales overlying the dorsal half of the forewing base.

Description. Adult (Figs 15a–c). Wingspan 42–50 mm (male); 49–54 mm (female). Male antennae subpectinate / subserrate (i.e., broad raised transverse bands on underside of each segment barely projecting beyond shaft on each side), with long ciliations up to *ca* 1x width of flagellum. Head and thorax pale grey, with scales bicoloured, very narrow lamellate; head and prothorax often paler, with brownish tinge. Forewing shining slate grey with markings indistinctly picked out in cream to yellowish scales and giving greenish cast to the wing; basally with whitish hair-like scales contrasting with rest of wing; antemedian and postmedian lines broken into spots, indistinct, whitish; all three stigmata vaguely picked out in yellowish; subterminal line very indistinct or absent, terminal dots absent; fringe pale brownish. Hindwing pale to dark grey, unmarked, fringe white. Underside: ochreous to pale grey; forewing with indistinct reniform and postmedian line; hindwing with variably distinct discal spot and postmedian line. Abdomen pale grey, with some pale brown scales towards the apex of the segments. Male abdominal base (Fig. 15d) without brushes, levers or pockets; A3 apodemes present. Male

genitalia (Fig. 15e): uncus blunt, rather broad, oblong, not hooked; valva upright, very weakly sinuous, apical part of costa rather straight, apex broad, bluntly rectangular with narrow field of spine-like setae and well developed corona of *ca* 33–35 elements in a single row; clasper moderately robust, gently curved; ampulla long, weakly clavate, apex with 'pinched' appearance; phallus (Fig. 15f) with weak sclerotised apical tooth; vesica with cornuti long, in single broad uninterrupted strip. Female S7 as in Fig. 15g. Female genitalia (Figs 15h, i): ovipositor lobes blunt, squared off; (segment 9 rather extensile); segment 8 with scattered short to medium-length setae laterally and dorsally, not forming distinct caudal band; ostium with dorsal desclerotised ridges oblong, rather indistinct; lateral pockets short; ductus bursae long, smoothly sclerotised to about 1/2 distance to corpus bursae, where rugose; inner curve of appendix bursae moderately well sclerotised and rugose, outer curve more weakly sclerotised and rugose; corpus bursae with single short scobinate ridged signum.

Type material. Lectotype: male (here designated), 'Homer 1.1.45 G Howes [the 'G' looks like a 'C'] / A. nobilia TYPE G. HOWES / G. HOWES, COLLECTION' (MONZ) (examined, not dissected).

Note. *Aletia nobilia* was described from 10 specimens of both sexes; there is no mention of a holotype in the original description (Howes 1946), so the specimens must be regarded as syntypes. As noted under Methods and Conventions above, neither the labelling by Howes nor the mention of a holotype by Dugdale (1988) constitutes a valid lectotype designation (ICZN Articles 73.1, 74.5); however, the specimen photographed by Dugdale as the holotype and labelled as above is here selected lectotype, to avoid possible confusion in the future.

Distribution. (Map 15). Locally widespread in the South Island, but not known from the Nelson, Dunedin or Southland districts.

— / WD, MB, NC, MC, MK, OL, CO, FD

Biology. The life history is unknown. The adults come to light.

Flight period. December to February.

Remarks. This striking large noctuid was discovered and described remarkably late (1945–1946), though it is locally widespread in the southern alpine zone and may be fairly common where it occurs. In common with several other New Zealand moths associated with rocky habitats, *I. nobilia* exhibits a distinctive bluish grey sheen to the forewings that mimics the colour and sheen of rocks; other examples are *Physetica caerulea* (Noctuidae), *Scoparia asaleuta* Meyrick (Crambidae) and *Aponotoreas incompta* (Philpott) (Geometridae).

16. *Ichneutica nullifera* (Walker, 1857) new combination

Figs 16a–d (adults); 16e–g (male abdominal base and genitalia); 16h–j (female S7 and genitalia).

Agrotis nullifera Walker, 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 742.
Alysia specifica Guenée, 1868. *Entomologist's Monthly Magazine 5*: 3–4. Synonymised by Meyrick (1887: 7).

Diagnosis. *Ichneutica nullifera* is unlikely to be confused with any other species because of its very large size and rather uniform deep fawn to dark greyish forewing coloration, with indistinct markings. Even the smallest specimens of *I. nullifera* (wingspan 53 mm) are at the upper range of wingspan for *I. nobilia*, another large nearly unicolorous species; *nobilia* is easily distinguished by its glossy forewings, which have a bluish sheen.

Description. Adult (Fig. 16a–c). Wingspan 53–67 mm (male); 57–77 mm (female). Male antennae subpectinate / serrate, with ciliations just less than width of flagellum (serrations rather deeper, more conspicuous than in *nobilia*); pectinations up to *ca* 0.3x flagellum width. Head and thorax in typical form grey with scales bicoloured, narrow lamellate; forewing near-unicolorous dark grey or brownish grey with stigmata extremely indistinct or obsolete, at most reniform weakly indicated by pale scaling; antemedian and postmedian lines indistinct to obsolete, or postmedian indicated by vague dark dashes along veins; postmedian strongly oblique below reniform and approaching antemedian closely on dorsum, occasionally the two lines confluent on dorsum; sometimes a scattering of white scales along costa; subterminal line sometimes represented by a series of white spots; fringe grey, narrowly tipped white. Hindwings paler grey, without markings. In some specimens from, e.g., Central Otago, Otago Lakes and Southland (Blue Mountains), thorax and forewings deep fawn brown instead of grey and hindwings pale brownish. Underside: forewing pale fawn to deep brownish grey with faint reniform stigma; hindwing as forewing but paler, with variably distinct discal spot, postmedian line absent or very suffused and indistinct. Abdomen pale grey to deep brownish grey. Male abdominal base (Fig. 16e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 16f): uncus narrow, pointed, not hooked; valva upright, very weakly sinuous with apical part of costa straight, apex broad, bluntly rectangular with narrow field of spine-like

setae and weak corona of ca. 22–30 elements in a single row; clasper moderately robust, rather strongly curved; ampulla long, digitate; phallus (Fig. 16g) with weak apical tooth; vesica with cornuti in single uninterrupted strip, moderately long. Female S7 as in Fig. 16h. Female genitalia (Figs 16i, j): ovipositor blunt, squared off; segment 8 with numerous medium-length setae laterally and numerous medium-length to long setae dorsally forming caudal band; ostium with dorsal desclerotised ridges weakly developed (barely scobinate); lateral pockets moderately long; ductus bursae long, smoothly sclerotised to about 1/2 distance to corpus bursae, where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve more weakly sclerotised and rugose; corpus bursae with pair of scobinate ridged signa, ventral signum shorter.

Type material. *Agrotis nullifera*: Holotype: male, 'Type [green-ringed circular label] / N. Zealand Earl 45–30 / Agrotis nullifera.' [per JSD] (NHMUK) (examined, not dissected).

Alysia specifica: Lectotype: male (here designated), 'Type [red-ringed circular label] / Ex Musaeo Ach. Guenée / Ex Oberthür Coll. Brit. Mus. 1927-3 / S73 [red pencil] Gen. Alysia Gn. Mont. Magaz. 1868 Genus nouveau 1.2. Alysia Specifica Gn nat M.H. magaz. Nouvelle Zélande.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Agrotis nullifera* was described from a single male (Walker 1857). *Alysia specifica* was described from an unspecified number of males and a single female (Guenée 1868). As noted above, under *Ichneutica panda* and *I. nobilia*, these specimens must be regarded as syntypes, and neither the labelling of a 'Type' nor the mention of a holotype by Dugdale (1988: 204) constitutes a valid lectotype designation. The specimen regarded as holotype by Dugdale (*loc. cit.*) is here designated lectotype to avoid any further confusion.

Distribution. (Map 16). Central North Island, Wellington coast, and throughout the South Island.

TO, WN / NN, BR, WD, MB, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL

Biology. Larvae feed in the stems and root-crowns of large speargrasses (*Aciphylla* spp.) (Apiaceae), leaving conspicuous piles of pale brownish frass near the leaf-bases (Hudson 1928). The larva is described as follows by Hudson (1928: 55): "very stout, bright yellowish brown, considerably paler on the under surface; the dorsal line is faintly indicated, the subdorsal and lateral lines are dull brown, with a chain of elongate white spots beneath each; the spiracles and dorsal surface of the posterior segments are black; there are also numerous white dots all over the larva." Larvae are often gregarious as described by Howes (1914b: 97–98), who found as many as five full-grown larvae in a single *Aciphylla* clump. Pupation is in a loose cocoon in detritus at the base of the host (Hudson, *loc. cit.*).

Flight period. November to early April (but one reared specimen in NZAC without locality is dated 11 September 1929).

Remarks. This is the largest species of true noctuid in New Zealand (species with larger wingspans formerly placed in Noctuidae are now regarded as Erebidae). It is very widespread and often common in the South Island, but only known from Tongariro National Park and the Wellington coast in the North Island. On the basis of male and female genitalia, as well as the size and indistinct forewing pattern, *nullifera* appears to be closely related to *I. nobilia*. In common with that species (and many other moths with internally feeding larvae), *nullifera* has a strong tendency to go greasy in collections.

IV. *Ichneutica lithias* group

Diagnosis. Male abdominal base without brushes, levers or pockets; A3 apodemes present. Uncus rectangular; valva strongly sinuous; cucullus weakly differentiated; claspers symmetrical, fairly narrow, without transverse lamellae; apical setae of valva not forming distinct 'crest'; dorso-apical hooked seta of corona absent; vesica not strongly elongated; cornuti not reduced, cornutal strip not interrupted.

Remarks. The broad truncate uncus as well as the woody host-plant set *I. lithias* apart from most other members of *Ichneutica*, and its relationships within the genus are obscure.

17. *Ichneutica lithias* (Meyrick, 1887) new combination

Figs 17a–c (adults); 17d–f (male abdominal base and genitalia); 17g–i (female S7 and genitalia).

Mamestra lithias Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 17.

Diagnosis. *Ichneutica lithias* is a distinctive small noctuid, with at least the reniform (and usually the orbicular) stigma clearly outlined with white scales, a suffusion of dark grey and white scales along the veins, and

the forewing fringe usually distinctly chequered. It is unlikely to be confused with any other species when in reasonable condition.

Description. Adult (Figs 17a–c). Wingspan 28–35 mm (male); 33–38 mm (female). Male antennae bipectinate to *ca* 17–25 segments short of apex, pectinations up to 1.5x width of flagellum. Head and thorax mottled black, white and reddish brown, with white-edged black bar on prothorax and white-edged black exterior lines on tegulae; scales bicoloured or tricoloured, narrow lamellate. Forewing ground-colour reddish brown, more or less strongly overlain and sprinkled with dark grey and white scales, especially along veins, giving grey to silvery grey sheen; antemedian line variably distinct, white, black-edged on both sides; postmedian usually distinct, white, shallowly scalloped, black-edged basally; claviform stigma present, small, white, black-edged; orbicular stigma small, white, black-edged; reniform distinct, black-edged, with white inner lining; area between antemedian and postmedian lines not darkened; subterminal line distinct, white, broken, with weak W-shaped evagination above tornus; terminal area usually suffused silvery grey; series of dark subtriangular marks along termen present; fringe chequered blackish and white. Hindwing plain brown, unmarked; dark line along termen present, indistinct; fringe brownish white basally, brown medially and pure white distally. Underside: forewing grey-brown, usually densely and finely mottled whitish towards costa and beyond subterminal line, reniform stigma usually rather distinct, postmedian line variably distinct, subterminal line pale or indistinct, series of dark marks along termen; hindwing whitish, mottled grey except along anal margin, discal spot usually distinct, postmedian line usually rather distinct, series of dark marks along termen. Abdomen with distinct blackish white-tipped scale-tufts on segments 1–3; rest mottled light to dark greyish interspersed with pale reddish brown. Male abdominal base (Fig. 17d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 17e): uncus very broad, slightly indented at sides, with broad truncate tip; valva oblique, rather angular, cucullus weakly differentiated and bluntly rounded with well developed corona of ca. 20 elements in a single row and without spinose setae, but with narrow band of hair-like setae; apico-dorsal strong hooked seta separate from corona absent; clasper rather robust, evenly curved; ampulla long, digitate; phallus (Fig. 17f) subapical tooth absent; vesica forming complete loop; cornuti of moderate length, in single uninterrupted band. Female S7 as in Fig. 17g. Female genitalia (Figs 17h, i): ovipositor lobes blunt, small, rounded to squared off; segment 8 with a few fine short to medium length setae laterally, medium-length setae forming distinct band dorsally; ostium with indistinct triangular dorsal desclerotised ridges and very short sclerotised lateral pockets of even length (subtending distinct sclerotised 'lip' or shelf in dorsal wall of ostium); ductus bursae of moderate length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve not sclerotised, densely and finely rugose; corpus bursae distinctly rugose, with single short scobinate ridged signum dorsally (ventral signum possibly represented by a minute patch of scobinations).

Type material. Lectotype (here designated): male, 'Fereday Collection' (CMNZ) (examined, not dissected).

Note. *Mamestra lithias* was described from two males from Castle Hill MC, collected by J.D. Enys (Meyrick 1887). According to Hudson (1898), the syntypes were in the Fereday collection, now in CMNZ (cf. Dugdale 1988: 203). Only one specimen from the Fereday collection has been located there; it is assumed to be one of those Meyrick saw, and it is therefore designated lectotype here.

Distribution. (Map 17). Widespread in the South Island; in the North Island, only known from the Rangipo Desert TO.

TO / NN, BR, MB, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL

Biology. The larva has not been described, but has been found and reared on the subalpine shrub *Melicytus alpinus* (Violaceae) by Brian Patrick (Patrick 1994b; reared specimen in OMNZ).

Flight period. October to April, with most records from December to March.

Remarks. *Ichneutica lithias* inhabits coastal to subalpine and alpine shrublands almost throughout the South Island, and is locally common. Only a single North Island specimen was seen during the course of this revision, collected in 2010 from a remote area of low native forest on volcanic dunes in the army training area of the Rangipo Desert (specimen in NZAC).

V. *Ichneutica marmorata* group

Diagnosis. Male abdominal base without brushes, levers or pockets; A3 apodemes present. Uncus pointed; valva rather strongly sinuous; cucullus barely differentiated; claspers symmetrical, narrow, without transverse lamellae;

apical setae of valva not forming distinct 'crest'; dorso-apical hooked seta of corona absent; vesica not strongly elongated; cornuti strongly reduced, cornutal strip not interrupted.

Remarks. In genitalia, *I. marmorata* shows an interesting mix of characters of the *Ichneutica ceraunias*-group (strongly reduced cornuti, rather small female genitalia), and the *nullifera*-subgroup (shape of valva, presence of corona, enlarged ampulla). The very long, pointed sickle-like clasper is unique to this species, and its relationships within the genus are obscure.

18. *Ichneutica marmorata* (Hudson, 1924)

Figs 18a–h (adults); 18i–k (male abdominal base and genitalia); 18l-n (female S7 and genitalia).

Persectania marmorata Hudson, 1924. *Entomologist's Monthly Magazine 60*: 7–8.

Ichneutica dives Philpott, 1924. *Transactions and proceedings of the New Zealand Institute 55*: 207. Synonymised by Philpott (1927: 80).

Diagnosis. *Ichneutica marmorata* is a variable species that could possibly be confused with *I. notata* or *I. chryserythra*. It differs from *notata* in the much shorter pectinations of the male antenna (up to *ca* 4x flagellum width, cf. 7–8x flagellum width in *notata*), and in the lack of yellowish scaling on the forewing; this scaling gives *notata* a distinct greenish tinge, whereas the forewing of *marmorata* is grey or violet-reddish. Differences from *I. chryserythra* are given under that species, q.v.

Description. Adult (Figs 18a–h). Wingspan: 33–41 mm (male); 41–46 mm (female). Male antennae bipectinate to 2–3 segments short of apex; pectinations up to *ca* 4x width of flagellum. Head and thorax mixed reddish and whitish, scales bicoloured, narrow lamellate. Forewing dull violet-reddish to violet-grey; antemedian line evenly waved, sometimes with stronger indentation basad on vein 1A+2A, silver-grey, bordered black exteriorly; claviform present, round to elongate, usually containing some silver-grey scales; orbicular round, outlined black and sometimes with interior lining of whitish or copper-brown scales; reniform weakly C-shaped, pattern as for orbicular; postmedian line weakly scalloped, black, edged silver-grey exteriorly; a usually rather distinct subterminal line of cream-white to copper-brown scales; terminal area beyond this often suffused silver-grey and contrasting with adjacent area of wing, especially in female; termen with series of small dark subtriangular marks; fringe more or less concolorous with ground colour, not chequered. Female forewing usually more contrastingly marked than in male, stigmata brighter, reniform and orbicular nearly or completely infilled with pale scales. Hindwing greyish brown, with diffuse postmedian line and more or less broken dark line along termen. Underside: forewing grey to pinkish grey with subterminal and terminal areas speckled whitish, reniform variably distinct; hindwing pale grey, mottled darker exteriorly and with distinct discal spot and postmedian line; both wings with distinct dark dashes along termen. Abdomen greyish. Male abdominal base (Fig. 18i) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 18j): uncus pointed, weakly hooked; valva oblique, weakly sinuous with costa very straight towards apex, apex bluntly rounded with small area of rather inconspicuous spine-like setae and corona of ca. 22–30 elements in a single row; clasper moderately robust, strongly curved and reaching beyond dorsal edge of valva; ampulla long, digitate; phallus (Fig. 18k) without subapical tooth; vesica with cornuti very small and reduced to narrow strip in apical 1/3 of vesica. Female S7 as in Fig. 18l. Female genitalia (Figs 18m, n): ovipositor lobes blunt, squared off; segment 8 with scattered medium-length setae laterally and forming narrow caudal band dorsally; ostium with dorsal desclerotised ridges barely developed; lateral pockets short; ductus bursae rather short, smoothly sclerotised to near junction with corpus bursae where very weakly rugose; inner curve of appendix bursae weakly sclerotised and rugose, outer curve membranous; (corpus plus appendix bursae small); corpus bursae with pair of small ridged scobinate signa, sometimes reduced.

Type material. *Persectania marmorata*: Holotype: female, 'Otira 2/19 / Persectania marmorata / Collection, Lindsay / Type. G.V. Hudson. / 2007.222.1687' (CMNZ) (examined, not dissected).

Ichneutica dives: Holotype: male, 'Mt Arthur 4500′ 24-12-21 A. Philpott / 29 / Ichneutica dives Philp. Holotype ♂ / NZAC slide Noct. 255 genitalia ♂' (NZAC) (examined, including genitalia).

Note. *Persectania marmorata* was described from a single female collected by the dentist J.W. Campbell and given to Stuart Lindsay (Hudson 1924). *Ichneutica dives* was described from five males and two females taken at sugar (Philpott 1924a); Philpott mentions a holotype male, an allotype female and 'paratypes' in the original description. The allotype female, a paratype female, and two paratype males are in NZAC and labelled as such by Philpott. A further male collected at the type locality by Philpott on 27 Dec 1921 is in NZAC and is presumably

also a paratype, though not labelled as such; it is missing its abdomen. All other Philpott specimens from Mt Arthur in NZAC were collected after the date of description, so the sixth paratype must be considered missing.

Distribution. (Map 18). Widespread in the South Island; in the North Island only known from Tongariro National Park and one other locality (see Remarks below).

TO, HB / NN, WD, MB, NC, MC, MK, CO, FD, SL

Biology. There is no definitive account of the life history of this species. White (1991: Appendix 1) indicates *Chionochloa* as a host. The basis of this record may be an observation by Brian Patrick, who saw a female ovipositing at night on copper tussock (*Chionochloa rubra* subsp. *cuprea*) in the Longwood Range SL on 23 Dec 1981 (B.H. Patrick, pers. comm.). Only a single reared specimen has been seen in collections: a female in NZAC from Kakapo Brook Valley NC, collected by C. de Sassi; the host-plant was *Festuca novae-zelandiae*. The pupa (Kakapo Valley specimen) has large raised rugose ridges dorsally on A4–7 and a long apically forked cremaster. White (2002) gives 'herbs' as hosts, but the source of this is unknown.

Flight period. Late October to February.

Remarks. This is another locally common and widespread species, strictly subalpine or alpine in the northern parts of its range (central North Island, northern South Island), but descending to the lowlands in Central Otago (e.g. 200 m a.s.l. at Kawarau Gorge), and even occurring in forest at sea-level in Fiordland (Deep Cove) (B. Patrick, pers. comm. and material in OMNZ). Outside Tongariro National Park, *I. marmorata* appears to be known in the North Island only from a single specimen in NZAC from Puketitiri HB, collected by J.S. Armstrong on 27 Nov 1934. This is not given as a locality for *marmorata* by Hudson (1939), and Davies (1973) did not record this species from Hawkes Bay despite considerable collecting effort at Puketitiri, but it is accepted here provisionally, since suitable habitat exists in the nearby Kaweka Ranges.

Specimens of *I. marmorata* from the North Island (Rangipo Desert, Tongariro National Park) appear to have a more extensive field of cornuti on the vesica than those examined from the South Island; this is not here accorded any taxonomic significance as no other consistent differences were observed.

VI. *Ichneutica disjungens* group

Diagnosis. Male abdominal base without brushes or pockets; levers present in *I. moderata* only; A3 apodemes present in all 3 species. Uncus strap-like or robust and pointed; valva sinuous; cucullus weakly differentiated; claspers symmetrical, narrow to fairly broad, without transverse lamellae; apical setae of valva not forming 'crest' or crest weak; dorso-apical hooked seta (or 2 setae) of corona present, more or less separated from rest of corona by elongate base; vesica not strongly elongated; cornuti not reduced, cornutal strip not interrupted.

Remarks. This grouping of three species is tentative; however, the male genitalia of *I. moderata* and *I. oliveri* share an unusual cucullus shape, with the apical seta stalked, as in most species of *Physetica* (Hoare 2017). This character is less convincingly developed in *I. disjungens*, which however shares a similar form of the uncus with *I. oliveri* and has a broadly similar wing pattern.

19. *Ichneutica disjungens* (Walker, 1858) new combination

Figs 19a–d (adults); 19e–g (male abdominal base and genitalia); 19h–j (female S7 and genitalia); W19 (wing venation).

Heliophobus disjungens Walker, 1858. *List of the specimens of lepidopterous insects in the collection of the British Museum. XV*: 1681. *Hadena nervata* Guenée, 1868. *Entomologist's Monthly Magazine 5*: 40. Synonymised by Meyrick (1887: 15).

Diagnosis. *Ichneutica disjungens* is a very distinctive and rather invariable species, with white-lined forewing veins overlying a dark brown ground colour, and a strongly marked, white-bordered reniform stigma. It is unlikely to be confused with any other species.

Description. Adult (Figs 19a–d). Wingspan 34–38 mm (male); 35–39 mm (female). Male antennae bipectinate to *ca* 10–14 segments short of apex, pectinations up to *ca* 3x width of flagellum. Head and thorax variegated pale olive-ochreous, white and dark brown, darker scales often outlining white central area on each tegula, scales mostly bicoloured, narrow lamellate to hairlike. Forewing mixed olive-ochreous and pale ochreous, with veins strongly marked in white and most markings outlined black; antemedian line represented by an irregular curved series of black marks between veins, edged pale ochreous basally; postmedian line pale olive-grey, edged black basally; claviform stigma present, short to elongate, contiguous with white streak along CuP below; orbicular

stigma distinct, round, outlined black, with inner lining of pallid scales and infilled olive; reniform distinct, bounded above and below by white streaks along veins of cell, coloration as for orbicular; area between antemedian and postmedian lines not darkened; subterminal line present, W-shaped evagination above tornus and V-shaped bend at tornus; terminal area concolorous with ground colour; series of dark subtriangular to crescentic marks along termen present, distinct; fringe brownish, apically white. Hindwing dark brown to grey-brown, with indistinct postmedian line and pale area beyond; dark line along termen present; fringe white, with more or less distinct subbasal brownish line. Underside: forewing grey-brown, with the veins marked white beyond the disc, reniform stigma distinct, postmedian line often distinct, except towards dorsum, series of dark marks along termen; hindwing whitish, variably suffused brown towards termen, discal spot distinct, postmedian line usually distinct, series of dark marks along termen. Abdomen pale ochreous, mottled dark grey-brown. Male abdominal base (Fig. 19e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 19f): uncus robust, pointed, weakly hooked; valva relatively upright, sinuous, cucullus moderately differentiated, truncate, with well-developed corona of *ca* 16–22 elements in a single row separated from field of spinose setae (not forming 'crest') by band of hair-like setae; 2 apico-dorsal strong hooked setae separate from corona present; clasper rather narrow, curved; ampulla long, digitate; phallus (Fig. 19g) subapical tooth absent; vesica forming complete loop; cornuti of moderate length, in single uninterrupted band. Female S7 as in Fig. 19h. Female genitalia (Figs 19i, j): ovipositor lobes blunt, small (and short), squared off; segment 8 with no setae laterally, and short setae scattered dorsolaterally, not meeting dorsally and not forming band; ostium with dorsal desclerotised ridges long and prominent; short sclerotised lateral pockets of even length; ductus bursae of moderate length, rather broad, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae short, strongly sclerotised and rugose, outer curve weakly sclerotised and partially rugose; corpus bursae very weakly rugose, with pair of elongate scobinate ridged signa, of roughly equal length; more weakly ridged.

Type material. *Heliophobus disjungens*: Holotype: male, 'Type [green-rimmed circular label] / N. Zealand 45–30 / Heliophobus disjungens' [per JSD] (NHMUK) (examined, not dissected).

Note. *Heliophobus disjungens* was described from a single male collected by Percy Earl, probably at Waikouaiti DN (Dugdale 1988).

Hadena nervata: Lectotype (designated by Dugdale (1988: 202)): male, 'LECTOTYPE JSD 1980 / syntype / H. nervata Gn. [folded label with description] / Ex Musaeo Ach. Guenée / Ex Oberthür Coll. Brit. Mus. 1927-3' [per JSD] (NHMUK) (examined, not dissected).

Note. *Hadena nervata* was described from an unspecified number of specimens of both sexes (Guenée 1868). There is a female paralectotype from the Guenée collection in the NHMUK. The type locality is Rakaia MC, and the collector was R.W. Fereday (Guenée 1868; Dugdale 1988).

Distribution. (Map 19). Widespread throughout the South Island; in the North Island only known from the central volcanic plateau.

TO / NN, MB, NC, MC, SC, MK, OL, CO, DN, FD, SL

Biology. The life history is poorly known, and the larva is apparently undescribed, but this species is amongst those recorded by Kelsey (1957) on 'tussock', referring collectively to *Poa cita*, *P. colensoi* and *Festuca novae-zelandiae* (Poaceae).

Flight period. October to March, but with most records from November and December.

Remarks. *Ichneutica disjungens* inhabits tussock grasslands, chiefly in the eastern South Island, but extending into Fiordland in the south west; there is a central North Island population centred on Tongariro National Park. It is especially a moth of the subalpine and alpine zones, occurring up to 1300 m a.s.l. in the Rock and Pillar Range in Otago (Barratt & Patrick 1987). The distinctive forewing pattern with the veins picked out in white is probably an adaptation for camouflage amongst grass stems, and is paralleled in grassland noctuids overseas, for example the European *Cerapteryx graminis* (Linnaeus) and *Tholera decimalis* (Poda).

20. *Ichneutica moderata* (Walker, 1865) new combination

Figs. 20a–d (adults); 20e–g (male abdominal base and genitalia); 20h–j (female S7 and genitalia).

Agrotis? moderata Walker, 1865. *List of the specimens of lepidopterous insects in the collection of the British Museum. XXXII*: 705–706.

Mamestra griseipennis Felder & Rogenhofer, 1875. *Reise der österreichischen Fregatte Novara um die Erde in den Jahern 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf-Urbair. Zoologischer Theil. Band 2. Abtheilung 2. Heft 4*: pl. CIX fig. 22. Synonymised by Dugdale (1988: 200).

Diagnosis. *Ichneutica moderata* is a rather nondescript species, but in set specimens a very helpful diagnostic character is the usually completely unmarked creamy white hindwing fringe which contrasts strongly with the dark grey-brown hindwing. Similar species such as *I. sistens* and *I. virescens* have a brownish hindwing fringe, or at least a brown median line in the fringe. The abdomen of *I. moderata* in both sexes usually has a transverse bar of yellow scales on each segment, which is often conspicuous; there are no yellow scales in *I. sistens* or female *I. virescens*, and yellowish scales are confined to the tip of the abdomen in male *virescens*. On the forewing of *moderata*, a useful recognition feature is the deeply scalloped postmedian forewing line; even if the line itself is indistinct, the pale specks on the veins beyond (each more or less clearly preceded and followed by a small blackish speck) are usually visible. *Ichneutica sistens* has a weakly scalloped postmedian line, and no pale specks beyond. The male of *I. moderata* has non-pectinate antennae; that of *I. sistens* has distinct short pectinations. *Ichneutica virescens*, a larger species than *moderata*, does have the white specking on the postmedian line, but usually has a strong greenish or bluish grey glossy tinge to the forewing lacking in *moderata*, and three blackish smudges basad of the subterminal line, which *moderata* also lacks. The underside of the hindwing in *moderata* has a rather broad median dark cross-line; in both *sistens* and *virescens*, the cross-line is much narrower, and in *sistens* it is always distinctly postmedian in position (the position varies in *virescens*).

Description. Adult (Figs 20a–d). Wingspan 33–38mm (male); 36–43 mm (female). Male antennae not pectinate (at most very weakly unipectinate at base) and weakly serrate beneath (with distinct ciliations up to *ca* 1x width of flagellum). Head and thorax grey-brown, with scales bicoloured, hairlike to very narrow lamellate. Forewing grey-brown; antemedian line indistinct or distinct, dark grey, scalloped; postmedian line indistinct to distinct, dark grey, scalloped, with more or less conspicuous parallel line of pale dots on veins beyond; claviform stigma present as a dark grey U or absent; orbicular stigma outlined dark grey, often indistinct; reniform usually indistinct, outlined dark grey, often including white scales interiorly; a dark grey diffuse transverse line between antemedian and postmedian lines; subterminal line indistinct; terminal area often paler than ground colour of wing; series of dark subtriangular marks along termen present, indistinct; fringe brown, paler basally and with distinct line of dark-tipped scales centrally. Hindwing grey, unmarked; dark line along termen absent; fringe basally cream, pure white beyond. Underside: forewing greyish with apex pale; reniform stigma indistinct; postmedian line indistinct except towards costa, where usually edged with pale suffusion on each side; hindwing whitish ochreous, suffused grey in distal 1/4 to 1/3 beyond median line; discal spot usually distinct; median line distinct. Abdomen mottled grey and pale brown; hair-scales at base pale grey; variably developed transverse bands of yellow scales, often conspicuous. Male abdominal base (Fig. 20e) without brushes or pockets, but with reduced levers; A3 apodemes present. Male genitalia (Fig. 20f): uncus strap-like, apically spatulate, blunt; valva oblique, strongly sinuous, costa with blunt protuberance at 2/3; apex bird's-head-shaped, with stout seta on apico-dorsal 'beak' and with distinct corona of ca. 45 elements in a single row; clasper robust, S-shaped; ampulla long, digitate; phallus (Fig. 20g) with subapical tooth absent; vesica forming complete loop; cornuti moderately long, in single uninterrupted band. Female S7 as in Fig. 20h. Female genitalia (Figs 20i, j): ovipositor lobes bluntly pointed, subtriangular; segment 8 with rather sparse medium-length setae laterally and dorsally, forming caudal band; ostium with long, curved, slightly raised dorsal desclerotised ridges; lateral pockets short; ductus bursae moderately long, smoothly sclerotised to near junction with corpus bursae where finely rugose; inner curve of appendix bursae well sclerotised and moderately rugose, outer curve forming distinctive ovoid shape with very straight posterior section, well sclerotised, not rugose; corpus bursae with pair of long ridged scobinate signa, ventral signum rather shorter.

Type material. *Agrotis moderata*: Lectotype (designated by Dugdale (1988: 200)): female, 'Lectotype ♀ JSD 1980 [circular label] / Type [green-rimmed circular label] / N. Zealand Auckland, Oxley 60–73 / Agrotis? moderata / Agrotidae genitalia slide 352' [per JSD] (NHMUK) (examined, including genitalia slide).

Mamestra griseipennis: Lectotype (designated by Dugdale (1988: 200)): female, 'FELDER COLLN / Type [red-rimmed circular label] / griseipennis n. / CIX f 22 Mamestra griseipennis n. Neu Seeld. / 606' [per JSD] (NHMUK) (examined, not dissected [abdomen broken]).

Note. *Agrotis moderata* was described from two specimens (Walker 1865a: 706). The male paralectotype, also an Oxley specimen from Nelson, is in the NHMUK. *Mamestra griseipennis*, like other Felder and Rogenhofer

species, lacks a description, and is based on an illustration; however, as there are two specimens in the NHMUK labelled as coming from the Felder Collection, Dugdale (1988: 200) implicitly regarded these as syntypes and selected a lectotype.

The type locality for both *Agrotis moderata* and *Mamestra griseipennis* is Nelson; both specimens were collected by T.R. Oxley (see Dugdale 1988). Dugdale (1988: 200) discussed Meyrick's (1912a) misinterpretation of the name *griseipennis* as a senior synonym of *Chera virescens* Butler and its true identity as a junior synonym of *moderata*.

Distribution. (Map 20). Throughout New Zealand from the Bay of Plenty south; absent from the northern North Island. Also Chatham Islands.

BP, TK, TO, HB, RI, WN / SD, NN, WD, MB, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL / SI / CH

Biology. The larva is probably moderately polyphagous on low-growing herbaceous plants, but is apparently most often associated with *Raoulia* spp. (Asteraceae), recorded hosts including *R. australis*, *R. subulata* and *R. beauverdii* (White 2002; B.H. Patrick, pers. comm., and reared material in OMNZ). Young larvae have also been found by Brian Patrick on *Crassula manaia* (Crassulaceae) on the Taranaki coast; these larvae readily accepted leaves of lawn daisy (*Bellis perennis*) in captivity. Bejakovich and Dugdale ([1998]) give 'pasture and legumes' as well as *Raoulia* as hosts, though Gaskin (1966a) states that all larvae he was rearing on *Trifolium repens* (white clover) died in their third instar of unknown causes. He does not say whether larvae were found on this host, or reared from eggs from a captured female. According to Hudson (1950) larvae on *Raoulia* made silken tunnels amongst the roots of the plants. Hudson (1950: 76) describes the full-grown larva as follows: "length... about... 35 mm, stout, cylindrical, slightly tapering at each end; back pale dull reddish; sides dull greenish, speckled and suffused with blackish; underside clear, pale, dull green. Head ochreous-brown, with two conspicuous blackish-brown stripes; thoracic segments pale greenish-brown; second segment [i.e. prothorax] with elongate-oval blackish-brown horny dorsal plate; other thoracic segments with rudimentary dorsal plates. General surface somewhat wrinkled. A conspicuous series of trapezoidal black marks on the back of segments 5–11 [i.e. A1–A7], fainter posteriorly; segments 12 and 13 [i.e. A8, A9] darker on back; a narrow, pale reddish dorsal line; a double series of highly polished warts [pinacula] on each abdominal segment, except the last, and a single series on each thoracic segment. Spiracles black." Pupation is in a flimsy cocoon amongst the *Raoulia* roots (Hudson, *loc. cit.*).

Flight period. October to April.

Remarks. This is a widespread and often common moth of open habitats, occurring from the lowlands to the montane zone. Its absence from the northern North Island corresponds with the scarcity of *Raoulia* in this area.

The male and female genitalia of *moderata* are distinctive and unusual, but they share the essential features of *Ichneutica* as defined here.

21. *Ichneutica oliveri* (Hampson, 1911) new combination

Figs 21 a, b (adults); 21c–e (male abdominal base and genitalia); 21f–h (female S7 and genitalia).

Morrisonia oliveri Hampson, 1911. *The Annals and Magazine of Natural History (eighth series) 8*: 424.

Diagnosis. *Ichneutica oliveri* has a very distinctive and invariable forewing pattern, and is unlikely to be confused with any other noctuid in New Zealand.

Description. Adult (Figs 21a, b). Wingspan 38–40 mm (male); 42–46 mm (female). Male antennae weakly bipectinate to *ca* 15 segments short of apex, pectinations up to *ca* 1x width of flagellum. Head greenish straw, frons whitish; thorax greenish straw, with numerous white scales in tegulae, especially in female, and a few white-tipped scales in prothoracic collar; other white scales forming more or less distinct lines on either side of central line of mesothorax, especially in female, blackish patches either side of thoracic crest and laterally on tegulae, scales narrow lamellate. Forewing centrally olive green, exteriorly straw, with veins marked in silvery white and areas between veins basally and subterminally black or black-edged; antemedian line present only as W-shaped pale mark towards dorsum; postmedian line distinct only in costal half, black and zigzag, bordered by strongly oblique pale straw fascia from near apex to just below reniform; claviform stigma present as silver-grey dash; orbicular stigma oblique, trapezoidal, outlined black, interiorly with straw and/or silver-white scales; reniform oblique, outlined black, interiorly silver-grey with border of olive; subterminal line broad, straw-coloured, with distinct W-shaped evagination nearly reaching termen, obsolete just above middle, where interrupted by dark lead-grey area outlined black; series of dark subtriangular marks along termen conspicuous; fringe dark grey. Hindwing brownish

grey, paler basally, with indistinct discal spot; dark line along termen indistinct to absent; fringe white, with some grey scaling. Underside: forewing greyish, with postmedian fascia and subterminal line (as on upperside) showing paler; reniform stigma variably distinct; postmedian line distinct only towards costa; hindwing whitish ochreous, suffused grey exteriorly; discal spot and postmedian line distinct; series of dark marks along termen. Abdomen pale brownish grey, strongly speckled dark grey and with yellowish apical tuft. Male abdominal base (Fig. 21c) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 21d): uncus rather broad, broadened further just beyond middle, then tapering slightly to blunt apex; valva oblique, sinuous, costa bent but without distinct protuberance at 2/3; apex bird's-head-shaped, with stout seta on apico-dorsal 'beak' and with corona of *ca* 23–25 elements at apex of a field of stout spine-like setae; clasper long, slender, curved, apically weakly spatulate; ampulla of moderate length, digitate; phallus (Fig. 21e) with subapical tooth absent; vesica forming complete loop; cornuti moderately long, somewhat shorter basally and apically, forking into two groups apically. Female S7 as in Fig. 21f. Female genitalia (Figs 21g, h): ovipositor lobes squarish; segment 8 with moderately numerous medium-length to long setae laterally and dorsally, forming distinct caudal band; ostium with moderately short dorsal desclerotised ridges, each expanded into distinct scobinate bump distally; lateral pockets moderately long; ductus bursae moderately long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where strongly rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve smoothly C-shaped, moderately sclerotised, rugose near ductus seminalis inception; corpus bursae with pair of weakly ridged scobinate signa, ventral signum rather shorter.

Type material. Holotype: female, 'Type [red-rimmed circular label] / New Zealand Wakatipu Bold Peak 3000ft 8.II.1910 1910-507 / Morrisonia oliveri type ♀ Hampson / Agrotidae genitalia slide 298' [per JSD] (NHMUK) (examined, including slide).

Note. *Morrisonia oliveri* was described from a single female (Hampson 1911).

Distribution. (Map 21). South Island only, where widespread, but not known from eastern districts from mid-Canterbury to Southland.

— / BR, WD, MB, KA, NC, MK, OL, FD

Biology. Unknown.

Flight period. December to March.

Remarks. *Ichneutica oliveri* inhabits alpine shrubland and tussockland, and has been reported visiting *Veronica* flowers in the evening (Hudson 1928). It usually occurs locally in small numbers and is not numerous in collections. Hudson (1928) gave Nelson as a locality, and given its occurrence on the Paparoa Range BR (specimens in NZAC), it may well be present further north in the north-west Nelson ranges; however, no specimens from the Nelson region were seen in collections during the course of this revision.

VII. *Ichneutica mutans* group

Diagnosis. Male abdominal base without brushes, levers or pockets; A3 apodemes present. Uncus pointed; valva sinuous; cucullus well differentiated; claspers symmetrical, narrow, without transverse lamellae; apical setae of valva not forming distinct 'crest' or crest weak; dorso-apical hooked seta of corona present but weakly differentiated from corona; vesica (usually) strongly elongated; cornuti not reduced, cornutal strip not interrupted.

Remarks. The very elongate vesica, which has an especially long basal tubular portion, is diagnostic of this group of species. The vesica is less elongate in *I. averilla*; however other features of the genitalia and especially the wing pattern of the female indicate that *averilla* is likely a close relative of *I. mutans* and the other species in this group.

22. *Ichneutica averilla* (Hudson, 1921) new combination

Figs 22a–d (adults); 22e–g (male abdominal base and genitalia); 22h–j (female S7 and genitalia).

Melanchra averilla Hudson, 1921. *Entomologist's Monthly Magazine 57*: 255.

Melanchra furtiva Philpott, 1924. *Transactions and proceedings of the New Zealand Institute 55*: 663–664. Synonymised by Dugdale (1988: 202).

Diagnosis. Males of *Ichneutica averilla* are usually relatively easily distinguished from those of *mutans* by their rather uniformly pale reddish ochreous forewing ground colour; *mutans* generally has the forewing brown with a blackish suffusion from the base extending to between the stigmata, and the postmedian area beyond the

reniform contrastingly pale. More unicolorous males of *mutans* have the forewing grey rather than pale ochreous. The antennal pectinations of male *I. averilla* are rather longer (up to 2.5x flagellum width) than those of *mutans* (1.5–2x flagellum width). In both sexes of *averilla*, the antemedian forewing line is obsolete or represented only by a trace of pale scaling in the centre of the wing; in *mutans*, this line is fairly distinct and picked out by darker scaling on its distal edge. In *I. mutans*, the dark wedge or streak above the tornus is usually very distinct and runs from the subterminal line to the postmedian; it tends to be shorter and weaker in *averilla*, and rarely reaches the postmedian: however, this character is variable and not fully reliable.

Description. Adult (Figs 22a–d). Wingspan 33–41 mm (male); 36–41 mm (female). Male antennae bipectinate to *ca* 20 segments short of apex, pectinations up to *ca* 2.5x width of flagellum. Head and thorax pale reddish ochreous in male, whitish grey in female; prothorax in both sexes with distinct V-shaped dark brown or blackish bar and tegulae with some dark brown or blackish scales exteriorly in lines; with most scales bicoloured, narrow lamellate. Forewing reddish ochreous (male) or whitish grey (female); black basal streak present, sinuous; antemedian line obsolete or indistinctly represented by paler scaling in mid-portion; postmedian line irregular, pallid, indistinct except towards dorsum, where sometimes edged interiorly with black line that may extend towards claviform; claviform stigma present, distinct, U-shaped, black-edged, or indistinct, lacking black edging; orbicular stigma moderately large, oblique, suboval, pallid, weakly to strongly black-edged, relatively indistinct except in specimens with ground-colour darkened in middle of wing; reniform indistinct to moderately distinct, pallid, edged black basally and dorsally and with interior basal crescent of ground-colour; area between antemedian and postmedian lines sometimes darkened in both sexes, dark area not extending to costa or dorsum, but sometimes extending to wing base; subterminal line pale, moderately distinct, broken, and variably highlighted by dark brown scaling on inner edge, especially towards tornus where dark triangle or streak extends in towards postmedian line; terminal area concolorous with wing or darker, but with moderately distinct dark streaking along veins; series of dark subtriangular marks along termen absent or indistinct; fringe mottled brown and white (male) or grey and white (female). Hindwing brownish, sometimes with indistinct postmedian line and pale area beyond; dark line along termen present, indistinct; fringe brownish white, with brown median line. Underside: forewing ochreous to brownish or greyish, paler towards costa and termen; reniform stigma very indistinct; postmedian line absent; hindwing whitish, finely mottled darker exteriorly; discal spot and postmedian line usually very indistinct. Abdomen with small dorsal scale-tuft on segment 1 and smaller one on segment 2 reddish ochreous mottled white (male) or grey mottled white (female); rest of abdomen pale ochreous mottled brown, pink-tinged laterally in male. Male abdominal base (Fig. 22e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 22f): uncus moderately narrow, pointed, weakly hooked; valva upright, sinuous, cucullus moderately well differentiated and truncately rounded with well-developed corona of ca. 30–42 elements in a single row and strong field of spinose setae not forming distinct 'crest'; apico-dorsal strong hooked seta present but not well separated from corona; clasper robust, strongly curved and sinuous; ampulla moderately long, digitate; phallus (Fig. 22g) with subapical tooth present as a slight raised area; vesica forming complete loop; cornuti rather short, very short basally, in single uninterrupted band. Female S7 as in Fig. 22h. Female genitalia (Figs 22i, j): ovipositor lobes blunt, small, weakly squared off; segment 8 with a few shortish setae laterally, with scattered short to medium setae in a band dorsally; ostium with pair of short dorsal desclerotised ridges and long lateral pockets, left pocket in ventral view longer; ductus bursae long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and strongly rugose, outer curve well sclerotised, not rugose; corpus bursae strongly rugose, with a pair of small scobinate ridged signa of even size; (appendix bursae very large).

Type material. *Melanchra averilla*: Lectotype (here designated): female, '1036a' [corresponding entry in Hudson register: 'Mt Egmont 3000 ft (Miss Averil Lysaght)'] (MONZ) (examined, not dissected).

Note. *Melanchra averilla* was described from two female specimens collected by Averil Lysaght in December 1920 (Hudson 1921). Dugdale (1988: 202) indicated that he had not located the syntypes in MONZ, and the species was not treated by Palma *et al.* (1989) in their list of primary types of arthropods in MONZ. However, a single specimen still stands under the name *averilla* in the Hudson collection in MONZ, as noted above (pers. obs. 2018), and this is here designated lectotype to stabilise nomenclature and avoid any possible confusion in the future. The paralectotype was not found.

Melanchra furtiva: Holotype: male, 'Mt Arthur 4500 ft. 27-12-21 A. Philpott / Melanchra furtiva Philpott Holotype. ♂. / 647 [handwritten]' (NZAC) (examined, not dissected).

Note. *Melanchra furtiva* was described from an unspecified number of specimens, but Philpott clearly designated a holotype in the original description (Philpott 1924b). There are 6 males labelled as paratypes by Philpott in NZAC, and one male paratype in CMNZ, all collected on Mt Arthur NN in December 1921, along with the allotype female in NZAC, collected in the same locality on 12 Dec 1922.

Distribution. (Map 22). Only known from Mt Taranaki in the North Island; throughout the South Island and also Stewart Island.

TK / NN, BR, MB, KA, NC, MC, MK, OL, CO, DN, FD, SL / SI

Biology. The coloration of the full grown larva is described by Hudson (1950: 81) as follows (with terminology updated): "Head ochreous brown, with dark stripe on each side. Body rather dark purplish grey on back, pale green below lateral line, with a very irregular paler intermediate area of dull orange-ochreous; a very broken pale subdorsal line, its components slightly convergent on each segment; eight very conspicuous black bars on the lateral portions of segments A1–A8, with a distinct paler patch behind each bar; these bars terminate on the spiracle...; legs and prolegs green, tipped with brown. Rather variable in colour and depth and distinctness of markings." The host-plant given by Hudson is *Plantago*, but it is clear from his account that he reared the species from the egg, and the larva is likely to be moderately polyphagous in common with many of its herb-feeding congeners.

Flight period. November to March.

Remarks. *Ichneutica averilla* has in the past been confused with *I. mutans*, and Hudson (1928) treated the synonym *furtiva* Philpott as a form of *mutans*, whilst recognising his own *averilla* as distinct. The confusion was sorted out by Dugdale (1988: 202), who synonymised *furtiva* with *averilla*.

According to Gaskin (1966a), the egg of this species (Gaskin's *Melanchra furtiva*) was described by Watt (1914) as a variety of *I. mutans*. In his remarkable paper on New Zealand Lepidoptera eggs, Watt (1914) recognised three 'varieties' of *mutans* based on distinct egg morphology, colour and batch characteristics. One he considered to be typical *mutans*, and the other two he designated as 'variety A' and 'variety B'. In an addendum, he briefly described the adults (presumably female) corresponding to the variety A and B egg types. Neither description can be confidently identified as referring to *Ichneutica averilla*. To my knowledge, Watt's astute observations have never been followed up. I searched for possible voucher material of Watt's 'varieties' in MONZ in 2018, but was unable to find any specimens unambiguously associated with his 1914 paper. A silvery female of *I. averilla* labelled 'Nevis 20.11.10' is apparently the only specimen of this species from the Watt collection that certainly dates from before 1914; this specimen also bears a number that looks like '18' on a greenish label. There is no evidence that this moth and its numbered label have anything to do with Watt's observations on eggs. However, it does show that Watt had collected *I. averilla*, and as the species was unnamed at the time, he would most likely have identified it as *mutans*. See also below, in the Remarks under *Ichneutica mutans*.

This is a very widespread species in the South Island, essentially montane, but occurring near sea level further south (e.g. Catlins SL); in the North Island it only appears to have been captured in the vicinity of Mt Taranaki, the type locality (cf. Fox 1970a). It usually seems to occur in small numbers, but may be locally common, e.g. around Dunedin (B.M. Lyford, B.H. Patrick, pers. comm.).

See under *Ichneutica fenwicki* for the bizarre record of *I. averilla* from England, and its misidentification as *Melanchra dives* (a synonym of *fenwicki*).

23. *Ichneutica bromias* (Meyrick, 1902) new combination

Figs 23a–c (adults); 23d–f (male abdominal base and genitalia); 23g–i (female S7 and genitalia).

Melanchra bromias Meyrick, 1902. *Transactions of the Entomological Society of London 1902*: 273–274.

Diagnosis. *Ichneutica bromias* differs from *I. mutans* in its overall darker forewing coloration: in particular, the costa in *bromias* is dark and concolorous with the forewing ground colour, whereas in *mutans*, the costa tends to be pallid at least basally, and/or there is a pale subcostal streak. In the male genitalia, the clasper of *bromias* is sinuous and curved at its apex towards the valval costa; in *mutans* it is either more or less straight or curved towards the valval dorsum. *Ichneutica mutans* has not been recorded from the Chathams, so *bromias* is unlikely to be confused with any other noctuid currently known from its restricted range.

Description. Adult (Figs 23a–c). Wingspan 34–42 mm (male); 32–43 mm (female). Male antennae bipectinate to *ca* 25–28 segments short of apex, pectinations up to *ca* 2x width of flagellum. Head and thorax pale ochreous, usually strongly suffused deep pinkish brown in male, and often white or grey in female, usually with strong black bar across prothorax, and black lines exteriorly on tegulae, scales bicoloured to tricoloured, narrow lamellate. Forewing ground colour pale ochreous, often suffused pinkish in male, to white in female, extensively suffused dark slate grey in both sexes; antemedian line obsolete; postmedian line weakly indicated, irregular; claviform stigma present, strongly outlined black; orbicular stigma usually distinct, outlined black and with inner lining of pale scales, round to oblong and oblique; reniform distinct, large and broad, with inclusion of pale scales distally; area between antemedian and postmedian lines usually irregularly darkened, except on dorsum, which often has extensive pale scaling, most intense in area towards tornus, especially in female; subterminal line whitish, broken and weakly indicated in male, distinct in female with V- or W-shaped evagination just below middle; terminal area darkened; series of dark subtriangular marks along termen absent in male, weakly indicated in female, but both sexes with pale dots where veins meet the fringe; fringe brownish to greyish. Hindwing brownish grey, sometimes with indistinct postmedian line and pale area beyond; dark line along termen present; fringe whitish with dark central line. Underside: forewing pale ochreous variably mixed or suffused greyish, often paler towards termen; reniform stigma indistinct; postmedian line indistinct or absent; hindwing ochreous to greyish ochreous suffused grey, especially exteriorly; discal spot and postmedian line usually fairly distinct. Abdomen greyish in male, laterally pale ochreous, darker grey, mottled blackish in female, and often tinged pinkish basally in both sexes. Male abdominal base (Fig. 23d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 23e): uncus narrow, pointed, not hooked; valva oblique, very angular with costa apically straight, cucullus well differentiated and subtriangular with well developed corona of ca. 40 elements in a single row and well spaced field of large spinose setae not forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper narrow, claw-like, curved towards valval costa; ampulla short, clubbed; phallus (Fig. 23f) with subapical tooth absent; vesica extremely long, (probably forming loop in naturally everted state); cornuti rather short, in single continuous band. Female S7 as in Fig. 23g. Female genitalia (Figs 23h, i): ovipositor lobes blunt, small, squared off; segment 8 with a few short setae laterally, with scattered short to medium setae in a band dorsally; ostium with pair of short but prominent dorsal desclerotised ridges and sclerotised lateral pockets (left pocket in ventral view short, right much longer); ductus bursae moderately long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and strongly rugose, outer curve sclerotised, not rugose; corpus bursae strongly rugose, with a single small scobinate ridged signum ventrally; (appendix bursae very large).

Type material. Lectotype (designated by Dugdale (1988: 202)): male, 'Lectotype [round label] / Chatham Is. F. /00 / bromias Meyr. / Melanchra bromias Meyr. 4/3 E. Meyrick det. in Meyrick Coll. Lectotype ♂' [per JSD] (NHMUK) (examined, not dissected).

Note. *Melanchra bromias* was described from four specimens of both sexes (Meyrick 1902). The lectotype designation mentioned by Dugdale (1988: 202) by 'an unknown designator' is apparently unpublished and therefore not valid; Dugdale is taken to have designated the lectotype under ICZN Article 74.5.

Distribution. (Map 23). Endemic to the Chatham Islands, and recorded from Rēkohu / Chatham, Rangiaotea / Pitt, and Rangatira / South East Islands.

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Biology. The life history is unknown, but the larva is presumed to be polyphagous on low-growing plants in common with related species.

Flight period. November to March.

Remarks. *Ichneutica bromias* is closely related to *I. mutans*, which it replaces on the Chatham Islands. It is common where it occurs. The close relationship of the two species is demonstrated by the components of the female pheromones, which were found to be similar in *bromias* and *mutans*; different components were found in *I. insignis*, *I. plena* and *I. ustistriga* (see Frérot *et al*. (1993) for details). Frérot *et al.* (*loc. cit.*) observed that *I. bromias* females would not call (release pheromones) at a temperature of 18ºC, unlike the other species studied; however, at 15ºC they showed normal calling behaviour.

24. *Ichneutica erebia* (Hudson, 1909) new combination

Figs 24a–g (adults); 24h–j (male abdominal base and genitalia); 24k–m (female S7 and genitalia).

Melanchra erebia Hudson, 1909. *Subantarctic Islands of New Zealand vol. 1*: 68.

Melanchra oceanica Salmon, 1956. *Records of the Dominion Museum 3*: 78–79. Synonymised by Dugdale (1971: 124).

Diagnosis. Though a variable species, *Ichneutica erebia* is unlikely to be confused with any other noctuid within its restricted subantarctic distribution. Some forms of *erebia* resemble *I. pagaia* from the Snares, but they lack the distinct W-shaped evagination of the forewing subterminal line that is visible even in weakly marked specimens of *I. pagaia*, which also has more distinct stigmata. As noted by Dugdale (1971), the antennal integument is dark in *I. erebia*, but pallid or testaceous (light reddish brown) in *I. pagaia*.

Description. Adult (Figs 24a–g). Wingspan 33–43 mm (male); 39–43 mm (female). Male antennae bipectinate to *ca* 8 segments short of apex, pectinations up to *ca* 4.5x width of flagellum. Head and thorax ochreous mixed with greyish or pale to dark reddish brown in male, pale greyish brown to dark brown in female, often paler (scales whitish) in centre of mesothorax; with scales mostly weakly bicoloured (pale-tipped), very narrow lamellate. Forewing whitish grey, sprinkled pale brown, or pale ochreous, or pale to dark reddish brown; antemedian line distinct, black irregular, and postmedian line distinct, black, deeply scalloped, or both lines obsolete; claviform and orbicular stigmata absent; reniform absent or represented by indistinct dark smudge; area between antemedian and postmedian lines not darkened or darkened beyond reniform; subterminal line absent but pale dusting along veins in subterminal area present in some specimens and often interspersed with some blackish or black and brown interneural smudges; terminal area concolorous with ground colour; series of marks along termen absent or present as brownish crescents; fringe concolorous with wing. Hindwing dark grey-brown to blackish brown, unmarked; dark line along termen absent; fringe whitish to dark brown. Underside: forewing dark grey to blackish brown, sometimes paler towards termen, veins sometimes lined darker; hindwing pale ochreous variably suffused blackish brown, sometimes leaving wedge-shaped pale streaks along veins distally; discal spot distinct; postmedian line absent. Abdomen mottled dark grey and pale brown, more yellowish apically in male. Male abdominal base (Fig. 24h) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 24i): uncus moderately robust, bluntly pointed, not hooked; peniculus not strongly projecting laterally; valva oblique, sinuous, cucullus well differentiated, spatulate and bluntly rounded with well developed corona of *ca* 40–45 elements in a single row and field of spinose setae not forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona present but obscured in ventral view by spinose setae; clasper relatively small, moderately curved; ampulla very short, digitate; phallus (Fig. 24j) with subapical tooth absent; vesica long, forming complete loop; cornuti short, in single uninterrupted band. Female S7 as in Fig. 24k. Female genitalia (Figs 24l, m): ovipositor lobes blunt, small, squared off, (moderately well sclerotised); segment 8 with a few or no setae laterally, and short setae in a scattered band dorsally; ostium with dorsal desclerotised ridges reduced to small 'windows'; long lateral pocket on left, shorter pocket on right in ventral view; ductus bursae rather long, smoothly sclerotised to before 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae weakly sclerotised and rugose, outer curve weakly sclerotised and partially rugose; corpus bursae very weakly rugose, with single tiny scobinate signum, not ridged; appendix bursae moderately large.

Type material. *Melanchra erebia*: Holotype: female, '13' [corresponding entry in Hudson register: 'Erebus Cove Port Ross Nov 29 — 07 Brown [sic]'] (MONZ) (examined, not dissected).

Note. *Melanchra erebia* was described from a single specimen, sex unspecified; the collector's name was R. Browne (Hudson 1909).

Melanchra oceanica: Holotype: male, 'Ocean Isd 23.10.43 / Melanchra oceanica Det. J.T. Salmon, 1954 Type / HOLOTYPE [red label]' (MONZ) (examined, not dissected).

Note. *Melanchra oceanica* was described from two male specimens (holotype and paratype) from Ocean Island (Salmon *in* Salmon & Bradley 1956) collected by the distinguished ornithologist R.A. Falla.

Distribution. (Map 24). Auckland Islands and Campbell Island. Dugdale (1971) records it from Auckland, Adams, Ewing, French and Rose Islands, to which Ocean Island (type locality of the synonym *Melanchra oceanica*) can be added. It is also very common on Enderby Island (specimens in NZAC collected by B. Anderson and M. Buxton, December 2015). There are also 3 specimens in MONZ from Campbell Island collected on 24 Aug 1943 by R.W. Balham.

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Biology. Described by Dugdale (1971). The larva is polyphagous; known host-plants are the mega-herbs *Pleurophyllum criniferum* (Asteraceae) and *Stilbocarpa* (Araliaceae), as well as *Carex* (Cyperaceae); Dugdale (*loc. cit.*) also notes larvae on *Chionochloa antarctica* (Poaceae), *Urtica australis* (as *U. aucklandica*) (Urticaceae) and *Raukaua simplex* (Araliaceae), some or all of which are also probable hosts. The larval coloration is described as follows (Dugdale, *loc. cit.*, quoted in different order from original): "Head capsule: patterned from instar 3, pallid ground colour overlain with dark brown reticulations, thickest along dorsal part of each parietal lobe from seta A1 to the P series, and laterally; a conspicuous pallid area around setae A2, A3. 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 SD2 pinacula always, dark. Dorsal line double, thickened anteriorly and posteriorly on each segment, region between setae D1, D2 marbled; a narrow pallid crenulate line below D2; zone between D2 and SD1 extensively marbled; between SD1 and spiracle a broad solid-colour 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."

Flight period. August to January (from type material of *erebia* and *oceanica* and specimens in MONZ and NZAC). The flight period is probably longer than this, as sampling has been very limited and adults reared in captivity emerged in April as well as August.

Remarks. *Ichneutica erebia* was treated as a subspecies of *I. mutans* by Dugdale (1971), but differs considerably from that species in its long male antennal pectinations and in its wing pattern and, to a lesser extent, in its male genitalia. It was raised again to species rank by Dugdale (1988). Its presence on Campbell Island is recorded here for the first time based on material examined in MONZ in 2018. It may be a very common species in its restricted subantarctic habitat.

25. *Ichneutica mutans* (Walker, 1857) new combination

Figs 25a–e (adults); 25f–h (male abdominal base and genitalia); 25i–k (female S7 and genitalia); L25 (larva).

Hadena mutans Walker, 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 602.

Hadena lignifusca Walker: 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 603. Synonymised by Meyrick (1887: 17).

Xylina spurcata Walker, 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 631. Synonymised by Meyrick (1912a: 100).

Xylina vexata Walker, 1865: *List of the specimens of lepidopterous insects in the collection of the British Museum. XXXIII*: 755. Synonymised by Meyrick (1887: 17).

Mamestra acceptrix Felder & Rogenhofer, 1875. *Reise der österreichischen Fregatte Novara um die Erde in den Jahern 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf-Urbair. Zoologischer Theil. Band 2. Abtheilung 2. Heft 4*: pl. CIX, fig. 19. Synonymised by Meyrick (1887: 17).

Mamestra passa Morrison, 1874. *Proceedings of the Boston Society of Natural History 17*: 139. Synonymised by Franclemont (1981: 133).

Hadena debilis Butler, 1877. *Proceedings of the Zoological Society of London for 1877*: 385. Synonymised by Meyrick (1887: 17).

Diagnosis. *Ichneutica mutans* is a variable moth, most likely to be confused with *I. averilla, I bromias* (confined to the Chathams and not currently sympatric), and *I. petrograpta*; differences are given under those species.

Description. Adult (Figs 25a–e). Wingspan 28–40 mm (male); 28–41.5 mm (female). Male antennae bipectinate to *ca* 20–26 segments short of apex, pectinations up to *ca* 1.5–2x width of flagellum. Head and thorax pinkish ochreous to deep pinkish brown, often suffused white or grey, especially in female, usually with strong black bar across prothorax, bordered pale above, and black lines exteriorly on tegulae, scales bicoloured to tricoloured, narrow lamellate. Forewing ground colour pale ochreous brown to pinkish brown or dark brown in male, female usually with strong suffusion of black and white scales giving grey appearance, male may also have grey suffusion especially towards base and in centre of wing; in female area between postmedian and subterminal lines often strongly suffused white, this suffusion may extend along dorsum to antemedian line; veins in distal half of wing marked black and speckled white; basal black streak usually present and distinct in male, distinct to indistinct or absent in female; subbasal oblique blackish streak from dorsum absent or represented by ill-defined smudge; antemedian line present, distinct in dorsal half of wing, dark-edged, irregular; postmedian line usually indistinct in male, more distinct in female, pallid, regularly scalloped in costal half of wing, irregular in dorsal half,

dark-edged basally; claviform stigma present, outlined black in U-shape; orbicular stigma usually rather distinct, outlined black and with inner lining of pale scales, round to oblong and oblique; reniform distinct, dark edged basally and with dark (brown to grey or blackish) inner crescent, pale distally; area between antemedian and postmedian lines often irregularly darkened; subterminal line whitish, often rather weakly indicated in male, more distinct in female, without definite evagination below middle; a usually very distinct black streak extending basad from subterminal line just above tornus, usually reaching postmedian line (or streak less distinct and not reaching postmedian in '*debilis*' form); terminal area concolorous with ground colour; series of dark subtriangular marks along termen present, sometimes nearly joined into continuous line; fringe brownish in male to greyish in female, marbled with white dots at ends of veins. Hindwing pale to dark brownish grey, with or without distinct discal spot; dark line along termen present, continuous or broken; fringe whitish with dark central line. Underside: forewing grey-brown except towards costa, dorsum and termen (beyond subterminal line) where pale ochreous, costa and termen mottled darker; reniform and postmedian line rather indistinct; hindwing whitish, mottled darker towards costa and termen; discal spot and postmedian line rather distinct. Abdomen ochreous to yellowish brown in male, laterally pinkish, whitish ochreous, strongly mottled blackish in female. Male abdominal base (Fig. 25f) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 25g): uncus moderately narrow, pointed, not hooked; valva oblique, angular with costa apically near straight, cucullus well differentiated, truncately rounded, with well-developed corona of ca. 40–45 elements in a single row and well-spaced field of large spinose setae not forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper narrow, claw-like, curved; ampulla very short and fine, digitate; phallus (Fig. 25h) with subapical tooth absent; vesica very long, forming complete loop; cornuti in single unbroken band, rather short basally, of moderate length from near base to apex. Female S7 as in Fig. 25i. Female genitalia (Figs 25j, k): ovipositor lobes blunt, small, weakly squared off; segment 8 with a few shortish setae laterally, with numerous short to long setae in a band dorsally; ostium with rather long prominent dorsal desclerotised ridges and moderate lateral pockets, right pocket in ventral view longer; ductus bursae moderately long, narrow, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae weakly rugose, with a pair of small scobinate ridged signa; dorsal signum smaller; (appendix bursae very large, but smaller than that of *averilla*).

Type material. *Hadena mutans*: Lectotype (designated by Dugdale (1988: 203)): male, 'Type [green-ringed circular label] / N. Zealand Bolton 54-4 / 100. Hadena mutans' [per JSD] (NHMUK) (examined, not dissected).

Note. *Hadena mutans* was described from 11 specimens of both sexes collected by Bolton, Colenso and Sinclair (Walker 1857). The type locality is presumed to be Auckland (Dugdale 1988), as for *H. lignifusca* and *Xylina spurcata*, also collected by Bolton (below).

Hadena lignifusca: Lectotype (designated by Dugdale (1988: 203)): male, 'Type [green-ringed circular label] / N. Zealand Bolton 54-4 / 101. Hadena lignifusca' [per JSD] (NHMUK) (examined, not dissected).

Note. *Hadena lignifusca* was described from three males collected by Bolton (Walker 1857).

Xylina spurcata: Lectotype (designated by Dugdale (1988: 204)): female, 'Type [green-ringed circular label] / N. Zealand Bolton 54-4 / 21. Xylina spurcata' [per JSD] (NHMUK) (examined, not dissected).

Note. *Xylina spurcata* was described from two females collected by Bolton (Walker 1857).

Xylina vexata: Holotype: male, 'Type [green-ringed circular label] / N. Zealand. Auckland Oxley 60–73 / Xylina vexata' [per JSD] (NHMUK) (examined, end of abdomen including genitalia missing).

Note. *Xylina vexata* was described from a single male collected by T. R. Oxley (Walker 1865b). The true type locality is Nelson, not Auckland, as established by Dugdale (1988: 17).

Mamestra acceptrix: Holotype: female, '603 / CIX f. 19 Mamestra acceptix n. N. Seeld. / acceptrix n. / Type [red-ringed circular label] / Felder Colln.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Mamestra acceptrix*, like other Felder and Rogenhofer species, lacks a description, and is based on an illustration; however, as there is one specimen in the NHMUK labelled as coming from the Felder Collection, this is regarded as the holotype (cf. Dugdale 1988: 204). The type locality is Nelson, as established by Dugdale (1988).

Mamestra passa. Holotype: female, 'Cal. / Type / Mamestra passa 1913 Morr' (MSUC) (not examined, but identity clear from photograph and discussion in Franclemont (1981)).

Note. *Mamestra passa* was described from an unspecified number of specimens, but there is nothing in the original description to imply more than one was seen, and only one relevant specimen is in MSUC. The type

locality was given as California by Morrison (1874); Franclemont (1981) implies that this was an error due to mislabelling, and does not discuss the possibility that the species was accidentally imported to California. There is no other evidence that *I. mutans* has ever occurred in California, but a once-off importation cannot be ruled out.

Hadena debilis: Lectotype (here designated): female, 'Type [red-ringed circular label] / N. Zealand Enys. 77-34 / Hadena debilis Butler Type' [per JSD] (NHMUK) (examined, not dissected).

Note. *Hadena debilis* was described from 'several examples' of unspecified sex from the collections of J. Hector and J.D. Enys; the locality was given as '? North Island' by Butler (1877); only one relevant specimen apparently remains in NHMUK (Dugdale 1988). Dugdale (1988) gives Hawkes Bay (HB) as the likely locality for the lectotype: Enys took over the lease of Akitio station in the northern Wairarapa (WA) with his brother in 1873 (Starke 1993), so perhaps this is the true type locality. There is no mention of type material in the original description, and the mention of a holotype by Dugdale (1988: 204) does not constitute a valid lectotype designation, so the specimen hitherto regarded as the holotype is here designated lectotype. As noted in the key to species and description above, *debilis* corresponds to the weakly marked form with the dark forewing streak from the subterminal line above the tornus not reaching the postmedian line.

Note. *Maoria mutans* ab. *pallescens* Warren was synonymised with *mutans* by Dugdale (1988: 204); the name is infrasubspecific and therefore unavailable (ICZN Article 45.6.2).

Distribution. (Map 25). Throughout New Zealand from the Three Kings Islands to Stewart Island.

TH / ND, AK, CL, WO, BP, TK, TO, GB, HB, RI, WI, WN / SD, NN, BR, WD, MB, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL / SI

Biology. The larva (Fig. L25) is polyphagous on dicotyledonous plants, chiefly herbaceous, but occasionally feeds on trees and shrubs, e.g. apple (*Malus domesticus*) where young larvae may damage the surface of fruits as well as feeding on the leaves. The larva is briefly described as follows by Hudson (1928: 66): "rather stout, with the anterior segments wrinkled. It varies much in colour; the dorsal surface is usually reddish-brown; the lateral line is broad and black; a series of subdorsal stripes also black; the ventral surface is green. Sometimes these markings are hardly visible, and the larva is entirely green, whilst occasionally the brown colour predominates." Hudson (*loc. cit.*) figured the larva on his pl. I, fig. 27. Bejakovich and Dugdale [(1998)] keyed and figured the larva (their fig. 62, reproduced here as Fig. L25); they distinguish the larva of *I. mutans* from those of *I. ustistriga* and members of the *I. insignis* complex on the basis of the following characters: segments A7–A9 without a sublateral dark pattern (though white marbling may be present) (sublateral dark pattern present in the other species); A8 with a three-pronged dorsal dark pattern (U-shaped pattern in the other species). Pupation is in earth or moss (Hudson 1928).

Flight period. Throughout the year, at least in lowland sites.

Remarks. *Ichneutica mutans* is one of New Zealand's commonest and widespread noctuids, occurring throughout the country from Northland to Stewart Island in a wide range of native and modified habitats. Its relative abundance and polyphagous habits as a larva, with host-plants including important crops such as apple (*Malus*), cabbage (*Brassica rapa*) and garden pea (*Pisum sativum*), have given it the status of a minor pest species in the past (e.g. Collyer & van Geldermalsen 1975, Frérot & Foster 1991). However, White (1991) already documented massive declines in the prevalence of this species between the early 1960s and late 1980s at his two tussock grassland light-trapping sites at Cass MC: *I. mutans* declined by 83.4% at the less modified site and by 91.4% at the more modified site in this time period (data derived from White 1991: Appendix 1). White argued that the displacement of endemic herbs by invasive browntop grass (*Agrostis capillaris*) was a major driver for this decline. It seems likely that the species has suffered elsewhere, although quantitative data are lacking and it is undoubtedly able to adapt to exotic herbaceous plants in weedy places. There is a great need for renewed and ongoing monitoring of populations of common moths such as this.

Frérot and Foster (1991) studied the pheromones of populations identified as *I. mutans* from Auckland AK and Lincoln MC. They found that both populations shared the same main female sex pheromone components, but that the Lincoln population had an extra aldehyde component ((Z)-9-tetradecenal) and males from this population would only respond if this component was present; likewise even a small quantity of the aldehyde suppressed any response from Auckland males. The implication is that two reproductively isolated 'entities' have been confused under the name *mutans*. These entities would appear to be sympatric throughout much of the country at least from Taranaki south, as Frérot *et al.* (1993) reported that traps baited with Auckland-type and Lincoln-type pheromone blends both caught males in all areas where they were set, except at their three sites in the Wellington district

(WN), where only the Lincoln-type traps attracted males. Frérot *et al.* (1993: 78) note that the 'neck' of the cucullus in the male valva appears to be narrower in the Lincoln-type males than in the Auckland-type males, but I have been unable to confirm this observation: specimens examined for this revision show no obvious variation in this character. Since no other morphological differences have been observed to enable separation of these two putative species, their taxonomy and diagnosis is beyond the scope of the current morphology-based revision and *I. mutans* is here treated for the time being as a single species with separate 'pheromone races'.

As noted above under *I. averilla*, Watt (1914) recognised distinctive 'varieties' of *mutans* based on his detailed studies of eggs, but there appears to be no definite voucher material of the relevant date in his collection in MONZ. Nonetheless, in the MONZ series of *mutans*, I did find two females collected by Watt labelled 'Egmont 24/1/16' and 'Egmont 25/1/16'; both are specimens of *Ichneutica morosa*. It seems possible that *I. morosa* corresponds to Watt's 'rich reddish brown' variety B. Since no Watt specimens were found in the MONZ series of *I. morosa*, he may have misidentified this species; alternatively, the *morosa* specimens ended up in the *mutans* series due to a curatorial error when transferring specimens, because of the alphabetical proximity of the two species names. In view of the suspected cryptic diversity within *I. mutans*, it would be of immense interest to pursue this question of the 'egg varieties' further, more than 100 years after Watt's pioneering work.

26. *Ichneutica petrograpta* (Meyrick, 1929) new combination

Figs 26a–d (adults); 26e–g (male abdominal base and genitalia); 26h–j (female S7 and genitalia).

Melanchra petrograpta Meyrick, 1929. *Transactions and proceedings of the New Zealand Institute 60*: 484.

Diagnosis. As pointed out by White (2002: 313), *Ichneutica petrograpta* is very similar to *I. mutans*. The female of *petrograpta* has the area between the postmedian and subterminal lines on the forewing suffused whitish, forming a rather distinct fascia contrasting with the grey ground colour; in female *mutans* this area does not stand out from the rest of the wing, except in certain strongly marked specimens, but in these, the base of the forewing costa is likewise contrastingly pale (Fig. 25e), whereas in *petrograpta* the costa is uniform greyish apart from the pale ends of the cross-lines. Also in these variegated *mutans* females (and indeed in almost all specimens of *mutans*), there is a distinct blackish triangular dash from the subterminal to the postmedian line just above the tornus; this dash is absent in *petrograpta* females (and in most, but not all, males). The males of the two species are more difficult to distinguish superficially: *petrograpta* appears darker because of its strong scattering of black scales over the forewing (cf. Howes 1943), and has slightly longer antennal pectinations (up to 2.5x the width of the flagellum, cf. up to 2x in *mutans*).

Description. Adult (Figs 26a–d). Wingspan 39–44 mm (male); 38–40 mm (female) (few set specimens examined). Male antennae bipectinate to *ca* 18–20 segments short of apex, pectinations up to *ca* 2.5x width of flagellum. Head and thorax mottled black, white and olive brown or greenish brown (more olive or greenish brown present in male); prothorax with black bar; tegulae with diffuse exterior black lines; scales unicolorous or bicoloured, narrow lamellate. Forewing ground colour olive brown or greenish brown, mostly obscured in female by black and white scaling; basal black streak present, short, curved towards costa and bisected by white scaling longitudinally; antemedian line rather distinct, white in female, pale olive in male, edged black on both sides; postmedian line distinct (more so in female), weakly scalloped, colour as for antemedian; claviform stigma present, distinct, U- to V-shaped, black-edged and infilled with white (female) or pale olive (male) scales; orbicular stigma distinct, round, colour as for claviform; reniform distinct, rather large, colour as for other stigmata but with additional dark basal interior crescent; area between antemedian and postmedian lines appears darkened compared to area between postmedian and subterminal lines, which is strongly suffused white in female, white and olive in male; subterminal line distinct, white or white and olive, without distinct evagination, and often in male with contrasting dark scaling basad, especially towards tornus; terminal area mottled black, white and olive in male, black and white in female; series of dark crescentic marks along termen present; fringe black and white, weakly chequered. Hindwing pale brownish to greyish, with indistinct discal spot, otherwise unmarked; dark line along termen present, broken into dashes; fringe white to brownish white with dark median line. Underside: forewing grey to brownish grey; more whitish exteriorly where mottled grey; reniform stigma and postmedian line rather indistinct; hindwing whitish, strongly mottled grey especially towards costa; discal spot and postmedian line rather distinct. Abdomen with dorsal scale-tufts on segments 1–3 mottled black, white and olive; rest of abdomen ochreous, variably speckled black and white. Male abdominal base (Fig. 26e) without brushes, levers or pockets;

A3 apodemes present. Male genitalia (Fig. 26f): uncus moderately robust, pointed, minutely hooked; valva oblique, angular, cucullus well differentiated, subtriangular, truncate, with well-developed corona of *ca* 40 elements in a single row and rather diffuse field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta present, not well separated from corona; clasper rather slender, curved only at base; ampulla short, thumb-like; phallus (Fig. 26g) with subapical tooth absent; vesica very long, forming complete loop; cornuti moderately short, slightly longer at mid-length of vesica, in single uninterrupted band. Female S7 as in Fig. 26h. Female genitalia (Figs 26i, j): ovipositor lobes blunt, small, truncately rounded; segment 8 with a few medium length setae laterally in caudal part of segment, with numerous short to medium setae forming distinct band dorsally; ostium with dorsal desclerotised ridges short, poorly developed and flat, and lateral pockets moderately long, left pocket in ventral view longer; ductus bursae moderately long, very slightly broader at about mid-length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae rather strongly rugose, with a single very small scobinate (weakly ridged) signum; (appendix bursae large).

Type material. Holotype: female, 'L. Wakatipu New Zealand GVH 26.1.05 / petrograpta Meyr. / Dasygaster petrograpta Meyr. 1/1 E. Meyrick det. in Meyrick Coll. Holotype ♀ / Agrotidae genitalia slide 360' [per JSD] (NHMUK) (examined, including slide).

Note. *Melanchra petrograpta* was described from a single female taken at sugar (Meyrick 1929).

Distribution. (Map 26). South-western South Island only.

— / WD, OL, FD

Biology. Unknown.

Flight period. December to February.

Remarks. *Ichneutica petrograpta* is apparently endemic to the south-west of the South Island in the Westland, Otago Lakes and Fiordland districts, occurring locally in subalpine and alpine shrublands and tussocklands. It is rather poorly represented in collections.

VIII. *Ichneutica insignis* group

Diagnosis. Male abdominal base without brushes, levers or pockets; A3 apodemes present. Uncus pointed; valva sinuous; cucullus moderately to well differentiated; claspers symmetrical, narrow, without transverse lamellae; apical setae of valva not forming distinct 'crest' or crest weak; dorso-apical hooked seta of corona present or absent; vesica not strongly elongated; cornuti not reduced, cornutal strip not interrupted.

Remarks. This species group presents by far the most difficult taxonomic problems in the New Zealand Noctuidae. A few species are rather constant and easily recognised (e.g. *brunneosa*), but others appear so variable, both in wing pattern and in male and female genitalia, that it is almost impossible to arrive at a satisfactory taxonomic scheme based on these characters. It is likely that very recent and/or incomplete speciation is rife in the *insignis* group as a whole (see also 'Note on *insignis-plena* complex' below).

This treatment recognises 14 species in the *insignis* group, including 4 new species. In delineating taxa in the complex, much reliance has been placed on characters of the male antennae (length of pectinations and number of segments at the antennal apex without pectinations); rather subtle differences in the male valvae have also been accorded some weight where they conform with differences in antennae and/or wing pattern. In order to complete this revision within a reasonable time-frame, I have had to curtail studies of this extremely difficult group with a number of issues not fully resolved, especially the larval and adult diagnostic characters and taxonomic status of *I. insignis*, *I. plena* and *I. skelloni*, and of the various tentatively assigned 'forms' in the complex surrounding the latter two species. Further taxonomic changes are almost certain when more detailed studies are conducted in this group, and the classification given here must be considered tentative.

27. *Ichneutica brunneosa* (Fox, 1970) new combination

Figs 27a–c (adults); 27d–f (male abdominal base and genitalia); 27g–i (female S7 and genitalia).

Melanchra brunneosa Fox, 1970. *New Zealand Entomologist 7(3)*: 22–24.

Diagnosis. The distinctive reddish ochreous coloration of *Ichneutica brunneosa* and its very constant pattern of large stigmata and distinct crosslines allows for easy recognition. Paler forms of *Ichneutica sericata* have a

similar forewing colour, but lack the distinct antemedian and postmedian lines of *brunneosa*; the male of *sericata* also has much longer antennal pectinations (up to *ca* 4x the flagellum width; cf. 2.5x in *brunneosa*).

Description. Adult (Figs 27a–c). Wingspan 32–37 mm (male); 34–39 mm (female). Male antennae bipectinate to *ca* 15 segments short of apex, pectinations up to *ca* 2.5x width of flagellum. Head and thorax rust brown, paler (reddish ochreous) on frons and in patches on prothorax and tegulae, with scales mostly bicoloured, narrow lamellate, some broad lamellate on tegulae. Forewing rust brown with markings paler, reddish ochreous; antemedian line moderately distinct, near straight, oblique; postmedian line distinct, weakly scalloped; claviform stigma present, distinct, V-shaped; orbicular stigma large, oblique, filled interiorly with rust brown; reniform large, distinct, pale edging more distinct distally; area between antemedian and postmedian lines not darkened; subterminal line distinct, with W-shaped evagination above tornus; terminal area concolorous, dissected by pallid lines along veins that extend into fringe; series of subtriangular marks along termen present, distinct, deep rust brown; fringe ochreous, with deep rust brown median line. Hindwing reddish brown, unmarked except for rather distinct discal spot; dark line along termen present; fringe reddish brown, whitish basally. Underside: forewing reddish ochreous to reddish brown, darker in apical 1/3, and with veins beyond disc lined paler; reniform stigma rather distinct; postmedian line very indistinct; hindwing reddish ochreous, darker exteriorly; discal spot distinct; postmedian line moderately distinct. Abdomen with distinct dorsal scale-tuft on segment 1 and smaller tuft on 2 concolorous with thorax; rest of abdomen pale ochreous, mixed with rust brown, especially laterally. Male abdominal base (Fig. 27d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 27e): uncus moderately narrow, bluntly pointed, not hooked; valva oblique, sinuous, cucullus moderately well differentiated and bluntly rounded with reduced poorly defined corona of ca. 17–21 well-spaced elements in a single row and field of spinose setae not forming distinct 'crest'; apico-dorsal strong hooked seta absent; clasper moderately robust, weakly curved; ampulla of moderate length, weakly clubbed; phallus (Fig. 27f) with subapical tooth present, minute; vesica forming complete loop; cornuti short basally and apically, longer centrally, in uninterrupted band. Female S7 as in Fig. 27g. Female genitalia (Figs 27 h, i): ovipositor lobes blunt, small, squared off; segment 8 with medium-length setae laterally, and short to medium setae in a band dorsally; ostium with indistinct dorsal ridges that are hardly desclerotised and with short lateral pockets of even length; ductus bursae of moderate length, rather broad distally, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and with few rugae, outer curve sclerotised, not rugose; corpus bursae weakly rugose, with two indistinct elongate scobinate signa, signa not ridged; ventral signum much longer but very weakly sclerotised.

Type material. Holotype: male, 'Mt Egmont, south side, 1700 ft. 26.xi.64, K.J. Fox' [data from Fox (1970b)] (MONZ) (not examined but photograph seen).

Note. Fox (1970b) described *Melanchra brunneosa* from the holotype, a female allotype from Lake Waikaremoana, and four male paratypes from Mt Taranaki / Egmont.

Distribution. (Map 27). From the Coromandel peninsula south to Stewart Island, with a large apparent gap in distribution in the central South Island.

CL, WO, TK, GB, WN / SD, NN, BR, FD, SL / SI

Biology. Unknown.

Flight period. October to January.

Remarks. It is interesting that this species, which is widespread and can be common in quite accessible localities, was overlooked by the earlier New Zealand collectors. It was first recognised by Kenneth Fox from specimens he collected on Mt Taranaki in the 1964 and 1967, though an earlier specimen collected by C.J. Lindsay at Lake Waikaremoana in 1961 was discovered in MONZ (Fox 1970b). Probably it is one of those species that responds well to the stronger (mercury vapour) lights available to moth collectors since the 1950s. It is found in native forest, but records indicate that it is a very local species.

28. *Ichneutica chlorodonta* (Hampson, 1911) new combination

Figs 28a–f (adults); D28g, h (underside); 28i–k (male abdominal base and genitalia); 28l–n (female S7 and genitalia).

Morrisonia chlorodonta Hampson, 1911. *The Annals and Magazine of Natural History (eighth series) 8*: 423–424.

Diagnosis. *Ichneutica chlorodonta* may be distinguished from most other species by the strong, complete greenish outlines to the orbicular and reniform stigmata and the very strongly marked and usually broad greenish subterminal line. The presence of a distinct blackish reniform stigma on the forewing underside (Figs D28g, h) is a useful diagnostic character. A form occurring in Westland and here attributed to *I. skelloni s.l.* (Fig. 40n) resembles *chlorodonta* superficially and in male genitalia, but is larger (wingspan 40 mm), and has a less strongly outlined reniform that includes some orange scaling; the forewing underside of this form lacks a distinct dark reniform, though a trace of the reniform is present. Differences between *I. chlorodonta* and the very closely related *subcyprea* are given under that species, below.

Description. Adult (Figs 28a–f). Wingspan 31–36 mm (male); 27–34 mm (female). Male antennae bipectinate to *ca* 20 segments short of apex, pectinations up to *ca* 2–2.5x width of flagellum. Head and thorax variegated pinkish, white, lime green and black in varying combinations; prothorax usually with distinct black transverse bar; tegulae often strongly green-suffused, and with blackish exterior lines; scales bicoloured or tricoloured, narrow lamellate. Forewing deep purplish brown, but this colour sometimes largely obscured by the wing markings; basal streak absent; subbasal blackish suffusion near dorsum present, bordered above by a strong lime-green patch; antemedian line nearly straight, glossy greyish lilac to glossy leaden, bordered black distally; postmedian line weakly scalloped, colour as for antemedian, bordered black basally; claviform stigma present, a lime-green crescent, usually bordered black distally; orbicular stigma small to large, bordered black exteriorly and with inner lining of lime-green, (often paler, almost creamy in female) or nearly filled with green; reniform small to very large, coloration as for orbicular; area between antemedian and postmedian lines more or less suffused blackish or sometimes glossy grey-lilac between orbicular and reniform, and with at least a trace of lime-green to pale olive-green or golden green scaling in dorsal 1/2 (often area enclosed by antemedian line, claviform and postmedian line almost entirely green); subterminal line represented by narrow to broad lime-green fascia, obsolete towards costa, black-bordered distally and with strong W-shaped evagination just below middle; terminal area blackish, often suffused glossy grey-lilac distally and with series of dark subtriangular marks along termen (sometimes joined into line), marks sometimes subtended by series of lime-green crescents; fringe purplish brown, paler basally. Hindwing dark brownish grey, unmarked, or with indistinct discal spot and postmedian line; dark line along termen present, moderately distinct; fringe brownish grey, paler basally. Underside (Figs D28g, h): forewing dark brown, whitish basally towards dorsum, sometimes suffused pinkish towards costa and termen; reniform stigma always very distinct, blackish, outlined pale; orbicular stigma present, indistinct to rather distinct, brown to blackish, outlined pale; postmedian line absent, indistinct or very distinct, where present smooth; hindwing suffused pink brown to dark brown, discal spot distinct; postmedian line indistinct to distinct. Abdomen with distinct dorsal scale-tufts on segments 1–3 purplish brown, otherwise silvery grey to blackish, usually tinged pink laterally and terminally in male. Male abdominal base (Fig. 28i) without brushes, levers or pockets; A3 apodemes present, extending on each side outside an imaginary line continuing caudad from S2 apodemes (cf. *subcyprea*, below). Male genitalia (Fig. 28j): uncus rather narrow, blunt, not or very weakly hooked; valva very upright, weakly sinuous, cucullus rather weakly differentiated, truncate with well-developed corona of ca. 32–37 elements in a single row and field of spinose setae of rather even width not forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona absent, but one or two enlarged corona elements in this position; clasper robust, nearly right-angled in middle, (not bulbous apically); ampulla rather short, digitate; phallus (Fig. 28k) with subapical tooth absent; vesica forming complete loop; cornuti basally very short and in a single row, from about mid-loop in several rows (forming single band), long and then becoming moderately short subapically. Female S7 as in Fig. 28l. Female genitalia (Figs 28m, n): ovipositor lobes blunt, small, squared off; segment 8 with a few short setae ventrolaterally, medium-length setae laterally, and short to medium setae in a band dorsally; ostium with moderately well developed dorsal desclerotised ridges and short lateral pockets of even length; ductus bursae of moderate length, rather broad distally, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and with few rugae, outer curve sclerotised, not rugose; corpus bursae moderately rugose, with pair of very elongate scobinate ridged signa, ventral signum shorter and sometimes poorly sclerotised.

Type material. Holotype: female, 'Type [red-ringed circular label] / N. Zealand Longstaff 1910-277 / 196 – 8.2.10 Ngaruawahia / Morrisonia chlorodonta Hmpsn type ♀ / abdomen missing' [per JSD] (NHMUK) (examined).

Note. Hampson (1911) described *Morrisonia chlorodonta* from an unspecified number of specimens, but unambiguously designated the female from Ngaruawahia as 'type'; he also described an 'aberration' ('Ab. 1') with a greater degree of green coloration on thorax and forewing, and mentioned a second locality, Taumarunui (as 'Taumaranui').

Distribution. (Map 28). Throughout the three main islands of New Zealand.

ND, AK, CL, WO, BP, TK, TO, HB, RI, WN / BR, WD, MB, NC, SC, OL, DN, FD, SL / SI

Biology. Unknown; no reared specimens were seen in collections.

Flight period. September to April.

Remarks. *Ichneutica chlorodonta* is a very widespread and locally fairly common species, but appears to be strictly associated with native forest and shrubland. There is considerable variation in the forewing markings, with particularly strongly marked specimens showing much green on the forewing occurring in wetter western districts such as Taranaki and Fiordland.

29. *Ichneutica subcyprea* new species

Figs 29a–c (adults); D29d (underside); 29e–j (male abdominal base and genitalia); 29k–m (female S7 and genitalia); L29 (larvae).

Diagnosis. *Ichneutica subcyprea* is very similar to *I. chlorodonta*; it differs in the slightly shorter pectinations on the male antenna (up to *ca* 1.5x flagellum width, cf. 2–2.5x in *chlorodonta*), in the lack of distinct lilac-grey to leaden coloration in the antemedian and postmedian lines, in the lack of green scaling between antemedian and postmedian lines (apart from the stigmata outlines), in the much paler hindwing, which has a coppery brown hue (dark brown in *chlorodonta*) and in the underside of both wings, which is much paler than in *chlorodonta* (see Figs D28g, h, D29d). In the male genitalia, the smaller, more rounded cucullus of the valva and less strongly bent clasper (Figs 29f, i) are diagnostic of *I. subcyprea*. The A3 apodemes of the male are also slightly shorter in *I. subcyprea* than in *I. chlorodonta* (see below and Figs 28i, 29e). In the female genitalia, the signa of the corpus bursae in *I. subcyprea* are much smaller than in *chlorodonta*.

Description. Adult (Figs 29a–c). Wingspan 32–34 mm (male), 30–32 mm (female). Male antennae bipectinate to *ca* 22–25 segments short of apex, pectinations up to *ca* 1.5x width of flagellum. Head and thorax pinkish brown, dark markings as described for *I. chlorodonta*, but lacking any green scaling. Forewing deep pinkish brown, suffused deep copper-brown to blackish; markings as described for *I. chlorodonta*, but subbasal green spot usually smaller and less distinct; inner edge of antemedian line, outer edge of postmedian and termen lacking distinct lilac-grey or leaden scaling; this scaling replaced by areas almost concolorous with the ground-colour that appear pink rather than grey or lilac in a strong light; orbicular stigma usually smaller than in *chlorodonta*, nearly round; reniform stigma enclosing only very small crescent of ground-colour (in one specimen, orbicular and reniform reduced and entirely green without inclusions of ground-colour). Hindwing pale copper-brown, much paler than in *I. chlorodonta*, suffused darker exteriorly and with paler spot near tornus within suffusion; discal spot and postmedian line small and fairly distinct, or indistinct. Underside (Fig. D29d): much paler than in *I. chlorodonta*; forewing and hindwing pale glossy ochreous, suffused pinkish towards costa and termen; forewing with distinct dark reniform stigma but orbicular very indistinct and pale and postmedian line absent; hindwing with distinct discal spot, postmedian line very indistinct. Abdomen much paler than in *I. chlorodonta*, yellow-ochreous, scale tufts on dorsum of segments 1–3 pinkish brown; some scales on segment 1 tuft white-tipped. Male abdominal base (Figs 29e, h) without brushes, levers or pockets; A3 apodemes present, shorter than in *I. chlorodonta*, ending on each side level with S2 apodemes. Male genitalia (Figs 29f, i): as described for *I. chlorodonta*, but cucullus distinctly smaller and more rounded and corona with *ca* 25–30 elements; clasper not as sharply bent and tending to be bulbous apically; phallus and vesica (Figs 29g, j) as in *I. chlorodonta*. Female S7 as in Fig. 29k. Female genitalia (Figs 29l, m) as described for *I. chlorodonta*, but S8 with setae less dense, more scattered, especially laterally; ostium with dorsal desclerotised ridges somewhat more prominent and lateral pockets slightly longer; corpus bursae with signa very reduced, much shorter than in *chlorodonta* and not ridged.

Type material. Holotype: male, 'NEW ZEALAND AK 36 59.6S 174 34.3E Waitakere Ra. 30 m Farley Tk (W end) emg. 11 Oct 2001 R.J.B. Hoare / Larva in dead frond base on tree fern 'trunk' near chewed *Tmesipteris* sp. 18 Aug 2001, reared on *Tmesipteris* / NZAC slide Noct. 338 genitalia ♂ / NZAC04226028 [database barcode

label]' (NZAC). Paratype: 2 males, 2 females, AK: Waitakere Ra. 270m, Tom Thumb Bypass Tk, emg. 16, 18 (♂♂), 20, 21 Oct (♀♀) 2001, R.J.B. Hoare, larvae on *Tmesipteris tannensis* 4 Aug 2001 (genitalia on slides NZAC Noct. 384 ♂, Noct. 478 ♀) (all NZAC).

Note. The type series consists of all known reared specimens. The fork-fern near which the holotype larva was found was probably *Tmesipteris tannensis*. Both tracks where the larvae were found in 2001 are now closed due to the continuing spread of kauri dieback (*Phytophthora agathidicida*) in the Waitakere Ranges.

Distribution. (Map 29). In the North Island, only known from Northland, Auckland, Coromandel, near Ohakune TO, Mt Taranaki and Mt Messenger TK; in the South Island only known from Opouri Valley SD.

ND, AK, CL, TK, TO / SD

Biology. Larvae (Fig. L29) were discovered in two places near Huia in the Waitakere Ranges AK (Farley Track and Tom Thumb Bypass Track), feeding on fork-ferns (*Tmesipteris tannensis*; Psilotaceae) growing from the trunks of tree-ferns (Hoare 2006, as *Graphania chlorodonta*). Young larvae were bright green and found feeding openly by day on the 'leaves' (strictly speaking, enations): no detailed description was made at this stage, but a photograph was taken by N.A. Martin (Fig. L29), and this shows pale dorsal, subdorsal and lateral lines and pale yellow intersegmental divisions. Later, when given the opportunity to hide in dead frond-bases of silver fern (*Cyathea dealbata*), they became deep pinkish brown and camouflaged against this substrate, and fed at night. The following description was made on 5 Sep 2001 of a larva collected on 4 Aug (on Tom Thumb Bypass Track) and probably in its penultimate or final instar: 'Length *ca* 28 mm. Head pale pinkish, margins of adfrontal area greyish pink, rest of head reticulated dark brownish pink; body dull pinkish, paler ventrally, densely covered with white speckling and a lesser extent of blackish speckling; speckling macroscopically forming a narrow blackish mid-dorsal stripe, an indistinct whitish subdorsal stripe and an indistinct whitish lateral stripe that is paler and more well-defined on thorax; legs and prolegs yellowish white, each proleg with dark patch anteriorly at base; setae D1 and D2 on T2–3 and A1–7, and seta L2 on A1–7 surrounded by white at base.' Larvae pupated in the dead frond-bases. The host-plant is a highly unusual epiphytic fern and belongs to one of two genera in the order Psilotales (Smith *et al.* 2006).

Flight period. Mainly September to December, with one record from January and one from July.

Etymology. The name *subcyprea* is derived from the Latin prefix *sub-* (under or below) and *cypreus* (copper) and refers to the pale coppery brown hindwings that distinguish this species from *I. chlorodonta*.

Remarks. This species was at first confused with *I. chlorodonta* (Hoare 2006), but is described here as new based on relatively small but significant differences in external appearance and male and female genitalia from that species. The remarkable host-plant association of *I. subcyprea* may well be additional evidence in favour of its separation as a distinct species, on the assumption that the biology of *I. chlorodonta* differs. Although there are few rearings of *I. subcyprea*, it seems reasonable to suppose that feeding on *Tmesipteris*, a brittle, coriaceous plant with no other known insect associates, represents a highly specialised host shift and that the species is probably monophagous. No other New Zealand noctuid is known to feed exclusively on ferns.

Ichneutica subcyprea is poorly represented in collections, but is probably very local in occurrence and is likely to have been overlooked. It has only been found in humid native forest where its host-plant occurs. Interestingly, in the Waitakere Ranges AK, where *I. chlorodonta* and *I. subcyprea* are sympatric, *I. chlorodonta* has so far only been found at higher altitudes (above 300 m a.s.l.), whereas *I. subcyprea* occurs from near sea-level (at the type locality near Huia) to 380 m. The female of *I. subcyprea* has apparently not been captured in the wild, and is only known from reared specimens.

30. *Ichneutica dundastica* new species

Figs 30a–d (adults); 30e–g (male abdominal base and genitalia); 30h–j (female S7 and genitalia).

Diagnosis. The male of *Ichneutica dundastica* has a rather nondescript appearance, but can readily be distinguished from its relatives in the *insignis* group by the very long antennal pectinations, reaching about 5x the width of the flagellum. The female is a far more strikingly patterned moth; the large size and very large white reniform combined with the red-brown and purplish grey variegation of the forewing are distinctive; other species in the *insignis* group with a large white reniform in the female have conspicuous green coloration on the forewing, which *dundastica* lacks. The apparently very restricted range of *I. dundastica* (Tararua Range WN) limits the likelihood of confusion with other species.

Description. Adult (Figs 30a–d). Wingspan 38.5–42 mm (male); 39.5–45 mm (female). Male antennae bipectinate to *ca* 10–12 segments short of apex, pectinations up to *ca* 5x width of flagellum. Head and thorax pale reddish brown; prothorax with usually distinct dark transverse bar, and often scattering of whitish scales, especially in female; tegulae centrally suffused pale reddish ochreous in male to white in female; tegulae exteriorly with scattered blackish scales (male) or with more distinct blackish outline (some females), scales mostly narrow lamellate. Forewing dull reddish brown, suffused with purplish grey in bands before antemedian line, before subterminal line and in terminal area; suffusion more pronounced in female leading to brighter appearance (male often appearing superficially rather unicolorous dull brown, but purplish scaling probably always present in fresh specimens); basal streak usually short or absent, occasionally longer and distinct, black; antemedian line distinct only centrally, pallid, edged darker distally; postmedian line very weakly indicated, pallid, irregularly crenulate; claviform stigma present, usually more distinct in female, a small whitish V; orbicular stigma moderately large, round to oblong, outlined black, with inner lining of whitish and pale red-brown scales and infilled purplish grey; reniform large, coloration as for orbicular in male, in female with very conspicuous white infill distally; area between antemedian and postmedian lines not darkened; subterminal line present, rather distinct, picked out in cream to pale red-brown scales and often highlighted anteriorly by deep red-brown suffusion that is most conspicuous towards tornus, where it may contain some blackish scales; terminal area purplish grey; a continuous dark line along termen; fringe brown, with some paler scaling at intervals giving very weakly chequered appearance. Hindwing brown, with more or less distinct suffused discal spot; dark line along termen present, distinct; fringe whitish beyond dark subbasal line. Underside: forewing whitish brown to greyish brown or mid-brown, almost unmarked except for trace of reniform stigma, veins beyond disc sometimes faintly lined paler; hindwing somewhat paler, usually with rather distinct discal spot and with variably distinct postmedian line. Abdomen silvery grey in male, pale yellowish brown laterally and terminally; mottled whitish brown and greyish in female. Male abdominal base (Fig. 30e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 30f): uncus rather narrow, pointed, not hooked; valva upright, narrow, sinuous, cucullus rather well differentiated, truncately rounded with well-developed corona of ca. 30–35 elements in a single row and rather dense even band of spinose setae not forming distinct 'crest'; apico-dorsal strong seta separate from corona present but not noticeably hooked and not strongly differentiated from corona elements; clasper moderately robust, evenly curved, in shape of profile of a duck's head; ampulla long, digitate; phallus (Fig. 30g) with subapical tooth present as low sclerotised ridge; vesica forming complete loop; cornuti moderately short and in narrow band basally, moderately long and dense (in broad band) apically. Female S7 as in Fig. 30h. Female genitalia (Figs 30i, j): ovipositor lobes very short, blunt, truncately rounded; segment 8 without setae laterally with few medium to long setae forming sparse band dorsally (only at caudal end of segment); ostium with distinct long dorsal desclerotised ridges and short lateral pockets of even length; ductus bursae of moderate length, slightly broadened in mid-portion, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve weakly sclerotised and rugose in region of ductus seminalis inception, sclerotised and smooth on exterior curve; corpus bursae barely rugose, with pair of very long scobinate ridged signa of roughly equal length.

Type material. Holotype: male, "NEW ZEALAND WN; Tararua Ra; Dundas Hut 1250m; 29 Nov 1984; J.S. Dugdale; m.v. trap / NZAC slide Noct. 157 genitalia ♂/ NZAC04226029 [database barcode label]" (NZAC). **Paratypes:** 11 males, 8 females, as follows: 2 females, same data as Holotype; 7 males, 3 females, same locality and collector as Holotype, but 26 Nov 1984 (1 female), 27 Nov 1984 (4 males, 1 female), 3 Dec 1984 (2 males, 1 female, NZAC slide Noct. 364 genitalia ♀), 6 Dec 1984 (1 male) (all NZAC); 4 males, 3 females, "Subalpine scrub; Dundas Hut 3700'; Northern Tararuas; 1–3.12.84 K.J. Fox" (MONZ).

Distribution. (Map 30). Only known from the Tararua Range to the north-east of Wellington.

WN / —

Biology. Unknown. All adults were collected at light.

Flight period. Only recorded in late November and early December, but there has been little or no sampling at other times of year.

Etymology. The species name is derived from the type (and only known) locality, Dundas Hut, combined with the late Latin adjective 'phantasticus' (fantastical), indicating the striking appearance of the female.

Remarks. Though *I. dundastica* is at present only known from a single alpine shrubland locality, it is likely to be more widespread in the Tararua Range. As an alpine species with a very restricted known distribution, its populations should be carefully monitored in the face of climate change.

31. *Ichneutica fenwicki* (Philpott, 1921) new combination

Figs 31a, b (adults); 31c–h (male abdominal base and genitalia); 31i–k (female S7 and genitalia).

Melanchra fenwicki Philpott, 1921. *Transactions and proceedings of the New Zealand Institute 53*: 337.

Melanchra dives Philpott, 1930. *Records of the Auckland Institute and Museum 1*: 1. Synonymised by Dugdale (1988: 202).

Diagnosis. The relatively large size, deep reddish brown to blackish forewing coloration, and especially the black patches of scales adjacent to the subterminal forewing line are together distinctive. The male genitalia differ from those of other members of the *insignis* group in the rather long strip of scattered short basal cornuti; in other species these short cornuti are much denser and not scattered.

Description. Adult (Figs 31a, b). Wingspan 36–42 mm (male); 43–47 mm (female). Male antennae bipectinate to *ca* 13–15 segments short of apex, pectinations up to *ca* 3.5x width of flagellum. Head and thorax deep reddish brown, sometimes tinged blackish, with scales weakly bicoloured (pale-tipped), narrow lamellate. Forewing deep reddish brown to blackish, darker specimens usually palest along costa and dorsum and in subterminal area beyond reniform stigma; basal streak conspicuous, black, or inconspicuous due to admixture of yellowish and red-brown scales; antemedian line absent or weakly indicated near claviform by a short section; postmedian line at most weakly indicated below reniform by short W-shaped section of black or red-brown scales; claviform stigma present, usually large and distinct, V-shaped, black, with inner lining of yellowish scales; orbicular stigma large, round to oblong, outlined black, with inner lining of yellowish scales; reniform large, coloration as for orbicular; area between antemedian and postmedian lines sometimes darkened, blackish; subterminal line present, rather irregular and indistinct, picked out in yellowish scales and often highlighted by surrounding black patches, especially in middle of termen and towards tornus; terminal area concolorous with rest of wing, or with darker area between antemedian and postmedian lines; series of dark subtriangular marks along termen absent; fringe dark brown, inconspicuously paler basally. Hindwing dark brown, unmarked; dark line along termen present, indistinct; fringe brownish, paler basally. Underside: forewing dull reddish brown to fuscous, paler dorsally; reniform stigma rather indistinct; postmedian line absent; hindwing whitish brown densely suffused dark brownish, especially towards termen, and reddish brown towards costa; discal spot distinct; postmedian line indistinct or absent. Abdomen mottled black and reddish ochreous, paler laterally and apically. Male abdominal base (Figs 31c, f) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 31d, g): uncus rather narrow, truncate or pointed, slightly hooked; valva upright, sinuous, cucullus moderately differentiated, spatulate / truncately rounded with well-developed corona of ca. 35–40 elements in a single row and dense band of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona present but somewhat obscured in ventral view by spinose setae, or may be reduced (Secretary Island form, see below); clasper moderately robust, boomerang-shaped or more evenly curved; ampulla very short, digitate; phallus (Figs 31e, h) with subapical tooth absent; vesica forming complete loop; cornuti very short and scattered basally, moderately long and dense apically, where forming single uninterrupted band. Female S7 as in Fig. 31i. Female genitalia (Figs 31j, k): ovipositor lobes blunt, of moderate size, squared off; segment 8 with scattered medium length setae laterally and in irregular band dorsally; ostium with strongly raised elliptical dorsal desclerotised ridges and short lateral pockets, pocket on right in ventral view longer; ductus bursae of moderate length, with slight bulge about 1/3 from ostium to corpus bursae, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose (except towards ductus seminalis inception, where rugose and weakly sclerotised); corpus bursae moderately rugose, with pair of elongate scobinate signa, ventral signum very long but very weakly developed, not ridged; dorsal signum short, ridged.

Type material. *Melanchra fenwicki*: Holotype: male, 'Dunedin, 1-12-14 / Melanchra fenwicki Philp. Holotype ♂. [rectangular label with small red circular label attached to bottom right corner] / Fenwick Coll. / M. fenwicki, Philp.' (MONZ) (examined, not dissected).

Melanchra dives: Holotype: male, '[red circular label] / Flagstaff 23.10.14 / Melanchra dives Philpott Holotype. ♂ / C.E. Clarke Collection' (AMNZ) (examined, not dissected).

Note. *Melanchra fenwicki* was described from a single specimen (Philpott 1921). *Melanchra dives* was described from 'a good series of both sexes' (Philpott 1930b: 1); the holotype was designated in the original description.

Distribution. (Map 31). Local in the southern South Island and Stewart Island only.

DN, FD, SL / SI

Biology. The life history is unknown.

Flight period. October to November.

Remarks. *Ichneutica fenwicki* is apparently a very local spring-flying species of southernmost New Zealand, best known from the area of Dunedin (e.g. Swampy Summit and Mt Cargill), but also occurring locally in the Catlins (Tautuku, Purakaunui Bay), Fiordland and Stewart Island. An obscurely marked narrow-winged form has been captured at sea level on Secretary Island FD by E. Edwards and P. Willemse, and apparently differs from typical *fenwicki* in the strong reduction of the apico-dorsal hooked seta of the cucullus (based on a single male genitalia preparation). Although this character is considered too minor here to warrant taxonomic recognition, further study of this population is desirable.

This species was erroneously reported from Britain as *Melanchra dives* or *Graphania dives* by Smith (1954: 20), South (1961: pl. 72, fig. 11), Bretherton *et al.* (1979: 274) and Waring and Townsend (2003: 409). The record is based on a specimen believed to have been taken flying by day at Spurn Head, Yorkshire by J.N. Thornton. The moth is in the NHMUK: it has been re-examined by M. Honey (pers. comm.) and identified as a specimen of *Ichneutica averilla*.

Note on the *Ichneutica insignis-plena* complex

Ichneutica insignis and *I. plena* are treated here as separate species, but morphologically they seem to represent the extremes of an almost continuous swathe of variation that has not fully separated into diagnosable entities. Whilst typical (pinkish brown) *Ichneutica insignis* and typical (bright green) *I. plena* are abundantly distinct on external characters, no constant differences have been found in either male or female genitalia between the two 'species', and there is an intermediate form (itself variable) that defies confident assignment to one or the other (see below), but is here assigned to *I. plena s.l.* (*sensu lato*). Attempts to diagnose this form (or forms) as one or more separate species have failed because of the variability of the whole complex.

The possibility of synonymising *plena* with *insignis* (the latter name has page priority in Walker 1865b) was considered; this would have removed the problem of assigning the intermediate forms to one species or the other. However, there are reasons for retaining them as separate taxa, as follows: (1) Frérot *et al.* (1993) recovered quite different female sex pheromone components from *I. insignis* and *I. plena* and indeed suggested that there were possible sibling species within *plena*; (2) according to Bejakovich and Dugdale ([1998]), there are diagnostic characters in the larvae (see below); (3) the degree of variation in a single species encompassing both *plena* and *insignis* would be extreme even in a world context.

Bejakovich and Dugdale ([1998]) give larval characters separating *I. plena* from *I. insignis*, and they also recognise a third species in the complex, which they call '*Graphania* "*xanthogramma*" (of authors)' (this corresponds to *Ichneutica plena s.l.* in Figs 33e–h and 33l–p in the current work: see Remarks under *I. plena*). They give "*xanthogramma*" in inverted commas because true *xanthogramma* is regarded as a synonym of *I. insignis* (see below). They illustrate the adult (their figs 103, 104) and larva (their figs 56, 63; Fig. L33b of the current work) and key the larva out separately from *I. insignis* and *I. plena*. According to the characters in this key, larvae of these three species can be diagnosed based on body pattern and degree of sclerotisation of the V1 pinaculum on the prothorax. The variability and reliability of these larval characters ideally needs reassessing with abundant fresh material; this has not been possible within the constraints of the current revision. All available larvae in NZAC are faded and the key characters no longer visible.

32. *Ichneutica insignis* (Walker, 1865) new combination

Figs 32a–g (adults); D32h (male antenna); 32i–n (male abdominal base and genitalia); 32o–t (female S7 and genitalia); L32 (larva).

Euplexia insignis Walker, 1865. *List of the specimens of lepidopterous insects in the collection of the British Museum. XXXIII*: 724.

Xylina turbida Walker, 1865. *List of the specimens of lepidopterous insects in the collection of the British Museum. XXXIII*: 754–755.
Synonymised by Meyrick (1888: 45).

Mamestra angusta Felder & Rogenhofer, 1875. *Reise der österreichischen Fregatte Novara um die Erde in den Jahern 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf-Urbair. Zoologischer Theil. Band 2. Abtheilung 2. Heft 4*: pl. CIX, fig. 18. Synonymised by Dugdale (1988: 203).

Mamestra polychroa Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 16–17. Synonymised by Meyrick (1888: 45).

Melanchra xanthogramma Meyrick, 1912. *Transactions and proceedings of the New Zealand Institute 44*: 117. Synonymised by Dugdale (1988: 203).

Diagnosis. *Ichneutica insignis* is a variable moth that can be very hard to distinguish from the closely related *I. skelloni* and from some darker forms of *I. plena*. It is distinguished from *I. skelloni* by the length of the pectinations in the male antennae (not exceeding 1.5x the flagellum width, cf. 2–3x in *skelloni*), and in the male genitalia, the strongly angled costa of the valva, and the broad cucullus, with over 50 corona elements (valva more sinuous and corona almost always with less than 50 elements in *skelloni*). A distinct whitish suffusion along the forewing dorsum is considered diagnostic of *insignis*, though this feature only occurs in some specimens: it appears never to occur in *plena* and though the dorsum may be pale in *skelloni*, it is not distinctly whitish. Differences between *I. insignis* and *I. skelloni* are discussed in more detail under that species (q.v.). *Ichneutica plena* usually has extensive green forewing scaling (lacking in *insignis*, which at most has green suffusion on each side of the subbasal black cloud, and green edging to the stigmata and subterminal line). Darker forms with less green coloration, here assigned to *plena s.l.*, tend to have the area beyond the reniform stigma somewhat patterned and the postmedian line relatively distinct throughout; this area of the wing in *insignis* is usually plain pinkish to dark brown with the postmedian line very indistinct or obsolete. (But see also 'Notes on the *insignis-plena* complex' above.)

Description. Adult (Figs 32a–g). Wingspan 31–37.5 mm (male); 31–39 mm (female). Male antennae (Fig. D32h) bipectinate to *ca* 20 segments short of apex, pectinations up to *ca* 1.5x width of flagellum. Head and thorax deep pinkish brown, variably sprinkled or suffused whitish; prothorax with usually distinct dark transverse bar, bordered pale above; tegulae centrally suffused whitish (tips of scales) and with distinct blackish exterior line; scales mostly narrow lamellate. Forewing deep pinkish brown, sometimes whitish-suffused along dorsum from near base to tornus; basal streak usually present, distinct, black; subbasal oblique black streak from dorsum present, long, rather parallel with dorsum, usually with lime-green scaling below that extends along dorsum; antemedian line usually distinct centrally, pinkish but often with some lime-green scaling, edged blackish on both sides, nearly straight; postmedian line more or less distinct below reniform, zigzag, pinkish, edged blackish at least distally, obsolete or very indistinct in costal 1/2; claviform stigma present, a lime-green U or V, edged black exteriorly; orbicular stigma distinct, round to oblong, outlined black, with inner lining of lime-green scales; reniform conspicuous, coloration as for orbicular in male, in female with very conspicuous white infill distally, in both sexes with blackish interior basal crescent; area between antemedian and postmedian lines not conspicuously darkened; subterminal line present, rather distinct, picked out in cream to lime-green scales and highlighted anteriorly by blackish suffusion towards tornus, and with strong W-shaped evagination just below middle of wing; terminal area suffused blackish except at apex; series of dark subtriangular spots often joined to form a continuous dark line along termen; fringe mixed brown to blackish, with whitish spots at ends of veins. Hindwing dark brown, with more or less distinct suffused discal spot; dark line along termen present, more or less distinct; fringe whitish with brown median line. Underside: forewing dark grey brown except whitish towards base of dorsum, mottled whitish towards costa and termen; reniform stigma indistinct; postmedian line absent; subterminal line indistinct, pale; hindwing whitish brown, densely mottled dark brown, sometimes pinkish towards costa; discal spot and postmedian line usually distinct. Abdomen with distinct dorsal scale-tuft on segment 1, much smaller tufts on 2–3, tufts pinkish, frosted white apically; rest of abdomen mixed ochreous and dark silvery grey in male, pinkish brown laterally and terminally; similar but often paler in female. Male abdominal base (Figs 32i, l) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 32j, m): uncus rather narrow, bluntly pointed, not hooked; valva oblique, sinuous, cucullus well differentiated, very long and subtriangular with well-developed corona of ca. 55–65 elements in a single row and rather dense narrow band of spinose setae not forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately robust, moderately short, thumb-like, straight, oriented parallel with 'neck' of cucullus and reaching about 1/2 way along 'neck' (occasionally reduced, very short and stubby, e.g. in *xanthogramma* holotype); ampulla rather short, fine, digitate, sometimes slightly swollen mid-length; phallus (Figs 32k, n) with subapical tooth represented by low sclerotised ridge; vesica forming

complete loop; cornuti moderately short and in narrow band basally, moderately long and dense (in broad band) apically. Female S7 as in Figs 32o, r. Female genitalia (Figs 32p, q, s, t): ovipositor lobes moderately long, blunt, truncately rounded; segment 8 with scattered short to medium-length setae laterally, and medium to long setae forming sparse band dorsally (only at caudal end of segment); ostium with very prominent long dorsal desclerotised ridges that bulge caudally and taper anteriorly, and short lateral pockets of even length; ductus bursae of moderate length, very slightly constricted at level of pockets, without distinct bulge at mid-length, smoothly sclerotised to just over 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae moderately sclerotised and rugose, outer curve weakly sclerotised and rugose in region of ductus seminalis inception, sclerotised and smooth on exterior curve; corpus bursae barely to distinctly rugose, with pair of elongate scobinate ridged signa of roughly equal length.

Type material: *Euplexia insignis*: Lectotype: female (designated by Dugdale (1988: 203)), 'Type [green-ringed circular label] / N. Zealand Auckland Oxley 60–73 / Euplexia insignis Walker' [per JSD] (NHMUK) (examined, not dissected).

Xylina turbida: Holotype: male, 'Type [green-ringed circular label] / N. Zealand Auckland Oxley 60–73 / Xylina turbida' [per JSD] (NHMUK) (examined, not dissected).

Note. *Euplexia insignis* was described from two specimens, a male and a female (Walker 1865b). The male is apparently lost (J.S. Dugdale, NHMUK notebook). *Xylina turbida* was described from a single specimen. The true type locality for both names is Nelson, as determined by Dugdale (1988: 10, 17).

Mamestra angusta: Holotype: female, 'CIX f. 18 Mamestra angusta n., patri? / 616 / Type [circular red-ringed label] / Felder Coll. / angusta n.' [per JSD] (NHMUK) (examined, abdomen missing).

Note. The type locality of *Mamestra angusta* is presumed to be Nelson (Dugdale 1988: 10, 203). (The word *patri* or *patria* (Latin: country) on the label alongside a question mark probably indicates the labeller's doubt about the country of origin.)

Mamestra polychroa: Lectotype: male, 'Christchurch New Zealand RWF /85 / Mamestra polychroa Meyr. det. D.S. Fletcher in Meyrick Coll. / Melanchra insignis Walker 10/5 E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, dissected, genitalia on slide BMNH 21720).

Note. *Mamestra polychroa* was described from an unspecified number of specimens of both sexes (Meyrick 1887) from Blenheim and Christchurch. Dugdale (1988: 203) gives D.S. Fletcher as the designator of the lectotype. I have not traced any publication by Fletcher designating this lectotype; Dugdale (*loc. cit.*) should probably be regarded as the designator.

Melanchra xanthogramma: Holotype: male, 'Holo-type [red-ringed circular label] / New Zealand GVH .11 / Melanchra xanthogramma Meyr. 5/1 E. Meyrick det. in Meyrick Coll. / ?Holotype? [DSF] agrees well with type description [JSD] / xanthogramma Meyr.' [per JSD] (NHMUK) (examined, dissected, genitalia on slide BMNH 21717).

Note. *Melanchra xanthogramma* was described from a single male from Wellington (Meyrick 1912b).

Note on synonymy. All the relevant type specimens are in the NHMUK and have been examined for this revision. As discussed below, *Hadena skelloni* Butler is here removed from synonymy with *insignis* and reinstated as a species, with *beata* Howes as a synonym. The lectotype of *Euplexia insignis* Walker is a female and has not been dissected: the apparent variability of female genitalia in this complex means that dissection would probably not be informative. Some weight has been placed on the form of the subbasal cloud in this specimen: it runs parallel to the dorsum and not obliquely up towards the antemedian line as in the *skelloni* holotype. The holotypes of *Xylina turbida* (male, not dissected) and *Mamestra angusta* (female, abdomen missing) have the same form of subbasal cloud, together with whitish scaling along the forewing dorsum, and the synonymy of these taxa with *insignis* is upheld here. All three of these specimens have the plain pinkish postmedian area beyond the reniform and reduced / obsolescent postmedian line that are here considered typical of *insignis*. The lectotype of *Mamestra polychroa* and holotype of *Melanchra xanthogramma* (both male) are both darker specimens with a greater extent of green scaling, and were dissected for this revision; the genitalia of both specimens fall within the range of variation of both *insignis* and *plena*; the cucullus appears too broad for either to be identified as *skelloni*. The holotype of *xanthogramma* has a very short stubby clasper, a feature found in some specimens of *I. plena* (q.v.), but the wing pattern is unlike that of any specimens here referred to *plena*; identically patterned specimens have been dissected (e.g. NZAC slides Noct. 391, 392) and have a longer clasper, so this character is assumed to be variable,

as in *plena*. I retain *polychroa* and *xanthogramma* as synonyms of *insignis* here based on this assumption, as well as on the obsolescence of the postmedian line in the area beyond the reniform stigma in both specimens.

Distribution. (Map 32). Widespread throughout New Zealand.

ND, AK, CL, WO, BP, TK, TO, HB, WI, WN / NN, BR, WD, MB, KA, NC, MC, SC, MK, CO, DN, SL

Biology. The larva (Fig. L32) is polyphagous on low-growing plants; particular hosts are rarely specified by authors, but Gaskin (1966a) mentions red clover (*Trifolium pratense*) based on his own observations. The egg is figured by Hudson (1928: frontispiece, figs 7, 8), and described by him as follows: "semi-globose, considerably flattened above and beneath. A number of branching ribs radiate from the micropyle, the spaces between them being slightly ribbed transversely. Its colour is pale green, becoming dark brown in the centre as the enclosed embryo develops." He describes the fully grown larva as follows: "pale greenish brown, inclining to yellow on the ventral surface. The lateral lines consist of a series of black markings near the posterior margin of each segment; the subdorsal lines are represented by four oblique black marks on each side of the four posterior segments of the larva. The region between these lines is much clouded with yellowish green or pink, the larvae having a tendency to diverge into pink and green varieties. The anal segment [A10] is dull yellow. The head is brown, with two black stripes and several black dots." A preserved larva is figured by Bejakovich and Dugdale ([1998]: fig. 64, reproduced here as Fig. L32), who also key the larva. According to these authors, the larva of *I. insignis* is distinguished from that of *I. plena* by the lack of marbling or white stippling in the body pattern, and by the pallid posterior band on A8, which is conspicuously white in *plena*, but not so in *insignis*. They distinguish *insignis* from other members of this complex based on the V1 setal pair on the prothorax, which is borne on a sclerotised pinaculum in *insignis*, but not in the other species. (The other species included in their key are *skelloni* (as *beata*), *scutata* and "*xanthogramma*" (see 'Note on the *insignis-plena* complex' above)).

Flight period. Throughout the year.

Remarks. This is one of New Zealand's more widespread and abundant noctuids, though, in common with some other species, it is apparently scarce or absent from dry inland tussock grassland sites, and White (1991, 2002) referred only a single specimen to this species from his extensive Cass and Mackenzie Basin light-trapping studies. White's "*Graphania* sp. nr *insignis*" (White 2002: 311) is tentatively identified here as *I. skelloni*, based on male antennal pectinations, wing pattern and dissection of a male collected by White in NZAC.

33. *Ichneutica plena* (Walker, 1865) new combination

Figs 33a–p (adults); 33q–x (male abdominal base and genitalia); 33y, z, aa–dd (female S7 and genitalia); L33a, b (larva).

Erana plena Walker, 1865. *List of the specimens of lepidopterous insects in the collection of the British Museum. XXXIII*: 744
Dianthoecia viridis Butler, 1880. *Cistula Entomologica 2*: 547. Synonymised by Meyrick (1887: 17).

Diagnosis. The brightest green forms of *Ichneutica plena* can be rather easily distinguished from other members of this complex except perhaps *I. peridotea*; for differences see under that species. Darker forms may be hard to distinguish from dark forms of *Ichneutica insignis*: see under that species for a discussion. Forms here assigned to *I. plena s.s.* or *plena s.l.* almost invariably lack a distinct black basal forewing streak (often present in *I. insignis*); where present it is very short (Fig. 33f).

Description. Adult (Figs 33a–p). Wingspan 31.5–39 mm (male); 31–40 mm (female). Male antennae bipectinate to *ca* 18–27 segments short of apex (13 segments short in one richly variegated specimen in NZAC, possibly not conspecific), pectinations up to *ca* 1.5–2x width of flagellum. Head and thorax moss-green, thorax variably sprinkled blackish; prothorax with usually well-developed black transverse bar; tegulae often strongly suffused white in female, more or less distinctly bordered deep pinkish brown in both sexes; scales mostly unicolorous or bicoloured, lamellate or narrow lamellate (mostly 4- to 7-pointed). Forewing moss-green, variably suffused blackish; basal black streak absent or short and indistinct; subbasal oblique black cloud running to fold distinct in more strongly marked specimens, otherwise absent or indistinct; antemedian line usually rather distinct, irregular, pallid, usually with some white scales, dark-edged distally; postmedian line more or less distinct, finely and evenly scalloped, green to whitish, dark-edged basally; claviform stigma usually distinct as a whitish crescent, often infilled blackish; orbicular stigma distinct, small to large, roundish, outlined white (sometimes white outline very finely surrounded by black scales) with inner dark suffusion; reniform distinct, outlined white (this outline sometimes very finely surrounded by black scales), with pale orange-brown (male) or white (female) infill and

blackish basal inner crescent; area between antemedian and postmedian lines often in male suffused with blackish scales, or at least a faint median transverse line running between orbicular and reniform; subterminal line present, rather distinct, white, highlighted in male by variable blackish scaling beyond in terminal area, and usually basad by more or less distinct blackish to dark brown cloud or streak just above tornus, a more or less distinct W-shaped evagination in line just below centre of wing; terminal area concolorous with ground colour, or with blackish shading as described above, apex of wing usually paler, often white in female; series of dark marks along termen present, usually joined into irregular line; fringe variably mottled green, brown and blackish, chequered white at ends of veins. Hindwing dark grey-brown, with faint discal spot and postmedian line; dark line along termen present; fringe whitish with brown subbasal line. Underside: forewing dull grey-brown, paler exteriorly; reniform stigma rather distinct; postmedian line absent; subterminal line sometimes present, indistinct; series of dark spots along termen more or less distinct; hindwing whitish brown mottled grey-brown; discal spot and postmedian line usually distinct. Abdomen with distinct dorsal scale-tuft on segment 1 green or variably mottled brown, white and green, smaller tufts on 2 and 3 brownish or, in female, mixed brown and white; rest of abdomen yellowish ochreous variably mottled or suffused dark grey in male, and tinged pinkish laterally and terminally, ochreous mottled blackish in female. Male abdomen (Figs 33q, t) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 33r, u, w): as described for *I. insignis* above: no consistent distinctions have been found, but there appears to be more intraspecific variation in *plena*, especially in the breadth of the cucullus, and in the shape of the clasper, which may be relatively narrow and parallel-sided, or broad basally and tapering, or very short and stubby; phallus (Figs 33s, v, x) as in *I. insignis*. Female S7 as in Figs 33y, bb. Female genitalia (Figs 33z, aa, cc, dd): most characters as described for *insignis*; corpus bursae with one or two pairs of elongate scobinate ridged signa: a lateral pair of roughly equal length (often near anterior end of corpus and sometimes with ends close together), dorsal and ventral signa either both slightly longer than these, or much reduced and inconspicuous, or only ventral signum of this pair present, very short (i.e. 3 signa in total), or one pair of signa, dorsal and ventral, of roughly equal length.

Type material. *Erana plena*: Holotype: male, 'Type [green-ringed circular label] / Photographed BM negative no 47546 / Noctuidae Brit. Mus. slide no. 8233 ♂ / N. Zealand Auckland Oxley 60/73 / Erana plena' [per JSD] (NHMUK) (examined, including slide).

Note. *Erana plena* was described from a single male (Walker 1865b). The true type locality is Nelson (Dugdale 1988: 10, 17).

Dianthoecia viridis: Lectotype (here designated): female, 'Type [red-ringed circular label] / Photographed BM negative no 47547 / N. Zealand. Marlborough, Skellon 80-57 / ♀ Dianthoecia viridis Butler, type' [per JSD] (NHMUK) (examined, not dissected).

Note. *Dianthoecia viridis* was described from two specimens of unspecified sex (Butler 1880); there is no mention of a type or holotype in the original description, so the specimens must be regarded as syntypic. Dugdale's (1988: 205) mention of a holotype does not constitute a valid lectotype designation (ICZN Article 74.5), so the specimen formerly regarded as the 'holotype' is here designated lectotype to preserve stability of nomenclature.

Distribution. (Map 33). Widespread throughout the main islands of New Zealand.

ND, AK, CL, BP, TK, TO, HB, WN / NN, BR, WD, MB, NC, MC, SC, MK, OL, CO, DN, FD, SL / SI

Biology. The larva (Fig. L33a), in common with that of related species, is polyphagous on herbaceous plants; Hudson also gives the native tree *Fuchsia excorticata* as a host and Gaskin (1966b) indicates that it will accept garden fuchsia in captivity; there is also a record from *Coprosma* (reared specimen in OMNZ). Hudson (1928: 65) describes the coloration of the larva as follows: "pale pinkish brown becoming pale green on the ventral surface; there is an obscure wavy blackish lateral line, stronger near the middle of each segment; a wavy blackish subdorsal line stronger near the middle of the posterior segments and appearing from above as a series of very slightly oblique blackish marks." The larva is also keyed and figured by Dugdale and Bejakovich ([1998]: fig. 65): distinctions given by these authors from *I. insignis* are discussed under that species, q.v. Pupation is in the soil (Hudson 1928).

Flight period. Late August to May.

Remarks. *Ichneutica plena* as defined here is a very common and widespread species throughout New Zealand; however the variation in wing pattern, male antennal pectinations and male and female genitalia indicate that more than one species may still be confused under this name; the female sex pheromones studied by Frérot *et*

al. (1993) also suggested that more than one species may be involved. Specimens with a darker ground colour and less extensive green forewing scaling are illustrated in the plates as *I. plena s.l. (sensu lato*: Figs 33e-h, l–p): this is *Graphania* "*xanthogramma*" in the sense of Bejakovich and Dugdale ([1998]). The corresponding larva is depicted in Fig. L33b.

34. *Ichneutica naufraga* new species

Figs 34a–d (adults); 34e–g (male abdominal base and genitalia); 34h–j (female S7 and genitalia).

Diagnosis. The male of *Ichneutica naufraga* can be distinguished from male *I. mutans* (also present on Big South Cape Island) by the much longer pectinations of the male antennae (up to 3.5x flagellum width, cf. 2x in *mutans*) which reach much closer to the antennal apex (12 segments short of apex, cf. 20 or more segments in *mutans*). The female can be distinguished by its brown rather than grey coloration and both sexes by the lack of a distinct dark streak extending basad of the subterminal line of the forewing (this streak is almost always present in *mutans*).

Description. Adult (Figs 34a–d). Wingspan 35–37 mm (male); 35–41 mm (female). Male antennae bipectinate to *ca* 12 segments short of apex, (but distinctly unipectinate for another 3 segments), pectinations up to *ca* 3.5x width of flagellum. Head and thorax pale to deep reddish ochreous; prothorax without dark transverse bar; tegulae sometimes with exterior blackish lines; scales mostly weakly bicoloured, very narrow lamellate. Forewing ground colour deep ochreous brown, variably overlaid with blackish scales, often almost entirely blackish, especially in female; basal black streak usually absent, occasionally present, short; antemedian line indistinct, irregular, pale brown, edged darker on both sides; postmedian line indistinct except below reniform, where dark-edged on both sides, scalloped, colour as for antemedian; claviform stigma rather indistinct, U- to V-shaped, dark-edged and with or without paler inner lining, or only represented by pale scales; orbicular stigma indistinct or distinct, round to slightly oblong, colour as for claviform; reniform usually distinct, dark-edged basally, with pale outline and dark basal interior crescent; area between antemedian and postmedian lines sometimes with dark suffusion extending to tornus and along termen; subterminal line indistinct or distinct, whitish, without distinct evagination, variably highlighted by irregular dark surrounding scaling, especially in dorsal half of wing; terminal area concolorous with ground colour, or darkened in those specimens with central dark suffusion; series of dark crescentic marks along termen present, may be weakly joined to form irregular line; fringe brown, more or less concolorous with wing. Hindwing dark grey-brown to brown, with indistinct to distinct discal spot, and sometimes faint median line, otherwise unmarked; dark line along termen present or absent; fringe brownish white with brown median line. Underside: forewing plain mid- to dark brown, sometimes paler exteriorly, reniform stigma indistinct; postmedian line absent; hindwing whitish brown mottled reddish brown to dark brown at least towards costa; discal spot distinct; postmedian line variably distinct. Abdomen ochreous, more reddish ochreous laterally in male, variably suffused blackish in both sexes. Male abdominal base (Fig. 34e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 34f): uncus rather narrow, pointed, apically strongly sclerotised, slightly bifid and weakly hooked; valva oblique, sinuous, cucullus well differentiated, spatulate, with well-developed corona of ca. 42 elements in a single row and rather diffuse field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta possibly present, but not well separated from spinose setae; clasper of moderate size, near straight, digitate; ampulla short, thumb-like; phallus (Fig. 34g) with subapical tooth absent; vesica long, forming complete loop; cornuti short basally, of medium length towards apex, in single uninterrupted band. Female S7 as in Fig. 34h. Female genitalia (Figs 34i, j): ovipositor lobes of moderate size, truncately rounded; segment 8 with a few short to medium length setae laterally, numerous medium length setae dorsolaterally, but setae almost absent dorsally and thus not forming distinct band; ostium with dorsal desclerotised ridges long, well developed and expanded into indistinct 'bulge' caudally, and moderately short lateral pockets of even length; ductus bursae moderately long, without distinct bulge but slightly broader at about mid-length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve weakly sclerotised and rugose towards inception of ductus seminalis, becoming sclerotised and not rugose exteriorly; corpus bursae very weakly rugose, with two elongate scobinate ridged signa of roughly equal size.

Type material. Holotype: male, 'N.E. Long I. to light at hut / 6Nov68 J.S. Dugdale / Long I. S.W. Stewart I. Exp. Nov68 / NZAC slide Noct. 374 genitalia ♂/ NZAC04226030 [database barcode label]' (Figs 34e, f, g)

(NZAC). Paratypes: 4 males, 2 females, same data as holotype, but dates as follows: 6–13 Nov 1968 (2 males), 12 Nov 1968 (1 male), 13 Nov 1968 (1 female), 15 Nov 1968 (1 male, 1 female) (Figs 34a–d) (all NZAC).

Note. The holotype is unset; all paratypes have been relaxed and set.

Distribution. (Map 34). Big South Cape Island (former name: Long Island), off South-west Stewart Island, only.

— / — / SI

Biology. Moths have been reared from larvae and pupae found amongst the broad-leaved grass *Poa foliosa*, and are possibly more or less monophagous on this host-plant. Larvae feed at night (Dugdale 1971: 124). No description of the larva is available.

Flight period. Only recorded in November, but there has been little or no sampling at other times of year.

Etymology. The name *naufraga* is from the Latin, meaning 'shipwrecked', and refers to the remote island home of this species.

Remarks. This species was apparently first discovered on Big South Cape Island by R.K. Dell and B. A. Holloway in January 1955; there are specimens in MONZ from this expedition. It was mentioned by Dugdale (1971: 124, under Remarks on '*Graphania insignis pagaia*') as a 'possibly subspecifically distinct population [of *insignis*]'. It is erected here as a full species based on the differences in wing pattern, antennal and genitalic characters from other species as described above, and as already noted by Dugdale (*loc. cit.*). Big South Cape Island, formerly rat-free, was the site of an infamous ecological disaster in the early 1960s when an invasion of ship rats (*Rattus rattus* (Linnaeus)) caused the extinction of the last known populations of bush wren (*Xenicus longipes* (Gmelin)) and greater short-tailed bat (*Mystacina robusta* (Dwyer)) (e.g., Bell 1978). The collecting expedition on which the type series of *I. naufraga* was captured took place in 1968; the moth seems to have been present in good numbers. It has not been searched for since, and further surveys to determine its current status are highly desirable.

35. *Ichneutica pagaia* (Hudson, 1909) new combination

Figs 35a–f (adults); 35g–i (male abdominal base and genitalia); 35j–l (female S7 and genitalia).

Leucania pagaia Hudson, 1909. *Subantarctic Islands of New Zealand vol. 1*: 67, pl. II fig. 9.

Diagnosis. *Ichneutica pagaia* is unlikely to be confused with any other moth in its limited range on the Snares Islands, where it is the only noctuid recorded (Dugdale 1971). It is similar to some pale forms of *I. erebia* from the Auckland Islands, but differs in the very pale ochreous antennae (antennae reddish ochreous to dark brown in *erebia*).

Description. Adult (Figs 35a–f). Wingspan 32.5–38 mm (male); 35.5–40 mm (female). Male antennae bipectinate to *ca* 6–8 segments short of apex, pectinations up to *ca* 4x width of flagellum. Head and thorax pale ochreous to whitish ochreous, occasionally darker brown on prothorax in dark-winged specimens; scales unicolorous, very narrow lamellate. Forewing very variable, whitish, yellowish or pinkish ochreous, occasionally more or less completely suffused black; sometimes a short black basal streak; antemedian line picked out by distal blackish, strongly dentate edging, or obsolete; postmedian line picked out by inner black edging, strongly scalloped, or obsolete; claviform stigma present, U-shaped, black-edged, or absent; orbicular stigma round, represented by clear pale ochreous ring, more or less contrasting with ground colour, sometimes black-edged or edged reddish ochreous on pinkish specimens; reniform usually more or less distinct, somewhat produced towards apex of wing, coloration as for orbicular; area between antemedian and postmedian lines occasionally darkened particularly below and between stigmata; subterminal line indistinct, but sometimes distinct in area of W-shaped evagination above tornus, where 'W' is filled with pale ochreous scales and terminal area contrastingly darkened; terminal area concolorous with wing or blackish; series of dark subtriangular marks along termen absent; fringe blackish or brownish basally, whitish to ochreous distally. Hindwing pale to dark brown, unmarked; dark line along termen absent; fringe whitish with dark subbasal line. Underside: forewing mid-brown to dark brown in disc, ochreous exteriorly; dark discal colour sometimes extending into subterminal area along veins; reniform stigma faintly indicated, otherwise unmarked; hindwing uniform whitish ochreous to ochreous; discal spot faint to distinct; postmedian line absent, faint, or rarely distinct. Abdomen without distinct scale-tufts basally, pale ochreous, more or less strongly mottled black, predominantly blackish in dark-winged specimens. Male abdominal base (Fig. 35g) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 35h): uncus somewhat swollen subapically, pointed, weakly hooked; valva oblique, rather angular, cucullus moderately well differentiated,

obliquely and bluntly rounded with well developed corona of *ca* 25–28 elements in a single row and compact field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper moderately robust, straight; ampulla short, digitate; phallus (Fig. 35i) with subapical tooth absent; vesica forming complete loop; basal cornuti very short and in a single or double row; other cornuti short, in uninterrupted band. Female S7 as in Fig. 35j. Female genitalia (Figs 35k, l): ovipositor lobes blunt, of moderate size, truncately rounded; segment 8 with scattered medium length setae laterally and medium to long setae dorsally forming distinct band; ostium including lamella postvaginalis rather weakly sclerotised, lacking distinct dorsal desclerotised ridges but with short lateral pockets of even length; ductus bursae short, slightly broadened centrally, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve not sclerotised, strongly rugose in region of ductus seminalis inception, becoming smooth and weakly sclerotised on right exterior curve in ventral view; corpus bursae strongly rugose, signa absent. (Internal genitalia very small, about equal in length to segments 8–9 combined.)

Type material. Holotype: male, '1. [in red ink]' [corresponding entry in Hudson register (Subantarctic Islands): '1. 1 specimen taken by Dr Benham on the Snares 15 Nov 1907'] (MONZ) (examined, not dissected).

Note. *Leucania pagaia* was described from a single male (Hudson 1909), and only this specimen was found in MONZ. However, in the volume of Hudson's collection register that includes Subantarctic Lepidoptera in MONZ, there is a second entry under this species: '2. 1 specimen Snares Nov 15 1907'. Possibly another specimen was given away, or discarded because of damage.

Distribution. (Map 35). Endemic to the Snares Islands.

— / — / SN

Biology. The host-plants are almost certainly the tussock grasses *Poa astonii* and *Poa tennantiana* (Poaceae); a few larvae have been found in bases of *P. astonii* tussocks (preserved larvae in NZAC) and numerous pupae amongst the dead skirts at the base of *Poa tennantiana* tussocks, from which moths were reared by Carol Horning (many reared specimens with exuviae in NZAC). The colour pattern of the larva is described as follows by Dugdale (1971: 124), based on preserved larvae: "Dorsal line double, zone between this and the level of seta D2 marbled, bounded ventrally by a continuous dark narrow band; then a very pale, narrow (?white) stripe; the zone from seta SD1 level to 1/2 spiracle height level dark, marbled ventrally, including seta SD2 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 with pallid zone around setae A2, A3, extending as a stripe to apex of adfrontal area."

Flight period. November to February.

Remarks. This subantarctic species displays morphological features typical of many Lepidoptera endemic to such islands, i.e., the large abdomen of the female related to high egg-laying capacity and reduced flight ability, and the corresponding long pectinations of the male antenna (cf. Roff 1990; Sattler 1991). As with certain alpine species (e.g., *Ichneutica ceraunias*), the internal genitalia of the female are notably reduced in size compared to those of its relatives. It appears to be common to abundant in its restricted habitat, and there are no known threats at present, though sampling in recent years has been very limited.

Dugdale (1971) treated *Ichneutica pagaia* as a subspecies of *I. insignis* (as *Graphania insignis pagaia*), but later (Dugdale 1988) regarded it as a full species. Certainly species status is more than justified by the substantial and constant morphological differences in male antennae, wing pattern, and male and female genitalia from those of *I. insignis*.

36. *Ichneutica pelanodes* (Meyrick, 1931) new combination

Figs 36a–c (adults); 36d–i (male abdominal base and genitalia); 36j–l (female S7 and genitalia).

Melanchra pelanodes Meyrick, 1931. *Transactions and proceedings of the New Zealand Institute 62*: 92–93.

Diagnosis. *Ichneutica pelanodes* is probably not consistently distinguishable on external characters from some forms of *I. skelloni*. However, in the North Island, *I. skelloni* is only known from the Wellington district while *I. pelanodes* occurs from Northland to Taupo districts. In series, *pelanodes* appears to be on average a darker moth, with a more deeply purplish or magenta forewing; the forewing of *pelanodes*-like forms of *skelloni* tends to be a lighter pinkish brown, and the female in particular is often much paler than any *pelanodes* female, with a pale pinkish ochreous hue (though dark *pelanodes*-like females also occur in the west of the range of *skelloni*). In the male genitalia, the strongly swollen diamond-shaped uncus of *pelanodes* is diagnostic; *skelloni* sometimes has a

subapically swollen uncus but it is never as broad as in *pelanodes*. Likewise, in *skelloni* the clasper does not usually reach as far along the cucullus stem as in *pelanodes* (compare Figs 36e, h with Figs 40r, t, w, z).

Description. Adult (Figs 36a–c). Wingspan 30–37 mm (male); 33–36 mm (female). Male antennae bipectinate to *ca* 17–18 segments short of apex, pectinations up to *ca* 2–3x width of flagellum. Head and thorax deep magenta, variably sprinkled white, especially on tegulae (less so in northern populations); prothorax with more or less well developed black transverse bar; scales mostly bicoloured (pale- or white-tipped), narrow lamellate. Forewing deep magenta, this colour variably and sometimes almost completely obscured by black and white scaling; basal black streak present, short, usually upcurved and bisected by white scales, often with cloud of olive-green scales just dorsad; subbasal oblique black cloud running to fold distinct in more strongly marked specimens, otherwise indistinct; antemedian line more or less distinct, irregular, with scales of variable colour, usually some at least silvery grey and some pale magenta, line dark-edged distally; postmedian line more or less distinct, silvery grey to pale magenta, irregular, dark-edged basally; claviform stigma usually distinct only distally where represented by white or pale magenta crescent; orbicular stigma distinct, somewhat oblique, outlined black with white inner lining; reniform distinct, outlined black with pale magenta (male) or white (female) infill and black basal inner crescent; area between antemedian and postmedian lines usually of ground colour and appearing dark compared to silvery-suffused area between postmedian and subterminal lines; subterminal line present, more or less distinct, often broken, white, usually most distinct at tornus where preceded by blackish or deep magenta cloud, and with irregularly W-shaped evagination above tornus, towards apex and in evagination sometimes small patches of olive-green scaling; terminal area of ground colour, or with blackish shading and usually with some white scales scattered in distalmost portion; series of dark marks along termen joined into irregular line; fringe pinkish brown to blackish, chequered white. Hindwing dark brown, with faint discal spot and postmedian line; dark line along termen present; fringe whitish with brown median line. Underside: forewing dark greyish, densely mottled paler exteriorly; reniform stigma indistinct or absent; postmedian line absent; hindwing whitish, mottled grey; discal spot and postmedian line rather distinct. Abdomen with distinct dorsal scale-tuft on segment 1, and small indistinct tufts on 2 and 3 magenta, tipped white; rest of abdomen pale grey, heavily mottled black distally, and tinged magenta laterally. Male abdominal base (Figs 36d, g) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 36e, h): uncus moderately to strongly expanded subapically (diamond-shaped), bluntly rounded, not hooked; valva rather oblique, strongly sinuous, cucullus moderately differentiated, truncate / bluntly rounded with well-developed corona of ca. 32–45 elements in a single row and short band of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper robust, strongly curved; ampulla rather short, digitate; phallus (Figs 36f, i) with subapical tooth minute or absent; vesica forming complete loop; cornuti short and in narrow band basally, longer and in broader band beyond this to apex. Female S7 as in Fig. 36j. Female genitalia (Figs 36k, l): ovipositor lobes blunt, of moderate size, truncately rounded; segment 8 with very few medium length setae laterally and many medium to long setae forming distinct band dorsally; ostium with distinct long dorsal desclerotised ridges (each ridge ending in more prominent sclerotised bulge caudally) and short lateral pockets, pocket on right in ventral view longer; ductus bursae short, slightly broadened centrally, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve not sclerotised, strongly rugose in region of ductus seminalis inception, becoming smooth and strongly sclerotised on right exterior curve in ventral view; corpus bursae moderately rugose, with pair of very elongate scobinate ridged signa, ventral signum about 1/2 length of dorsal.

Type material. Holotype: male, 'Type [circular red-ringed label] / Waimarino New Zealand GVH .30 / pelanodes Meyr. / Melanchra pelanodes Meyr. 1/1 E. Meyrick det. in Meyrick Coll. Holotype ♂' [per JSD] (NHMUK) (examined, including genitalia on BMNH slide 21718).

Note. *Melanchra pelanodes* was described from a single male collected at sugar in January at an altitude of 2800 ft (ca 850 m) (Meyrick 1931).

Distribution. (Map 36). Scattered localities in the North Island south to the Taupo district (TO). Only a few South Island specimens confirmed: from Percy Saddle, Turret Range FD and Mt Bee, Eyre Forest OL; a single Stewart Island specimen in OMNZ from Mason Bay.

ND, AK, WO, TO / OL, FD / SI

Biology. Unknown. Adults have been taken at light and at sugar in wetland habitats.

Flight period. October to February.

Remarks. *Ichneutica pelanodes* as here defined is characterised by the expanded diamond-shaped uncus in the male genitalia, and the distally-positioned clasper, which usually overlaps the base of the cucullus (both features present in the holotype). It is more or less confined to wetland sites, such as the gumlands of Northland, the peatlands of the Waikato, and subalpine wetlands of the central volcanic plateau; its occurrence in the volcanic dunes of the Rangipo Desert TO is a departure from this pattern. Its North Island habitats, especially the gumlands and peatlands, have been severely reduced in extent over the last 100 years, but it can still be locally common, and it is present in alpine districts of the South Island. Northland specimens are on average smaller and tend to have a 'smoother', less richly variegated forewing pattern than those from the central North Island and South Island; their identity as *I. pelanodes* has been confirmed by dissection. Hoare (2011) listed these Northland populations as '*Graphania* sp. (*insignis* group)'.

There is a rather atypical specimen in NZAC from Massey, west Auckland, captured at light by D.J. Allan on 22 March 1976. This specimen, a male, broadly resembles *Ichneutica insignis* in external characters: the forewing has a distinct basal streak, a pallid reniform stigma and a pale pinkish suffusion beyond the disc strongly contrasting with the dark colour of the rest of the wing. However, it is smaller than most *insignis* and the genitalia (NZAC slide Noct. 107) are completely typical of *pelanodes* as delimited above. Whilst *I. pelanodes* is otherwise unknown from the Auckland district, a specimen of *Adeixis griseata* (Geometridae) was captured in December 1976 at the same locality by the same collector: this geometrid is highly characteristic of gumland sites (Hoare 2011). A small remnant of gumland is still present further south in Glen Eden, at Waikumete Cemetery (Clarkson *et al.* 2011), and the moths may have wandered from here. There may also be other suitable habitat for both species nearby (or such habitat may have existed in the 1970s).

37. *Ichneutica peridotea* new species

Figs 37a–c (adults); 37d–i (male abdominal base and genitalia); 37j–l (female S7 and genitalia).

Diagnosis. This species is separated here from *Ichneutica plena* on the basis of the narrower valva, smaller cucullus with less dense field of spinose setae, and the corona with fewer elements (ca 30–35, cf. 55–65 in *plena*). Externally, it differs from *plena* in the duller olive-green tone of the thorax and forewing, the lack of exterior dark lines on the tegulae, and, in the male, the lack of orange-brown scaling in the reniform stigma (only olive-green and white scaling is present). The dorsal thoracic scales are narrower than in *plena*, giving the thorax a distinctly 'fluffier' appearance.

Description. Adult (Figs 37a–c). Wingspan 31–34 mm (male); 32 mm (female) (only one female known). Male antennae bipectinate to *ca* 23–25 segments short of apex, pectinations up to *ca* 2x width of flagellum. Head and thorax deep olive-green (fading to brownish olive in older specimens), thorax variably sprinkled white (tegulae more strongly suffused white in female); prothorax usually without, sometimes with blackish transverse bar; tegulae without distinct exterior lines; scales mostly unicolorous or weakly bicoloured, narrow lamellate (apically 2- to 4-pointed). Forewing olive-green (fading to brownish olive in older specimens), variably suffused dark brown; basal black streak absent; subbasal oblique dark brown cloud running to fold usually rather distinct; antemedian line variably distinct, irregular, white, dark-edged distally; postmedian line rather distinct, evenly scalloped, white, dark-edged basally; claviform stigma usually distinct only distally as a whitish crescent; orbicular stigma distinct, usually rather large, roundish, outlined white (sometimes white outline very indistinctly surrounded by dark scales) infilled with ground colour; reniform distinct, outlined white (this outline sometimes very finely surrounded by dark scales), with olive-green (male) or white (female) infill and deep olive to dark brown basal inner crescent; area between antemedian and postmedian lines often in male suffused with dark brown scales, not forming transverse line; subterminal line present, rather distinct, white, highlighted basad by more or less distinct dark brown cloud or streak just above tornus (not extended into streak), a more or less distinct W-shaped evagination in line just below centre of wing; terminal area with deep olive to dark brown shading, apex of wing very slightly paler; series of dark marks along termen present, usually joined into irregular line; fringe mottled olive green and deeper green or brown, chequered white at ends of veins. Hindwing dark grey-brown, occasionally with faint discal spot, without postmedian line; dark line along termen distinct or indistinct; fringe brownish white with darker brown median line. Underside: forewing whitish brown, somewhat orange-tinged, darker in disc, with reniform stigma indistinct; postmedian line absent; hindwing as forewing but paler; discal spot usually fairly distinct; postmedian line indistinct. Abdomen with distinct dorsal scale-tuft on segment 1 mixed olive-green and

white, tufts on 2 and 3 similar but smaller and with narrower scales; rest of abdomen pale ochreous variably mottled or suffused orange-brown and dark grey, and tinged orange laterally and terminally. Male abdominal base (Figs 37d, g) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 37e, h): uncus narrow, bluntly pointed, barely hooked; valva rather upright, very narrow at mid-length, sinuous, cucullus weakly differentiated, bluntly rounded with well-developed corona of *ca* 30–35 elements in a single row and narrow, even, somewhat scattered band of spinose setae not forming 'crest'; apico-dorsal strong hooked seta present but rather weakly differentiated from other corona elements; clasper moderately robust, boomerang-shaped; ampulla rather long, digitate; phallus (Figs 37f, i) with subapical tooth absent; vesica forming complete loop; cornuti moderately short and in narrow band basally, longer and in broader band beyond this to near apex, where again short. Female S7 as in Fig. 37j. Female genitalia (Figs 37k, l): ovipositor lobes short, blunt, truncately rounded; segment 8 with scattered ventral and lateral setae short to medium-length; setae becoming dense dorsally, medium length to long, and forming distinct caudal band; ostium with prominent long dorsal desclerotised ridges that bulge caudally and taper anteriorly, and very short lateral pockets of even length; ductus bursae of moderate length, very slightly constricted at level of pockets, without distinct bulge at mid-length, smoothly sclerotised to just over 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae moderately sclerotised and rugose, outer curve weakly sclerotised and rugose in region of ductus seminalis inception, sclerotised and smooth on exterior curve; corpus bursae strongly rugose, with pair of indistinct rather short scobinate ridged signa of roughly equal length.

Type material. Holotype: male, 'NEW ZEALAND AK 36 41.7S 174 41.8E Albany, Wright Rd. 13-14 Jul 2008 A. Emmerson R. Hoare m.v. trap / Photographed by B. Rhode / NZAC slide Noct. 397 genitalia ♂/ NZAC04226031 [database barcode label]' (NZAC). Paratypes: 10 males, 1 female, as follows: AK: 3 males, same locality as holotype, but 21–22 Aug 2010, RJBH (1), 28–29 Aug 2010, RJBH (1), 13 July 2014 RJBH, AWE (1) (all to m.v. trap); 1 male, Albany, Three Streams Arboretum, 10 Sep 2003, m.v. trap, AWE; 2 males, 1 female, Titirangi, light trap, 10 Aug 1953, C.R. Thomas (genitalia slides NZAC Noct. 104 ♂, NZAC Noct. 396 ♀); 1 male, same locality and collector but "Aug 1953"; 1 male, Titirangi, 226 Konini Rd, actinic trap, 27–28 July 2013, RJBH; 1 male, Waitakere Ranges, 213 Scenic Drive, lit window, 8 Aug 2010, RJBH, R. Newcomb.

Distribution. (Map 37). Only known from the Auckland district, probably overlooked elsewhere in northern New Zealand.

AK / —

Biology. Unknown. All adults have been taken at light.

Flight period. July to September.

Etymology. The epithet *peridotea* is a Latin adjective coined from the name of the precious stone peridot. The name refers both to the olive-green colour of the moth (peridot is gem-quality olivine) and to its predominant occurrence in August, for which month peridot is the official birthstone (Kunz 1913).

Remarks. In addition to the characters given in the Diagnosis above, the restricted late winter flight time of *Ichneutica peridotea* (July to early September) further supports its recognition as a distinct species. This species has only been collected in forested areas of the Auckland district, where it was first discovered by C.R. Thomas in Titirangi in 1953. It comes to light in small numbers, and only a single female is known. It has doubtless been overlooked elsewhere due to its winter flight time, and can be expected to occur more widely in the northern North Island. However, it was not found by A.J. Steer during his light-trapping survey of Lepidoptera of the Mahakirau Forest Estate, Coromandel Ranges (A.J. Steer, pers. comm., Steer collection in NZAC).

38. *Ichneutica scutata* (Meyrick, 1929) new combination

Figs 38a–h (adults); D38i (male antenna); 38j–o (male abdominal base and genitalia); 38p–r (female S7 and genitalia); L38 (larva).

Melanchra scutata Meyrick, 1929. *Transactions and proceedings of the New Zealand Institute 60*: 485.

Diagnosis. The typical form of *Ichneutica scutata* resembles a pallid or 'washed out' form of *I. insignis* or *I. skelloni*, and like *insignis*, often has a distinct pale stripe along the forewing dorsum. It can be distinguished from both these species by the longer antennal pectinations in the male (Fig. D38i: up to 4x the flagellum width, cf. 1.5x in *insignis*, 2–3x in *skelloni*), which reach closer to the antennal apex (9–14 segments short of apex, cf. 15–21 in *skelloni* and *insignis*). In many, but not all, males of *scutata*, the outer margin of the reniform stigma is obscured

and blends with the area of plain scaling beyond; in *insignis* and *skelloni*, the outer margin of the reniform is distinct. The subbasal forewing cloud, where present, is rather diffuse and of the *skelloni* form (shortish, obliquely rising from the dorsum) rather than of the *insignis* form (longer, parallel to dorsum). In most specimens of *scutata* (especially males), the forewing costa is broadly and conspicuously pale, more so than in any specimens of *skelloni* or *insignis*. A distinctive small dark form from Mid Canterbury (Figs 38e, f) somewhat resembles *I. sericata*, but the forewing is duller, lacking the rich reddish or earth-brown tones of that species, and the subbasal forewing cloud is distinct (absent or reduced to a small spot in *sericata*). The female of *scutata* usually has extensive pale greyish white or mauvish grey forewing scaling and is generally much paler than females of the other species. As noted by Hudson (1939), the basal forewing streak of this species is often reddish brown, or when black, often contains reddish brown scales; in *skelloni* and *insignis*, the streak is entirely black: however, some *scutata* also have an entirely black basal streak. The late flight time (chiefly April to July) of the species is another aid to identification (cf. Hudson 1939).

Description. Adult (Figs 38a–h). Wingspan 30–39 mm (male); 34–36.5 mm (female). Male antennae (Fig. D38i) bipectinate to *ca* 9–14 segments short of apex, pectinations up to *ca* 4x width of flagellum. Head and thorax pinkish brown to reddish brown, variably sprinkled and overlaid white and/or ochreous, especially on tegulae; prothorax with at most weakly developed brownish transverse bar; tegulae usually bordered darker brown to blackish exteriorly; thoracic scales mostly bicoloured, narrow lamellate. Forewing reddish brown, pinkish brown or ochreous brown in male, greyish white, pale mauvish grey or whitish brown in female: usually in male, sometimes in female with distinct suffusion of blackish brown scales from below reniform and orbicular stigmata to subterminal line near tornus; this patch sometimes containing reddish brown scales; specimens with this patch have the area beyond the subterminal line suffused blackish except towards apex; some forms (especially smaller specimens from MC) have much of forewing more or less suffused blackish; basal streak present, distinct, black to red-brown, or indistinct or absent; subbasal oblique black cloud running to fold distinct in more strongly marked specimens, otherwise indistinct; antemedian line usually very indistinct, pallid, weakly dark-edged; postmedian line usually obsolete, occasionally weakly indicated below reniform by pallid, crenulated, dark-edged line; claviform stigma usually distinct only distally where represented by white or occasionally blackish crescent; orbicular stigma distinct, somewhat oblique, weakly outlined red-brown to black with white inner lining; reniform distinct basally, where outlined red-brown to black with white inner lining and dark basal inner crescent, distally more or less indistinct in paler males, where incorporated into whitish ochreous to pinkish suffusion that is often contiguous with pallid costal suffusion from base; reniform distally distinct in darker specimens where pallid suffusion absent or reduced; sometimes an indistinct greyish suffused fascia just beyond position of postmedian line; subterminal line present, more or less distinct, often broken, whitish, usually most distinct at tornus where preceded by reddish brown to blackish cloud, and with irregularly W-shaped evagination above tornus, infilled with pallid scales that are usually concolorous with postdiscal area, but occasionally (in grey females) with whitish scales that contrast with grey postdiscal colour, or (in dark males) infilled with dark ground colour; terminal area of ground colour, or with blackish shading and usually with some greyish scales in distalmost portion; series of dark marks along termen joined into irregular line; fringe pinkish brown to dark brown, variably chequered paler brown to white. Hindwing dark brown, usually with faint discal spot and very faint postmedian line; dark line along termen present; fringe brownish with white basal line. Underside: forewing grey-brown to dark brown in disc, paler, more ochreous brown exteriorly, often densely mottled; reniform stigma moderately distinct; postmedian line absent; hindwing whitish brown densely mottled grey-brown; discal spot distinct; postmedian line variably distinct. Abdomen with distinct dorsal scale-tuft on segment 1, concolorous with thorax, occasionally in fresh specimens a minute tuft present on segment 2 of similar colour, no other tufts; rest of abdomen in male pale brownish, suffused blackish grey, more reddish brown laterally; in female whitish brown densely mottled black. Male abdominal base (Figs 38j, m) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 38k, n): uncus narrow, bluntly pointed, not or barely hooked; valva rather upright, weakly sinuous, cucullus moderately differentiated, small, spatulate / truncate with well developed corona of *ca* 25–28 elements in a single row and short or very short rather dense band of spinose setae not forming 'crest'; apico-dorsal strong hooked seta present, but not strongly separated from corona; clasper moderately robust, long, curved at *ca* 120°; ampulla moderately long, digitate; phallus (Figs 38l, o) with subapical tooth absent; vesica forming complete loop; cornuti basally short and in narrow band, longer and in broader band to apex, where a few shorter cornuti. Female S7 as in Fig. 38p. Female genitalia

(Figs 38q, r): ovipositor lobes rather short, blunt, truncately rounded; segment 8 with scattered short setae ventrally, and medium-length setae laterally; moderate band of medium to long setae forming distinct band dorsally at caudal end of segment; ostium with distinct long dorsal desclerotised ridges (each ridge ending in slight sclerotised bulge caudally) and very short lateral pockets of even length; ductus bursae moderately long, slightly broadened centrally, smoothly sclerotised to just before 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve not sclerotised, strongly rugose in region of ductus seminalis inception, becoming smooth and strongly sclerotised on right exterior curve in ventral view; corpus bursae moderately rugose, with pair of elongate scobinate ridged signa, ventral signum about 1/2 length of dorsal.

Type material. Holotype: male, 'Type [red-ringed circular label] / Wellington New Zealand GVH. 28. / scutata Meyr. / Melanchra scutata Meyr. 3/1 E. Meyrick det. in Meyrick Coll. Holotype ♂' [per JSD] (NHMUK) (examined, not dissected).

Note. *Melanchra scutata* was described from a single male (Meyrick 1929).

Distribution. (Map 38). Southern North Island and eastern South Island.

TO, HB, WN / NN, KA, MC, SC, MK, OL, CO, DN, SL

Biology. The larva (Fig. L38) is polyphagous on low-growing shrubs, herbs and grasses, and has been reared (from ova) by Hudson (1950) on *Plantago* spp., and by B. Patrick from *Plagianthus divaricatus* and *Convolvulus* (White 2002). Bejakovich and Dugdale ([1998]) indicate that larvae fed on introduced prairie grass (*Bromus willdenowii*) and annual poa (*Poa annua*) in captivity, but grasses are probably not a preferred diet in the wild (J.S. Dugdale, pers. comm., cf. White 2002). The life history is described by Hudson (1950: 79–80): he states that the eggs are laid in large batches with adjacent eggs nearly touching. He describes the fully grown larva as follows: "Length... about 31 mm, stout, cylindrical, slightly tapering towards head, with very pronounced hindslope. Head pale ochreous brown, with blackish stripes. General colour deep purplish brown, darker and more suffused anteriorly; much paler dull ochreous subdorsal and lateral longitudinal bands, becoming darker and less distinct towards head. A series of elongate triangular black dashes on subdorsal line, one dash on each segment from the seventh to hindslope; another series of much less distinct dashes on lower lateral region. Underside of larva, legs and prolegs dull ochreous-brown, faintly tinged with green." The larva is keyed and illustrated by Bejakovich and Dugdale ([1998]: fig. 66; reproduced here as Fig. L38); they distinguish it from the larva of *plena* based on the lack of marbling or white stippling in the body pattern, and the lack of a clear white pallid band posterior to D2 on A8; from the larva of *insignis* based on the unsclerotised pinaculum of the prothoracic V1 setal pair and from that of *skelloni* (as *beata*) based on the uniform dark coloration of the lateral head stripe to the hind margin of the epicranium (head stripe reticulate towards the epicranium margin in *skelloni*). Pupation is in the soil according to Hudson (*loc. cit.*).

Flight period. Late March to July.

Remarks. This is a moth of the drier eastern side of both islands, showing a pattern of distribution similar to that of species such as *Izatha copiosella* (Walker), *Gymnobathra hamatella* (Walker) (Xyloryctidae) and *Pseudocoremia pergrata* (Philpott) (Geometridae) (Hoare 2010). It flies mainly in the autumn and winter months, and may be common in open habitats such as grasslands and coastal dunes, though it is apparently rare in some inland tussock districts: White (2002) recorded only two specimens in his Mackenzie and Cass studies. A rather distinctive small dark form from Mid Canterbury (Figs 38e, f) is here assigned to *I. scutata* based on characters of the male antennae and male genitalia and on flight time (autumn).

39. *Ichneutica sericata* (Howes, 1945) new combination

Figs 39a–g (adults); D39h (male antenna); 39i–n (male abdominal base and genitalia); 39o–q (female S7 and genitalia).

Melanchra sericata Howes, 1945. *Transactions of the Royal Society of New Zealand 75*: 66–67, pl. 7 fig. 3.

Diagnosis. *Ichneutica sericata* may be hard to distinguish from some forms of *I. skelloni*, but in the male the longer antennal pectinations (up to *ca* 4x flagellum width, cf. 2–3x in *skelloni*) are diagnostic. Paler forms of *I. sericata* can usually be recognised by the reddish brown, nearly unicolorous forewing, the large claviform and reniform stigmata and the distinct discal spot on the hindwing. Dark forms from Homer FD and Stewart Island have the claviform smaller and the hindwing discal spot less distinct, but these specimens are darker and more

unicolorous than known forms of *skelloni*. In the male genitalia, the nearly straight clasper on the valva distinguishes this species from *I. skelloni* (Figs 39j, m).

Description. Adult (Figs 39a–g). Wingspan 34–40 mm (male); 37–39 mm (female). Male antennae (Fig. D39h) bipectinate to *ca* 8–14 segments short of apex, pectinations up to *ca* 4x width of flagellum. Head and thorax rich pinkish brown to rufous brown or deep magenta brown; prothorax without or occasionally with indistinct darker transverse bar; tegulae sometimes weakly greenish- or ochreous-suffused, sometimes with indistinct exterior black line on each tegula; scales mostly unicolorous, hair-like or very narrow lamellate. Forewing rich reddish brown to deep magenta brown, sometimes (especially in Homer FD and Stewart Island specimens) suffused blackish; subbasal blackish suffusion near dorsum absent or reduced to small spot; occasionally some greenish suffusion above this; antemedian obsolete, or represented by a few dark scales in centre of wing near claviform, occasionally present, indistinct, pallid, nearly straight; postmedian line more or less indistinct, slightly paler than ground colour, weakly scalloped, edged slightly darker distally; claviform stigma present, small to large, when large a distinct whitish V, sometimes edged with a few black scales distally; orbicular stigma small to moderately large, more or less oblong, outlined whitish, incomplete on costal margin; reniform large, coloration as for orbicular, but with dark brown to blackish inner crescent basad and rest often infilled paler brown than ground colour in male, whitish in female; area between antemedian and postmedian lines not darkened; subterminal line indistinct to distinct, whitish to pale or mid-green, palest and most distinct towards tornus, where more or less distinctly edged dark brown to blackish basad, with W-shaped evagination just below middle; terminal area slightly darker than ground colour except in darkest forms; series of dark subtriangular marks along termen absent or present, sometimes joined into line; fringe brownish, paler basally. Hindwing brownish white, variably suffused blackish, usually much paler in female, discal spot usually distinct in both sexes, postmedian line very indistinct to distinct; dark line along termen present, variably distinct; fringe brownish grey, paler basally. Underside: forewing ochreous to dark brown, more or less suffused deep reddish, paler basally, with reniform stigma usually present as a distinct dark crescent; postmedian line absent; series of dark subtriangular marks along termen absent, indistinct or distinct; hindwing ochreous to dark brown suffused dark greyish exteriorly and reddish towards costa, or whole hindwing suffused reddish (Stewart Island); very distinct dark discal spot present; postmedian line absent or indistinct. Abdomen with distinct dorsal scale-tuft on segment 1, reddish brown to magenta brown, sometimes frosted white, without distinct tufts on 2–3; rest of abdomen whitish ochreous mottled grey in female and some males, often strongly suffused dark grey in male, usually tinged pink laterally and terminally in male. Male abdominal base (Figs 39i, l) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 39j, m): uncus rather narrow, blunt, not or very weakly hooked; valva oblique to upright, weakly sinuous, cucullus rather weakly differentiated, truncate / rounded with well-developed corona of ca. 20–35 elements in a single row and dense field of spinose setae of rather even width not forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper robust, tongue-like, nearly straight, not bulbous apically; ampulla short, digitate; phallus (Figs 39k, n) with subapical tooth absent or just detectable as minute area of darker sclerotisation; vesica forming complete loop; cornuti basally short and in a single irregular row, for most of length of cornutal band in several rows, cornuti moderately long, becoming shorter subapically. Female S7 as in Fig. 39o. Female genitalia (Figs 39p, q): ovipositor lobes blunt, of moderate length, squared off; segment 8 with rather numerous short to medium-length setae ventrolaterally and laterally, and numerous short to medium setae in a band dorsally; ostium with indistinct dorsal desclerotised ridges and moderately short lateral pockets of even length; ductus bursae rather short, not dorsoventrally sinuous, with rather distinct bulge distally, narrowing at level of pockets, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and with few rugae, outer curve not sclerotised, not rugose, except towards ductus seminalis inception; corpus bursae weakly rugose, dorsal signum reduced to small scobinate patch, not ridged, ventral signum almost obsolete, a minute scobinate patch.

Type material. Lectotype: male (here designated), 'Homer 21.12.43 / G. HOWES, COLLECTION / MELANCHRA SERICATA TYPE G Howes' (MONZ) (examined, not dissected).

Note. *Melanchra sericata* was described from 8 specimens, all from Homer Tunnel FD: one collected in Dec 1942, and 7 collected in Dec 1943 by Howes (2 specimens) and T.M. Smith (5 specimens) (Howes 1945). There is no mention of a holotype in the original description, only of 'types', so the type series is syntypic. The mention of a holotype by Dugdale (1988: 205) does not constitute a valid lectotype designation (ICZN Article 74.5) and I am

unaware of any other published designation; therefore the specimen hitherto regarded as the 'holotype' is here designated lectotype to preserve stability of nomenclature. Only two possible paralectotypes remain in MONZ: a male (Fig. 39a) and a female labelled as collected on 20 Dec 1944 by Howes. The original description does not mention any specimens collected in 1944, but it is possible that either the date 1943 given in the original description or the date 1944 on the labels is a *lapsus calami*; in fact, on the label of the male the last figure in the date is ambiguous and could possibly be interpreted as a '2'. Since the issue does not affect the identification of this species, it is not further investigated for this revision. The whereabouts of the five specimens collected by T.M. Smith are unknown.

Distribution. (Map 39). Known from the southern South Island and Table Hill, Stewart Island, with a single record from Taranaki (see Remarks below).

TK / WD, NC, MC, OL, DN, FD / SI.

Biology. The life history is unknown.

Flight period. August (Stewart Island specimens), November to December.

Remarks. *Ichneutica sericata* has been the source of much confusion, and almost all the material in collections formerly identified as this species probably belongs to other members of the *insignis* group, especially *I. skelloni.* The confusion was only resolved very late in the preparation of this revision, when the surviving male paralectotype of *sericata* was dissected. The characteristic reduced male genitalia with their short valva and rather straight clasper show that this is a distinct species.

It was apparently first collected by M.O. Pasco in November 1910: two of his specimens, recovered from the Southland Museum by Brian Patrick, are in NZAC, but are unfortunately very mouldy. They are labelled 'Howden Hut': this presumably refers to Lake Howden Hut at the junction of the Routeburn and Greenstone Tracks in Fiordland. The type series was collected at Homer FD in the 1940s as detailed above, and the species was found again in small numbers from the 1980s onwards by Brian Patrick and Brian Lyford at a number of locations (though their material in BLNZ and OMNZ has been identified until now as an undescribed species). A few specimens (in LUNZ) were collected by Helen Harman and Pauline Syrett at Chancellor Shelf, Fox Glacier in December 1984, and a single specimen was taken by Eric Edwards and the author at Cascade Creek FD in December 2011. The species is poorly represented in most collections and apparently very local, though perhaps commoner in Fiordland. It has been captured mainly in shrubland at altitudes from 470 to *ca* 900 m.

A single yellowish male specimen in MONZ (probably faded) was captured by K.J. Fox in the Pouakai Range TK on 9 Jan 1978 (Fig. 39g). This specimen has antennal pectinations up to *ca* 4x the flagellum width, pectinations to 9 or 10 segments short of the apex, mostly hair-like scaling on the thorax, an enlarged reniform stigma and the ampulla on the valva short and straight, all characters that correspond with this species. It is identified as *I. sericata* here with some reservations, given that this represents a major range extension and the species is so far unknown from north-west Nelson.

40. *Ichneutica skelloni* (Butler, 1880) new combination, reinstated species

Figs 40a–o (adults); D40p (male antenna); 40q–z, aa (male abdominal base and genitalia); 40bb–dd (female S7 and genitalia).

Hadena skelloni Butler, 1880. *Cistula Entomologica 2*: 547–548.

Melanchra beata Howes, 1906. *Transactions and proceedings of the New Zealand Institute 38*: 510–511. **New synonymy.**

Diagnosis. All forms of this species differ superficially from *I. insignis* in the rather longer antennal pectinations in the male (Fig. D40p: up to 2–3x flagellum width; cf. 1.5x in *insignis*); when there is a subdorsal cloud of black scales on the forewing, this tends to be shorter, broader and to run more obliquely from the dorsum to near the antemedian line than in *insignis*, where this marking is longer, narrower and more parallel with the dorsum. The basal forewing streak may be present or absent in *I. skelloni* (in the definition of this species adopted here), as in *I. insignis*, and this is not considered a character of diagnostic importance (*pace* White 2002). The male genitalia of *I. skelloni* differ from those of *insignis* in the lack of a strong angle on the valval costa (costa sinuous rather than angular in *skelloni*) and in the much smaller, less expanded cucullus, which usually has 40 or fewer corona elements (over 50 elements in *insignis*, but one Fiordland specimen identified as *skelloni* on antennal and forewing characters also has over 50 elements). The clasper usually overlaps the dorsal edge of the valva in slide preparations, whereas in *insignis*, there is usually little or no overlap: this character is however, rather variable and

may not be reliable. Separation of the larger forms of *skelloni* from *insignis*, and especially of females, still remains problematic and the taxonomy requires further research.

Some forms of *I. skelloni* could be confused with *I. scutata*: differences are given in the Diagnosis for that species.

Some specimens of *I. skelloni* are superficially very similar or identical to *Ichneutica pelanodes*: for differences, see the Diagnosis under that species, above.

Description. Adult (Figs 40a–o). Wingspan 32–40 mm (male); 36–44 mm (female) (see below for geographic size variation). Male antennae (Fig. D40p) bipectinate to *ca* 15–21 segments short of apex, pectinations up to *ca* 2–3x width of flagellum. Head and thorax pinkish ochreous to pinkish brown, sometimes weakly tinged green, often sprinkled white (tips of scales), often paler in female; prothorax with variably developed blackish transverse bar; tegulae dusted pale or whitish ochreous especially exteriorly, and more or less distinctly lined darker reddish to blackish on exterior margin; thoracic scales mostly bicoloured, very narrow lamellate. Forewing pinkish ochreous to pinkish brown, varying to dark greyish, sometimes more or less delicately greenish tinged (especially towards margins), with markings variably distinct; basal streak present or absent; sometimes a subbasal cloud of olive-green scales; antemedian line more or less indistinct, pallid, usually with dark exterior edging at least in region of claviform stigma; postmedian line usually indistinct, sometimes distinct in pale females, where whitish, evenly scalloped, dark-edged basally; claviform stigma present, usually distinct only distally, C-shaped, picked out in pallid scales with black outline; orbicular stigma indistinct to distinct, small to large, more or less oblique, narrowly margined blackish with narrow inner lining of pallid scales; reniform large, indistinct to moderately distinct, colour as for orbicular, with faint dark basal crescent (*beata* forms), or with orange infill in male, white in female (*skelloni* forms); area between antemedian and postmedian lines sometimes strongly darkened from near dorsum to space between reniform and orbicular stigmata, or with an irregular dark line running from costa to dorsum between stigmata; subterminal line irregular, often broken, often indistinct, except where picked out irregularly in whitish scales (most conspicuously near tornus, but also sometimes in centre of wing), with broken or sometimes continuous line of dark scales along inner margin, sometimes only distinct near tornus, where it may extend basad as a blackish to deep pinkish brown smudge (but not usually reaching postmedian line); W-shaped evagination above tornus more or less indistinct; sometimes some olive-green scaling in evagination and towards wing apex; terminal area concolorous with rest of wing except usually slightly paler at apex; series of dark marks along termen present, joined into indistinct line; fringe mottled or chequered paler (white to pinkish ochreous) and darker (brown to blackish). Hindwing brown, unmarked or with indistinct discal spot; dark line along termen present, indistinct; fringe whitish with brown median line. Underside: forewing mid-brown or reddish brown to grey-brown or dark brown, often paler dorsally, sometimes densely mottled paler exteriorly; reniform stigma usually indistinct or absent; postmedian line indistinct or absent; subterminal line sometimes present, pale; hindwing whitish to whitish brown, sometimes tinged pink, densely mottled grey-brown, discal spot distinct, postmedian line variably distinct. Abdomen with dorsal scale-tuft on segment 1 pinkish ochreous tipped whitish; no distinct tufts on 2 or 3; rest of abdomen in male pale ochreous variably mottled greyish, more pinkish laterally and terminally; in female, pale ochreous strongly suffused or mottled grey-brown. Male abdominal base (Figs 40q, v, y) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 40r, t, w, z): uncus rather narrow, blunt, not hooked, sometimes moderately expanded before apex, but not diamond-shaped; valva oblique, narrow, sinuous, cucullus moderately well differentiated and bluntly rounded with well-developed corona of *ca* 21–40 (occasionally *ca* 50) well-spaced elements in a single row and narrow field of spinose setae forming at most very slight ‘crest’; apico-dorsal strong hooked seta usually present but not well differentiated from other corona elements; clasper rather short, variably robust and curved; ampulla moderately short to long, narrow, digitate; phallus (Figs 40s, u, x, aa) with subapical tooth absent or present, very small; vesica forming complete loop; cornuti short and in narrow band basally, longer and in broader band beyond this to apex. Female S7 as in Fig. 40bb. Female genitalia (Figs 40cc, dd): ovipositor lobes blunt, rather small, truncately rounded; segment 8 with a few short to medium-length setae laterally, and many medium-length to long setae forming distinct band dorsally; ostium with prominent long dorsal desclerotised ridges and short lateral pockets of even length; ductus bursae of moderate length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve not sclerotised but strongly rugose in region of ductus seminalis inception, becoming smooth and strongly sclerotised on right exterior

curve in ventral view; corpus bursae weakly to strongly rugose, with pair of elongate scobinate ridged signa, ventral signum slightly shorter (signa sometimes reduced).

Note. Specimens of *I. skelloni* from Nelson Lakes (St Arnaud) and Canterbury (Arthurs Pass, Craigieburn Range and Banks Peninsula) have a wingspan of 32-37 mm, and resemble the more strongly marked specimens of the Fiordland form (see below) in forewing colour and markings, but often with a paler reniform stigma (Fig. 40a) and/or with the ground colour paler ochreous brown. Such specimens often closely resemble *Ichneutica insignis*: differences are given under the Diagnosis, above. The type specimen of *skelloni* (from Marlborough) belongs to this northern form.

Specimens of the *beata* form (see Note on Synonymy below) have a wingspan of 31–37 mm; the forewing is weakly patterned and pallid (Figs 40e, f, m) with rather indistinct stigmata; the dark edging to the subterminal line above the tornus is often the most prominent marking (Fig. 40f).

Specimens attributed to *I. skelloni* from Fiordland (OMNZ) (Figs 42b–d) are larger (wingspan 40–42 mm) and show patterns intermediate between the northern and *beata* forms: the forewing ground colour is deeper purplish brown, the basal streak often present (short) and sometimes a subbasal oblique blackish cloud from the dorsum; often there is a dark basal border to the reniform stigma that may connect it to the distal margin of the orbicular (see Figs 40b, c).

Specimens of other forms attributed to *skelloni* are more or less strongly patterned, often greyish or brown, with the most prominent forewing markings usually being the reniform stigma (orange in the male, white in the female) and the dark smudge preceding the white subterminal line near the tornus (Figs 40g–i, k–m). See also under Remarks below.

Type material. *Hadena skelloni*: Holotype: male, 'N. Zealand Marlborough, Skellon 80-57 / Hadena skelloni Butler, Type 80-57' [per JSD] (NHMUK) (examined, including genitalia on slide BMNH Noct. 10505).

Melanchra beata: Holotype: female, [Otatara SL] (repository unknown, not located, lost) (cf. Dugdale 1988: 202).

Note. *Hadena skelloni* was described from a single specimen of unspecified sex (Butler 1880). *Melanchra beata* was described from a single female, taken at blossom in November in bush near Otatara (as 'Ototara') (Howes 1906).

Note on synonymy. *Hadena skelloni* was effectively synonymised with *Melanchra insignis* by Butler (1890: 675), who treated it as a variety of *insignis*, and this synonymy has been accepted ever since (e.g., Meyrick 1912a: 100; Hudson 1928: 65; Dugdale 1988: 203). However, the genitalia of the male holotype of *skelloni* in the NHMUK (slide Noct. 10505) are atypical of *insignis*, having a rather narrow cucullus and lacking a prominent angulation in the valval costa. Though the forewing colour pattern of the holotype of *skelloni* is close to that of a common form of *insignis*, there is a possibly significant difference in the form of the blackish subbasal cloud (see under Diagnosis above).

The female holotype of *Melanchra beata* from Otatara SL is lost (Dugdale 1988). In establishing the identity of *beata*, much reliance has been placed on the male specimen from Kapuka SL, collected by Philpott and now in NZAC (Fig. 40f); this is the specimen illustrated by Hudson (1928) (cf. Dugdale 1988); it was dissected for this revision (genitalia on slide NZAC Noct. 383). A long series of rather small specimens matching this one in coloration, antennal pectinations (up to *ca* 2x flagellum width) and in male genitalia, was collected by Brian Patrick in Dunedin in the 1980s and these might be regarded as 'typical *beata*'; no further specimens from near the type locality have been seen. Larger specimens from Fiordland and Canterbury (in OMNZ) were also identified by Patrick as *beata* based on external characters, and the genitalia and antennal characters support this identification. Since the holotype of *Hadena skelloni* lacks antennae, the length of the antennal pectinations cannot be checked; however, the male genitalia of the *skelloni* holotype show the rather narrow cucullus and sinuous rather than angled valval costa typical of OMNZ *beata*, and matches the OMNZ Canterbury specimens identified as *beata* in wing-pattern; therefore, all these forms are treated as a single variable species and *skelloni* is here accepted as the valid, older name for this taxon.

Distribution. (Map 40). In the North Island, only confirmed from Wellington; very widespread in the South Island. Hudson's (1928) record of *beata* from Hastings requires further investigation: no specimens of *skelloni* are confirmed from Hawkes Bay. Recorded from Stewart Island by Bejakovich and Dugdale ([1998]) as *beata*; this record is accepted here though no specimen was seen by the author.

WN / NN, BR, WD, MB, NC, MC, MK, OL, CO, DN, FD, SL / SI

Biology. The larva of the small '*beata* form' has been reared from the egg by Brian Patrick in Dunedin and feeds in captivity on herbs, including *Bellis perennis* (lawn daisy) (Bejakovich & Dugdale [1998]), *Plantago*, *Senecio* and *Ranunculus* (reared specimens in NZAC, OMNZ; B.H. Patrick, pers. comm.). Larvae of the large Fiordland form have been found in the wild on *Astelia nervosa* and *Dracophyllum longifolium* (reared specimens in OMNZ), but they were not observed to feed on these plants and may have just been resting on them; they pupated soon after collection (B.H. Patrick, pers. comm.). The larva is keyed out and the terminal abdominal segments illustrated by Bejakovich and Dugdale ([1998]: fig. 57); they distinguish it from the larva of their "*xanthogramma*" (= *plena s.l.* of this work, see under 'Notes on the *insignis-plena* complex' above) based on the straight line formed by punctures Pa and Va and seta P2 on the head capsule; additional characters given are 'segment 8 with setae D1 on the pale lightly speckled mid-dorsal area; thoracic segments T2, T3 with the dark spiracular stripe ventral margin straight; subdorsal anterior white dot distinct on most segments'.

Flight period. July to April, but most specimens recorded between September and December.

Remarks. *Ichneutica skelloni* is defined here broadly to include small specimens from Dunedin and Southland matching the original description of *beata* and the figure in Hudson (1928: plate X fig. 2), as well as larger, more richly patterned *beata*-like forms from Fiordland and Westland, and variegated specimens of intermediate size occurring from Wellington to Stewart Island that more or less closely match the type specimen of *skelloni*. Brian Patrick found the small ('*beata*') form of this species commonly in the 1980s by light-trapping around Dunedin from sea level to 720 m, over 200 specimens being recorded in a single spring. Adults were present from mid-August to mid-November (B.H. Patrick, pers. comm.). Specimens were also reared through from the egg (see above). It appears to be essentially a forest and shrubland species.

The definition of *I. skelloni* adopted here makes for an enormously variable species: size, wing pattern and coloration, length of male antennal pectinations and some details of genitalia (e.g. width of the cucullus and number of corona elements) all show a moderate to wide range of variation. However, attempts to define more than one species within this apparent complex have so far met with failure; variation in all characters appears to be more or less continuous, and genitalic, antennal and wing pattern characters do not necessarily align. Since the species or complex as a whole can be distinguished from *I. insignis* and *I. plena* based on the narrower valva and cucullus and the lesser number of elements in the corona, as well as the slightly longer antennal pectinations in the male, this set of characters is used to delimit *skelloni* here. Further research is certainly desirable, but it seems plausible that this is another taxon in a state of active speciation, with lineages that have not yet separated completely into definable entities. Another more daunting possibility is that the narrow, '*skelloni* type' of valva (which is also found, e.g., in *I. chlorodonta*, *I. subcyprea* and *I. peridotea*) has evolved convergently on a number of occasions from the broader '*insignis* / *plena* type' and that the species as here defined may be polyphyletic.

A few specimens from Westland in OMNZ resemble *I. chlorodonta* (Fig. 40n), but differ from that species in being larger, having distinct orange scaling within the reniform stigma, and lacking the very well defined dark reniform on the forewing underside. They are tentatively referred to *I. skelloni s.l.* for the time being, since they appear to fit better within the broad definition of this species adopted here.

Two rather broad-winged grey specimens in OMNZ (both male), with the orbicular and reniform stigmata large and closely approximated (Fig. 40o) are here tentatively referred to *I. skelloni s.l.* They were captured on 30 September 1995 at Porter Heights MC by Simon Morris, and were separated in OMNZ as a probable new species. A slide preparation has been made of the male genitalia of one specimen (OMNZ IV42458) and the genitalia fall within the range of variation of *skelloni* as here defined. However, further material of this 'form' is desirable to reassess its taxonomic status.

IX. *Ichneutica unica* group

Diagnosis. Male abdominal base with or without brushes, levers and pockets; A3 apodemes always present. Uncus pointed; valva sinuous; cucullus moderately or well differentiated; claspers asymmetrical, with left clasper elongated and sometimes sinuous, narrow, without transverse lamellae; apical setae of valva forming distinct 'crest'; dorso-apical hooked seta of corona present or absent; vesica not strongly elongated; cornuti more or less reduced, cornutal strip interrupted.

Remarks. This species group may well be monophyletic, based on the unique modifications of the male genitalia (asymmetrical claspers and cornutal strip interrupted). Most species also have the peniculus lobe enlarged and strongly extending laterally from the tegumen. In the female genitalia, all species have the ovipositor laterally flattened, the papillae anales squared off with setae concentrated along an apical sclerotised ridge, and a second pair of sclerites parallel and mesad of the papillae anales but shorter. The species are superficially diverse and were formerly placed in three different genera (*Aletia*, *Graphania* and *Tmetolophota*). The biology is known for few species, but it is suspected that the host-plants of all members of this group are monocots, or plants with a similar growth form; the modified flattened ovipositor of the females may function in placing eggs under appressed leaf-bases or sheaths that clasp the stem, or between dense leaves or stems at the base of tussocks.

Ichneutica omicron subgroup

Diagnosis. Forewing grey, with most stigmata and crosslines at least indistinctly indicated; male abdominal base with brushes, levers and pockets.

41. *Ichneutica barbara* new species

Figs 41a, b (adults); 41c–e (male abdominal base and genitalia); 41f–h (female S7 and genitalia).

Diagnosis. The only external character so far observed that may distinguish *Ichneutica barbara* from *I. omicron* is the yellowish anal tuft in the male; the anal tuft is greyish in the few males of *omicron* examined. However, *omicron* is believed to be confined to the North Island and *barbara* to the South Island. In the male genitalia, *I. barbara* is diagnosed by the simple right clapser, which lacks the short blunt apical process or weak fork present in *omicron*. Other diagnostic genitalia characters are given below in the Description. Differences between this species and *I. sistens* are as described for *omicron* below.

Description. Adult (Figs 41a, b). Wingspan 32–37 mm (male); 33–36 mm (female). Externally this species appears is almost identical to *Ichneutica omicron*, q.v., although the serrations on the male antenna are perhaps slightly shorter in *barbara* (less than 0.3x width of flagellum at maximum), and the anal tuft of the male in this species is yellowish (Figs 41a, b), contrasting with the greyish abdomen (anal tuft greyish and concolorous with the abdomen in *omicron* (Fig. 42a), though more material needs to be examined to confirm that this character is constant). Male abdominal base (Fig. 41c) with brushes, levers and pockets. Distinguished from *omicron* by three characters in the male genitalia (Fig. 41d), which appear to be extremely constant and diagnostic: both claspers are distinctly more slender and less robust than in *omicron*; the right clasper has a blunt unmodified apex, without any sign of the apical process present in *omicron*, and the apical cornuti on the vesica (Fig. 41e) are reduced to a single linear cluster, the parallel cluster present in *omicron* being reduced in *barbara* to at most a few very short and weakly sclerotised cornuti. Female S7 as in Fig. 41f. Female genitalia (Figs 41g, h): as described for *I. omicron*, below; no consistent differences observed.

Type material. Holotype: male, 'NEW ZEALAND DN Portobello Dunedin 24-28 Oct 1984 B. Patrick / NZAC slide Noct. 174 genitalia ♂/ NZAC04226032 [database barcode label]' (NZAC). Paratypes: 2 males, 2 females, same data as holotype, but genitalia on slides NZAC Noct. 168 (male) and NZAC Noct. 173, Noct. 485 (female), other male undissected (Fig. 41b) (all NZAC).

Distribution. (Map 41). South Island only, chiefly eastern.

— / KA, NC, MC, SC, OL, CO, DN, SL

Biology. Unknown; possibly associated with shrubland localities (B.H. Patrick, pers. comm.), like *I. omicron*.

Flight period. October to December.

Etymology. This species is named after my friend and colleague Dr Barbara Anderson of Dunedin, who has worked tirelessly to promote the study of moths in New Zealand, in the hope of generating vital baseline data on their abundance, distribution and ecological interactions. Such data will be essential for studying and mitigating the adverse effects of environmental change in this country.

Remarks. *Ichneutica barbara* has usually been misidentified in collections as '*Aletia*' *inconstans* (a synonym of *I. sistens*: see below, under that species). The name *Aletia inconstans* was also applied to this species by White (2002: 302), who, however, recognised its close relationship to *omicron*. *Ichneutica barbara* appears to be more widespread and commoner than its North Island sister-species *omicron*, though still local. A long series was

collected by Brian Patrick at Portobello, on the Otago Peninsula DN, in the 1980s, and this may prove a good area to investigate the still unknown life history.

42. *Ichneutica omicron* (Hudson, 1898) new combination

Figs 42a, b (adults); 42c–e (male abdominal base and genitalia); 42f–h (female S7 and genitalia).

Melanchra omicron Hudson, 1898. *New Zealand moths and butterflies (Macro-Lepidoptera)*: 22; pl. V fig. 42.

Diagnosis. No reliable external differences between *Ichneutica omicron* and *I. barbara* n. sp. have been observed, except possibly for the anal tuft character cited under that species above; however, as far as is currently known, *omicron* is confined to the North Island and *barbara* to the South Island. Differences in the male genitalia are as described in the Description for *barbara* above; see also Figs 41d, 42d. Differences between *I. omicron* and *I. sistens* are relatively subtle and best appreciated when material is in good condition. *Ichneutica omicron* has a pronounced anterior mesothoracic scale-tuft and dorsal scale-tufts on the basal abdominal segments, all of which are absent in *sistens*. The head, thorax and forewing of *omicron* always have a distinct olive-greenish cast, whereas *sistens* is usually plain greyish or brownish grey (though some specimens have a slight greenish tinge). The forewing of *sistens* has a more or less pronounced serrate median blackish line passing just anterior to the reniform stigma; there is at most a very indistinct brownish line in this position in *omicron*. The hindwing of *omicron* has a sharp, distinct median brown line in the fringe; that of *sistens* has at most a diffuse fringe-line, and usually the fringe is more or less unicolorous white or brown in this species.

Description. Adult (Figs 42a, b). Wingspan 32–37 mm (male); 32–37 mm (female). Male antennae very weakly subpectinate, pectinations up to *ca* 0.3x width of flagellum; also serrate beneath, very weakly at base, serrations becoming more prominent to about 2/3 length of flagellum, then tapering with taper of antenna. Head and thorax mottled olive-grey and white, with scales mostly bicoloured, hairlike, narrow lamellate and broad-tipped lamellate; anterior and posterior mesothoracic crests present; tegulae with line of dark -tipped lamellate scales parallel to mesal margin. Forewing olive-grey; antemedian line distinct in dorsal 1/2 as W-shaped pallid mark; postmedian line rather distinct except towards costa, pallid, weakly and evenly scalloped; claviform stigma present, outlined black, or absent; orbicular stigma distinct, round, outlined black with pallid inner lining; reniform distinct, colouring as for orbicular; area between antemedian and postmedian lines not darkened; subterminal line present, more or less broken into pallid dots, each preceded by darker dot; terminal area concolorous; series of dark crescentic marks along termen weakly indicated; fringe mottled pallid and dark greyish, with pale basal line. Hindwing dark greyish, unmarked; dark line along termen weakly indicated; fringe yellowish white with dark median line. Underside: forewing dark grey-brown, except towards costa, dorsum and termen where densely mottled whitish; hindwing whitish, densely mottled grey-brown; discal spot present, small; postmedian line variably distinct, but often obsolete except centrally. Abdomen mottled dark brown and yellowish white, with strong dorsal scale-tufts on segments 1–3 of dark brown, pale-tipped scales. Male abdominal base (Fig. 42c) with brushes, levers and pockets. Male genitalia (Fig. 42d): uncus short, swollen at mid-length, pointed, not hooked; valva oblique, angular, cucullus well differentiated, subtriangular / spatulate with well-developed corona of ca. 35–38 elements in a single row and field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; claspers asymmetrical, both robust, curved; left clasper with long apical more or less curved sharp process; right clasper with very short blunt apical process (sometimes making apex appear weakly forked); ampulla rather long, digitate, sinuous; phallus (Fig. 42e) with subapical tooth absent but a lateral swelling of phallobase apex present; vesica forming complete loop; cornuti rather long, apically in two unequal linear clusters separated from main body of cornuti by area of scattered minute cornuti. Female S7 as in Fig. 42f. Female genitalia (Figs 42g, h): ovipositor lobes blunt, strongly squared off (with microspinulose 'lip' apically); segment 8 with moderate clothing of short to long setae in caudal 1/3 throughout, forming distinct caudal band; ostium with dorsal desclerotised ridges present as small 'bumps'; lateral pockets short and indistinct; ductus bursae rather short, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve well sclerotised, smooth; corpus bursae with a pair of short scobinate ridged signa; dorsal signum slightly smaller.

Type material. Neotype (here designated): male, 'Kilbirnie Nov 1947 G. Ramsay / NZAC slide Noct. 516 genitalia ♂/ NZAC04226042 [database barcode label]' (NZAC).

Original syntypes: 4 specimens, [Wellington WN, A. Norris] (not located in MONZ, lost) (cf. Dugdale 1988: 204).

Note. *Melanchra omicron* was described from an unspecified number of specimens collected by Mr A. Norris (Hudson 1898). Based on data from the G.V. Hudson register in MONZ, there were at some point four syntypes with the labels '143a', '143b', '143c' and '143d' in the Hudson collection (cf. Dugdale 1988: 204). These have not been located, but the following note appears in red ink in the relevant place in the Hudson register: "Good specimens of this *Mamestra* are in coll. Norris". Syntypes of the other three noctuid species described by Hudson (1898) from Norris material (*Meterana alcyone*, *M. diatmeta* and *M. coeleno*) are also missing (Dugdale 1988) and the specimens were presumably returned to Norris. No steps have been taken to attempt to locate the Norris collection, but it is considered extremely unlikely based on the author's experience and that of other lepidopterists that any 19th century New Zealand Lepidoptera collections survive in private hands, and the Norris material is certainly not in any of the public repositories of New Zealand Lepidoptera. The collection, including the *omicron* syntypes, must be presumed destroyed after such a long time.

The identity of the species is established here based on the figure in Hudson (1898: pl. v, fig. 42), together with the later diagnosis by Hudson (1939: 400) where the abdominal scale-tufts of *omicron* are given as a key character distinguishing it from '*Aletia inconstans*' (i.e. *Ichneutica sistens*: see Remarks below). Hudson was of course unaware that there are two externally identical species with the *omicron* wing pattern (as shown here); the second (southern) species is described as *I. barbara* n. sp. above. Wellington is known to be an area of faunal overlap, where some predominantly South Island species such as *Izatha huttonii* (Butler) (Lepidoptera: Xyloryctidae) occur alongside their North Island siblings (Hoare 2010a). Therefore the assumption of a straightforward North Island / South Island divide in distribution between the two species may be premature. For this reason, it is considered necessary here to designate a dissected Wellington specimen as neotype in order to clarify the taxonomic status of the name and preserve stability of nomenclature (cf. ICZN Article 75.3).

Distribution. (Map 42). Central and southern North Island.

TK, TO, WI, WA, WN / —

Biology. The life history is unknown. The species has been collected in shrubland localities (see below).

Flight period. November and December.

Remarks. *Ichneutica omicron* has caused considerable confusion in the literature and in collections. Having described *Melanchra omicron* in 1898, Hudson (1928) later regarded it as a synonym of '*Aletia*' *inconstans*, but reversed this view on the advice of Meyrick and Stuart Lindsay in his later work (Hudson 1939). '*Aletia*' *inconstans* is here synonymised with *Ichneutica sistens* (q.v.) based on an examination of the holotype in the NHMUK, but most specimens under the name *inconstans* in collections are in fact *Ichneutica barbara*, the southern sibling species of *I. omicron*, described as new above.

Ichneutica omicron is a poorly known species: it has been collected in small numbers on coastal and inland volcanic dunes in shrubland, and in *Olearia* shrubland not associated with dunes.

43. *Ichneutica sollennis* (Meyrick, 1914) new combination

Figs 43a–c (adults); 43d–f (male abdominal base and genitalia); 43g–i (female S7 and genitalia).

Aletia sollennis Meyrick, 1914. *Transactions and proceedings of the New Zealand Institute 46*: 101–102.

Aletia sollenis Meyrick: Dugdale, 1988. *Fauna of New Zealand 14*: 201. Incorrect subsequent spelling.

Diagnosis. *Ichneutica sollennis* is a species of nondescript appearance, but may be recognised by its very plain brownish forewing with the transverse rows of white dots on the darkened veins at about 1/4 and 4/5, and the lack of distinct pectinations or serrations on the male antenna. White (2002: 306) mentions 'rosy scales' as occurring at the base of the forewing: these are the orange-ochreous or pinkish-ochreous scales referred to in the description below; they are not confined to the base of the wing, but are perhaps most conspicuous (though still indistinct without magnification) in the broken subterminal line (see Fig. 43a), and provide another useful diagnostic character.

Description. Adult (Figs 43a–c). Wingspan 32–35 mm (male); 32–33 mm (female). Male antennae without pectinations; serrate beneath, very weakly at base, serrations becoming more prominent to about 2/3 length of flagellum, then tapering with taper of antenna. Head and thorax dark greyish brown, with scales bicoloured (grey and brown), narrow lamellate. Forewing dark brown, indistinctly mixed orange-ochreous or pinkish-ochreous, with

black and white speckling along veins giving greyish appearance and forming transverse rows of white dots at about 1/4 and, more distinctly, beyond postmedian line; antemedian and postmedian lines indistinctly paler than ground colour, weakly scalloped; claviform stigma absent; orbicular stigma indistinctly outlined in pale scales or absent; reniform rather indistinct, outlined in pale scales; area between antemedian and postmedian lines not darkened; subterminal line indistinct, broken, of orange-ochreous or pinkish-ochreous scales; terminal area concolorous with rest of wing; series of dark subtriangular marks along termen absent; fringe dark brown, with indistinct pale line basally. Hindwing dark brownish, unmarked; dark line along termen indistinct; fringe brownish with pale basal line. Underside: forewing dark grey-brown, weakly to moderately mottled paler towards costa and termen; hindwing grey-white, densely mottled grey-brown especially exteriorly; discal spot present, variably distinct; postmedian line very indistinct. Abdomen with mixed whitish, brown and grey scales. Male abdominal base (Fig. 43d) with brushes, pockets and levers. Male genitalia (Fig. 43e): uncus short, narrow, pointed, not hooked; valva oblique, sinuous, apex short-spatulate with well developed corona of *ca* 50–55 elements in a single row and strong field of spinose setae forming costal 'crest'; apico-dorsal strong hooked seta separate from corona present; claspers asymmetrical, both curved and papillate basally (papillae each bearing a short seta, basal papillae in form of broad lamellae); right clasper blunt; left clasper extremely long and sharply pointed; ampulla moderately short, digitate, blade-like; phallus (Fig. 43f) with subapical tooth present; vesica forming complete loop, with distinct subbasal diverticulum and apically swollen; cornuti moderately long, divided into two well-separated strips, one central and one apical (apical strip single, not divided into two). Female S7 as in Fig. 43g. Female genitalia (Figs 43h, i): ovipositor lobes blunt, squared off, with distinct 'lip'; segment 8 with some short to medium-length setae laterally, and with many medium-length setae caudally forming distinct caudal band; ostium with small, indistinct dorsal desclerotised ridges and short lateral pockets; ductus bursae relatively short, distinctly expanding anterior to ostium, smoothly sclerotised to about 1/2 way to junction with corpus bursae where weakly rugose; inner curve of appendix bursae well sclerotised and sparsely rugose, outer curve well sclerotised, not rugose; corpus bursae with single scobinate ridged signum ventrally.

Type material. Lectotype (designated by Dugdale (1988: 201)): male, 'Lectotype [yellow-ringed circular label] / Waipori New Zealand AP. 28.1.89 / sollennis Meyr. / Aletia sollennis Meyr. 1/1 E. Meyrick det. in Meyrick Coll. Lectotype ♂' (NHMUK) (examined; not dissected (abdomen missing)).

Note. *Aletia sollennis* was described from two male specimens from Waipori (Meyrick 1914). The lectotype designation mentioned by Dugdale (1988: 201) by 'an unknown designator' is apparently unpublished and therefore not valid; Dugdale is taken to have designated the lectotype under ICZN Article 74.5. The paralectotype is in NZAC.

According to Hudson (1928: 58), the discoverer was Mr H. Howes; he presumably gave the type specimens to Philpott, who sent first one, then the other to Meyrick. The lectotype was already missing its abdomen when seen by Meyrick and was originally misidentified by him as *Dasygaster hollandiae* Guenée, an endemic Australian noctuid with a distinctive abdomen (Meyrick 1911: 69). Following correspondence with Philpott, and after being loaned the paralectotype, which has its abdomen, Meyrick (1914) corrected his misidentification and described *sollennis*.

There is confusion of the date of collection of the lectotype. Meyrick (1911) gave the date as January 1889, but the figure indicating the month on the label is an 'h'-like character that appears to be a '4'. I tentatively regard the character as a '1' with an accidental downward stroke of the pen to the right, as this date conforms to Meyrick's description. Moreover, the label is probably in Meyrick's handwriting; he appears to have removed the original label and written his own. As noted above, the initials 'AP' on the label (for Alfred Philpott) are not those of the collector according to Hudson (1928). The paralectotype in NZAC probably has its original label (now very degraded and brown) and this clearly reads 'Waipori 28.11.99'. It seems likely that both specimens were collected on the same date, and I therefore suggest that Meyrick mistranscribed both the month and year on the lectotype label. Dugdale (1988: 201) quotes the date on the lectotype label as follows: '28.4.89 [?28.11.09]'; the version in square brackets probably alludes to his reading of the paralectotype label, though the year is incorrect. I have seen no Lepidoptera specimens in the Philpott collection in NZAC dating from prior to 1898, which perhaps lends some further support for Meyrick having been mistaken about the year. Research into correspondence surrounding these specimens may provide further elucidation, but the matter does not affect the taxonomy of this species.

Distribution. (Map 43). Eastern and central southern South Island.

— / MB, KA, NC, MC, SC, MK, OL, CO

Biology. Unknown.

Flight period. Mainly November to February; White (2002) also gives October and April.

Remarks. Although poorly represented in some collections, this is a locally fairly common species of alpine areas. White (2002) recorded it relatively abundantly in his Mackenzie Basin light trapping sites above 850 m a.s.l., particularly in sites characterised by a mixed sward dominated by *Chionochloa* (see White 2002: 306 and table 1, pp. 24–25). As noted under *Ichneutica micrastra* above, the habitat and modified bilaterally flattened ovipositor of *I. sollennis* suggest the likelihood of a monocot host-plant.

Ichneutica unica subgroup

Diagnosis. Forewing brown, with stigmata and crosslines absent, except that reniform stigma may be partially indicated by white dots; male abdominal base without brushes, levers or pockets (but with A3 apodemes).

44. *Ichneutica cornuta* new species

Figs 44a–c, D44d (adults); 44e–g (male abdominal base and genitalia); 44h–j (female S7 and genitalia).

Diagnosis. *Ichneutica cornuta* bears a close superficial similarity to the typical pale form of *I. arotis*, from which it can easily be distinguished in the male by the long antennal pectinations. Female *cornuta* and pale ochreous forms of *arotis* are hard to separate, but *arotis* almost invariably has at least a trace of dark scaling on the thorax, especially lines parallel to the outer edge of the tegulae, whereas the thorax of *cornuta* is unmarked in all specimens seen. Another subtle difference is visible in the distal third of the wing, where the brown interneural streaks in *cornuta* run parallel to the darkened veins and are unbroken from the termen to the disc (Fig. D44d); in *arotis*, the streaks towards the tornus are broken by oblique pallid lines between veins M3 and CuA1 and between CuA1 and CuA2 and form wedge-shaped marks on the termen (Fig. D54m).

Description. Adult (Figs 44a–c). Wingspan 34–37 mm (male); 37–40 mm (female). Male antennae bipectinate to *ca* 9–11 segments short of apex, pectinations up to *ca* 3x width of flagellum. Head and thorax whitish ochreous to pale pinkish ochreous, with scales unicolorous to weakly bicoloured, narrow lamellate. Forewing pale ochreous, with veins mottled grey and white and interneural spaces with brownish ochreous streaking, often paler along fold where darker markings absent; antemedian line represented only by dark dots on stems of Rs, CuA and 1+2A; postmedian line by curved series of dark dots on all veins beyond cell; claviform stigma absent; orbicular stigma absent, or present (in dark specimens) as a pallid ellipse; reniform usually indistinct, or present as narrow dark pale-margined mark; other markings absent; fringe mottled ochreous and brownish, paler basally. Hindwing greyish, unmarked but veins slightly darkened; dark line along termen indistinct; fringe whitish with dark median line. Underside: forewing suffused blackish brown except towards costa, dorsum and termen where pale ochreous; reniform stigma and postmedian line absent; series of dark dots along termen present; hindwing whitish ochreous, lightly mottled black towards costa and apex; discal spot and postmedian line absent. Abdomen whitish ochreous, mottled dark grey. Male abdominal base (Fig. 44e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 44f): uncus weakly swollen at mid-length, pointed, not hooked; valva oblique, angular, cucullus well differentiated, weakly spatulate, with well developed corona of ca. 26–28 elements in a single row and field of spinose setae not forming costal ‘crest’; one or two apico-dorsal strong hooked setae barely separate from corona; claspers asymmetrical, both robust, curved, crenulate; left clasper with long apical straight sharp process; right clasper without process; ampulla very long, digitate, slightly swollen beyond mid-length; phallus (Fig. 44g) with subapical tooth present, minute; vesica forming complete loop; cornuti rather short, in narrow dense band to about 3/4 length of vesica, where cornuti become very sparse and short, a group of slightly longer but still sparse cornuti at apex. Female S7 as in Fig. 44h. Female genitalia (Figs 44i, j): ovipositor lobes blunt, squared off but with slightly sinuous distal margin; segment 8 with moderately dense fine long setae dorsally and laterally, forming a distinct caudal band dorsally; ostium with distinct but rather short and very narrow dorsal desclerotised ridges and well developed long lateral pockets; ductus bursae of moderate length, (with swollen portion just proximal to colliculum), smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve well sclerotised, smooth; corpus bursae with a pair of short, broad ridged scobinate signa.

Type material. Holotype: male, 'NEW ZEALAND MK Ball Hut Tasman V. 1090 m 31 Mar. 77 JSD / NZAC slide Noct. 234 genitalia ♂/ NZAC04226033 [database barcode label]' (NZAC). Paratypes: 3 males, 1 female, same data as holotype (female dissected with genitalia on slide NZAC Noct. 339) (all NZAC); 1 male, same data as holotype except collector W.J. Sweney (LUNZ); 2 males, 1 female, WD: Westland NP, Castle Rocks Hut 1220 m, 14, 15 Jan 1986, C.A. Muir (Figs 44a, b, c) (all LUNZ).

Distribution. (Map 44). Western Alps of the South Island.

— / NN, BR, NC, MK, OL, FD

Biology. Unknown.

Flight period. January to April.

Etymology. The species name is from the Latin *cornutus* (horned) and draws attention to the well developed antennal pectinations of the male, which distinguish this species from the very similar *I. arotis*.

Remarks. This poorly known species has been collected in rather scattered localities in the South Island alpine zone. In spite of its close superficial similarity to *I. arotis*, the asymmetrical claspers in the male genitalia, the dispersed arrangement of cornuti on the vesica and the form of the ovipositor lobes in the female indicate that *cornuta* belongs in the *I. unica* group and is probably not closely related to *arotis*. *Ichneutica cornuta* and *I. arotis* are sympatric at least at Arthur's Pass and in the Otago Lakes region at Dart Hut, and probably elsewhere.

This species was mentioned by White (2002: 330) as '*Tmetolophota* sp. undescribed' of LUNZ and '*Tmetolophota* sp. No. 2' of NZAC.

45. *Ichneutica lissoxyla* (Meyrick, 1911) new combination

Figs 45a–c (adults); 45d–f (male abdominal base and genitalia); 45g–i (female S7 and genitalia).

Leucania lissoxyla Meyrick, 1911. *Transactions and proceedings of the New Zealand Institute 43*: 70.

Diagnosis. *Ichneutica lissoxyla* may be distinguished from the superficially similar *I. paraxysta* by the lack of a black streak along vein CuP of the forewing (streak present in *paraxysta*), and by the much longer antennal pectinations in the male (antennae serrate rather than distinctly pectinate in *paraxysta*).

Description. Adult (Figs 45a–c). Wingspan 33–37 mm (male); 31.5–39 mm (female). Male antennae bipectinate to *ca* 10–11 segments from apex, pectinations up to *ca* 3x width of flagellum. Head and thorax dull pinkish brown, paler posteriorly, with scales hairlike to narrow lamellate. Forewing pale to mid pinkish brown; veins marked in black and strongly speckled white; cross-lines and stigmata absent; fringe concolorous. Hindwing brownish grey, unmarked, fringe whitish. Underside: forewing uniform greyish brown, dorsum and sometimes termen pale ochreous, unmarked except veins more or less distinctly lined darker; hindwing whitish, unmarked except veins sometimes slightly darker. Abdomen whitish brown, tinged pinkish laterally. Male abdominal base (Fig. 45d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 45e): uncus tapered, pointed, hooked; valva oblique, sinuous, apex blunt, obliquely rounded with corona of *ca* 21–27 elements well differentiated from scattered spinose setae; dorso-apical hooked seta absent; clasper robust, hardly curved, with rugose margins; left clasper with short, narrow apical process, right clasper lacking such process; ampulla moderately long, digitate to thumb-like; phallus (Fig. 45f) with subapical tooth absent; vesica (probably) forming complete loop; cornuti rather short, reduced to small field on curve of vesica at about 1/2 length, and apical patch subdivided into two adjacent groups of *ca* 6–10 cornuti each, these groups interspersed with smaller scale-like cornuti. Female S7 as in Fig. 45g. Female genitalia (Figs 45h, i): ovipositor lobes large, blunt, squared off; segment 8 with numerous long fine setae laterally and long and short setae dorsally forming a distinct caudal band; ostium bursae with short, indistinct dorsal desclerotised ridges and short, indistinct lateral pockets; ductus bursae of moderate length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve smoothly sclerotised, not rugose; corpus bursae with 2 ridged scobinate signa; ventral signum small; dorsal signum either larger, elongate or smaller.

Type material. Holotype: male, 'Type [red-ringed circular label] / Mt Arthur New Zealand GVH 4000′ 2.89 / lissoxyla Meyr. / Leucania lissoxyla Meyr. 1/1 E. Meyrick det. in Meyrick Coll. Holotype ♂' [per JSD] (NHMUK) (examined, not dissected).

Note. Meyrick (1911) described *Leucania lissoxyla* from a single male, although he mentioned that Hudson had a female from the same locality.

Distribution. (Map 45). Central and southern North Island, and almost throughout the South Island.

TK, TO, WN / NN, BR, WD, KA, NC, MC, SC, OL, CO, DN, FD

Biology. Unknown. Adults come to light.

Flight period. January to April.

Remarks. *Ichneutica lissoxyla* is a very widespread and often common alpine species, occurring chiefly above 850 m a.s.l. It was first recorded from the North Island by Fox (1970a) based on specimens he had taken on Mt Taranaki TK; it has since been found to occur in other North Island alpine areas (Mt Ruapehu TO and the Tararua Range WN). There is variation in the size of the signa on the female corpus bursae and in the number of cornuti on the male vesica that may warrant further investigation; however, external characters seem to be very constant with only minor variation.

46. *Ichneutica micrastra* (Meyrick, 1897) new combination

Figs 46a, b (adults); D46c (underside); D46d (male antenna); 46e–g (male abdominal base and genitalia); 46h–j (female S7 and genitalia).

Leucania micrastra Meyrick, 1897. *Transactions of the Entomological Society of London 1897*: 383.

Diagnosis. The male of this species can be distinguished from those of *I. phaula* and *I. sapiens* by the very weakly unipectinate antennae (Fig. D46d), with anterior pectinations not exceeding 1/3 the width of the flagellum. Both *I. phaula* and *I. sapiens* have the antennae bipectinate, with the longest anterior pectinations nearly as wide as the flagellum. Both sexes of *I. micrastra* have the head, thorax and forewing rather deep, dull rusty brown, usually much darker than *I. phaula*, which is ochreous to pale reddish brown. *Ichneutica micrastra* is a larger, more robust-bodied moth than *I. phaula*, and the ranges of the two species are not thought to overlap (*micrastra* is only known from the North Island and *phaula* from the South Island and Stewart Island). Characters separating females of *I. micrastra* and *I. sapiens* are discussed under the Diagnosis for that species, below.

Description. Adult (Figs 46a, b). Wingspan 36–43 mm (male); 40–46 mm (female). Male antennae (Fig. D46d) weakly unipectinate and serrate beneath, pectinations up to *ca* 0.3x width of flagellum; also serrate beneath, very weakly at base, serrations becoming more prominent to about 2/3 length of flagellum, then tapering with taper of antenna. Head and thorax dull rust-brown to dull pinkish brown, with scales bicoloured or tricoloured, narrow lamellate; some white-tipped scales subapically on tegulae. Forewing dull rust brown to dull pinkish brown; antemedian line absent; postmedian line represented weakly by white spots on veins beyond disc; claviform and orbicular stigmata absent; reniform represented only in lower half by two white dots either side of darkening along vein CuA at end of cell; veins obscurely marked in black, mottled with white scales; vein 1+2A usually with white dots at 1/3 and near tornus; other markings absent; termen unmarked (cf. *sapiens*); fringe concolorous with wing. Hindwing dark grey, veins faintly darker, otherwise unmarked; dark line along termen absent; fringe pale brown, paler basally, darker distally. Underside (Fig. D46c): forewing dull grey-brown, except towards dorsum where yellowish white, sprinkled white towards apex and termen; reniform stigma absent; postmedian line absent; termen unmarked; hindwing whitish, sprinkled blackish and suffused pinkish towards costa; discal spot absent; postmedian line absent; termen unmarked. Abdomen pale brown, weakly pinkish-tinged, paler than thorax. Male abdominal base (Fig. 46e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 46f): uncus rather short, rather narrow, pointed, not hooked; valva oblique, not sinuous, cucullus well differentiated, rather flatly rounded with well-developed corona of ca. 35–44 elements in a single row, with apical field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately narrow, strongly curved; claspers asymmetrical; left clasper with narrow sinuous apical process, right clasper blunt; ampulla long, digitate; phallus (Fig. 46g) with subapical tooth absent; vesica forming complete loop; cornuti long, in broad band starting from 1/2 vesica length, apically reduced to single line with separate narrow patch opposite. Female S7 as in Fig. 46h. Female genitalia (Figs 46i, j): (overall length 10.5 mm); ovipositor lobes blunt, strongly squared off, with distinct apical 'lip', setae strongly concentrated near 'lip'; segment 8 with numerous short to long setae laterally and dorsally forming a near-complete caudal band around segment (long setae concentrated towards caudal edge of segment); ostium bursae with rather short indistinct dorsal desclerotised ridges and moderately short, indistinct lateral pockets; ductus bursae rather long, smoothly sclerotised to around 2/3 way to junction with corpus bursae where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae weakly rugose, with pair of elongate ridged scobinate signa, ventral signum very small (apparently occasionally obsolete).

Type material. Holotype: female, 'Type [red-ringed circular label] / Wellington New Zealand GVH /93. / micrastra Meyr. / Holotype ♀ Leucania micrastra Meyr. 1/1 E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania micrastra* was described from a single female (Meyrick 1897).

Distribution. (Map 46). Very local in the northern and southern North Island; South Island records probably all result from confusion with *I. sapiens*.

ND, AK, WI, WN / —

Biology. Unknown. A monocot host is strongly suspected based on the wetland habitat, the known associations of its close relative *I. phaula* (see below), and the similarly modified bilaterally flattened ovipositor (a possible adaptation for inserting eggs under leaf-bases of such plants).

Flight period. October to December.

Remarks. This is a poorly known species, associated with wetlands and heathlands, such as the flax swamps around Paiaka WI and the Northland gumlands (cf. Hoare 2011). For separation from *Ichneutica sapiens*, formerly treated as a synonym, see under that species below.

47. *Ichneutica sapiens* (Meyrick, 1929) new combination, reinstated species

Figs 47a, b (adults); D47c (underside); D47d (male antenna); 47e–g (male abdominal base and genitalia); 47h–j (female S7 and genitalia).

Aletia sapiens Meyrick, 1929. *Transactions and proceedings of the New Zealand Institute 60*: 484.

Diagnosis. *Ichneutica sapiens* is very similar to *I. micrastra*, but smaller and shorter-winged. Male antennal characters differ between the two species as noted in the Diagnosis for *micrastra* above, and in the description below. Both sexes may be distinguished from *I. micrastra* by the presence of a faint dark line connecting the ends of the veins along the forewing termen (no such line in *micrastra*) and by the presence of dark dashes along the termen on the hindwing underside (Fig. D47c). Other differences are as detailed in the description below.

Description. Adult (Figs 47a, b). Wingspan 35–37 mm (male), 38–39 mm (female). Very similar to *Ichneutica micrastra*, differing only as follows: male antenna (Fig. D47d) distinctly bipectinate, with anterior pectinations up to just less than 1x the flagellum width, pectinations and serrations reaching to *ca* 15 segments short of apex. Forewing somewhat shorter and broader than in *I. micrastra*; coloration and markings similar but upper part of reniform stigma usually more clearly indicated, with suffusion of white and/or black scaling at end of cell; termen narrowly and indistinctly blackish (cf. termen unmarked in *micrastra*). Hindwing upperside and forewing underside more or less as described for *micrastra*, but forewing underside (Fig. D47c) with indistinct dark line along termen (absent in *micrastra*); hindwing underside (Fig. D47c) with more extensive dark suffusion than in *micrastra*, usually with indistinct crescentic discal spot, and with series of dark dashes along termen (discal spot and dashes absent in *micrastra*). Abdomen (especially in male) darker than in *micrastra*, suffused greyish. Male abdominal base (Fig. 47e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 47f): as described for *I. micrastra*, but cucullus smaller, with corona of 28–31 elements; claspers shorter, less strongly curved; left clasper with apical process as described for *micrastra*; phallus and vesica (Fig. 47g) as described for *micrastra*, but apical cornuti slightly less robust. Female S7 as in Fig. 47h. Female genitalia (Figs 47i, j): as described for *I. micrastra*, but smaller (overall length 9.5 mm); segment 8 with far fewer setae than in *micrastra*, and these more strictly confined to caudal part of segment; ductus bursae rugose from *ca* 1/2 way along length to corpus bursae; corpus bursae and appendix bursae as described for *micrastra*; only a single, dorsal signum observed.

Type material. Holotype: male, 'Type [red-ringed circular label] / Waiouru New Zealand GVH .11.28. / sapiens Meyr. / Leucania sapiens Meyr. 3/1 Holotype E. Meyrick det. in Meyrick Coll. / Meyrick Coll. B.M. 1938-290.' (NHMUK) (examined, not dissected).

Note. *Aletia sapiens* was described from a single male taken at sugar (Meyrick 1929). Another male in the NHMUK has been dissected and the genitalia were examined for this revision (slide Agrotidae 216).

Distribution. (Map 47). Central North Island (Tongariro National Park), Westland (two males in FRNZ from Sentinel Rock, Franz Josef, collected on 3 Dec 1964 by J.S. Dugdale), southern South Island and Stewart Island.

TO / WD, OL, SL / SI

Biology. Unknown. A monocot host is strongly suspected, for the same reasons as given above under *I. micrastra*.

Flight period. December to early January.

Remarks. This species was synonymised with *Ichneutica micrastra* (as *Tmetolophota micrastra*) by Dugdale (1988: 209). However, the clear differences in male antennae, and more subtle differences in wing shape, wing pattern and male and female genitalia as detailed above, show that this synonymy is incorrect, and the species is therefore reinstated here. *Ichneutica sapiens* is almost certainly a wetland species; several fresh specimens were captured in a light trap at Grant Road, Otatara SL, in December 2011 near the restored wetland on the Rance property (see Acknowledgments). The known distribution is highly unusual, with apparently very disjunct populations in the central North Island, Westland and the southern South Island, and may be relictual, although the moth has probably been overlooked in some areas. No morphological differences have been found that would justify the separation of the disjunct populations as separate species. An analogous situation may exist with the probable sister-species pair *Ichneutica emmersonorum* (only known from Tongariro National Park TO) and *I. stulta* (only known from Southland): see under *I. stulta* below.

There is an old specimen of *I. sapiens* in MONZ labelled 'Omakau 1.4.11 A. Hamilton'. No other records are known from Central Otago, despite extensive collecting there by Brian Patrick over a number of years, and all other specimens seen were caught in December or January: indeed, all of the closely related species *micrastra*, *sapiens* and *phaula* appear to be univoltine and are not known to fly after mid-summer. Therefore I treat this specimen as possibly mislabelled, and CO is not included in the distribution here.

48. *Ichneutica phaula* (Meyrick, 1887) new combination

Figs. 48a–c (adults); 48d–f (male abdominal base and genitalia); 48g–i (female S7 and genitalia).

Leucania phaula Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 10.

Leucania dunedinensis Hampson, 1905. *Catalogue of the Lepidoptera Phalaenae in the British Museum. Vol. 5*: 591. Synonymised by Meyrick (1912a: 96).

Leucania neurae Philpott, 1905. *Transactions and proceedings of the New Zealand Institute 37*: 330, pl. XX fig. 5. Synonymised by Meyrick (1909: 5).

Diagnosis. Differences between *Ichneutica phaula* and *I. micrastra* are treated under that species, above; the ranges of the two species are not thought to overlap. *Ichneutica phaula* is usually a paler moth than *I. sapiens* (with which it is sympatric in the southern South Island), and generally lacks the reddish tinge to the thorax and forewings of that species (though some *phaula* do have such a tinge). The dorsal scaling of the antenna in *I. phaula* is almost invariably pure white and contrasts with the brown head scaling; in *I. sapiens*, the antenna is dorsally whitish and mottled with brown scales, and contrasts only weakly with the head colour. A further character is the presence in *I. phaula* of rather distinct white spots at about 1/4 forewing length at the base of the discal cell and on vein 1+2A; these spots are indistinct or absent in *I. sapiens*. The underside of the hindwing in *I. phaula* is usually whitish and lacks the extensive dark suffusion present in *I. sapiens*.

Description. Adult (Figs 48a–c). Wingspan 32–40 mm (male); 36–45 mm (female). Male antennae weakly bipectinate, pectinations tapering gradually to apex, pectinations up to *ca* 0.5–0.8x width of flagellum; also serrate beneath, very weakly at base, serrations becoming more prominent to about 2/3 length of flagellum, then tapering with taper of antenna. Head and thorax dull olive-brown to dull pinkish ochreous, with scales unicolorous or weakly bicoloured, hairlike to very narrow lamellate (white-tipped scales absent on tegulae). Forewing dull olive brown to dull pinkish ochreous; veins marked black, strongly speckled white; antemedian and postmedian lines absent; claviform and orbicular stigmata absent; reniform represented by a few whitish scales in outline, especially two dots either side of darkening along vein CuA at end of cell; line of white dots on veins at 4/5 form impression of a line; white dots on vein 1+2A at 1/3 and near tornus; sometimes weak dark line along termen; other markings absent; fringe brown, paler basally. Hindwing dark grey, paler basally, unmarked; dark line along termen absent; fringe whitish, with darker line subbasally. Underside: forewing dull grey-brown, except towards costa and dorsum where whitish, often narrowly to broadly sprinkled white towards apex and termen; reniform stigma absent or very indistinct; postmedian line absent; termen with series of very small dark marks; hindwing whitish, usually weakly sprinkled blackish exteriorly (occasionally strongly suffused blackish); small crescentic discal spot present; postmedian line absent; termen with indistinct series of dark marks. Abdomen pale pinkish ochreous, more yellowish apically. Male abdominal base (Fig. 48d) without brushes, levers or pockets; A3 apodemes present. Male

genitalia (Fig. 48e): very similar to those of *sapiens*, corona with 23–31 elements; phallus (Fig. 48f) as in *sapiens*, except cornuti (before subapical bifurcation) in somewhat longer and denser band. Female S7 as in Fig. 48g. Female genitalia (Figs 48i, j): very similar to those of *I. micrastra*, but smaller (overall length 8.7 mm); segment 8 setae as in *micrastra* (i.e. denser and more extensive than in *sapiens*); ductus bursae as in *sapiens*, with rugose portion starting at *ca* 1/2 length.

Type material. *Leucania phaula*: Lectotype (designated by Dugdale (1988: 210)): male, 'Nov. 1872 Sumner bred from larva found in tussock / Fereday Collection. / ~~HOLO~~LECTOYPE [*sic*] Leucania phaula Meyrick teste J.S. Dugdale' (CMNZ) (examined, not dissected).

Note. *Leucania phaula* was described from two males (Meyrick 1887). The paralectotype is in CMNZ, and was collected by Fereday in Fendalton MC, also in Nov 1872; there is no indication that this second specimen was reared.

Leucania dunedinensis: Holotype: male, 'Spaelotis dunedinensis Butler type / Type [red-ringed circular label] / Dunedin 88.8 / N. Zealand Dunedin Purdie 88.8' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania dunedinensis* was described from a single Dunedin specimen collected by Purdie (Hampson 1905a). Hampson gives the wingspan as 36 mm, but according to J.S. Dugdale's notes, this specimen measures 32.8 mm. However, there are three other Purdie specimens in NHMUK measuring *ca* 36–38 mm in wingspan (JSD, notes). Since this anomaly does not affect the identity of *dunedinensis* as a synonym of *phaula*, the issue is left unresolved here. From the labelling on the presumed holotype, *dunedinensis* was perhaps a manuscript name of Butler's, made available by Hampson.

Leucania neurae: Lectotype (here designated): male, 'West Plains [no date] / LECTOTYPE ♂ Leucania neurae Philpott' (NZAC) (examined, not dissected).

Note. *Leucania neurae* was described from two males taken at sugar (Philpott 1905: 330). J.S. Dugdale labelled one specimen as lectotype, but did not publish this designation, retaining the specimens as syntypes (Dugdale 1988: 210). This specimen is here designated lectotype to avoid any possible confusion in future.

Distribution. (Map 48). Very locally widespread in the eastern South Island and Nelson district, and also known from Stewart Island. North Island records (TO) are probably erroneous (see below).

— / NN, KA, MC, DN, SL / SI

Biology. The larva has been found in sand dunes feeding on the endemic pingao (*Ficinia spiralis*) (Cyperaceae) and the introduced marram grass (*Ammophila arenaria*) (Poaceae) by Brian Patrick (Patrick 1994a; reared material in OMNZ). In the original description, Meyrick (1887) records that the two specimens of the type series were reared from 'tussock-grass' (presumably by R.W. Fereday), and Hudson (1928) gives silver tussock, *Poa cita* (as *P. caespitosa*), as the host-plant, with no further details.

Flight period. October to December.

Remarks. *Ichneutica phaula* is only known with certainty from the South Island and Stewart Island, where it is widespread in coastal localities. It apparently sometimes wanders inland: there are specimens from Wairoa Gorge NN and Gore SL in NZAC. It is relatively rare in collections, and may be overlooked. In Southland and Stewart Island it occurs alongside its close relative *I. sapiens*. Specimens from the Nelson district (Farewell Spit, Sandhill Creek, Wairoa Gorge) appear to be on average larger than those from the southern South Island and have the antennal pectinations very slightly shorter, but since no other differences (either external or genitalic) have been found, these populations are retained as *I. phaula* here.

Records of *Ichneutica phaula* from the central North Island are here considered to be probably erroneous, and due to confusion with *I. unica* and possibly *I. sapiens*. Clarke (1920) records 'a few at sugar on the Mangaehuehu Stream' near Rangataua; however, the only Clarke specimen with the relevant data that stood in the series of *phaula* in AMNZ is in fact a specimen of *I. unica* (AMNZ database no. 3778). It has now been moved to the series of *unica* and renamed in the database (J.W. Early, pers. comm.).

Hudson (1928, 1939) gives Rangataua, Waiouru, Waimarino and Taupo (all TO) as localities for *phaula*, but all remaining specimens in the Hudson collection in MONZ are from Dunedin and Invercargill. Extensive collecting in and around Tongariro National Park in the last 50 years by a number of collectors has apparently failed to turn up any specimens of *I. phaula*. The only correctly identified specimen that is labelled as coming from the North Island is one in the main Lepidoptera collection in MONZ labelled 'Taupo 1907'. This specimen is from

the Fenwick collection, and Fenwick did most of his collecting around Dunedin, a known *phaula* locality, so it may possibly be mislabelled.

49. *Ichneutica toroneura* (Meyrick, 1901) new combination

Figs 49a–c (adults); 49d–f (male abdominal base and genitalia); 49g–i (female S7 and genitalia).

Leucania toroneura Meyick, 1901. *Transactions of the Entomological Society of London 1901*: 565.

Diagnosis. *Ichneutica toroneura* resembles some forms of *I. unica* but can usually be distinguished by the rather uniformly black-marked forewing veins: where the veins are marked in black in *unica*, the marking is more uneven, giving the effect of dots and dashes; this is best seen on vein 1+2A where *unica* shows at least short interruptions near the base of the vein and near the tornus, and usually distinct dots in these positions (absent in *toroneura*). In the male, the antennal pectinations are longer in *toroneura* (up to 3x the width of the flagellum) than in *unica* (up to 2x), and the serrations on the underside of the antenna are longer, narrower and more discrete, tending to be nearly oblong in profile, whereas those in *unica* are closer together and more falcate, i.e. each serration has a strongly convex basal edge and a concave distal edge (cf. Philpott 1929: 300): the latter difference is best appreciated by examining the underside of the antenna at about 2/3 length where the serrations are longest. For differences between *I. toroneura* and some forms of *I. acontistis*, see under that species, below.

Description. Adult (Figs 49a–c). Wingspan 29–36 mm (male); 29–33 mm (female). Male antennae bipectinate to *ca* 4–5 segments short of apex, pectinations up to *ca* 3x width of flagellum; also serrate beneath, with serrations long, very discrete and near-oblong in profile (cf. *I. unica* below). Head and thorax pale ochreous, with scales unicolorous, hairlike or very narrow lamellate. Forewing pale ochreous to dull brownish ochreous; veins marked in black; 1+2A all black, without distinct interruption; postmedian line occasionally represented as pale indistinct interruption to marks along veins; reniform stigma extremely faintly outlined in pale scales; no other markings; fringe concolorous with wing. Hindwing pale brownish to grey-brown, unmarked except veins slightly darker than ground colour; dark line along termen absent; fringe whitish. Underside: forewing whitish ochreous, suffused brown in basal 4/5 except towards costa and dorsum, also veins lined brown beyond disc; hindwing whitish, veins lined brownish, otherwise unmarked. Abdomen whitish ochreous basally (including basal hair-scales), more yellowish ochreous distally and laterally. Male abdominal base (Fig. 49d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 49e): uncus short, narrow, pointed, not hooked; valva oblique, angular, apex bluntly rounded, spatulate, with well developed corona of *ca* 17–24 elements in a single row; apico-dorsal strong hooked seta separate from corona present or absent; clasper short, blunt, very weakly curved; claspers asymmetrical, relatively robust, left with very short apical twisted process absent from right (part of process possibly broken off in examined preparations); ampulla long (equal to or longer than clasper), apically slightly sinuous and hooked; phallus (Fig. 49f) with subapical tooth absent; vesica forming complete loop; cornuti rather short, separate apical patch in two groups. Female S7 as in Fig. 49g. Female genitalia (Figs 49h, i): ovipositor lobes blunt, squared off; with distinct 'lip', (with setae concentrated apically); segment 8 with sparse setae of mixed lengths laterally and long setae dorsally confined to apex of segment and forming distinct caudal band; ostium with small, indistinct dorsal desclerotised ridges, left lateral pocket short, right long; ductus bursae of moderate length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae well sclerotised and rugose, outer curve smoothly sclerotised, not rugose; corpus bursae with single fairly small ridged scobinate signum.

Type material. Lectotype (designated by Dugdale (1988: 210)): male, 'Lectotype [yellow-ringed circular label] / Mt Cook New Zealand GVH 12/99 / toroneura Meyr. / Leucania toroneura Meyr. 6/4 Lectotype E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania toroneura* was described from four males from Mt Cook (Meyrick 1901). The lectotype designation mentioned by Dugdale (1988: 210) by 'an unknown designator' is apparently unpublished and therefore not valid; Dugdale is taken to have designated the lectotype under ICZN Article 74.5.

Distribution. (Map 49). Central southern South Island.

— / MK, CO

Biology. Larvae were reported by Dick (1940) to feed on foliage of silver tussock (*Poa cita*) and hard tussock (*Festuca novae-zelandiae*).

Flight period. November to January.

Remarks. *Ichneutica toroneura* is a local species that appears to be confined to the dry inland tussocklands of Central Otago and the Mackenzie Country, occurring up to at least 1320 m a.s.l. (White 2002), though chiefly at lower elevations. Records from other areas are almost certainly misidentifications of *toroneura*-like forms of *I. unica* or *I. acontistis*. Although there are rather few recently collected specimens in NZAC, White (2002) found this species relatively abundant in his Mackenzie Basin light-trapping sites in the 1990s, with 992 specimens recorded below 850 m a.s.l. As an endemic specialist of inland tussocklands with a restricted range, populations of this species should be closely monitored.

50. *Ichneutica unica* (Walker, 1856) new combination

Figs 50a–d (adults); 50e–g (male abdominal base and genitalia); 50h–j (female S7 and genitalia).

Leucania unica Walker, 1856. *List of the specimens of lepidopterous insects in the collection of the British Museum. IX*: 112.
Nonagria juncicolor Guenée, 1868. *Entomologist's Monthly Magazine 5*: 2–3. Synonymised by Meyrick (1887: 10).

Diagnosis. *Ichneutica unica* is closely related and very similar to *I. toroneura*; the differences are described under the Diagnosis for that species, above.

Description. Adult (Figs 50a–d). Wingspan 32–37 mm (male); 32–36 mm (female). Male antennae bipectinate to *ca* 7 segments short of apex, pectinations up to 2x width of flagellum. Head and thorax dull ochreous, paler posteriorly on thorax, with scales unicolorous, hairlike to very narrow lamellate. Forewing dull ochreous; veins variably marked in black; antemedian line absent; postmedian line present as indistinct smoothly curved line of ground colour, interrupting the black vein-marking which appears as series of dots just basad of it; claviform and orbicular stigmata absent; reniform present, very faintly outlined in pale and (especially in North Island specimens) with lower part infilled blackish where it overlaps stem of CuA; vein 1+2A with more or less distinct dark dot where black line is interrupted at 1/3 and near tornus (often 2 dots at 1/3); no other markings; fringe concolorous, paler basally. Hindwing dark greyish, unmarked; dark line along termen absent; fringe pale ochreous. Underside: forewing dark grey brown, paler brown towards costa, dorsum and termen and veins more or less distinctly lined darker beyond disc; hindwing brownish white sometimes suffused greyish (North Island specimens); discal spot minute or absent; otherwise unmarked or with veins darkened. Abdomen pale ochreous to pinkish ochreous, paler basally (including basal hair-scales). Male abdominal base (Fig. 50e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 50f): as described for *toroneura*, but cucullus often (not always) with stout apico-dorsal seta separate from corona; ampulla less hooked apically, and left clasper possibly with longer apical process (though may be broken off in *toroneura* preparations examined); phallus (Fig. 50g) with apical cornuti on vesica more strongly developed and less clearly separated from main group than in *toroneura*. Female S7 as in Fig. 50h. Female genitalia (Figs 50i, j): As described above for *I. toroneura*; no definite differences found, except corpus bursae more rugose and with a second very indistinct and unridged ventral signum.

Type material. *Leucania unica*: Holotype: female, 'Type [green-ringed circular label] / N. Zealand 45-30 / Leucania unica' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania unica* was described from a single specimen collected by Percy Earl (Walker 1856); the likely type locality is Waikouaiti DN (Dugdale 1988). The page number for the description is misprinted as '12' in Dugdale (1988: 210); it should be '112'.

Nonagria juncicolor: Lectotype (here designated): male, 'Type [red-ringed circular label] / Ex Musaeo Ach. Guenée. / Non. juncicolor Gn. En Monthl. Magaz. 1868 p... unica Wlk p. 112? Nlle Zélande M. Knaggs / Ex Oberthür Coll. Brit. Mus. 1927-3.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Nonagria juncicolor* was described from an unspecified number of male specimens (Guenée 1868); from the description, which twice contains the word 'sometimes' relating to variable markings, it is clear that Guenée had more than one specimen in front of him. The mention of a holotype by Dugdale (1988: 210) does not constitute a valid lectotype designation (ICZN Article 74.5); therefore the specimen hitherto treated as the holotype is designated lectotype here to avoid any possible confusion in the future.

In describing *juncicolor*, Guenée (1868: 3) noted "it is scarcely possible that this can be *Leucania unica*, Walker, p. 112, in which the anterior wings are without spots, and the abdomen much paler than the thorax". However, Guenée was misled by Walker's description; the *unica* holotype hardly differs from the *juncicolor* lectotype in coloration, and both fall well within the range of variation of *I. unica* as defined here. The 'M[onsieur]

Knaggs' mentioned on the label was the English lepidopterist H. Guard Knaggs, who probably received the specimen from R.W. Fereday (see under *Ichneutica sistens*, below).

Distribution. (Map 50). Central North Island and throughout the South Island.

TO / SD, NN, BR, MB, KA, MC, SC, MK, OL, CO, DN, FD, SL

Biology. The life history appears to be very poorly known, but there is a single reared (crippled) specimen in NZAC from Mt Murchison BR with associated pupal and larval exuviae and a label indicating that *Chionochloa pallens* was the host-plant. Doubtless other *Chionochloa* species and maybe other grasses are suitable hosts.

Flight period. October to January.

Remarks. This is a widespread grassland species, occurring in a variety of habitats including coastal dunes (e.g., at Kaitorete Spit MC), frost flats (e.g., near Rangitaiki TO), inland volcanic dunes (e.g., Rangipo Desert TO) and inland tussock grasslands up to 1300 m a.s.l. (many South Island localities). In his tussock grassland light-trapping studies, White (2002: 335) found the species far more abundant below 850 m a.s.l. than above this altitude. North Island specimens of *I. unica* (Fig. 50b) tend to have a deeper brown forewing colour, a more distinct reniform stigma and a darker hindwing underside than those from the South Island, but no differences have been found in male antennae or genitalia, so no taxonomic distinction is made here.

X. *Ichneutica propria* group

Diagnosis. Male abdominal base with or without brushes, levers or pockets, or with partial development of these; A3 apodemes present. Uncus pointed; valva weakly to strongly sinuous; cucullus moderately to well differentiated; claspers symmetrical, narrow, without transverse lamellae; apical setae of valva usually forming distinct 'crest'; dorso-apical hooked seta of corona present or absent; vesica not strongly elongated; cornuti not reduced, cornutal strip not interrupted.

Remarks. This very large species group may well be paraphyletic. It brings together most species formerly assigned to *Tmetolophota* by Dugdale (1988) with others formerly in *Dipaustica*, *Graphania* and *Aletia.* Some species placed here have arguably the most 'complex' male abdominal and genital traits in *Ichneutica*, i.e. brushes, levers and pockets are present, the valva is strongly sinuous / S-shaped, the cucullus is large and well differentiated, the corona has many elements, the costal setae at the valval apex form a crest, the dorso-apical hooked seta of the corona is present. However, study of the genitalia plates will show that there is a continuum between species with all these traits strongly developed and species that have one or more of them reduced, hence the broad circumscription of this species group.

Ichneutica sistens subgroup

Diagnosis. Male abdominal base without brushes or pockets; A3 apodemes present; valva rather narrow, weakly sinuous; clasper rather narrow, with or without papillae, pollex at base not strongly projecting; cucullus not extending to a beak-like point; basal tubular portion of vesica lacking field of denticles.

51. *Ichneutica acontistis* (Meyrick, 1887) new combination

Figs 51a–d, D51e (adults); 51f–k (male abdominal base and genitalia); 51l–n (female S7 and genitalia).

Leucania acontistis Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 9.

Diagnosis. *Ichneutica acontistis* is superficially similar to *I. paraxysta*; external and genitalic differences are listed under that species. In practice, confusion is unlikely to arise except in unlabelled museum material, since the two species are allopatric, *paraxysta* being confined to the North Island and *acontistis* to the South. Well-marked *I. acontistis* could be confused with *I. stulta*; differences are treated below, under the latter species (see also Figs D51e, D53c). A few specimens of *I. acontistis* from Arthurs Pass NC and some localities in MB have all the forewing veins lined black and superficially resemble *I. toroneura*; however, *I. toroneura* always lacks the dark streak from the base of the forewing along CuP, which is invariably present in *acontistis*. The males of this form can easily be distinguished from *toroneura* by their much shorter antennal pectinations (up to *ca* 1x flagellum width; cf. up to 3x in *toroneura*).

Description. Adult (Figs 51a–d). Wingspan 31–39.5 mm (male); 32–38.5 mm (female). Male antennae bipectinate to *ca* 13–15 segments short of apex, pectinations up to *ca* 1x width of flagellum. Head and thorax pale

ochreous, sometimes faintly reddish-tinged, tegulae often whitish ochreous posteriorly; prothorax with indistinct to distinct dark transverse bar, when distinct sometimes bordered cream above; tegulae in strongly marked specimens sometimes each with trace of dark streak near mesal margin; thoracic scales unicolorous, hairlike. (Forewing costa straight except very weakly arched at base.) Forewing pale ochreous (darker and greyish-suffused in specimens from MB); veins finely and usually inconspicuously marked in blackish; a fine to strong blackish streak from base of wing to about 1/2 wing length along CuP; sometimes a short oblique subbasal blackish streak from dorsum; dark line along 1+2A without distinct interruption; all cross-lines and stigmata obsolete; usually a pale cream streak along lower inside margin of disc, continuous with pale streaks along veins M3 and CuA1; often an indistinct dark streak above this from centre of disc to space between M2 and M3, not reaching termen; fringe concolorous with wing. Hindwing pale brownish to grey-brown, unmarked except veins sometimes slightly darker than ground colour; dark line along termen absent; fringe whitish. Underside: forewing pale ochreous with veins slightly darker; hindwing paler whitish ochreous with veins slightly darker; otherwise unmarked (specimens from MB with underside darker, suffused greyish). Abdomen pale ochreous to whitish ochreous, paler basally. Male abdominal base (Fig. 51f, i) without brushes, levers and pockets; A3 apodemes present. Male genitalia (Figs 51g, j): uncus rather short, narrow, pointed, at most weakly hooked; valva rather upright to moderately oblique, weakly sinuous; cucullus not strongly differentiated, apex truncately rounded; with well developed corona of ca. 18–28 elements in a single row, and dense band of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper moderately long, straight, digitate, more or less strongly papillate on costal edge; claspers symmetrical; ampulla moderately short, digitate to thumb-like, often with slightly expanded apex; phallus (Figs 51h, k) with subapical tooth absent; vesica forming complete loop; cornuti of moderate and even length, forming compact band along apical 1/2 of vesica. Female S7 as in Fig. 51l. Female genitalia (Figs 51m, n): (overall length 7.5–7.7 mm); ovipositor lobes blunt, of moderate size, squared off; segment 8 with few scattered short to medium-length setae laterally, setae becoming denser dorsally, forming caudal band; ostium with dorsal desclerotised ridges rather short and indistinct; lateral pockets moderately long; ductus bursae of moderate length, sinuous; smoothly sclerotised to about 2/3 way to junction with corpus bursae where weakly rugose; inner curve of appendix bursae strongly sclerotised and moderately rugose, outer curve sclerotised, not rugose; corpus bursae moderately rugose, with pair of short scobinate ridged signa, ventral signum smaller.

Type material. Holotype: male, 'Castle Hill Station from Enys / Fereday Collection / 44 / Leucania acontistis Meyr. / HOLOTYPE ♂ Leucania acontistis Meyrick teste JS Dugdale' (CMNZ) (examined, not dissected).

Note. *Leucania acontistis* was described from a single male (Meyrick 1887: 19).

Distribution. (Map 51). South Island, chiefly eastern and apparently not reaching Nelson.

— / MB, NC, MC, MK, OL, CO, DN, SL

Biology. The larva feeds on various grasses (Poaceae) including *Poa*, *Elymus* and *Rytidosperma* (Patrick 1994a); Dick (1940) and Kelsey (1957) mention it amongst the species feeding on 'tussock' (i.e. *Poa cita*, *P. colensoi* and/or *Festuca novae-zelandiae*). The larva has not been described. One specimen in OMNZ and one in NZAC were reared from pupae under rocks.

Flight period. September to January.

Remarks. *Ichneutica acontistis* is a locally common tussock grassland moth that does not seem to have experienced the 20th century declines documented in other species of the same habitat e.g. by White (1991). Indeed, White's light trapping figures (*loc. cit.*, Appendix 1) would seem to indicate that *acontistis*, like *I. propria*, increased in numbers up to the late 1980s. However, further quantitative data since this time is lacking and new survey work is needed to monitor the status of this and other grassland moths.

The male genitalia of this species show some variation in the breadth of the valva and cucullus, but the variation appears to be continuous and does not seem to correspond with any external characters.

52. *Ichneutica emmersonorum* new species

Figs 52a, b (adults); 52c–e (male abdominal base and genitalia); 52f–h (female S7 and genitalia).

Diagnosis. *Ichneutica emmersonorum* may be distinguished from *I. similis* without dissection by the somewhat broader forewing, darker forewing ground colour, and less distinct reniform stigma; the black lines along the veins in the distal half of the wing are distinct and highlighted by surrounding pale scales, whereas in *similis* only traces of dark lines are present. For differences from *I. steropastis*, see under that species below.

Description. Adult (Figs 52a, b). Wingspan 33.5–36 mm (male); 33–37 mm (female). Male antennae very weakly bipectinate (longest pectinations well under 1x width of flagellum) and serrate. Head and thorax dull chocolate brown; bar on prothorax black, edged white posteriorly; tegulae brownish white, or mixed white and brown, with strong black lines laterally and mesally; scales unicolorous or bicoloured, narrow lamellate to hairlike. (Forewing costa weakly arched). Forewing chocolate brown with admixture of pinkish brown scales, darker than *similis*, veins lined blackish; black basal streak moderately long, usually obscured by surrounding ground colour; distinct subbasal black streak from dorsum below 1+2A; a white streak along Cu stem from base, edged black above; whitish streaks along most veins beyond cell except M2; whitish streak along 1+2A, usually less clearly indicated than in *similis*; antemedian and postmedian lines absent, or postmedian faintly indicated towards costa only; stigmata absent except for faint reniform, much less distinct and narrower than in *similis* and indicated only by traces of whitish outline; subterminal line absent but subterminal area with some blackish interneural streaking; series of dark marks along termen present as faint broken line; fringe chocolate brown, chequered white. Hindwing dark brown, unmarked; dark line along termen present, indistinct; fringe whitish with dark median line, line sometimes broken (chequered). Underside: forewing dark brown, paler at apex; fringe strongly chequered as upperside; hindwing pale ochreous irregularly suffused brown; series of dark marks along termen; discal spot indistinct. Abdomen without distinct scale-tufts dorsally; whitish, mottled or suffused dark brown. Male abdominal base (Fig. 52c) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 52d): uncus somewhat expanded in middle, bluntly pointed, not hooked; valva oblique, barely sinuous, cucullus weakly differentiated, bluntly rounded, with well developed corona of *ca* 20 elements in a single row and field of spinose setae forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper moderately slender, curved, dorsally papillate; ampulla rather long, digitate; phallus (Fig. 52e) with subapical tooth absent; vesica forming complete loop; cornuti moderately long, in uninterrupted band basally, narrowing to a single row apically next to a field of very short cornuti. Female S7 as in Fig. 52f. Female genitalia (Figs 52g, h): (overall length 8.5–8.7 mm); ovipositor lobes blunt, of moderate size, truncately rounded; segment 8 with numerous medium length setae laterally, setae somewhat sparser dorsally, forming band in caudal 1/3 of segment; ostium with long rather indistinct dorsal desclerotised ridges (without caudal bulge) and long sclerotised lateral pockets, right pocket in ventral view longer; ductus bursae long, strongly constricted below ostium, then weakly broadened mid-length, smoothly sclerotised to about 2/3 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae moderately rugose, with pair of short scobinate ridged signa, ventral signum slightly smaller, but distinctly ridged.

Type material. Holotype: male, 'NEW ZEALAND TO 39 10.9S 175 31.4E Tongariro NP 1000 m Whakapapanui Tk, m.v. 5 Dec 2000 R. Hoare, G. Hall, T. Sirey / NZAC slide Noct. 277 genitalia ♂/ NZAC04226034 [database barcode label]' (NZAC). Paratypes: 1 male, 2 females (all NZAC), as follows: 1 male, 1 female, same locality as holotype, but 5 Dec 1994, J.S. Dugdale and P. Peckham, to light (Figs 52a, b) (female with genitalia slide NZAC Noct. 373); 1 female, TO: Rangipo Desert, Tukino Access Rd, 8 Dec 2009, R. Hoare, S. Forgie (genitalia slide NZAC Noct. 461).

Distribution. (Map 52). Only known from the central North Island volcanic plateau, from various localities within and around Tongariro National Park.

TO / —

Biology. Unknown.

Flight period. November to January.

Etymology. This species is named after my dear friends Alan and Kath Emmerson, whose contribution to this revision is detailed in the Acknowledgments. Alan kindly donated material of this species to NZAC. The species name is in the genitive plural.

Remarks. Although *Ichneutica emmersonorum* resembles *I. similis* superficially, and has been confused with that species in collections, the genitalia indicate that the two are probably not closely related. Instead, *I. emmersonorum* is extremely closely related to *I. stulta*, based on wing pattern and female genitalia (male genitalia are unknown in *stulta*). The pattern of light and dark forewing streaks in *emmersonorum* is in essence very similar to that in *stulta*, though it is a much darker, more strongly marked moth. The female genitalia of the two species are also very alike, but those of *emmersonorum* are somewhat smaller (8.5–8.7 mm vs. 9–9.3 mm in *stulta*) and have a more strongly ridged ventral signum on the corpus bursae. In erecting *emmersonorum* as a new species, I have

placed some weight on these small differences in the genitalia, when considered alongside the more obvious differences in coloration and wing shape.

This species was apparently discovered by G.V. Hudson at Waimarino (National Park); he captured specimens at sugar in January 1930 and December 1931 along with specimens of *I. similis* (Hudson 1939; Hudson collection and register in MONZ). However, he failed to distinguish the two species and identified all his captures as *similis*; his figure (Hudson 1939: pl. LV fig. 22) purporting to be of *similis* in fact shows *I. emmersonorum*. K.J. Fox and F. Chambers were next to collect the species, in the 1960s and 1970s: their specimens, labelled 'Ruapehu', 'S.W. Ruapehu' and 'Ohakune track', are also in MONZ. There are a few more recent specimens in NZAC (forming the type series) from the Whakapapanui Track and from the Tukino Access Road in the Rangipo Desert. The species remains very little known but its coloration and relationships strongly suggest a monocot host-plant.

53. *Ichneutica stulta* (Philpott, 1905) new combination

Figs 53a, b, D53c (adults); 53d–f (female S7 and genitalia).

Leucania stulta Philpott, 1905. *Transactions and proceedings of the New Zealand Institute 37*: 329, pl. XX fig. 1.

Diagnosis. *Ichneutica stulta* resembles some very well-marked forms of *I. acontistis* (specimens with a subbasal dorsal streak, Figs 51c, d), but may be distinguished by the rather strongly arched costa of the forewing (costa almost straight in *acontistis*), and by the presence of a discal spot on the hindwing underside (spot absent in *acontistis*). There are wedge-shaped dark interneural streaks in the subterminal area of the forewing in *I. stulta* that are rarely present in *I. acontistis*. A significant but subtle difference is in the streaks between M2 and M3 and between M3 and CuA1 (see Figs D51e, D53c): these streaks are entire (when present) in *acontistis*, but broken centrally by a very fine oblique pale line in *stulta*. The hindwing upperside in *I. stulta* is also noticeably darker than that of southern South Island specimens of *I. acontistis*; though *acontistis* specimens from Marlborough do have a rather dark brown hindwing. *Ichneutica stulta* is very closely allied to the central North Island endemic *I. emmersonorum* (and the wing markings of both are essentially similar), but *emmersonorum* can easily be distinguished by its strongly marked thorax and much darker forewing coloration.

Description. Adult (Figs 53a, b). Wingspan 33–41 mm (female). Male antennae 'shortly ciliated' according to Philpott (1905) (see Remarks below). Head and thorax pale reddish ochreous; bar on prothorax blackish, indistinctly edged pale posteriorly; tegulae unmarked or with faint darker lines laterally and mesally; scales mostly unicolorous, narrow lamellate to hairlike. (Forewing costa rather strongly arched). Forewing pale reddish ochreous to dull ochreous, dorsum sometimes paler, pale ochreous; black basal streak moderately long; more or less distinct subbasal black streak from dorsum below 1+2A; a white streak along Cu stem from base, edged blackish above in discal cell; whitish streaks bordering most veins beyond cell except M2, veins themselves brownish ochreous; dark streaking between M1 and M2 and along CuP more or less pronounced; antemedian and postmedian lines absent; stigmata absent; subterminal line absent but subterminal area with some blackish interneural streaking; series of dark marks along termen absent; fringe inconspicuously chequered ochreous and white. Hindwing dark brown, unmarked; dark line along termen absent; fringe ochreous, darker basally. Underside: forewing brownish, paler towards apex, with fairly distinct reniform and series of dark marks along termen, fringe unmarked; hindwing paler ochreous, with discal spot and series of dark marks along termen. Abdomen without distinct scale-tufts dorsally; ochreous, mottled dark brown. Male abdomen and genitalia: unknown. Female S7 as in Fig. 53d. Female genitalia (Figs 53e, f): (overall length 9.0–9.3 mm); ovipositor lobes blunt, of moderate size, squared off; segment 8 with rather numerous short to medium-length (mostly very fine) setae laterally, setae becoming sparser dorsally, forming scattered caudal band; ostium with dorsal desclerotised ridges rather short and indistinct; lateral pockets moderately long; ductus bursae rather long, sinuous, smoothly sclerotised to about ¾ way to junction with corpus bursae where weakly rugose; inner curve of appendix bursae strongly sclerotised and weakly rugose, outer curve sclerotised, not rugose; corpus bursae very weakly rugose, with pair of short scobinate signa, ventral signum smaller, hardly ridged; dorsal signum distinctly ridged.

Type material. Lectotype (here designated): Female, 'West Plains [no other data] / Leucania stulta Philpott. Holotype ♀ / NZAC slide Noct. 326 genitalia ♀' (NZAC). Paralectotypes: 2 females (Fig. 53a), (each labelled '*Leucania stulta* Philpott Paratype'), same data as Lectotype (NZAC). A further female in NZAC (Fig. 53b), also labelled 'West Plains' without date, is not labelled as a Paratype and at 33 mm in wingspan is much smaller than

the 41 mm given for the species in the original description by Philpott (1905). This specimen is therefore excluded from the type series, and may be the last specimen of this species ever caught (see below).

Note. *Leucania stulta* was described and figured by Philpott (1905) based on an unspecified number of specimens of both sexes; he stated that he had not taken the male at West Plains, and that he figured the male from a specimen supplied by Mr. Gibb from Tuturau. This male is apparently lost (see below). A female in NZAC has been treated as Holotype (Dugdale 1988), based on having been labelled as such by Philpott, but as there was no mention of a holotype in the original description, it must be regarded as a syntype. I designate this specimen as Lectotype here.

Distribution. (Map 53). Only known from the original localities of West Plains and Tuturau, Southland.

— / SL

Biology. Unknown.

Flight period. October to December (Philpott 1905).

Remarks. This species has been misinterpreted by lepidopterists: either it has been considered a form (i.e. unpublished synonym) of *I. acontistis* (cf. Patrick 1994a: 25), or southern, well-marked specimens of *acontistis* have been misidentified as *I. stulta* in collections. Close examination of the remaining type specimens and of Philpott's description and illustration of *I. stulta* shows that it is a good species distinct from *I. acontistis*. The forewing shape and pattern (see Diagnosis above) do not fall within the range of variation seen in *acontistis*, and in particular, the female terminalia show distinct differences: they are much larger (length 9 mm or more, cf. 7.5–7.7 mm in *acontistis*) and there are many fine setae laterally on segment 8, where *acontistis* only has a few scattered setae. The ventral signum on the corpus bursae is reduced in *stulta* as compared to *acontistis*. The corpus bursae appears to be much more weakly rugose in *stulta* than in *acontistis*: this character requires confirmation, since degree of rugosity may vary in *Ichneutica* with reproductive status, but examination of an unmated *acontistis* female (NZAC slide Noct. 457) suggests there is a difference between the species. Moreover, Philpott describes the antennae of male *stulta* as 'shortly ciliated' only; those of *I. acontistis* have pectinations up to 1x the flagellum width and Philpott would surely have mentioned pectinations in *stulta* had they been this distinct. The male antennae of *Ichneutica emmersonorum* (q.v., the possible sister-species of *I. stulta*) have very short inconspicuous pectinations, and it is likely that those of male *I. stulta* are (or were) similar.

Philpott recorded this species as 'not common' and had not collected the male. However, Robert Gibb of Tuturau supplied a male for Philpott to describe and this is figured by Philpott (1905: Plate 20, fig. 1). It is extremely regrettable that Gibb's material appears to have been lost (see also under *Ichneutica skelloni*), since, as far as I can ascertain, no further specimens of *I. stulta* have been taken since Philpott's time and therefore no male of this species is known to survive in collections. The last specimen known to have been collected is possibly the small female fom West Plains in NZAC that lacks a Paratype label (see under Type material above); unfortunately, it also lacks a date, but was presumably taken after 1905. Apart from the four females in NZAC, the only other known specimens are two females, one each in MONZ and AMNZ. The MONZ female is in the Hudson collection and is labelled '188a': from the corresponding entry in the Hudson register, this is a Philpott specimen from West Plains; like the other specimens, it lacks a date. The register indicates that Hudson at some point had another specimen (188b) from the same source, but this is no longer in his collection. The AMNZ female only has a pencil-written label saying '*stulta*' and lacks other data: the style of setting is identical to Philpott's other specimens, and it is presumably also from the same source. Conceivably, it came via Hudson and is the missing '188b' specimen.

Brian Patrick collected intensively in the Invercargill area and elsewhere in Southland during the 1980s (Patrick 1994a), but never rediscovered *I. stulta*. A number of species have almost certainly disappeared from the Invercargill area following habitat loss, especially loss of wetlands and shrublands and changes in plant composition of protected sites: Patrick (1994a: Table 2) lists 36 species of moths that he did not rediscover in his surveys of the southern plains and coast. Most of these survive more or less precariously elsewhere (especially species that are also present in the alpine zone), but *Xanthorhoe bulbulata* (Guenée) (Geometridae) has declined drastically throughout its range and may be extinct (Patrick 2000). Since the lowland southern South Island has been well surveyed for larger Lepidoptera and few new discoveries are forthcoming, it seems probable that *Ichneutica stulta* is a critically endangered species with a very small population and restricted range, if it is not already extinct. Intensive survey of remaining native grassland and wetland habitats in spring is an urgent priority in an attempt to relocate this moth.

54. *Ichneutica arotis* (Meyrick, 1887) new combination

Figs 54a–l, D54m (adults); 54n–p (male abdominal base and genitalia); 54q–s (female S7 and genitalia); L54la (larva); L54pu (pupa).

Leucania arotis Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 11.

Leucania aulacias Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 11. Synonymised by Hudson (1898: 12).

Leucania obsoleta Howes, 1906. *Transactions and proceedings of the New Zealand Institute 38*: 511. Junior homonym of *Leucania obsoleta* (Hübner [1803]). Synonymised by Longstaff (1912: 112).

Leucania innotata Howes, 1908. *Transactions and proceedings of the New Zealand Institute 40*: 534. Replacement name for *Leucania obsoleta* Howes. Synonymised by Longstaff (1912: 112).

Diagnosis. *Ichneutica arotis* could be confused with worn *I. blenheimensis*, with female *I. cornuta*, with *I. theobroma*, or with *I. epiastra*. Diagnostic characters are given under those species.

Description. Adult (typical forms) (Figs 54a–h). Wingspan 31–41 mm (male); 35–46 mm (female). Male antennae (whitish dorsally at base), subpectinate basally, serrate. Head and thorax pale ochreous to reddish ochreous, with scales mostly unicolorous, narrow lamellate to hairlike; prothorax sometimes with faint black lines; anterior mesothoracic scale-crest present; tegulae often mesally and exteriorly with black lines. Forewing pale ochreous to reddish ochreous, with veins marked dark grey and often a pale streak along fold where darker shading absent; antemedian line absent; postmedian line absent or represented by series of dark dots on veins in even curve, dots sometimes joined to form zigzag line; claviform and orbicular stigmata absent; reniform obsolete or very indistinctly outlined in pale scales, and almost always with at least faint white dot at dorsal end; dark dots on vein 1+2A at 1/3 and near tornus, sometimes joined by an elliptical marking along the vein; interneural brown shading in distal 1/3 of wing; shading broken by oblique pallid lines between veins M3 and CuA1 and between CuA1 and CuA2 and forming wedge-shaped marks on the termen (Fig. D54m); other markings absent; fringe concolorous with wing, with paler basal line. Hindwing brownish, with faint discal spot, without postmedian line; dark line along termen present, more or broken into dashes; fringe pale ochreous. Underside: forewing blackish brown except exteriorly on costa, dorsum and in terminal area, where pale ochreous, sometimes suffused pinkish, and with veins more or less distinctly lined darker; reniform stigma indistinct; postmedian line absent or present only towards costa; series of dark dots along termen usually distinct; hindwing whitish ochreous variably suffused grey; discal spot usually distinct (rarely absent); postmedian line absent or indistinct; series of dark dots along termen usually distinct. Abdomen mottled light and dark brown and appearing whitish, brown or greyish.

Adult (northern dark form) (Figs 54i, j). Wingspan 40–45 mm (male); 41–44 mm (female). As for typical form, but on average larger: head and thorax more or less strongly tinged pinkish; prothoracic lines and dark lines on tegulae distinct; forewing more or less strongly suffused deep chocolate brown (including interneural streaking) in male (more reddish ochreous in female), though palest males are pinkish ochreous; pale ochreous lines in distal 1/3 of wing more distinct and forming an oblique line from termen just below apex, and an irregular zigzag line towards tornus; reniform stigma usually relatively distinct; elliptical mark on vein 1+2A present, enclosing area of violet-grey scaling (only distinct in very fresh specimens). Hindwing blackish; fringe tipped clear white; abdomen greyish, suffused pinkish laterally. Underside: in male, much darker than in typical form; pale borders of forewing underside and pale areas of hindwing often strongly suffused pinkish; sometimes hindwing underside almost entirely blackish brown; female underside more or less as in typical form.

Adult (swamp form) (Fig. 54k). Wingspan 33–37 mm (male); 31–32 mm (female). As described for typical form, but smaller: head, thorax and ground colour of forewing (including interneural streaking) pale to rich pinkish ochreous to deep reddish brown; tegulae lacking any trace of dark lines; dark dots of postmedian line only very faintly indicated or absent; reniform stigma always obsolete, but white dot at dorsal end present, and often preceded by narrow white streak along distal portion of CuA stem in disc. Underside: as in typical form, but forewing sometimes lacks distinct central dark suffusion and is nearly unicolorous ochreous to greyish.

(All forms). Male abdominal base (Fig. 54n) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 54o): uncus narrow, pointed, weakly hooked; valva oblique to rather upright, sinuous, cucullus bluntly rounded with well developed corona of ca. 18–25 elements in a single row and field of spinose setae forming more or less distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present (or a pair of setae present) or absent; clasper narrow to moderately robust, straight or curved; ampulla long, digitate, sometimes expanded apically; phallus (Fig. 54p) with subapical tooth absent; vesica forming complete loop; cornuti moderately long, in uninterrupted band that narrows and curves left apically. Female S7 as in Fig. 54q.

Female genitalia (Figs 54r, s): ovipositor lobes blunt, squared off; segment 8 with long and medium-length setae laterally, and in a narrow band dorsally; ostium with pair of long dorsal desclerotised ridges, lacking caudal 'bumps' and long sclerotised lateral pockets; ductus bursae moderately long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve well sclerotised, not rugose; corpus bursae with pair of very short scobinate ridged signa, ventral signum slightly shorter.

Type material. *Leucania arotis*: Lectotype (designated by Dugdale (1988: 209)): male, 'from Skellon / Fereday Collection / ~~HOLO~~LectoTYPE [*sic*] ♂ Leucania arotis Meyrick teste Dugdale' (CMNZ) (examined, not dissected).

Note. *Leucania arotis* was described from nine specimens from Blenheim, Christchurch and Rakaia (Meyrick 1887: 11). There is a female specimen collected by Fereday in Christchurch in NHMUK labelled as lectotype; this must be regarded as a paralectotype following Dugdale's designation of the above CMNZ specimen as lectotype. Although *Leucania aulacias* was described above *L. arotis* on the same page (Meyrick 1887: 11), priority was legitimately given to the name *arotis* by Hudson (1898) as first reviser, as pointed out by Dugdale (1988: 209).

Leucania aulacias: Holotype: male, '21/2/74 at sugar Manuka Bush Reservoir Dunedin / Fereday Collection / 20 / HOLOTYPE ♂ Leucania aulacias Meyrick teste Dugdale' (CMNZ) (examined, not dissected).

Note. *Leucania aulacias* was described from a single male (Meyrick 1887: 11).

Leucania obsoleta Howes *nec* Hübner: Holotype: male, [Dunedin DN, W.G. Howes], not located (cf. Dugdale 1988: 209).

Leucania innotata: Holotype as for *L. obsoleta* (*pace* Dugdale 1988: see Note below).

Note. *Leucania obsoleta* was described from a single female specimen from Dunedin (Howes 1906), which could not be located by Dugdale (1988: 209). Howes (1908), having realised that the name *Leucania obsoleta* was preoccupied, introduced *Leucania innotata* as a replacement name. According to Dugdale (1988), "as well as altering the name *obsoleta* to *innotata* Howes gave a new description and cited particular specimens collected around Dunedin in October 1906". This needs qualifying: the new description given by Howes (1908) is in fact identical to the original description, except that the phrase 'slight dark shading from base' [of forewing] is replaced by 'very slight dark shading'. Dugdale (*loc. cit.*) goes on to say (of the October 1906 specimens): "I have identified these as being in NMNZ [i.e. MONZ] and have designated a LT from that series". I located the latter specimen in MONZ in 2018, but was unable to find any other specimen from this series. According to ICZN Article 72.7, this lectotype designation has no status, since a replacement name and the name it replaces are objective synonyms and by definition have the same type material. However, this specimen is still available as a potential neotype, should the need arise following further taxonomic research on this species (see Remarks below).

Distribution. (Map 54). Throughout the two main islands of New Zealand, but not yet recorded from Stewart Island.

ND, AK, CL, WO, BP, TK, TO, GB, HB, WI, WA, WN / SD, NN, BR, WD, MB, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL

Biology. The life history is rather poorly documented, but the species has been reared by Brian Patrick from stems of pampas grass (*Cortaderia* sp.). He also found a freshly emerged female on a pedestalled *Schoenus* tussock in a wetland at Dead Horse Pinch, Pig Root CO, suggesting that this may be a possible host-plant (Patrick 1997). Hudson (1950: 78–79) recorded the larva from *Phormium tenax*, and described it as follows when full-grown: "Length... about... 45 mm. Cylindrical, moderately stout, tapering strongly at both extremities, but most posteriorly. General colour dull reddish-ochreous, with numerous darker, slightly wavy, longitudinal lines. Head ochreous, with fine blackish markings. A double, slender brownish-red dorsal line, with pale interspace, very conspicuous; a similar, but slightly fainter subdorsal line; lateral area darker through being crowded with numerous irregular brownish strigulae; a row of rather conspicuous black dots on lateral area just above spiracles; spiracles whitish, ringed with blackish, small and inconspicuous; no definite markings below spiracular line. Undersurface, legs and prolegs paler and duller, very slightly tinged with faint greenish-grey. Younger larvae have the general colouring paler." Hudson's larvae pupated in a loose cocoon near the surface of the ground "hidden in the stem of a dead flax blade." White (2002: 330) rejected Hudson's account of *I. arotis* feeding on *Phormium* for unknown reasons; it is correct, as confirmed by two recent rearings from *Phormium tenax* by N.A. Martin (specimens from Omana

Regional Park AK in NZAC); a larva on *Phormium* that was subsequently reared through to adult is shown in Fig. L54la, and the pupa in L54pu. The larva corresponds quite closely with Hudson's description.

Flight period. Mainly September to April, but with a few records from June to August in the North Island.

Remarks. Though Hudson (1928) regarded it as very scarce, *Ichneutica arotis* appears to be a relatively common and very widespread species; perhaps the apparent increase is accounted for by the stronger lights available to entomologists since the 1950s. It is also (apparently) an extremely variable species, and may be in an active state of speciation (see below). Noctuid larval damage on *Phormium* has traditionally been assigned to *Ichneutica steropastis* (the 'flax notcher'); since *I. arotis* is now confirmed from this host and *I. blenheimensis* is also known from flax (see below), it will be interesting to see if differences in the biology of the three species on this host-plant can be observed.

Two 'forms' or ecotypes of *arotis* are separately described here as they are localised within the range of *arotis* and have often been separated in collections as potential segregate species. The 'northern dark form' (Figs 54i, j) is confined to higher rainfall areas of the North Island, and is particularly well known from the higher elevations of the Waitakere Ranges AK, from Mt Te Aroha BP and from the Waitaanga Plateau TK. The darkest specimens of this form (always males) are very striking and appear quite distinct from typical pallid *arotis*; however, a series from the Waitaanga Plateau in NZAC shows apparently intermediate forms, and since no differences have been observed in the antennae or genitalia, the form is retained within *arotis* here. Nonetheless, this form appears only to have been collected in spring from October to December, whilst 'typical *arotis*' occurs almost throughout the year in northern New Zealand, so further investigation is warranted.

The 'swamp form' is small and pinkish or reddish (Fig. 54k) and appears to be confined to wetland localities. Paler specimens of this form seem to grade into the weakly marked form that Howes described as *Leucania innotata*. Again, there are no observed differences in antennae or genitalia from typical *arotis*. At Carters Scenic Reserve WA, both a small *innotata*-like form and the typical large form of *arotis* were collected on the same night in December 2003, suggesting that two species may be involved. However, elsewhere in the North Island (e.g. Rangipo Desert TO and Whangaparaoa BP), intermediate specimens occur (e.g., Fig. 54l) that cannot confidently be assigned to one form or another, so, without clear and consistent diagnostic characters, no formal taxonomic distinction is made here.

The classification adopted here is tentative and more work on *I. arotis* is very desirable, including detailed observations on early stages, host plants and genetics, to determine if more than one species should be recognised.

55. *Ichneutica theobroma* new species

Figs 55a, b (adults); 55c–e (male abdominal base and genitalia); 55f–h (female S7 and genitalia).

Diagnosis. The male of *Ichneutica theobroma* is a large moth with a deep pinkish brown forewing that lacks conspicuous markings except a small white spot at the dorsal end of the reniform stigma. It is only likely to be confused with the darkest specimens of the 'northern dark form' of *I. arotis*, but is broader-winged and lacks the conspicuous pale markings in the subterminal area of the forewing that are present in these specimens of *I. arotis* (a subapical streak and an irregular tornal zigzagging mark from the tornus to the middle of the termen). *Ichneutica theobroma* only has traces of these markings, which usually appear as separate ochreous streaks. Dark males of 'northern dark' *arotis* also have the hindwing underside densely suffused blackish, at least in the tornal area; in *theobroma*, the hindwing underside is finely and evenly speckled blackish but there is no dense suffusion of dark scaling.

Separation of females of *theobroma* from those of the 'northern dark form' of *arotis* remains problematic; both moths are paler and narrower-winged than their respective males, and no consistent differences, either external or genitalic, have been observed. They are currently identified in collections based on collection date and locality: *I. theobroma* is currently unknown south of AK, so BP and TK females are all assigned to *arotis*; in ND and AK, September and October specimens are considered likely to be *theobroma*, whilst mid to late November specimens are 'northern dark' *arotis*. However, at least in the Waitakere Ranges AK, there is overlap between *theobroma* and 'northern dark' *arotis* in October (and probably early November, when no sampling has been undertaken). Further study is needed.

Description. Adult (Figs 55a, b). Wingspan 42–48 mm (male); 42–44 mm (female). Male antennae (white dorsally at base), weakly subpectinate, serrate. Head and thorax deep pinkish brown (male) or pinkish ochreous

(female), with scales mostly bicoloured, tipped white, narrow lamellate; prothorax with very faint to distinct dark transverse bar, faintly edged paler above; anterior mesothoracic scale-crest present; tegulae sometimes mesally and exteriorly with indistinct black lines. Forewing deep pinkish brown in male, pinkish ochreous in female suffused pinkish brown between veins, veins in both sexes indistinctly marked dark grey (outlined with white in female), costa more or less sprinkled with white, and paler ochreous areas along fold and dorsum in female (absent in male); antemedian line absent; postmedian line absent or represented by series of dark dots on veins in even curve, dots sometimes indistinctly joined to form zigzag line; claviform and orbicular stigmata absent; reniform obsolete or very indistinctly outlined in pale scales, and with distinct white dot at dorsal end; dark dots on vein 1+2A at 1/3 and near tornus often indistinct, sometimes joined by an elliptical marking along the vein; in distal 1/3 of wing, oblique ochreous lines between veins R5 and M1, M3 and CuA1,CuA1 and CuA2 and CuA2 and fold more or less distinct; other markings absent; fringe concolorous with wing, with paler basal line. Hindwing blackish brown, with faint discal spot, without postmedian line; dark line along termen present, indistinct; fringe brownish white with dark median line. Underside: forewing blackish brown centrally; whitish ochreous towards dorsum, ochreous suffused pinkish along costa and in subterminal and terminal area; costa with dense sprinkling of white scales in fresh specimens; series of dark marks along termen; hindwing whitish ochreous, tinged pinkish towards costa and evenly and very finely speckled blackish throughout; discal spot distinct; postmedian line absent or indistinct; series of dark marks along termen. Abdomen in male dark silvery grey or mottled silver-grey and black, strongly tinged pinkish laterally; in female mottled grey, white and pinkish ochreous. Male abdominal base (Fig. 55c) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 55d): as described for *arotis* above, but spinose setae on cucullus less robust, more hairlike, and not strongly overlapping costa, forming at most a weak 'crest'; corona of valva with *ca* 24–25 elements; phallus (Fig. 55e) as described for *arotis*. Female S7 as in Fig. 55f. Female genitalia (Figs 55g, h): not distinguished from those of *arotis*.

Type material. Holotype: male, 'NEW ZEALAND ND Omahuta SF Kauri Sanctuary 10 Oct 1974 / K.J. Fox & J.S. Dugdale to light / NZAC slide Noct. 486 genitalia ♂/ NZAC04226035 [database barcode label]' (NZAC). Paratypes: 8 males as follows: 3 males (NZAC), same locality and collectors as holotype, 2 on 7 Oct 1974, 1 on 10 Oct 1974; 4 males (MONZ), same locality, 3 on 7 Oct 1974, 1 on 10 Oct 1974, K.J. Fox; 1 male, AK: Waitakere Ra., Cutty Grass Tk, 10 Oct 2010, R.J.B. Hoare (Fig. 55a) (NZAC).

Distribution. (Map 55). Only known from the kauri forests of the northern North Island.

ND, AK / —

Biology. Unknown. Possibly associated with the large *Gahnia* sedges, *G. setifolia* and *G. xanthocarpa* (Cyperaceae), on which large noctuid caterpillars have been found but not reared.

Flight period. Mid September (one example) to late October. Specimens have been taken in the Waitakere Ranges on 31 October, so the species surely continues on the wing at least until early November.

Etymology. The species epithet *theobroma* (Greek 'food of the gods') is the generic name of the cocoa tree (*Theobroma cacao*), from whose seeds chocolate is made, and refers to the rich chocolatey colour of the male moth.

Remarks. This fine species was discovered in October 1974 in Omahuta Forest ND by Ken Fox and John Dugdale. It has also been found at nearby Mangamuka Gorge ND, and in the Waitakere Ranges AK, usually above 300 m in elevation. The male genitalia characters used to distinguish this species from *I. arotis* (less robust spinose setae on cucullus, barely overlapping the costa) are admittedly minor. However, these small distinctions along with the narrow flight time (almost all specimens taken in October), geographical restriction and consistently dark and very invariable forewing pattern are here considered sufficient evidence to separate *theobroma* from *arotis* at the species level. It is likely that the choice of host-plant will also prove to be specialised.

56. *Ichneutica lyfordi* new species

Figs 56a (adult); 56b–d (male abdominal base and genitalia).

Diagnosis. This species is distinctive in the following combination of characters: long pectinations on the male antennae (4x width of flagellum); antennal pectinations reaching to about 6 segments short of apex; forewing with strongly contrasting longitudinal pattern of dark and light streaks, including dark scaling in the discal cell that is bordered by pale streaks. In members of the *Ichneutica ceraunias* complex, the pectinations of the male antennae are much longer (up to 8x flagellum width); the antennae are pectinate to the apex; the discal cell is more or less

infilled with pale scaling; and there is a distinct pale streak along CuP that is absent from *I. lyfordi*. The most strongly marked specimens of *I. acontistis* have somewhat similar forewing markings to *I. lyfordi*, but *I. acontistis* is usually a smaller narrower-winged species (wingspan 31–39.5 mm), and the pectinations of the male antennae are much shorter (ca 1x flagellum width) and only reach to *ca* 13–15 segments short of the antennal apex (ca 6 segments short of apex in *I. lyfordi*). The forewing of *I. lyfordi* has a strong chocolate-coloured wedge from the end of the disc to the termen and a strong streak of the same colour that runs all the way from base to termen in the region of vein CuP; both of these are lacking even in well-marked *acontistis*.

Description. Adult (Fig. 56a). Wingspan 39–40 mm (male); female unknown. Male antennae bipectinate to *ca* 6 segments short of apex, pectinations up to *ca* 4x width of flagellum; serrate beneath. Head and thorax ochreous to mid-brown, unmarked; thoracic scales unicolorous, hairlike. Forewing dark chocolate brown, with broad paler streaks along costa, below cell and along dorsum deep ochreous to mid-brown; streak below cell often divided apically by narrow strip of ground-colour between M3 and CuA1; R veins lined indistinctly with silvery grey; M1, M3 and CuA1 and lower margin of cell lined white; 1+2A lined white; a fine blackish streak below cell from wing base to about 1/4 wing length; a fine black streak arising subbasally from dorsum and running parallel with 1+2A to *ca* 3/8 wing length; a broader wedge-shaped black streak in disc from about 1/4 to 2/3 wing length; sometimes short streaks of blackish scaling below base of M1 and between bases of M3 and CuA1; termen with broken line of dark brown scales; fringe cream. Hindwing pale brown suffused with grey; darker along veins; paler terminally around tips of veins; dark line along termen very faint; fringe white basally, pale cream apically. Underside: forewing pale brown, variably suffused greyish through discal area and along 1+2A; hindwing paler, unicolorous pale brown. Abdomen whitish ochreous basally, yellowish ochreous distally. Male abdominal base (Fig. 56b) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 56c): uncus of moderate length, rather narrow, pointed, not hooked; peniculus somewhat projecting laterally; valva rather upright, weakly sinuous; cucullus not strongly differentiated, apex obliquely rounded; with well developed corona of *ca* 24–26 elements in a single row, and dense band of rather short, flexible spinose setae forming small costal 'crest'; claspers symmetrical; clasper long, strongly and evenly curved, pointed, with single small papilla near base on costal edge, uneven on dorsal surface, with setose papillae; ampulla very long, club-shaped, expanded apex unevenly dentate dorsally; phallus (Fig. 56d) with subapical tooth present, well developed; vesica forming complete loop; cornuti of moderate and mostly even length (a few shorter cornuti in central part of band apically), forming compact band along apical 1/2 of vesica. Female genitalia: unknown.

Type material. Holotype: Male, 'NZ OL 700m White Burn Von R South Branch 20 Feb 2015 BM Lyford / NZAC slide Noct. 445 genitalia ♂/ NZAC04226036 [database barcode label]' (NZAC). Paratypes (Fig. 56a): 3 males (all NZAC), same data as Holotype, except one caught 16 Feb 2015 (genitalia on slide Noct. 446) (others not dissected).

Note. Further specimens of this species (all male) are in BLNZ.

Distribution. (Map 56). Only known from the Von Valley in the Otago Lakes district of the South Island.

— / OL

Biology. Unknown. All known specimens have been collected at light.

Flight period. February.

Etymology. The species is named in honour of its discoverer, Brian M. Lyford, whose energetic pursuit of Lepidoptera has resulted in a hugely important collection (BLNZ), especially rich in southern and alpine species. Brian generously assisted the author with loans and gifts of material for this revision, including the type series of this distinctive new species.

Remarks. The Von Valley has recently emerged as an overlooked area of narrow-range endemism in Lepidoptera. This species and the newly described *Arctesthes titanica* Patrick, Patrick & Hoare (Geometridae: Larentiinae) (Patrick *et al.* 2019) are only known from this area. The female of this striking moth remains unknown and further investigations to determine its biology, distribution and conservation status are very desirable.

57. *Ichneutica paraxysta* (Meyrick, 1929) new combination

Figs 57a–c (adults); 57d–f (male abdominal base and genitalia); 57g–i (female S7 and genitalia).

Leucania paraxysta Meyrick, 1929. *Transactions and proceedings of the New Zealand Institute 60*: 483.

Diagnosis. *Ichneutica paraxysta* is closely related and very similar to the South Island *I. acontistis* (cf. Dugdale 1988), but the two species are nowhere sympatric. Externally, the two species are quite easily distinguished on male antennae: as pointed out by White (2002), *acontistis* has distinctly bipectinate antennae with the pectinations up to about 1x the width of the flagellum, whereas *paraxysta* has much reduced indistinct pectinations up to 0.3x the width of the flagellum (White refers to this condition of the antennae as 'subpectinate'). The pale highlighting of the lower margin of the cell and of veins M3 plus CuA1 is almost always much more distinct in *paraxysta* than in *acontistis*. No clear differences have been found in the male genitalia between the two species (though the corona in *paraxysta* has on average more elements); in the female genitalia, *I. paraxysta* has a small dense patch of setae on the anterior margin of S8 between the ostium margin and the base of the anterior apophysis on each side (Fig. 57i) that is absent in *I. acontistis*.

Description. Adult (Figs 57a–c). Wingspan 34–38 mm (male); 34–38 mm (female). Male antennae weakly bipectinate (subpectinate) to *ca* 25 segments short of apex, strongly serrate beneath. Head and thorax tawny-ochreous to pinkish ochreous, fading to whitish ochreous posteriorly on mesothorax; prothorax with straight black band bordered white posteriorly; scales unicolorous, hairlike, except black and white scales of prothorax narrow lamellate. Forewing pale ochreous with veins very finely and evenly marked grey to black; diffuse to distinct silvery white subcostal streak from base along vein R2; clear silvery white streak along lower inner margin of cell (Cu stem) forking to run along veins M3 and CuA1 (where bisected by black lines), the fork in female overlaid by yellowish scales; vein 1+2A more or less margined by silvery white in mid section; apices of veins R4, R5 and M1 more or less highlighted by silvery white scales in male, yellowish scales in female; areas between veins and surrounding white streaks from M1 to CuP and along costa more or less infuscate with dark brown, the infuscation extending to wing base; transverse lines and stigmata absent; fringe mottled pale ochreous and brown. Hindwing grey-brown, unmarked; dark line along termen absent; fringe pale ochreous. Underside: forewing brownish ochreous, more or less suffused blackish in basal 2/3 and with veins lined brown to blackish, otherwise unmarked; hindwing whitish ochreous, more or less suffused grey or blackish towards base, especially towards anal margin, and veins lined blackish, discal spot absent or small, otherwise unmarked. Abdomen without distinct scale-tufts, ochreous, mottled blackish. Male abdominal base (Fig. 57d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 57e): as described for *I. acontistis* above, except corona of *ca* 25–30 elements; phallus (Fig. 57f) as in *acontistis*. Female S7 as in Fig. 57g. Female genitalia (Figs 57h, i): (overall length 8.5 mm); ovipositor lobes blunt, of moderate length, truncately rounded; segment 8 with small dense patch of short setae on each side between ostium and base of anterior apophyses, laterally with patch of medium-length setae, rather few widely spaced medium-length setae dorsally, forming distinct caudal band; ostium with short dorsal desclerotised ridges (ridges narrower than in *I. acontistis*) and long sclerotised lateral pockets of even length; ductus bursae of moderate length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae rather strongly rugose, with pair of short scobinate ridged signa, ventral signum slightly smaller.

Type material. Lectotype (designated by Dugdale (1988: 210)): male, 'Lectotype [yellow-ringed circular label] / Waiouru New Zealand GVH 12.28 / paraxysta Meyr. / Leucania paraxysta 4/1 E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania paraxysta* was described from two specimens, a male and a female, collected by G.V. Hudson at Waiouru TO (Meyrick 1929). The female paralectotype is still present in NHMUK.

Distribution. (Map 57). North Island mountains only.

TK, TO / —

Biology. Unknown. Almost certain to feed on native tussock grasses in the genera *Poa* and *Festuca*, like its close South Island relative *I. acontistis*.

Flight period. November to January.

Remarks. *Ichneutica paraxysta* is a locally common species in North Island subalpine shrubland and tussockland, within its restricted range in the Mt Taranaki district (including the Pouakai Range) and on Mt Ruapehu. It was not found during surveys of the Tararua Range WN in the 1980s.

58. *Ichneutica prismatica* new species

Figs 58a–d (adults); 58e–g (male abdominal base and genitalia); 58h–j (female S7 and genitalia).

Diagnosis. With its distinctive forewing pattern of pale streaks on an ochreous ground colour, *Ichneutica prismatica* is unlikely to be confused with any other species in its range. It resembles *I. paraxysta* from the North Island, but is on average smaller (wingspan 30–37 mm, cf. 34–38 mm in *paraxysta*) and with a narrower forewing, and lacks the distinct dark scaling along the veins that is present in *paraxysta* (though some traces of darker lines are visible under magnification). The hindwing fringe is usually pure white in *prismatica*, but brownish white in *paraxysta*. When the two species are seen side by side, *Ichneutica prismatica* is a much lighter-bodied, less robust moth than *I. paraxysta*. Confusion is unlikely to arise (except in unlabelled or mislabelled material), as the two species are allopatric.

Description. Adult (Figs 58a–d). Wingspan 30.5–36 mm (male); 32–37 mm (female). Male antennae subpectinate, pectinations up to *ca* 0.3x width of flagellum, strongly serrate beneath. Head and prothorax tawny-ochreous, fading to whitish ochreous on meso- and metathorax; prothorax with straight dark brown transverse band bordered white posteriorly; tegulae unmarked; scales unicolorous, hairlike, except brown and white scales of prothorax very narrow lamellate. Forewing pale brownish ochreous fading to pale pinkish or whitish ochreous along costa and dorsum, veins very faintly marked darker brown distally; very indistinct fine tawny basal streak; diffuse pale ochreous to cream streak (weakly forked apically) from disc along underside of vein R5 and both sides of M1; clear silvery white streak along lower inner margin of cell (Cu stem) forking to run along veins M3 and CuA1; vein 1+2A more or less distinctly margined by white especially distally; transverse lines and stigmata absent; fringe mottled pale ochreous and brown. Hindwing dark grey-brown, with faint discal spot; dark line along termen absent or very indistinct; fringe white, sometimes with brown subbasal line. Underside: forewing suffused dark brown to 4/5 in male, to 3/4 in female, except along costa, where whitish ochreous, whitish ochreous beyond this, otherwise unmarked; hindwing whitish, unmarked or variably sprinkled or suffused with dark scaling (dark scaling strongly concentrated along veins in the Mt Prospect OL specimen), otherwise unmarked except occasionally a very small discal spot. Abdomen without scale-tufts, pale ochreous, mottled blackish in both sexes. Male abdominal base (Fig. 58e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 58f): uncus narrow, pointed, weakly hooked; valva rather upright, weakly sinuous, cucullus poorly differentiated, truncate, with well-developed corona of *ca* 22–25 elements and moderately dense apical field of spinose setae forming short costal 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper moderately narrow, truncate, slightly curved; ampulla long, digitate; phallus (Fig. 58g) with subapical tooth absent; vesica forming complete loop; cornuti of moderate length throughout, in single uninterrupted band. Female S7 as in Fig. 58h. Female genitalia (Figs 58i, j): ovipositor lobes blunt, moderately long, truncately rounded; segment 8 with scattered medium-length setae laterally, setae becoming denser dorsolaterally in caudal part of segment, no setae or few scattered long setae in centre of dorsum; ostium with moderately long narrow dorsal desclerotised ridges and short lateral pockets of even length; ductus bursae rather short, slightly constricted at level of pockets, then broadening slightly mid-length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae rather strongly rugose, with pair of short scobinate ridged signa, ventral signum slightly smaller, (ridge on dorsal signum extended into a short papilla).

Type material. Holotype: male, "NEW ZEALAND CO; Lammermoor Range; 1100-1150m; 28 December 1999; B & H & C Patrick / OMNZ IV42522" (OMNZ). Paratypes: 8 males, 5 females, as follows: 4 males, 2 females, same locality as Holotype but 1100 m, 12 Jan 1991, B.H. Patrick (Figs 58b, d) (genitalia on slides OMNZ IV42523 ♂, OMNZ IV42526 ♀) (OMNZ); 1 male, CO: Great Moss Swamp, 1050 m, 16 Feb 1983, B.H. Patrick (OMNZ); 1 male, CO/DN: Macraes ED, Redbank, 580 m, 18 Dec 1993, B.H. Patrick (Fig. 58a) (OMNZ); 1 male, CO: Bullock Ck, tussock fen 920 m, 24 Jan 2005, E. Edwards, B. Rance (NZAC); 1 male, OL: Mt Prospect, trib[utary] of Thomas Burn 470 m, 17 Dec 2001, E. Edwards, B. Rance (NZAC); 1 female, CO: Kawarau Gorge, 24–31 Dec 1990, B.H. Patrick (genitalia on slide OMNZ IV42524) (OMNZ); 1 female, CO: Mt Buster 1280 m, 15 Dec 1991, B.H. Patrick (Fig. 58c) (OMNZ); 1 female, "Dunedin, 11/12/23 / Fenwick Coll." [locality probably misleading, see below] (MONZ).

Distribution. (Map 58). Most known localities are in Central Otago, but range extends east to the border of the Dunedin district at Redbank and west into the Otago Lakes district at Ross Spur, Eyre Mountains (specimen in BLNZ collected in 2017), and Mt Prospect, E. of Te Anau (NZAC paratype).

— / OL, CO, [DN]

Biology. The life history is unknown. Adults are at least partially diurnal (Patrick 1997).

Flight period. December, January.

Etymology. The species name is from late Latin *prismaticus*, and refers to the pale streak through the disc of the forewing that radiates into several streaks in the distal part of the wing, like light being scattered by a prism.

Remarks. *Ichneutica prismatica* is a *Chionochloa* tussock grassland specialist (B.H. Patrick pers. comm.) that is apparently very local and uncommon (cf. Patrick (1997), who treats it under the name '*Tmetolophota* n. sp.'). Its habit of flying by day is unusual for a New Zealand noctuid, but has been noted as an occasional habit of several other alpine species that are normally nocturnal (e.g. *Ichneutica ceraunias*, *I. cuneata*, *I. virescens*). The only specimen in collections captured before 1983 is the paratype in MONZ from the Fenwick collection, with the locality 'Dunedin'; this presumably refers to the district rather than the immediate environs of the city, since the species seems to be almost confined to Central Otago, and only reaches the far western edge of the Dunedin (DN) region.

59. *Ichneutica sistens* (Guenée, 1868) new combination

Figs 59a–j (adults); 59k–p (male abdominal base and genitalia); 59q–v (female S7 and genitalia).

Eumichtis sistens Guenée, 1868. *Entomologist's Monthly Magazine 5*: 39–40.

Agrotis mitis Butler, 1877. *Proceedings of the Zoological Society of London for 1877*: 383–384. **New synonymy.**

Spaelotis inconstans Butler, 1880. *Cistula Entomologica 2*: 545. **New synonymy.**

Leucania temenaula Meyrick, 1907. *Transactions and proceedings of the New Zealand Institute 39*: 106. Synonymised by Dugdale (1988: 200).

Leucania pachyscia Meyrick, 1907. *Transactions and proceedings of the New Zealand Institute 39*: 106–107. Synonymised by Dugdale (1988: 200).

Aletia munda Philpott, 1917. *Transactions and proceedings of the New Zealand Institute 49*: 239. **New synonymy.** (Synonymised with *mitis* Butler by Dugdale (1988: 200).)

Aletia gourlayi Philpott, 1921. *Transactions and proceedings of the New Zealand Institute 53*: 337. **New synonymy.** (Synonymised with *mitis* Butler by Philpott (1928: 483).)

Melanchra cyanopetra Meyrick, 1927. *Transactions and proceedings of the New Zealand Institute 58*: 313. **New synonymy.**

Aletia lacustris Meyrick, 1934. *Transactions and proceedings of the Royal Society of New Zealand 64*: 151. **New synonymy.**

Diagnosis. Though very variable in size and details of coloration, *Ichneutica sistens* can usually be recognised by the rather plain grey, dark grey or greenish grey forewing with large pale-outlined reniform stigma and rather uniformly greyish thorax with the scales finely pale-tipped and lacking a mesothoracic crest. It is a smaller species than *I. virescens*, with a stubbier forewing and more rounded, less oblique termen, and it lacks the strong forewing gloss of that species. Though *sistens* often has the subterminal forewing line edged basally with dark 'teeth' these tend to be distributed evenly along the line and do not form three distinct dark 'clouds' on the costa, in the disc and above the tornus, as in *virescens*. Differences from *I. moderata* are treated under that species (q.v.). Differences from *Ichneutica omicron* and *I. barbara* are treated under *I. omicron* (q.v.).

Description. Adult (Figs 59a–j). Wingspan 28–39 mm (male); 29–39 mm (female). Male antennae very weakly bipectinate to *ca* 15–22 segments short of apex, pectinations up *ca* 0.5x width of flagellum, distinctly serrate beneath in basal 2/3. Head and thorax brownish grey to grey; prothorax with weak to strong dark transverse bar; with scales mostly bicoloured, white-tipped, narrow lamellate. Forewing pale greyish brown to whitish grey or greenish or bluish grey; antemedian line more or less distinct, whitish, edged black distally; postmedian line more or less distinct, whitish, edged black basally, evenly and finely scalloped; claviform stigma present, round to V-shaped, distinct and edged black, or indistinct; orbicular stigma round to slightly oblong, usually distinct, black-edged with pale inner lining, often a blackish dot interiorly towards basal edge; reniform rather large, distinct, usually edged blackish at least in middle, with pale inner lining and infill of ground colour; area between antemedian and postmedian lines not darkened, but often a distinct blackish irregular transverse fascia just anterior to reniform; subterminal line very distinct to indistinct; when distinct, whitish and often highlighted by adjacent blackish line basad; terminal area concolorous with rest of wing or slightly paler; series of dark subtriangular marks or dots along termen present, more or less distinct; fringe mottled brownish grey, with pale basal line. Hindwing brownish, with or without indistinct postmedian line and pale area beyond; dark line along termen present as series of dashes; fringe whitish to brownish with dark median line. Underside: forewing whitish grey to dark grey, if paler then often suffused dark grey in disc, suffusion sometimes extending along veins beyond but not reaching termen,

reniform stigma indistinct, postmedian line usually indistinct, series of dark dots along termen; hindwing whitish grey to dark grey, more or less sprinkled greyish exteriorly, discal spot and postmedian line variably distinct, a series of dark dashes along termen. Abdomen ochreous brown mixed greyish, small dorsal scale-tuft on segment 1 darker grey tipped white. Male abdominal base (Figs 59k, n) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 59l, o): uncus somewhat expanded in middle, pointed, very weakly hooked; valva upright, sinuous, cucullus well differentiated, spatulate, with well developed corona of *ca* 29–36 elements in a single row and small field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper robust, weakly to moderately curved; ampulla rather short and weakly sclerotised, digitate, with more or less distinctly clubbed apex; phallus (Figs 59m, p) with subapical tooth present, minute to large; vesica forming complete loop; cornuti rather short, in single uninterrupted band, a patch of very short cornuti apically in centre of band. Female S7 as in Figs 59q, t. Female genitalia (Figs 59r, s, u, v): ovipositor lobes blunt, truncately rounded; segment 8 with very sparse medium-length setae laterally, and sparse short to long setae dorsally forming weak caudal band; ostium with moderately well-developed dorsal desclerotised ridges and short lateral pockets; ductus bursae moderately long, distinctly expanded posteriorly towards ostium, smoothly sclerotised to near junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve sclerotised and weakly rugose; corpus bursae with pair of short scobinate signa, dorsal signum distinctly ridged, ventral signum hardly ridged, sometimes reduced to indistinct patch of scobinations.

Type material. *Eumichtis sistens*: Lectotype (here designated): male, 'Type [red-ringed circular label] / Ex Oberthür Coll. Brit. Mus. 1927-3 / Ex Musaeo Ach. Guenée / 12. Eum.? Sistens Gn. Ent. month. mag. p... Nlle Zelande H. Knaggs, les antennes [diffèrent] beaucoup du lichenea' [per JSD] (NHMUK) (examined, not dissected). (In J.S. Dugdale's NHMUK notes, the word after 'les antennes' on the last label is given as 'difference'; I have presumed that 'diffèrent' was intended.)

Note. Guenée (1868) described *Eumichtis sistens* from an unspecified number of specimens, but at least two, as he mentions differences between the sexes, and there are two specimens, a male and a female, in NHMUK that are labelled as coming from his collection. The male was regarded by Dugdale (1988: 200) as the holotype, and by using the term 'unique' he implied that this was the only specimen in the type series. However, Guenée makes no mention of a 'type' or 'holotype', so the two specimens must be interpreted as syntypes (ICZN Article 73.1) and the mention of a holotype by Dugdale does not constitute a valid lectotype designation (Article 74.5). The specimen hitherto regarded as the holotype is here designated lectotype to avoid further confusion. The type locality is presumed to be Rakaia MC, where R.W. Fereday was based (Dugdale 1988); the title of Guenée's (1868) paper implies that Fereday was the collector of all species there described. I know of no evidence that H. Guard Knaggs, mentioned on the label and given as the collector by Dugdale (1988: 200), ever visited New Zealand; no overseas trips are mentioned in his obituary (Kirby 1908). Knaggs also received specimens from Fereday (see Knaggs 1867), and may have forwarded the Noctuidae to Guenée.

Agrotis mitis: Holotype: male, 'Type [red-ringed circular label] / N. Zealand Enys 77-34 / A. mitis Butler type' [per JSD] (NHMUK) (examined, including genitalia on slide BMNH Noct. 10501).

Note. It is presumed that *Agrotis mitis* was described from a single specimen (Dugdale 1988), and the original description nowhere implies that more than one was seen (Butler 1877). The type locality is believed to be Castle Hill MC, as the collector was J.D. Enys (Dugdale 1988).

Spaelotis inconstans: Holotype: male, 'Type [red-ringed circular label] / N. Zealand Marlborough, Skellon 80-57 / Spaelotis inconstans Butler Type / Agrotidae genitalia slide 347' [per JSD] (NHMUK) (examined, including genitalia slide).

Note. *Spaelotis inconstans* was apparently described from two specimens, one of which Butler referred to as a 'var.' (variety), comparing it with the 'type' (Butler 1880); according to ICZN Article 72.4.1, such a variant is to be excluded from the type series, and the remaining specimen (which matches Butler's main description) is therefore the holotype. The second, 'variant' specimen is not mentioned in J.S. Dugdale's NHMUK notes and may be lost.

Leucania temenaula: Lectotype (designated by Dugdale (1988: 200)): male, 'Lectotype [yellow-ringed circular label] / Dunedin New Zealand GVH .05. / temenaula Meyr. / Leucania temenaula Meyr. 5/2 E. Meyrick det. in Meyrick Coll. Lectotype ♂' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania temenaula* was described from three male specimens from Rakaia MC and Dunedin DN (Meyrick 1907). The lectotype designation mentioned by Dugdale (1988: 200) by 'an unknown designator' is apparently unpublished and therefore not valid; Dugdale is taken to have designated the lectotype under ICZN Article 74.5. One paralectotype (not so labelled) is in the NHMUK and bears the same label data as the lectotype, except that it is specimen 3/5 in the Meyrick collection.

Leucania pachyscia: Lectotype (designated by Dugdale (1988: 200)): female, 'Lectotype [yellow-ringed circular label] / L. Wakatipu New Zealand GVH /03. / pachyscia Meyr. / Leucania pachyscia Meyr. 1/1 E. Meyrick det. in Meyrick Coll.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania pachyscia* was described from two females, one from Mt Arthur NN, and the other from L. Wakatipu OL (Meyrick 1907). Dugdale (1988: 200) indicated that the lectotype was designated by I.W.B. Nye, but I have not been able to trace any such published designation, and therefore attribute the designation to Dugdale (*loc. cit.*). The Mt Arthur specimen has not been traced (J.S. Dugdale, NHMUK notebook).

Aletia munda: Holotype: male '[two red circular labels] / WAIOURU 4/3/16 / Aletia munda Ph. ♂ type. / [illegible, possibly capital B]' (MONZ) (examined, not dissected).

Note. *Aletia munda* was described from two male specimens collected by H.W. Simmonds and forwarded to Philpott by Dr J.A. Thomson of the Dominion Museum (now MONZ) (Philpott 1917a). Philpott clearly mentions a 'type ♂ in coll. Dominion Museum' in the original description, and the type label on the holotype is in Philpott's handwriting.

Aletia gourlayi: Holotype: male, 'Arthur's Pass Feb., 1920 / Aletia gourlayi Philp. Holotype ♂. / HOLOTYPE (square pink label]' (CMNZ) (examined, not dissected).

Note. *Aletia gourlayi* was described from 'several' male specimens collected by E.S. Gourlay (Philpott 1921). Philpott clearly mentions a 'type in the discoverer's collection': Gourlay was based in Christchurch at the time, and the specimen is now in CMNZ.

Melanchra cyanopetra: Lectotype (designated by Dugdale (1988: 199), see below): male, '[circular red label] / M. cyanopetra Meyr. Type ♂. Waiho Gorge. 22.2.27 A. Castle' (MONZ) (examined).

Note. *Melanchra cyanopetra* was described from two specimens, a male and a female, from Waiho Gorge WD, collected in February and April by Amy Castle (Meyrick 1927). Dugdale (1988: 199) gives the date on the lectotype label as '18.2.27' but the male specimen in MONZ labelled as type has the date '22.2.27' as given above. This is presumed to be a *lapsus calami* by Dugdale. There is a male specimen in NZAC with the appropriate date, but this is labelled 'Waiho Gorge S.W. 18.2.27' without any indication of collector or type status; it cannot be the male seen by Meyrick as the wingspan is only 33 mm and Meyrick gives 36 mm for his male (the correct wingspan of the '22.2.27' specimen). There are several specimens collected at Waiho Gorge in February 1927 in various collections, and males in AMNZ (database number AMNZ 922) and NZAC have been dissected for this revision. The female paralectotype collected in April has not been located. Note that White (2002: 303) misspelled the name of this synonym as *cyanoptera*.

Aletia lacustris: Lectotype (designated by Dugdale (1988: 200)): male, 'LAKE ROTOROA 14/3/31 / Aletia lacustris ver. by E. Meyrick / HOLOTYPE [square pink label]' (CMNZ) (examined, not dissected).

Note. *Aletia lacustris* was described from 4 specimens of both sexes collected by Lawford White. Meyrick gives the date of capture as 14 Mar 1931; Dugdale (1988: 200) gives '14.2.31'; I interpret the relevant number on the label as a rather cramped '3' in accordance with Meyrick's description. According to Dugdale (*loc. cit.*), Meyrick retained one specimen and returned the others to Lindsay, who placed the holotype label on the specimen Dugdale selected as lectotype. Dugdale regarded the specimen retained by Meyrick as belonging to a different species, stating that it resembled 'a dark *A. sistens*'; according to the synonymy adopted here, all four specimens are conspecific and referable to *sistens* (see 'Note on synonymy' below). There are in fact 13 specimens including the lectotype in CMNZ with the same data.

Note on synonymy. *Ichneutica sistens* is here treated as a single variable species with eight synonyms, more than any other New Zealand noctuid species. There is considerable minor variation in the male genitalia in the size of the cucullus, shape of the ampulla, and especially in the degree of development of the subapical tooth on the phallus, but the variation in all cases appears continuous and of little use for delimiting species. The same applies to the variable size and wing pattern. No convincing evidence has been found that would allow the recognition of more than one species. Dugdale (1988: 200) already justified the synonymy of *temenaula* and *pachyscia* with

sistens, and of *munda* with *mitis*, and Philpott (1928) justified the synonymy of *gourlayi* with *mitis*. I briefly treat each of the remaining new synonymies below.

1) *Agrotis mitis*. A continuous range of variation in wing pattern exists in series linking the pale grey forms matching the *mitis* holotype to darker more greenish grey forms matching the *sistens* lectotype. No differences in genitalia have been found between forms with differing wing patterns, so, although the lectotype of *sistens* has not been dissected, it is confidently treated as a senior synonym of *mitis* here.

2) *Spaelotis inconstans*. The colour pattern of the *inconstans* holotype in the NHMUK is intermediate between those of the primary types of *sistens* and *mitis*, and the genitalia match those of the *mitis* holotype, so it is confidently identified as a specimen of *I. sistens*. Note that White (2002) retained *Aletia inconstans* as a separate species, but his '*inconstans*' (along with most specimens under this name in collections) represents the species here described as *Ichneutica barbara*, which is the sister-species of *I. omicron* and not closely related to *sistens*.

3) *Melanchra cyanopetra*. Meyrick described *cyanopetra* from two bluish-tinged specimens from Westland. Few specimens have been identified as *cyanopetra* since the original series was collected at Waiho Gorge in 1927, leading to concerns that its population(s) might be at risk (Patrick & Dugdale 2000): its currently listed conservation status is 'data deficient' (Hoare *et al.* 2017). However, even within the original series there are greyer specimens that cannot effectively be distinguished from specimens usually assigned to *sistens* or *mitis*. Again, no differences in male antennae or in genitalia support the separation of *cyanopetra*, so it is synonymised with *sistens* here.

4) *Aletia lacustris*. The synonymy of *lacustris* with *mitis* was anticipated by White (2002) who noted that there seemed to be no reliable characters for separation. The name *lacustris* was erected for specimens from the Buller region with a greenish tinge to the forewings, but this coloration is variable even within these populations, and a greenish tinge was already mentioned in the original descriptions of both *sistens* and *inconstans* (Guenée 1868; Butler 1880). No diagnostic external characters have been found and the genitalia do not differ from those of *sistens* and its other synonyms.

Excluding *inconstans* (which he misidentified: see above), White (2002) recognised two species in this 'group', *Aletia sistens* and *A. mitis*. White gives male antennal characters as diagnostic for the two taxa, i.e. male antenna *bipectinate* basally in *sistens*, and triangulate processes with anterior margins extended in cross-section; antenna *subpectinate* in *mitis*, and triangulate processes with anterior margins *not* extended in cross-section (both 'species' have the antenna serrate beneath, or 'dentate' in White's terminology). These terms are illustrated in his figs 46a and 47 (p. 43), though interpretation is not straightforward, as the different antennal types are not depicted from exactly the same angle of view. I believe that White is referring to slight differences in the appearance of the anterior pectinations towards the base of the antenna, which may or may not have a small ventral 'flange' (or 'extension'). Where such a flange is present the contour of the underside of each flagellomere from the apex of the central serration to the apex of the pectination / flange appears slightly concave (his fig. 47); where there is no flange, the contour is more or less straight. I have looked at male antennae of specimens assigned to all the various synonyms of *sistens* and my own assessment is that the prominence of the 'flanges' varies subtly between flagellomeres and increases along the length of the antenna from the base in all specimens; 'flanges' also appear more or less prominent depending on the angle of view. There does appear to be some slight variation in the maximum length of the basal pectinations of the antenna (and correspondingly in the maximum prominence of the 'flanges'), but variation seems to be continuous and does not allow confident separation of specimens into two or more species. Given the subtle and apparently continuous nature of variation in characters of antennae, wing pattern and genitalia, only a single species can be recognised based on the morphological species concept adopted in this work.

Distribution. (Map 59). Central North Island; widespread in the South Island, where chiefly eastern.

TO / NN, BR, WD, MB, KA, NC, MC, MK, OL, CO, DN, FD, SL

Biology. The larva was described very briefly by Lindsay (1930), under the name *Aletia temenaula*, as follows: "25 mm long, elongate, smooth, ochreous; numerous longitudinal stripes, pale fuscous". It has been found and reared on grasses (Poaceae), including silver tussock (*Poa cita*) (Lindsay 1930, as *Poa caespitosa*), browntop (*Agrostis capillaris*), *Rytidosperma* sp., and *Elymus* sp. (reared specimens in NZAC, OMNZ). The adults come to light at night, and the type series of the synonym *gourlayi* was collected at flowers of *Dracophyllum* (Philpott

1921). The pupa has a remarkable pair of large deep pits dorsally on A4, not seen in any other species (see Genus description for *Ichneutica*).

Flight period. January to May, with most records from February and March; there are two specimens in NZAC from Kawerau Gorge CO collected on 30 September 1984.

Remarks. In the broadened definition adopted here, *Ichneutica sistens* is a locally widespread species of open habitats such as braided riverbeds, tussock grasslands and dunes. In White's (1991) long-term study of tussock grassland moth populations in the Cass Basin MC, this species (listed as *Aletia mitis*) showed a decline at one site (Ribbonwood Fan) and a substantial increase at the other (Sugarloaf Fan) between his 1961–63 and 1987–89 light-trapping periods. In NZAC, there are many older (pre-1990) and few recent specimens of *sistens*, but this may partly reflect a relative lack of recent collecting in suitable habitats at the appropriate season. Renewed survey work is desirable to establish the current status of this moth.

Ichneutica rubescens subgroup

Diagnosis. Male abdominal base without brushes or pockets; A3 apodemes present; valva rather narrow, moderately sinuous; clasper rather broad, without distinct papillae, pollex at base not strongly projecting; cucullus not extending to a beak-like point; basal tubular portion of vesica lacking field of denticles.

60. *Ichneutica maya* (Hudson, 1898) new combination

Figs 60a–c (adults); 60d–f (male abdominal base and genitalia); 60g–i (female S7 and genitalia).

Melanchra maya Hudson, 1898. *New Zealand moths and butterflies (Macro-lepidoptera)*: 17; pl. IV, fig. 31.

Diagnosis. *Ichneutica maya* is a strikingly patterned and unmistakeable noctuid; it shows little variation in wing pattern and is unlikely to be confused with any other species.

Description. Adult (Fig. 60a–c). Wingspan 37–43 mm (male); 37–43 mm (female). Male antennae bipectinate to *ca* 9–11 segments short of apex, pectinations up to *ca* 1.5x width of flagellum. Head and thorax deep pink, sprinkled white, with or without black transverse bar on prothorax and with outer edges of tegulae black; central longitudinal crest on mesothorax orange-brown, sprinkled white (and often other areas, e.g. rear of prothorax, tinged orange); rear of metathorax with white central patch, bordered black; scales mostly bicoloured, very narrow lamellate. Forewing ground-colour whitish ochreous, strongly suffused with pink towards base, along costa and along veins distally, and with orange-brown patchily around stigmata and basad of subterminal line; dorsum clear ochreous-white; distinct black basal streak edged white above and elliptical black mark just beyond near dorsum, white-edged below; antemedian line obsolete or distinct only in middle of wing as greyish line; postmedian line only indicated by short black dashes along veins beyond disc; claviform stigma present, large, broadly V-shaped, black-edged, infilled with leaden grey; orbicular stigma large, distinct, round to oblong, black-edged only dorsally and infilled with pinkish or lead-grey scales, or both, and sometimes some orange-brown scales; reniform very large, more or less S-shaped, black-edged and infilled as for orbicular stigma; area between antemedian and postmedian lines not darkened; subterminal line broken, white, distinct only where it abuts the following large black marks: a triangle or truncate triangle from opposite mid-termen, its base on the line, and a curved L-shaped mark from near tornus to beneath reniform, its short basal margin edged white; terminal area black, suffused pink; series of dark subtriangular marks along termen present; fringe chequered pale brown and black and scalloped in fresh specimens. Hindwing dark brown, unmarked; dark line along termen present; fringe whitish with dark median line. Underside: forewing reddish ochreous, more pinkish towards costa and usually strongly suffused blackish except for apex and area beyond subterminal line, reniform indistinct, postmedian line moderately distinct towards costa only, dark marks along termen usually indistinct; hindwing whitish ochreous, sometimes pinkish towards costa and variably sprinkled blackish, discal spot distinct, postmedian line variably distinct, series of dark dashes along termen. Abdomen segment 1 whitish, variably tinged pinkish grey, with concolorous dorsal scale-tuft; rest of abdomen mottled ochreous and blackish, pink-tinged laterally. Male abdominal base (Fig. 60d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 60e): uncus rather narrow, pointed, not hooked; valva rather upright (and short), weakly sinuous, cucullus weakly differentiated, bluntly rounded with well developed corona of ca. 20 elements in a single row and rather even band of spinose setae not forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper very robust, curved and weakly sinuous; ampulla short, elongate-triangular; phallus (Fig. 60f) with

subapical tooth present; vesica forming complete loop; cornuti moderately short, longer in centre, in single uninterrupted band. Female S7 as in Fig. 60g. Female genitalia (Figs 60h, i): ovipositor lobes blunt, small, truncately rounded; segment 8 with a few fine short to medium-length setae laterally, medium-length setae forming distinct band dorsally; ostium with distinct long dorsal desclerotised ridges and moderate sclerotised lateral pockets of even length; ductus bursae (with caudal portion rather strongly melanised), rather long, without distinct bulge but broad at mid-length, smoothly sclerotised to just under 2/3 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve weakly sclerotised, rugose in region of ductus seminalis inception; corpus bursae moderately rugose, with pair of short scobinate ridged signa of roughly equal length, ventral signum narrower.

Type material. Holotype: male, '98a' [Tableland Track, Mt Arthur NN, 13 Jan 1891, G.V. Hudson] (MONZ) (examined, not dissected).

Note. *Melanchra maya* was described from a single specimen of unspecified sex (Hudson 1898); the holotype was stated to be a female by Dugdale (1988: 203) but the antennal pectinations show that it is a male.

Distribution. (Map 60). Widespread but local in the mountains of the southern half of the North Island and throughout the South Island.

TK, HB, RI, WN / NN, BR, WD, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL

Biology. The life history in the wild is not known, but B.H. Patrick (pers. comm.) reared young larvae from the egg; from a selection of herbaceous plants and shrubs offered, they fed on *Luzula* sp. and *Poa annua*. He describes the eggs as light green and laid in a batch, and the young larva as bright green with a mottled grey dorsal pattern and a white lateral band. After 10 weeks, they were 22 mm in length; he was unable to rear them through further. Hudson (1928) records the adults at *Veronica* blossom and at sugar, and they are also regularly attracted to light.

Flight period. December to March.

Remarks. *Ichneutica maya* is locally common in higher rainfall subalpine to alpine habitats throughout its range, occurring down to sea level in Southland. However, it is absent from certain areas, particularly the drier valleys of Central Otago, and from the Remarkables, though present in nearby Queenstown and on Coronet Peak (B.H. Patrick, B.M. Lyford, pers. comm.). Likewise, it was not one of the species recorded by White (2002) in his tussock grassland surveys at Cass and in the Mackenzie Country, though it is present at Mt Cook Village MK. In the North Island, it appears not to have been recorded from Tongariro National Park, but is present nearby (Mangaehuehu Stream RI: see Clarke 1920) and has also been found on Mt Taranaki and in the Kaweka and Tararua Ranges.

61. *Ichneutica paracausta* (Meyrick, 1887) new combination

Figs 61a–e (adults); 61f–h (male abdominal base and genitalia); 61i–k (female S7 and genitalia).

Mamestra paracausta Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 15–16.

Diagnosis. Though variable in colour, *Ichneutica paracausta* is not likely to be confused with any other New Zealand noctuid. The very long black basal forewing streak, which is contiguous with the dark outer edging of the tegulae, is a distinctive feature in all colour forms; in some specimens it is more or less obscured by a dark brown cloud running through the centre of the wing to the postmedian line, but these specimens also have a contrastingly white or pale grey patch along the distal 2/3 of the dorsum, giving a diagnostic wing pattern (Figs 61a, c).

Description. Adult (Figs 61a–e). Wingspan 33–38 mm (male); 36–42 mm (female). Male antennae bipectinate to *ca* 5 segments short of apex, pectinations up to *ca* 3.5x width of flagellum. Head and thorax pale to deep copper brown; transverse bar on prothorax black, edged white posteriorly; anterior mesothoracic crest black, tipped white; tegulae edged black laterally, with inner white lining or (especially in female) mostly white; scales bicoloured to tricoloured, narrow lamellate to hairlike. Forewing copper brown or pale copper brown, this colour often almost obscured, confined to centre of wing, or replaced by black and white scaling giving overall grey appearance; veins more or less distinctly lined or mottled black beyond cell; costa often pure white at base; basal black streak very long, gently curved down towards dorsum, usually extending to postmedian line and forming lower margin of claviform stigma; antemedian line represented by at most a few dark scales below fold; postmedian line indistinct except in dorsal half of wing, where often distinct, white, black-edged or brown-edged interiorly and often exteriorly; claviform stigma present as very elongate black V or obscured by blackish scaling;

orbicular stigma obsolete in male, distinct, large and elongate in female, edged black and infilled white; reniform very indistinct in male, distinct in female, where forms a robust S nearly contiguous with orbicular, black-edged and with thick inner white lining; area between antemedian and postmedian lines often darkened (copper brown or blackish) between orbicular, reniform and basal streak, the dark scaling then forming a conspicuous central streak from base, dividing beyond postmedian into two patches on termen; subterminal line absent; terminal area concolorous with wing, or darkened as described above; series of dark subtriangular marks along termen present, conspicuous, those above CuA1 and CuA2 elongated into streaks; fringe chequered brownish grey and white. Hindwing pale greyish brown, with discal spot, indistinct postmedian line and pale area beyond; dark line along termen present, conspicuous, broken into dashes; fringe brownish white, with very diffuse darker median line. Underside: forewing pale ochreous to pinkish ochreous or brownish ochreous, specimens with central dark scaling on upperside with similar darkening on underside, reniform stigma indistinct to very distinct, large, postmedian line absent to distinct and complete, series of dark dashes along termen; hindwing whitish, more or less evenly sprinkled brownish or grey, discal spot very distinct, postmedian line indistinct to distinct, series of dark dashes along termen. Abdomen with dorsal scale-tufts on segments 1–2 white, mottled black or brown, no distinct tuft on segment 3; rest of abdomen white to pale cream, mottled black. Male abdominal base (Fig. 61f) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 61g): uncus rather robust, bluntly pointed, minutely hooked; valva oblique, weakly sinuous, cucullus weakly differentiated, bluntly rounded, without distinct corona, but with dense field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta present; clasper robust, blade-like, with straight costal and curved dorsal edges; ampulla rather long, digitate or slightly clubbed; phallus (Fig. 61h) with subapical tooth absent; vesica forming complete loop; cornuti of moderate length, in single uninterrupted band. Female S7 as in Fig. 61i. Female genitalia (Figs 61j, k): ovipositor lobes blunt, squared off; segment 8 with numerous very fine short to medium length setae laterally, setae becoming sparser mid-dorsally, medium-length, forming indistinct caudal band; ostium with rather short weakly raised dorsal desclerotised ridges and short lateral pockets; ductus bursae of moderate length, hardly broadening mid-length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve moderately sclerotised, not rugose; corpus bursae weakly rugose, with pair of small round scobinate ridged signa, of roughly equal size.

Type material. Lectotype (designated by Dugdale (1988: 204)): male, 'Mamestra paracausta Meyr. / Fereday Collection, / 72' (CMNZ) (examined, not dissected).

Note. *Mamestra paracausta* was described from a male and a female from Castle Hill, collected by J.D. Enys (Meyrick 1887).

Distribution. (Map 61). Widespread in the South Island and reaching Stewart Island; very local in the central North Island.

TK, TO, HB / NN, BR, WD, KA, NC, MC, MK, OL, CO, DN, FD, SL / SI

Biology. The life history has not been well documented, but the larva is known to feed on various grasses (Patrick 1994a; White 2002). A brief larval description is given by Philpott (1901: 169) as follows: "Length 13 lines [ca 27 mm]; dull whitish; dorsal line of indistinct darker colour; subdorsal very faint; lateral stripe more pronounced; many minute specks of colour; head pale brownish, with darker markings; dorsal surface of first thoracic segment darker." This description was paraphrased by Hudson (1928: 68). Philpott gave no host-plant data for his larva, but indicated that it was very similar to larvae that subsequently produced adults of *I. infensa*: it is likely he collected both species of larva on grasses. Philpott (*loc. cit.*) also mentions rearing a specimen of *I. paracausta* from a pupa "found enclosed in a slight cocoon under a piece of bark on a fallen tree".

Flight period. October to early January; Philpott reared a specimen which emerged on 22 September (Philpott 1901).

Remarks. *Ichneutica paracausta* is essentially a frequent, but not abundant, species of montane forest, subalpine and alpine shrubland and tussockland, occurring down to sea level in Southland. In the North Island, most localities are around the central volcanic plateau, Mt Taranaki and the adjacent Pouakai Range, but there is an interesting record of the species at Little Bush, near Puketitiri, Hawkes Bay (about 560 m a.s.l.), where Davies (1973) described it as 'scarce' (two specimens from this locality in NZAC confirm the record).

62. *Ichneutica rubescens* (Butler, 1879) new combination

Figs 62a–d (adults); 62e–g (male abdominal base and genitalia); 62h–j (female S7 and genitalia).

Xylophasia rubescens Butler, 1879. *Cistula Entomologica 2*: 489.

Diagnosis. The black dot at the basal edge of the orbicular stigma appears to be a constant diagnostic character for this large and rather striking species, though it is sometimes hard to see in faded specimens. Superficially, *I. rubescens* most closely resembles *Meterana pascoi* (Howes), but in the latter species the orbicular stigma encloses a dark streak rather than a dot. *Meterana pascoi* is also a smaller species (wingspan 40 mm or less), with a narrower, more pointed forewing that has a distinctly scalloped terminal fringe (fringe only weakly scalloped in *I. rubescens*). There is a rather distinct elongate discal spot on the hindwing upperside in *M. pascoi*; this is absent in *I. rubescens*. On the underside, *M. pascoi* has distinct postmedian lines on both forewing and hindwing; *I. rubescens* has at most a very faint postmedian line on the hindwing only.

Description. Adult (Figs 62a–d). Wingspan 38–45 mm (male); 38–44 mm (female). Male antennae very weakly bipectinate to *ca* 30 segments short of apex, pectinations up to *ca* 0.3x width of flagellum. Head and thorax ochreous, mottled black and white (especially on anterior and posterior mesothoracic crests); prothorax with weak black transverse bar, edged white posteriorly; tegulae with or without mesal black line, and with exterior dark brown edging; scales mostly more or less unicolorous, or bicoloured black and white, narrow lamellate. Forewing pale ochreous, more or less suffused deep pinkish brown and with most markings more or less edged orange-brown; in some specimens costa and area between postmedian and subterminal lines snow white; basal streak absent; antemedian line absent in paler specimens, present but indistinct in darker specimens as strongly zigzag pale ochreous line; postmedian line obsolete in most specimens, sometimes represented towards dorsum by white scalloped portion in dark specimens; claviform stigma present, usually very indistinct, edged orange-brown, U-shaped; orbicular stigma usually moderately distinct, slightly oval, edged orange-brown, infilled white or pale ochreous and with distinct black dot towards basal margin; reniform rather distinct, edged orange-brown, with inner ochreous or white lining and black lining inside this; subterminal line indistinct, white to pale ochreous, irregular, edged with broken orange-brown line basally; terminal area darker brown than ground-colour in patches at tornus and just above middle; series of dark subtriangular to crescentic marks along termen present; fringe chequered ochreous and dark brown. Hindwing grey-brown, unmarked, sometimes tinged pinkish distally and at base of fringe; dark line along termen present, rather indistinct; fringe whitish with brown median line. Underside: forewing yellow-ochreous to pinkish ochreous, more or less strongly suffused blackish except (usually) towards margins, reniform stigma usually rather distinct, postmedian line absent, series of indistinct dark marks along termen; hindwing whitish suffused with pinkish and more or less densely sprinkled with blackish, especially towards costa, discal spot tiny to large, distinct, postmedian line absent or indistinct, series of faint dark dashes along termen. Abdomen with dorsal scale-tufts on segments 1–3 mixed black, white and pinkish brown (tipped white); rest of abdomen ochreous mottled black. Male abdominal base (Fig. 62e) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 62f): uncus slender, bluntly pointed, not hooked; valva moderately upright, sinuous, cucullus moderately well differentiated, bluntly rounded with well developed corona of ca. 30–40 elements in a single row and rather narrow field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona absent; clasper very robust, curved, with blunt, strongly sclerotised apex; ampulla moderately short, digitate; phallus (Fig. 62g) with subapical tooth present, large; vesica forming complete loop; cornuti moderately long, apically divided into two rows, with a few tiny cornuti between. Female S7 as in Fig. 62h. Female genitalia (Figs 62i, j): ovipositor lobes blunt, of moderate length, truncately rounded; segment 8 with numerous medium to long setae laterally, setae becoming sparser dorsally, forming indistinct band not confined to caudal part of segment; ostium with long narrow dorsal desclerotised ridges (ending caudally in prominent bulge) and very long lateral pockets of roughly even length; ductus bursae of moderate length, narrowest but not constricted below ostium, then broadening strongly mid-length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae rather strongly rugose, with pair of moderate-sized scobinate ridged signa, ventral signum slightly longer.

Type material. Holotype: male, 'Type [red-ringed circular label] / Otago 79-19 Xylophasia rubescens Butler (Type) / N. Zealand Otago Hutton 79-19' [per JSD] (NHMUK) (examined, not dissected).

Note. *Xylophasia rubescens* was described from an unspecified number of specimens (Butler 1879), but nothing in the original description implies that Butler saw more than one.

Distribution. (Map 62). Local in the southern North Island, throughout the South Island; also Stewart Island and the Auckland Islands.

TK, TO, WN / NN, BR, WD, MB, NC, MC, MK, OL, CO, DN, FD, SL / SI / AU

Biology. This species has been reared from larvae on *Gunnera prorepens* by Brian Patrick (reared specimen from Stewart Island in OMNZ); it has also been recorded as feeding on other native herbs and grasses (B.H. Patrick, pers. comm.), so is doubtless polyphagous on herbaceous plants. Barratt and Patrick (1987) give "many herb species, especially *Luzula*" but according to Brian Patrick (pers. comm.) the *Luzula* record is erroneous and correctly refers to *I. maya*. The life history has not been documented in detail, but the larva is described as moss green with black markings (B.H. Patrick, pers. comm.); larvae fed up slowly in captivity (B.H. Patrick, pers. comm.).

Flight period. December to April.

Remarks. *Ichneutica rubescens* is a very widespread and often common species throughout the South Island and Stewart Island, but more localised in the North Island, where it is known from Tongariro National Park, Mt Taranaki and the Tararua Ranges. Its range extends to the Auckland Islands in the subantarctic. It occurs in podocarp and beech forests as well as native grasslands (cf. Dugdale 1971). Figures given by White (1991: Appendix 1) indicate a decline in this species at his light-trapping sites at Cass MC between the early 1960s and the late 1980s.

Ichneutica propria subgroup

Diagnosis. Male abdominal base with brushes, levers and pockets variably developed, rarely complete; A3 apodemes present; valva sinuous; clasper rather narrow, irregularly papillate, pollex at base not strongly projecting; cucullus extending to a beak-like point; basal tubular portion of vesica lacking field of denticles.

Remarks. *Ichneutica haedifrontella* n. sp. has a smoother clasper and more rounded cucullus than other members of this subgroup (similar to members of the *sistens* subgroup), but the wing pattern and frontal tubercles of the head indicate a close relationship with *I. epiastra*, so it is placed in this subgroup next to that species.

63. *Ichneutica cuneata* (Philpott, 1916) new combination

Figs 63a–d (adults); 63e–j (male abdominal base and genitalia); 63k–m (female S7 and genitalia).

Aletia cuneata Philpott, 1916. *Transactions and proceedings of the New Zealand Institute 48*: 420.

Aletia dentata Philpott, 1923. *Transactions and proceedings of the New Zealand Institute 54*: 148. **New synonymy.**

Diagnosis. *Ichneutica cuneata* may be distinguished from all other greyish noctuid species within its range by the infilled dark grey to blackish reniform stigma of the forewing and the rather pale ochreous-grey hindwing base, which grades without a sharp demarcation into the broad dark grey wing border. On the hindwing underside, the demarcation between pale base and dark exterior is sharper, and there is a distinct discal spot and often a distinct postmedian line; no other species has a similar hindwing underside.

Description. Adult (Figs 63a–d). Wingspan 32–39 mm (male); 34–39 mm (female). Antennae blackish with some pale scales dorsally; male antennae weakly bipectinate to *ca* 22–25 segments before apex, pectinations up to *ca* 0.5x width of flagellum. Head and thorax pale grey, with scales bicoloured grey and white, narrow lamellate, some scales with a yellowish tawny tinge, especially posteriorly on mesothorax. Forewing grey, with strong suffusion of pale ochreous scales giving greenish grey appearance; antemedian usually indistinct, wavy, picked out in blackish or tawny scales; postmedian line indistinct, scalloped, colour as for antemedian; claviform stigma present or absent, outline blackish or tawny; orbicular stigma rather indistinct, round, outlined dark and with inner lining of white scales; reniform distinct, filled with dark grey, outlined in white; area between antemedian and postmedian lines not darkened, but often with wavy dark grey transverse line just anterior to reniform; often a series of white dots on veins between postmedian and subterminal lines; subterminal line weakly indicated in pale ochreous scales; terminal area concolorous with rest of wing, or somewhat darker between veins; series of dark subtriangular marks along termen present, rather indistinct; fringe chequered pale ochreous and blackish. Hindwing basally pale ochreous-grey, sometimes with very indistinct postmedian line just before dark grey distal 1/2 of wing; dark line along termen absent; fringe creamy white, unmarked. Underside: forewing pale greyish to *ca* 2/3, dark grey beyond, reniform stigma usually distinct, postmedian line indistinct; hindwing whitish grey to 2/3, with distinct discal spot and more or less distinct postmedian line, dark grey beyond this. Abdomen pale ochreous,

strongly mottled blackish; segment 1 sometimes paler, whitish grey; dorsal scale-tuft on segment 1 concolorous. Male abdominal base (Figs 63e, h) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Figs 63f, i): uncus rather broad, blunt, not or minutely hooked; valva oblique, sinuous, cucullus moderately well differentiated, truncate / rounded with well developed corona of *ca* 40–46 elements in a single row and narrow field of short spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper robust, slightly curved to sinuous, with papillate subapical region; ampulla very long, digitate; phallus (Figs 63g, j) with subapical tooth present; vesica forming complete loop; cornuti moderately short, in single rather broad uninterrupted band. Female S7 as in Fig. 63k. Female genitalia (Figs 63l, m): ovipositor lobes blunt, small, squared off; segment 8 with a few or no setae laterally, and short setae in a scattered band dorsally; ostium with dorsal desclerotised ridges produced caudally into sclerotised triangular lobes and with long lateral pockets; ductus bursae rather long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised and partially rugose; corpus bursae very weakly rugose, with pair of elongate scobinate ridged signa of roughly equal size.

Note. The population of *I. cuneata* in Tongariro National Park TO (formerly separated as *Aletia dentata* Philpott) (Figs 63b, d) usually has the head and thorax blackish grey, finely mottled pale grey, and the blackish markings of the forewing more pronounced giving the whole moth a darker appearance than the typical South Island forms. See below under 'Note on synonymy'.

Type material. *Aletia cuneata*: Lectotype (here designated): male, 'Ben Lomond 3000′ 25/1/12 / Aletia cuneata Philpott Holotype ♂.' (NZAC) (examined, not dissected).

Note. *Aletia cuneata* was described from an unspecified number of specimens from Ben Lomond and Macetown. There is no mention of a holotype in the original description, so the type series must be regarded as syntypic (ICZN Article 73.1). The specimen labelled by Philpott as holotype, and treated as such by Dugdale (1988: 199), is here designated lectotype. There is a female from Macetown in NZAC, collected on 6 Feb 1909, and labelled by Philpott as 'Allotype'; this is regarded here as a paralectotype. An undated male from Timaru in NZAC, with a Philpott label indicating it is a paratype of *Aletia cuneata*, is here excluded from the type series as that locality was not mentioned in the original description.

Aletia dentata: Lectotype (here designated): male, '[circular red label] / TONGARIRO 5000. 10.1.16 / Aletia dentata Philp. Holotype ♂.' (MONZ) (examined, not dissected).

Note. As with *Aletia cuneata*, *A. dentata* was described from an unspecified number of specimens of both sexes collected by J.G. Myers; Philpott stated that the 'types' were in the Dominion Museum (now MONZ). Again, the type series must be regarded as syntypic, and the specimen labelled by Philpott as holotype, and treated as such by Dugdale (1988: 199), is here designated lectotype.

Note on synonymy. *Aletia dentata* was the name applied by Philpott and subsequent authors to the isolated population of *I. cuneata* in Tongariro National Park, which tends to be darker in coloration than South Island forms. No consistent differences in antennae or in male or female genitalia support the recognition of *dentata* as a separate taxon, and the colour of some paler specimens from Tongariro is identical to that of South Island specimens of *cuneata*, so *dentata* is here synonymised with *cuneata*.

Distribution. (Map 63). Widespread throughout the South Island; in the North Island only known from Tongariro National Park TO.

TO / NN, WD, MB, KA, NC, MC, SC, MK, CO, OL, DN, FD, SL

Biology. The life history has not been documented, and no reared specimens have been seen in collections. However, Patrick (1994b) gives 'herbs' as the larval pabulum.

Flight period. December to April.

Remarks. This species inhabits subalpine to alpine shrubland and tussockland and is widespread in the South Island but not abundant. It sometimes flies by day (Patrick *et al.* 1993; White 2002), and J.G. Myers collected several specimens resting on rocks (part of the type series of the synonym *dentata*: Philpott 1923). In Tongariro National Park, TO, its only known North Island locality, it has been found on Mt Ruapehu in the vicinity of Whakapapa Village and Silica Falls, and also further east in the Rangipo Desert.

64. *Ichneutica epiastra* (Meyrick, 1911b) new combination

Figs 64a–d (adults); D64e (head); 64f–k (male abdominal base and genitalia); 64l–n (female S7 and genitalia).

Leucania epiastra Meyrick, 1911. *Transactions and proceedings of the New Zealand Institute 43*: 58.

Diagnosis. *Ichneutica epiastra* is a somewhat variable species and can easily be confused with certain forms of *I. arotis*. The frontal tubercles on the head of *epiastra* (Fig. D64e) are diagnostic, but are normally concealed by scales. On the forewing, *epiastra* has a distinct row of black dots along the termen; in *arotis*, the termen is either unmarked or there is an indistinct series of brown dashes, not dots. The dorsal part of the reniform stigma in *epiastra* usually consists of two white dots more or less surrounded by black scaling, whereas in *arotis* at most a single white dot is present and the surrounding scales are pale to mid-brown. Differences between *epiastra* and the very similar *I. haedifrontella* n. sp. are described under that species below.

Description. Adult (Figs 64a–d). Wingspan 33–43 mm (male); 38–45 mm (female) (dwarf Westland form: 32–33 mm (male); 32 mm (female)). Frons with strongly sclerotised pair of long horn-like tubercles (Fig. D64e). Male antennae not pectinate, distinctly serrate beneath, with serrations increasing in depth to *ca* 2/3 length of antenna, then tapering off. Head and thorax pale ochreous to pinkish ochreous, with scales mostly bicoloured, pale-tipped, narrow lamellate, sometimes some black-tipped or brown-tipped scales on tegulae forming line near inner margin; (mesothorax with distinct anterior crest). Forewing pale ochreous to pinkish ochreous, occasionally deeper brown, irregularly and variably sprinkled with blackish dots, and often with grey or mixed grey and black scaling along Cu stem below cell, forming indistinct streak; antemedian line absent or reduced to 3–4 black dots on main veins; postmedian line represented by series of black dots on veins; claviform and orbicular stigmata absent; reniform indistinctly outlined pale, but with clear white edging in dorsal 1/2; area between antemedian and postmedian lines not darkened; subterminal line absent or very indistinct, represented by faint brown interneural dashes; terminal area concolorous with rest of wing; series of dark dot-like marks along termen present, distinct; fringe concolorous. Hindwing dark grey-brown, with veins often darker, unmarked; dark line along termen present, broken into dashes; fringe whitish, tinged brown basally. Underside: forewing whitish ochreous to ochreous-brown, variably suffused blackish centrally, reniform stigma usually distinct (darker than surrounding suffusion), except in dwarf Westland form, postmedian line absent, series of dark dots along termen; hindwing whitish ochreous to pale ochreous, very finely suffused blackish, sometimes weakly suffused pinkish towards costa, discal spot distinct except in dwarf Westland form, postmedian line absent or indistinct, series of dark dots along termen usually present. Abdomen segment 1 with dorsal scale-tuft brownish, tipped white; sometimes a similar minute scale-tuft on segment 2; rest of abdomen ochreous, usually tinged pinkish, mottled black and with basal hair-scales whitish ochreous. Male abdominal base (Figs 64f, i) without brushes or pockets but with complete levers and A3 apodemes. Male genitalia (Figs 64g, j): uncus narrow, pointed, not hooked; peniculus weakly projecting laterally; valva oblique, strongly sinuous, cucullus well differentiated, bluntly spatulate with well-developed corona of *ca* 34–40 elements in a single row and field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper rather narrow, strongly curved; ampulla long, very narrow, digitate; phallus (Figs 64h, k) with subapical tooth absent; vesica forming complete loop; cornuti rather long, except towards apex, where small or very small, in single uninterrupted band. Female S7 as in Fig. 64l. Female genitalia (Figs 64m, n): ovipositor lobes blunt, squared off; segment 8 with dense medium-length setae laterally and sparser setae dorsally forming caudal band; ostium with dorsal desclerotised ridges rather weakly raised and indistinct, lateral pockets very long; ductus bursae long, smoothly sclerotised to *ca* 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae with pair of very long scobinate, ridged signa of roughly equal size.

Type material. Lectotype (designated by Dugdale (1988: 201)): male, 'Syntype / Leucania epiastra Meyr. 8/3 E. Meyrick det. in Meyrick Coll. / Makara New Zealand RMS bred .09 / ♂' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania epiastra* was described from two specimens, a male and a female, reared from '*Arundo conspicua*' (probably = *Austroderia fulvida*) by R.M. Sunley, and sent to Meyrick by G.V. Hudson (Meyrick 1911). The paralectotype female is in the NHMUK, with the same label data, except that it is specimen 8/8 from the Meyrick collection (J.S. Dugdale, NHMUK notes).

Distribution. (Map 64). Widespread throughout the main islands of New Zealand.

AK, BP, WO, TK, TO, HB, RI, WN / NN, BR, WD, MB, MK, DN, FD, SL / SI

Biology. Larvae feed at night on the leaves of large native grasses of the genus *Austroderia* (toetoe) (Poaceae), hiding at the base of the leaves during the day and pupating in the flower-stems. The life history was described in some detail by Hudson (1928: 59), who credits Mr. Sunley with the observations. He describes the egg as 'spherical, flattened at the base, and rather coarsely ribbed, the ribs radiating from the micropyle... at first uniform pale yellow, but after a few days the micropyle becomes dark brown and a dark brown circle appears round it.' The full-grown larva is described as follows: '[47.5 mm] in length, dull brownish-green in colour, sometimes tinged with reddish-brown, especially on posterior segments. The dorsal and subdorsal lines are very narrow, but fairly well-marked; dull white in colour, faintly edged with red or reddish brown. The lateral line is somewhat indistinct, white in colour. On it are situated the spiracles, which are dull cream-colour edged with black. The lateral line is often edged with small brown blotches situated above the spiracles, and on the anterior segments these blotches are sometimes joined to form a broad, faintly marked upward edging to the lateral line. The integument, especially on the dorsal surface, has a number of fine white branching veins, and on each segment is a number of minute black dots from which spring short brown bristles [setae]. The prolegs are of the same colour as the body, edged with dark-brown hooks [crochets]. The head is horny, amber in colour, mottled and netted with brown.' The larva is also figured by Hudson (1928: pl. I, fig. 17). Further details of the life history are also recounted by Hudson (*loc. cit.*): 'When about the change into a pupa, this insect makes its way into the flower stem... forming a chamber [50–75 mm] long between two joints. It now loses its green colour and changes to a pale dull brownish-yellow, the dorsal surface often strongly tinged with pink. This pink tinge becomes very marked as the time of pupation approaches. The larva spends some weeks in the stem, and before changing into a pupa cuts a neat round hole through the stem, near the top of its chamber, leaving only a very thin film of the outermost layer intact. It then retires to the bottom of the chamber, and in a few days changes to a pupa, which rests on the old larval skin, head upwards. The pupa is very robust, and is at first light brown in colour, but soon becomes very dark brown and highly polished.'

Flight period. October to February.

Remarks. The synonymy of *Dipaustica* with *Ichneutica* is discussed under the genus description, above. Specimens collected near Okarito, Westland are smaller than typical *epiastra*, and the clasper in the male genitalia appears to be slightly broader at the base. These specimens are here regarded as a dwarf form of the species ('dwarf Westland form' in description above), since they share the sharp paired frontal processes and other features of the genitalia are identical to those of *epiastra*. They were found adjacent to pakihi wetland, a type of very infertile wet heath with little or no peat that is characteristic of the west coast of the South Island (see, e.g., Mew 1983).

Ichneutica epiastra is a fairly common species of forest clearings, wetlands, dunes and other open habitats where its host-plants grow. It is probably under-recorded, as it only seems to come to light in small numbers; it was first discovered by R.M. Sunley who reared specimens from larvae found at Makara WN. Hudson (1928) noted its 'sluggish' behaviour and the rarity with which it had been encountered as an adult. Since the advent of mercury vapour light, the moth has been recorded more frequently.

65. *Ichneutica haedifrontella* new species

Figs 65a, b (adults); D65c (head); 65d–i (male abdominal base and genitalia); 65j–l (female S7 and genitalia).

Diagnosis. This species is distinguished from the very similar *I. epiastra* by the tubercles on the frons, which are short and blunt (Fig. D65c), and not developed into elongate sharp-tipped 'horns' as is *epiastra*. Removal of a few scales from the lower frons will allow this character to be seen. No other reliable external characters have been noted. The male genitalia are quite distinct, and the levers on the male abdominal base are reduced in this species (complete in *epiastra*).

Description. Adult (Figs 65a, b). Wingspan 31–36 mm (male); 33–39 mm (female). Frons with sclerotised pair of short blunt tubercles (Fig. D65c), not developed into sharp-tipped 'horns'. Male antennae not pectinate, serrate beneath as in *Ichneutica epiastra*. Head, thorax, wings and abdomen as described for *I. epiastra*; no constant differences observed apart from frontal tubercles. Male abdominal base (Figs 65d, g) without brushes or pockets but with reduced levers; A3 apodemes present. Male genitalia (Figs 65e, h): uncus narrow, slightly swollen in middle, pointed, weakly hooked; valva rather upright, sinuous, cucullus weakly differentiated, truncate, with well developed corona of *ca* 18–22 elements in a single row and dense extensive field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately robust,

nearly straight; ampulla long, digitate; phallus (Figs 65f, i) with subapical tooth absent; vesica forming complete loop; cornuti rather short, very short towards apex, in single uninterrupted band. Female S7 as in Fig. 65j. Female genitalia (Figs 65k, l): ovipositor lobes blunt, moderately squared off; segment 8 with sparse medium-length setae laterally and dorsally, not forming distinct caudal band; ostium with moderately distinct dorsal desclerotised ridges and moderately long lateral pockets; ductus bursae moderately long, distinctly narrowed towards ostium, smoothly sclerotised to near junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae with pair of scobinate ridged signa of roughly equal length, ventral signum slightly narrower.

Type material. Holotype: male, 'NEW ZEALAND OL Dart Hut, 950m 14 Feb 1980 J.S. Dugdale and K.J. Fox / MV light trap / NZAC slide Noct. 153 genitalia ♂/ NZAC04226037 [database barcode label]' (NZAC). Paratypes: 1 female, same locality and collectors as holotype, but 26 Feb 1980 (NZAC); 6 males, NN: Blue Creek, 14 Jan 1965, J.S. Dugdale (male genitalia on slide NZAC Noct. 320) (Fig. 65a) (all NZAC).

Distribution. (Map 65). Only known from scattered alpine localities in Taranaki (Pouakai Range), Nelson (Mt Arthur and Blue Creek, near Mt Owen), Buller (Speargrass Creek, near Mt Robert, and Victoria Range), North Canterbury (Arthurs Pass), Otago Lakes (Dart Hut and Key Ridge), Dunedin (Mt Cargill, Swampy Summit) and Fiordland (Borland Saddle, Lyttles Flat, Homer Tunnel).

TK / NN, BR, NC, OL, DN, FD

Biology. There are two reared specimens in OMNZ, one from Mt Cargill DN labelled as bred from *Chionochloa conspicua* (Poaceae), and one from Swampy Summit DN labelled as bred from *Chionochloa*. All other specimens have been captured at light.

Flight period. December to February.

Etymology. The species name comes from the Latin *haedus* (a kid, young goat), and *frons* (brow, front of the head), with the diminutive ending *-ella*. It refers to the diagnostic short, blunt frontal protuberances of the adult, which are likened the undeveloped horns of a young goat.

Remarks. *Ichneutica haedifrontella* is apparently a very local species of the subalpine and alpine zone, but it probably occurs more widely than records so far indicate. Fox (1982) mentioned this as a recently discovered undescribed species (of *Dipaustica*) in his paper on the entomology of Egmont National Park; he also referred to 'other small *Dipaustica* species... on Ruapehu, and in Rangitikei, Westland and Fiordland'. Only two species of this group are recognised here (*epiastra* and *haedifrontella*), based on characters of the male genitalia and frons, and all specimens so far examined from Ruapehu, Rangitikei and Westland are referable to *epiastra*.

Like *Ichneutica epiastra*, *I. haedifrontella* has a 'dwarf' form (wingspan 31–33 mm), in which the forewing markings, especially the reniform stigma, are less distinct. Intriguingly, all known specimens from Pouakai Range TK and Dart Hut OL belong to this 'dwarf' form, whilst those, e.g., from Nelson and Buller and the single specimen from Key Ridge OL are distinctly larger and more clearly marked, and were misidentified as *epiastra* until recently. While there is some variation in the shape of the frontal tubercles within and between the apparently scattered populations of *haedifrontella*, the male genitalia are consistent and show the same striking differences from those of *epiastra* (see Figs 65e, h). Supposing that a close relationship to *epiastra* may be inferred from external characters and from the unusual presence of levers in the absence of brushes or pockets on S2, this species well demonstrates the potential rapidity of evolution in genital characters (especially in the degree of differentiation of the cucullus) that renders any division of *Ichneutica* into smaller genera problematic.

66. *Ichneutica lindsayorum* new name

Figs 66a–c (adults); 66d–f (male abdominal base and genitalia); 66g–i (female S7 and genitalia).

Graphania lindsayi Dugdale, 1988. *Fauna of New Zealand 14*: 203.

Ichneutica lindsayorum **replacement name** (*Ichneutica lindsayi* (Dugdale, 1988) preoccupied by *Ichneutica lindsayi* Philpott, 1926).

Diagnosis. Differences between *I. lindsayorum* and the similar *I. olivea* are given under that species, below. Some paler forms of *I. omoplaca* could also cause confusion; this species normally has a much darker thorax than *I. lindsayorum* (purplish brown to blackish, cf. pale brown to pinkish brown in *lindsayorum*) and the apex of the forewing conspicuously paler than the rest of the area beyond the subterminal line (no noticeable contrast in *lindsayorum*). *Ichneutica omoplaca* has a narrower forewing with the costa less arched, and the reniform stigma is smaller and less conspicuously S-shaped than in *I. lindsayorum* (see Figs 66a–c, 67a, b). *Ichneutica lindsayorum*

also apparently starts emerging later in the season: specimens taken in the spring before December will almost certainly prove to be *I. omoplaca*.

Description. Adult (Figs 66a–c). Wingspan 36–42 mm (male); 38–46 mm (female). Male antennae without distinct pectinations, subpectinate / serrate. (Head with scale-crest between antennae.) Head and thorax mixed pale copper brown to pinkish brown, black and white, with black transverse bar on prothorax and tegulae edged black exteriorly, especially laterally; scales bicoloured to tricoloured, narrow lamellate. Forewing pale ochreous, grey or pinkish, or sometimes a mixture of these, veins often mottled black and white, especially exteriorly; long fine black basal streak; antemedian line ochreous or white, dark-edged distally, rather evenly and strongly toothed; postmedian line white to pale ochreous, finely and evenly scalloped, dark-edged basally; claviform stigma present, small to large, V-shaped, dark-edged; orbicular stigma rather large, oblique, black-edged except towards costa, infilled whitish, pinkish or leaden grey; reniform very large, usually S-shaped, with lower (basal) stroke of S usually strongly extended basad and often confluent with orbicular and/or extended along stem of Cu, black-edged, with variable infill usually consisting of lead-grey dorsal and white to pinkish costal portions; area between antemedian and postmedian lines not darkened, but usually a weakly scalloped median line extending to dorsum below reniform; subterminal line present, pallid, often indistinct, with W-shaped evagination towards tornus; terminal area concolorous with wing; series of dark subtriangular marks along termen present; fringe mottled brown to grey and white. Hindwing grey-brown, darker along veins; dark line along termen present, more or less broken into dashes; fringe brownish, paler basally. Underside: forewing mid-brown, paler towards costa and termen, where whitish brown, mottled darker; reniform stigma and postmedian line variably distinct; series of dark spots along termen; hindwing pale ochreous mottled darker towards costa and termen; discal spot and postmedian line variably distinct. Abdomen with dark grey, white-tipped dorsal scale-tufts on segments 1–3; rest of abdomen mottled ochreous to whitish and black. Male abdominal base (Fig. 66d) with levers and pockets present, brushes vestigial, reduced to patch of short hair-like scales, easily abraded; A3 apodemes present. Male genitalia (Fig. 66e): uncus moderately robust (more so than in *I. olivea*), weakly hooked; valva oblique, sinuous, cucullus moderately well differentiated, weakly spatulate, with well developed corona of ca. 25–40 elements in a single row and field of spinose setae forming moderate 'crest'; apico-dorsal strong hooked seta separate from corona present or 2 setae present; clasper robust, straight beyond curved base and with papillae on costal surface subapically, edges not crenulate (cf. *I. olivea*); ampulla long, digitate; phallus (Fig. 66f) with subapical tooth present, long; vesica forming complete loop; cornuti of moderate length, in single unbroken band. Female S7 as in Fig. 66g. Female genitalia (Figs 66h, i): ovipositor lobes blunt, rather small, truncately rounded; segment 8 with rather sparse short and medium-length setae laterally and dorsolaterally, sparse medium-length setae forming indistinct band dorsally; ostium with distinct long dorsal desclerotised ridges (each ridge with distinct bulge caudally) and long lateral pockets, left pocket longer, extended into sinuous ventral elongation with outpocketing of outer ductus membrane; right pocket shorter, ending in transverse sclerotised groove; ductus bursae rather long (longer than in *olivea*), slightly broadened before mid-length in region of outpocketing, smoothly sclerotised to just under 2/3 way to junction with corpus bursae, where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve moderately sclerotised, rugose in region of ductus seminalis inception; corpus bursae rather strongly rugose, with pair of moderately short scobinate ridged signa; ventral signum smaller.

Type material. *Graphania lindsayi*: Holotype: female, 'Dunedin [two diagonal slashes below with space between for date, but undated] / 954g [Hudson register number] / HOLOTYPE ♀ Graphania lindsayi Dugdale, 1988' (NZAC) (examined, not dissected).

Ichneutica lindsayorum. As this is a replacement name, the type material is automatically the same as that for the name which it replaces, *Graphania lindsayi* (ICZN Article 72.7).

Note on nomenclature. The inclusion of *Graphania lindsayi* in the much expanded genus *Ichneutica* as defined in this work would give the combination *Ichneutica lindsayi* (Dugdale), which is a junior secondary homonym of *Ichneutica lindsayi* Philpott, 1926. Although *lindsayi* Philpott is here synonymized with *I. dione*, a replacement name is still necessary (ICZN Article 57.3), and the name *lindsayorum* is proposed here.

Distribution. (Map 66). Southern North Island and throughout the South Island.

TK, TO, RI / NN, BR, WD, MB, MC, MK, OL, CO, DN, FD, SL

Biology. The life history has not been documented in detail, but larvae are known to feed on *Ozothamnus leptophyllus* (Asteraceae) (reared specimens in OMNZ).

Flight period. December to April.

Etymology. To minimise any possible confusion resulting from the change in nomenclature, the new name (a genitive plural, meaning 'of the Lindsays') continues to honour the diligent Canterbury collector Stuart Lindsay (1888–1945), as well as his wife Jean Lindsay (for whom the flightless gelechiid moth *Kiwaia jeanae* Philpott was named (Philpott 1930a)).

Remarks. This species was for a long time confused with *Ichneutica olivea*. The differences (see above under *olivea*) were first pointed out by Lindsay, as related by Hudson (1939: 396). However, Hudson applied the name *olivea* to this taxon, and the name *Melanchra lata* Philpott to true *olivea*. As Dugdale (1988) pointed out, *Melanchra lata* is a synonym of *olivea*, leaving Lindsay's (commoner) species without a name. Dugdale supplied the name *Graphania lindsayi*. *Ichneutica lindsayorum* is a commoner and more widespread species than *I. olivea*, its range extending to the far south of the South Island. It inhabits shrublands containing its host-plant *Ozothamnus*.

Ichneutica lindsayorum is unusual in retaining pockets (as well as levers and A3 apodemes) on the male abdominal base but lacking functional scale-brushes (brushes are reduced to a small patch of very short hair-like scales). Stobbe's glands (which impregnate the brushes with pheromones in the pharate adult) are also absent.

67. *Ichneutica olivea* (Watt, 1916) new combination

Figs 67a, b (adults); 67c–e (male abdominal base and genitalia); 67f–h (female S7 and genitalia).

Melanchra olivea Watt, 1916. *Transactions and proceedings of the New Zealand Institute 48*: 413.

Melanchra lata Philpott, 1927. *Transactions and proceedings of the New Zealand Institute 58*: 81. Synonymised by Dugdale (1988: 204).

Diagnosis. *Ichneutica olivea* is easily confused with *I. lindsayorum* (see Remarks), and the most constant characters for separating the two appear to be as follows. The basal forewing streak in *I. olivea* is short, only reaching *ca* 1/2 way to the antemedian line; it usually reaches the antemedian in *I. lindsayorum*. The antemedian line in the forewing is strongly serrate throughout in *I. lindsayorum*, but nearly smooth in *olivea*; this is best appreciated in the region of the claviform stigma, where the line in *olivea* is straight, or has at most a very slight kink. The male antenna in *olivea* is weakly bipectinate, with the pectinations near the base just under 1x the width of the flagellum; the male antenna of *lindsayorum* is weakly serrate beneath but not pectinate. Specimens with distinct white (as opposed to pale brown or grey) scaling in the subterminal line, usually most pronounced towards the tornus, are *I. olivea*; white scaling is absent from the subterminal line in *lindsayorum*. The characters of the reniform stigma and subterminal line given by Lindsay in Hudson (1939) are not so reliable: the reniform often forms an angle with the costa in *olivea* as well as in *lindsayorum*, and while the subterminal line is usually more jagged in *lindsayorum*, with a strong W-shaped projection towards the termen above the tornus, there are specimens of this species with a smoother subterminal line that does not differ significantly in shape from that in *olivea*.

Description. Adult (Figs 67a, b). Wingspan 38–42 mm (male); 42–46 mm (female). Male antennae bipectinate to *ca* 23–25 segments short of apex, pectinations up to just under 1x width of flagellum. (Head with small scale-crest between antennae.) Head and thorax pinkish grey; prothorax with dark transverse bar; scales tricoloured, dark-banded subapically and pale-tipped (white-tipped on anterior mesothoracic crest), narrow lamellate. Forewing pinkish grey; short sinuous black basal streak white-edged above, thickened below at mid-length, reaching *ca* 1/2 way to antemedian line; antemedian line distinct only below cell, pale grey, dark-edged basally and distally; postmedian line indistinct, greyish, weakly scalloped, dark-edged basally; claviform stigma present, usually indistinct, partly edged blackish, U-shaped; orbicular stigma oblong and oblique, large, black-edged except towards costa, infilled dark grey and whitish; reniform nearly contiguous with orbicular, very large and distinct, black-edged except sometimes towards costa, with inner white lining only distally, infilled with blackish scales in U-shape in dorsal 1/2 leaving central patch of ground colour; area between antemedian and postmedian lines not darkened, but often indistinct dark fascia from reniform to dorsum; subterminal line distinct, whitish, without strong dentation or evagination, highlighted towards tornus by dark scaling basad; terminal area usually darker than ground colour; series of dark subtriangular marks along termen present, indistinct; fringe blackish grey, with irregular pale grey basal line. Hindwing brownish grey, unmarked; dark line along termen present; fringe brownish white with dark median line. Underside: forewing dark greyish brown, paler terminally, with reniform stigma and costal end of postmedian line faintly indicated; hindwing greyish to ochreous-brown, mottled pinkish and blackish towards costa; discal spot and postmedian line variably distinct. Abdomen with scale-

tufts on first three segments purplish brown, scales with paler bases and tipped white; rest of abdomen pale ochreous, variably suffused pinkish and mottled black. Male abdominal base (Fig. 67c) with brushes, levers and pockets. Male genitalia (Fig. 67d): uncus narrow, pointed, weakly hooked; valva oblique, sinuous, cucullus moderately well differentiated, truncate, with well developed corona of ca. 20–25 elements in a single row and small field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper very robust, crenulate along edges, curved; ampulla very long, digitate; phallus (Fig. 67e) with subapical tooth present, rather large; vesica forming complete loop; cornuti of moderate length, in single undivided band. Female S7 as in Fig. 67f. Female genitalia (Figs 67g, h): ovipositor lobes blunt, rather small, truncately rounded; segment 8 without setae laterally, rather sparse medium-length setae forming distinct band dorsally; ostium with distinct long dorsal desclerotised ridges (each ridge with slight bulge caudally) and sclerotised lateral pockets, right pocket shorter, left pocket longer, extended into sinuous ventral elongation with outpocketing of outer ductus membrane; ductus bursae rather short, very slightly broadened at mid-length, smoothly sclerotised to just under 2/3 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve weakly sclerotised, rugose in region of ductus seminalis inception; corpus bursae moderately rugose, with pair of rather long scobinate ridged signa of roughly equal size.

Type material. *Melanchra olivea*: Holotype: male, [Mt Egmont TK, early Jan 1915, M.N. Watt] (not examined, lost).

Note. Watt (1916) described *Melanchra olivea* in detail from a single male (referred to as the 'type specimen') but in a footnote to the original description mentions 'a good series' he obtained on Mt Egmont in January 1916, and briefly describes the female; he also mentions having seen a series in the collection of G. Howes, which, he says, 'appears to be the southern form of *M. olivea*'. Dugdale (1988: 204) mentions 9 male and 9 female paratypes in MONZ collected by Watt in January 1916 and established the identity of the species based on these. Under ICZN Article 72.4.1, 'the type series of a nominal species-group taxon consists of all the specimens included by the author in the new nominal taxon...except any that the author expressly excludes... or refers to as distinct variants'. On this basis, I follow Dugdale (*loc. cit.*) in regarding Watt's 1916 specimens as paratypes, but excluding from the type series the Howes material Watt mentions and briefly describes. It is likely, based on Watt's description of the wing colour and shape of the reniform stigma, that Howes' 'southern form' was in fact another species, *Ichneutica lindsayorum*, and indeed there are 6 specimens of *lindsayorum* collected by Howes at Flagstaff and Dunedin in 1915–1916 in MONZ (pers. obs. 2018). Since the identity of *I. olivea* is not in doubt based on the paratype material, there is no need to designate a neotype.

Melanchra lata: Holotype: female, 'Arthur's Pass 9-2-1926 A. Philpott / Melanchra lata Philpott Holotype. ♂.' (NZAC) (examined, not dissected).

Note. Philpott (1927) described *Melanchra lata* from a single female, and the sex is given as such in the original description; the male sign on the holotype label is an obvious *lapsus calami*.

Distribution. (Map 67). Locally distributed from the central North Island to the central South Island.

TK, TO, HB / MB, BR, WD, NC, MC

Biology. The life history appears to be unknown; specimens in OMNZ reared from *Ozothamnus* (given as the host-plant by White (2002) based on Patrick *et al.* (unpublished [1986])) are *I. lindsayorum*.

Flight period. December to March.

Remarks. *Ichneutica olivea* is a local and generally uncommon shrubland species that was for a long time confused in collections with the species here renamed *I. lindsayorum*. *Ichneutica lindsayorum* is *Melanchra olivea* in the sense of Hudson (1939: 396), whilst the true *olivea* is there identified as *Melanchra lata* Philpott. Hudson (*loc. cit.*) quotes Lindsay for the differences between the two species, but not all of Lindsay's characters are reliable, and confusion still occurs (see Diagnosis above).

68. *Ichneutica propria* (Walker, 1856) new combination

Figs 68a–e (adults); 68f–h (male abdominal base and genitalia); 68i–k (female S7 and genitalia); W68 (wing venation).

Leucania propria Walker, 1856. *List of the specimens of lepidopterous insects in the collection of the British Museum. IX*: 111–112.

Persectania basifascia Hampson, 1913. *The Annals and Magazine of Natural History (eighth series) 12*: 598. Synonymised by Dugdale (1988: 210).

Diagnosis. *Ichneutica propria* is a distinctive species, but could be confused with pale or faded specimens of *I. atristriga* that have lost their pinkish forewing tinge. *I. atristriga* lacks a distinct black transverse bar on the prothorax and has no black discal dash running through the reniform stigma: these features are almost invariably present in *propria*. The claviform and orbicular stigmata are usually quite clearly defined in *atristriga*, but in *propria* the claviform is absent and the orbicular absent or inconspicuous.

Description. Adult (Figs 68a–e). Wingspan 31.5–39 mm (male); 30–36 mm (female). Male antennae weakly bipectinate to *ca* 25 segments short of apex, pectinations up to *ca* 0.5x width of flagellum. Head and thorax dull ochreous to bright coppery; prothorax with black transverse bar, narrowly edged white above; tegulae sometimes with black lines mesally; scales mostly unicolorous, hairlike to narrow lamellate. Forewing pale ochreous to dull ochreous, with veins marked in silvery white variably mottled black; basal streak long, straight, black, edged white above; antemedian line absent; postmedian line represented only by dark dots on veins beyond cell; claviform stigma absent; orbicular stigma absent or reduced to dark dots above and below area of white scaling; reniform moderately distinct, small, usually consisting of silvery white scales more or less outlined black, but sometimes an irregular smudge of black; a brown to blackish streak below distal portion of disc contiguous with reniform, edged pale ochreous above to form pale discal streak basad and distad of reniform, and sometimes extending dorsad to meet basal streak; subterminal line absent; terminal area concolorous with wing or darkened between veins; series of dark subtriangular marks along termen present, distinct; fringe ochreous, more or less mixed blackish or dark brown. Hindwing brownish, unmarked; dark line along termen present, broken into dashes; fringe yellowish white, with diffuse darker median line. Underside: forewing brownish ochreous, suffused greyish except towards margins and in discal cell; reniform stigma absent to moderately distinct; postmedian line absent; series of dark subtriangular marks along termen distinct; hindwing whitish, sometimes suffused grey towards costa, discal spot usually distinct in male, indistinct or absent in female, postmedian line absent, series of dark marks along termen distinct. Abdomen without dorsal scale-tufts, ochreous mottled black, paler (whitish) basally. Male abdominal base (Fig. 68f) without brushes or pockets, but with slightly reduced levers; A3 apodemes present. Male genitalia (Fig. 68g): uncus robust, apically broad, bluntly rounded, not hooked; valva moderately upright, sinuous, cucullus well differentiated, truncately spatulate, with well developed corona of *ca* 35 elements in a single row and narrow field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately slender, curved, subapically papillate; ampulla long, digitate; phallus (Fig. 68h) with subapical tooth present, small; vesica forming complete loop; cornuti moderately long, shorter basally, in single uninterrupted band, with central field of shorter cornuti subapically. Female S7 as in Fig. 68i. Female genitalia (Figs 64j, k): ovipositor lobes blunt, of moderate length, truncately rounded; segment 8 with few medium-length setae laterally, rather numerous medium-length setae dorsally, forming distinct caudal band; ostium with long narrow dorsal desclerotised ridges and long lateral pockets of even length; ductus bursae of moderate length, constricted at level of pockets, then broadening slightly mid-length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae rather strongly rugose, with pair of short scobinate ridged signa of roughly equal size.

Type material. *Leucania propria*: Holotype: male, 'Type [green-ringed circular label] / N. Zealand. Earl. 45.30 / Leucania propria' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania propria* was described from a single specimen collected by Percy Earl (Walker 1856); the type locality is presumed to be Waikouaiti DN (Dugdale 1988).

Persectania basifascia: Lectotype (here designated): male, 'Type [red-ringed circular label] / New Zealand 1912-226 / Persectania basifascia Hampson Type ♂ / Agrotidae genitalia slide 171' [per JSD] (NHMUK) (examined, including genitalia slide).

Note. *Persectania basifascia* was described from two specimens, a male and a female. Dugdale (1988: 210) gives 'HT ♂ designated by Hampson', but there is no such designation in the original description. Hampson consistently used the term 'type' in the singular after stating the number of specimens of each sex on which his descriptions were based (e.g. in this case '1♂, 1♀ type', and so no valid holotype designation can be construed from his descriptions of multiple specimens (ICZN Article 73.1). The male is designated as lectotype here, since this specimen has been treated as the primary type and has been dissected.

Distribution. (Map 68). Widespread throughout the South Island, but only known from the central volcanic plateau in the North Island (Tongariro National Park and Pureora Forest).

TO / NN, BR, WD, MB, KA, NC, MC, MK, OL, CO, DN, FD, SL

Biology. The larva has not been described; it feeds on grasses (Patrick 1994a; White 2002). Reared specimens in NZAC (preserved in ethanol) are from native *Poa cita* (silver tussock) and *Festuca novae-zelandiae* (hard tussock), but it has almost certainly adapted to introduced grasses as well (see Remarks below).

Flight period. December to April, with most records in February and March.

Remarks. *Ichneutica propria* is a locally common grassland species with a chiefly eastern distribution in the South Island. It is one of the species that seems to have adapted well to the increase in exotic grasses, and showed no decline in the long-term tussock grassland light-trapping studies of White (1991).

This is the type species of *Tmetolophota.* Synonymy of *Tmetolophota* with *Ichneutica* is discussed under the genus description for *Ichneutica*, above.

69. *Ichneutica seducta* new species

Figs 69a–c (adults); 69d–f (male abdominal base and genitalia); 69g–i (female S7 and genitalia).

Diagnosis. Though variable in wing colour (pale greyish ochreous to bright orange brown), *Ichneutica seducta* is unlikely to be confused with any other noctuid species in its restricted range. The large S-shaped reniform stigma is usually relatively visible, though sometimes only the lower margin contrasts with the forewing ground colour, and the unmarked unicolorous thorax and dark hindwings are also distinctive.

Description. Adult (Figs 69a–c). Wingspan 38–41 mm (male); 41 mm (female) (only one female examined). Male antennae serrate beneath and very weakly bipectinate to *ca* 25–30 segments before apex, pectinations up to *ca* 0.3x width of flagellum. Head and thorax whitish or greyish ochreous to orange brown, with scales mostly unicolorous or weakly bicoloured, hairlike to very narrow lamellate. Forewing whitish or greyish ochreous to orange brown, concolorous with thorax; basal streak absent; antemedian line weakly indicated, zigzag, or reduced to black or brownish dots on veins Rs, Cu stem and 1+2A; postmedian line weakly indicated, brownish to blackish or represented only by dots on veins beyond disc; claviform stigma absent; orbicular stigma very indistinct, round, weakly edged blackish or brown, and with basal black dot; reniform more distinct, oblique, broad, weakly S-shaped, whitish to yellowish and indistinctly edged brown to blackish; area between antemedian and postmedian lines sometimes darkened around stigmata; subterminal line absent; terminal area concolorous with rest of wing; series of dark dots along termen; fringe concolorous with wing or slightly deeper brown in more orange specimens. Hindwing blackish brown, unmarked; dark line along termen absent or very indistinct; fringe whitish to pale orange brown, with indistinct darker median line. Underside: forewing suffused blackish, except around margins where pale ochreous to reddish ochreous (more or less matching upperside ground colour), reniform stigma indistinct or absent, postmedian line absent, series of dark marks along termen present or absent; hindwing whitish ochreous, variably suffused blackish except towards costa, discal spot indistinct, postmedian line absent or indistinct, series of dark marks along termen present or absent. Abdomen without distinct dorsal scale-tufts; whitish ochreous to orange ochreous, more or less densely mottled black. Male abdominal base (Fig. 69d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 69e): uncus weakly expanded subapically, bluntly pointed, not hooked; valva oblique, sinuous, cucullus well differentiated, subtriangular / truncate, with well developed corona of *ca* 45–50 elements in a single row and broad field of spinose setae forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately robust, curved to weakly sinuous, dorsally crenulate and costally papillate; ampulla very long, digitate, with slightly hooked apex; phallus (Fig. 69f) with subapical tooth present, rather long; vesica forming complete loop; cornuti moderately long, basal cornuti diverted at an angle to main band, band narrowed apically and with separate patch of a few cornuti laterally. Female S7 as in Fig. 69g. Female genitalia (Figs 69h, i): As described below for *I. semivittata* (q.v.) but ovipositor lobes larger, subtriangular rather than truncate, both signa slightly shorter.

Type material. Holotype: male, 'CHATHAM IS, NZ / Chatham Id Awatotara to light 13 Nov 1991 J.S. Dugdale / NZAC slide Noct. 488 genitalia ♂/ NZAC04226038 [database barcode label]' (NZAC). Paratypes: 4 males, 1 female, as follows: 1 male, same data as holotype except 12 Nov 1991, no genitalia slide, and additional green label 'Photographed by B.E. Rhode' (Fig. 69b); 1 male, CH: Chatham Is., Mangape Creek, to light, 9 Nov 1991, J.S. Dugdale (Fig. 69a); 1 male, CH: Chatham Is., Te One School, to light 5 Nov 1991, R.P. MacFarlane (Fig.

69c); 1 male, CH: South East Is., 2 Nov 1970, J.I. Townsend (genitalia on slide NZAC Noct. 233); 1 female, CH: Pitt Is., Canister Cove Scientific Res., 14 Jan 1990, C.A. Muir (genitalia on slide NZAC Noct. 489) (all NZAC).

Distribution. (Map 69). Chatham Islands only. Known from Rēkohu / Chatham, Rangiaotea / Pitt, and Rangatira / South East Islands.

— / — / CH

Biology. Apparently unconfirmed, but *I. seducta* is almost certainly the 'large red-brown noctuid moth (unnamed)' from the Chathams referred to by Dugdale and Emberson (2008: 119); they state that it feeds on tarahinau (*Dracophyllum arboreum*) (Ericaceae). However, there are no reared specimens in collections, and preserved larvae have not been located in NZAC. Further observations are needed to confirm the life history and host association.

Flight period. November to January.

Etymology. The name *seducta* is from the Latin *seductus* (distant, secluded, separated off) and refers to the island home of this species as well as its separation from the closely related *I. semivittata*.

Remarks. *Ichneutica seducta* is known only from a rather small number of specimens from native forest on the Chatham Islands. The presumed host-plant, *Dracophyllum arboreum*, is considered naturally uncommon but not currently threatened, and remains abundant in forest on the southern tablelands of Chatham Island and on Pitt Island (NZPCN 2019).

The male genitalia of *I. seducta* are very similar to those of *I. semivittata*, its probable sister species, differing only in the larger size of the cucullus and greater number of corona elements in *seducta*. Other island segregate taxa (e.g., *I. rufistriga* n. sp. from the Antipodes) tend to have the cucullus and corona reduced compared to their closest mainland relatives, and *seducta* offers an intriguing exception to this trend.

70. *Ichneutica semivittata* (Walker, 1865) new combination

Figs 70a–c (adults); 70d–f (male abdominal base and genitalia); 70g–i (female S7 and genitalia).

Leucania semivittata Walker, 1865. *List of the specimens of lepidopterous insects in the collection of the British Museum. XXXII*: 628.

Diagnosis. *Ichneutica semivittata* is a distinctive species; the straw-coloured forewing with its more or less well-defined streak of reddish ochreous running from the base to near the apex is diagnostic. *Ichneutica sulcana* is on average a larger species (wingspan 35–48 mm), with a much darker abdomen and hindwing, and has only 1 to 3 dark spots in the forewing postmedian line (a complete series of *ca* 8 to 9 spots is present in *I. semivittata*).

Description. Adult (Figs 70a–c). Wingspan 30–42 mm (male); 31–40 mm (female). Male antennae very weakly bipectinate to *ca* 25 segments short of apex and serrate beneath, pectinations up to *ca* 0.4x width of flagellum (posterior pectinations very indistinct). Head and thorax pale straw, grading to white posteriorly; sometimes V-shaped bar on prothorax and interior and exterior lines on tegulae orange brown; with scales mostly unicolorous, very narrow lamellate to hairlike. Forewing pale straw, usually with broad irregular streak of reddish ochreous from base along lower margin of cell to termen below apex; basal streak long, dark brown, edged orange-brown below and distally merging with area of brownish ochreous around lower margin of disc; antemedian line reduced to at most 3 dots, on base of veins Rs, CuA and 1+2A; postmedian line represented by dots on veins beyond cell; stigmata absent, except reniform indicated by blackish dots above and below, and a line below disc between bases of veins CuA1 and CuA2; area between antemedian and postmedian lines not darkened; subterminal line absent; terminal area with some weak shading between veins; series of dark subtriangular marks along termen present; fringe pale straw. Hindwing whitish, suffused brown to greyish, especially along veins, with postmedian line more or less clearly represented by dark dots on veins, without distinct pale area beyond; dark line along termen present as series of dashes; fringe white. Underside: forewing whitish ochreous with blackish suffusion of variable extent just beyond discal cell, reniform stigma indistinct or absent, postmedian line absent, series of dark marks along termen usually distinct; hindwing white, sometimes weakly suffused greyish exteriorly in male, discal spot present, postmedian line sometimes present as series of dark smudges along veins, series of dark marks along termen variably distinct. Abdomen without dorsal scale-tufts, pale straw mottled black (white towards base). Male abdominal base (Fig. 70d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 70e): uncus narrow, pointed, not hooked; valva oblique, angular, cucullus well differentiated, subtriangular, truncate, with well developed corona of *ca* 30–35 elements in a single row and field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately robust, rather sinuous,

crenulate on outer margin and papillate subapically; ampulla very long, digitate; phallus (Fig. 70f) with subapical tooth present, small; vesica forming complete loop; cornuti long, basal cornuti diverted at an angle to main band, band narrowed apically to a single row of large cornuti, but with separate patch of a few cornuti laterally. Female S7 as in Fig. 70g. Female genitalia (Figs 70h, i): ovipositor lobes blunt, small, truncately rounded; segment 8 with a few short to medium-length setae laterally, setae becoming sparser dorsally, forming indistinct band in caudal 1/3 of segment; ostium with long rather flat dorsal desclerotised ridges (ending caudally in prominent subtriangular bulge) and very long sclerotised lateral pockets of roughly even length; ductus bursae moderately long, slightly constricted below ostium, not strongly broadened mid-length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae very strongly sclerotised (broadened) and rugose, outer curve sclerotised, not rugose; corpus bursae rather strongly rugose, with pair of elongate scobinate ridged signa, ventral signum slightly longer.

Type material. Holotype: male, 'Type [green-ringed circular label] / N. Zealand. Auckland Oxley 60-73 / Leucania semivittata' [per JSD] (NHMUK) (examined, not dissected).

Note. *Leucania semivittata* was described from a single male collected by T.R. Oxley (Walker 1865a). The true type locality is Nelson (Dugdale 1988: 10, 17).

Distribution. (Map 70). Throughout New Zealand from the Three Kings Islands to Stewart Island.

TH / ND, AK, CL, BP, TK, TO, HB, WI, WN / NN, BR, WD, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL / SI

Biology. Larvae have been found on Juncaceae and Cyperaceae, including *Juncus procera*, *Carex secta* and another *Carex* sp. (reared specimens in OMNZ), as well as on tussock grasses (Poaceae) (Kelsey 1957, who pooled larval records from *Poa cita*, *P. colensoi* and *Festuca novae-zelandiae*). Hudson (1928), who gives 'native grasses' as hosts, describes the larval coloration as follows: "dull green, very finely streaked with reddish-brown; the dorsal and subdorsal lines are indicated by fine double reddish lines; there is a series of white dots, one on each segment, except on the second [i.e. the prothorax] and last [i.e. A10]; the lateral line is very distinct, dark reddish-brown, shaded with cream colour below; the spiracles are blackish; the underside of the larva and the whole of the second segment [prothorax] is a paler and clearer green than the rest of the body."

Flight period. August to April.

Remarks. *Ichneutica semivittata* is fairly common and very widespread throughout New Zealand, and can be found both in open grasslands and in clearings in forest, from the lowlands to the alpine zone above 1200 m. It usually occurs in small numbers, and was a relatively rarely collected species in White's tussock grassland studies in Canterbury and the Mackenzie country (White 1991, 2002).

71. *Ichneutica similis* (Philpott, 1924) new combination

Figs 71a–c (adults); 71d–f (male abdominal base and genitalia); 71g–i (female S7 and genitalia).

Persectania similis Philpott, 1924. *Transactions and proceedings of the New Zealand Institute 55*: 207–208.

Diagnosis. *Ichneutica similis* has been confused in collections with *I. emmersonorum* n. sp., a very local species known only from the central North Island; differences are described under *emmersonorum* above.

Description. Adult (Figs 71a–c). Wingspan 35–37 mm (male); 36–38 mm (female). Male antennae very weakly bipectinate to *ca* 25 segments short of apex and serrate beneath, pectinations up to *ca* 0.3x width of flagellum (posterior pectinations very indistinct). Head and thorax pinkish brown to reddish brown; transverse bar on prothorax black, edged white posteriorly; tegulae laterally broadly white, mesally narrowly white with black inner edge; scales mostly unicolorous, very narrow lamellate. Forewing pinkish brown to chocolate brown; rather long black basal streak, and white streaks along Cu stem (edged black above in disc) and 1+2A, and most veins beyond disc except M2; antemedian line obsolete; postmedian line represented by series of black dots on veins; claviform stigma absent; orbicular stigma absent; reniform more or less clearly indicated, S-shaped, incompletely edged black, lower stroke of S white, upper stroke usually white, rest ochreous to pale pinkish; white scales extending irregularly from reniform to near apex; subterminal line absent; terminal area concolorous with ground colour except where interrupted by white streaks; series of dark subtriangular marks along termen present; fringe chequered pinkish brown to reddish brown and white. Hindwing dark brown, unmarked; dark line along termen present, indistinct; fringe pinkish brown basally, chequered white, whitish apically beyond faint dark median line. Underside: forewing brown variably suffused with blackish, usually paler along distal part of costa and termen

where often suffused pinkish, reniform stigma very indistinct, postmedian line absent, series of dark marks along termen present (and usually with pinkish to whitish triangles extending between these into fringe); hindwing whitish ochreous, variably suffused or sprinkled blackish, discal spot usually distinct, postmedian line indistinct, series of dark marks along termen. Abdomen with small pinkish brown scale-tuft dorsally on segment 1; rest of abdomen ochreous mottled black, sometimes tinged pinkish laterally. Male abdominal base (Fig. 71d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 71e): uncus moderately expanded subapically, bluntly pointed, not hooked; valva rather upright, sinuous, cucullus well differentiated, small, bluntly rounded with well developed corona of *ca* 29–32 elements in a single row and field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately robust, curved, dorsally crenulate and costally papillate; ampulla long, digitate, weakly clubbed; phallus (Fig. 71f) with subapical tooth present, small; vesica forming complete loop; cornuti moderately long, basal cornuti diverted at an angle to main band, band apically with separate patch of a few cornuti laterally. Female S7 as in Fig. 71g. Female genitalia (Figs 71h, i): ovipositor lobes blunt, rather small, rounded; segment 8 with a few short to medium length setae laterally, setae sparse dorsally, forming very indistinct band along caudal margin of segment; ostium with long rather indistinct dorsal desclerotised ridges (ending caudally in prominent rounded bulge) and very long lateral pockets; ductus bursae long, strongly constricted below ostium, then distinctly broadened mid-length, smoothly sclerotised to just beyond 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised (broadened) and rugose, outer curve sclerotised, not rugose; corpus bursae strongly rugose, with pair of elongate scobinate ridged signa, ventral signum distinctly longer.

Type material. Holotype: male, 'Gouland Downs 7 Feb. 1922 A. Philpott / Persectania similis Philp. Holotype ♂ / 30' (NZAC) (examined, genitalia in vial on same pin as moth).

Note. *Persectania similis* was described from two specimens, a male and a female (Philpott 1924a). The male was clearly designated as holotype in the original description. The female paratype (labelled by Philpott as 'Allotype') is also in NZAC, and has the same data as the holotype.

Distribution. (Map 71). Very locally distributed in the North Island, western South Island and Stewart Island.
AK, WO, TO / NN, WD, FD, SL / SI

Biology. Suspected larvae of this species have been swept from *Empodisma* (Restionaceae) in wetlands (J.S. Dugdale, pers. comm.) but no reared specimens of the moth were seen in collections during this revision. *Empodisma* is not known from the locality where the Auckland specimen was captured (see below), though another member of Restionaceae, *Apodasmia similis* (oioi), is common there.

Flight period. January to March.

Remarks. This very local species is associated with peatlands in the Waikato and Southland, with upland wetlands in Tongariro National Park and north-west Nelson, and pakihi in Westland. The only known specimen from the Auckland district was collected at Kakamatua Inlet, a coastal wetland at the edge of the Waitakere Ranges (N. Hudson, pers. comm.). *Ichneutica similis* was not collected during brief surveys of the gumlands of Northland in 2007–8 (Hoare 2011), although these habitats otherwise have many specialist Lepidoptera species in common with the Waikato peatlands, and *Empodisma robustum* is locally present.

72. *Ichneutica virescens* (Butler, 1879) new combination

Figs 72a–d (adults); 72e–g (male abdominal base and genitalia); 72h–j (female S7 and genitalia).

Chera virescens Butler, 1879. *Cistula Entomologica 2*: 478.

Diagnosis. *Ichneutica virescens* is a large glossy species, with relatively distinct forewing markings (much more distinct than in *I. nobilia*) and minute antennal pectinations in the male (the antennae appear filiform except under magnification). A helpful recognition feature in fresh, well-marked specimens of *virescens* is the dark scaling along the inner edge of the subterminal line: this is divided into three patches, one near the apex, one level with the lower edge of the reniform and one above the tornus. These patches are absent from the similar *I. panda*, a smaller species with distinct antennal pectinations in the male. *Ichneutica virescens* might be confused at a glance with *I. falsidica*, but this again is a smaller species with a broader forewing and distinct male antennal pectinations; the forewing of most specimens of *falsidica* has a much more variegated appearance than that of *virescens*, and the area beyond the subterminal line is usually silvery grey and distinctly paler than the centre of the wing; there is no such contrast in *virescens*. *Ichneutica cuneata* differs from *virescens* in its smaller size, in the distinct dark infill of

the reniform stigma, and in the pale base and white fringe of the hindwing (hindwing nearly unicolorous in *virescens* and fringe only narrowly white beyond a brown median line).

Description. Adult (Figs 72a–d). Wingspan 42–46 mm (male); 40–49 mm (female). Male antennae very weakly bipectinate to *ca* 30 segments short of apex, and distinctly serrate beneath, pectinations up to *ca* 0.25x width of flagellum. Head and thorax dark grey, densely sprinkled white or brownish white (tips of scales), and sometimes with some blackish scaling towards mesal margin of tegulae; scales bicoloured, narrow lamellate. Forewing glossy slate-grey; basal streak present as tiny black mark upcurved towards costa and edged yellowish white; antemedian line moderately distinct, whitish, irregularly scalloped, dark-edged distally and sometimes basally; postmedian line variably distinct, sometimes broken, strongly scalloped, whitish to yellowish, edged black basally, and often with line of white dots beyond; claviform stigma present, often indistinct, small U-shaped, black-edged; orbicular stigma moderately distinct, round, black-edged only basally and distally, and with inner lining of white to yellowish scales; reniform moderately distinct, large, coloration as for orbicular; area between antemedian and postmedian lines darkened in indistinct fascia that extends from costa between orbicular and reniform to dorsum; subterminal line usually rather distinct, white to yellowish, highlighted by black clouds basad near apex, above middle of wing (level with dorsal margin of reniform) and towards tornus; terminal area concolorous with wing; series of dark subtriangular marks along termen present; fringe brownish white to greyish with 2–3 blackish lines. Hindwing grey-brown, unmarked; dark line along termen present; fringe whitish beyond brownish white base and dark median line. Underside: forewing greyish, costa sometimes paler, area beyond subterminal line weakly paler, reniform stigma and postmedian line usually present, indistinct, termen unmarked; hindwing whitish, sprinkled grey towards costa and suffused grey towards termen, discal spot and postmedian line present, usually rather indistinct, termen unmarked. Abdomen with distinct dorsal scale-tuft only on segment 1, tuft grey, speckled white; rest of abdomen silvery grey with admixture of whitish scales laterally and terminally. Male abdominal base (Fig. 72e) with complete levers and reduced pockets; brushes vestigial, reduced to patch of short hairlike scales; A3 apodemes present. Male genitalia (Fig. 72f): uncus distinctly expanded subapically, bluntly pointed, not hooked; valva oblique, slightly sinuous, cucullus well differentiated, subtriangular and truncate, with well-developed corona of *ca* 45–50 elements in a single row and narrow field of spinose setae forming small 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately slender, irregular-sided, straight; ampulla long, digitate, very weakly clubbed; phallus (Fig. 72g) with subapical tooth present; vesica forming complete loop; cornuti rather short, with separate lateral patch of a few cornuti apically. Female S7 as in Fig. 72h. Female genitalia (Figs 72i, j): ovipositor lobes bluntly rounded; segment 8 with numerous short to medium-length setae laterally, setae much sparser dorsally and not forming caudal band; ostium with long rather evenly raised dorsal desclerotised ridges and long well-developed lateral pockets, left pocket longer; ductus bursae long, smoothly sclerotised to near junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae with pair of rather short weakly ridged scobinate signa of roughly equal size.

Type material. Holotype: female, 'Type [red-ringed circular label] / 7 / N. Zealand Otago Hutton 79-19 / Chera virescens Butler type' [per JSD] (NHMUK) (examined, not dissected).

Note. *Chera virescens* was described from an unspecified number of specimens (Butler 1879), but there is nothing in the original description that implies more than one was seen.

Note on nomenclature. This species is known as *Leucania griseipennis* or *Aletia griseipennis* in the older literature, due to Meyrick's (1912a) misinterpretation of the name *griseipennis* Felder & Rogenhofer (in fact a synonym of *moderata*: see Dugdale (1988: 200)).

Distribution. (Map 72). Southern North Island and throughout the South Island; not known from offshore islands.

HB, TK, TO, WN / SD, NN, BR, WD, MB, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL

Biology. The larva is probably relatively polyphagous on low-growing plants, probably including grasses (see below), and has been reared on *Epilobium* (Patrick 1991), *Coriaria plumosa* (specimens in NZAC), and even ferns of the family Blechnaceae (White 2002, pers. comm. from B.H. Patrick). The egg is described by Hudson (1928: 56) as "about [0.8 mm] in diameter, spherical, much flattened; the micropyle is smooth with radiating ridges... colour is pale yellowish-white." He describes the full-grown larva as follows: "About [38 mm] long, slightly attenuated posteriorly, the head is light green and shining; the body very vivid green, paler and bluer beneath; the

second segment [prothorax] slightly yellowish; there is a very fine, white dorsal line, a conspicuous yellowish subdorsal line, a broad, white lateral line, and a series of minute whitish yellow specks between the lines." Hudson (*loc. cit.*) figures the larva on his plate 1, fig. 24. He does not report what he fed his larvae on, but states "the food-plant no doubt consists of native grasses", which perhaps implies that they accepted exotic grasses in captivity. White (2002), however, did not accept this record of grass as a pabulum, though he gave no reasons. Further investigation of the range of larval host-plants is needed. A specimen in NZAC was reared from a pupa under a rock.

Flight period. November to April, with most records from January to March.

Remarks. This is a generally common, sometimes locally abundant, subalpine and alpine species, descending to sea level in the west and south of the South Island. Hudson (1928) gives it as 'very common' on Mt Taranaki TK and 'extremely abundant' on the lower slopes of Mt Aurum and Mt Earnslaw OL. It occasionally flies by day.

Ichneutica infensa subgroup

Diagnosis. Male abdominal base with brushes, levers and pockets (except in *I. inscripta* and *I. supersulcana* where brushes are reduced or vestigial, and *I. thalassarche*, where brushes and pockets are absent but levers are present); valva sinuous; clasper rather narrow, irregularly papillate, pollex at base not strongly projecting; cucullus extending to a beak-like point; basal tubular portion of vesica lacking field of denticles.

Remarks. Members of this subgroup lack pectinations on the male antenna; most species are associated with monocot host-plants.

73. *Ichneutica alopa* (Meyrick, 1887) new combination

Figs. 73a–d (adults); 73e–j (male abdominal base and genitalia); 73k–m (female S7 and genitalia).

Leucania alopa Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 10.

Diagnosis. *Ichneutica alopa* could be confused with *I. agorastis*, *I. micrastra* or *I. sapiens*. The males of *I. agorastis* and *I. sapiens* (both usually smaller species than *alopa*) can be easily distinguished from that of *alopa* by their distinctly short-pectinate antennae; the antennae are ciliate but not pectinate in *I. alopa*. In both sexes, the forewing of *I. agorastis* has more distinct and paler crosslines than that of *alopa*, and the subterminal line especially is much more distinct in *agorastis*. On the forewing underside, *I. agorastis* usually has the terminal area (beyond the subterminal line) distinctly demarcated and paler than the rest of the wing; there is no such demarcation in *I. alopa*. Differences from both sexes of *I. micrastra* and from female *I. sapiens* are as follows: usually the reniform stigma is much more clearly marked in *I. alopa* than in *micrastra* or *sapiens*, with a distinct yellowish to orange outer margin (no such margin in *micrastra* or *sapiens*); *micrastra* and *sapiens* have distinct black and white speckling along the forewing veins (at most some blackish scaling along veins in *alopa*); in *alopa*, the forewing underside has a rosy suffusion towards the costa and the underside fringe is rosy (no such coloration in *micrastra* or *sapiens*).

Description. Adult (Figs 73a–d). Wingspan 39–45 mm (male); 39–45 mm (female). Male antennae (dorsally white at base), not pectinate, very weakly serrate, with ciliations beneath up to just under 1x flagellum depth. Head and thorax pinkish brown to deep reddish brown, with scales mostly unicolorous (some partially whitish), narrow lamellate. Forewing pinkish brown, occasionally deep purplish, costa speckled white and veins indistinctly speckled black and white; antemedian line indistinct, dark, strongly indented on vein 1+2A; postmedian line indistinct, dark, strongly scalloped; claviform stigma absent; orbicular stigma absent or present, outlined in white or orange-brown scales; reniform usually rather distinct, outlined in orange scales, particularly strongly on outer margin, and with white flecks opposite each other in lower part; area between antemedian and postmedian lines not darkened; subterminal line absent; terminal area sometimes very slightly darker than ground colour; dark marks along termen absent; fringe reddish brown, basally paler. Hindwing dark brownish, unmarked; dark line along termen present as series of dots or absent; fringe whitish, strongly tinged pinkish brown. Underside: forewing blackish brown, usually much paler whitish brown towards costa and termen, suffused rosy along costa and with fringe rosy; reniform stigma indistinct; postmedian line absent; hindwing whitish brown suffused grey; discal spot distinct; postmedian line absent; fringe rosy. Abdomen segment 1 with indistinct scale-tuft dark brownish, tipped white, sometimes similar but very indistinct tufts on segments 2 and 3; rest of abdomen greyish brown, tinged pinkish especially laterally. Male abdominal base (Figs 73e, h) with well-developed brushes, levers and pockets.

Male genitalia (Figs 73f, i): uncus narrow, pointed, not hooked; valva oblique, sinuous, with costa concave towards apex, apex short-spatulate with well developed corona of ca. 45–75 elements in a single row and field of spinose setae forming costal 'crest'; clasper short, digitate to thumb-like, weakly curved, with irregular costal margin; ampulla rather long, digitate; phallus (Figs 73g, j) with subapical tooth present, well developed; vesica forming complete loop; cornuti short basally and apically, otherwise rather long, in unbroken band. Female S7 as in Fig. 73k. Female genitalia (Figs 73l, m): ovipositor lobes pointed, subtriangular, (surface densely spinulose); segment 8 with fine long setae laterally and dorsally, not forming distinct caudal band; ostium with distinctly raised dorsal desclerotised ridges and short lateral pockets; ductus bursae of moderate length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve moderately sclerotised, especially in central strip; corpus bursae with single small roundish ridged scobinate signum, or with signum reduced to indistinct area of scobinations.

Type material. Lectotype (designated by Dugdale (1988: 209)): male, 'Feby-Mar /76 Lake Guyon / Fereday Collection / Leucania alopa Meyr.' (CMNZ) (examined, not dissected).

Note. *Leucania alopa* was described from two male specimens, from Lake Guyon and Lake Coleridge (Meyrick 1887: 10). I interpret the date on the lectotype label as [18]76 not 1875 as given by Dugdale (1988), though the digit is hard to read. The paralectotype is also in the Fereday collection in CMNZ, and was taken at sugar at Oakden's Station, Lake Coleridge between 1 and 7 Mar 1873.

Distribution. (Map 73). Central and southern North Island and much of the South Island.

TO, WI / BR, WD, MB, MC, MK, OL, CO, DN, FD, SL

Biology. The life history is unknown; one specimen has been reared from a pupa in *Sphagnum* moss (specimen in OMNZ) and one from a pupa in a *Raoulia* mat (specimen in NZAC).

Flight period. Late January to April.

Remarks. *Ichneutica alopa* is a distinctly local and rather poorly known moth of tussock grasslands and wetlands, though it is widespread and occurs from near sea-level to the alpine zone. In his Mackenzie Basin light-trapping study, White (2002) noted that it was principally found at a string bog site (his site W), dominated by *Oreobolus*, *Sphagnum*, *Carex* and *Chionochloa*. The remarkable variation in the number of elements in the corona (ca 46–47 in one specimen (Fig. 73f), *ca* 75 in another (Fig. 75i)) is not thought to be of taxonomic significance in this instance, since both specimens were captured on the same date at the same locality (St Arnaud MB, 25 March 1985).

74. *Ichneutica atristriga* (Walker, 1865) new combination

Figs 74a–e (adults); 74f–h (male abdominal base and genitalia); 74i–k (female S7 and genitalia); L74 (larva).

Xylina atristriga Walker, 1865. *List of the specimens of lepidopterous insects in the collection of the British Museum. XXXIII*: 756.

Mamestra antipoda Felder & Rogenhofer, 1875. *Reise der österreichischen Fregatte Novara um die Erde in den Jahern 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorf-Urbair. Zoologischer Theil. Band 2. Abtheilung 2. Heft 4*: pl. CIX fig. 23. Synonymised by Meyrick (1887: 8).

Diagnosis. The only species likely to be confused with *I. atristriga* is the smaller *I. propria* (q.v.), which lacks the pinkish tinge to the thorax and forewings and has a distinct dark discal forewing streak.

Description. Adult (Figs 74a–e). Wingspan 35–42 mm (male); 35–41 mm (female). Male antennae not pectinate, weakly serrate towards apex (ciliations up to *ca* 0.5x depth of flagellum). Head and thorax dull pinkish brown, with scales bicoloured to tricoloured, narrow lamellate, tipped white. Forewing ground colour reddish ochreous, usually extensively suffused dull pinkish brown except elongate areas beyond claviform and reniform stigmata, and veins mottled black and white; costa suffused greyish white; a black slightly sinuous streak from base to just before 1/3 wing length; antemedian line absent; postmedian line weakly indicated by darker scales, scalloped; claviform stigma present as greyish white elongate mark at end of basal streak, surrounded by black; orbicular stigma usually distinct, elliptical, greyish white outlined black; reniform S-shaped, colour as for orbicular but often with inclusion of blackish grey scales; subterminal line present as series of pale dots; terminal area not paler than rest of wing; series of dark subtriangular marks along termen present; fringe brownish, paler basally. Hindwing dark grey, unmarked; dark line along termen weakly indicated; fringe brownish white with dark median line. Underside: forewing blackish brown except towards costa, dorsum and termen where paler, dull ochreous to grey-brown, sometimes tinged pinkish; reniform stigma indistinct; postmedian line absent or very indistinctly represented only on costa; series of dark dots along termen; hindwing whitish ochreous finely speckled dark; often

pink-tinged towards costa; discal spot present, small; postmedian line very indistinct; series of dark dots along termen. Abdomen segment 1 with dorsal scale-tuft deep pinkish brown tipped white; sometimes a similar smaller tuft on segment 2; rest of abdomen pale ochreous, more or less tinged pinkish, and sometimes with scattered black scales. Male abdominal base (Fig. 74f) with brushes, levers and pockets. Male genitalia (Fig. 74g): uncus narrow, pointed, not hooked; valva oblique, strongly sinuous, cucullus strongly developed and triangular, with well developed corona of *ca* 70–75 elements in a single row and field of spinose setae forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper rather small, narrow, curved; ampulla long, digitate; phallus (Fig. 74h) with subapical tooth present; vesica forming complete loop; cornuti moderately long, in uninterrupted band (curving left from 2/3 length of band), with central field of shorter cornuti subapically between rows of longer ones. Female S7 as in Fig. 74i. Female genitalia (Fig. 74j, k): ovipositor lobes blunt, small, weakly squared off; segment 8 without setae laterally, with scattered short to medium setae in a narrow band dorsally; ostium with long evenly raised dorsal desclerotised ridges and long lateral pockets, left pocket (in ventral view) much longer than right and ending in distortion of ductus wall; ductus bursae of moderate length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and with a few rugae, outer curve well sclerotised, not rugose; corpus bursae with a pair of small scobinate ridged signa, ventral signum very small and indistinct.

Type material. *Xylina atristriga*: Lectotype (designated by Dugdale (1988: 209)): male, 'Type [green-rimmed circular label] / N. Zealand Auckland Oxley 60-73 / Xylina atristriga' [per JSD] (NHMUK) (examined, not dissected).

Mamestra antipoda: Holotype: female, '610 / [illegible] Mamestra [illegible] / Felder Coll. / Rothschild Bequest BM1939-1 / CIX f 23 Mamestra antipoda n. N. Seeld.' [per JSD] (NHMUK) (examined, not dissected).

Note. *Xylina atristriga* was described from 2 males (Walker 1865b: 756). The true type locality is Nelson (Dugdale 1988: 10, 17). *Mamestra antipoda*, like other Felder and Rogenhofer species, lacks a description, and is based on an illustration; however, as there is one specimen in the NHMUK labelled as coming from the Felder Collection, this is regarded as the holotype (cf. Dugdale 1988: 209). The type locality is Nelson, as established by Dugdale (1988).

Distribution. (Map 74). Throughout the three main islands of New Zealand.

ND, AK, CL, BP, TO, GB, HB, RI, WI, WN / SD, NN, BR, MB, KA, NC, MC, MK, OL, CO, DN, FD, SL / SI

Biology. The life history has been surprisingly poorly documented for such a common moth. Kelsey (1957) included the species in a list of insects feeding on tussock (which in this case included only *Poa cita* (as *P. caespitosa*), *P. colensoi* and *Festuca novae-zelandiae*). Gaskin (1966a) recorded rearing larvae on *Bromus* spp. and *Festuca* spp., but does not specifically state whether the larvae were collected in the wild or whether he reared them from eggs from a captured female; the context perhaps suggests the former. The larva was keyed and figured in colour by Bejakovich and Dugdale [1998]: their photograph (reproduced here as Fig. L74) shows a pallid larva with the head capsule pale brown, broadly darker in a central stripe and laterally, prothorax tinged yellowish brown, a distinct dark-edged greyish mid-dorsal stripe, becoming poorly defined on the thorax, a dark subdorsal stripe on each side, thicker towards the anterior end of each segment and edged whitish below (only the whitish edging distinct on the thorax), and a greyish lateral stripe, again more poorly defined on the thorax.

Flight period. November to May, but with most records between December and April.

Remarks. *Ichneutica atristriga* is a ubiquitous moth, and was often cited as one of the commonest New Zealand noctuids in earlier works, e.g. Hudson (1928) who referred to its 'great abundance' and Gaskin (1966b) who stated that it 'literally floods to light on the outskirts of Wellington'. It is undoubtedly still a common species, but there is evidence of a major fall in numbers, at least in some localities. A decline was already documented in tussock grassland at Cass MC by White (1991), who recorded a decrease of 45.7% at one of his light trapping sites and 82.6% at the other between the early 1960s and the late 1980s (data derived from White 1991: appendix 1). White proposed continued regular monitoring of common species such as this to maximise sensitivity and statistical robustness of data on environmental changes.

75. *Ichneutica blenheimensis* (Fereday, 1883) new combination

Figs 75a, b (adults); 75c–e (male abdominal base and genitalia); 75f–h (female S7 and genitalia).

Leucania blenheimensis Fereday, 1883. *Transactions and proceedings of the New Zealand Institute 15*: 196.

Diagnosis. This species may be easily recognised when in good condition by the blackish forewing fringes, which contrast strongly with the pallid forewing. Even when the fringes are worn, a trace of this dark coloration usually remains; however, specimens with the wings very worn are easily confused with worn pale examples of *I. arotis*. Other characters that may be of help in such cases are the lack of an anteromedian scale-tuft on the thorax, the lack of dark longitudinal stripes on the tegulae in *blenheimensis* (both these features present in *arotis*) and the unmarked underside (*arotis* has dark dots along the termen of both wings, and usually a distinct discal spot on the hindwing).

Description. Adult (Figs 75a, b). Wingspan 37 mm (male); 40–41 mm (female). Male antennae not pectinate, weakly serrate. Head and thorax pale straw, with scales unicolorous or weakly bicoloured, narrow lamellate. Forewing pale straw, with stems of veins R and CuA (above and below disc) strongly mottled black and white and apical R veins, CuA1, CuA2 and 1+2A less strongly; postmedian line represented by dark dots on veins; stigmata and other markings absent; fringe blackish, strongly contrasting with wing. Hindwing brownish grey, somewhat darker on veins, markings absent; dark line along termen weakly indicated or absent; fringe whitish with dark median line. Underside: blackish grey, whitish ochreous towards costa, dorsum and termen, with darker speckling around apex, otherwise unmarked; hindwing white, speckled greyish except in disc and anal area, otherwise unmarked. Abdomen without distinct scale-tufts basally, whitish ochreous, more yellowish apically in male and with scattered black scales in female, often weakly tinged pinkish in both sexes. Male abdominal base (Fig. 75c) with brushes, levers and pockets. Male genitalia (Fig. 75d): uncus very narrow, pointed, not hooked; valva oblique, moderately sinuous, cucullus well differentiated, subtriangular, with well developed corona of ca. 35–40 elements in a single row and field of spinose setae forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately robust, curved, weakly clubbed; ampulla long, broad, blade-like; phallus (Fig. 75e) with subapical tooth present, small; vesica forming complete loop; cornuti in uninterrupted band, long but reducing strongly in size towards apex, where few longer cornuti border a group of very small ones laterally. Female S7 as in Fig. 75f. Female genitalia (Figs 75g, h): ovipositor lobes blunt, strongly squared off, (lobes large, ovipositor strongly flattened laterally), with apical and subapical setae of mixed lengths and short fine setae proximally; segment 8 with mostly short to medium-length setae laterally, and medium to long setae in a narrow band dorsally; ostium with pair of moderately short dorsal desclerotised ridges and long sclerotised lateral pockets; ductus bursae long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae sclerotised and rugose, outer curve well sclerotised, not rugose; corpus bursae with a single small scobinate ridged signum.

Type material. Lectotype (designated by Dugdale (1988: 209)): female, '10 / Fereday Collection' (CMNZ) (examined, not dissected).

Note. *Leucania blenheimensis* was described from an unspecified number of female specimens. Under his description, Fereday (1883: 196) states: "This insect was presented to me by Mr. William Skellon, then residing at Meanee [near Napier HB], but now at Timaru. He informed me that he took it at Meanee at sugar, that he had taken two specimens there, and two at Blenheim, and that the Blenheim specimens were smaller than the Meanee." This statement, taken together with the fact that Fereday offers only a single wingspan measurement rather than a range, certainly implies that he did not see all four of Skellon's specimens. The use of the term 'this insect', and the fact that the information about number of specimens and relative sizes from the two localities is given second-hand, could be taken to imply that Fereday had only a single specimen before him when he made the description. However, there are two specimens in the Fereday collection in CMNZ, and for this reason J.S. Dugdale regarded them as part of a syntype series and designated one as the lectotype (Dugdale 1988: 209). Meyrick (1887) recorded three specimens from Napier and Blenheim: he almost certainly saw these in Fereday's collection, and one of these is presumed to be the specimen in the NHMUK recognised by Dugdale as a paralectotype (J.S. Dugdale, NHMUK notes, as 'paratype').

Distribution. (Map 75). Very locally but widely distributed through the three main islands of New Zealand.
ND, AK, BP, TK, TO, GB, HB, WI, WN / WD, MB, KA, MC, OL, DN, SL / SI

Biology. The only record of the life history comes from Chappell (1930: 559), who reared the species from the egg. He records that the young larvae fed on an introduced grass (*Bromus catharticus*, as *B. unioloides*) and would not accept flax (*Phormium tenax*), which the older larvae ate. The coloration of the fully grown larvae is described as follows: 'pale yellowish brown; pale dorsal and subdorsal lines; broad dark brown line above creamy

lateral line; ventral surface same as upper surfaces.' Chappell gives *Phormium tenax* unequivocally as the host-plant and also states 'larvae obtained in June': therefore, it seems possible that he found wild larvae as well as rearing the species from the egg, which is perhaps why he offered *Phormium* to the young larvae. It is not known how widely Chappell experimented with potential host-plants when he reared *blenheimensis*, but based on his observations, the young larvae are suspected to be moderately polyphagous on grasses (since they readily accepted an introduced grass), while *Phormium* may or may not be the only pabulum of the later instar larvae. Certainly, much further investigation of the life history is needed.

Flight period. October to February.

Remarks. *Ichneutica blenheimensis* is a very widespread species occurring from the far north of Northland (Parengarenga Harbour) to Stewart Island. However, it is poorly known and poorly represented in collections. It seems to occur at very low density and has only ever been found in small numbers: 5 specimens taken on 6 Jan 1970 by K.J. Fox at Lake Rotoaira TO (MONZ) may represent the most ever seen in one night. It seems to be more frequent in drier eastern localities and is unrecorded from most western North Island forested areas (except North Egmont TK), and from much of the western South Island. It is also not yet known from the dry inland basins of Central Otago and the Mackenzie country, and was not found by White (1991, 2002) in his tussock grassland studies. Clarke (1933) gives McKinnon Pass FD as a locality but there is no such specimen in the Clarke collection in AMNZ and no Fiordland specimens were seen during this revision.

76. *Ichneutica infensa* (Walker, 1857) new combination

Figs 76a–d (adults); 76e–g (male abdominal base and genitalia); 76h–j (female S7 and genitalia).

Orthosia infensa Walker, 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 748.

Mamestra arachnias Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 23. Synonymised by Meyrick (1888: 45).

Diagnosis. *Ichneutica infensa* is a narrow-winged species, easily distinguished from other New Zealand noctuids, except *I. inscripta*, by the rather intricate pale markings along the base of the forewing costa, including a narrow white subcostal streak and two or three very short oblique pale lines between this streak and the costa. (These spider's-web-like markings probably suggested the apt name *arachnias* to Meyrick). For differences from *I. inscripta*, see under that species below.

Description. Adult (Figs 76a–d). Wingspan 32–37 mm (male); 33–37 mm (female). Male antennae not pectinate, filiform; ciliations up to just under 1x depth of flagellum; (head with small scale-crest between antennae). Head and thorax mottled white, pinkish brown and ochreous, with scales unicolorous or bicoloured (pale-tipped), narrow lamellate; prothorax with dark transverse bar edged white posteriorly; distinct mesothoracic scale-tuft. Forewing pinkish brown, fading slightly to dull ochreous towards costa and dorsum, veins marked blackish and mottled white; base of costa with 2 more or less distinct white V-shaped marks on black background; antemedian and postmedian lines indistinct; antemedian line strongly and deeply toothed, dark brown, edged ochreous basally; postmedian line dark brown, strongly zigzag, edge ochreous distally; antemedian and postmedian often approaching on fold, where both strongly indented; claviform stigma very indistinct or absent; orbicular stigma very elongate, edged blackish, with inner lining of white to pale ochreous scales; reniform very indistinct, S-shaped, picked out by a few pale scales and by 1–2 conspicuous white flecks dorsally at lower edge of disc; area between antemedian and postmedian lines not darkened; subterminal line incomplete, represented by oblique interneural ochreous streaking, more or less pronounced; terminal area concolorous with wing; series of dark crescentic marks along termen present; fringe dark brown, mottled, pallid basally and chequered by white lines extending from ends of veins. Hindwing dark grey-brown, with more or less distinct discal dot, otherwise unmarked; dark line along termen present, indistinct; fringe brownish white, with dark median line. Underside: forewing dark brownish, paler exteriorly, especially towards dorsum, and pinkish-tinged towards costa and termen; reniform stigma and postmedian line usually indistinct; series of dark subtriangular marks along termen; hindwing pale ochreous variably mottled blackish, pinkish-tinged towards costa and apex; discal spot distinct and postmedian line usually rather indistinct. Abdomen with distinct dorsal scale-tufts on segments 1–3 pinkish brown, tipped ochreous; rest ochreous-whitish densely mottled black, often with yellowish scaling apically and around valvae in male. Male abdominal base (Fig. 76e) with well-developed brushes, pockets and levers; (Stobbe's glands well-developed, with distinct hairs). Male genitalia (Fig. 76f): uncus very narrow, pointed, not hooked; valva oblique, strongly sinuous, cucullus well differentiated, very broadly truncate-spatulate, with well developed corona

of *ca* 60–67 elements in a single row and narrow field of spinose setae forming distinct costal 'crest' and stretching at least 1/2 way across cucullus; apico-dorsal strong hooked seta separate from corona present; clasper moderately long, digitate, slightly sinuous; ampulla very long, digitate, with apex weakly spatulate; phallus (Fig. 76g) with subapical tooth present, small to minute; vesica forming complete loop, (with a very distinct subapical lateral diverticulum); cornuti moderately long, in single strip that narrows subapically; a few cornuti towards apex of vesica beyond a distinct gap. Female S7 as in Fig. 76h. Female genitalia (Figs 76i, j): (total length 8.2.mm), ovipositor lobes blunt, of moderate length, rounded to squared off; segment 8 with only one or two short setae laterally, very few widely spaced medium-length setae dorsally, not forming distinct band; ostium with distinct long dorsal desclerotised ridges; lateral pockets moderately long; ductus bursae of moderate length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose; corpus bursae rather strongly rugose, with pair of distinct elongate scobinate ridged signa, roughly equal in length.

Type material. *Orthosia infensa*: Holotype: female, 'Type [green-ringed circular label] / N. Zealand 45-50. / Orthosia infensa' [per JSD] (NHMUK) (examined, not dissected).

Mamestra arachnias: Holotype: female, '68 [handwritten] / 78 [printed] / Blenheim and Meane [*sic*, = Meeanee] near Napier from Skellon / Fereday Collection / HOLOTYPE ♀ Mamestra arachnias Meyrick teste Dugdale / 2007.222.773' (CMNZ) (examined, not dissected).

Note. *Orthosia infensa* was described from a single female collected by Percy Earl, and presumably from Waikouaiti DN (Dugdale 1988: 202). *Mamestra arachnias* was also described from a single female, collected by W. Skellon; the type locality is given as Blenheim by Dugdale (1988) but Skellon collected both at Blenheim and at Napier (Meeanee) (Fereday 1883), and both localities are mentioned in the original description by Meyrick (1887) and on the label of the holotype in CMNZ, so we cannot be certain where the specimen was taken.

Distribution. (Map 76). Widespread throughout the North and South Islands, but apparently very rare in the north and west of the North Island.

AK, TK, TO, HB, WI, WN / SD, NN, WD, MB, KA, NC, MC, MK, OL, CO, DN, SL

Biology. The recorded host-plants are all low-growing Cyperaceae, i.e. *Carex* spp. including species formerly placed in the genus *Uncinia* (Patrick 1989, 1994a). Chappell (1930) reports rearing the species from the egg on '*Bromus unioloides*' (a synonym of *Bromus catharticus*, which is adventive in New Zealand) (Poaceae), suggesting that grasses may also be suitable hosts. He describes the fully grown larva as follows: "Length about [30mm]; yellowish-brown with a very broad reddish brown dorsal line and fine subdorsal lines of the same colour; head dark brown." Hudson (1939: 397), who records the species on *Carex solandri*, gives the following description of the penultimate instar: "Slender, subcylindrical, rather flattened, tapering at each end, orange-ochreous, slightly tinged with greenish posteriorly; a moderate brownish-black dorsal line; two very fine, pale brown subdorsal lines; a brownish-black lateral line, with thickened spot on each segment beyond thoracic; a clear yellowish line below this. Head bright ochreous-orange." Of the full-grown larva Hudson states: "the spaces between the principal lines are covered with very fine paler lines giving a chagreened appearance". He indicates that the larva feeds up very slowly during the winter months, pupating in early spring. There is a small chance that the accounts of Chappell or Hudson (or both), which presumably relate to North Island rearings, could refer to *I. inscripta*, confused until now with *infensa*. This is considered unlikely in view of the relatively remote habitats favoured by *inscripta* (see below), but further investigation is needed.

Flight period. Late October to February, with most lowland records in November and December.

Remarks. *Ichneutica infensa* is widespread and fairly frequent in a range of habitats including native forest and tussock grassland, though not abundant and usually represented in collections by fewer specimens than other very widespread species. In the North Island, it has been confused until now with the very similar *I. inscripta*, described below, and the ranges of the two species still need investigating. The northernmost record of *I. infensa* is Titirangi AK, where a single specimen was captured by C.R. Thomas in 1953: the specimen is in NZAC and its identity has been confirmed by dissection. Thomas lived and light-trapped in Waima Crescent (cf. Hoare 2005), at about 100 m a.s.l.; it is interesting that *I. inscripta*, which occurs nearby in the Waitakere Ranges, has so far only been found at a much higher elevation (380 m).

77. *Ichneutica inscripta* new species

Figs 77a (adult); 77b–d (male abdominal base and genitalia); 77e–g (female S7 and genitalia).

Diagnosis. This species is very similar to *Ichneutica infensa*, with which it has been consistently confused in collections. It can be distinguished by the more variegated forewing pattern, especially the more pronounced pale subterminal line, with contrasting areas of darker pinkish coloration along its inner margin. In comparison, the forewing of *infensa* appears relatively smooth and almost unmarked in this area. In the male abdomen and genitalia, *I. inscripta* is characterised by the strong reduction of the S2 brushes and Stobbe's glands (neither reduced in *infensa*), the short blunt clasper (long and digitate in *infensa*), and the reduced field of spinose setae that stretch less than 1/2 way across the cucullus (more than 1/2 way in *infensa*).

Description. Adult (Fig. 77a). Wingspan 36–39 mm (male); 36 mm (female). As described for *infensa* above, except on average larger, forewing more variegated, more intricately marked, especially in tornal area where pale zigzag subterminal line is more pronounced and contrasts rather strongly with an irregular, more or less V- or U-shaped dark pinkish brown marking on its inner margin; further smaller V-shaped or wedge-shaped dark pinkish brown markings extend along the inner margin of the subterminal line towards the apex; often a dark streak is present between the indented antemedian and postmedian lines where they approach each other on the fold; this streak is absent or very indistinct in *I. infensa*. Hindwing, underside and abdomen as described for *infensa*. Male abdominal base (Fig. 77b) with pockets and levers well-developed; brushes strongly reduced, not reaching pockets; Stobbe's glands vestigial, without hairs. Male genitalia (Figs 77c, d) as described for *I. infensa* above, except clasper short, not digitate, cucullus with field of spinose setae reduced, reaching less than 1/2 way across cucullus; corona with *ca* 50–75 elements. Female genitalia: as described above for *I. infensa*, but much larger (total length 11.5 mm); ostium / antrum apparently somewhat more elongate and narrower; signa of distinctly different sizes: ventral signum much shorter than dorsal.

Type material. Holotype: male, 'NEW ZEALAND TK Waitaanga Plat. in forest 520m 16-18 Dec 1981 / J.S. Dugdale and K.J. Fox / NZAC slide Noct. 468 genitalia ♂/ NZAC04226039 [database barcode label]' (NZAC). Paratypes: 5 males, 1 female, as follows: 1 female, same locality as holotype, but 500 m, 17 Dec 1988, J.S. Dugdale, P. Peckham (NZAC; genitalia slide Noct. 539 ♀); 1 male, AK: Waitakere Ranges, Cutty Grass Tk 380 m, 29 Nov 2008, R.J.B. Hoare, N. Hudson, A.W. Emmerson (Fig. 77a, NZAC); 3 males, CL: Mahakirau Forest Estate 390 m, 20 Oct, 25 Nov, 5 Dec 2017, A.J. Steer (all NZAC; genitalia slide Noct. 538 ♂); 1 male, WO: Herangi Range, Mangatoa Saddle, south of Marakopa, 10 Dec 1982, J.S. Dugdale, K.J. Fox (NZAC).

Distribution. North Island only; known from Auckland south to Taranaki.

AK, WO, CL, BP, TK / —

Biology. Unconfirmed, but likely to be similar to that of *I. infensa*. Just possibly the records attributed to *I. infensa* in the literature may refer partly to this species, but see above under *infensa*.

Flight period. Late October to January.

Etymology. The species name comes from the Latin *inscriptus* ('written on, inscribed') and refers to the more strongly marked forewing of this species as compared to its close relative *I. infensa*.

Remarks. This species was only recognised as distinct very late in the course of the current revision, when a review of abdominal characters revealed the strongly reduced brush of some specimens formerly regarded as *I. infensa*; the reduced brush is associated with rudimentary Stobbe's glands (these glands are fully developed in *I. infensa*). The supporting characters in the forewing markings and the valva of the male genitalia confirm that this is an overlooked sibling species of *infensa*. The differences in the female genitalia noted above in the description (especially the marked difference in size) also support the separation, but ideally need confirming with more material, as only a single female of *I. inscripta* is known, and only one female *I. infensa* has been dissected.

Ichneutica inscripta appears to be confined to dense native forest, usually at higher elevations in areas of high rainfall: it has been found at 380 m a.s.l. in the Waitakere Ranges AK, at 390 m in the Mahakirau Forest Estate, Coromandel Range CL, at 540 m in the Herangi Range WO, at 520 m on the Waitaanga Plateau TK, and at 880 m at Dawson Falls, Mt Taranaki TK. At least on the Waitaanga Plateau, it occurs together with *I. infensa*, but *infensa* is apparently very rare in the areas where *inscripta* is found (see also under *infensa* above).

78. *Ichneutica lignana* (Walker, 1857b) new combination

Figs 78a, b (adults); 78c–e (male abdominal base and genitalia); 78f–h (female S7 and genitalia); L78a, b (larva).

Hadena lignana Walker, 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 758.

Diagnosis. The dark markings surrounding the subterminal line and strongly marked claviform, orbicular and reniform stigmata give *Ichneutica lignana* a characteristic appearance. The most similar species are perhaps *I. morosa*, *Meterana pansicolor* (Howes) and *M. pascoi* (Howes); all of these lack the distinct claviform that is present in *lignana*. The two *Meterana* species have a more pointed apex to the forewing than *lignana*.

Description. Adult (Figs 78a, b). Wingspan 32–40 mm (male); 33–39 mm (female). Male antennae not pectinate, with ciliations up to just under 1x flagellum depth; (head with small scale-crest between antennae). Head and thorax whitish ochreous, scales of head-crest, rear of prothorax and exterior of tegulae pinkish brown; transverse black bar on prothorax, and scattered black scales on tegulae; scales mostly unicolorous or bicoloured, some tricoloured, narrow lamellate; black-tipped scales broader. Forewing whitish ochreous, markings blackish brown (the scales pinkish brown basally and black apically); diffuse streak between base and claviform, more strongly defined in male; antemedian line indistinct, irregularly zigzag, dark-edged basally and distally, sometimes consisting of silvery white scales; postmedian line very indistinct, deeply scalloped, fine, black; claviform stigma present, U-shaped; orbicular stigma distinct, oblong, black-outlined, sometimes infilled with silvery white scales; reniform very distinct, outlined black-brown, with inner ochreous lining and lower 1/2 infilled deeper black, more distinctly in male; area between antemedian and postmedian lines not darkened; subterminal line indistinct, broken, pale ochreous to white, and picked out by distinct surrounding squares of dark scaling extending in from termen just above middle and near tornus; terminal area concolorous with wing except for these squares; series of dark subtriangular marks along termen present, distinct; fringe mottled blackish and pale brown, paler in lines extending from tips of veins. Hindwing grey-brown, unmarked; dark line along termen present; fringe whitish, with dark median line. Underside: forewing dark brown, except broadly pale ochreous along costa, dorsum and termen (where demarcation corresponds to subterminal line on upperside); series of distinct dark dots along termen; hindwing pale ochreous suffused brown except towards costa, and mottled blackish; discal spot usually distinct, postmedian line usually indistinct; series of dark dots or dashes along termen. Abdomen with dorsal scale-tufts on segments 1–3 pale ochreous, banded brown before apex; rest of abdomen mottled ochreous and blackish, more yellowish apically in male. Male abdominal base (Fig. 78c) with brushes, levers and pockets. Male genitalia (Fig. 78d): as described for *I. infensa*, except uncus strongly broadened beyond middle, diamond-shaped; cucullus slightly more rounded, less truncate apically, and with corona of *ca* 48–62 elements; apico-dorsal hooked seta more robust and longer than in *infensa*; field of spinose setae on cucullus much more extensive and forming more distinct 'crest'; ampulla not apically spatulate; phallus (Fig. 78e) with distinct subapical tooth; cornuti moderately long, in single band, not reduced to single row apically. Female S7 as in Fig. 78f. Female genitalia (Figs 78g, h): ovipositor lobes blunt, rather small, truncately rounded; segment 8 with numerous medium-length setae laterally, and short to long setae forming distinct band dorsally; ostium with distinct long dorsal desclerotised ridges; lateral pockets long; ductus bursae long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, partially rugose (towards ductus seminalis inception); corpus bursae weakly rugose, with pair of short scobinate ridged signa, ventral signum tiny.

Type material. Holotype: male, 'Type [green-ringed circular label] / N. Zealand Earl 45-30 / Hadena lignana' [per JSD] (NHMUK) (examined, not dissected).

Note. *Hadena lignana* was described from a single male (Walker 1857). The type locality is presumed to be Waikouaiti DN (Dugdale 1988).

Distribution. (Map 78). Throughout the main islands of New Zealand, also on the Three Kings.

TH / ND, AK, CL, WO, BP, TK, TO, HB, RI, WI, WN / NN, BR, WD, MB, KA, NC, MC, MK, OL, CO, DN, FD, SL, / SI

Biology. The life history is surprisingly poorly documented. The egg was described in detail by Watt (1914). The larva has apparently never been described or figured until now, but late in the course of this revision, a larva was found on the native grass *Poa anceps* beside the Huia Dam Road in the Waitakere Ranges AK and successfully reared through (grass identification confirmed by E. Cameron, AMNZ). When found the larva was probably in its third or fourth instar (Fig. L78a) and was described as follows: Head green, longitudinally striped darker green, paler green below stemmata. Body tapering posteriorly, no hump on A8, bright green; indistinct dorsal line whitish

green, bordered dark green on each side; conspicuous broader cream subdorsal line bordered dark green above only; area between dorsal and subdorsal stripes with pale marbling arranged into indistinct longitudinal stripes; clear white lateral stripe (on level of spiracles) narrowly bordered darker above, broad whitish green subventral area contiguous with lateral stripe and with some darker green mottling; green below this including bases of prolegs. Pinacula very indistinct, greyish. Thoracic legs translucent greenish. Setae brownish. Spiracles pale ochre brown with black peritremes. The larva later turned pale brown (Fig. L78b), presumably following a moult; the markings remained similar and the above description applies with the substitution of 'brown' for 'green'. Moss was accepted for pupation. (Larva collected 27 December 2018, moth emerged 10 Mar 2019 (NZAC)).

Other grasses known to be hosts are *Poa cita* and *Festuca novae-zelandiae* (Patrick 1994a; reared material in ethanol in NZAC).

Flight period. Throughout the year in the northern North Island, mainly October to April further south.

Remarks. *Ichneutica lignana* is a very common and widespread species throughout New Zealand, occurring in many different habitat types including native forest, shrublands, coastal areas and tussock grasslands, from sea level to over 1300 m.

79. *Ichneutica morosa* (Butler, 1880) new combination

Figs 79a–e (adults); 79f–h (male abdominal base and genitalia); 79i–k (female S7 and genitalia).

Xylophasia morosa Butler, 1880. *Cistula Entomologica 2*: 543.

Mamestra pelistis Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 20. Synonymised by Meyrick (1912a: 101).

Diagnosis. Apart from its sister-species, *Ichneutica mustulenta* n. sp., diagnosed below, *I. morosa* is perhaps most likely to be confused with weakly marked forms of *Ichneutica lignana*; external differences are given under that species, above.

Description. Adult (Figs 79a–e). Wingspan 32–40 mm (male); 34–38 mm (female). Male antennae not pectinate, ciliations just over 1/2 width of flagellum. Head and thorax pale ochreous, more or less strongly sprinkled black and pale reddish ochreous; often a black transverse bar on prothorax, and dark exterior lines on tegulae; scales bicoloured or tricoloured, narrow lamellate. Forewing pale ochreous to dull ochreous or reddish ochreous, with veins more or less strongly mottled black and white; antemedian line indistinct, pale ochreous; postmedian line pale ochreous, indistinct in pale specimens, more conspicuous in darker specimens, weakly scalloped; claviform stigma present, indistinct to moderately distinct, U-shaped, more or less infilled with variable combination of white, brown and/or blackish scales; orbicular stigma distinct, round, outlined black, except towards costa, and with inner lining of whitish scales, infilled with variable mixture of white and blackish scales; reniform very distinct, weakly outlined blackish, with whitish inner lining and characteristic apostrophe-shaped dark inner area, leaving central pallid portion; area between antemedian and postmedian lines not darkened, but often a dark irregular fascia running to dorsum from anterior margin of reniform; subterminal line whitish, variably distinct, irregular; terminal area distinctly darker than ground colour except in dark specimens; series of marks along termen joined to form dark line; fringe mottled ochreous, reddish brown and blackish, scalloped. Hindwing grey-brown to dark brown, unmarked; dark line along termen present; fringe whitish with dark median line. Underside: forewing brown, except towards costa, dorsum and termen, where pale ochreous; reniform stigma and postmedian line usually moderately distinct; series of dark dots along termen; hindwing pale ochreous sprinkled blackish towards costa and sometimes beyond postmedian line; discal spot and postmedian line usually fairly distinct; series of dark dots along termen. Abdomen with distinct dorsal scale-tufts on segments 1–3 ochreous, tipped white and banded dark brown; rest of abdomen pale ochreous, mottled blackish. Male abdominal base (Fig. 79f) with brushes, levers and pockets. Male genitalia (Fig. 79g): uncus somewhat expanded before apex, bluntly tapered, not hooked; valva rather upright, angular, cucullus well differentiated, subtriangular (sides equilateral), with well-developed corona of *ca* 43–54 elements in a single row and strong field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper short, weakly sinuous and with a few papillae before apex; ampulla long, digitate, sinuous; phallus (Fig. 79h) with subapical tooth present, small; vesica forming complete loop; cornuti short, divided into two parallel lines apically with scattered tiny cornuti between. Female S7 as in Fig. 79i. Female genitalia (Figs 79j, k): (total length 7.8–8.5 mm); ovipositor lobes blunt, moderately small, truncately rounded; segment 8 with very sparse medium-length setae laterally, and very few medium length setae forming indistinct band dorsally; ostium with broad flat dorsal desclerotised ridges (ending in

more distinct caudal 'bump') and long lateral pockets; ductus bursae long, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose (except in small area around ductus seminalis inception); corpus bursae moderately rugose, with pair of short scobinate ridged signa, ventral signum smaller.

Note. A form occurring on Rakaia Island MC (Fig. 79e) and occasionally elsewhere in the South Island (specimens in BPNZ, NZAC) has the head and thorax grey, mottled brown, and the forewing pale greyish ochreous to deep brown, suffused grey. Otherwise, the antennae, wing pattern and male genitalia of this form show no significant differences from those of *I. morosa*, and so it is here regarded as a colour morph.

Type material. *Xylophasia morosa*: Holotype: male, 'Type [red-ringed circular label] / N. Zealand. Marlborough, Skellon 80.57 / Xylophasia morosa Butler Type' [per JSD] (NHMUK) (examined, not dissected).

Mamestra pelistis: Lectotype: male, 'LECTOTYPE [circular label] / Mamestra pelistis Meyr. lectotype ♂ / Melanchra morosa 5/1 E. Meyrick det. in Meyrick Coll. / Akaroa New Zealand RWF /82' [per JSD] (NHMUK) (examined, not dissected).

Note. *Xylophasia morosa* was described from a single male lacking antennae (Butler 1880). *Mamestra pelistis* was described from nine specimens from Akaroa and Lake Coleridge MC; no holotype was designated in the description so the series is syntypic. The lectotype designation mentioned by Dugdale (1988: 203) by 'an unknown designator' is apparently unpublished and therefore not valid; Dugdale is taken to have designated the lectotype under ICZN Article 74.5.

Distribution. (Map 79). Southern North Island and throughout the South Island.

TK, TO, WA, WN / SD, NN, BR, WD, MB, KA, NC, MC, MK, OL, CO, DN, FD, SL

Biology. The life history is poorly documented, and the only identified host-plant appears to be the grass *Poa astonii* (reared specimen in OMNZ), but *I. morosa* also feeds on other grasses, including introduced *Poa* spp. (B.H. Patrick pers. comm.). The species was also suggested to feed on sedges (Cyperaceae) by White (2002: 313), who quotes Patrick *et al.* (1993) as the source, but the latter reference does not seem to mention *morosa*, and this host association may be erroneous. The larva appears to be undescribed.

Gaskin (1966b) indicated that the adults are more regularly found at blossoms than at light, and Hudson (1928) recorded the adults as abundant on white rata flowers in the Wellington Botanical Gardens.

Flight period. November to April, with most records in February and March.

Remarks. *Ichneutica morosa* is a fairly common moth that is perhaps most characteristic of the drier eastern parts of both main islands, but also occurs in higher rainfall areas such as Fiordland. It is found from the lowlands to the alpine zone above 900 m, but is absent from the northern North Island, where its sister species *I. mustulenta* is present. It was recorded only in small numbers by White (2002) in his tussock grassland light trapping studies in the Mackenzie Country and in even smaller numbers at Cass MC (White 1991).

80. *Ichneutica mustulenta* new species

Figs 80a–c (adults); 80d–f (male abdominal base and genitalia); 80g–i (female S7 and genitalia).

Diagnosis. *Ichneutica mustulenta* may be distinguished from *I. morosa* by its deeper red-brown head, thorax and forewing, and deeper black-brown hindwing; the hindwing underside especially is usually much darker in *mustulenta*, where it is almost entirely suffused blackish and deep pinkish, and lacks the conspicuous pale ochreous ground-colour that predominates in almost all spcimens of *I. morosa*. In *I. mustulenta*, the forewing costa has a distinct pale spot opposite the reniform stigma, bordered on either side by dark scaling; this spot is present in *I. morosa* but is indistinct as it hardly contrasts with the pale brownish ground colour of the wing. In the male genitalia, *I. mustulenta* is distinguished from *I. morosa* by the lack of distinct papillae on the costal margin of the clasper, and by the longer cucullus with a greater number of corona elements (60–66, cf. 43–54 in *I. morosa*). The female genitalia of *I. mustulenta* are distinctly larger (9.7–10 mm long) than those of *I. morosa* (7.8–8.5 mm).

Description. Adult (Figs 80a–c). Wingspan 33–36 mm (male); 38 mm (female). Male antennae not pectinate, very weakly to moderately serrate; ciliations just over 1/2 width of flagellum. Head and thorax deep magenta; prothorax with diffuse blackish transverse bar; scales bicoloured, mostly tipped white or pale ochreous, especially on lateral parts of anterior mesothoracic crest, narrow lamellate. Forewing deep magenta; all markings as described for *I. morosa*, but antemedian and postmedian lines more contrasting, creamy whitish and pale spot on costa opposite reniform stigma more distinct, bordered by dark scales on each side. Hindwing very dark brown,

unmarked; dark line along termen present; fringe dark brown, with pale basal line and slightly paler apex. Underside: as described for *I. morosa*, except darker, forewing blackish brown centrally; hindwing suffused blackish and deep pinkish and discal spot absent or very obscure among suffusion of dark scales. Abdomen as for *morosa*, but scale tufts on basal segments magenta mottled whitish, and rest of abdomen more thickly sprinkled with black scales and appearing predominantly dark. Male abdominal base (Fig. 80d) with brushes, levers and pockets. Male genitalia (Fig. 80e): as described for *morosa*, but cucullus more elongate, not equilateral and corona with *ca* 60–66 elements; clasper without distinct papillae; phallus and vesica (Fig. 80f) as for *morosa*. Female S7 as in Fig. 80g. Female genitalia (Figs 80h, i): very similar to those of *I. morosa*, q.v., but larger (total length 9.7–10 mm).

Type material. Holotype: male, 'Ex light trap Titirangi 11.II.53 C.R. Thomas / NZAC slide Noct. 299 genitalia ♂/ NZAC04226040 [database barcode label]' (NZAC). Paratypes: 3 males, 1 females, as follows: 1 male, AK: Waitakere Ranges, Cutty Grass Tk 380 m, 24 Jan 2013, R.J.B. Hoare, N. Hudson (Fig. 80a); 2 males, same locality, but 21 Feb 2013, R.J.B. Hoare, R. M. Bennik (Fig. 80b) (all NZAC); 1 female, TO: Pureora [as Puereora] SF camping ground, 13 Jan 1986, J.S. Dugdale (NZAC, genitalia slide Noct. 356 ♀).

Distribution. (Map 80). Widespread throughout the three main islands of New Zealand, but rather patchily recorded.

AK, CL, TK, TO, RI, WN / SD, WD, DN, FD, SL / SI

Biology. The life history is unknown, but the larva is presumed to feed on grasses and/or sedges, in common with related species.

Flight period. January to March.

Etymology. The species name comes from the late Latin *mustulentus* ('redolent of new or unfermented wine') and refers to the deep magenta (wine-like) forewing coloration that distinguishes this species from *I. morosa*.

Remarks. This species has always stood under the name *morosa* in most collections, and I am grateful to Brian Patrick for pointing out its distinctiveness, now confirmed by dissection. It is recognised as a separate species based on external coloration and minor but apparently constant differences in the male and female genitalia, as detailed in the Diagnosis and Description above. Though Hudson (1928) mentioned 'rich reddish-brown specimens' of *I. morosa*, there appear to be no specimens of *I. mustulenta* in his collection in MONZ. This species has a darker, more purplish hue than reddish specimens of *morosa* (compare Figs 80a–c with Fig. 79d).

Ichneutica mustulenta can be fairly common where it occurs, usually in moist forested localities in the west of both islands; it only overlaps with *morosa* in a few areas, such as Taranaki.

81. *Ichneutica omoplaca* (Meyrick, 1887) new combination

Figs 81a–f (adults); 81g–i (male abdominal base and genitalia); 81j–l (female S7 and genitalia).

Mamestra omoplaca Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 24.

Melanchra umbra Hudson, 1903. *Transactions and proceedings of the New Zealand Institute 35*: 243. Synonymised by Meyrick (1912a: 101).

Morrisonia macropis Hampson, 1918. *Novitates Zoologicae 25*: 121–122. Synonymised by Dugdale (1988: 204) [as *micropis*, an incorrect subsequent spelling].

Diagnosis. *Ichneutica omoplaca* is a variable but distinctive species: the pale ochreous to whitish scaling between the short narrow basal forewing streak and the costa almost always contrasts strongly with the darker ground colour and is diagnostic. Specimens where this contrast is weaker may be confused with *I. lindsayorum*; for differences, see under that species, above.

Description. Adult (Figs 81a–f). Wingspan 31–41 mm (male); 33–43 mm (female). Male antennae not pectinate, weakly serrate beneath, with ciliations just over 1/2 width of flagellum. (Head with small scale-crest between antennae.) Head and thorax usually deep pinkish brown, except on prothorax below distinct black transverse bar, where orange-ochreous; and often with ochreous or orange ochreous-tipped scales elsewhere, especially in anterior mesothoracic crest; sometimes almost entire mesothorax black, except for scale-crest; usually some broader-tipped pale ochreous scales scattered towards mesal margin of tegulae; scales unicolorous or bicoloured (pale-tipped), narrow lamellate. Forewing pale ochreous to pinkish brown, in specimens with black thorax strongly suffused black for much of its length; short black basal streak bordered pale ochreous above, the ochreous area reaching costa and usually contrasting with darker remainder of wing; antemedian line usually

indistinct, but sometimes in black-suffused specimens contrastingly pale ochreous and strongly dentate; postmedian line indistinct except in black-suffused specimens where pale ochreous, weakly zigzag in male, strongly zigzag in female; claviform stigma very indistinct; orbicular stigma moderately distinct, slightly oblong, narrowly dark-edged and with narrow inner lining of pale ochreous; reniform rather distinct, dark-edged, and with pale inner lining only distally, with blackish inner crescent basally; area between antemedian and postmedian lines not darkened except in black-suffused specimens where suffusion often spills beyond this area; subterminal line very weakly indicated by pale scales; terminal area mostly concolorous with rest of wing, or (often) blackish in black-suffused specimens, usually a more or less distinct and contrasting squarish area of pale ochreous at apex; series of dark subtriangular marks along termen present, sometimes merged into dark line; fringe brown to black with pale basal line. Hindwing dark brownish, unmarked; dark line along termen present, indistinct; fringe brownish white with dark median line. Underside: forewing dark brown, unmarked or somewhat paler and mottled towards costa and termen; reniform indistinct; postmedian line at most represented only towards costa; hindwing whitish brown, darker exteriorly; discal spot and postmedian line variably distinct. Abdomen with pinkish white-tipped dorsal scale-tufts on first three segments; rest of abdomen pale ochreous strongly mottled blackish. Male abdominal base (Fig. 81g) with brushes, levers and pockets. Male genitalia (Fig. 81h): uncus very narrow, pointed, not hooked; valva oblique, sinuous, cucullus well differentiated, subtriangular, truncate, with well developed corona of *ca* 55–60 elements in a single row and field of spinose setae forming distinct 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper very short, thickened, curved, with flanged apex; ampulla moderately long, digitate; phallus (Fig. 81i) with subapical tooth present; vesica forming complete loop; cornuti in single band, short basally, becoming longer medially, and long subapically; also a patch of long cornuti about 1/3 of way along band on right. Female S7 as in Fig. 81j (deeply cleft caudally). Female genitalia (Figs 81k, l): ovipositor lobes blunt, rather small, truncately rounded; segment 8 with rather sparse medium-length setae dorsolaterally, sparse long setae forming indistinct band dorsally; ostium with distinct long dorsal desclerotised ridges (each ridge with very distinct bulge caudally) and long lateral pockets, left pocket longer, extended into sinuous ventral elongation with outpocketing of outer ductus membrane; ductus bursae rather long, broadened before mid-length in region of outpocketing, smoothly sclerotised to about 1/2 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve strongly sclerotised, not rugose; corpus bursae strongly rugose, with pair of short scobinate ridged signa of roughly equal size.

Type material. *Mamestra omoplaca*: Lectotype: female (designated by Hampson 1905a: 382), 'Lectotype [round label] / Rakaia New Zealand RWF /85 / omoplaca Meyr. / Mamestra omoplaca Meyr. 6/2 E. Meyrick det. in Meyrick Coll. / Lectotype ♀ selected by Hampson 1905 Cat. Lep. Phal. 5: 382' (NHMUK) (examined, not dissected).

Note. *Mamestra omoplaca* was described from three specimens from Lake Coleridge and Rakaia MC (Meyrick 1887). Although Hampson (1905a) in his account of this species mentions both localities from the original description, he is taken to have designated the lectotype validly according to ICZN Article 74.5 by using the expression 'type' and referring to a single female with specified wingspan.

Melanchra umbra: Lectotype (designated by Dugdale (1988: 204)): male, '825 [old, browned label] / 527a' [corresponding entry in Hudson register: 'West Plains, Invercargill, Dec 16 — [18]98 (A. Philpott)'] (MONZ) (examined, not dissected).

Note. *Melanchra umbra* was described from 'a number of specimens' collected by Howes and Philpott near Invercargill (Hudson 1903). The information in the Hudson register corresponding to the lectotype label (see above) is more precise than that quoted by Dugdale (1988: 204). The remaining specimens of the type series have the labels 527b, c, d and e, and these are grouped under the register entry 'Invercargill Nov 99 (A. Philpott and G. Howes)'.

Morrisonia macropis: Holotype: female, 'New Zealand G.V. Hudson 1906-154. / Morrisonia macropis Hampson type ♀ / Agrotidae genitalia slide no. 330' (NHMUK) (examined, including slide).

Note. *Morrisonia macropis* was described from a single female (Hampson 1918: 122). The incorrect subsequent spelling *micropis* (Dugdale 1988: 204) is not in prevailing usage (possibly only cited by Dugdale, *loc. cit.*), so not to be maintained (ICZN Article 33.3).

Distribution. (Map 81). Widespread throughout New Zealand from Mt Te Aroha and Rotorua BP to Southland. No specimens were seen from Stewart Island, but there are two specimens from the Auckland Islands, where it is perhaps a vagrant (Dugdale 1971).

BP, TK, TO, GB, HB, WA, WN / NN, BR, KA, NC, MC, SC, MK, OL, CO, DN, FD, SL / — / AU

Biology. The life history has not been well documented; the larva probably feeds mainly on grasses (reared specimens in OMNZ); recorded host-plants include silver tussock, *Poa cita* (White 2002) and cocksfoot, *Dactylis glomerata* (B.H. Patrick, pers. comm.). Also reared on *Plantago lanceolata* by Hudson (1939), and Dugdale (1971: 128) records a specimen reared from a pupa found in soil under weeds in a *Pinus radiata* plantation (Eyrewell Forest, MC). The larva is undescribed (Bejakovich & Dugdale [1998]).

Flight period. October to March.

Remarks. This is a common species throughout most of its range, occurring in a variety of habitats from clearings in beech forest to tussock grasslands. It is absent from the northern North Island. The antrum / posterior ductus bursae in the female genitalia is similarly asymmetrical to those of *I. lindsayorum* and *I. olivea* in possessing an evagination on the left in ventral view, associated with an extended sinuous portion of the sclerotised ostium 'pocket'.

82. *Ichneutica steropastis* (Meyrick, 1887) new combination

Figs 82a–d (adults); 82e–g (male abdominal base and genitalia); 82h–j (female S7 and genitalia).

Mamestra steropastis Meyrick, 1887. *Transactions and proceedings of the New Zealand Institute 19*: 22–23.

Diagnosis. *Ichneutica steropastis* is usually an easily recognised species, but could perhaps be confused with darker forms of *I. arotis*, or with *I. inscripta* or *I. theobroma*. However, all of these species lack the usually distinct long dark basal forewing streak of *I. steropastis*, and *I. arotis* and *I. theobroma* lack the oblique subbasal dark streak from the dorsum (it may be present in *I. inscripta*, but usually indistinct). *Ichneutica inscripta* lacks the dark longitudinal streak in the discal cell that is usually distinct in *steropastis*, and has a subelliptical pale-margined orbicular stigma, absent in *steropastis*. Another possible confusion species is *Persectania aversa* (Walker), but the forewing of *aversa* usually has a much more strongly developed whitish subcostal streak, and in this species the orbicular stigma is modified into a distinct narrow doubled white streak that joins the white edge of the reniform; in *steropastis*, the dark discal streak may be very narrowly and indistinctly white-edged, but this is not contiguous with the reniform, and the reniform has no white edging, at most a tiny white distal dot. The hindwing fringe of *P. aversa* is conspicuously white beyond a brown subbasal line; that of *steropastis* is brown, with at most a narrow white edging. *Ichneutica emmersonorum* (confined to the central North Island) is usually a smaller moth (wingspan 33–37 mm), and has much more conspicuous pale streaking along the forewing veins than *I. steropastis*; a useful diagnostic character in *emmersonorum* is the conspicuous dark streak near the tornus, which is broadly surrounded by pale scaling; there is no such conspicuous streak in this position in *steropastis*.

Description. Adult (Figs 82a–d). Wingspan 32.5–45.5 mm (male); 33–45 mm (female). Male antennae not pectinate, not serrate beneath. Head and thorax dull pinkish brown to dark brown; black bar on prothorax narrowly to broadly edged white posteriorly; tegulae with exterior black lines, inner line edged whitish to pale ochreous mesally; scales mostly bicoloured, narrow lamellate. Forewing pinkish brown, marked with leaden grey to blackish along veins, and often whitish at base of costa, leaden suffusion broader along dorsal margin of disc and vein 1+2A; rather long blackish basal streak; a second parallel streak from near base of dorsum, both of these sometimes highlighted by surrounding ochreous scales; a third longer streak in disc blackish or dark brown, edged black; antemedian line absent; postmedian line indistinct, blackish, strongly zigzag; claviform stigma absent; orbicular stigma absent; reniform sometimes faintly discernible as pale-outlined S, with minute to distinct white dots above and below distally; subterminal line more or less distinct in dorsal half, pale ochreous, with strong W-shaped evagination above tornus and sometimes further single streak at tornus; terminal area with dark brown interneural streaking; series of dark crescentic marks along termen; fringe chequered blackish and pale ochreous. Hindwing dark grey-brown, unmarked; dark line along termen present; fringe white to ochreous with dark median line. Underside: forewing blackish, usually paler towards costa and termen, where dull brownish, usually tinged pink, reniform stigma and postmedian line absent, series of small dark marks along termen; hindwing dull brownish ochreous, rather densely sprinkled blackish, usually pinkish-tinged towards costa, discal spot usually indistinct, postmedian line absent, series of dark dashes along termen (occasionally entire hindwing strongly suffused

blackish and unmarked). Abdomen with dorsal scale-tuft on segment 1 only, tuft pinkish brown, tipped white; rest of abdomen pale ochreous variably mixed silver-grey and mottled black, often pinkish-tinged laterally and male with yellowish scales terminally. Male abdominal base (Fig. 82e) with brushes, levers and pockets. Male genitalia (Fig. 82f): uncus rather narrow, pointed, not hooked; valva moderately upright, weakly sinuous, cucullus strongly differentiated, anvil-shaped, with well-developed corona of ca. 55–65 elements in a single row and narrow field of spinose setae forming pronounced 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper rather slender, curved, weakly crenulate costally; ampulla long, digitate, weakly clubbed; phallus (Fig. 82g) with subapical tooth present; vesica forming complete loop; cornuti moderately long (shorter basally, where they form a lateral patch) and tapering to a single lateral line apically. Female S7 as in Fig. 82h. Female genitalia (Figs 82i, j): ovipositor lobes blunt, of moderate size, truncately rounded; segment 8 with few scattered medium-length setae laterally, numerous well-spaced short to long setae dorsally, forming band in caudal 1/2 of segment; ostium with long rather indistinct dorsal desclerotised ridges (without caudal bulge) and long lateral pockets; ductus bursae long, dorsoventrally weakly sinuous, constricted below ostium, then broadened mid-length, smoothly sclerotised to about 2/3 way to junction with corpus bursae where rugose; inner curve of appendix bursae strongly sclerotised and partially rugose, outer curve sclerotised, not rugose; corpus bursae moderately rugose, with pair of elongate scobinate ridged signa, ventral signum slightly longer.

Type material. Lectotype (designated by Dugdale (1988: 210)): male, 'Lectotype [circular label] / New Zealand RWF .85 / steropastis Meyr. / Mamestra steropastis Meyr. 2/1 E. Meyrick det. in Meyrick Coll. Lectotype ♂' [per JSD] (NHMUK) (examined, not dissected).

Note. *Mamestra steropastis* was described from 7 specimens of both sexes from Napier, Blenheim and Christchurch (Meyrick 1887). The lectotype designation mentioned by Dugdale (1988: 210) by 'an unknown designator' is apparently unpublished and therefore not valid; Dugdale is taken to have designated the lectotype under ICZN Article 74.5. There is one female paralectotype in the NHMUK, with the same data as the lectotype; two Fereday specimens from Christchurch in CMNZ, collected in November 1868 at Fendalton and on 30 Dec 1872 at Riccarton Bush may have been seen by Meyrick and are possible paralectotypes, although Meyrick does not mention December as a month of capture.

Distribution. (Map 82). Throughout New Zealand from the Three Kings to Stewart Island, and also on the Chatham Islands.

TH / ND, AK, CL, WO, BP, TK, TO, GB, WI, WA, WN / NN, BR, WD, MB, NC, MC, MK, OL, CO, DN, FD, SL / SI / CH

Biology. The larva is oligophagous on usually broad-leaved monocots of various families: it is best known from flax (*Phormium* spp, Xanthorrhoeaceae), but is also frequent on endemic *Austroderia* and introduced *Cortaderia* spp. (Poaceae), including *A. fulvida, A. richardii* and *C. selloana*. It was once reared from *Libertia* (Iridaceae) from Dunedin by B.H. Patrick (specimen in OMNZ), and is also known from *Poa foliosa* on Big South Cape Island (formerly Long Island) SI. Gaskin (1966) gives *Festuca* sp. as a host-plant based on his own observations. In his paper on the Lepidoptera of Otago, Philpott (1917b: 198) states that it is sometimes found on *Cordyline australis*, but there seem to be no recent records on this host-plant. The larva is described by Hudson (1928) as follows: "About [37 mm] in length, of almost uniform thickness, considerably flattened; the head is ochreous, the body very pale ochreous-brown; there are no distinct markings on the thoracic segments, except a few minute black dots round the middle of each; the rest of the body is covered with a number of very fine blackish lines, which become darker posteriorly, and are stronger on the dorsal and lateral regions; there is a row of minute black dots round the middle of each segment; the spiracles are black and the underside of the larva is faintly tinged with green." The larva is also keyed by Bejakovich and Dugdale ([1998]), who state that it is distinguished from that of *I. arotis* by the P1 head capsule setae (below the level of setae AF2 in *steropastis*, level with AF2 in *arotis*), and by the anal shield, which has a minute double mound between the D2 setae in *steropastis*, but not in *arotis*. As discussed under *I. arotis*, the host-plant is not a completely reliable guide to the identity of larvae, since both *arotis* and *steropastis* occur on *Austroderia* and on *Phormium*. As stated by Hudson, larvae hide by day in the old leaf-sheaths at the base of the host-plant and come up to feed at night, making distinctive V-shaped incisions in the margins of the leaves.

Flight period. October to March.

Remarks. This species is familiar as the flax notcher moth, and is widespread and relatively common throughout New Zealand, including offshore islands, though it is generally not observed in large numbers at light. As indicated above (under Biology), flax is not the only host-plant, and it should be noted that larvae of *Ichneutica arotis* (and the much rarer *I. blenheimensis*) also feed on *Phormium*, so that leaf-edge damage to this plant is not diagnostic of *steropastis*.

83. *Ichneutica sulcana* (Fereday, 1880) new combination

Figs 83a–d (adults); 83e–g (male abdominal base and genitalia); 83h–j (female S7 and genitalia).

(?)Leucania sulcana Fereday, 1880. *Transactions and proceedings of the New Zealand Institute 12*: 267–268; pl. IX fig. 3. [The query in parentheses before the genus name indicates Fereday's uncertainty about the correct generic placement.]

Diagnosis. *Ichneutica sulcana* and *I. supersulcana* form an unmistakeable pair of species: the sharply pointed forewing apex and strong contrast in colour between the pale ochreous forewings and very dark brown hindwings are characteristic of both. However, superficially *I. sulcana* and *I. supersulcana* are very similar and no reliable differences have been noted, although on average *supersulcana* tends to be a slightly larger, paler moth with the longitudinal dark forewing streaks less clearly defined. The dot between the bases of M3 and CuA1 is usually minute in *supersulcana*, smaller than in *sulcana*, but this character varies. The most reliable characters are in the male abdomen and genitalia: *I. supersulcana* (Fig. 84d) lacks the S2 brushes that are present in *sulcana* (Fig. 83e) and has correspondingly reduced sternal pockets. The spinose setae on the valval cucullus are dense in *sulcana* and form a costal 'crest' (Fig. 83f); they are sparser in *supersulcana* and do not form a crest (Fig. 84e). The clasper is much shorter in *sulcana* than in *supersulcana*, and the band of cornuti reaches further basad in *sulcana*, where it twists around the side of the vesica (no such twist in *supersulcana*). So far, the two species are not known to be sympatric (see under Distribution for both). Differences between *I. sulcana* and *I. semivittata* are given in the Diagnosis for that species, above.

Description. Adult (Figs 83a–d). Wingspan 35–46 mm (male); 42–48 mm (female). Male antennae not pectinate, weakly serrate beneath. Head and thorax pale ochreous, speckled black, with scales mostly unicolorous, hairlike to very narrow lamellate. Forewing pale ochreous, narrowly orange-ochreous along costa, and with veins more or less distinctly lined white; basal streak very long, deep olive brown to blackish, suffused into paler olive or sienna brown on upper margin; a similar olive to sienna brown suffusion extending from disc apex between veins M2 and M3, sometimes sprinkled with black scales; 6 more or less distinct black dots as follows: in disc at 1/6 and 1/3 wing length, and at 4/5 on vein M1, between bases of veins M3 and CuA1, and along vein 1+2A at 1/3 and 3/4; lines and stigmata absent; series of black dots along termen; fringe pale ochreous. Hindwing blackish, unmarked; dark line along termen absent; fringe blackish, with basal ochreous line. Underside: forewing yellow-ochreous, variably suffused black except towards costa, dorsum and termen, reniform stigma indistinct (enclosed by dark suffusion), postmedian line absent, series of distinct dark spots along termen; hindwing whitish ochreous, variably suffused blackish (often almost completely in male, less so in female), discal spot indistinct or absent, postmedian line absent, series of dark marks along termen indistinct or absent. Abdomen without distinct scale-tufts dorsally, pale ochreous mottled black, often nearly entirely suffused silver-grey except laterally. Male abdominal base (Fig. 83e) with brushes, levers and pockets. Male genitalia (Fig. 83f): uncus somewhat swollen subapically, pointed, barely hooked; valva oblique, strongly sinuous, (sacculus microsculptured area strongly rounded on costal margin), cucullus well differentiated, elongate / spatulate, with well-developed corona of ca. 70 elements in a single row and dense field of spinose setae forming distinct costal 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper short, narrow, smooth, apically curved, not or barely reaching base of cucullus 'neck'; ampulla long, digitate; phallus (Fig. 83g) with subapical tooth present; vesica forming complete loop; cornuti short, in uninterrupted band except apically where divided into two groups, with tiny cornuti between; basally cornutal band twists around side of vesica and reaches to opposite junction of straight basal portion of vesica with curved portion. Female S7 as in Fig. 83h. Female genitalia (Figs 83i, j): ovipositor lobes blunt, of moderate size, truncately rounded; segment 8 with few scattered medium length setae laterally, numerous well-spaced short to long setae dorsally, forming band in caudal 1/2 of segment; ostium with short indistinct dorsal desclerotised ridges (without caudal bulge) and moderately long lateral pockets; ductus bursae long, strongly constricted below ostium, then broadened mid-length, smoothly sclerotised to about 4/5 way to junction with corpus bursae where (rather finely) rugose; inner curve of appendix bursae strongly sclerotised and finely but distinctly rugose, outer curve sclerotised,

not rugose; corpus bursae moderately rugose, with pair of short scobinate ridged signa, ventral signum slightly shorter.

Type material. Lectotype: female (designated by Dugdale (1988: 210)), '5.2.78 Akaroa Rowe's Bush at night. / type / Fereday Collection. / HOLOTYPE [*sic*, pink label]' (CMNZ) (examined, not dissected).

Note. *Leucania sulcana* was described from an unspecified number of specimens from Akaroa and a single specimen from Dunedin (Fereday 1880). The lectotype is the only specimen certainly belonging to the type series that has been found in CMNZ.

Distribution. (Map 83). Widespread throughout the main islands; the lack of Northland records is undoubtedly due to under-recording.

AK, CL, BP, TK, TO, WI, WN / SD, NN, BR, WD, KA, NC, MC, OL, CO, DN, FD, SL / SI

Biology. Larvae feed on forest grasses and sedges and have been reared through from *Microlaena avenacea* (Poaceae) and *Carex* (Cyperaceae). Pupation is in the soil (Hudson 1928: 54). The coloration of the penultimate instar larva is described as follows by Hudson (1928: 54): "head... greenish-white, with two faint streaks and a very faint mottling; the body bright green with a conspicuous pinkish-white lateral line; a fine double dark green dorsal line, and a very fine dark green subdorsal line; between the principal lines there are numerous very slender yellowish streaks and the segmental divisions are marked in yellow." Hudson (*loc. cit.*) describes the fully grown larva as follows: "about [45 mm] in length, much attenuated posteriorly, pale reddish-ochreous, with numerous fine wavy darker lines; the subdorsal and lateral lines are straight and much more conspicuous; the spiracles are black, and there is a dark olive-green line down the midback."

Flight period. Chiefly late December to early May, but some specimens from the northern North Island recorded in August and September.

Remarks. This species occurs in small numbers at light, and is very widespread throughout the country from lowland forest to the alpine zone. However, it appears to be under-recorded, especially in the North Island, where there are surprisingly large gaps in known distribution. Specimens from the northern North Island tend to be smaller and have the longitudinal shading of the forewing more pronounced (Fig. 83c), though similar forms also occur elsewhere.

84. *Ichneutica supersulcana* new species

Figs 84a–c (adults); 84d–f (male abdominal base and genitalia); 84g–i (female S7 and genitalia).

Diagnosis. Very similar to *I. sulcana*; for diagnostic characters, see under that species above, and description below.

Description. Adult (Figs 84a–c). Wingspan 41–47 mm (male); 48 mm (female). Superficially hardly distinguishable from *I. sulcana*, q.v., and in wing markings probably falling within the range of variation for that species. However, *I. supersulcana* apparently never has the forewing basal streak or the post-discal streak as dark or well-defined as in the most strongly marked *sulcana*; these markings are reddish brown, edged dark brown below and do not contrast strongly with the pale ochreous ground colour. In most specimens, the black spot at the end of the cell, between the bases of veins M3 and CuA1, is minute, smaller than in most *sulcana*, but some specimens have a slightly larger spot here. The forewing underside tends to have the black suffusion less extensive than in *sulcana*, but this again is variable. Male abdominal base (Fig. 84d) with vestigial brushes, reduced to patch of short hairlike scales, with reduced pockets and complete levers; A3 apodemes present. Male genitalia (Fig. 84e): uncus somewhat swollen subapically, pointed, barely hooked; valva oblique, strongly sinuous, (sacculus microsculptured area straight on costal margin), cucullus well differentiated, truncate / spatulate, with well-developed corona of ca. 70 elements in a single row and scattered spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately narrow, curved, irregularly crenulate dorsally and minutely papillate costally; ampulla long, digitate; phallus (Fig. 84f) subapical tooth present; vesica forming complete loop; cornuti short, in uninterrupted band except apically where divided into two groups, with tiny short cornuti between; basally cornutal band does not twist around side of vesica and does not reach opposite junction of straight basal portion of vesica with curved portion. Female S7 as in Fig. 84g. Female genitalia (Figs 84h, i): as described for *I. sulcana* above, but S8 setae more concentrated towards caudal 1/5 of segment; ostium slightly narrower than in *sulcana*, with more distinct, long dorsal desclerotised ridges, each with caudal bulge, and longer

lateral pockets; anterior portion of ductus bursae and inner curve of appendix bursae more strongly rugose than in *sulcana*; signa smaller.

Type material. Holotype: male, 'NEW ZEALAND WN Tararua Ra. Dundas Hut 1250m 10 Feb 1985 G.W. Gibbs to light / NZAC slide Noct. 243 genitalia ♂/ NZAC04226041 [database barcode label]' (NZAC) (Figs 84d–f). Paratypes: 3 males, 1 female, same data as holotype (genitalia on slides Noct. 534 ♂, 535 ♀) (NZAC) (Figs 84b, c, g–i).

Distribution. (Map 84). Only known from the Tararua Ranges WN (type series) and two specimens from Tongariro National Park (TO).

TO, WN / —

Biology. Unknown.

Flight period. The few known specimens were captured in February.

Etymology. The species name derives from its close relative *sulcana* with the prefix *super-* indicating 'above', and refers to this species' slightly larger average size and its apparent restriction to higher altitudes in the areas where the two overlap.

Remarks. This species was recognised as new very late in the course of this revision and is known only from 7 specimens in NZAC; other collections may hold material, but several have not yet been searched: none was found in AMNZ, BLNZ or BPNZ (pers. obs.; B.M. Lyford, B.H. Patrick pers. comm.). The known habitats are margins of subalpine *Fuscospora cliffortioides* forest, subalpine scrub and tussock: at 1250 m in the Tararua Ranges, at 1000 m on the Whakapapanui Track, Tongariro National Park (one male in 2003) and at 1160 m on the Waitonga Falls Track, north of Ohakune TO (one male in 2007). The different development of secondary sexual characters (abdominal brushes and pockets) in the males of *sulcana* and *supersulcana* is remarkable. Such differences are rare amongst New Zealand noctuids in two such closely related species, but a similar situation occurs in two other species pairs: *I. infensa* / *I. inscripta* (above), and *I. thalassarche* / *I. ustistriga* (see below).

85. *Ichneutica rufistriga* new species

Figs 85a–c (adults); 85d–f (male abdominal base and genitalia); 85g–i (female S7 and genitalia).

Diagnosis. *Ichneutica rufistriga* is unlikely to be confused with any other species within its limited range on the Antipodes Islands: the only other noctuids recorded are *Agrotis ipsilon* (Hufnagel) and *Mythimna separata* (Walker) (Patrick 1994c). It differs from its close relative *I. ustistriga* in its smaller size, narrower forewings, less contrasting forewing markings, and in particular in the strong rufous coloration of the male head, thorax and forewings. The male genitalia offer further support for recognition of this taxon at species level, in particular in the smaller cucullus and much shorter corona (60 elements, as compared to over 80 in *ustistriga*).

Description. Adult (Figs 85a–c). Wingspan 38–44 mm (male); 37–44 mm (female). Male antennae serrate beneath and weakly bipectinate to *ca* 22–25 segments before apex, pectinations up to *ca* 0.8x width of flagellum. Head and thorax tawny to dull reddish brown in male, buffy grey to mauve-grey in female, more or less densely sprinkled whitish (tips of scales), especially along midline of thorax, with scales unicolorous or bicoloured, very narrow lamellate. Forewing dull reddish brown in male, more greyish to mauve-grey in female; basal streak absent; antemedian line obsolete in male, usually represented by some pale scaling in middle of wing in female; postmedian line pallid, very faint in male, more conspicuous in female, edged brownish basad below reniform, where edging is often continuous with claviform stigma; claviform stigma present as rather indistinct dark brownish V; orbicular stigma more or less distinct, round to oval, outlined brownish, with inner outline of whitish scales in female; reniform indistinct, large, rounded, outlined brownish in basal half, more or less obsolete distally; area between antemedian and postmedian lines not darkened; subterminal line usually very indistinct, whitish, broken; a smudge of dark brown scales extends more or less distinctly into streak from near tornus to postmedian line; terminal area concolorous with wing; series of dark subtriangular marks along termen absent; fringe brownish whitish, with a distinct dark subbasal line, weakly chequered brownish (male) to grey (female) distally. Hindwing pale brownish grey in male, more greyish in female, paler basally, veins not distinctly contrasting; dark line along termen present; fringe whitish with dark median line. Underside: forewing ochreous to greyish, more or less suffused reddish brown exteriorly in male, reniform stigma and postmedian line very indistinct, termen unmarked; hindwing greyish, weakly suffused orange brown towards costa in male, sprinkled blackish exteriorly, discal spot and postmedian line present, indistinct, termen unmarked. Abdomen with dorsal scale-tufts on segments 1–3

reddish brown (male and some females) to mauve-grey (some females), tipped white, more distinctly in female; rest of abdomen ochreous, paler basally, without distinct darker mottling, strongly tinged orange-brown to pinkish brown laterally, especially in male. Male abdominal base (Fig. 85d) with brushes, levers and pockets; brushes narrower than in *ustistriga*. Male genitalia (Fig. 85e): as described for *ustistriga* below, except cucullus much shorter and stouter, corona with only *ca* 60 elements; ampulla apex not expanded; phallus (Fig. 85f): vesica with band of cornuti hardly expanding towards apex. Female S7 as in Fig. 85g. Female genitalia (Figs 85h, i): as described for *ustistriga* below, but ductus bursae somewhat shorter, less constricted below ostium; corpus and appendix bursae smaller; corpus only weakly rugose; signa of approximately equal length.

Type material. Holotype: male, 'NEW ZEALAND Antipodes Is. Reef Pt. bred U. australis [*Urtica australis*] 28 Dec 1990 B.H. Patrick / OMNZ IV42482 / genitalia ♂ on slide IV42482 R. Hoare prep.' (OMNZ; pupal exuviae pinned under moth). Paratypes: 3 males, 3 females as follows: 2 females, same data as holotype, but bred 23 Dec 1990 and 31 Dec 1990 (both OMNZ); 2 males, 1 female, AN: Hut Cove, 13 Oct (♂♂), 15 Oct (♀) 1990, B.H. Patrick (Figs 85a, c) (NZAC).

Distribution. (Map 85). Antipodes Islands only.

— / — / AN

Biology. This species is appears to be polyphagous like its close relative, *I. ustistriga*: young larvae were found on *Urtica australis* by Brian Patrick (Patrick 1994c, as *Graphania ustistriga*; reared specimens in OMNZ); in captivity they accepted dock (*Rumex obtusifolius*), chickweed (*Stellaria media*) and rhubarb (*Rheum rhabarbarum*) (Patrick 1994c). Feeding damage believed to be possibly of this species was also noted on the fern *Austroblechnum durum* (Blechnaceae) (Patrick *loc. cit.*). The following information on larvae and life history is all from Patrick (1994c): young larvae were described as pale green, later becoming reddish. After a moult (perhaps at third instar), the larvae showed a broad white lateral band and three thin white dorsal lines on a dull green / brown ground colour, with rows of black dots dorsally. Larger larvae (probably fourth or fifth instar) were described as follows: "Up to 42 mm long, dorsally dull yellow-green with a double black dorsal line, subdorsal black line with a row of green dots within it. A wide yellowish band separates the subdorsal line from a broad yellow-white lateral band. A black dashed line marks the border of these two bands. Ventrally...plain dull yellow." Pupation is in a cocoon in the soil. A complete generation in captivity took 12 weeks.

Flight period. Recorded from October to February (but sampling has been limited; Patrick (1994c) suggests September to April as likely flight time).

Etymology. The name *rufistriga* is a compression of Latin *rufus* (reddish) and *ustistriga* (the most closely related species): the male of this species resembles a reddish *ustistriga*.

Remarks. This species has usually been identified as '*Graphania ustistriga*' in collections, and is undoubtedly a peripheral isolate of that species; differences in larvae and adult colour and size were already noted by Patrick (1994c), who considered that at least subspecific status was warranted. The differences in genitalia noted here support full species level recognition.

Ichneutica rufistriga appears to be a common species in its restricted area of distribution: there are good series of caught specimens in OMNZ, CMNZ and NZAC from Reef Point, Hut Cove and North Plains AN. It is hoped that the population will increase following the recent eradication of mice from the Antipodes Islands (cf. Patrick 1994c). Four other endemic species or subspecies of Lepidoptera are currently recognised from the Antipodes: *Proterodesma turbotti* (Salmon & Bradley) (Tineidae), *Elachista galatheae antipodensis* Dugdale (Elachistidae), *Scoparia albafascicula* Salmon (Crambidae), and *Mnesictena antipodea* (Salmon) (Crambidae). There are also potentially endemic new species of *Reductoderces* (Psychidae) and *Eudonia* (Crambidae) (Patrick 1994c). The local population of the magpie moth *Nyctemera annulata* (Erebidae) was formerly recognised as a subspecies *antipodea* Salmon (synonymised by Dugdale 1971).

86. *Ichneutica thalassarche* new species

Figs 86a, b (adults); 86c–e (male abdominal base and genitalia); 86f–h (female S7 and genitalia).

Diagnosis. *Ichneutica thalassarche* is unlikely to be confused with any other species within its limited range on the Chatham Islands: the very large size (47–50 mm wingspan), pale greyish thorax and forewing and the distinct series of black 'teeth' adjoining the white subterminal line are diagnostic.

Description. Adult (Figs 86a, b). Wingspan 47 mm (male); 50 mm (female). Male antenna bipectinate, pectinations up to *ca* 1x width of flagellum, reaching to *ca* 20–25 segments short of apex. (Sexual dimorphism rather pronounced.) Head and thorax pale greyish ochreous in male, mixed grey and white in female; prothorax with indistinct dark grey bar; mesothorax with some reddish (male) or blackish grey (female) scales scattered around margins of tegulae; scales mostly bicoloured (pale-tipped): in female, very narrow lamellate (with deeply forked tips), dark scales in female and most scales in male narrow lamellate (with scalloped tips). Forewing pale greyish ochreous in male, mid- grey in female; basal streak absent; in female, a strong white basal suffusion between lower margin of cell and 1+2A, absent in male; antemedian line very indistinct in male, in female patchily distinct, broad, whitish to grey, irregularly and finely bordered black on both sides; postmedian line very indistinct in male, rather distinct in female, broken into small 'scallops' by veins, irregularly bordered black basally, very irregularly and partially bordered black distally; claviform stigma absent, but a whitish suffusion present in this position in female; orbicular stigma very indistinct in male and blending with ground-colour distinct in female, round, almost entirely white with some greyish suffusion centrally, finely outlined black; reniform indistinct in male, blending with ground-colour, apart from some very fine fragmentary black edging, distinct in female, large, very weakly outlined black, otherwise white with greyish crescentic inclusion; area between antemedian and postmedian lines darkened with dark grey scaling towards dorsum in female, hardly darker in male; a median scalloped line passing between orbicular and reniform stigmata, from level of reniform to dorsum distinct and blackish in female, very indistinct and pale brownish in male; subterminal line cream in male, white in female, rather conspicuous, very regular and parallel to termen, without evagination, highlighted basally except in apical 1/3 by series of black subtriangular dashes between veins (these being the most conspicuous forewing markings in the male); terminal area greyish ochreous in male, mixed white and grey in female; series of dark subtriangular marks along termen absent; fringe cream in male, white in female, strongly chequered with series of brownish (male) or blackish (female) marks basally. Hindwing mostly suffused brownish grey, but with broad irregular band around costa and termen that is brownish white in male, whitish in female; dark suffusion in female only interrupted by paler band from anal angle about 1/2 way across wing; discal spot crescentic, rather distinct, especially in female; postmedian line rather distinct except towards costa; dark line along termen present, rather faint and broken in places; fringe cream in male, white in female, chequered brownish grey. Underside: forewing greyish, variably suffused blackish (from base to postmedian line or to subterminal line), area beyond subterminal line clear grey, reniform stigma indistinct, postmedian line absent or indistinct, termen unmarked but an almost continuous brownish weakly scalloped line along base of fringe; hindwing whitish, variably suffused or sprinkled blackish, and with distinct dark cloud near anal angle, discal spot distinct, median line more or less distinct; termen unmarked. Abdomen without distinct dorsal scale-tufts: in male, pale ochreous, with deeper pinkish ochreous anal tuft, hardly paler ventrally; in female, whitish, strongly and evenly mottled dark grey and brownish, paler at sides and ventrally, basal hair-scales pale brownish grey. Male abdominal base (Fig. 86c) without brushes or pockets (cf. *I. ustistriga*, where these are present), but with somewhat reduced, narrow levers; A3 apodemes present. Male genitalia (Fig. 86d): very similar to those of *I. ustistriga*, q.v.: chief differences are the larger club-like expansion of the ampulla apex in *I. thalassarche* and its somewhat longer, more curved clasper, which overlaps the edge of the valva in slide preparations (clasper in *I. ustistriga* overlies valva and does not overlap the edge). The embayment between the sacculus and cucullus is almost semicircular in *I. ustistriga*; it is larger in *I. thalassarche* and forms a half-oblong; phallus and vesica (Fig. 86e) as described for *I. ustistriga*, q.v. Female S7 as in Fig. 86f. Female genitalia (Figs 86g, h): very similar to those of *I. ustistriga*, q.v., but larger, and signa in the one dissected example appear to be shorter than those of *I. ustistriga*.

Type material. Holotype: Male, "NEW ZEALAND CH Pitt Island 23.vii.1995 L. Smith on window at night / Genitalia on slide RJB Hoare prep. July 2017" (LUNZ). Paratypes: 1 male, 1 female: male, same data as holotype but undissected (LUNZ) (Fig. 86a); female, CH: Rangatira (South East Is.), 14 Aug 1985, P. Scofield (Fig. 86b) (genitalia on slide NZAC Noct. 378) (NZAC).

Distribution. (Map 86). Only known from the Chatham Islands: from Rēkohu / Chatham, Rangiaotea / Pitt, and Rangatira / South East Islands.

— / — / CH

Biology. Unknown.

Flight period. Specimens examined have been captured in July and August, but collecting on the Chathams has been limited and it is unknown whether the species flies exclusively in winter.

Etymology. *Thalassarche* is the genus to which the Chatham Island albatross (*T. eremita* Murphy, 1930) belongs. *Ichneutica thalassarche* is albatross-like in its large wingspan, rather narrow, pointed wings, and in the grey and white coloration of the female, as well as in its breeding habitat on small oceanic islands.

Remarks. This large and impressive species is endemic to the Chathams, in common with *I. seducta* and *I. bromias*. It is uncommon in collections, but this may partly be due to lack of collecting during its flight period, which seems to be chiefly in July and August. It appears, like *Ichneutica rufistriga* n. sp. of the Antipodes, to be an island isolate of *I. ustistriga*, but whereas *I. rufistriga* is smaller than its mainland counterpart, *I. thalassarche* is on average larger.

87. *Ichneutica ustistriga* (Walker, 1857) new combination

Figs 87a–e (adults); 87f–h (male abdominal base and genitalia); 87i–k (female S7 and genitalia); L87 (larva).

Xylina ustistriga Walker, 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 630–631.

Xylina lignisecta Walker, 1857. *List of the specimens of lepidopterous insects in the collection of the British Museum. XI*: 631. Synonymised by Meyrick (1887: 26).

Diagnosis. *Ichneutica ustistriga* is a large moth that has a characteristic mauvish grey wing colour and distinct rather invariable pattern, with very large, dark-outlined orbicular and reniform stigmata, dark-edged claviform contiguous or near-contiguous with the dark edging of the postmedian line, and a conspicuous dark cloud between the postmedian and subterminal lines above the tornus. It is unlikely to be confused with any other species.

Description. Adult (Figs 87a–e). Wingspan 36–46 mm (male); 38–53 mm (female). Male antennae serrate and weakly bipectinate to *ca* 30 segments short of apex, pectinations up to *ca* 0.5x width of flagellum. Head and thorax purplish grey, more or less densely sprinkled white (tips of scales) and sometimes tinged reddish brown, with scales mostly bicoloured, very narrow lamellate. Forewing pale purplish grey; basal streak absent; antemedian line obsolete; postmedian line whitish, very faint, except below reniform where edged black; claviform stigma present as distinct black V; orbicular stigma usually distinct round to oval, outlined black; reniform moderately distinct, large, rounded, outlined black, outline often interrupted by white distally; area between antemedian and postmedian lines not darkened; subterminal line white, broken, distinct only where edged black basally just above middle of wing and towards tornus, where black extends more or less strongly into streak from above tornus to postmedian line; terminal area concolorous with wing; series of dark subtriangular marks along termen absent; fringe brownish white, with 2 distinct dark lines, weakly chequered. Hindwing grey brown, paler basally where veins contrast; dark line along termen present; fringe whitish with dark median line. Underside: forewing brownish ochreous to brownish grey or dark grey, usually paler towards dorsum (pale brown) and termen (whitish finely mixed grey) and strongly suffused pinkish on costa and towards apex, reniform stigma usually fairly distinct, postmedian line usually present, indistinct, scalloped brown line along termen (sometimes most of forewing suffused blackish grey, without distinct markings; hindwing whitish ochreous, sometimes suffused grey, especially towards termen, often pinkish towards costa, discal spot and postmedian line usually distinct, occasionally indistinct or absent, dark scalloped line along termen. Abdomen with dorsal scale-tufts on segments 1–3 grey tipped white; rest of abdomen ochreous, mottled grey and more or less densely suffused silvery grey. Male abdominal base (Fig. 87f) with brushes, levers and pockets. Male genitalia (Fig. 87g): uncus very narrow, pointed, not hooked; valva oblique, moderately sinuous, cucullus well differentiated, long and anvil-shaped, with well-developed corona of ca. 85 elements in a single row and narrow field of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper very robust basally, tapered abruptly into short digitate apex; ampulla narrow, digitate, with slightly expanded setose apex; phallus (Fig. 87h) with subapical tooth absent; vesica forming complete loop; cornuti in single uninterrupted band broadening towards apex, cornuti short basally, becoming longer towards vesica apex. Female S7 as in Fig. 87i. Female genitalia (Figs 87j, k): ovipositor lobes blunt, small, truncately rounded; segment 8 with few scattered medium length setae laterally, numerous well-spaced short to medium-length setae dorsally, forming band in caudal 1/2 of segment; ostium with dorsal desclerotised ridges strongly reduced and hidden in folds created by caudal extension of sclerotised lateral pockets; lateral pockets short; ductus bursae moderately long, strongly constricted below ostium, then broadened mid-length, smoothly sclerotised to about 1/2 way to junction with corpus bursae where (rather finely) rugose; inner

curve of appendix bursae strongly sclerotised and rugose, outer curve sclerotised, not rugose (but a more membranous area adjacent to ductus seminalis inception rugose); corpus bursae rather strongly rugose, with pair of elongate scobinate ridged signa, ventral signum distinctly shorter.

Type material. *Xylina ustistriga*: Lectotype: female (designated by Dugdale (1988: 205)), 'Type [blue-ringed circular label] / LECTOTYPE JSD 1980 / N. Zealand Colenso 53-19 / 19. Xylina ustistriga / HOLOTYPE ♀ [*sic*]' [per JSD] (NHMUK) (examined, not dissected).

Xylina lignisecta: Holotype: female, 'N. Zealand Bolton 54-4 / lectotype lignisecta Walker 1857: 631 selected J.S. Dugdale 1980 [*sic*] / LECTOTYPE JSD 1980 [*sic*]' [per JSD] (NHMUK) (examined, not dissected).

Note. *Xylina ustistriga* was described from two specimens of unspecified sex collected by William Colenso (Walker 1857), presumably in the Hawkes Bay or Taupo district (Dugdale 1988). *Xylina lignisecta* was described from a single female (from 'New Zealand', no locality or collector is specified) (Walker 1857: 631); the lectotype labels were added in error (Dugdale 1988: 205). There is only one possible candidate specimen in NHMUK for the type of *lignisecta*; the other specimen collected before the description is a male (Dugdale *loc. cit.*). Bolton was based in Auckland (Dugdale 1988) and this is the likely type locality of *Xylina lignisecta*.

Distribution. (Map 87). Throughout New Zealand from the Three Kings Islands to Stewart Island.

TH / ND, AK, CL, WO, BP, TK, TO, GB, HB, RI, WI, WN / SD, NN, BR, WD, MB, KA, NC, MC, SC, OL, CO, DN, FD, SL / SI

Biology. The larva (Fig. L87) is polyphagous on herbaceous plants and has also been reared from some shrubs, trees, and lianes, such as *Veronica elliptica*, *Muehlenbeckia* spp. including *M. australis* and *M. complexa* (Hudson 1928; Patrick 1994a), *Lonicera* (Hudson 1928), *Malus* (Wise 1956), *Pinus radiata* and *Parthenocissus* (Gaskin 1966b). The larva is briefly described as follows by Hudson (1928: 68): "dull greyish-brown with blackish subdorsal and lateral lines; there is a series of pale spots below the subdorsal line, and an obscure whitish streak below the lateral line." It is also keyed and figured by Bejakovich and Dugdale ([1998]: fig. 67, here reproduced as Fig. L87); they indicate that it differs from members of the *insignis* complex in the more or less horizontal orientation of A8 and A9 (these segments form an angle in side view in the *insignis* complex); in the form of the 'outer dorsal stripe' (Hudson's 'subdorsal line'), which is interrupted by the pale D2 pinaculum on A1–7 (the stripe ends at the D2 pinaculum on these segments in the *insignis* complex); and in the spiracular stripe (Hudson's 'lateral line'), which is more or less uniform and horizontal (in the *insignis* complex, usually broken on each segment into an oblique bar extending from spiracle to level of SD1). The larva differs from that of *I. mutans* in having a sublateral dark pattern on segments A7–A9 (sublateral dark pattern absent in *mutans*) and in the U-shaped dark dorsal pattern on A8 (pattern three-pronged in *mutans*) (Bejakovich & Dugdale, *loc. cit.*).

Flight period. Throughout the year.

Remarks. This is one of the most common and widespread noctuid species throughout New Zealand, but it usually occurs in small numbers (at least at light) and is not nearly as abundant as *I. mutans*. It may be found in almost any habitat including native forest, gardens and horticultural areas, orchards, and native and exotic grasslands.

Ichneutica mollis subgroup

Diagnosis. Male abdominal base without brushes, levers or pockets; A3 apodemes present; valva sinuous; clasper rather narrow, not papillate, with distinct projecting pollex at base; cucullus extending to a beak-like point; basal tubular portion of vesica with field of small denticles.

Remarks. *Ichneutica mollis* is morphologically unusual and has some peculiar features particularly in the male genitalia. The uncus is reduced and very narrow, the ampulla long and subtended by a strongly developed pollex; the ampulla is placed exceptionally far along the valva and thus intersects the clasper beyond the latter's base in slide preparations. The apex of the phallobase has a laterally expanded sclerotised portion that subtends the bulbous vesica base, and the vesica has an extensive patch of denticles subbasally, a feature not seen in any other *Ichneutica* species. The bulbous central portion of the female ductus bursae probably corresponds with this bulbous basal portion of the vesica.

88. *Ichneutica mollis* (Howes, 1908) new combination

Figs 88a–c (adults); 88d–f (male abdominal base and genitalia); 88g–i (female S7 and genitalia).

Melanchra molis Howes, 1908. *Transactions and proceedings of the New Zealand Institute 40*: 533–534.

Morrisonia mollis Howes, 1912 (*Transactions and proceedings of the New Zealand Institute 44*: 204) and subsequent authors. Incorrect subsequent spelling to be retained (see below).

Diagnosis. *Ichneutica mollis* is rather easily identified by its narrow pale forewings with weakly contrasting stigmata, oblique termen and scalloped fringe, and especially by the distinct dark scaling along the inner margin of the subterminal line, most pronounced near the tornus. At a glance, it might be confused with *Meterana pascoi* (Howes) or other pale brown *Meterana* species, but these have the reniform stigma dark and contrasting with the forewing ground colour.

Description. Adult (Figs 88a–c). Wingspan 34–43 mm (male); 38–42 mm (female). Male antennae filiform, not pectinate or serrate; ciliations at base up to *ca* 0.5x width of flagellum. (Head with small scale-crest between antennae.) Head and thorax pale ochreous in male, thorax tinged whitish in female, sometimes a blackish bar on prothorax and tegulae irregularly lined black exteriorly; scales bicoloured to tricoloured, narrow lamellate; a pair of orange-tipped scale-crests posteriorly on mesothorax. Forewing ground-colour pale ochreous in both sexes, but strongly suffused with white in female giving pale greyish appearance; dark subbasal dash or cloud between dorsum and 1+2A; antemedian line weakly indicated by darker ochreous to blackish scales, zigzag; postmedian line very weakly indicated, colour as for antemedian, deeply scalloped; claviform stigma barely indicated by a curved line of scales slightly darker than ground-colour; orbicular stigma indistinct, round, weakly edged black and/or orange; reniform large, more distinct than orbicular, edging as for orbicular, but generally with more orange scales that make it stand out from ground-colour in female; area between antemedian and postmedian lines not darkened; subterminal line broken, pale ochreous, distinct only where contrasting with blackish clouding, which in male runs irregularly basad of it from near tornus to 2/3 way up wing, and in female is more or less confined to dark smudge from tornus; terminal area concolorous with wing apart from black speckling along veins; series of dark subtriangular marks along termen present; fringe orange-brown to dark brown basally, whitish brown distally, chequered white, and scalloped. Hindwing grey-brown, paler basally and darkened along veins, otherwise unmarked; dark line along termen present, continuous or broken into dashes; fringe whitish with brownish median line. Underside: forewing pale ochreous, suffused pinkish in disc and with blackish suffusion between reniform stigma and postmedian line just below centre of wing (sometimes extending to subterminal line above tornus); reniform stigma indistinct, postmedian line variably distinct but always incomplete, series of dark spots along termen; hindwing whitish, weakly sprinkled blackish exteriorly, and sometimes suffused pinkish towards costa, discal spot and postmedian line usually rather indistinct, series of dark dots along termen. Abdomen with distinct dorsal whitish grey, orange-tipped scale-tufts on segments 1 and 2, not on 3; rest of abdomen pale ochreous, mottled black. Male abdominal base (Fig. 88d) without brushes, levers or pockets; A3 apodemes present. Male genitalia (Fig. 88e): uncus short, very narrow, bluntly pointed, not hooked; valva upright, sinuous, cucullus strongly differentiated, truncate-spatulate with well developed corona of ca. 45 elements in a single row and weak, narrow band of spinose setae not forming 'crest'; apico-dorsal strong hooked seta separate from corona present; clasper moderately short, digitate, evenly curved and extending at base into distinct outward-directed pollex (forming C-shape); ampulla very long, digitate; (pollex well developed and protruding as lobe); phallus (Fig. 88f) strongly curved; subapical tooth absent but large keel-like lobe present in this position; vesica forming complete loop, basally with strongly developed field of thorn-like denticles; cornuti rather short, in single band except apically, where divided, with secondary group forming short line, and with a few very short cornuti between these and main group. Female S7 as in Fig. 88g. Female genitalia (Fig. 88h, i): ovipositor lobes blunt, truncately rounded; S8 with short to medium-length setae laterally and dorsally, forming distinct caudal band; ostium with long, evenly raised dorsal desclerotised ridges and short lateral pockets; ductus bursae moderately long, with bulbous central portion containing more weakly sclerotized band; otherwise smoothly and evenly sclerotised to near junction with corpus bursae where weakly rugose; inner curve of appendix bursae strongly sclerotised and rugose, outer curve strongly sclerotized, not rugose; corpus bursae with a pair of very elongate ridged scobinate signa.

Type material. Lectotype (designated by Dugdale (1988: 203)): male, 'Coll. G. Howes Museum Collection' (MONZ) (examined, not dissected).

Note. *Melanchra mollis* was described from 5 specimens of unspecified sex from Dunedin DN (Howes 1908).

Note on nomenclature. Though Howes (1908: 533) published the name of this species as *Melanchra molis*, the name has been spelt *mollis* in all subsequent publications that I have seen except Warren (1912: 79, as *Maoria*

molis). As indicated by Dugdale (1988: 203), there is evidence that Howes intended the name to be *mollis*: he twice used that spelling in a subsequent publication (Howes 1912). According to ICZN Articles 33.3 and 33.4 *mollis* is an incorrect subsequent spelling of the name; however, because it is in prevailing usage and is attributed to the publication of the original spelling, it is to be preserved and treated as a correct original spelling (Article 33.3.1).

Distribution. (Map 88). Local in the North Island from Mt Te Aroha and the Coromandel peninsula south, widespread in the South Island and also known from Stewart Island.

CL, WO, BP, TK, TO, HB, RI, WN / SD, NN, BR, MB, WD, KA, NC, MC, MK, OL, CO, DN, FD, SL / SI

Biology. The life history has not been well documented, and the larva is variously reported to feed on grasses (Patrick 1994b) or herbs (Muir *et al.* 1995) (cf. White 2002); however, no reared specimens have been seen in collections. Adults come to light and are also recorded visiting flowers (Howes 1908).

Flight period. October to March, with most records in December and January.

Remarks. This is a local and usually rather uncommon species, occurring in a range of habitats from grasslands to montane beech forest and broadleaf / podocarp forest. It is unknown from the northern North Island (ND and AK regions), but otherwise very widespread. As noted in the subgroup diagnosis above, it is a morphologically peculiar species with no obvious close relatives.

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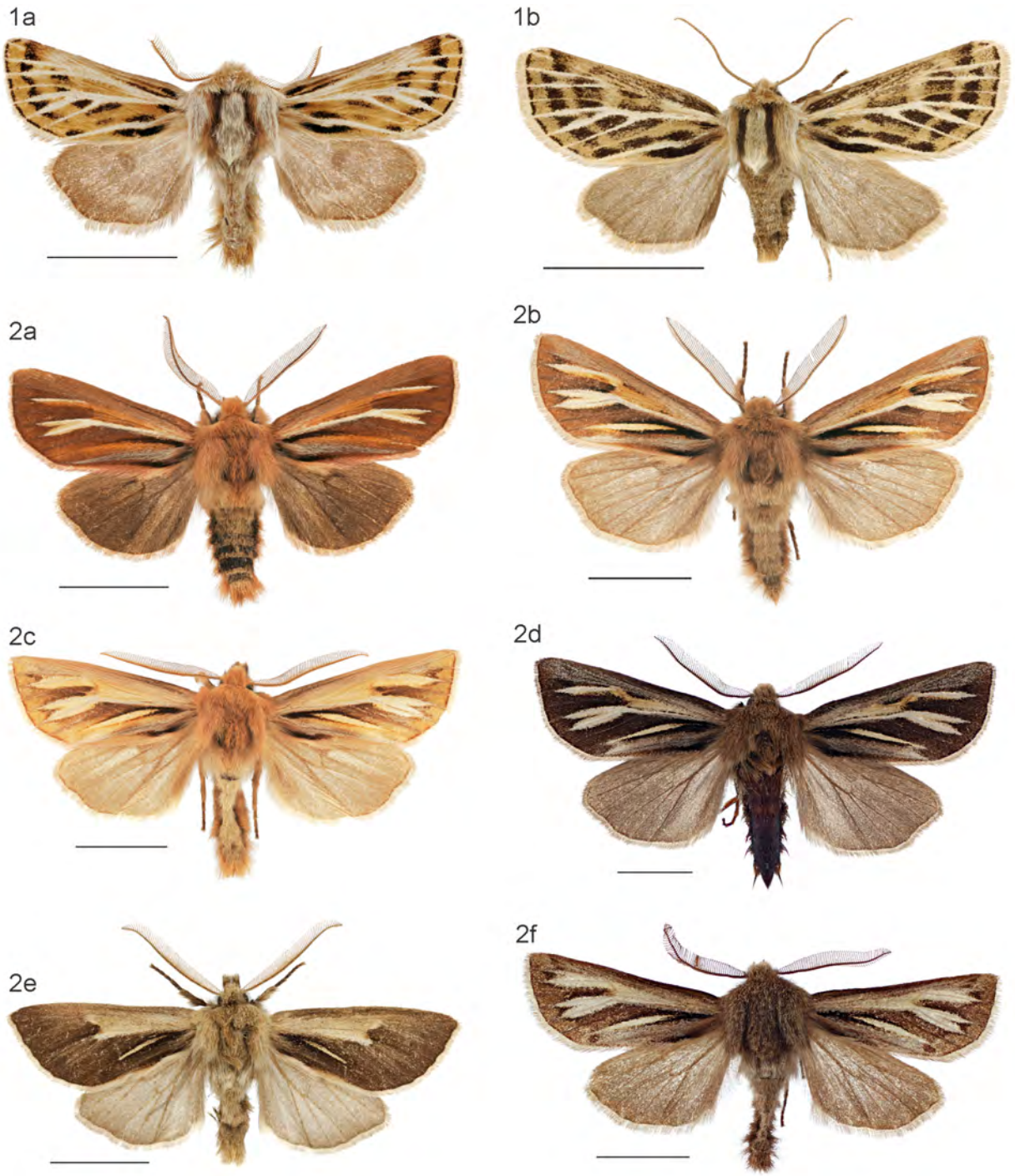
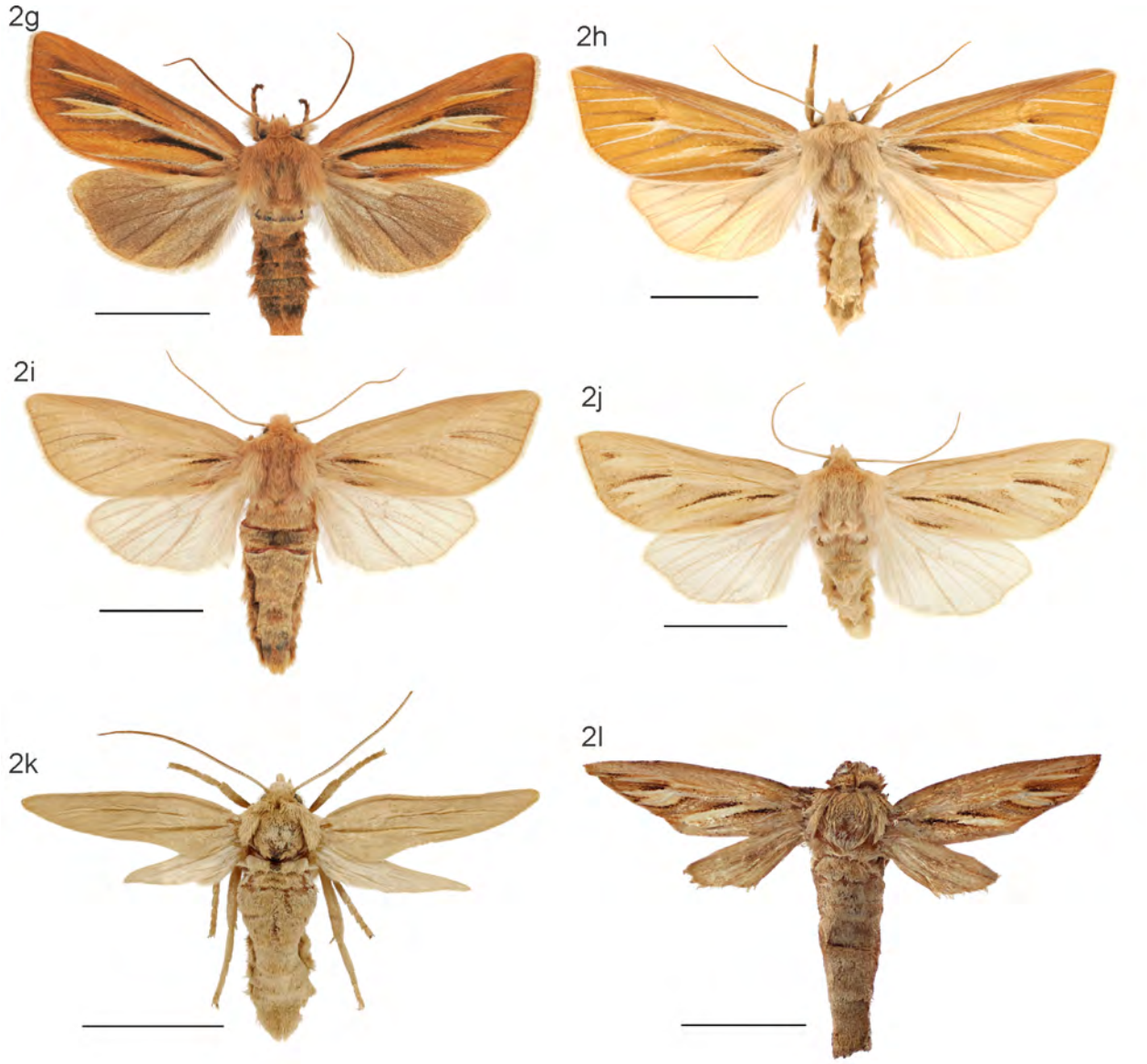
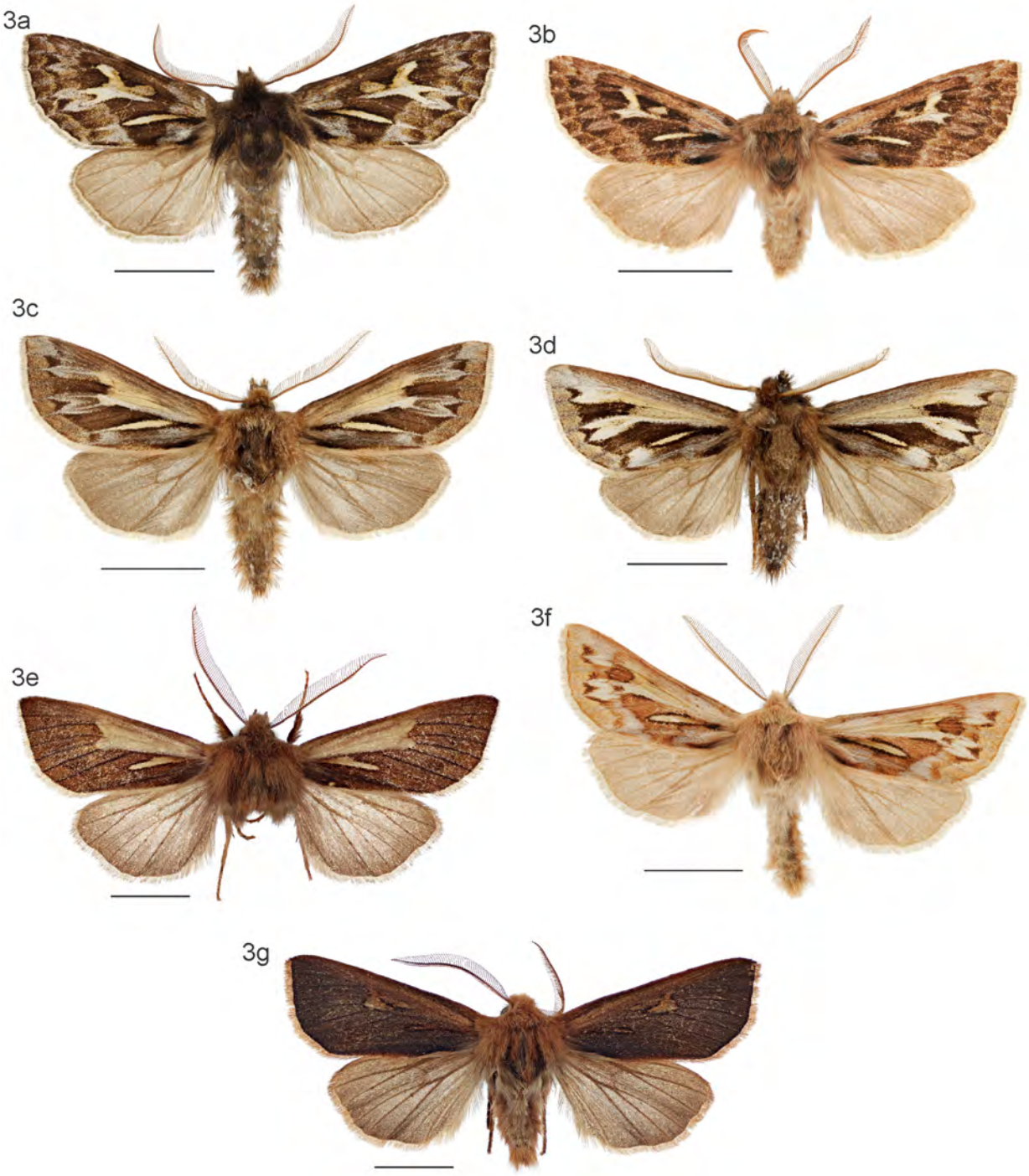


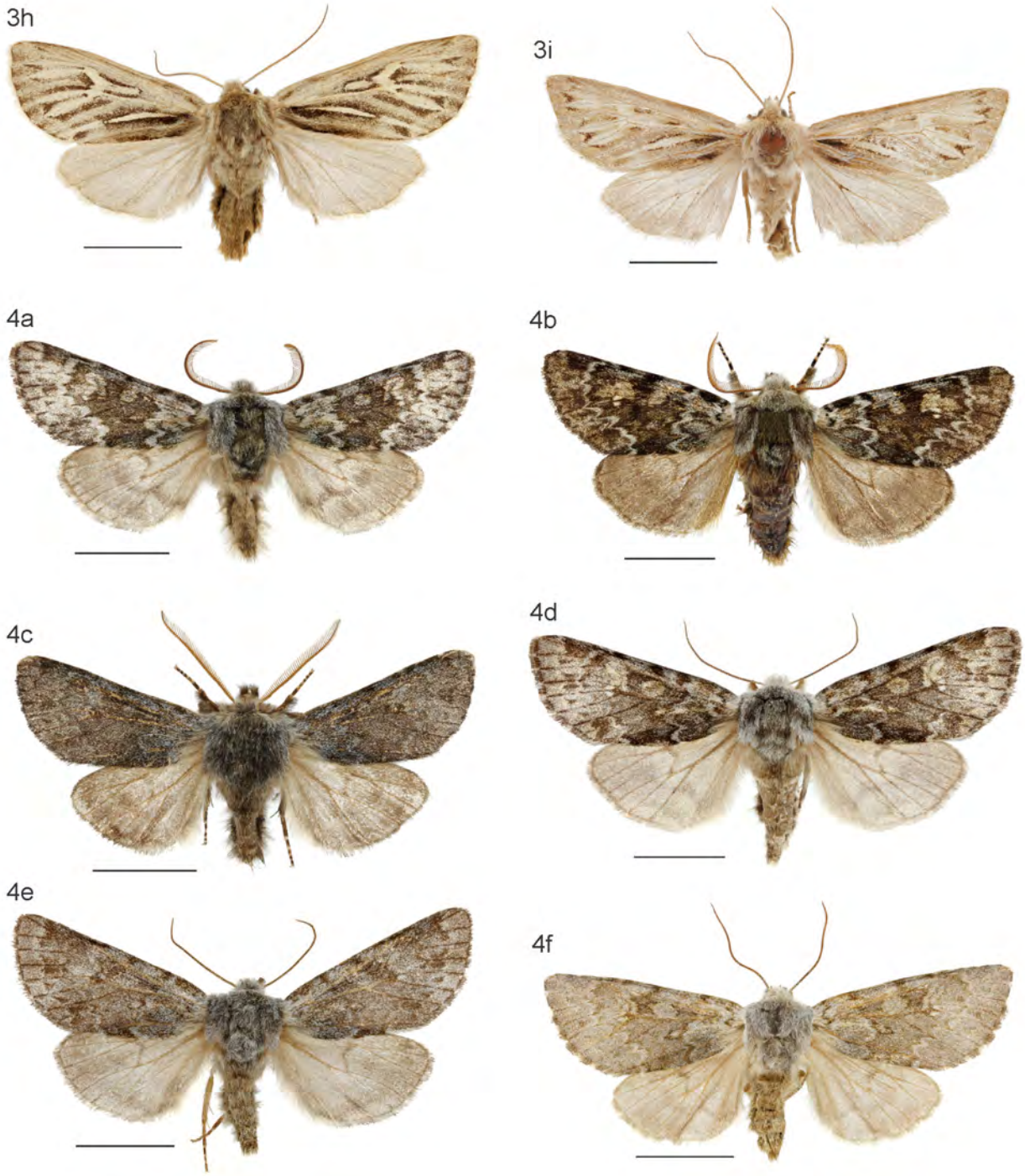
Fig. 1a, *Nivetica nervosa* male; **1b,** *N. nervosa* female; **2a, b, c, d,** *Ichneutica ceraunias* males; **2e,** *I. ceraunias* male (*lindsayi*-like form); **2f,** *I. ceraunias* male (Rock and Pillar Range CO form, OMNZ).
Note: for the adult habitus plates, information on type status and repository is given for type specimens; information on locality and repository is given for forms that are thought to be geographically restricted to part of a species' range. In other cases, only the sex is indicated. Scale bars = 1 cm.



Figs 2g, h, i, j, *Ichneutica ceraunias* females; **2k,** *I. ceraunias* brachypterous female, Flat Mt., Hope Arm, L. Manapouri FD (AMNZ); **2l,** *I ceraunias* brachypterous female, Rock and Pillar Range CO (OMNZ).



Figs 3a, b, c, d, e, f, g, *Ichneutica dione* males: **3e,** '*lindsayi* form' (holotype of *I. lindsayi*, CMNZ, synonym of *dione*); **3g,** unicolorous form, Deep Cove FD (OMNZ).



Figs 3h, i, *Ichneutica dione* females; **4a, b, c,** *I. cana* males; **4 d, e, f,** *I. cana* females.

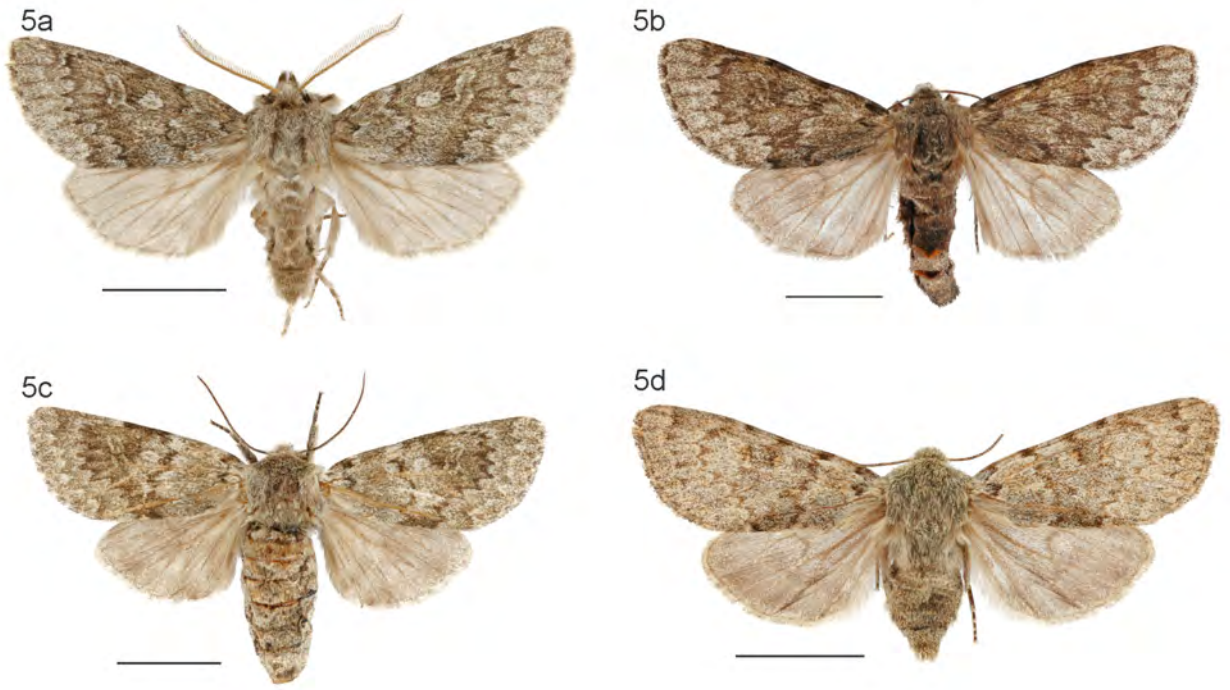
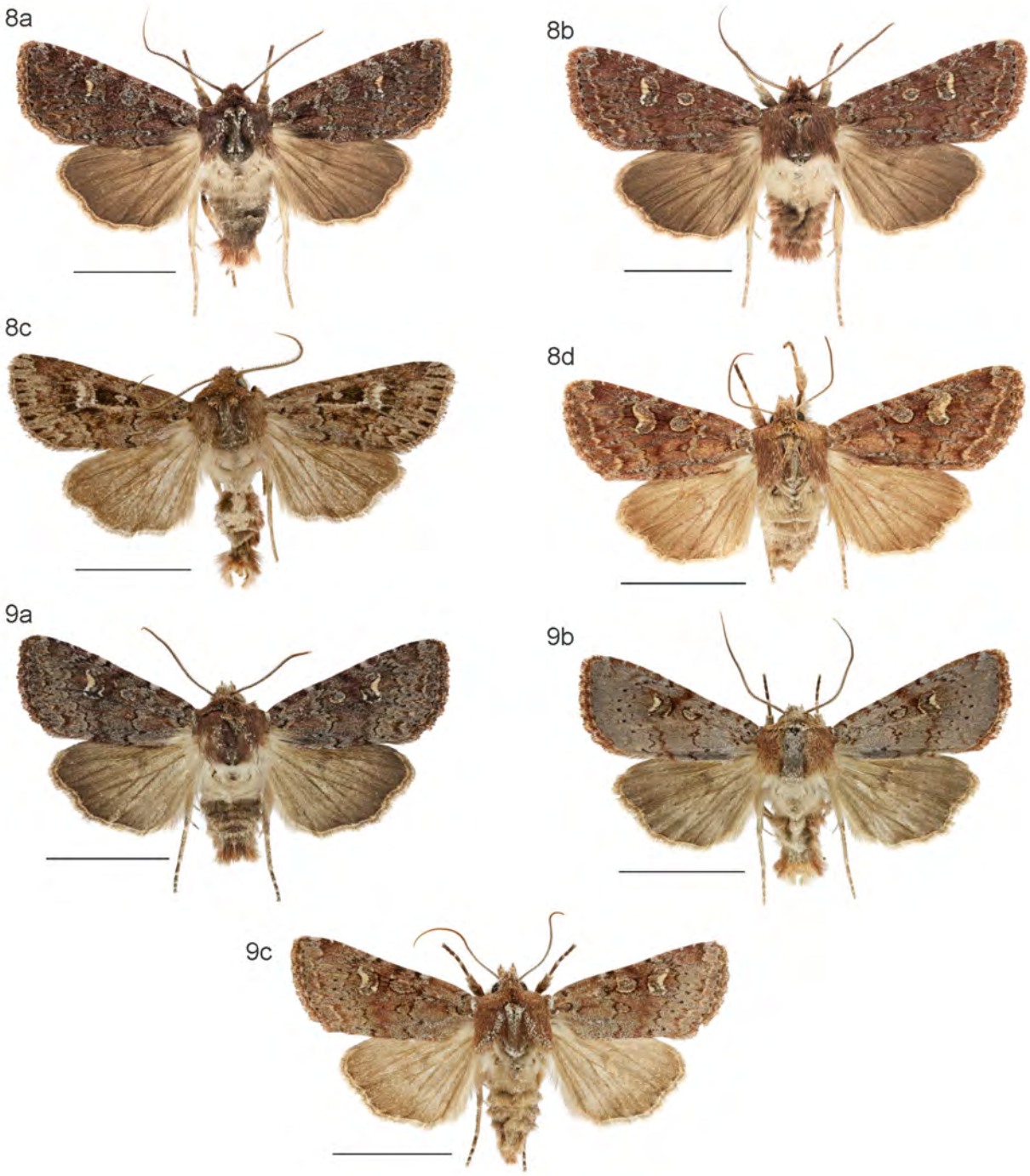
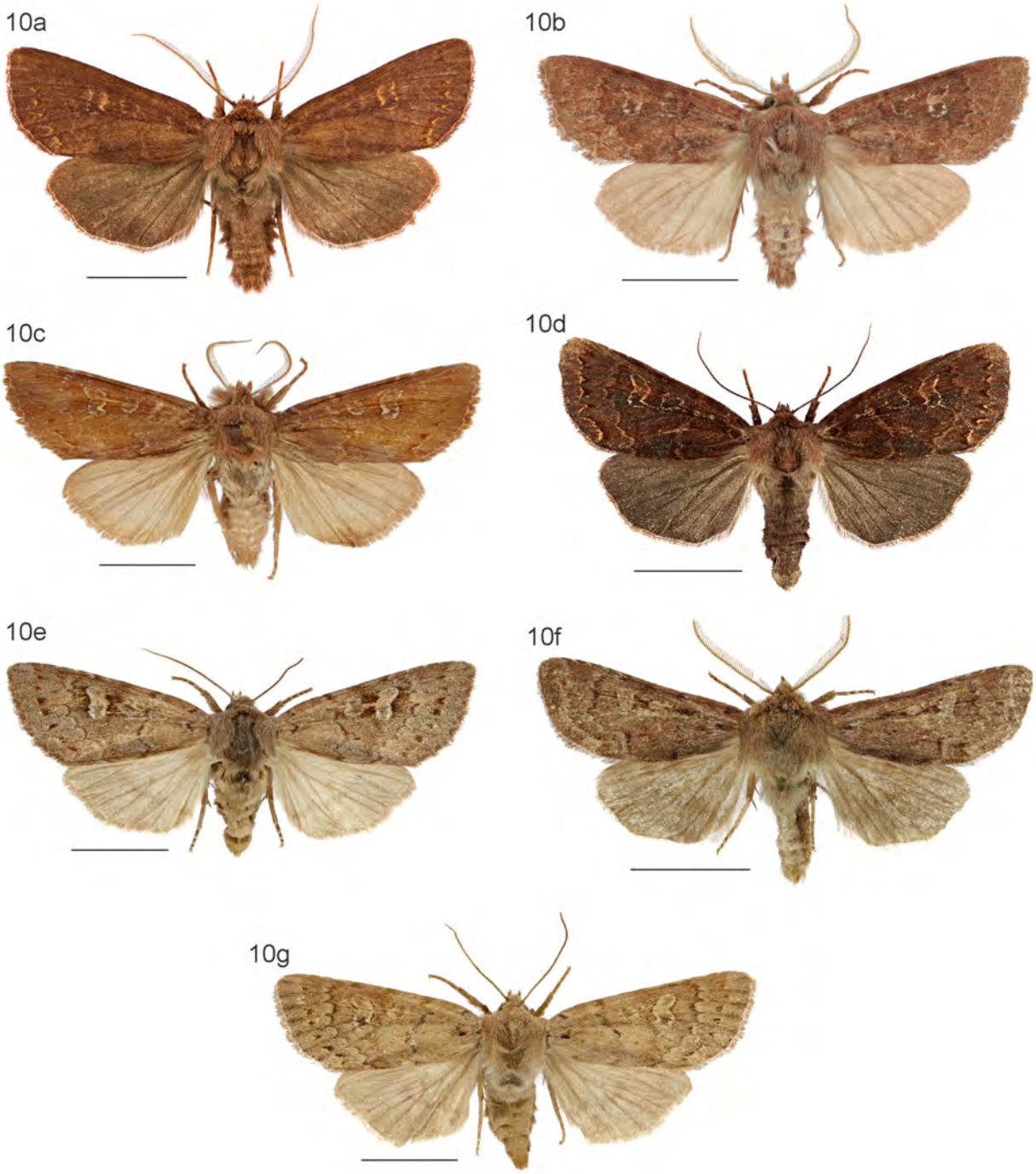


Fig. 5a, *Ichneutica eris* male holotype (MONZ); **5b, c, d,** *I. eris* females: **5b,** paratype (NZAC); **5c,** paralectotype of *Aletia lata* (MONZ, a specimen of *I. eris*, not conspecific with lectotype of *A. lata*, which is a synonym of *I. fibriata*).

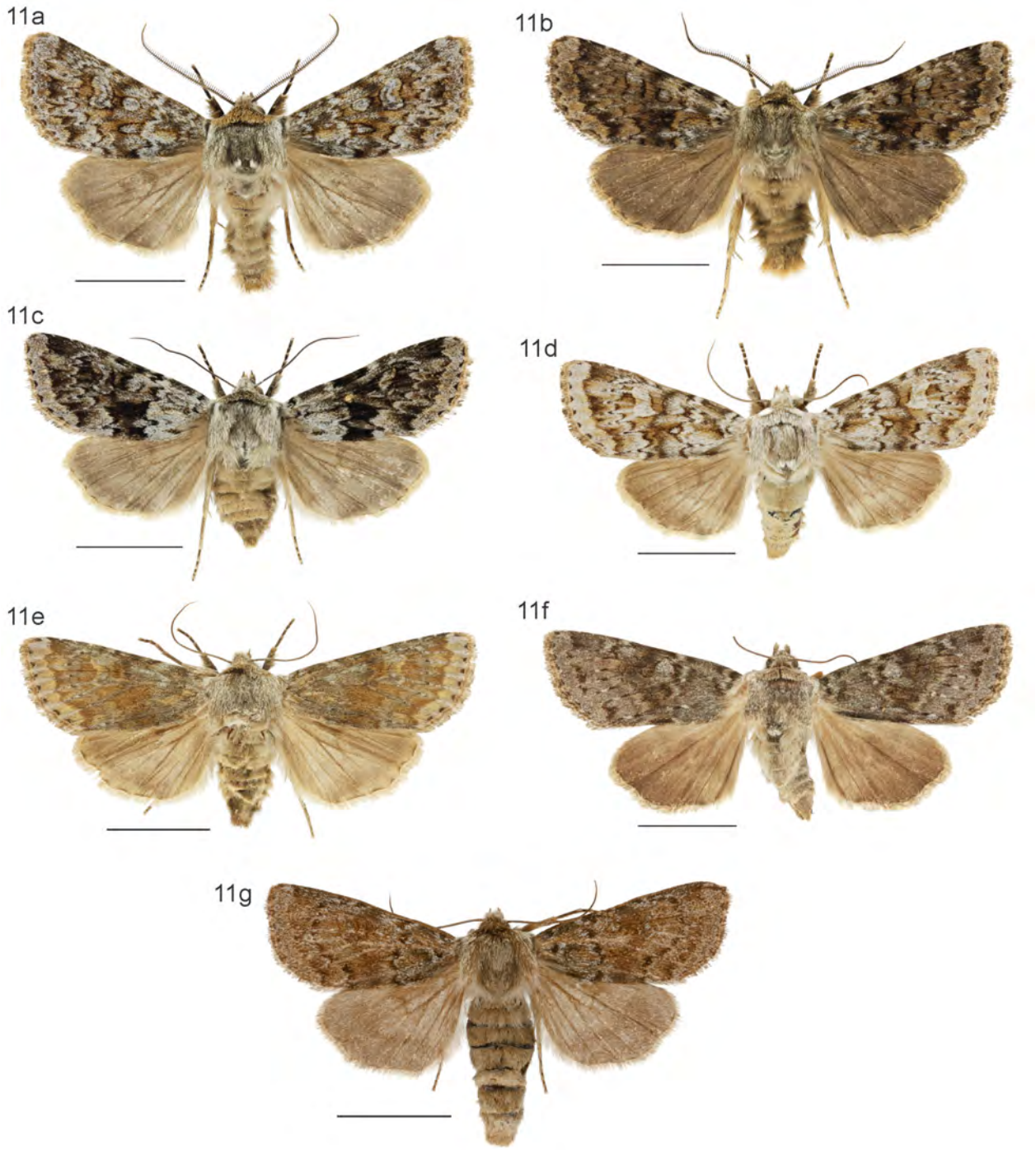
Figs 6a, b, *Ichneutica schistella* male paratypes (OMNZ); **7a, b,** *I. notata* males; **7c,** *I. notata* female.



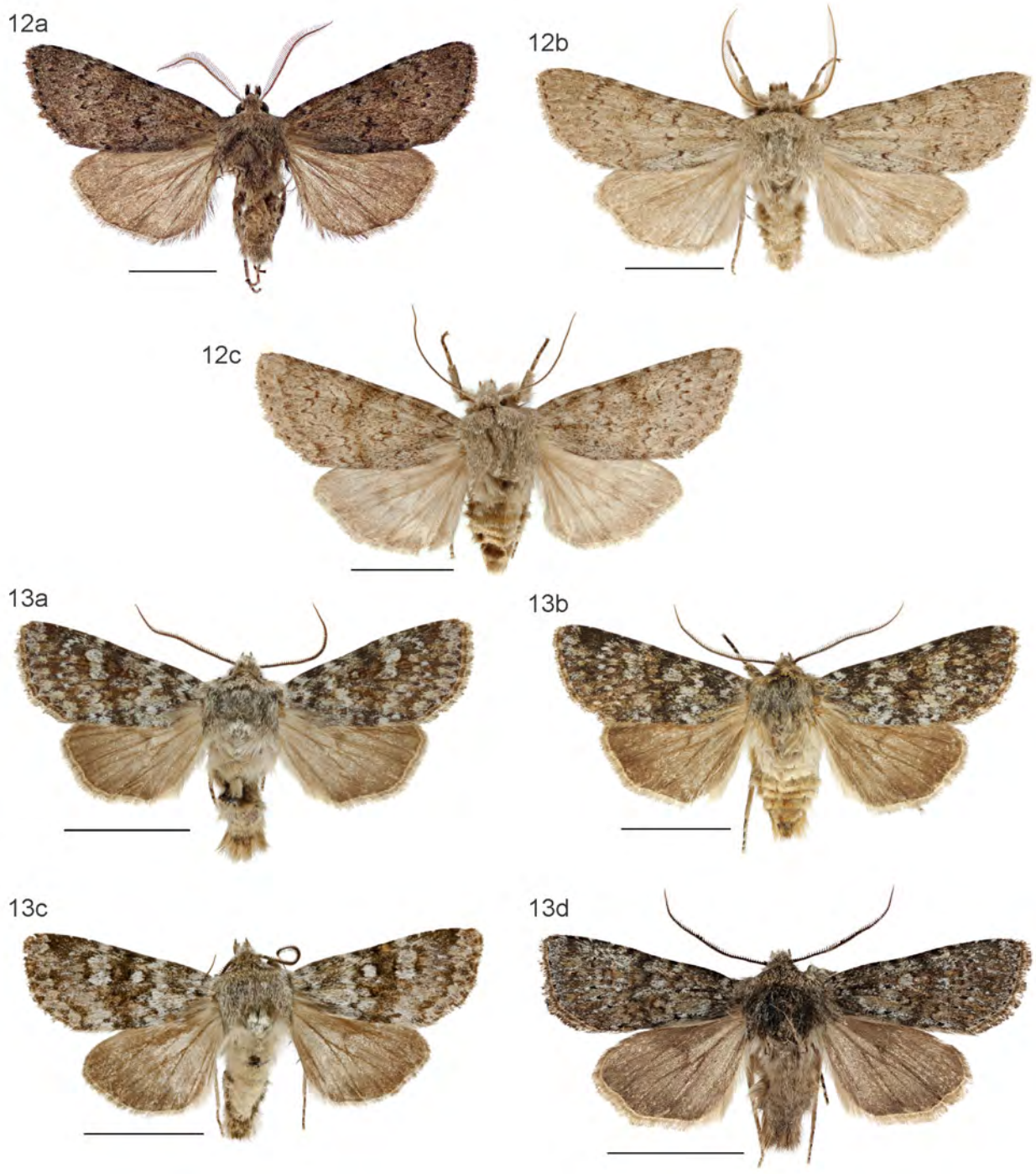
Figs 8a, b, c, *Ichneutica agorastis* males; **8d,** *I. agorastis* female; **9a, b,** *I. hartii* males; **9c,** *I. hartii* female.



Figs 10a, b, c, f, *Ichneutica chryserythra* males; **10d, e, g,** *I. chryserythra* females; (10e, f, g, specimens with forewing colour faded).



Figs 11a, b, *Ichneutica falsidica* males; **11c, d, e, f, g,** *I. falsidica* females.



Figs 12a, b, *Ichneutica fibriata* males; **12c,** *I. fibriata* female; **13a, b, c, d,** *I. panda* males: **13a–c,** strongly marked forms; **13d,** intermediate form.

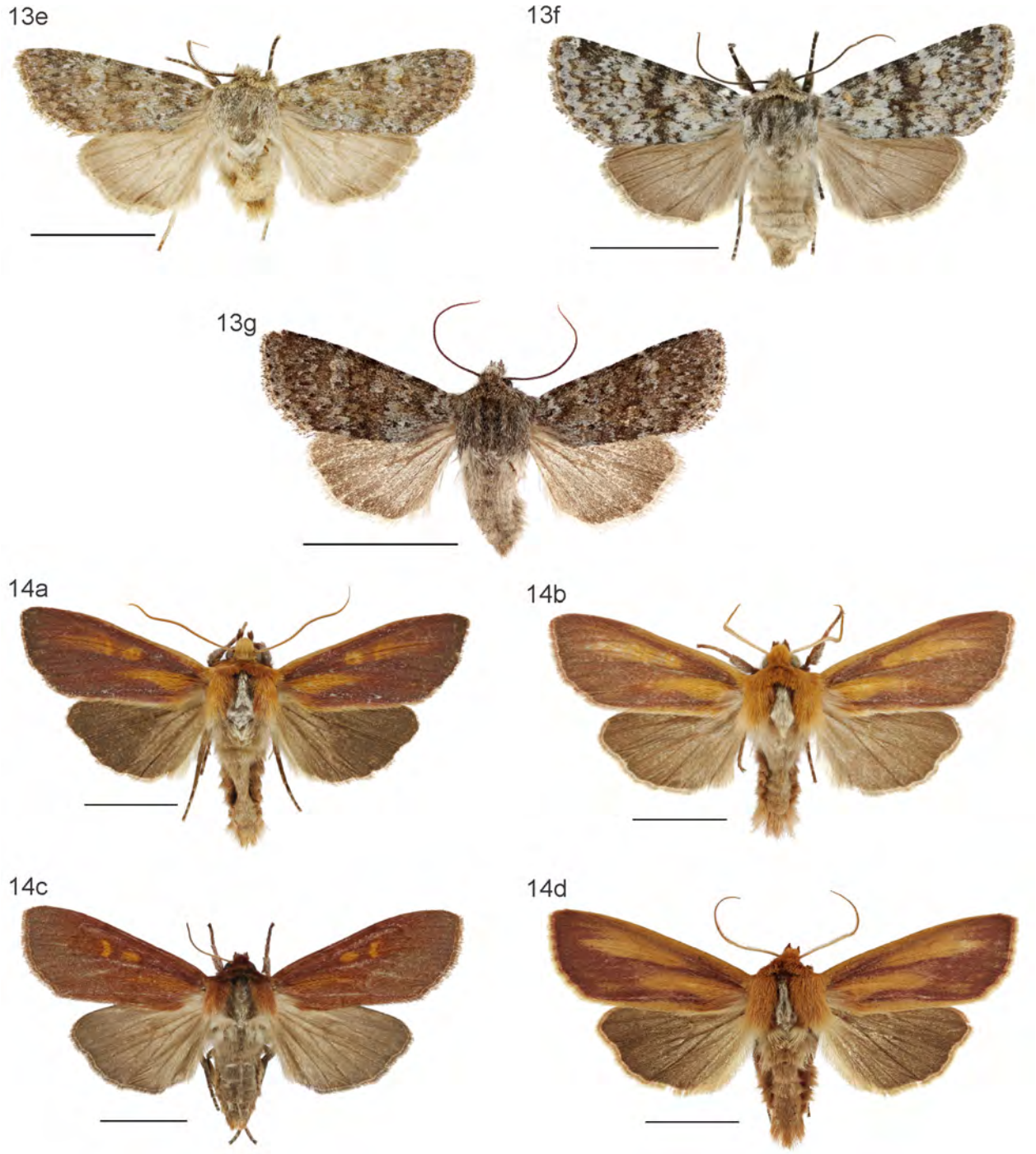


Fig. 13e, *Ichneutica panda* male, weakly marked form (holotype of *Aletia argentaria*, MONZ); **13f, g,** *I. panda* females: **13f,** strongly marked form; **13g,** weakly marked form; **14a, b, d,** *I. purdii* males; **14c,** *I. purdii* female.

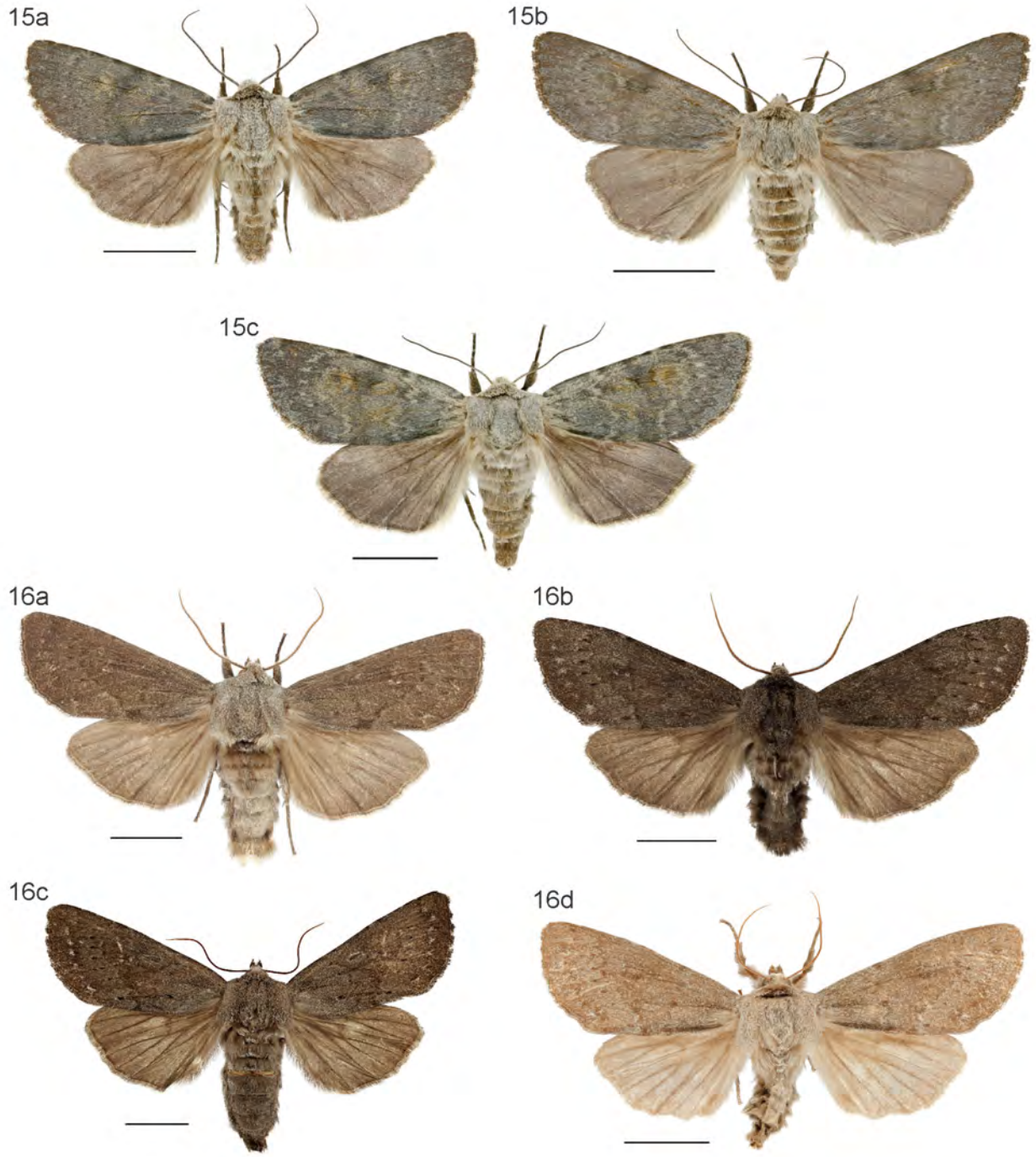
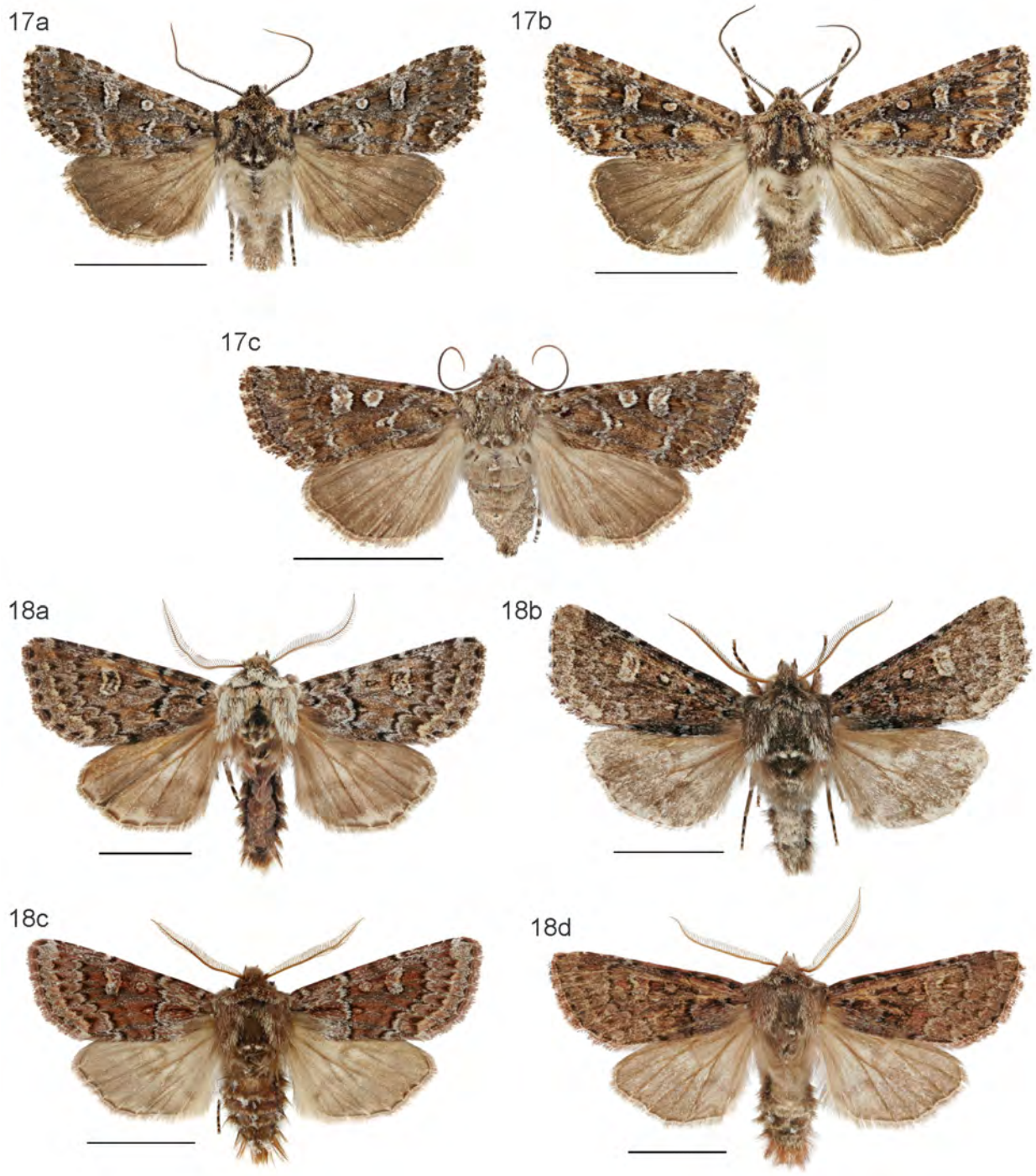
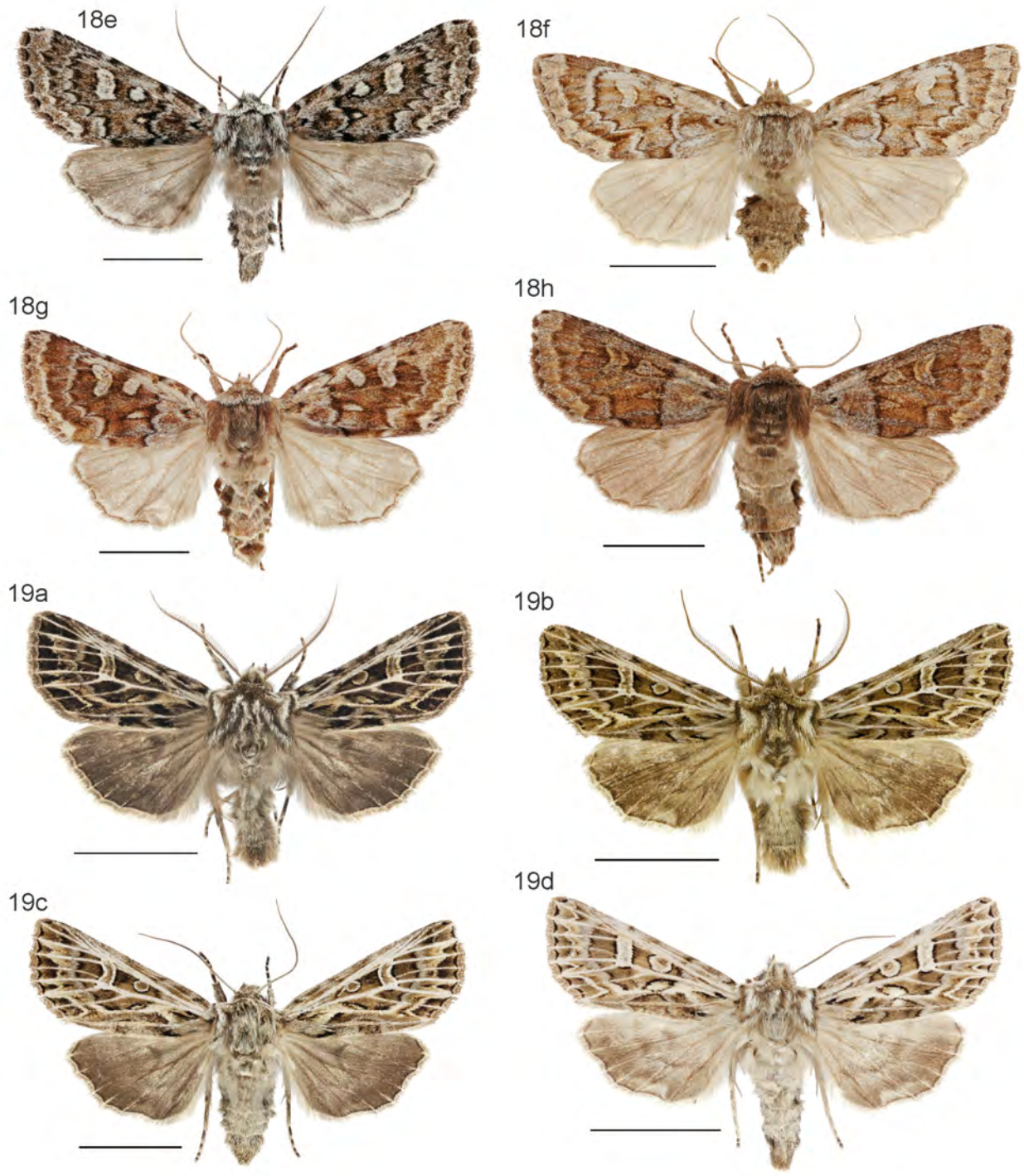


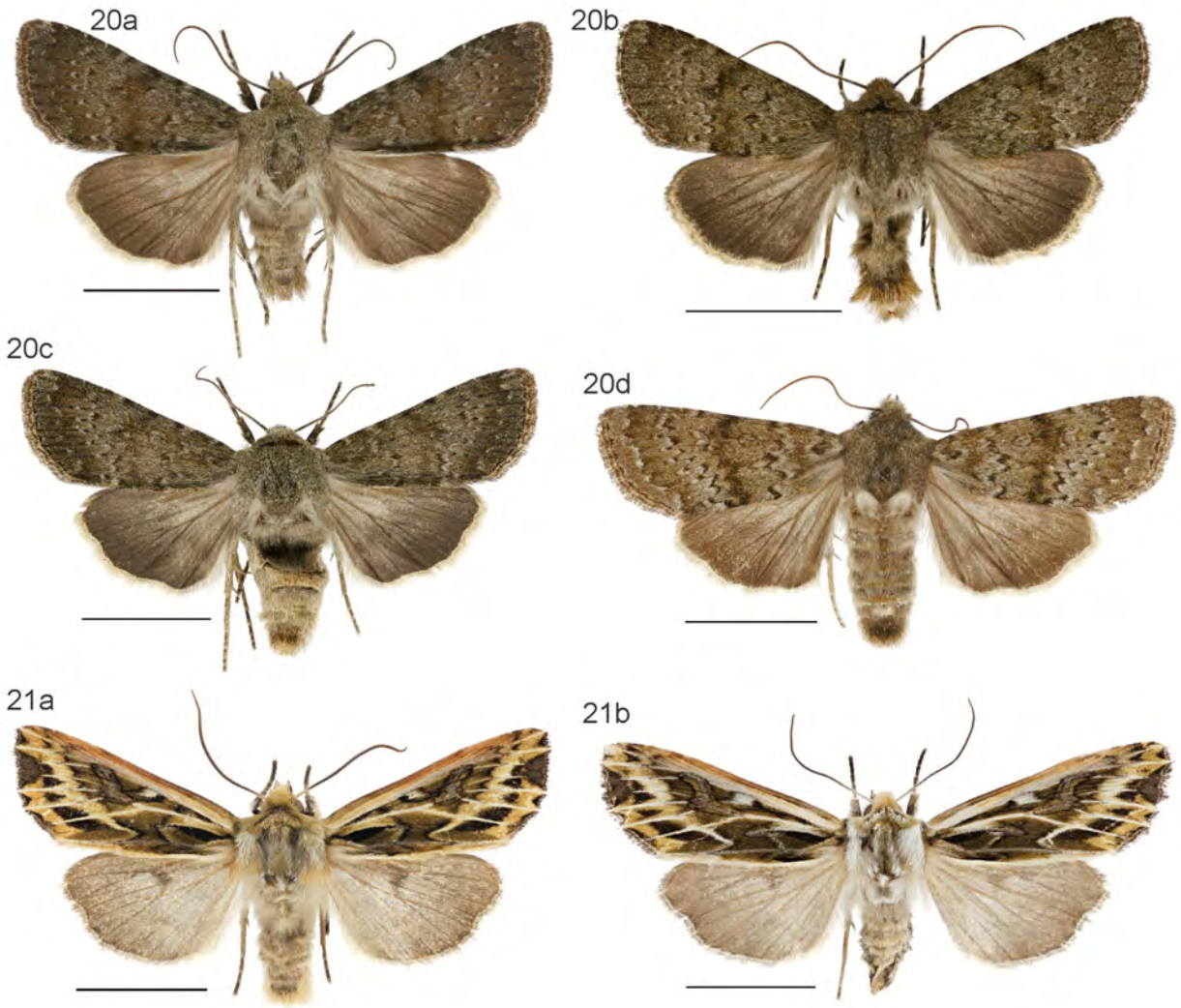
Fig. 15a, *Ichneutica nobilia* male; **15b, c,** *I. nobilia* females; **16a, b,** *I. nullifera* males; **16c, d,** *I. nullifera* females.



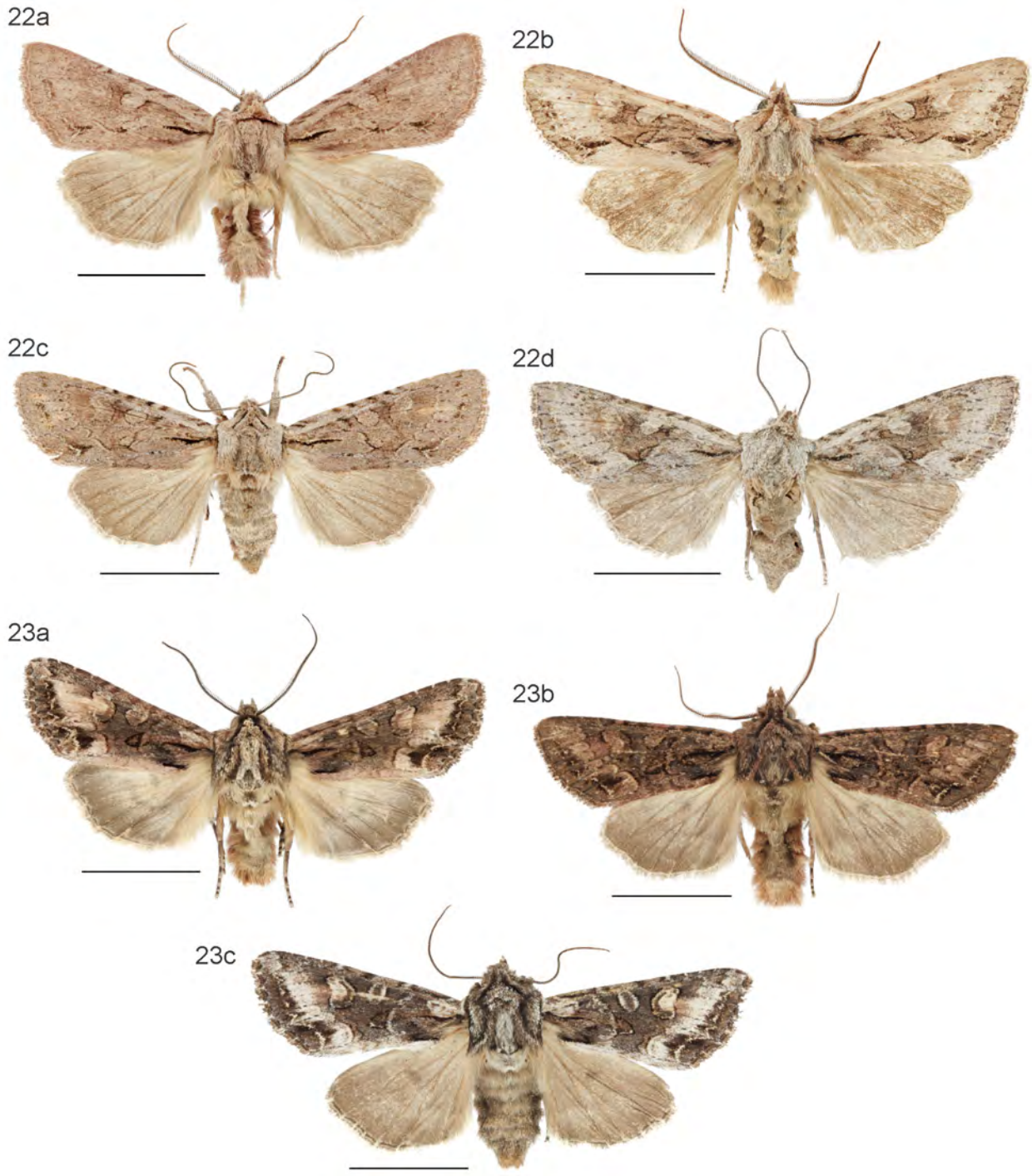
Figs 17a, b, *Ichneutica lithias* males; **17c,** *I. lithias* female; **18a, b, c, d,** *I. marmorata* males.



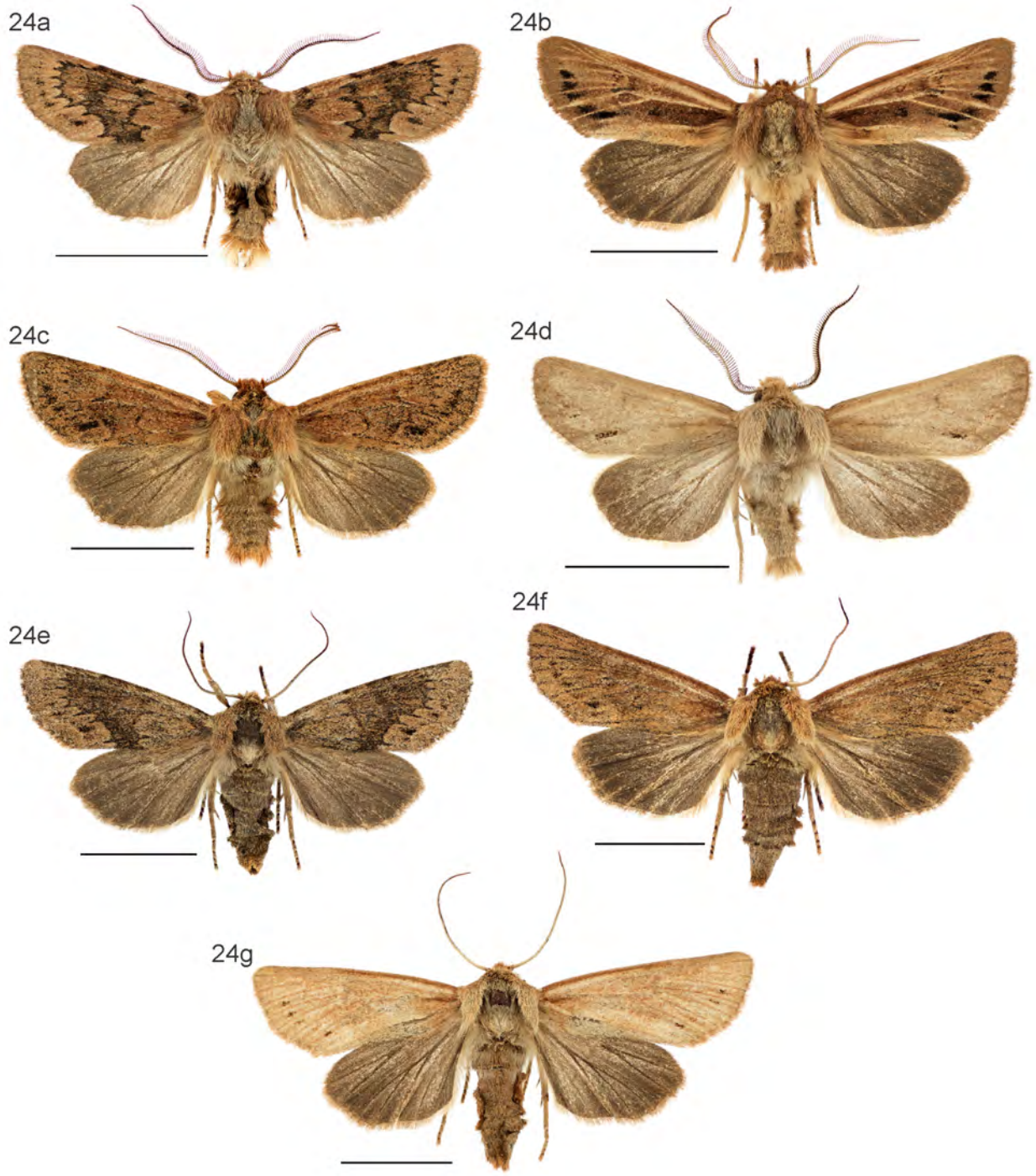
Figs 18e, f, g, h, *Ichneutica marmorata* females; **19a, b,** *I. disjungens* males; **19c, d,** *I. disjungens* females.



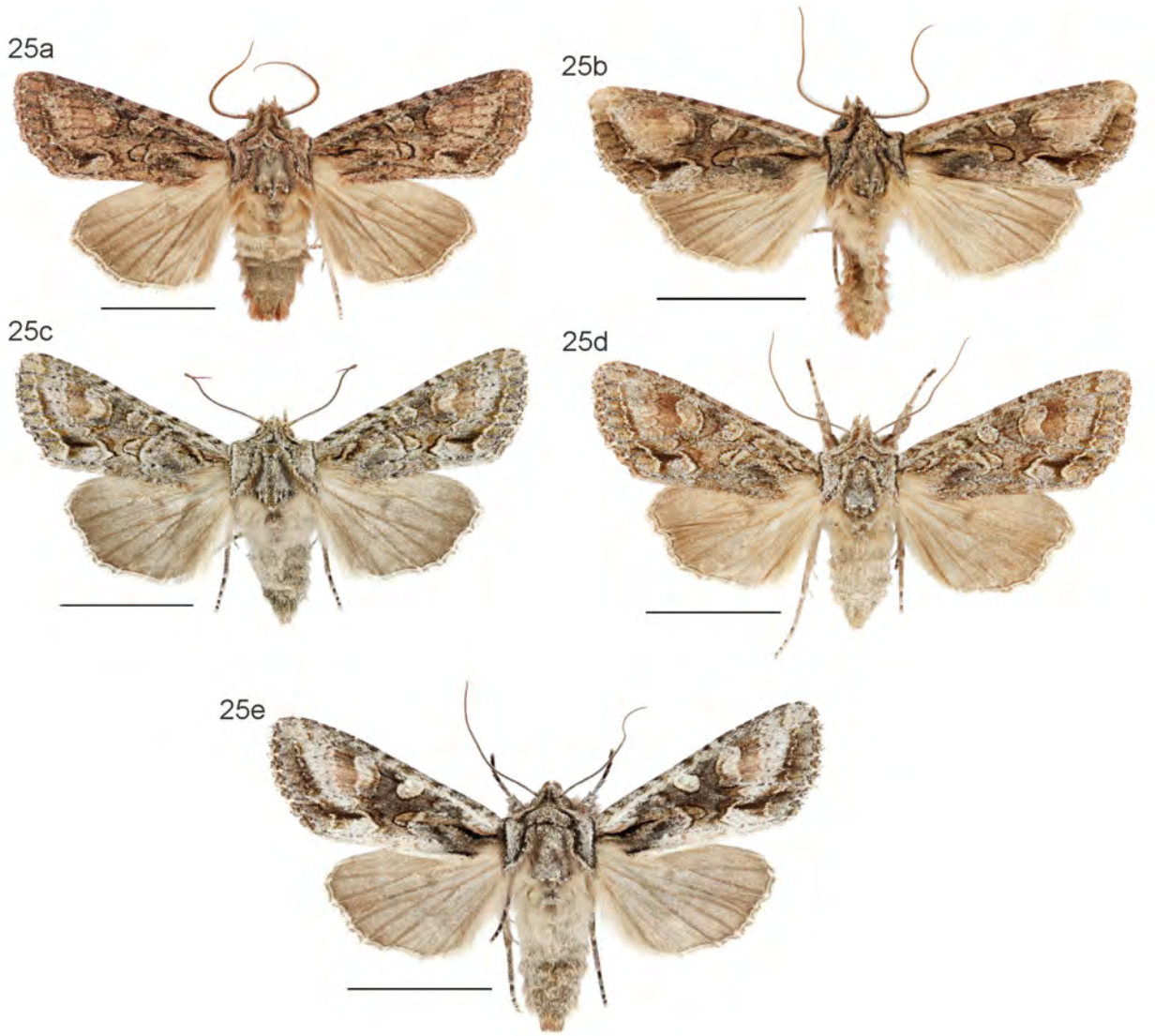
Figs 20a, b, *Ichneutica moderata* males; **20c, d,** *I. moderata* females; **21a,** *I. oliveri* male; **21b,** *I. oliveri* female.



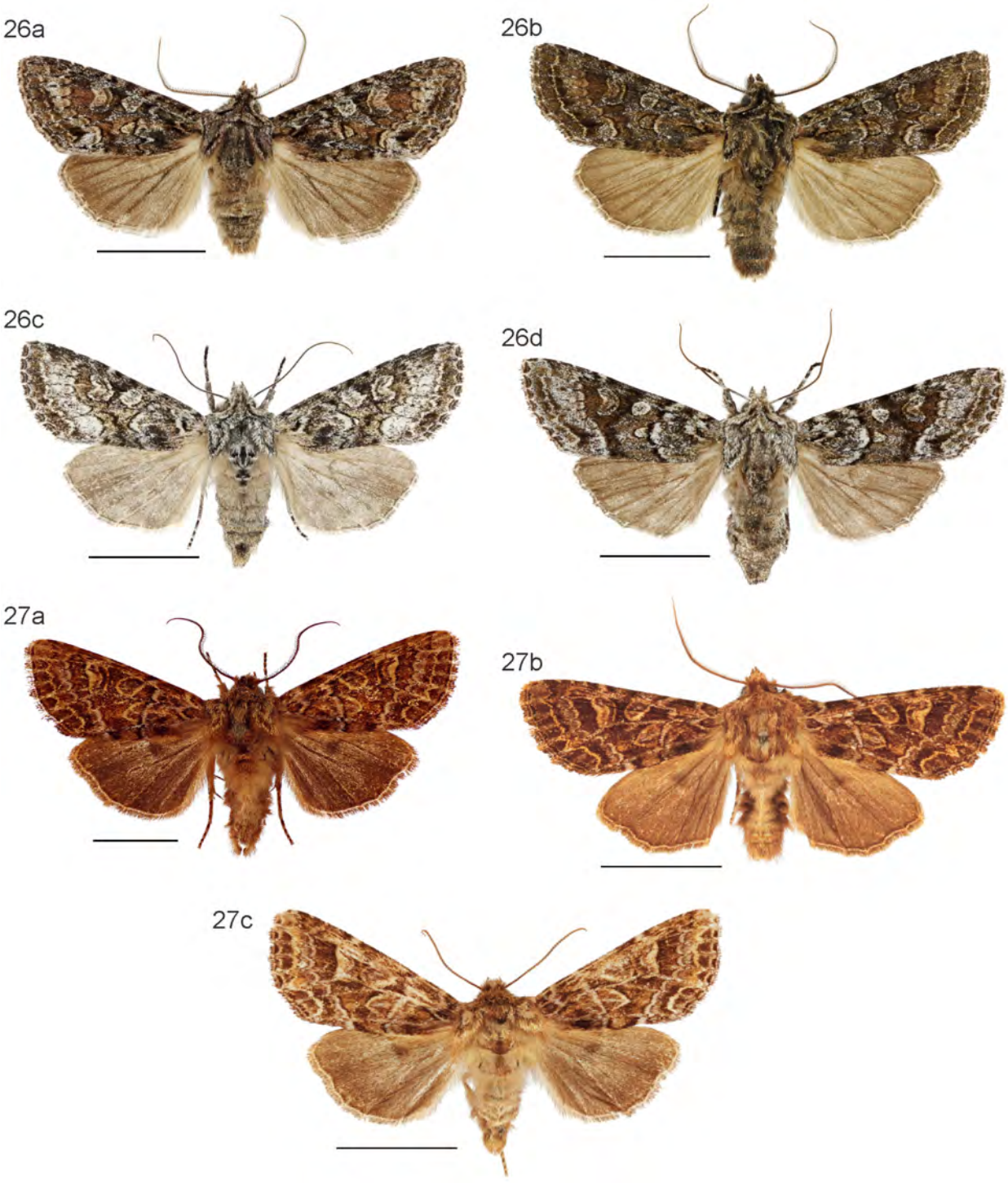
Figs 22a, b, *Ichneutica averilla* males; **22c, d,** *I. averilla* females; **23a, b,** *I. bromias* males; **23c,** *I. bromias* female.



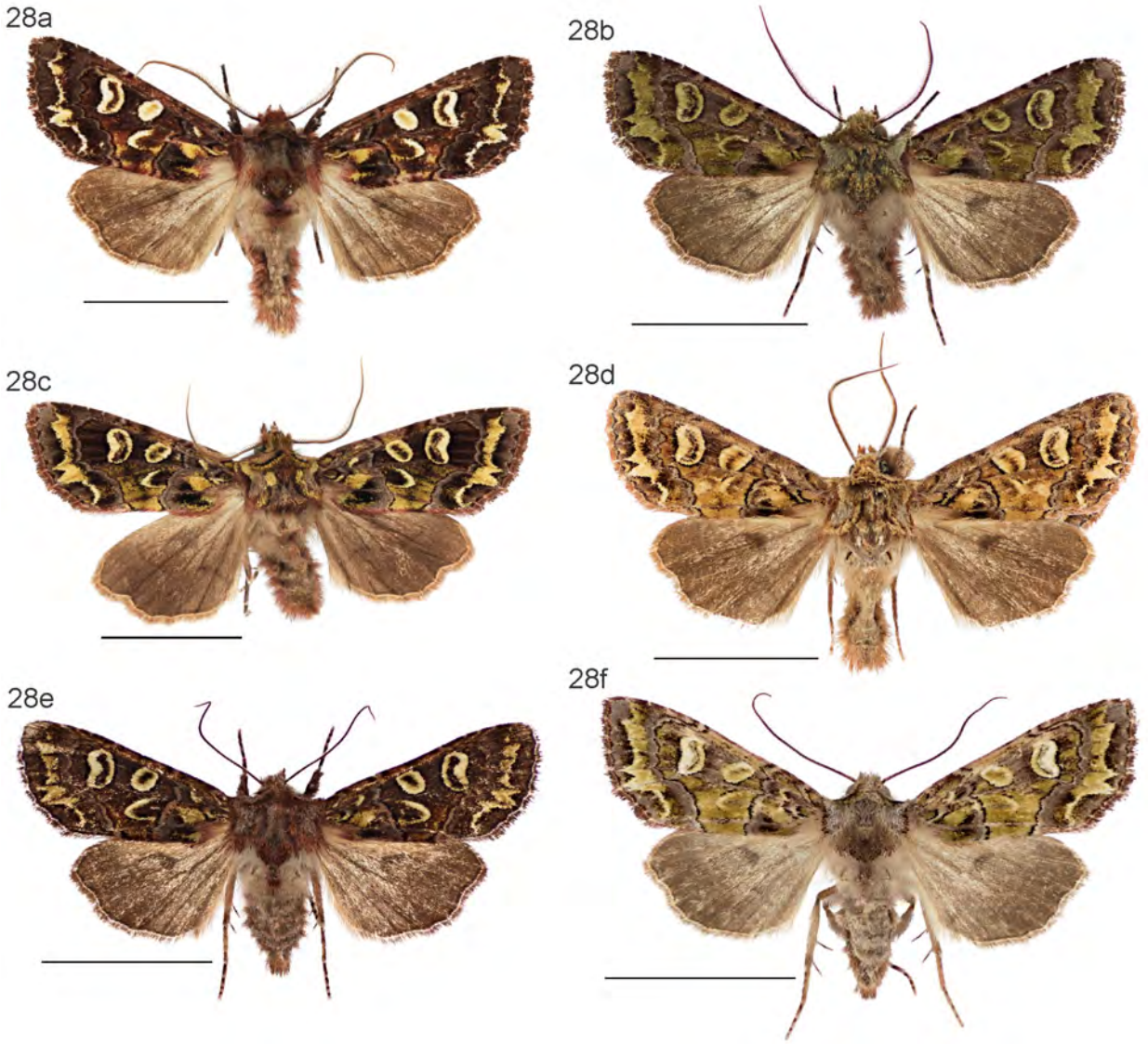
Figs 24a, b, c, d, *Ichneutica erebia* males; **24e, f, g,** *I. erebia* females.



Figs 25a, b, *Ichneutica mutans* males; **25c, d, e,** *I. mutans* females.



Figs 26a, b, *Ichneutica petrograpta* males; **26c, d,** *I. petrograpta* females; **27a, b,** *I. brunneosa* males; **27c,** *I. brunneosa* female.



Figs 28a, b, c, d, *Ichneutica chlorodonta* males; **28e, f,** *I. chlorodonta* females. (**28d** older specimen (Arthur's Pass NC, 1974, NZAC) with forewing colour faded from green to yellow.)

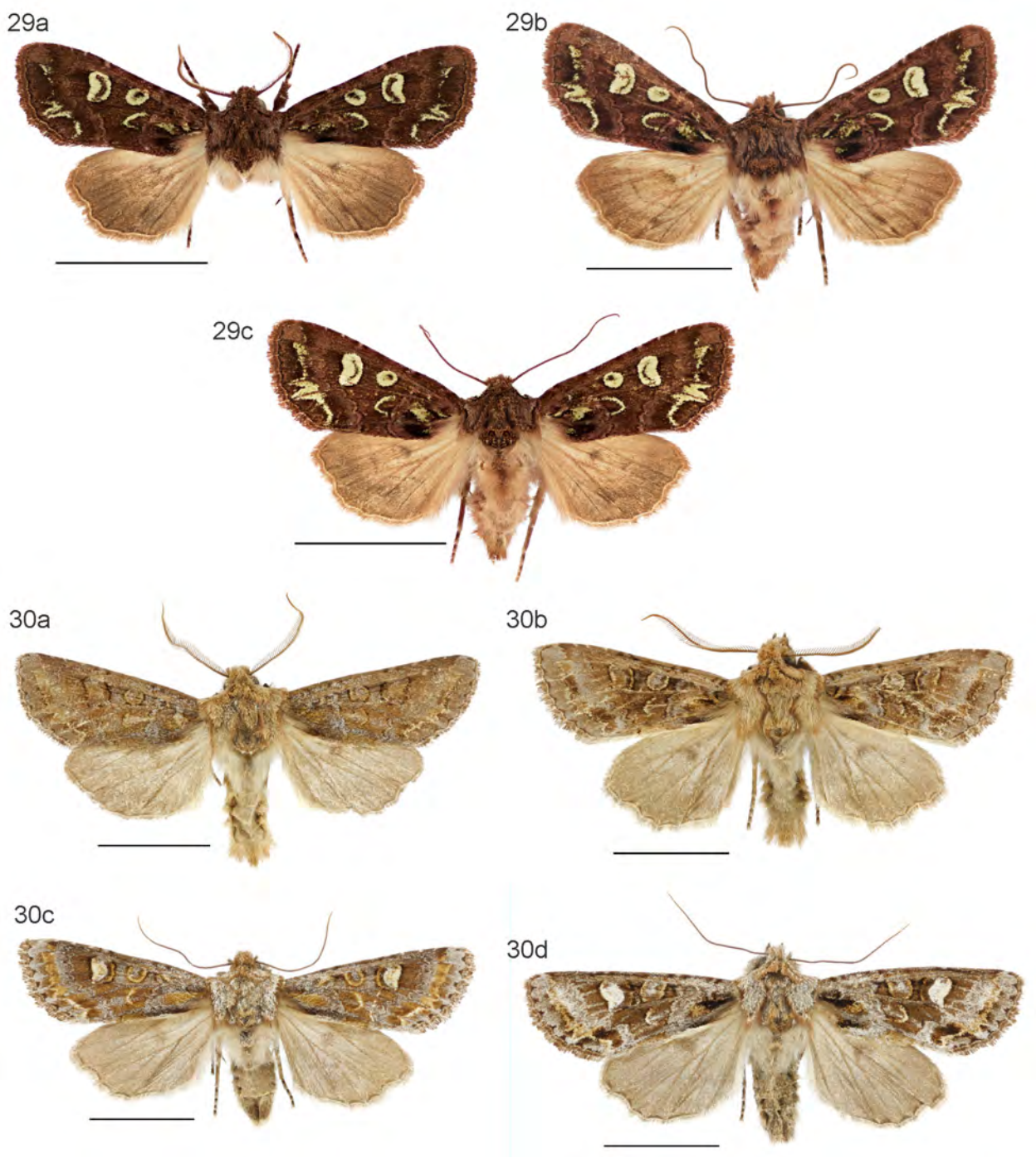
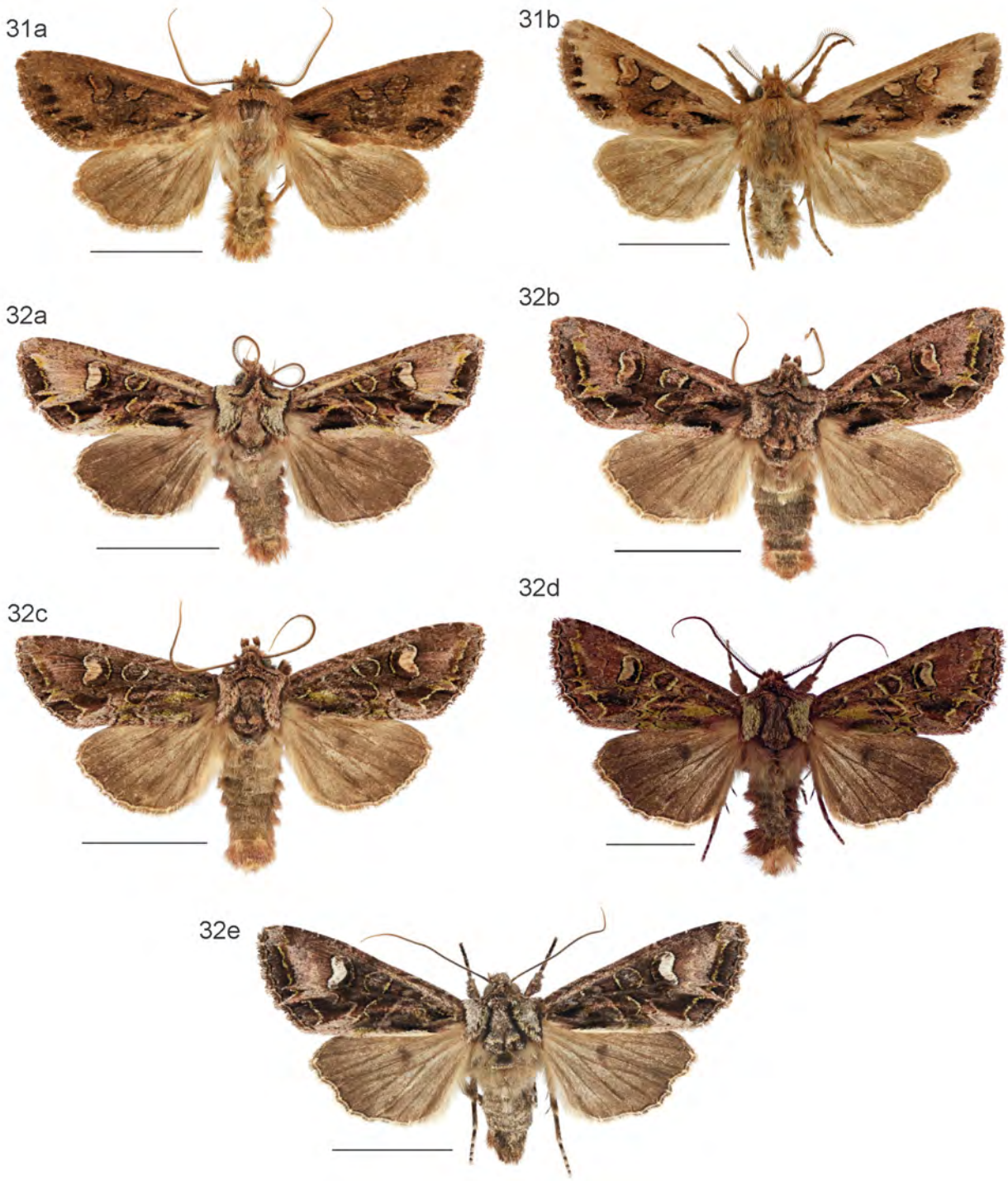
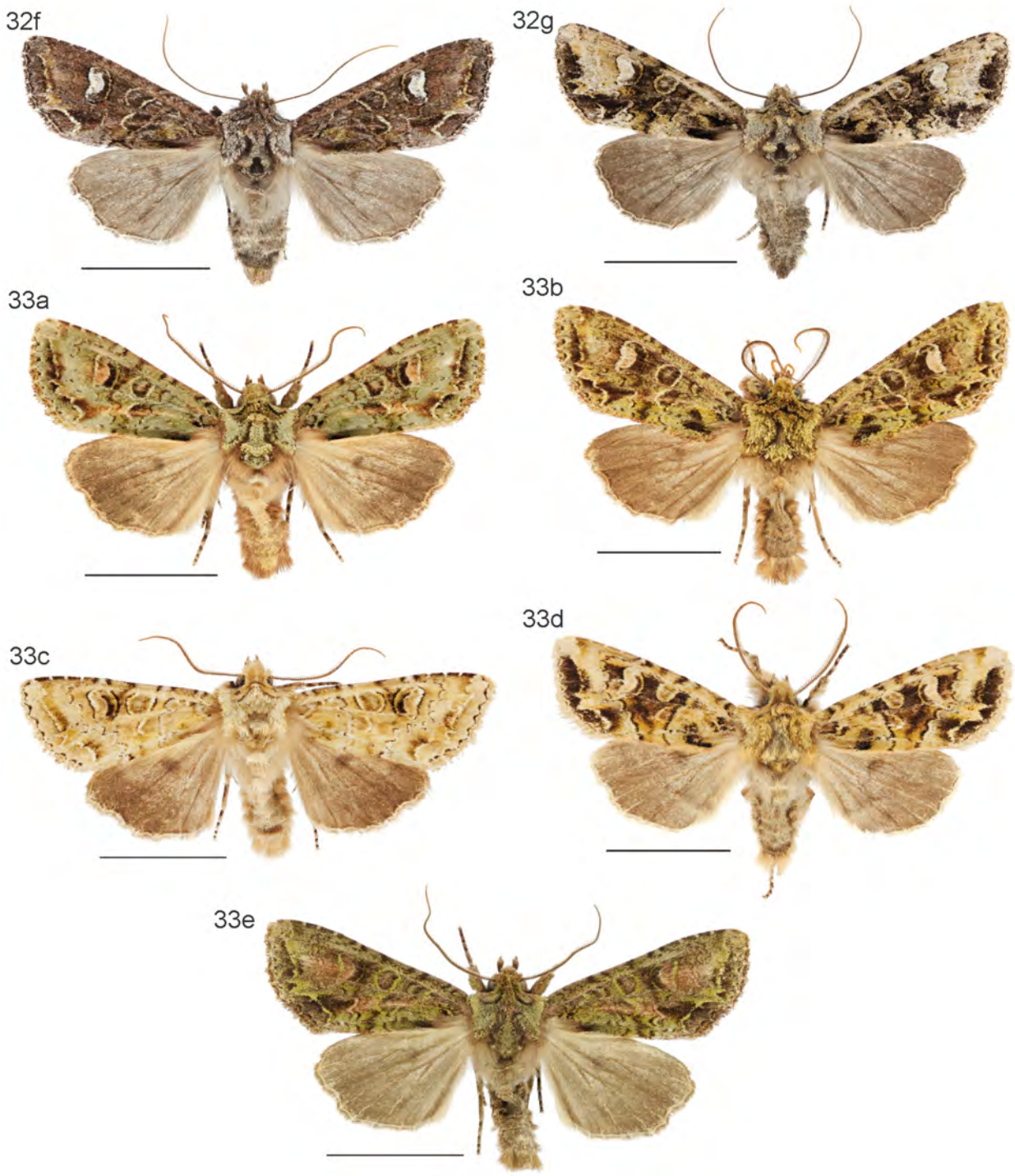


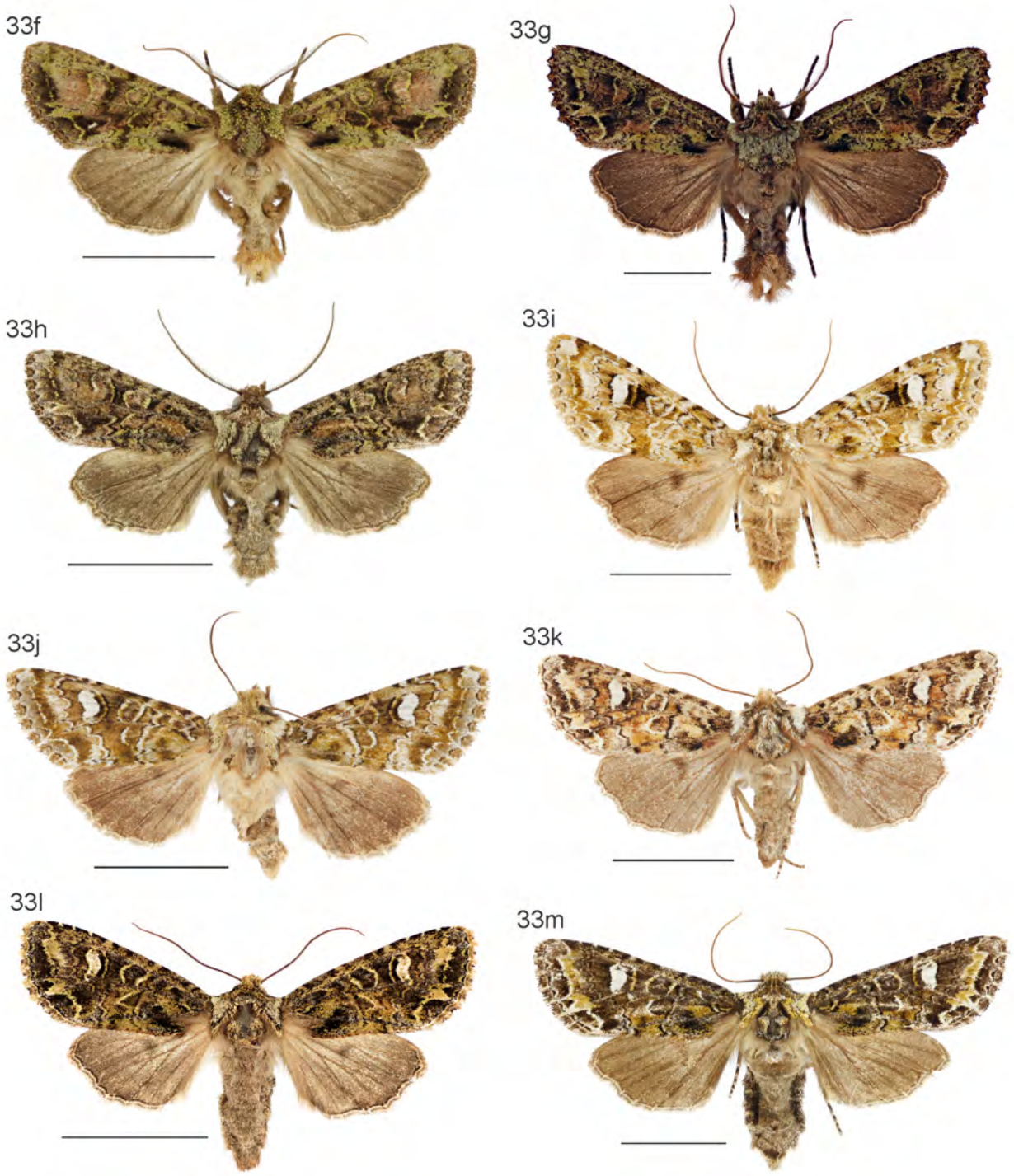
Fig. 29a, *Ichneutica subcyprea* male holotype; **29b, c,** *I. subcyprea* female paratypes; **30a, b,** *I. dundastica* male paratypes (NZAC); **30c, d,** *I. dundastica* female paratypes.



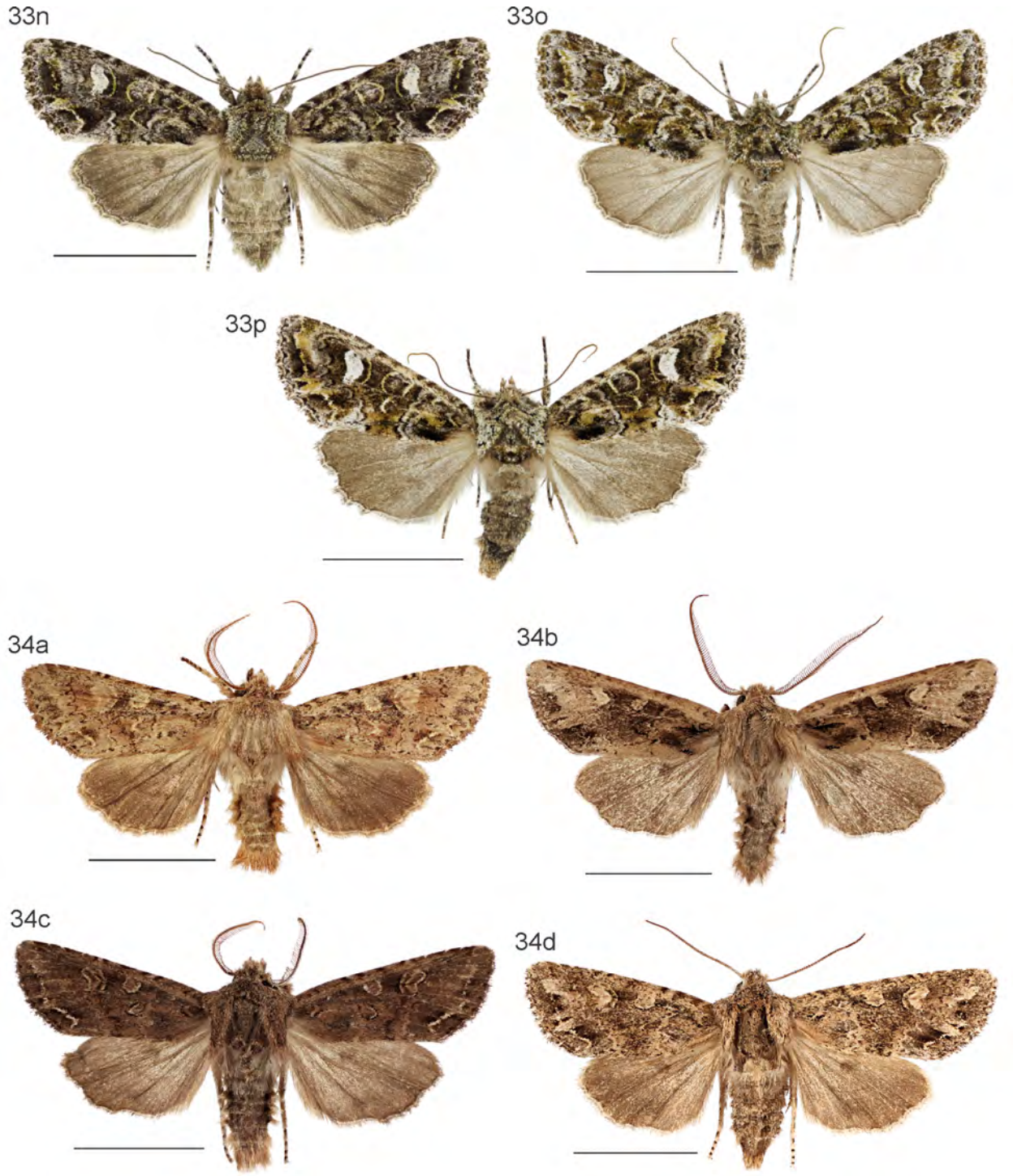
Figs 31a, b, *Ichneutica fenwicki* males; **32a, b, c, d,** *I. insignis* males; **32e,** *I. insignis* female.



Figs 32f, g, *Ichneutica insignis* females; **33a, b, c, d,** *I. plena* males. (**33c, d,** older specimens with forewing colour faded from green to yellowish.) **33e** *I. plena s.l.* male (specimen with pinkish colour around reniform as in *I. insignis*).

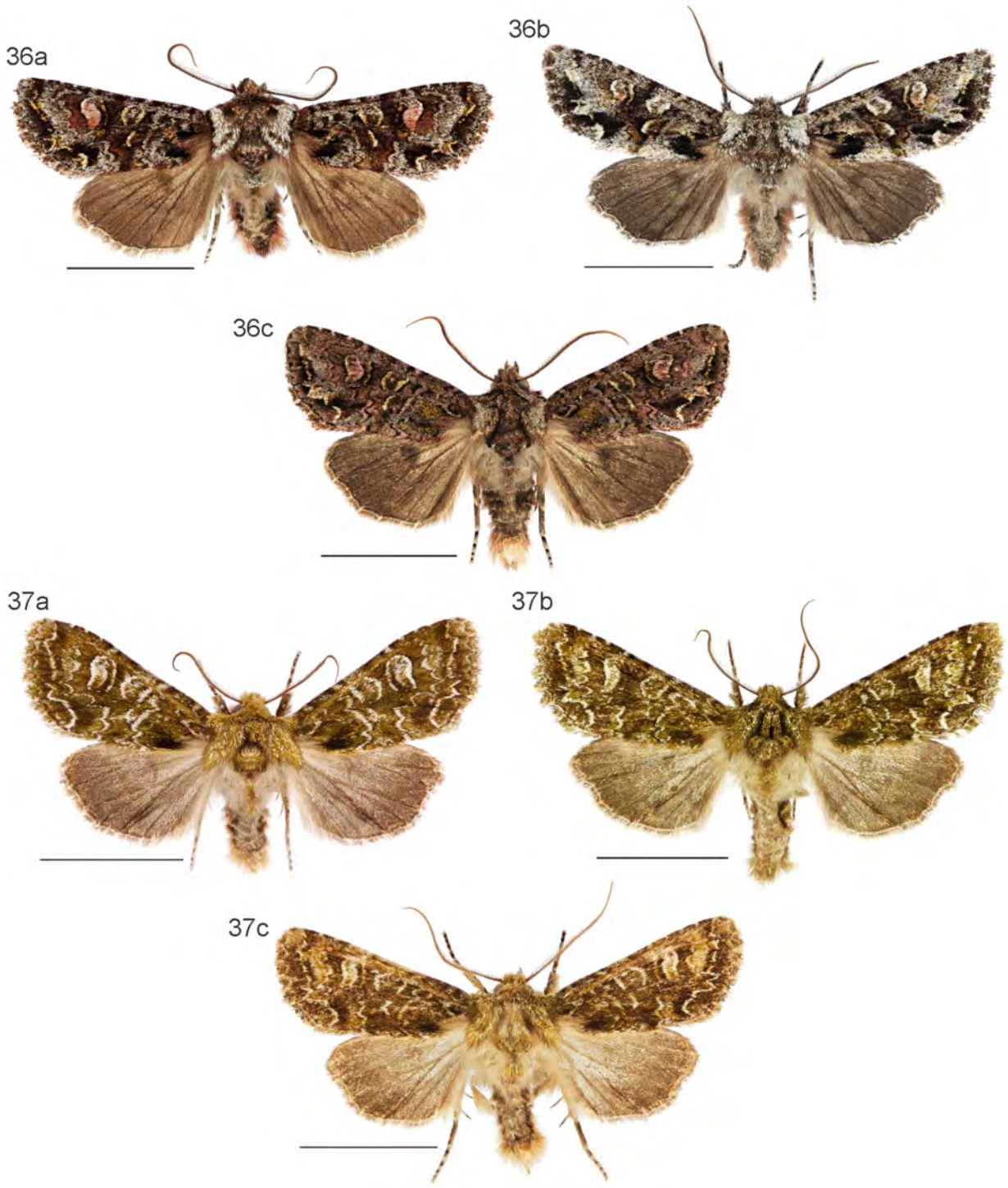


Figs 33f, g, h, *Ichneutica plena s.l.* males (specimens with darker forewing ground colour and green less extensive); **33i, j, k,** *I. plena s.s.* females; **33l, m,** *I. plena s.l.* females (specimens with darker forewing ground colour).

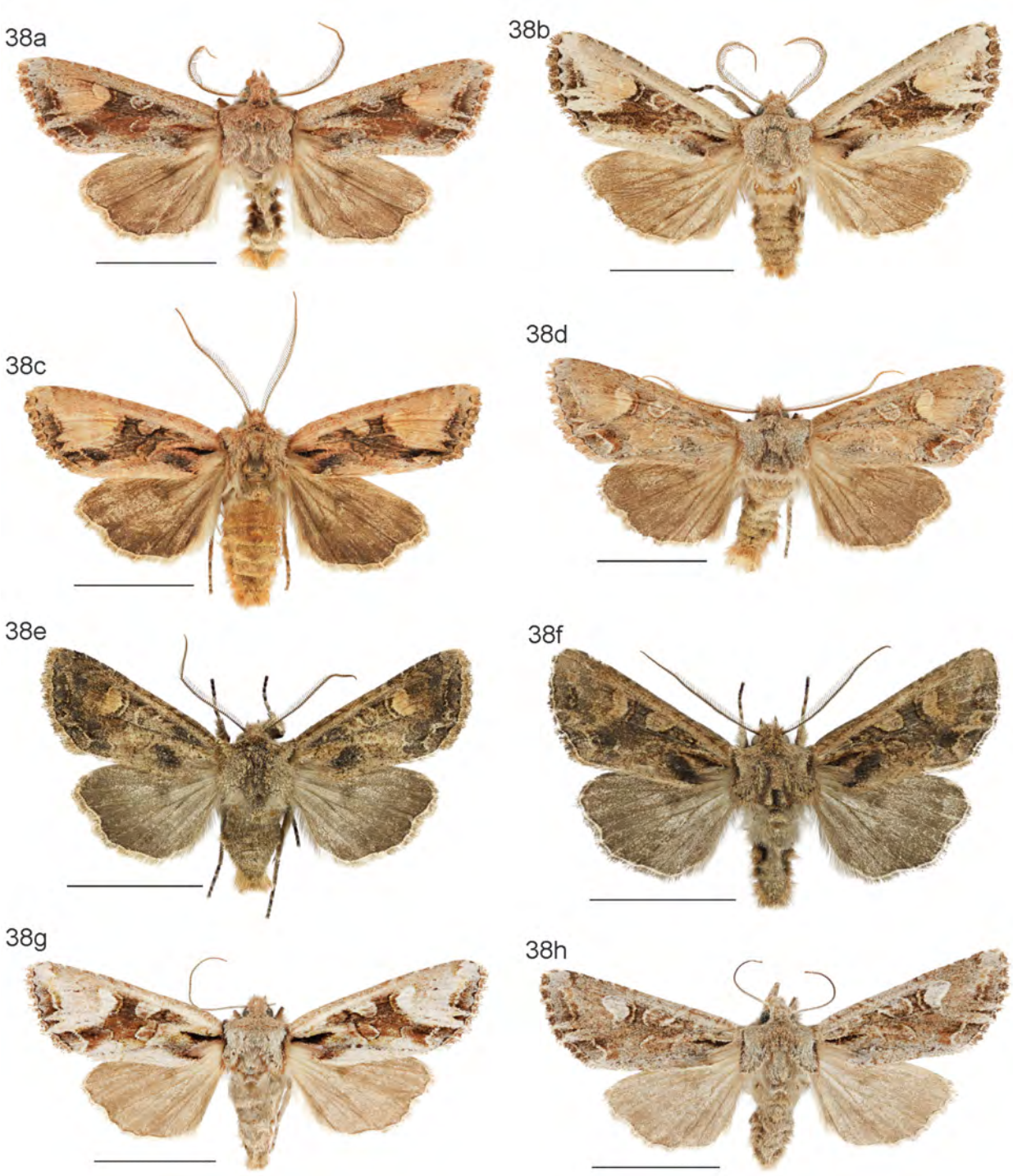


Figs 33n, o, p, *I. plena s.l.* females (specimens with darker forewing ground colour and bluish scaling near postmedian line); **34a, b,** *I. naufraga* male paratypes; **34c, d,** *I. naufraga* female paratypes.

Figs 35a, b, c, *Ichneutica pagaia* males; **35d, e, f,** *I. pagaia* females.



Figs 36a, b, *Ichneutica pelanodes* males, Tongariro N.P. TO (NZAC) **36c,** *I. pelanodes* male, northern peatland / gumland form, Kopuatai Peat Dome WO (NZAC); **37a, b,** *I. peridotea* male paratypes; **37c,** *I. peridotea* male holotype.



Figs 38a, b, c, d, *Ichneutica scutata* males; **38e, f,** *I. scutata* males, small dark Canterbury form (Kaitorete Spit MC, NZAC); **38g, h,** *I. scutata* females.

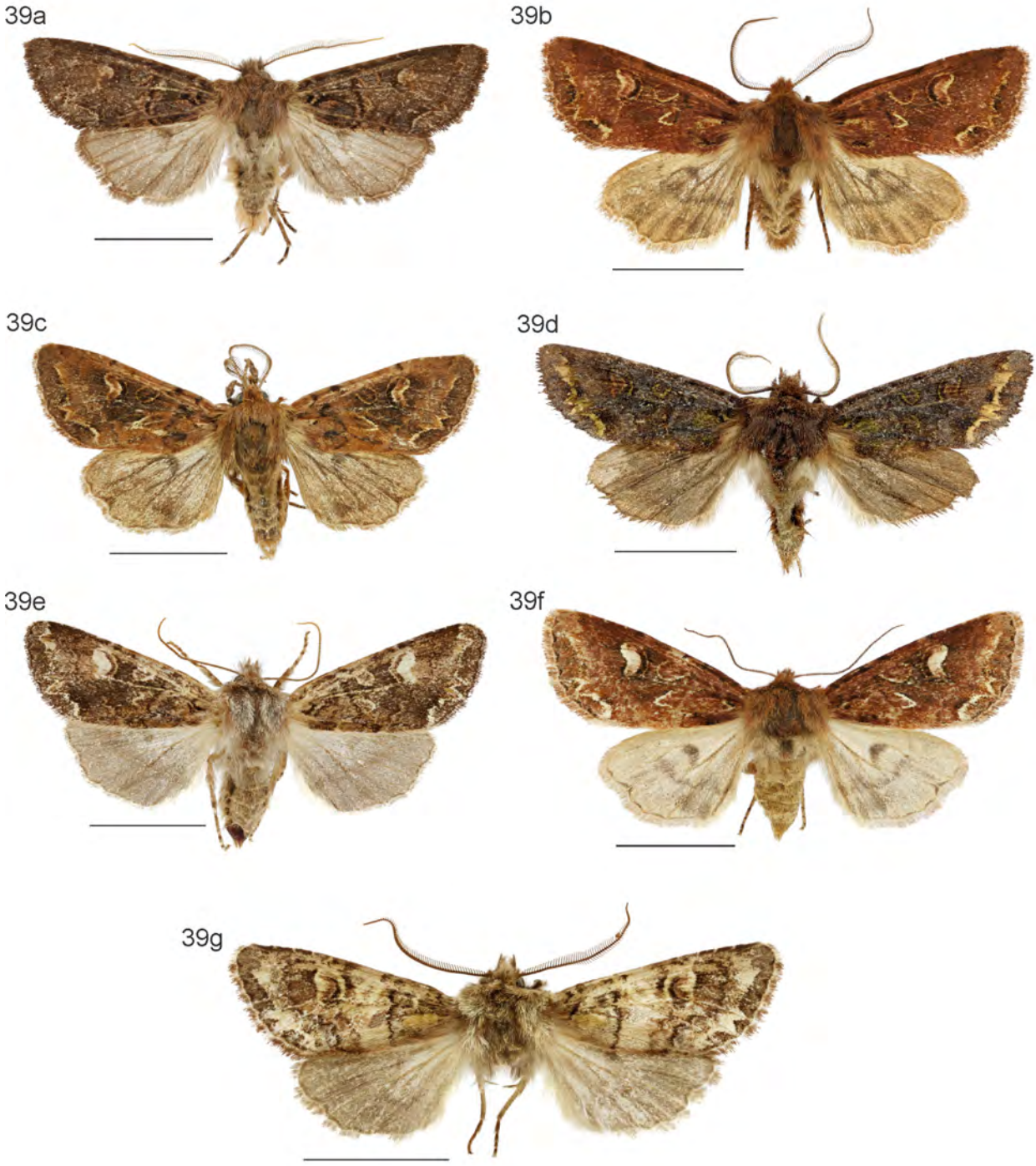


Fig. 39a, *Ichneutica sericata* male paralectotype, Fiordland (MONZ); **39b, c,** *I. sericata* males; **39d,** *I. sericata* male, dark Stewart Island form (Table Hill SI); **39e, f,** *I. sericata* females; **39g,** *I. sericata* male (Pouakai Range TK, MONZ).

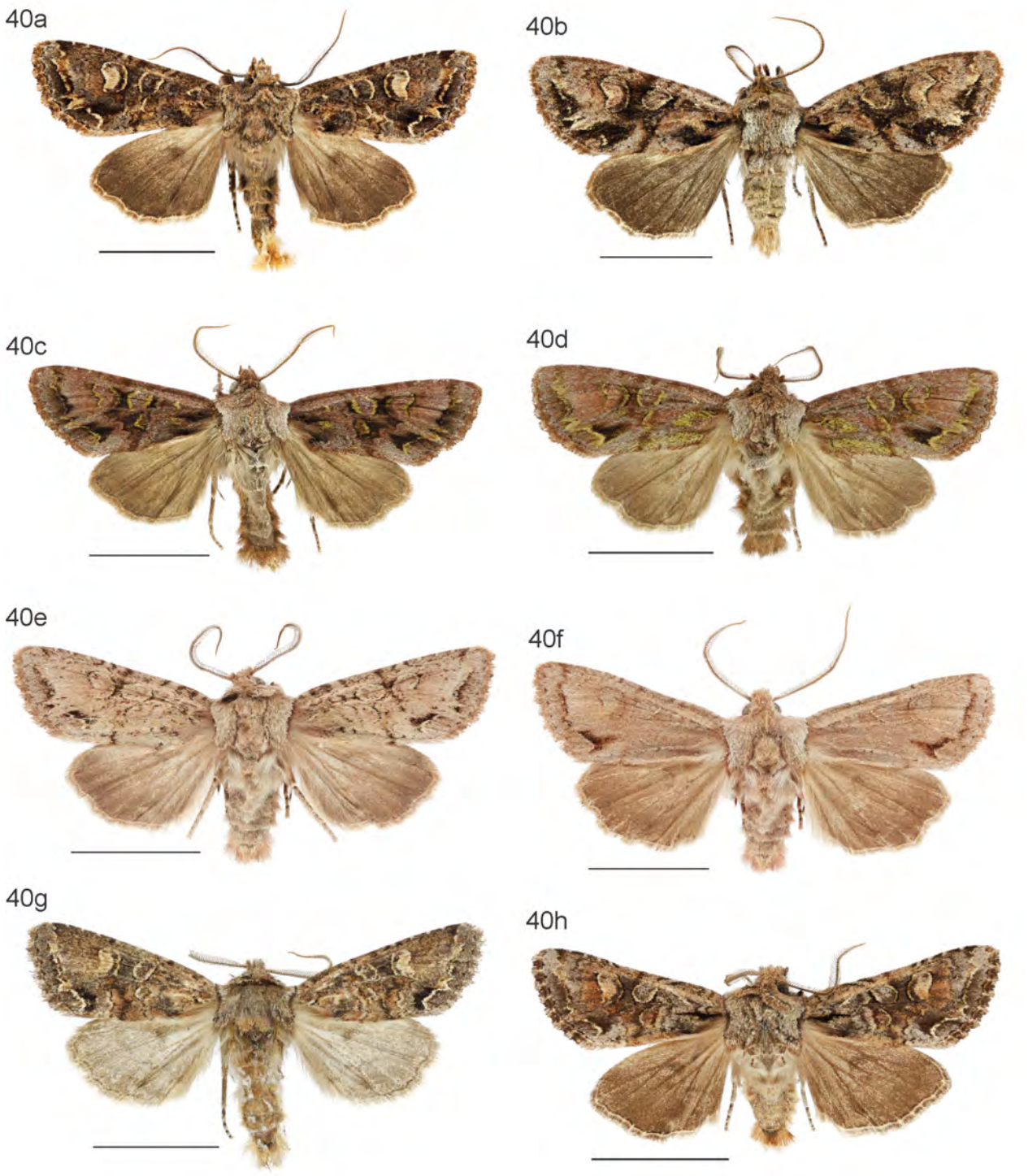


Fig. 40a, b, c, d, e, f, g, h, *Ichneutica skelloni* males: **40a,** St Arnaud MB (NZAC); **40b,** Lyttles Flat FD (OMNZ); **40c, d,** Secretary Is. FD (OMNZ); **40e,** Dunedin DN (NZAC); **40f,** Kapuka SL (NZAC); **40g,** Swampy Summit DN (OMNZ); **40h,** Kawarau Gorge CO (NZAC).

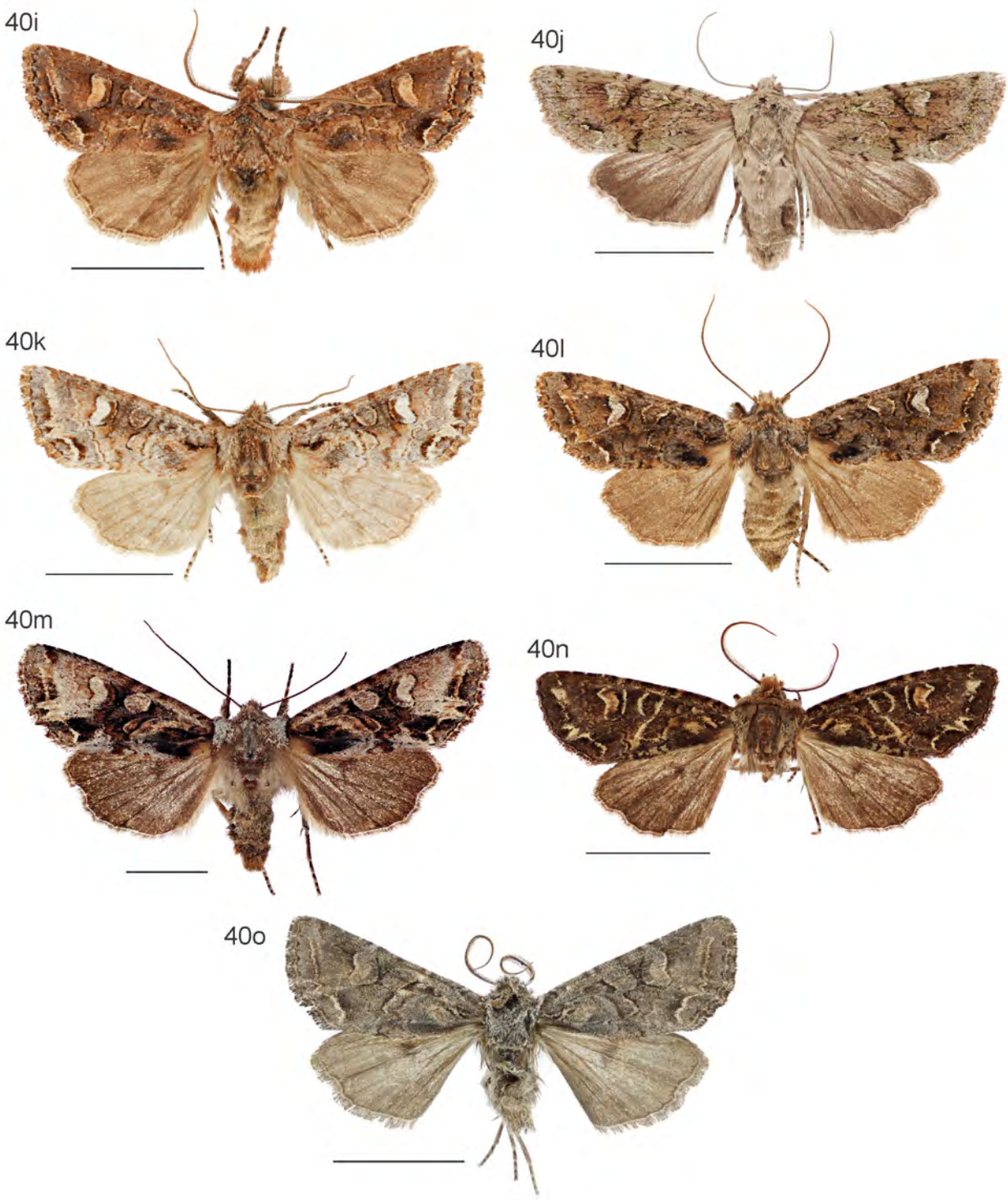


Fig. 40i, *Ichneutica skelloni* male, Flagstaff DN (NZAC); **40j, k, l, m,** *I. skelloni* females: **40j,** Dunedin DN (NZAC); **40k,** Dunedin DN (NZAC); 40l, Queenstown OL (NZAC); **40m,** Cascade Creek FD (NZAC); **40n,** *I. skelloni s.l.* male, *chlorodonta*-like form, Coal Creek WD (OMNZ); **40o,** *I. skelloni s.l.* male, grey form, Porter Heights MC (OMNZ).

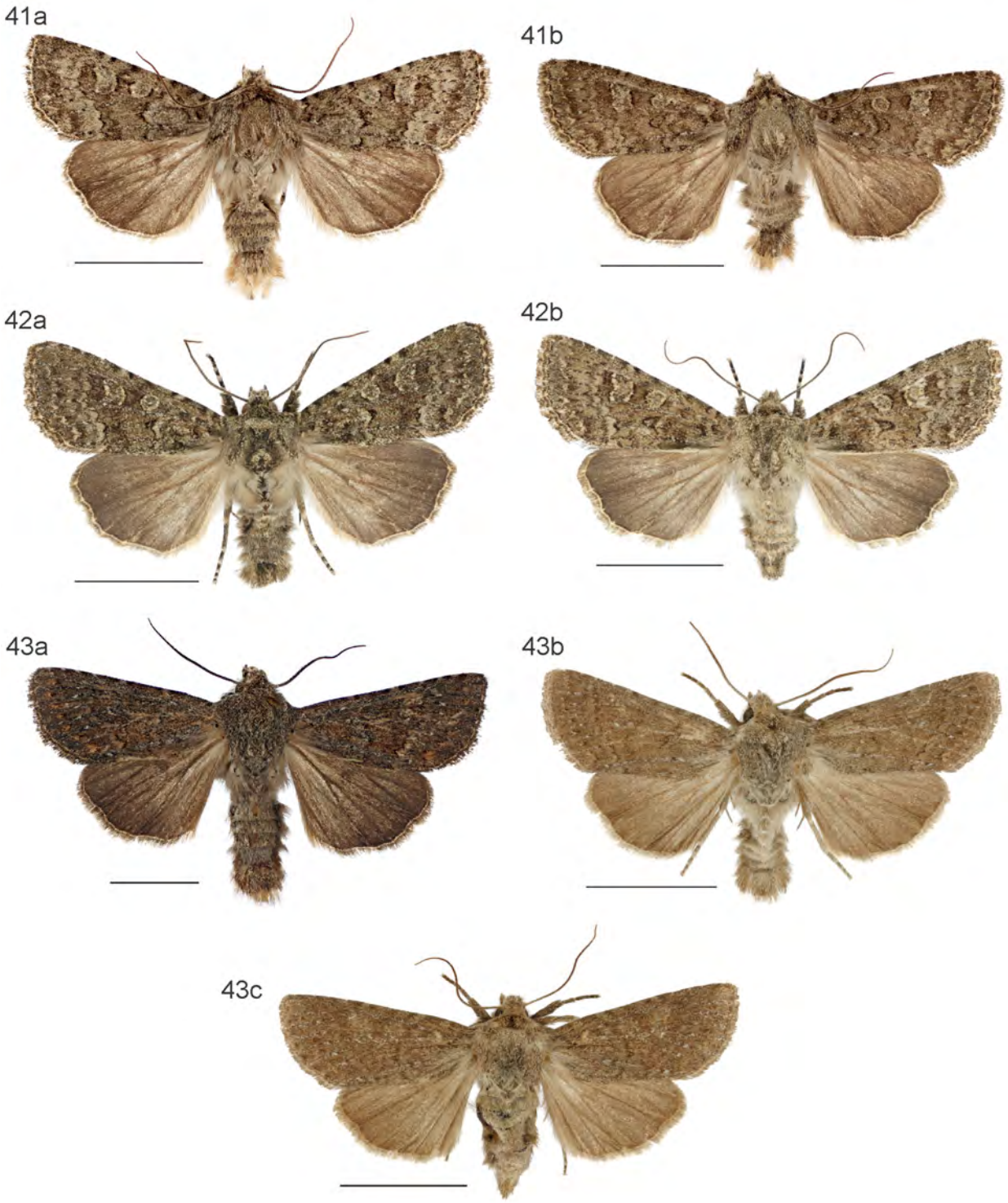
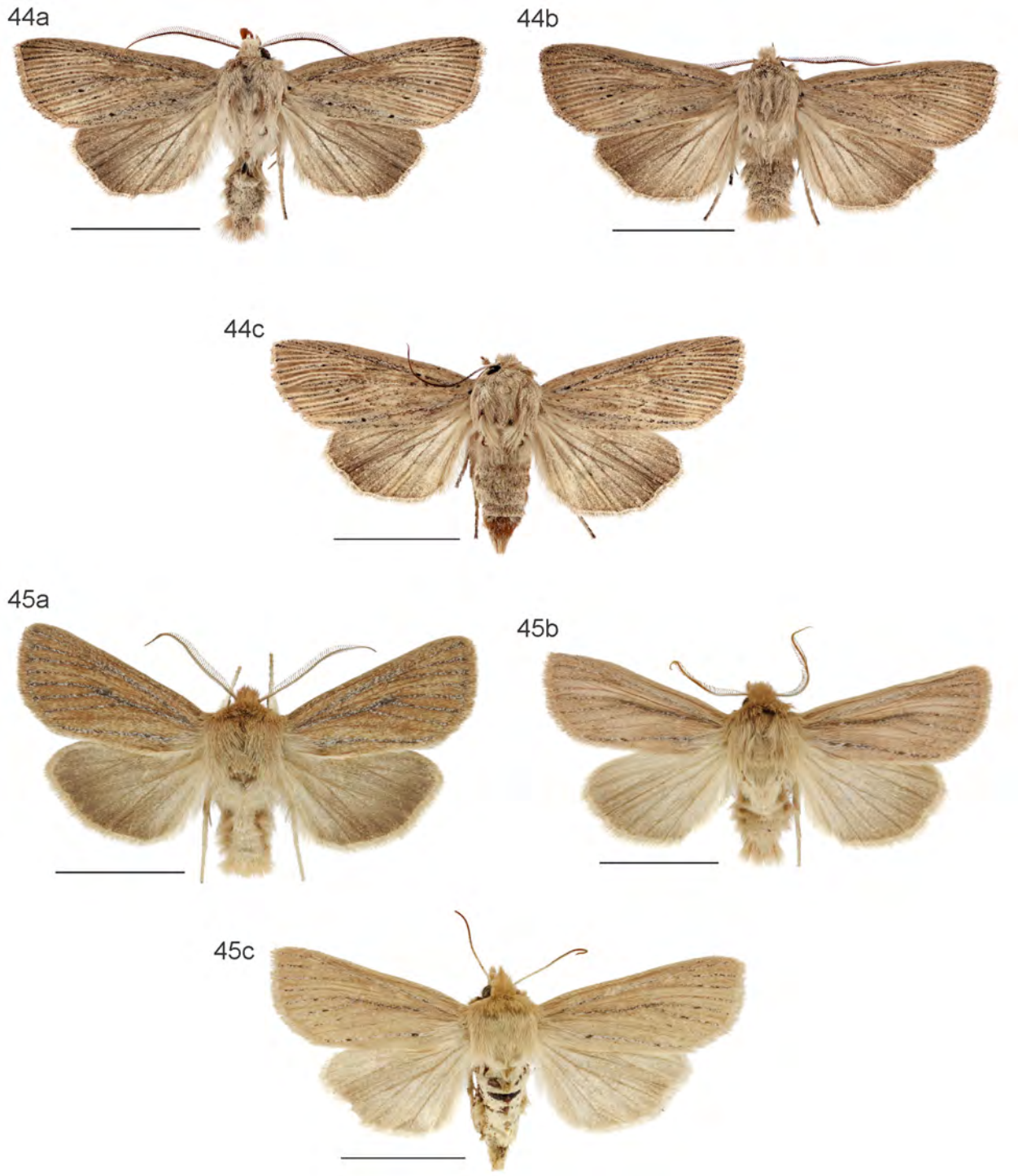


Fig. 41a, *Ichneutica barbara* male; **41b,** *I. barbara* male paratype; **42a,** *I. omicron* male; **42b,** *I. omicron* female; **43a, b,** *I. sollennis* males; **43c,** *I. sollennis* female.



Figs 44a, b, *Ichneutica cornuta* male paratypes (LUNZ); **44c,** *I. cornuta* female paratype (LUNZ); **45a, b,** *I. lissoxyla* males; **45c,** *I. lissoxyla* female.

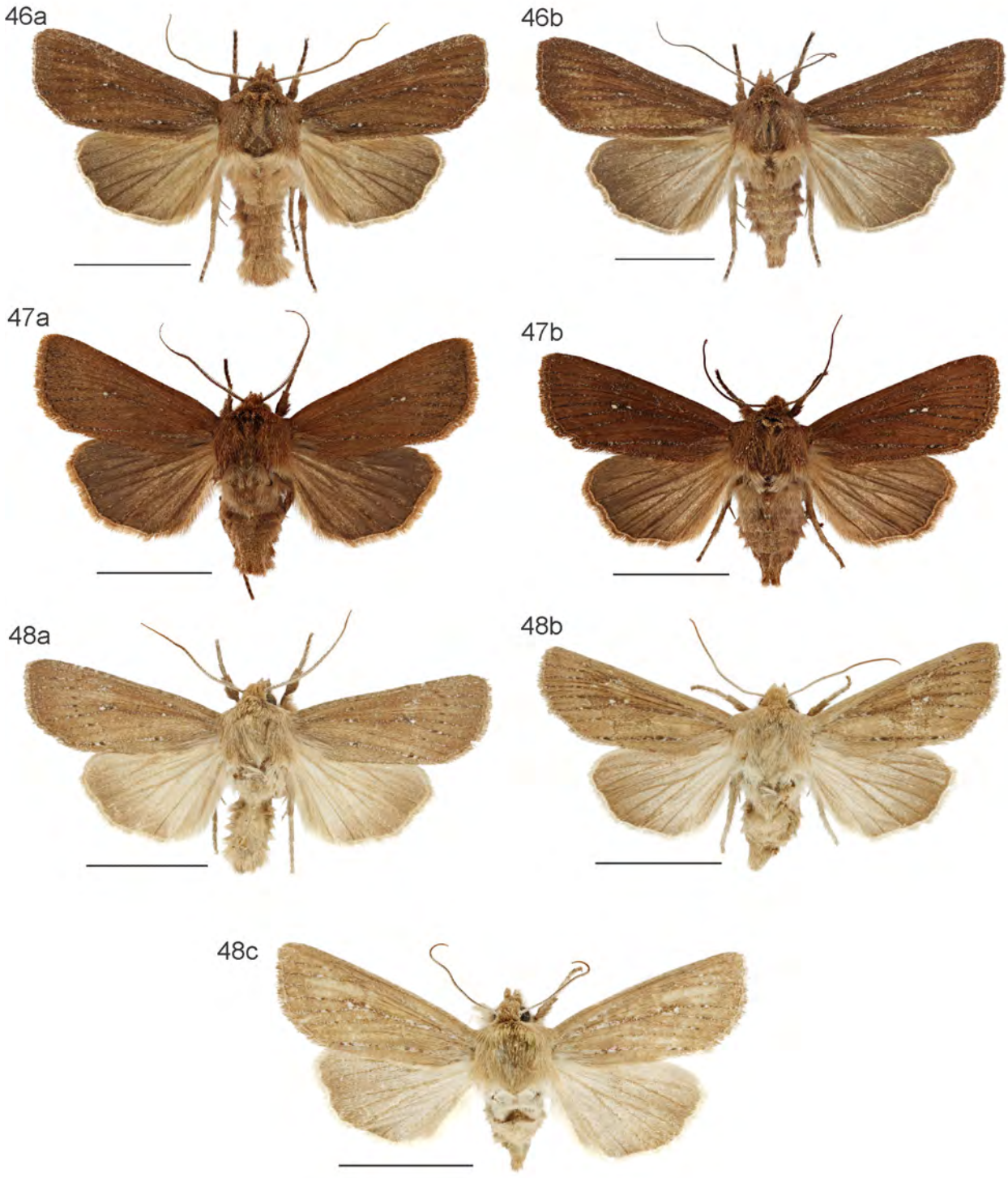


Fig. 46a, *Ichneutica micrastra* male; **46b,** *I. micrastra* female; **47a,** *I. sapiens* male; **47b,** *I. sapiens* female; **48a,** *I. phaula* male; **48b, c,** *I. phaula* females.

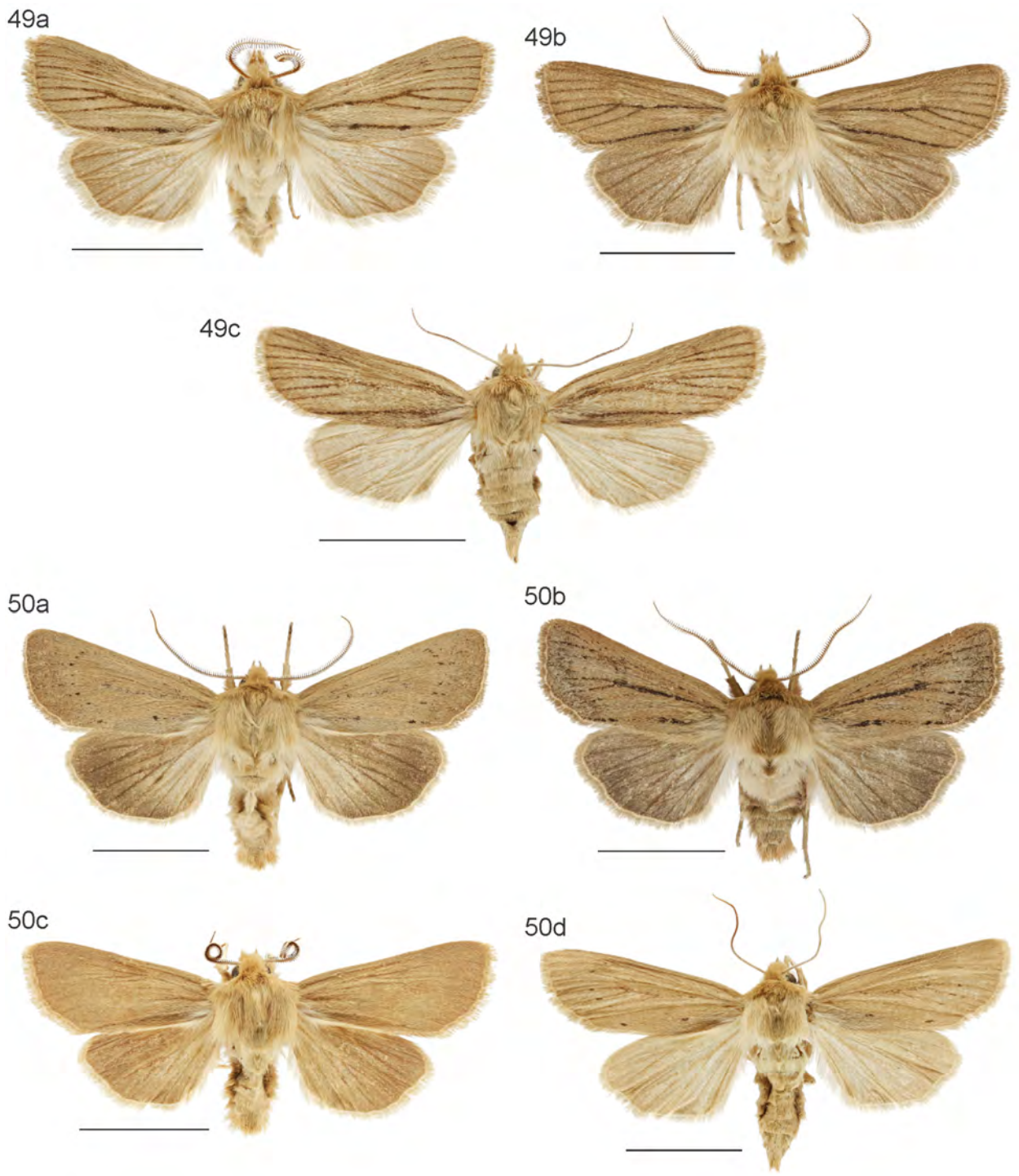
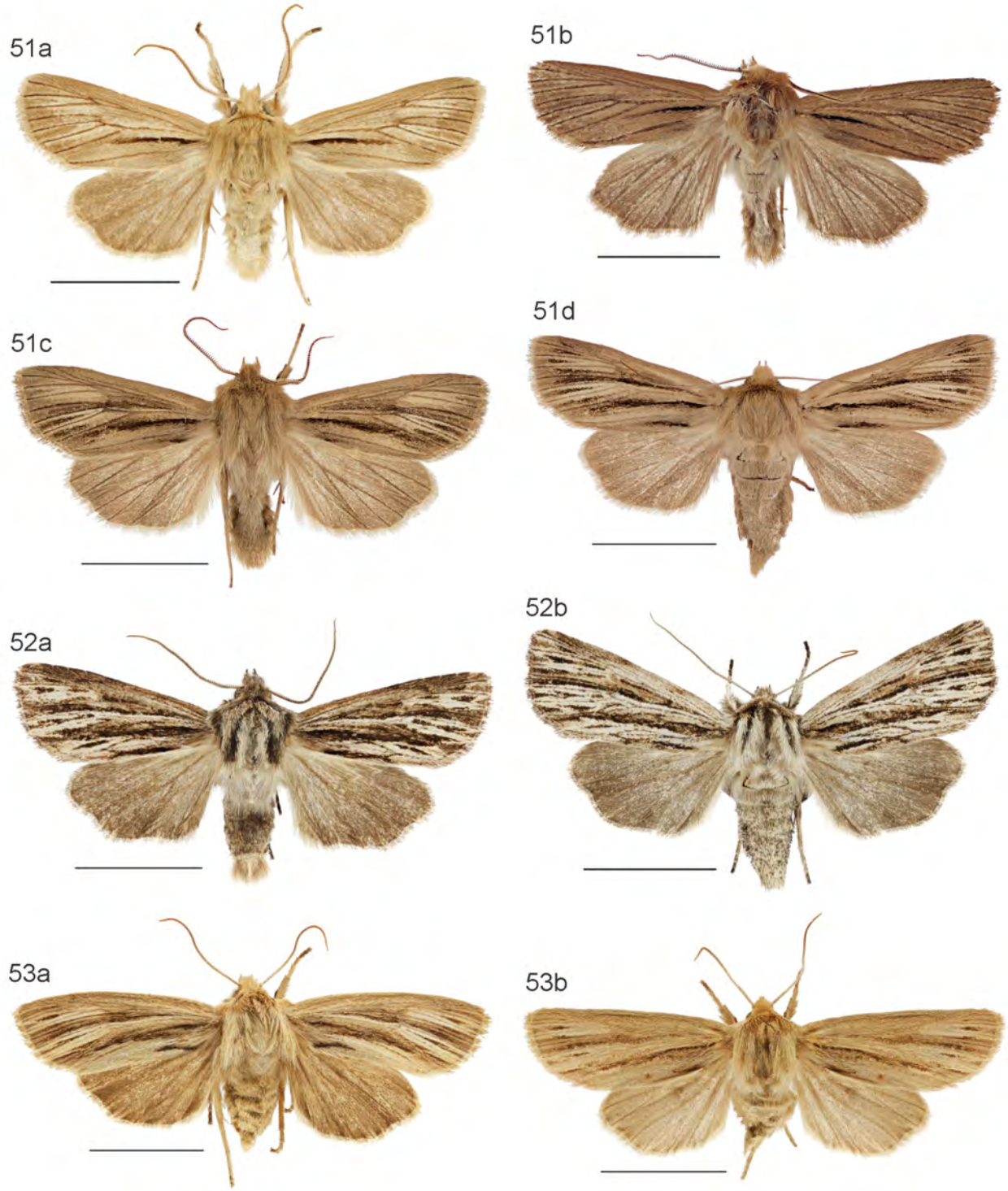
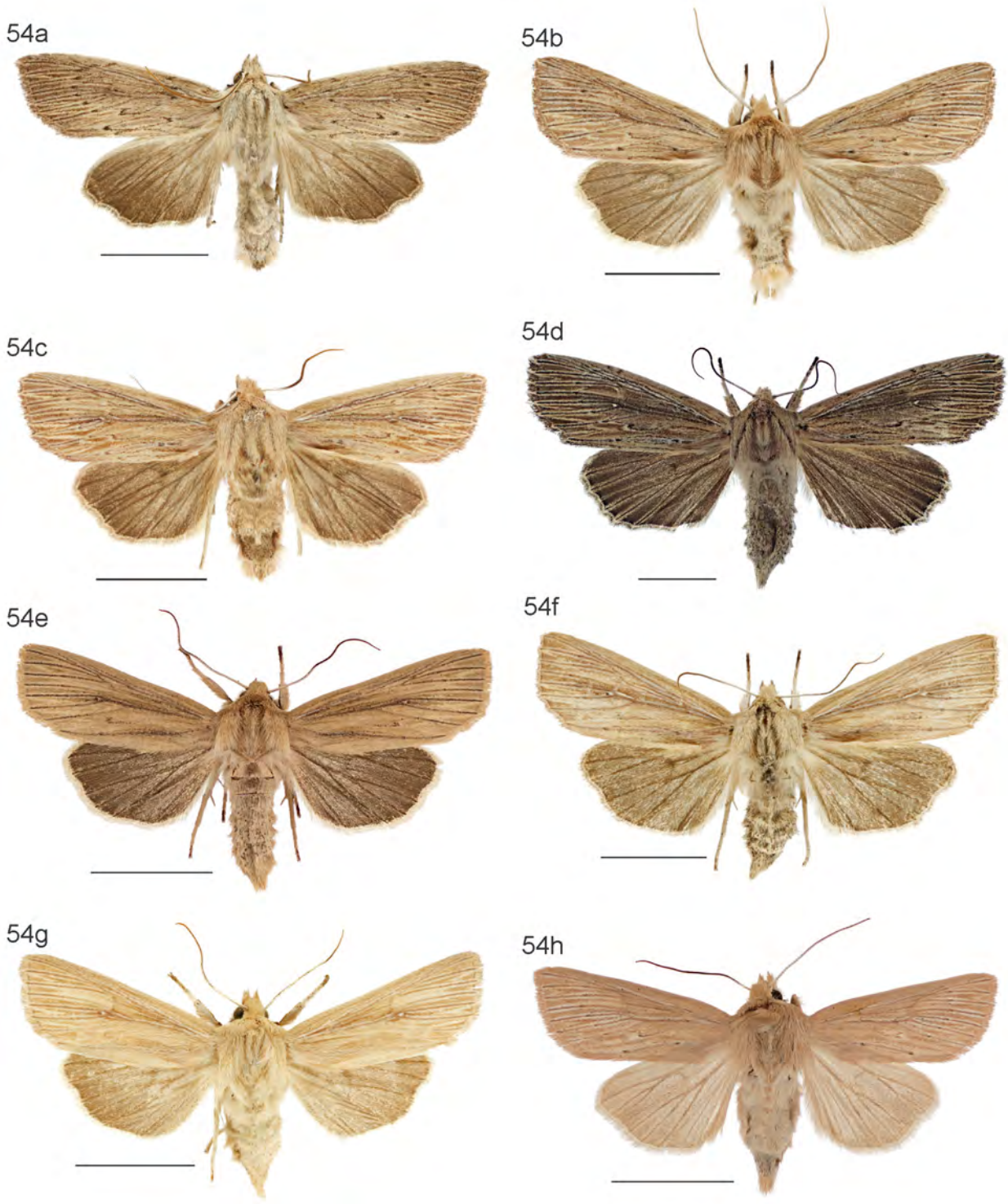


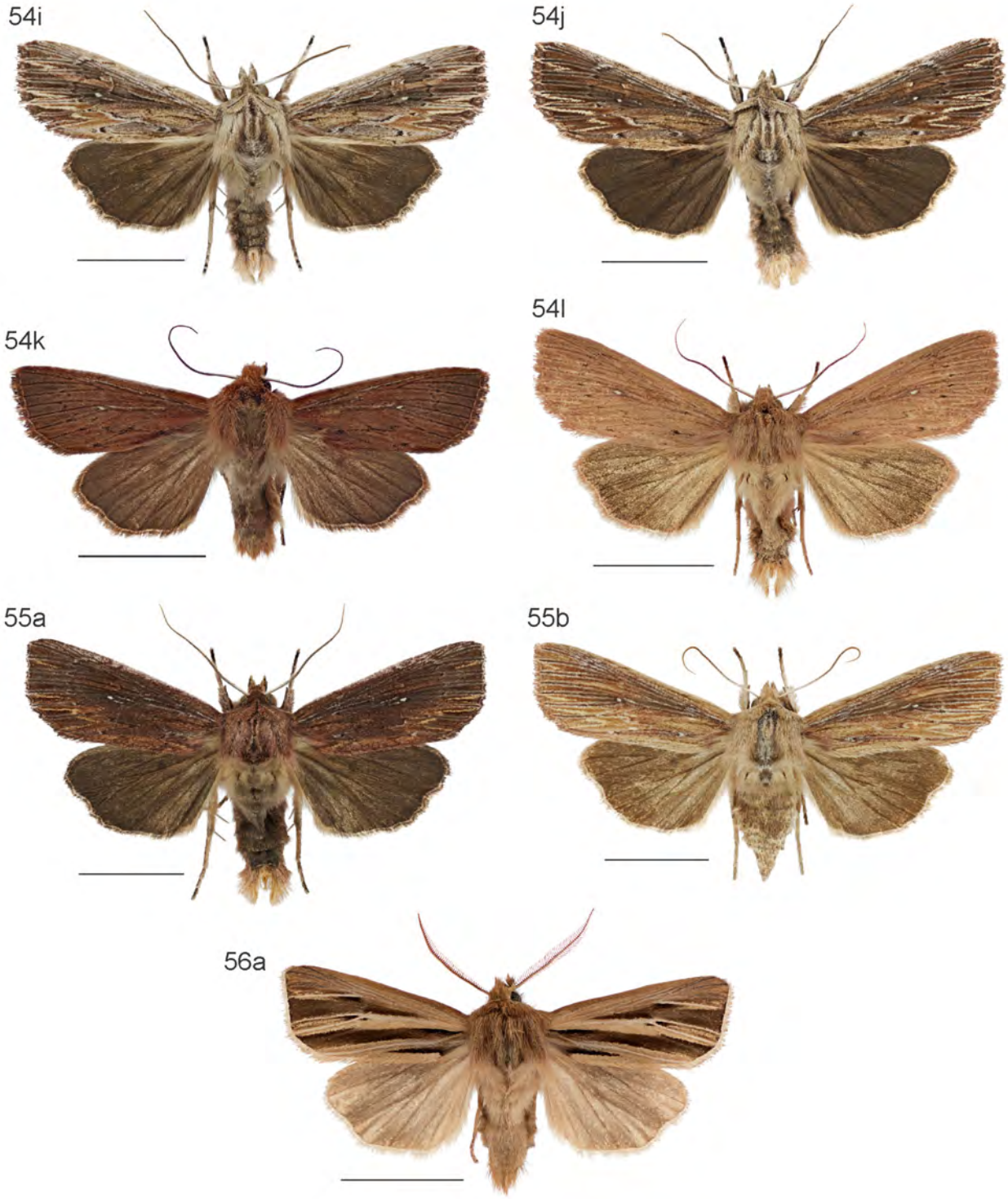
Fig. 49a, b, *Ichneutica toroneura* males; **49c,** *I. toroneura* female; **50a, b, c,** *I. unica* males: **50a,** Jack's Pass MB (NZAC); **50b,** dark form, Rangipo Desert TO (NZAC); **50c,** plain form, Lake Luna OL (NZAC); **50d,** *I. unica* female (no data, NZAC).



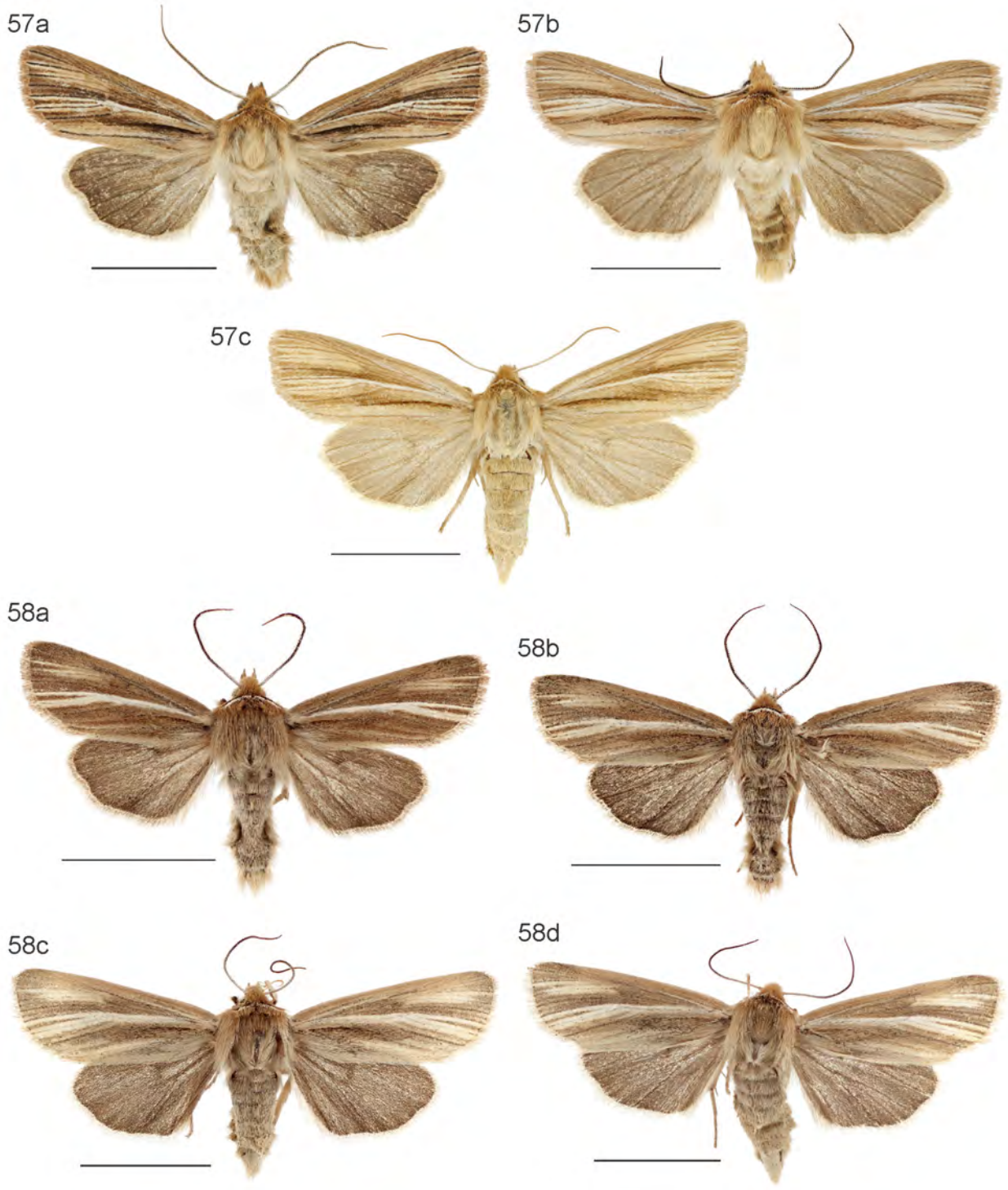
Figs 51a, b, c, *Ichneutica acontistis* males: **51b,** dark form, Upper Wairau V. MB (NZAC); **51c,** strongly marked form, Benmore Range CO (LUNZ); **51d**, *I. acontistis* female, strongly marked form, St Cuthbert Ra. CO (LUNZ); **52a,** *Ichneutica emmersonorum* male paratype (NZAC); **52b,** *I. emmersonorum* female paratype (NZAC); **53a,** *I. stulta* female paralectotype (NZAC); **53b,** *I. stulta* female.



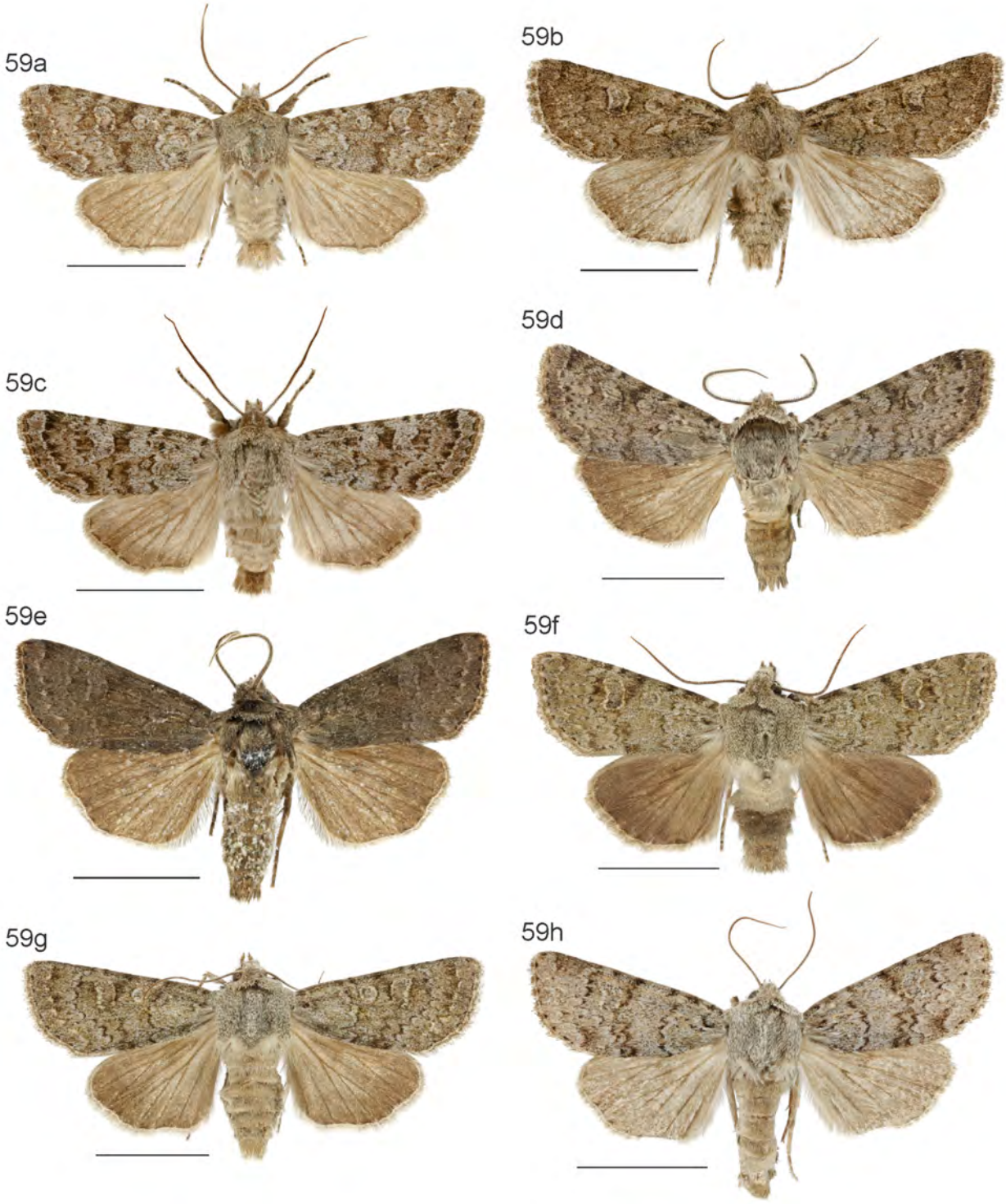
Figs 54a, b, c, *Ichneutica arotis* males; **54d, e, f, g, h,** *I. arotis* females.



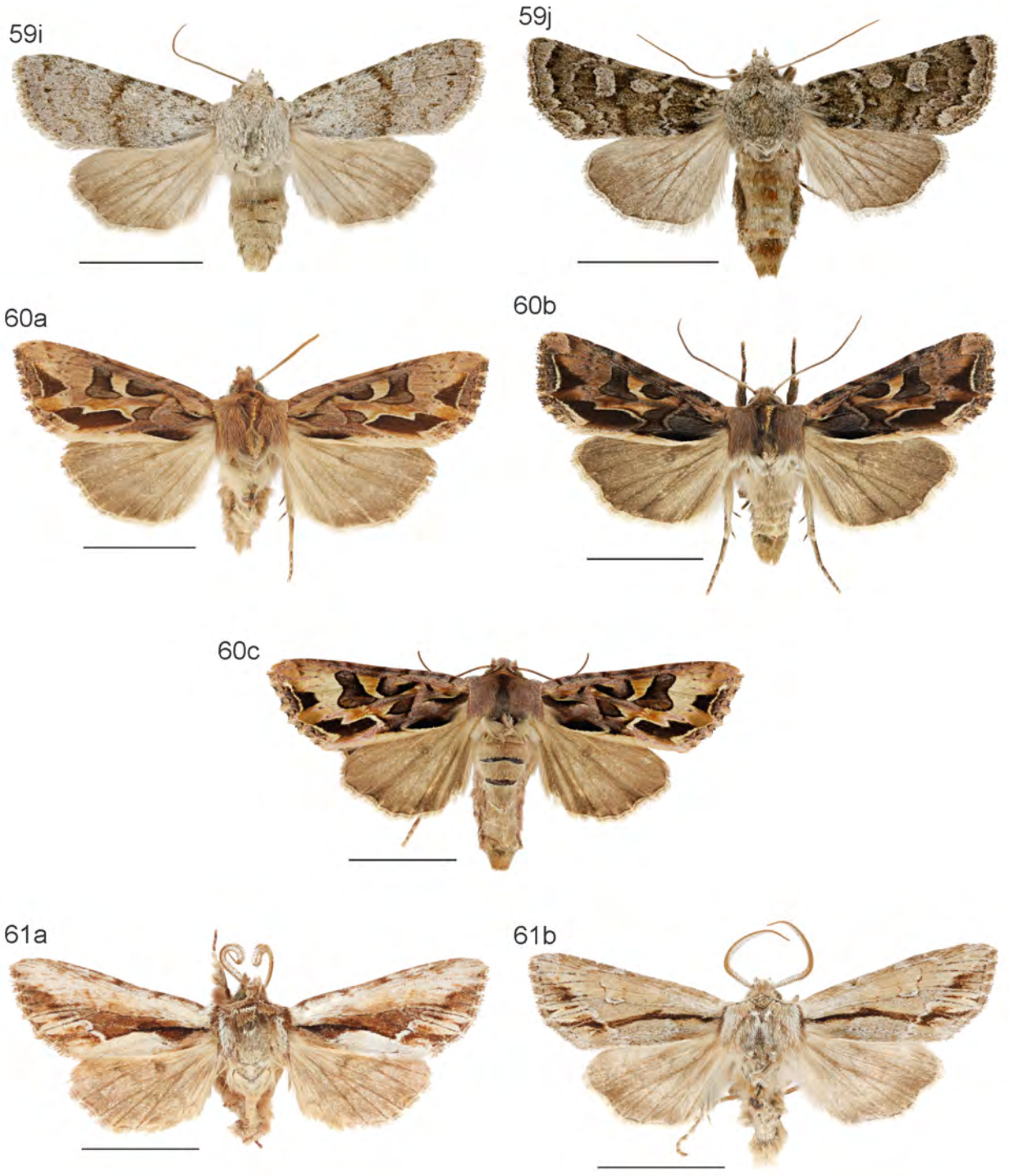
Figs 54i, j, k, l, *Ichneutica arotis* males: **54i, j,** northern dark form, Waitakere Ra. AK (NZAC); **54k,** swamp form, Mt Ruapehu TO (NZAC); **54l,** intermediate form, Rangipo Desert TO (NZAC) **55a,** *I. theobroma* male paratype, Waitakere Ra. AK (NZAC); **54b,** *I. theobroma* female; **56a,** *I. lyfordi* male paratype (NZAC).



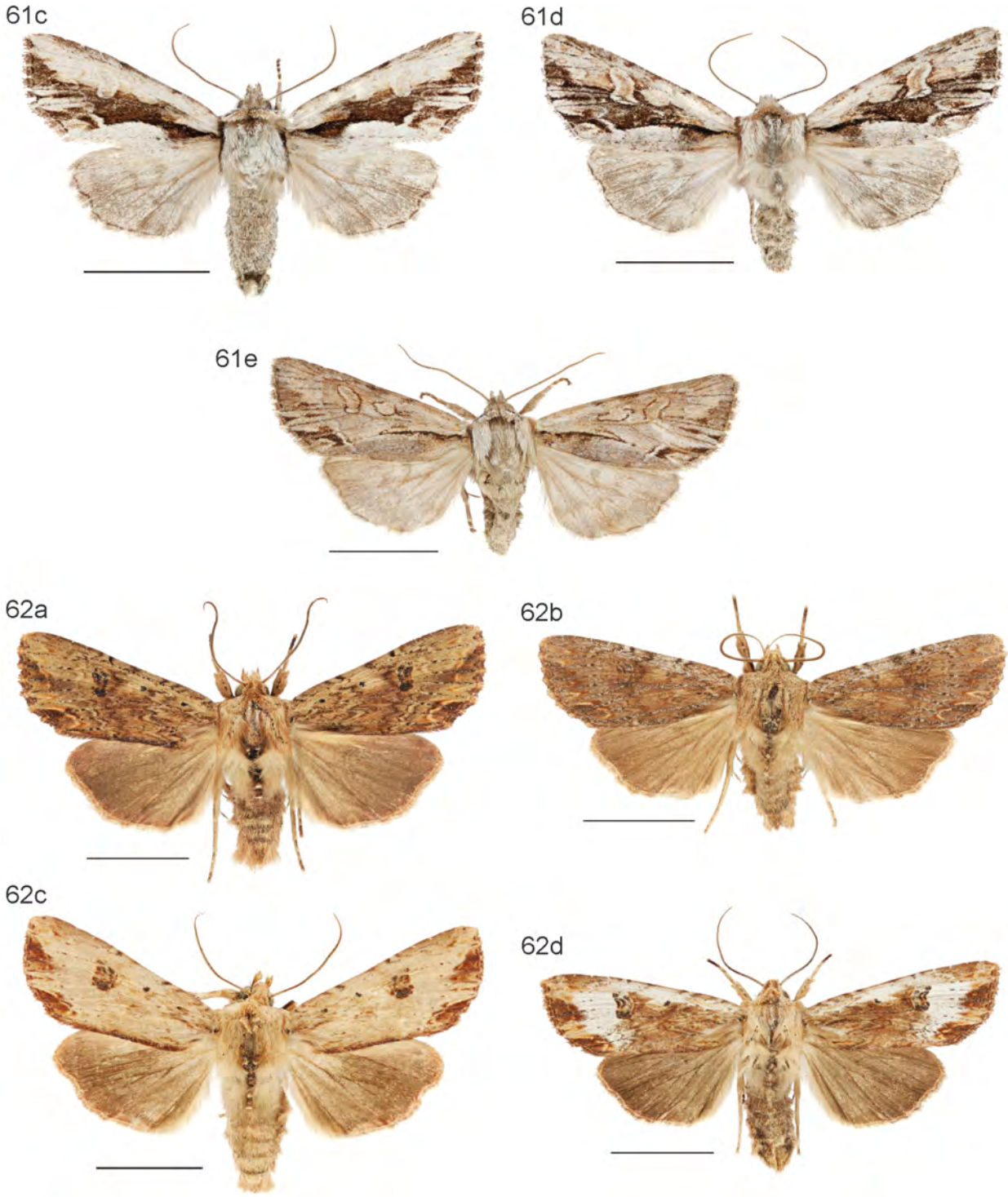
Figs 57a, b, *Ichneutica paraxysta* males; **57c,** *I. paraxysta* female; **58a, b,** *Ichneutica prismatica* male paratypes (OMNZ); **58c, d,** *I. prismatica* female paratypes (OMNZ).



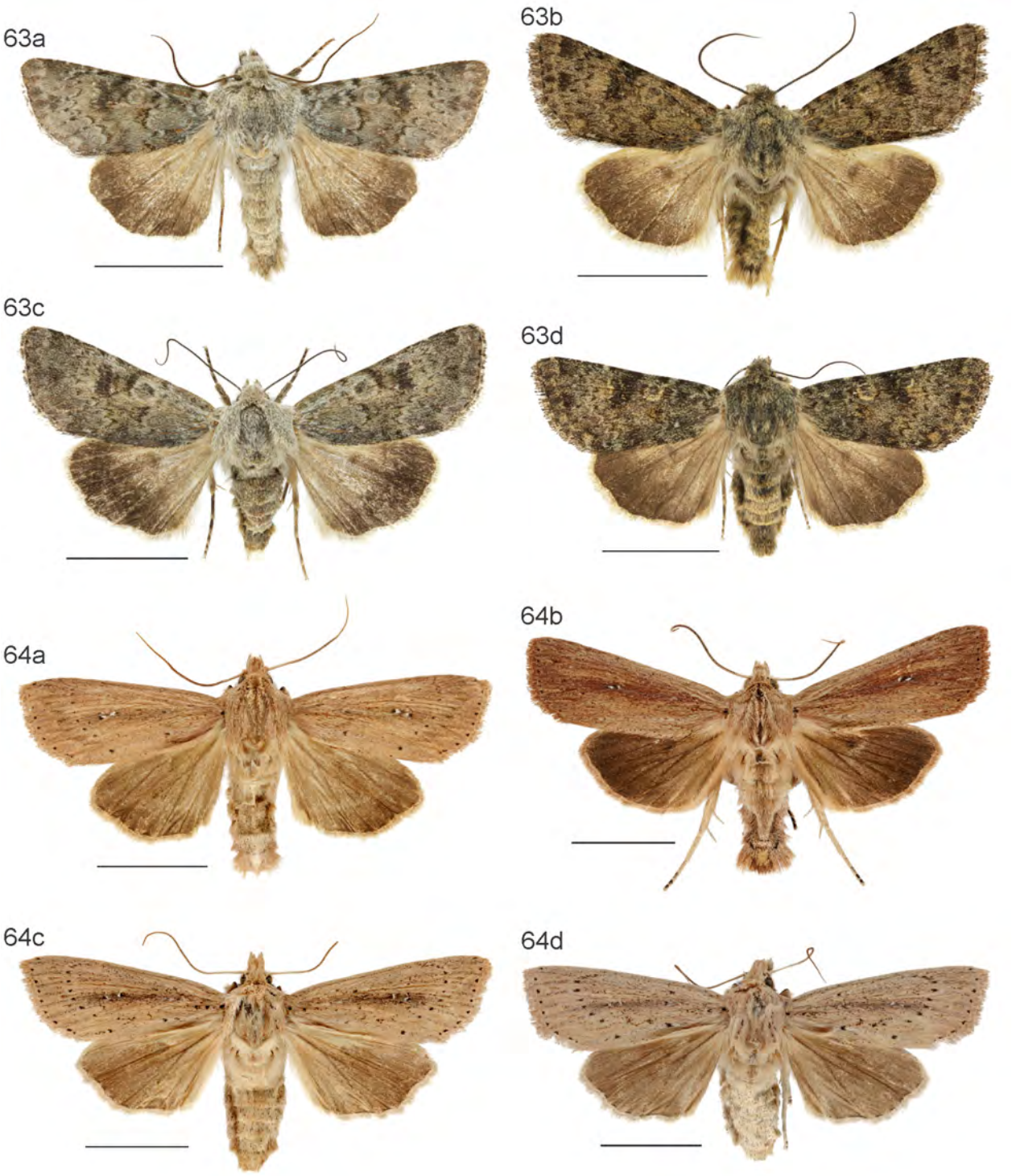
Figs 59a, b, c, d, e, f, *Ichneutica sistens* males; **59g, h**, *I. sistens* females.



Figs 59i, j, *Ichneutica sistens* females; **60a,** *I. maya* male; **60b, c,** *I. maya* females; **61a, b,** *I. paracausta* males.



Figs 61c, d, e, *Ichneutica paracausta* females; **62a, b, c,** *I. rubescens* males; **62d,** *I. rubescens* female.



Figs 63a, b, *Ichneutica cuneata* males: **63a,** Craigieburn MC; **63b,** Whakapapa Village, Mt Ruapehu TO; **63c, d,** *I. cuneata* females: **63c,** Pukaki Sci. Res, MK; **63d,** Silica Falls Tk, Mt Ruapehu TO; **64a, b,** *I. epiastra* males; **64c, d,** *I. epiastra* females.

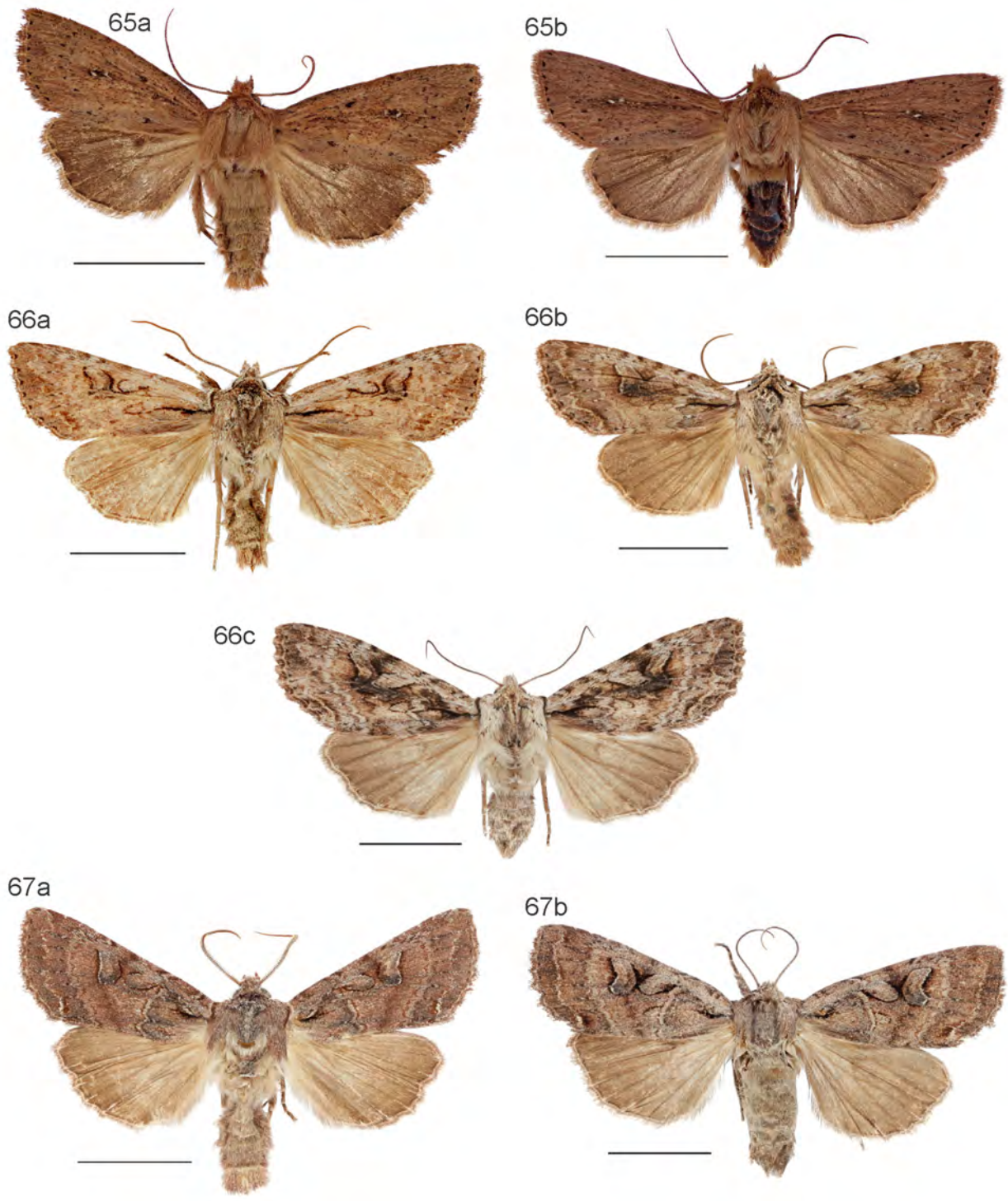
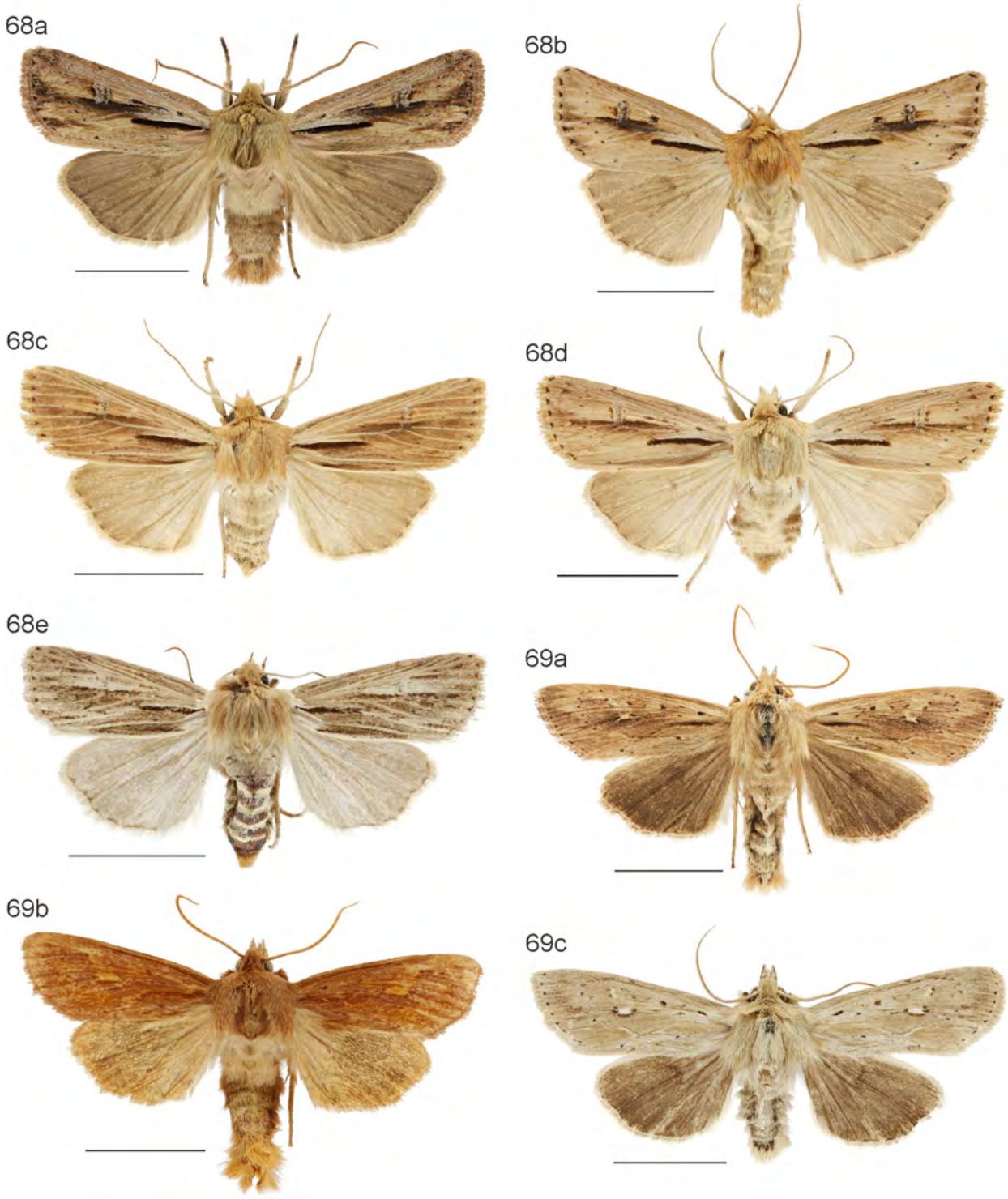


Fig. 65a, *I. haedifrontella* male paratype (NZAC); **65b,** *I. haedifrontella* male; **66a, b,** *I. lindsayorum* males; **66c,** *I. lindsayorum* female; **67a,** *I. olivea* male; **67b,** *I. olivea* female.



Figs 68a, b, *Ichneutica propria* males; **68c, d, e,** *I. propria* females; **69a, b, c,** *I. seducta* male paratypes (NZAC).

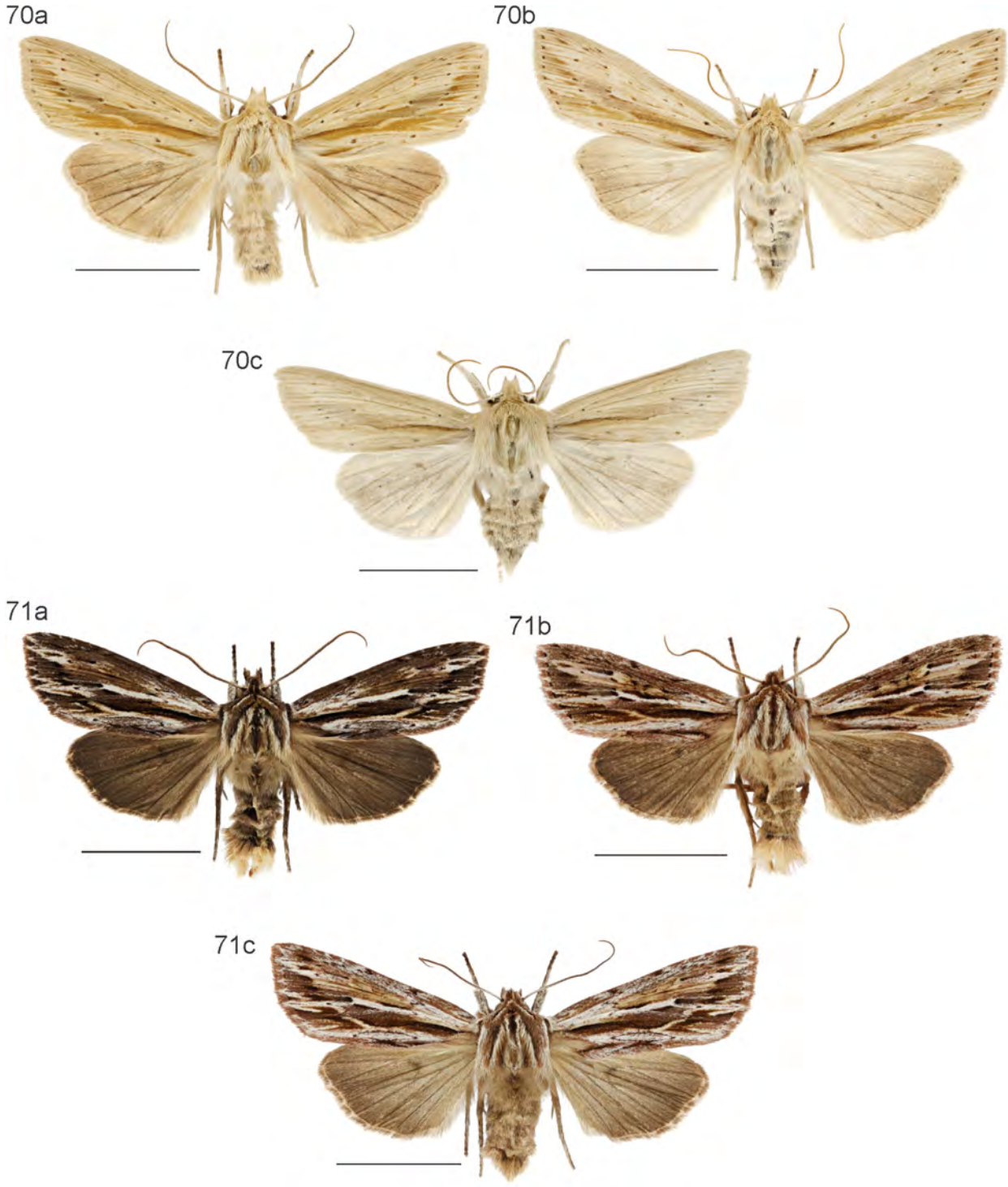


Fig. 70a, *Ichneutica semivittata* male; **70b, c,** *I. semivittata* females; **71a, b,** *I. similis* males; **71c,** *I. similis* female.

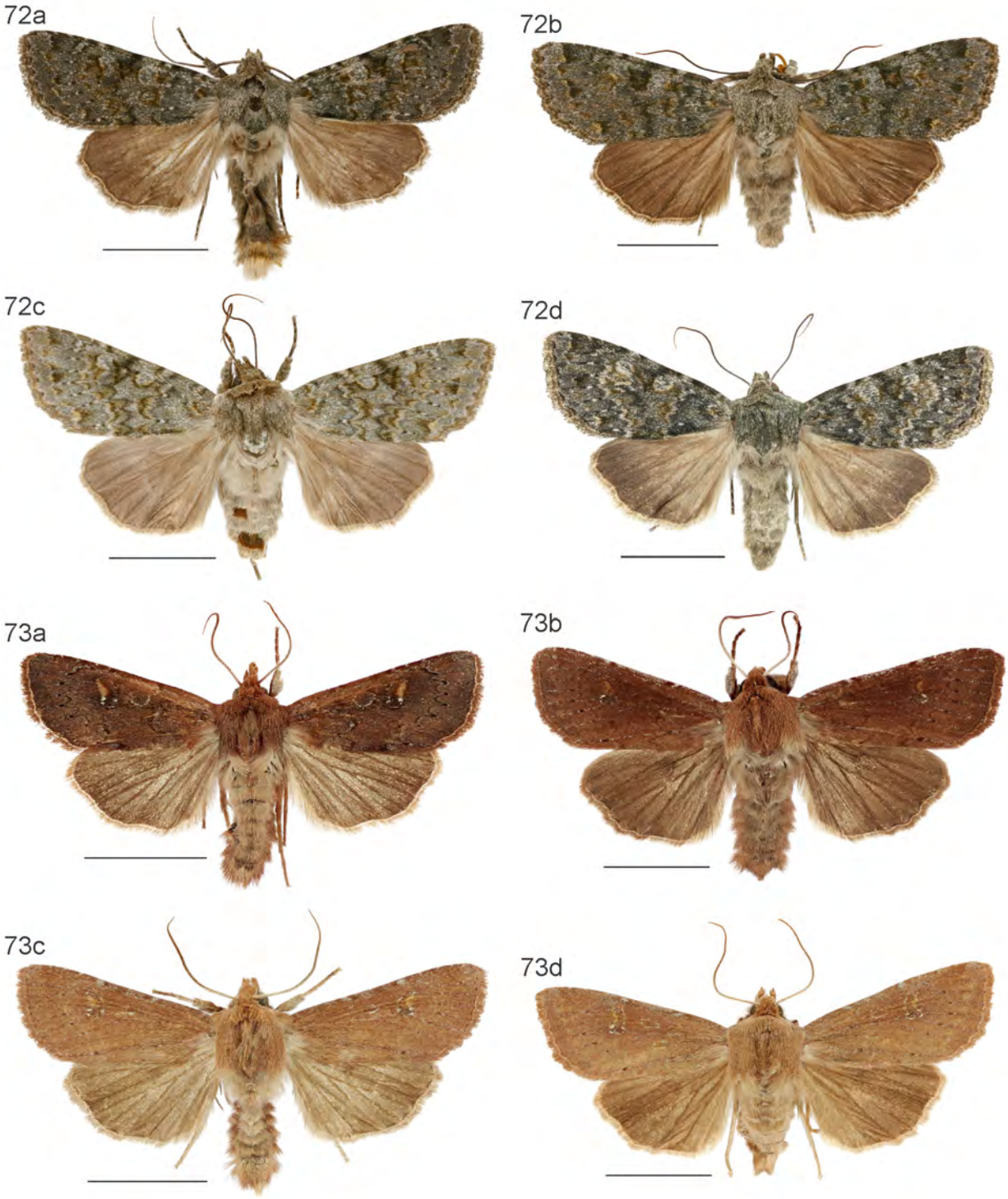
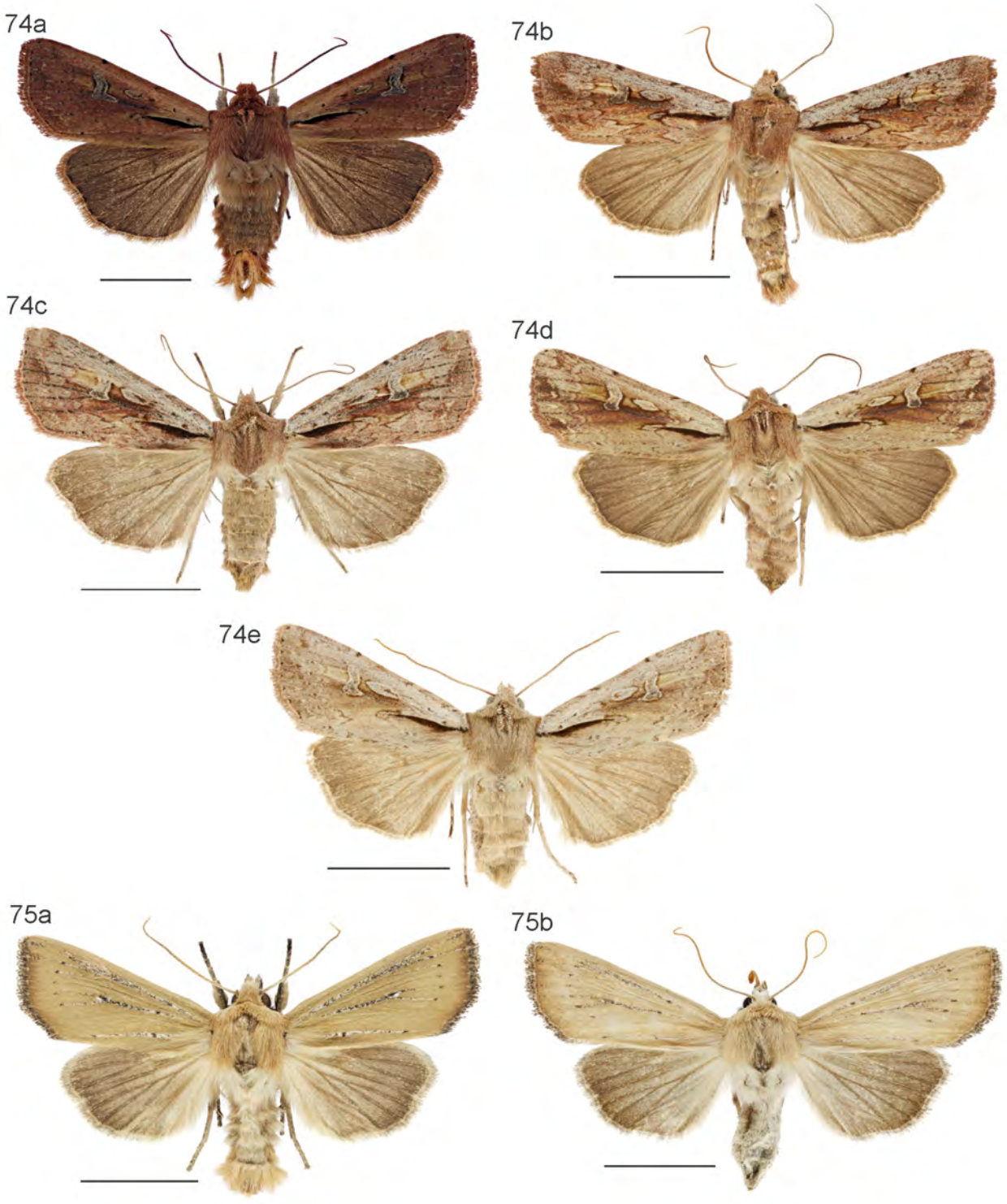
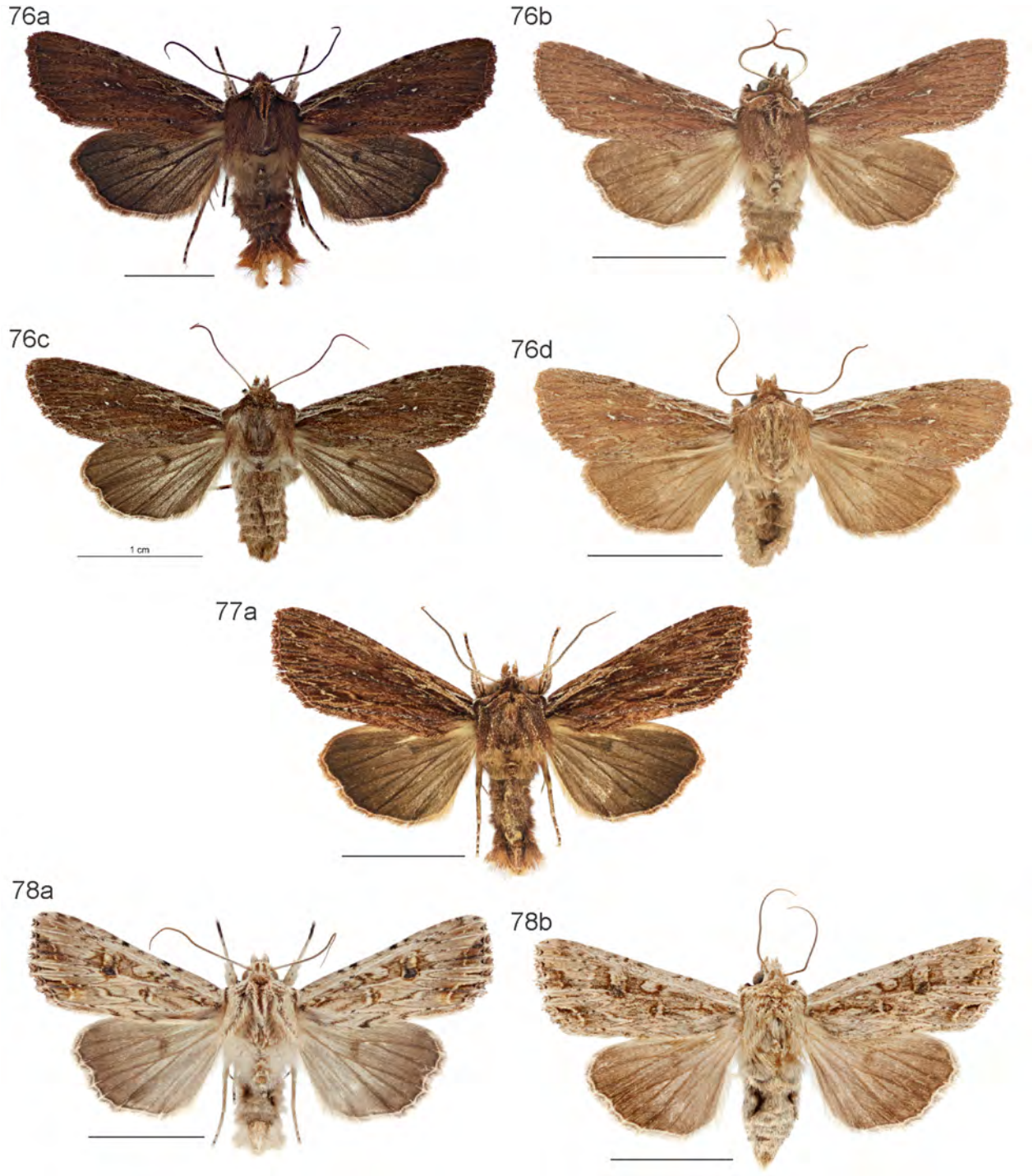


Fig. 72a, *Ichneutica virescens* male; **72b, c, d,** *I. virescens* females; **73a, b, c,** *I. alopa* males; **73d,** *I. alopa* female.



Figs 74a, b, *Ichneutica atristriga* males; **74c, d, e,** *I. atristriga* females; **75a,** *I. blenheimensis* male; **75b,** *I. blenheimensis* female.



Figs 76a, b, *Ichneutica infensa* males; **76c, d,** *I. infensa* females; **77a,** *I. inscripta* male paratype; **78a,** *I. lignana* male; **78b,** *I. lignana* female.

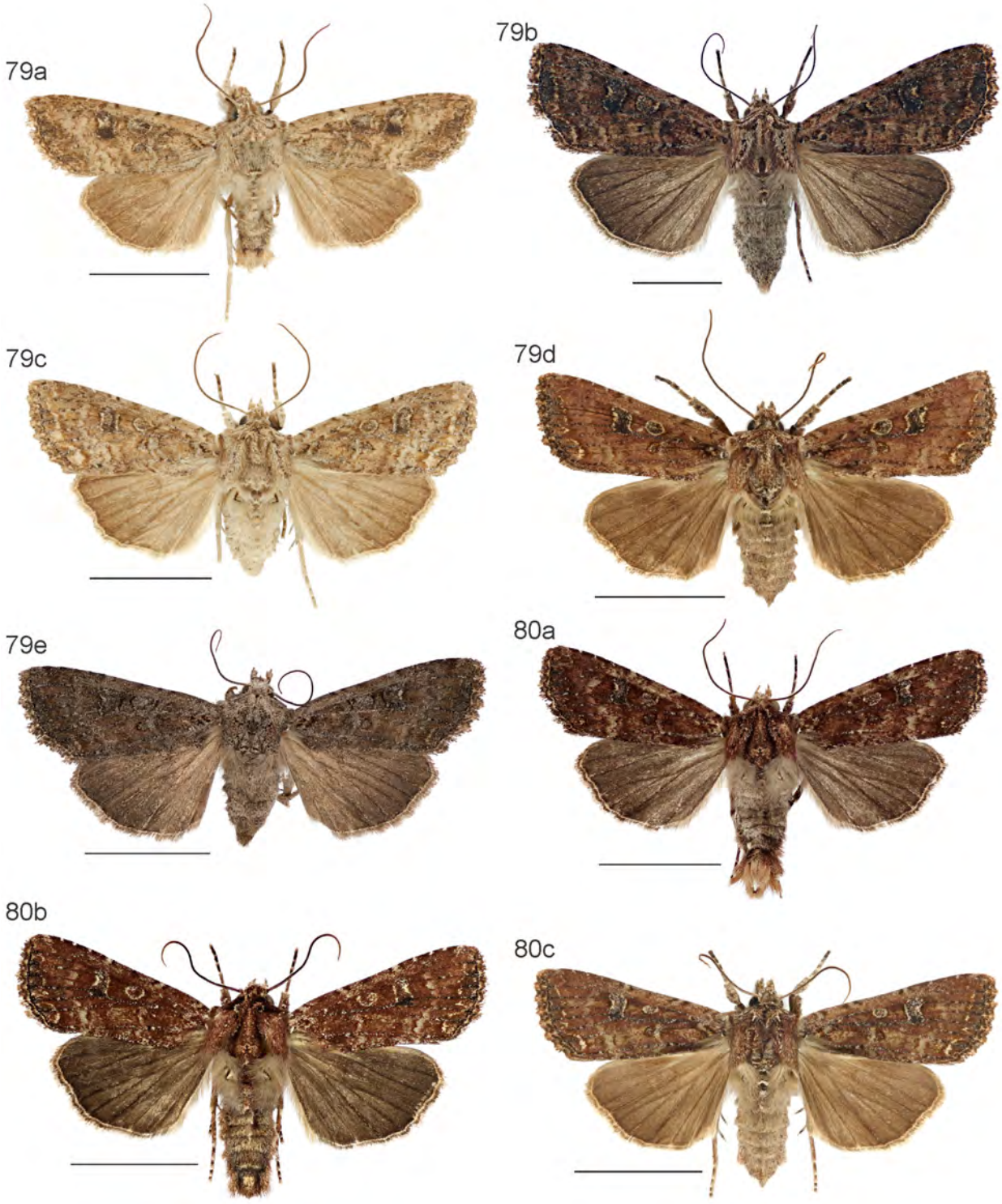
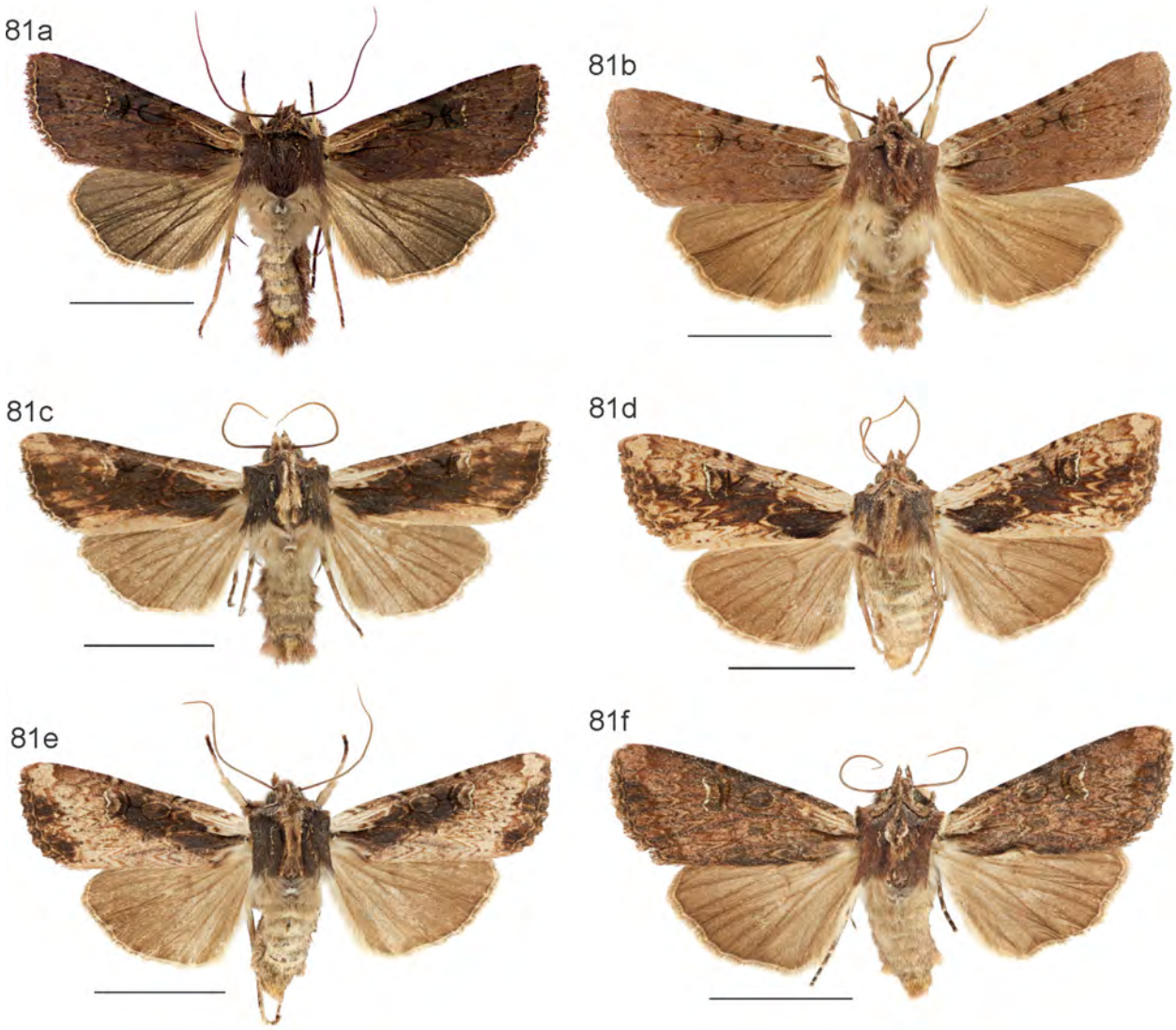
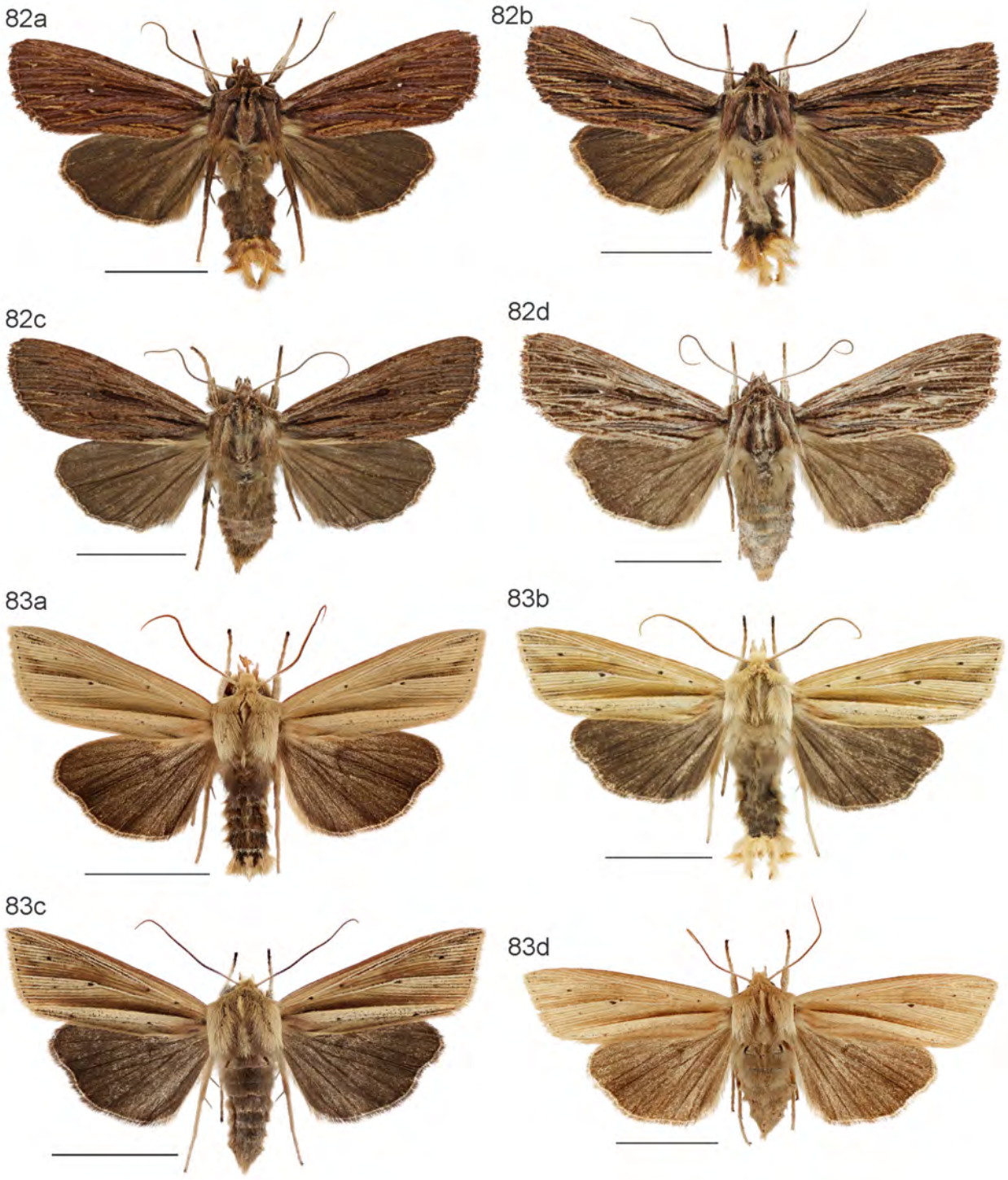


Fig. 79a, *Ichneutica morosa* male; **79b, c, d, e,** *I. morosa* females; **80a, b,** *I. mustulenta* male paratypes; **80c,** *I. mustulenta* female.



Figs 81a, b, c, *Ichneutica omoplaca* males; **81d, e, f,** *I. omoplaca* females.



Figs 82a, b, *Ichneutica steropastis* males; **82c, d,** *I. steropastis* females; **83a, b,** *I. sulcana* males; **83c, d,** *I. sulcana* females.

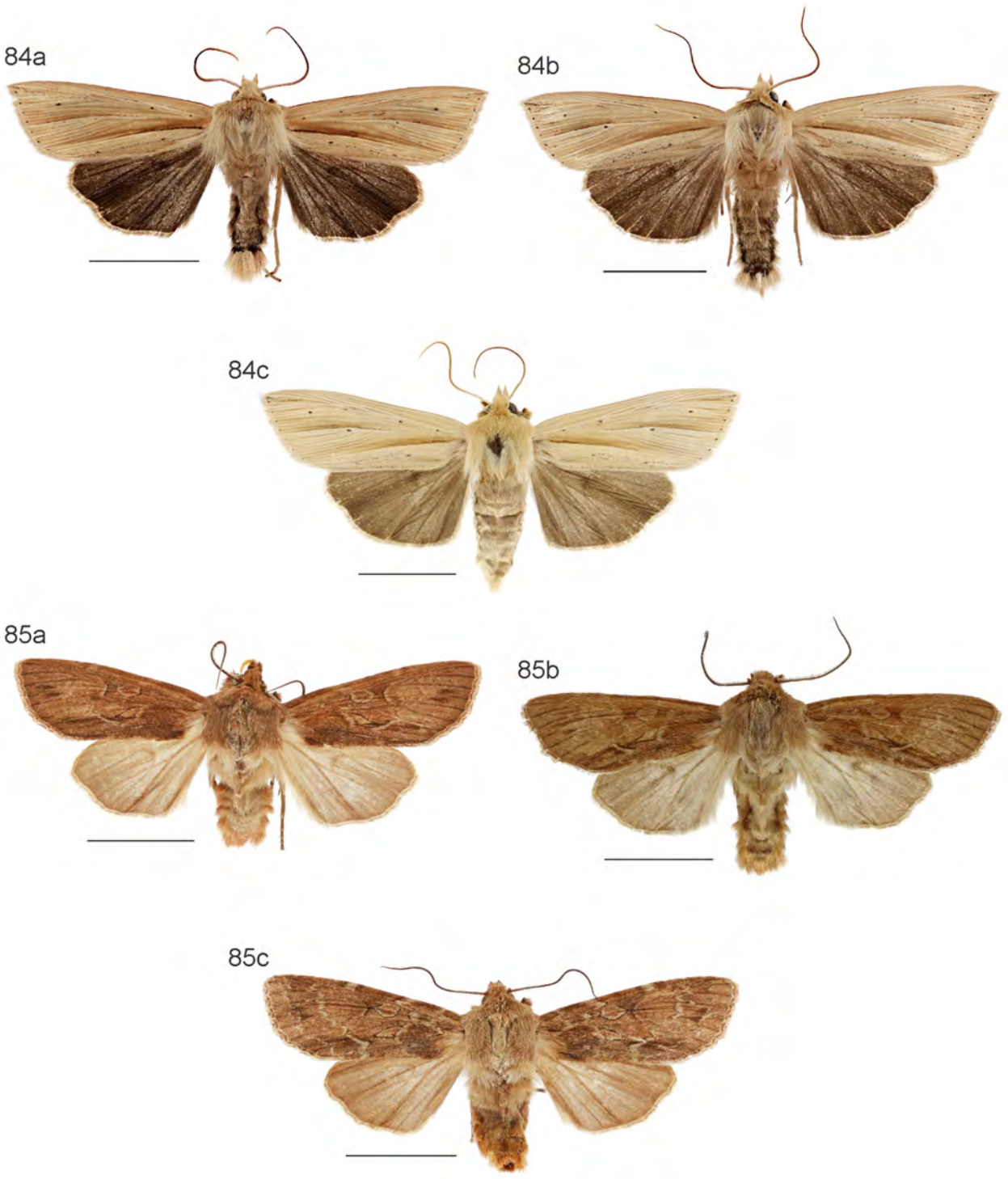


Fig. 84a, *Ichneutica supersulcana* male; **84b,** *I. supersulcana* male paratype; **84c,** *I. supersulcana* female paratype; **85a,** *I. rufistriga* male paratype; **85b,** *I. rufistriga* male; **85c,** *I. rufistriga* female paratype.

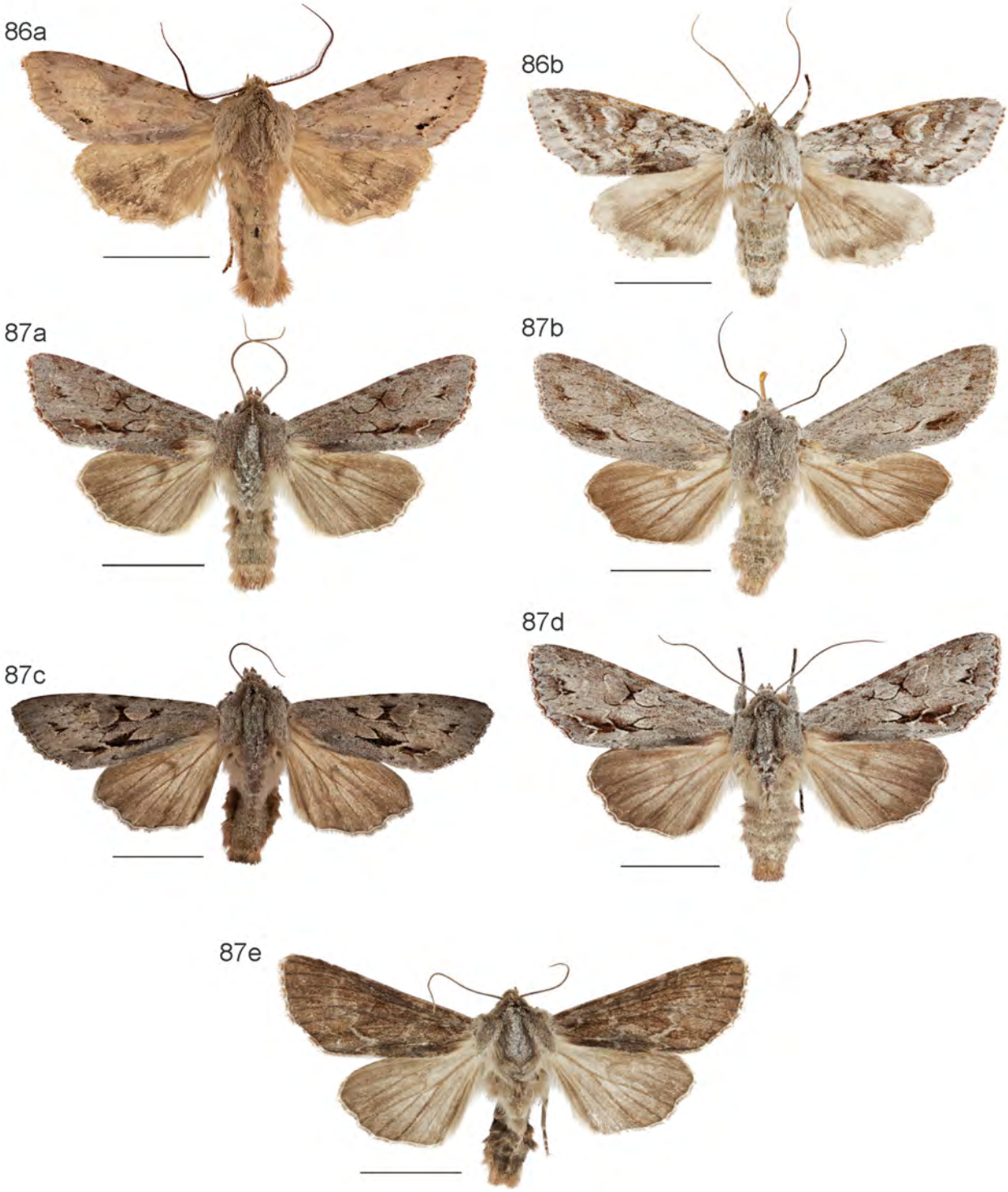


Fig. 86a, *Ichneutica thalassarche* male paratype (LUNZ); **86b,** *I. thalassarche* female paratype (NZAC); **87a,** *I. ustistriga* male; **87b, c, d, e,** *I. ustistriga* females: **87c,** large form, Swampy Summit DN (OMNZ); **87e,** weakly marked form, Nelson airport NN (NZAC).

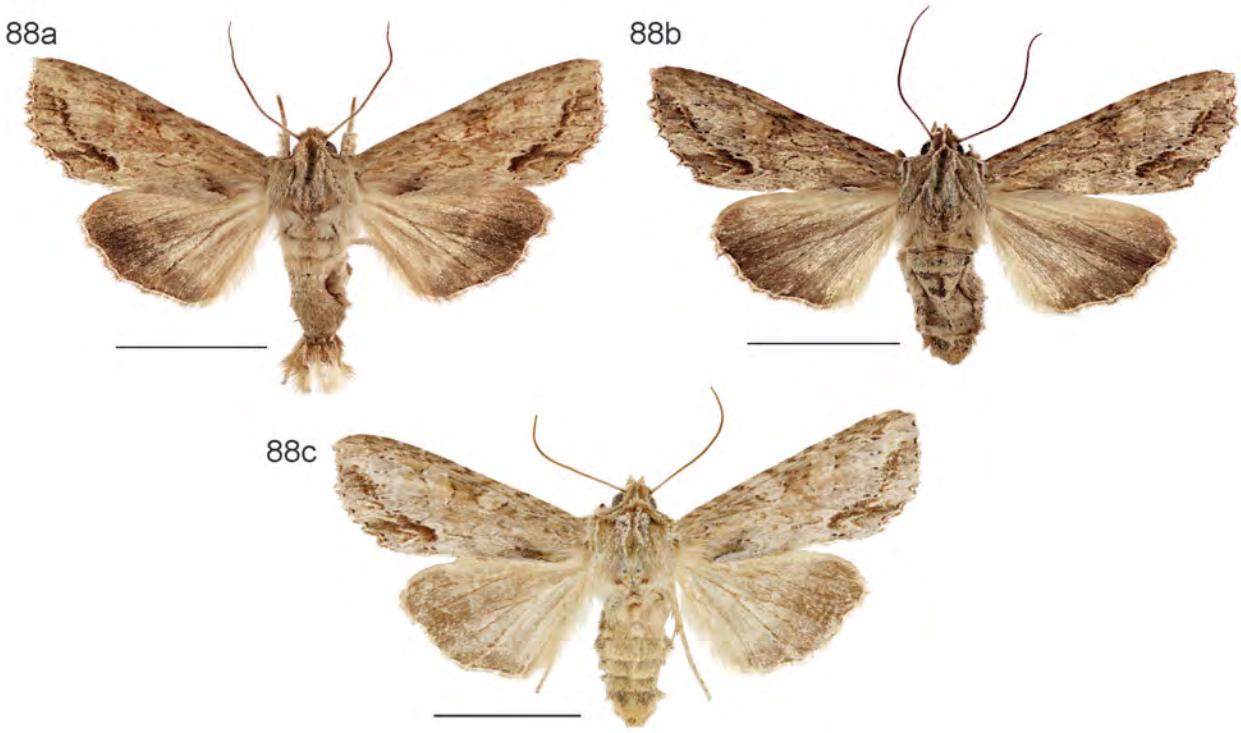
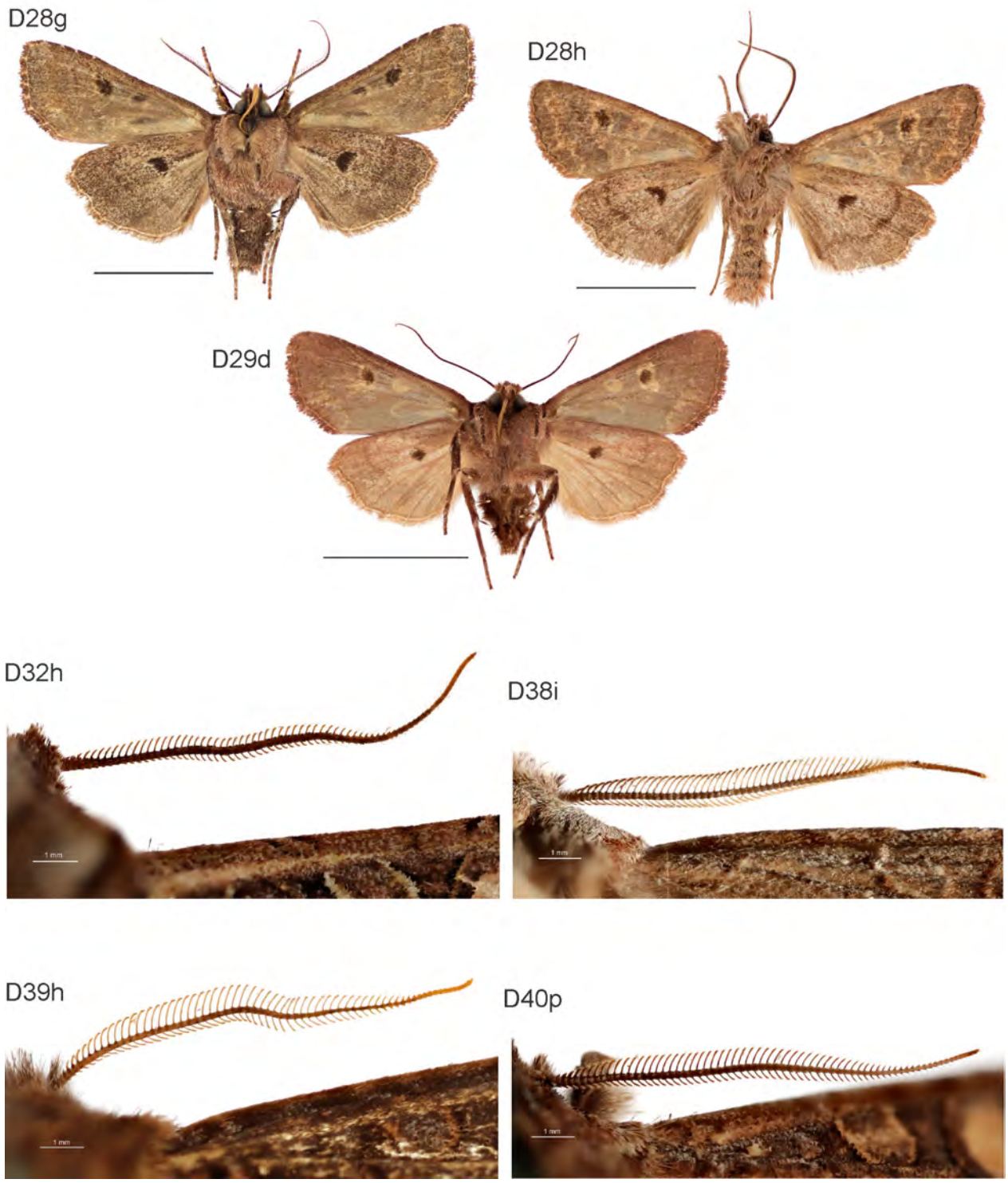


Fig. 88a, *Ichneutica mollis* male; **88b, c,** *I. mollis* females.



Figs D28g, h, *Ichneutica chlorodonta* male undersides; **D29d,** *I. subcyprea* female underside (note paler coloration, especially of hindwing); **D32h,** *I. insignis* male antenna; **D38i,** *I. scutata* male antenna; **D39h,** *I. sericata* male antenna; **D40p,** *I. skelloni* male antenna. Scale bars, Figs D28g, h, D29d = 1 cm; remaining figures = 1 mm.

Fig. D44d, *Ichneutica cornuta* female paratype (note unbroken interneural streaks parallel with veins, arrowed); **D54m,** *I. arotis* male (note interneural streaks broken by oblique pale lines, arrowed); **D51e,** *I. acontistis* female (note unbroken dark streaks above tornus, arrowed); **D53c,** *I. stulta* female paralectotype (note dark streaks above tornus broken by pale oblique lines, arrowed).

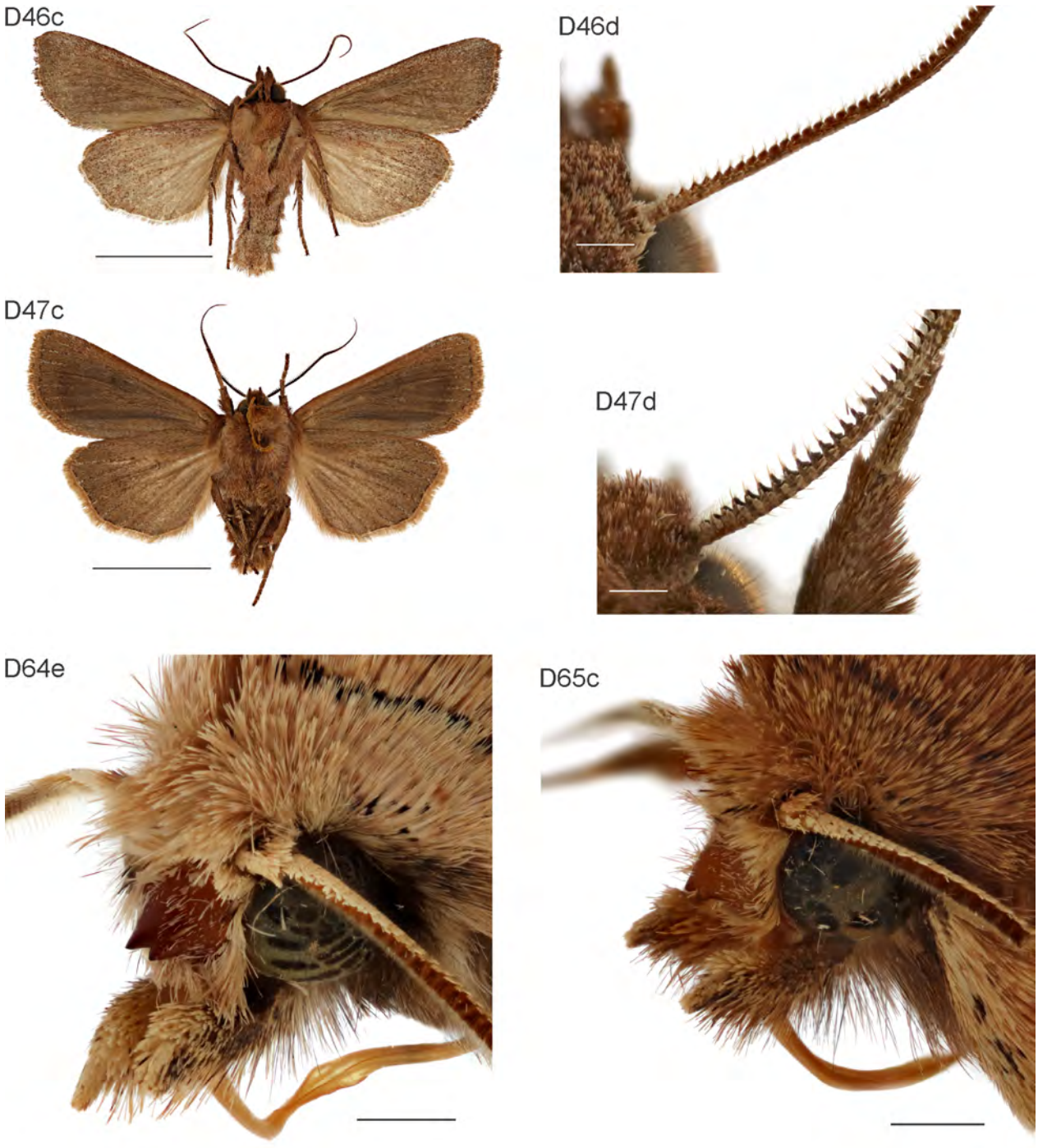


Fig. D46c, *Ichneutica micrastra* male underside; **D47c,** *I. sapiens* male underside (note dark terminal dashes on forewing and hindwing, absent in *micrastra*); **D46d,** *I. micrastra* male antennal base (pectinations very short); **D47d,** *I. sapiens* male antennal base (pectinations longer); **D64e,** *I. epiastra* head (long sharp frontal processes); **D65c,** *I. haedifrontella* head (shorter, blunt frontal processes). Scale bars, Figs D46c, D47c = 1 cm; remaining figures = 1 mm.

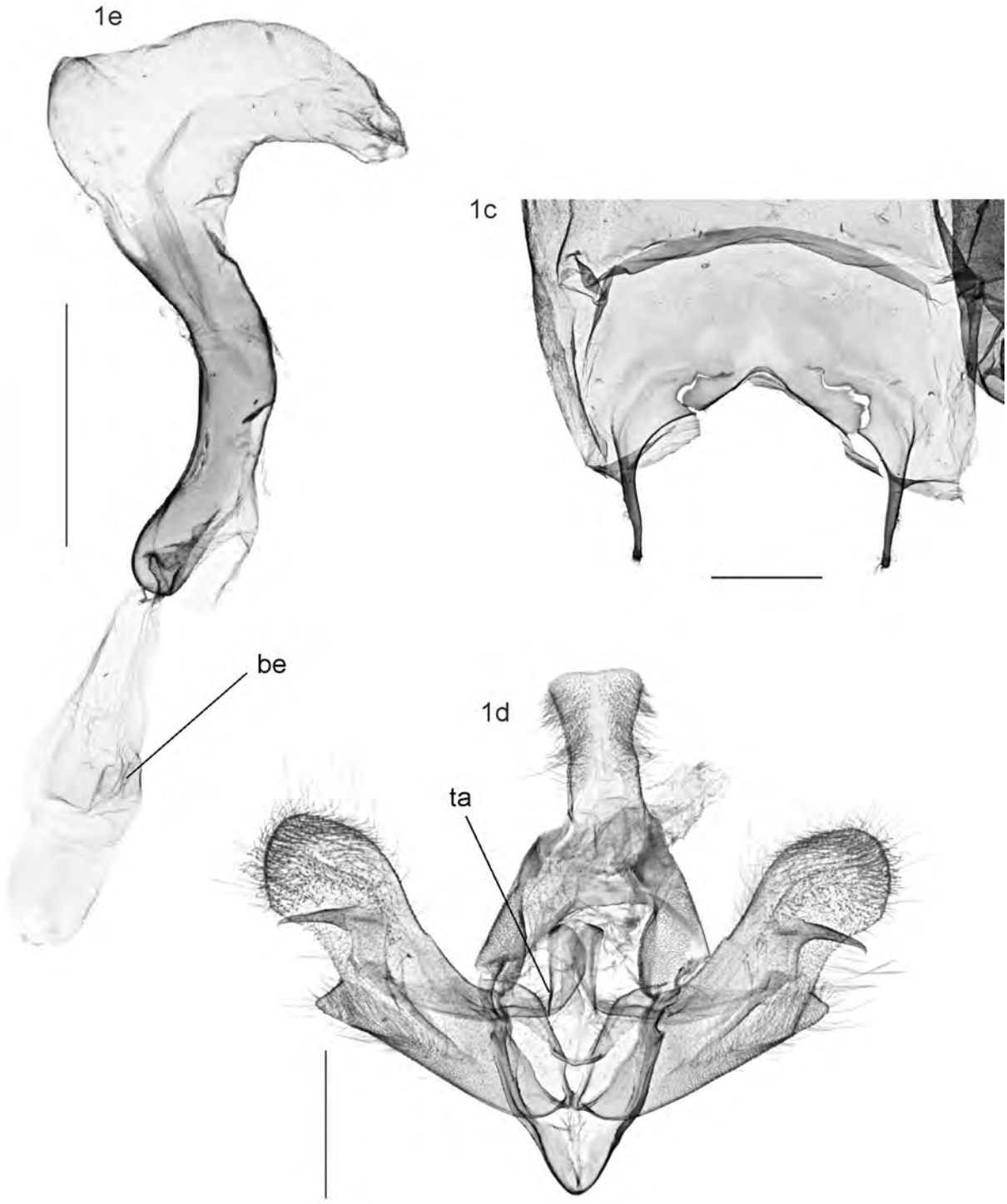


Fig. 1c, *Nivetica nervosa* male abdominal base; **1d,** genital capsule; **1e,** phallus, including bulbus ejaculatorius. (Slide NZAC Noct. 467.) Abbreviations: be—bulbus ejaculatorius; ta—apex of transtilla process (note sharply pointed tip).
Scale bar for all abdomen and genitalia figures = 1 mm, unless otherwise stated.

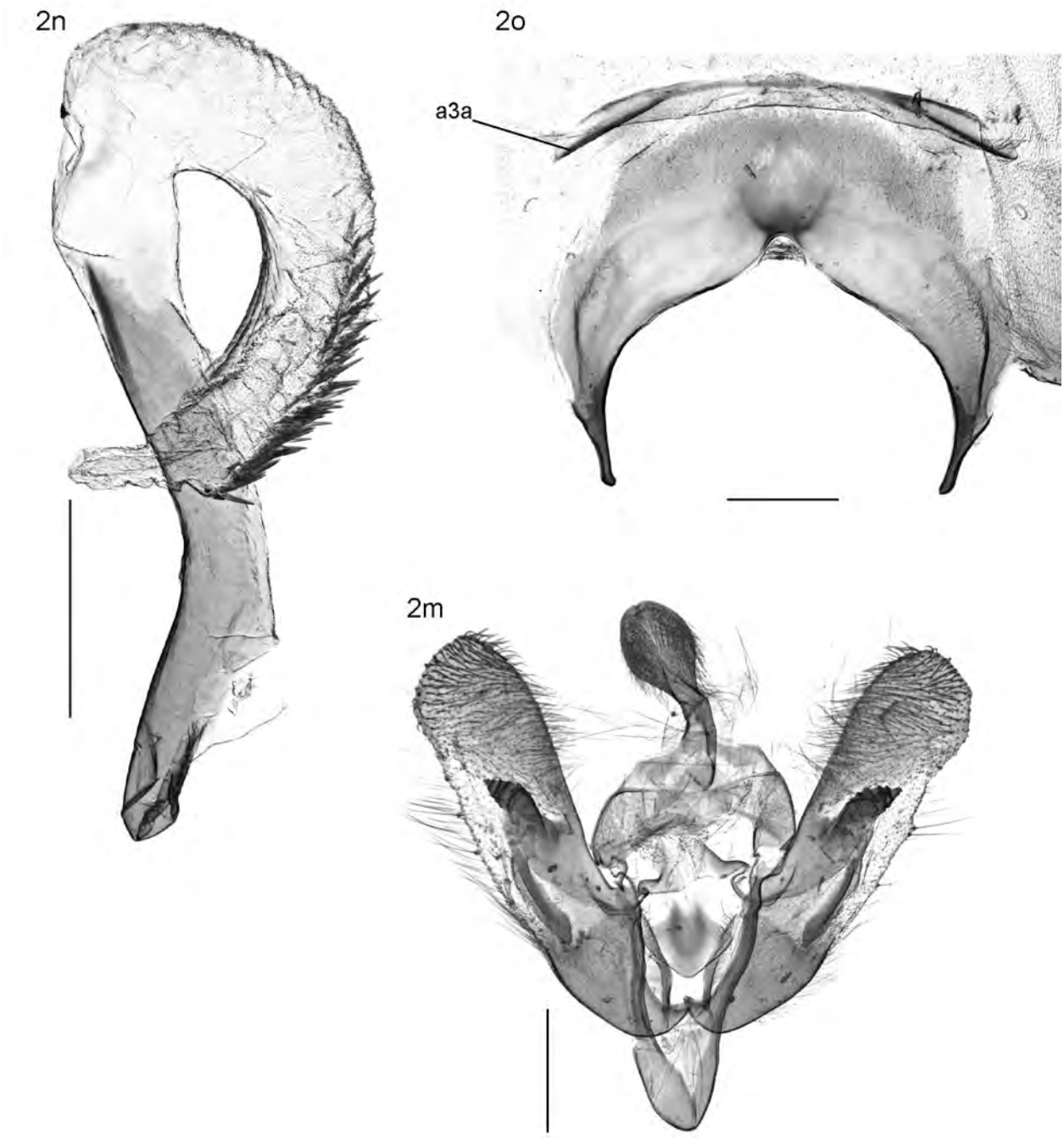


Fig. 2m, *Ichneutica ceraunias* male abdominal base; **2n,** genital capsule; **2o,** phallus. (Slide NZAC Noct. 261.) Abbreviation: a3a—A3 apodeme.

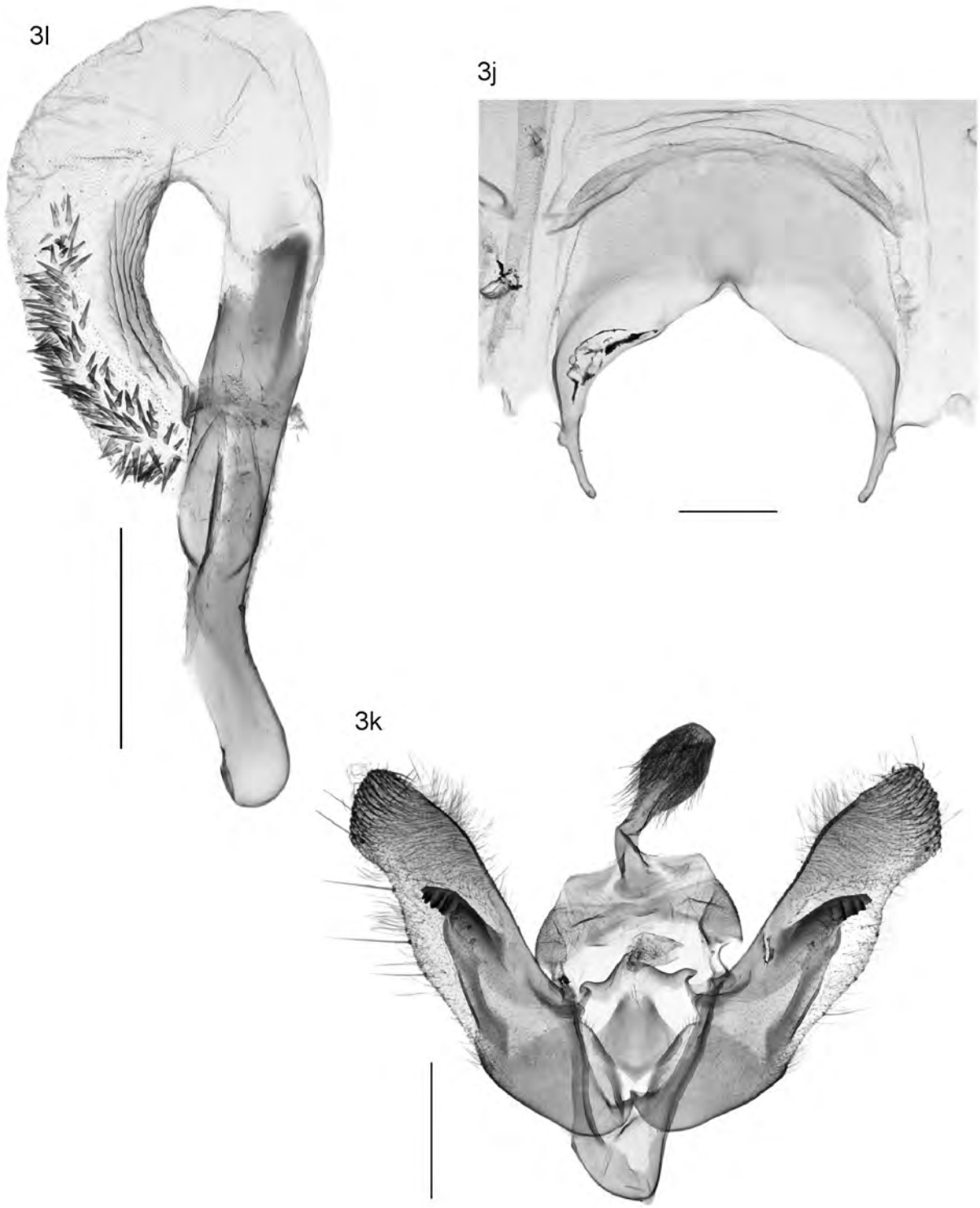


Fig. 3j, *Ichneutica dione* male abdominal base; **3k,** genital capsule; **3l,** phallus. (Slide NZAC Noct. 65.)

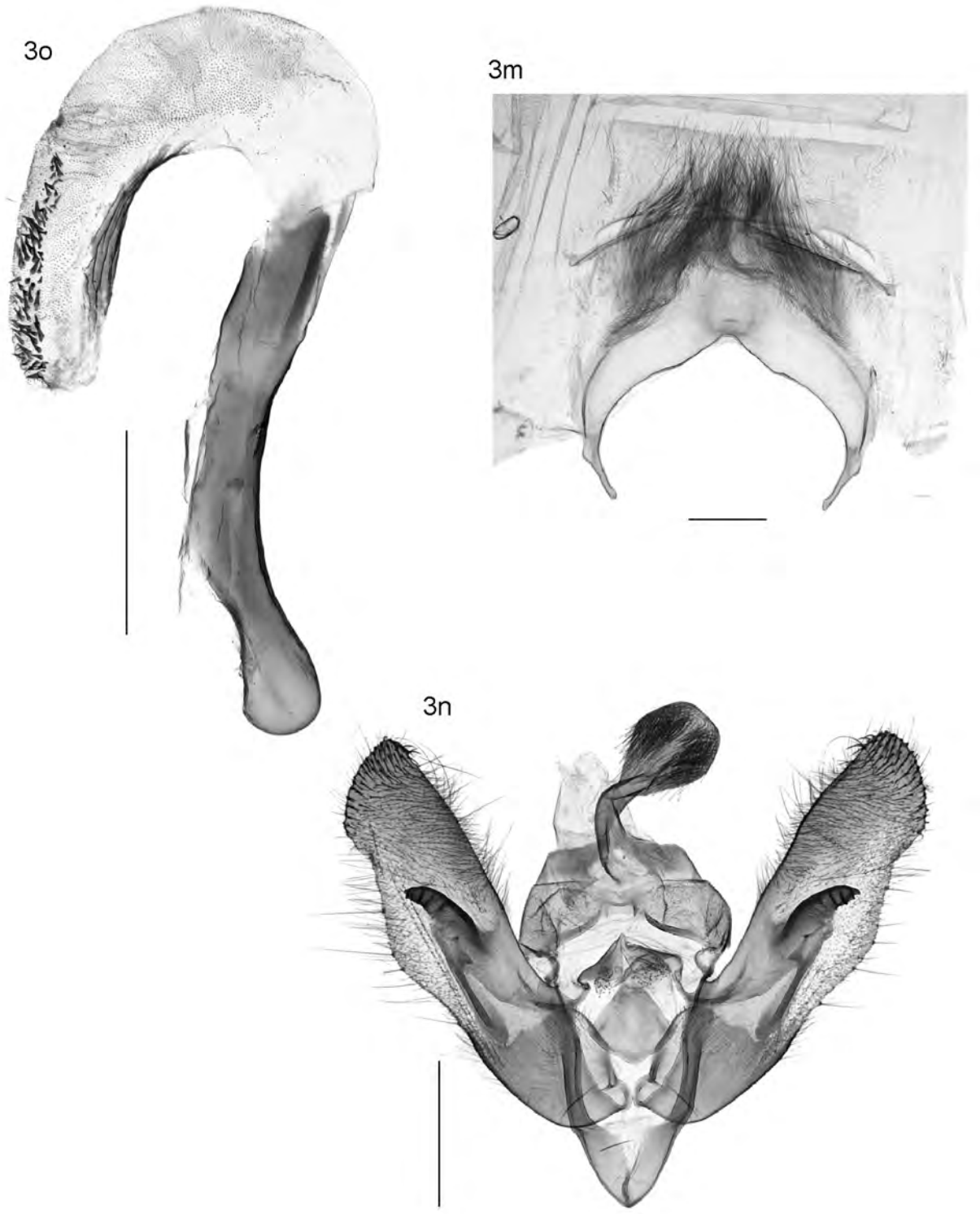


Fig. 3m, *Ichneutica dione* male abdominal base; **3n,** genital capsule; **3o,** phallus. (Slide NZAC Noct. 67.)

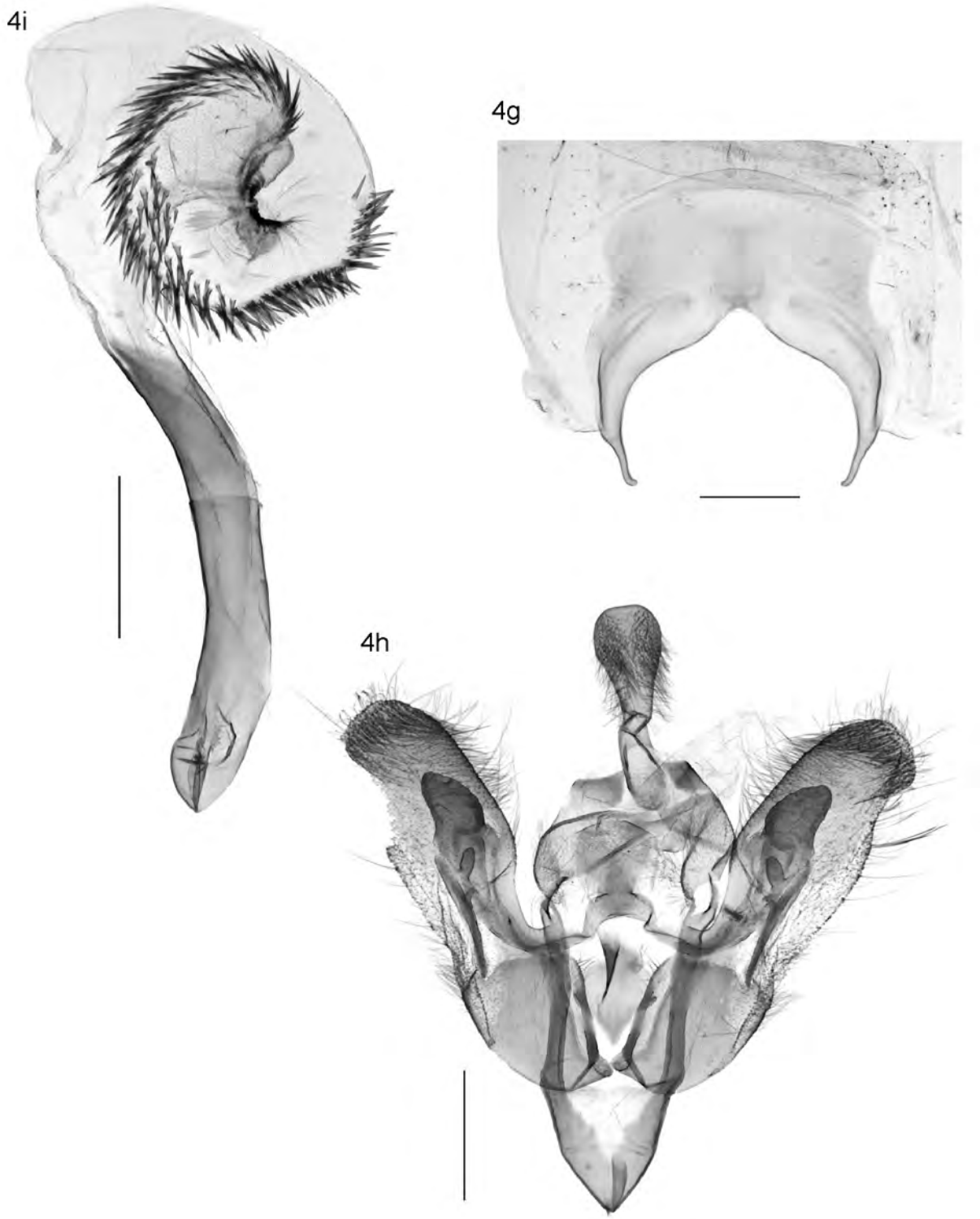


Fig. 4g, *Ichneutica cana* male abdominal base; **4h,** genital capsule; **4i,** phallus. (Slide NZAC Noct. 458.)

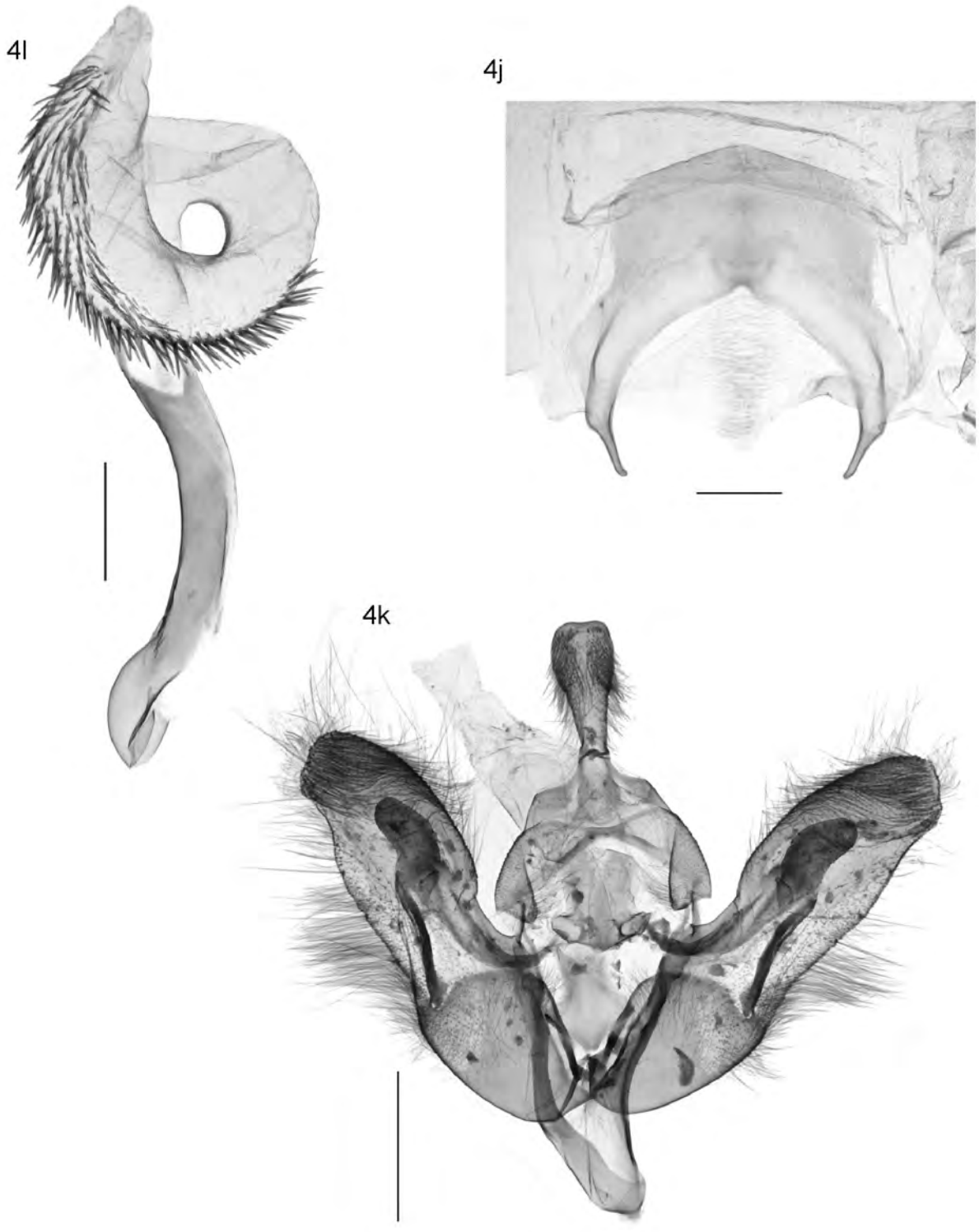


Fig. 4j, *Ichneutica cana* holotype male abdominal base; **4k,** genital capsule; **4l,** phallus. (Slide AMNZ 21949.)

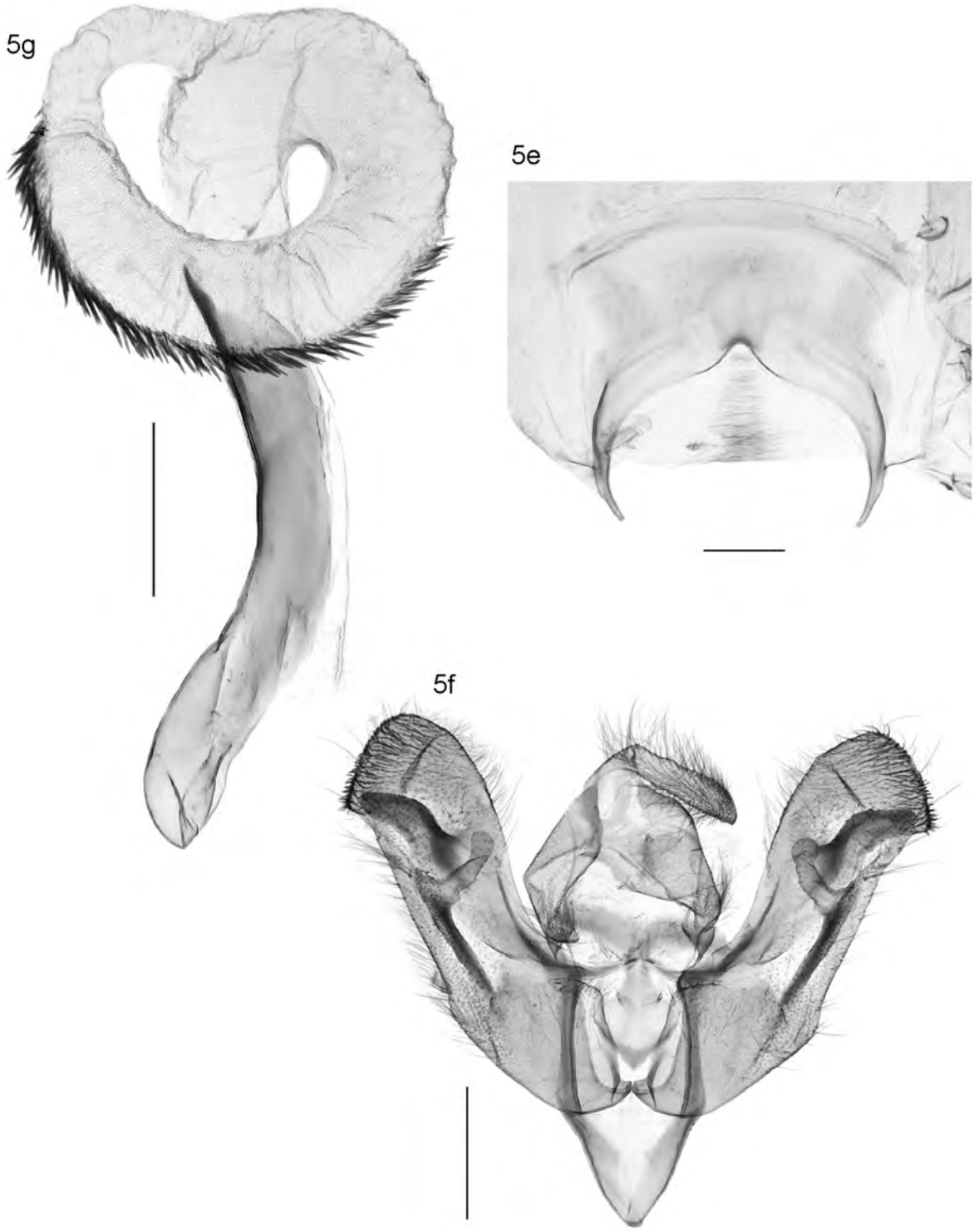


Fig. 5e, *Ichneutica eris* holotype male abdominal base; **5f,** genital capsule; **5g,** phallus. (MONZ.)

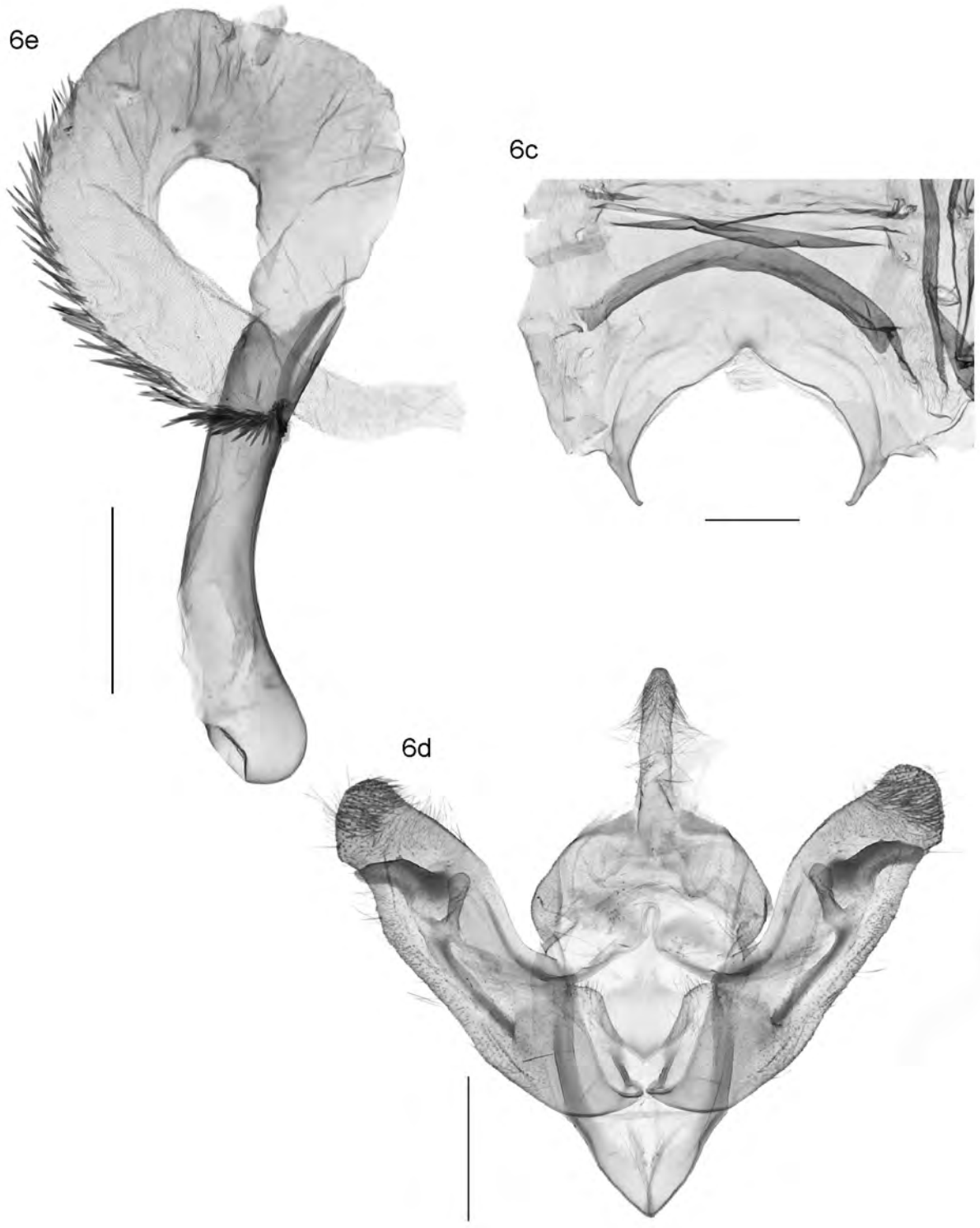


Fig. 6c, *Ichneutica schistella* holotype male abdominal base; **6d,** genital capsule; **6e,** phallus. (Slide OMNZ IV42557.)

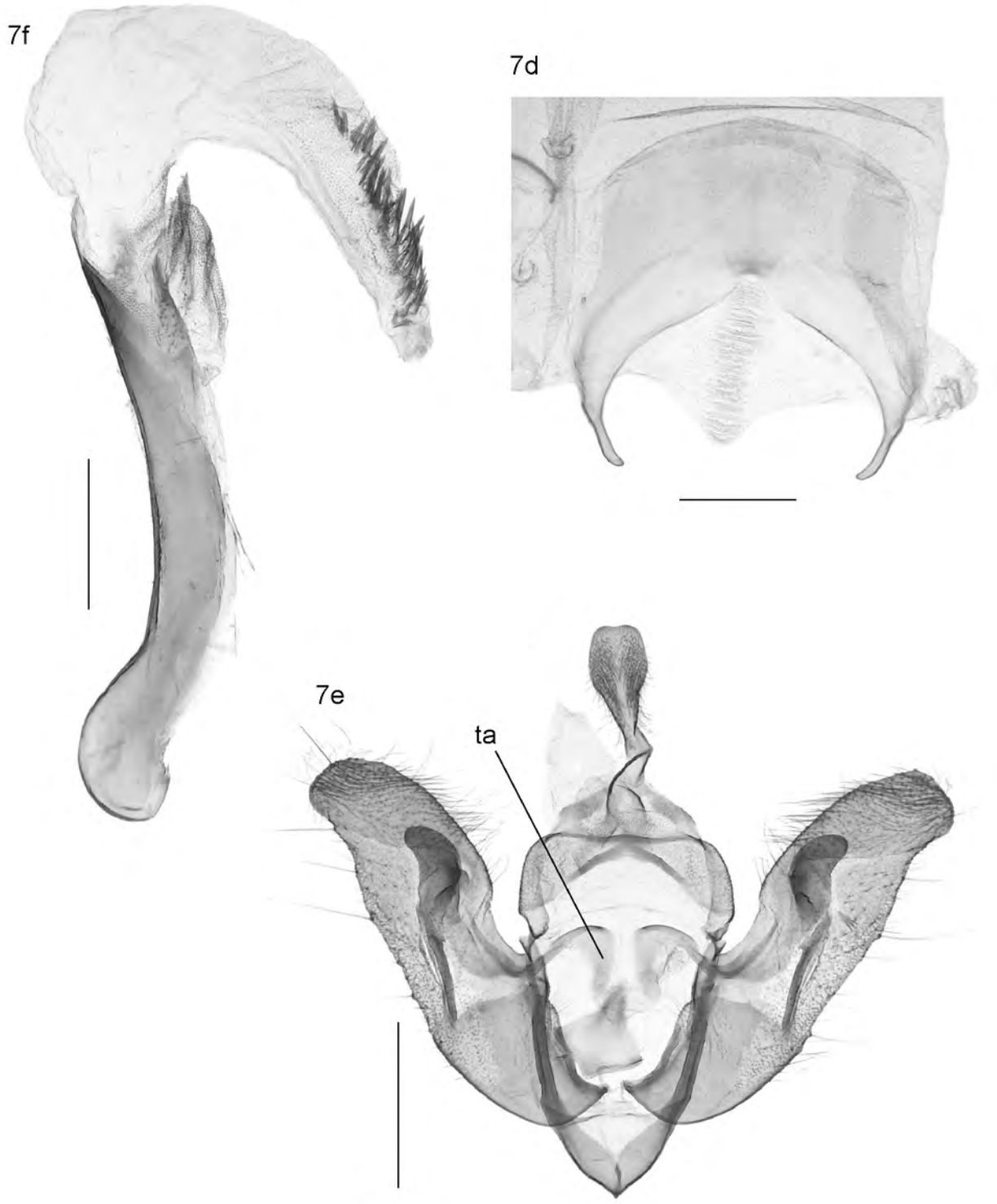


Fig. 7d, *Ichneutica notata* male abdominal base; **7e,** genital capsule; **7f,** phallus. (Slide NZAC Noct. 69.). Abbreviation: ta—apex of transtilla process (note bluntly rounded tip).

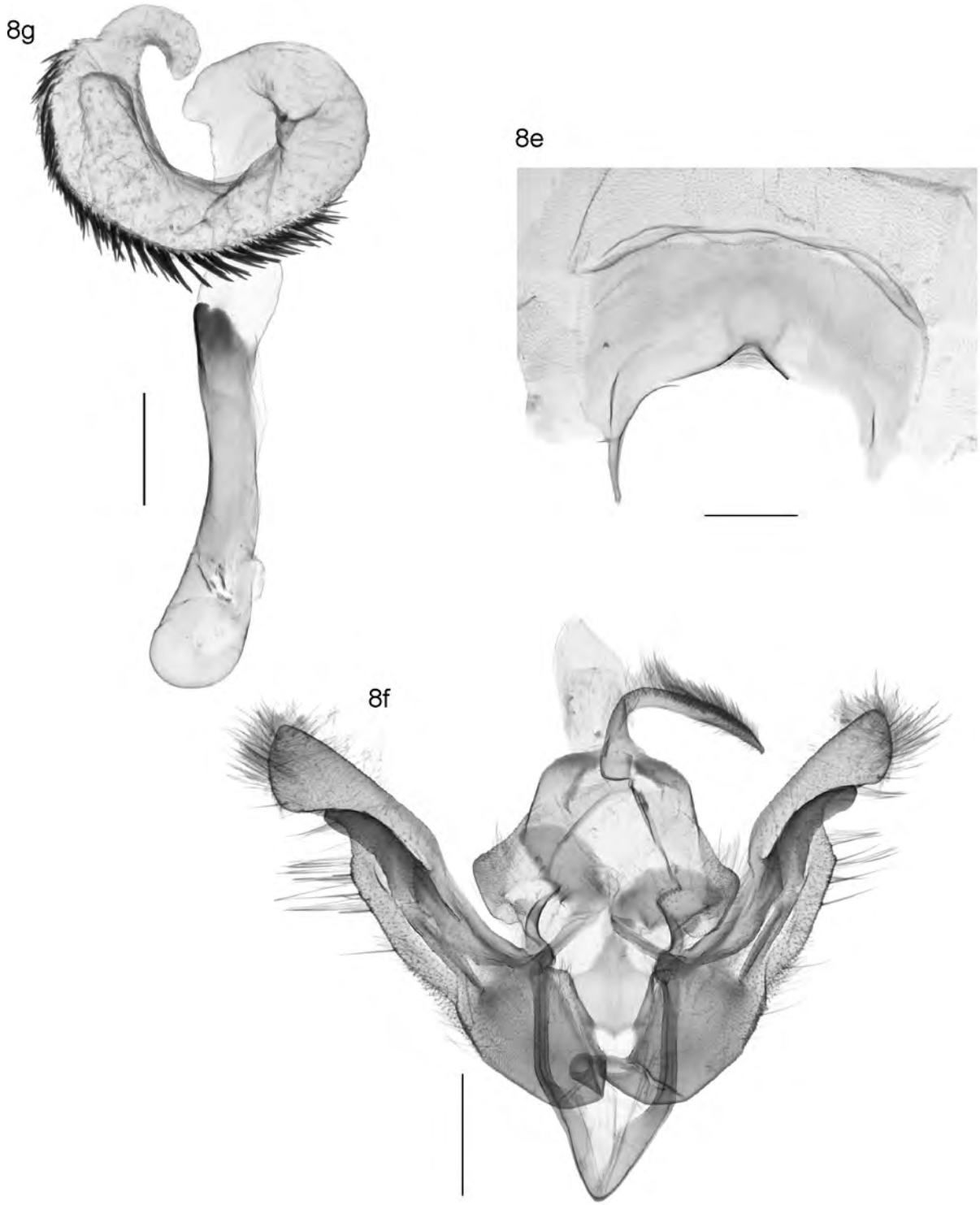


Fig. 8e, *Ichneutica agorastis* male abdominal base; **8f,** genital capsule; **8g,** phallus. (Slide NZAC Noct. 155.)

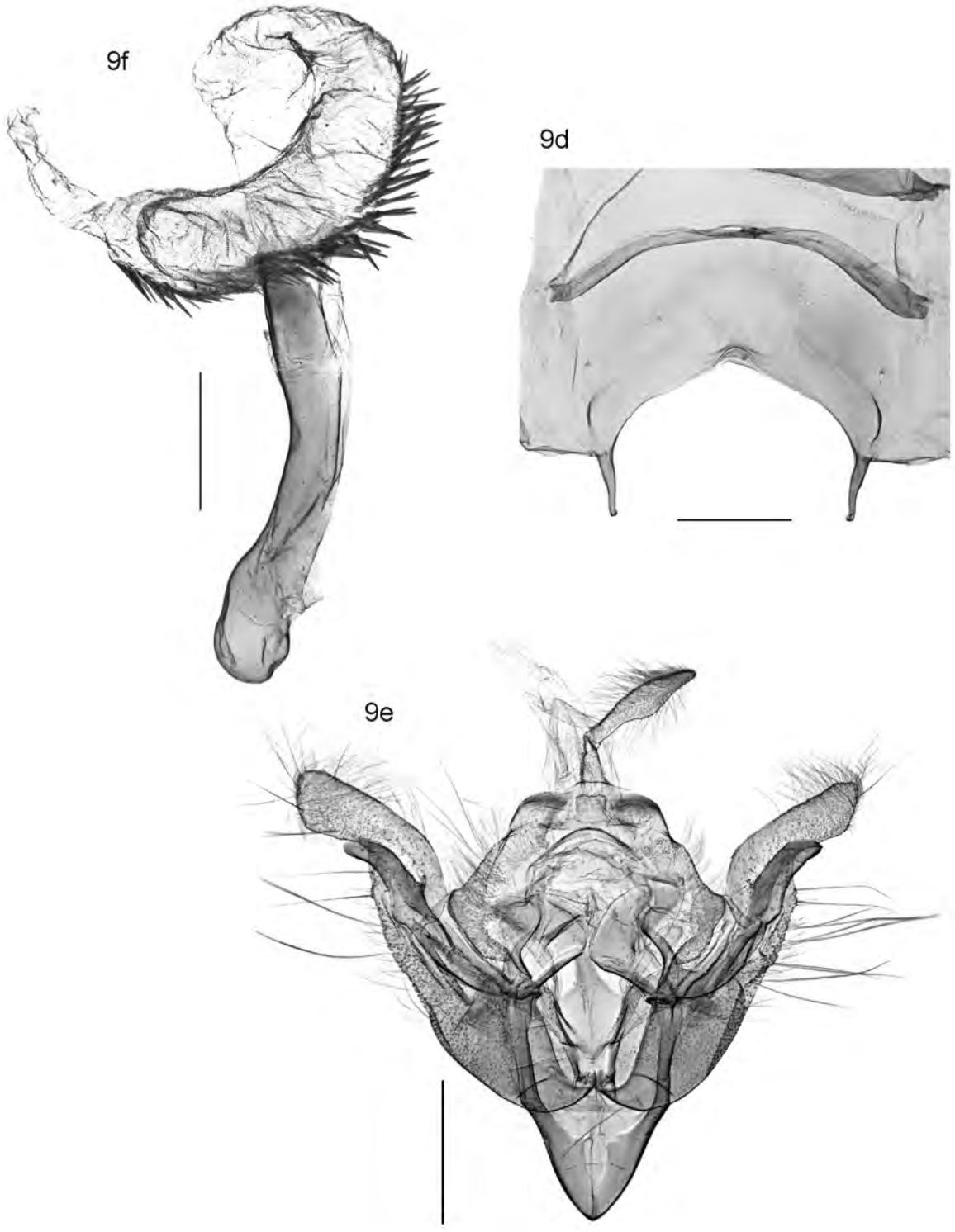


Fig. 9d, *Ichneutica hartii* male abdominal base; **9e,** genital capsule; **9f,** phallus. (Slide NZAC Noct. 422.)

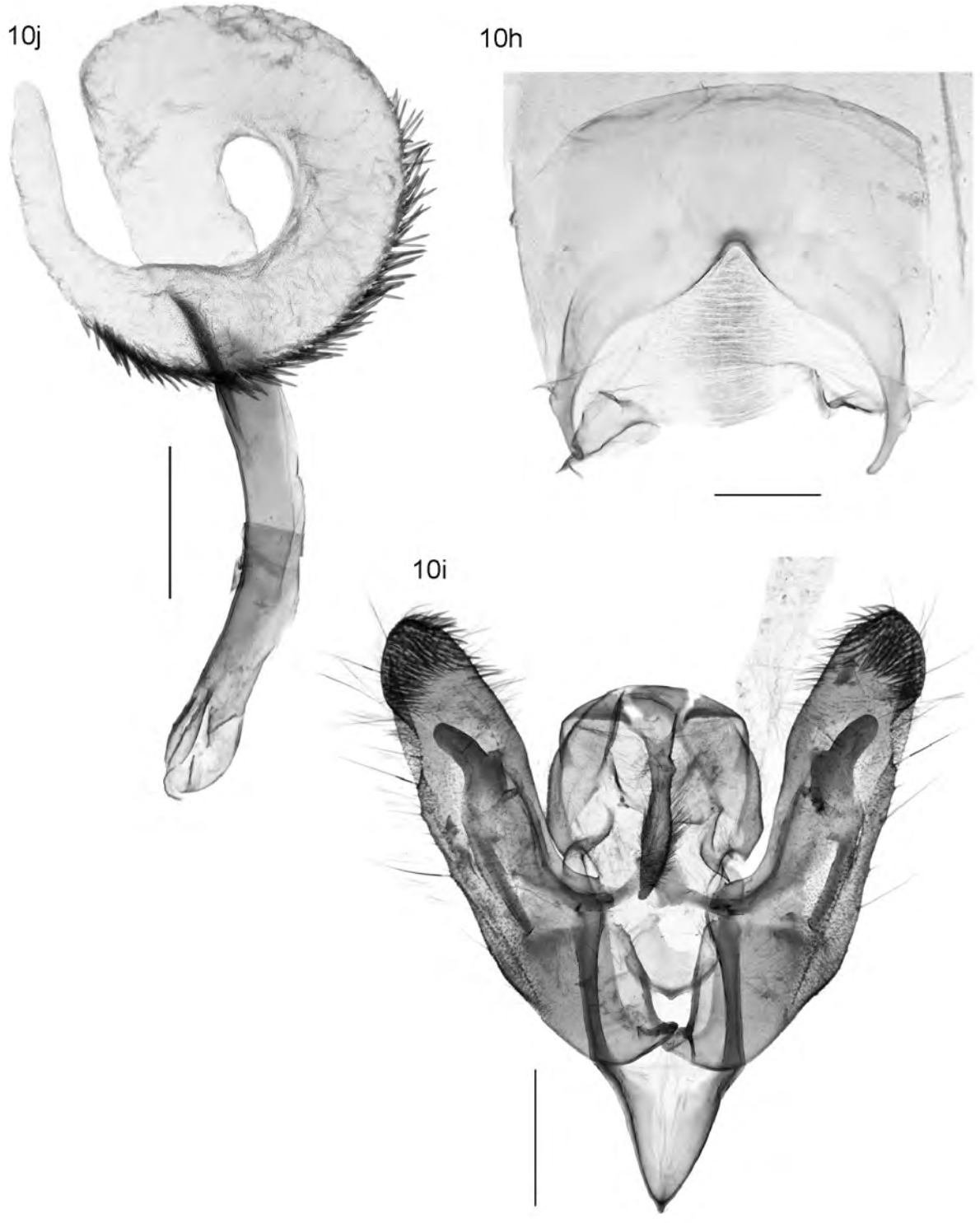


Fig. 10h, *Ichneutica chryserythra* male abdominal base; **10i,** genital capsule; **10j,** phallus. (Slide NZAC Noct. 160.)

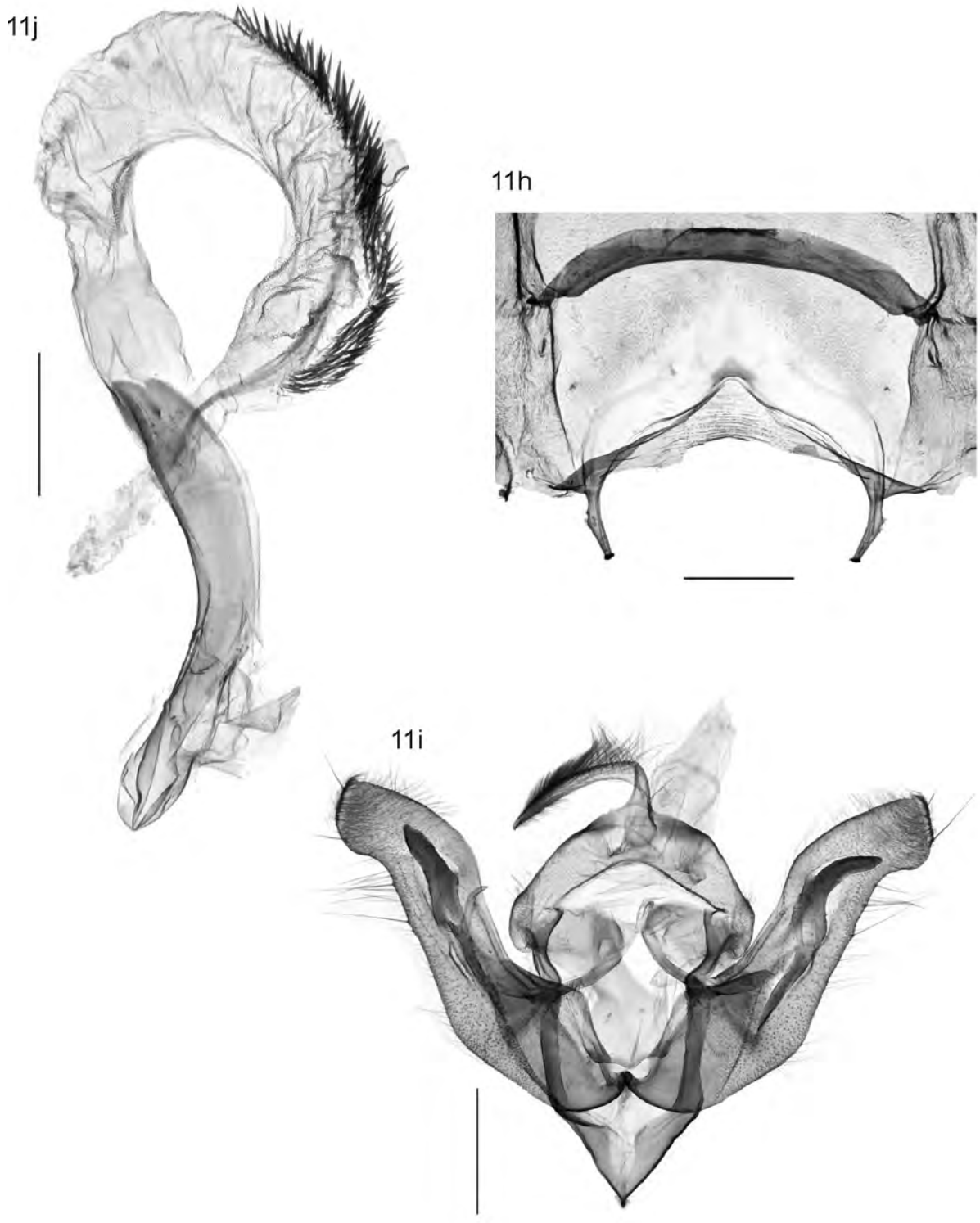


Fig. 11h, *Ichneutica falsidica* male abdominal base; **11i,** genital capsule; **11j,** phallus. (Slide NZAC Noct. 323.)

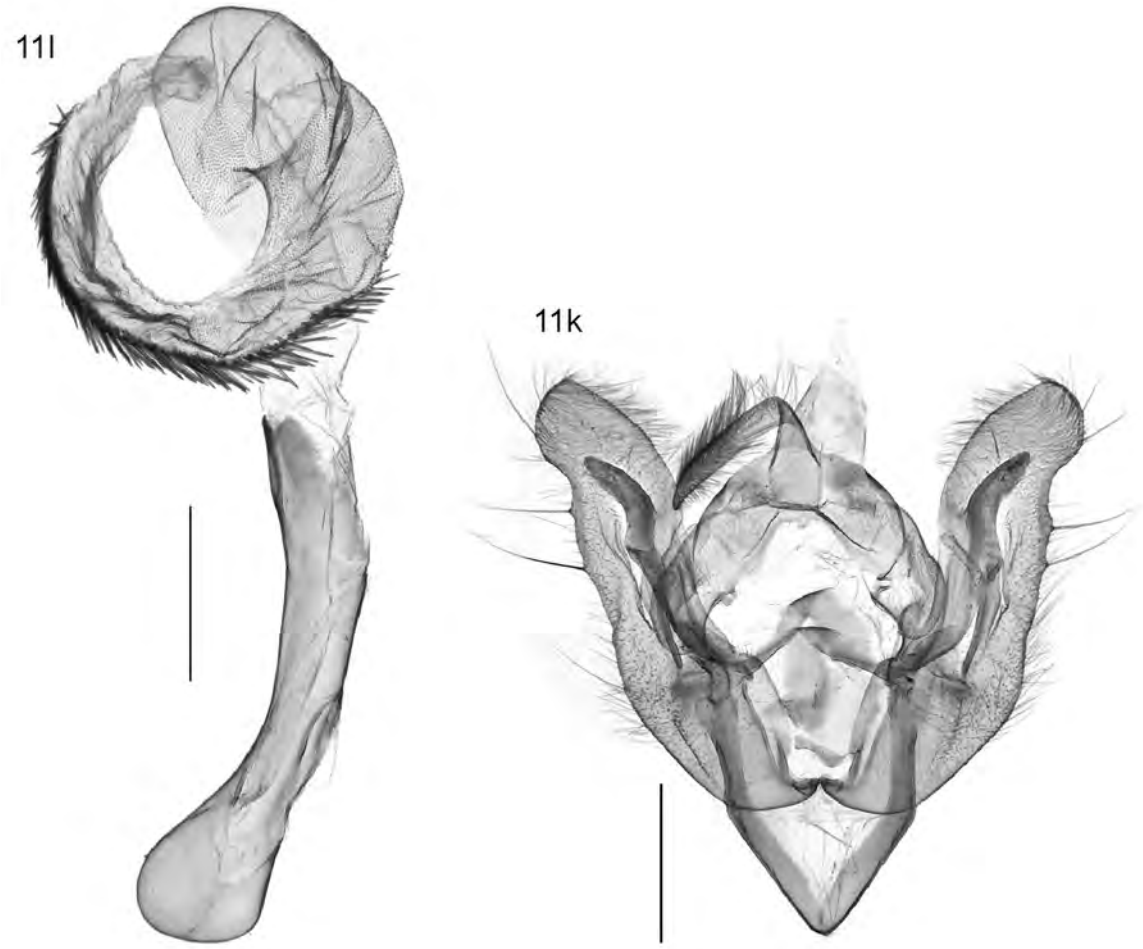


Fig. 11k, *Ichneutica falsidica* male genital capsule; **11l,** phallus. (Slide NZAC Noct. 99.)

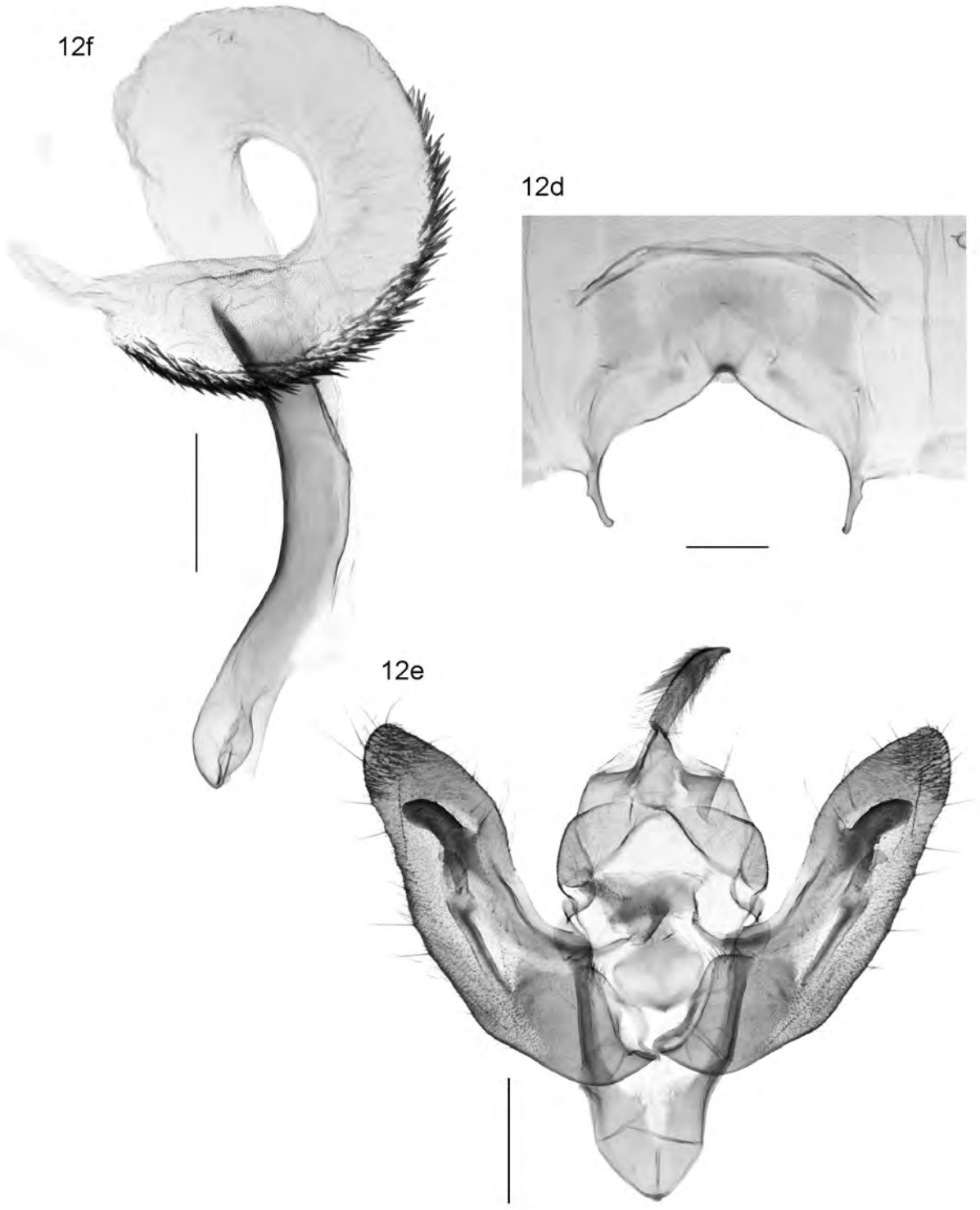


Fig. 12d, *Ichneutica fibriata* male abdominal base; **12e,** genital capsule; **12f,** phallus. (Slide NZAC Noct. 101.)

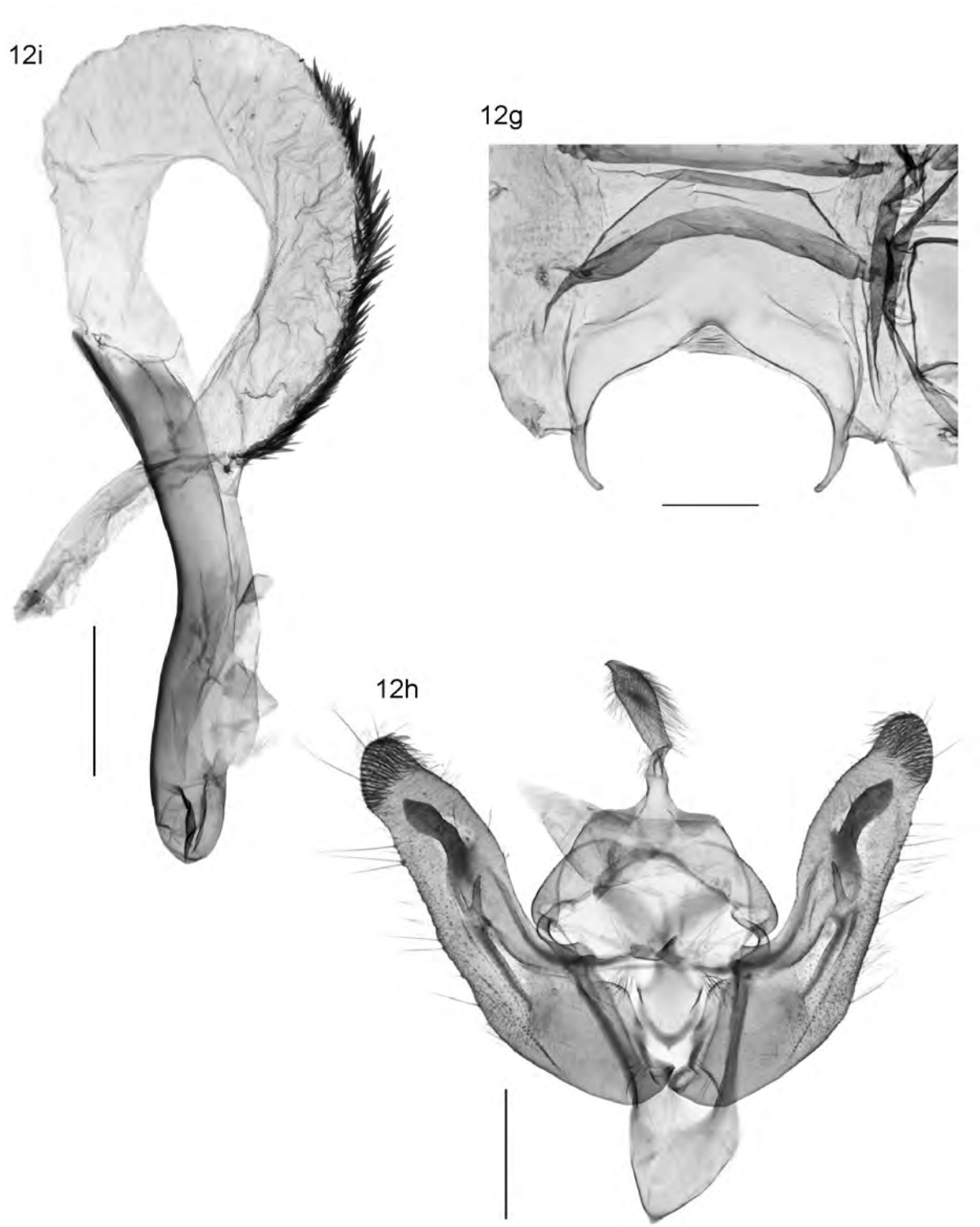


Fig. 12g, *Ichneutica fibriata* male abdominal base; **12h,** genital capsule; **12i,** phallus. (Slide NZAC Noct. 313.)

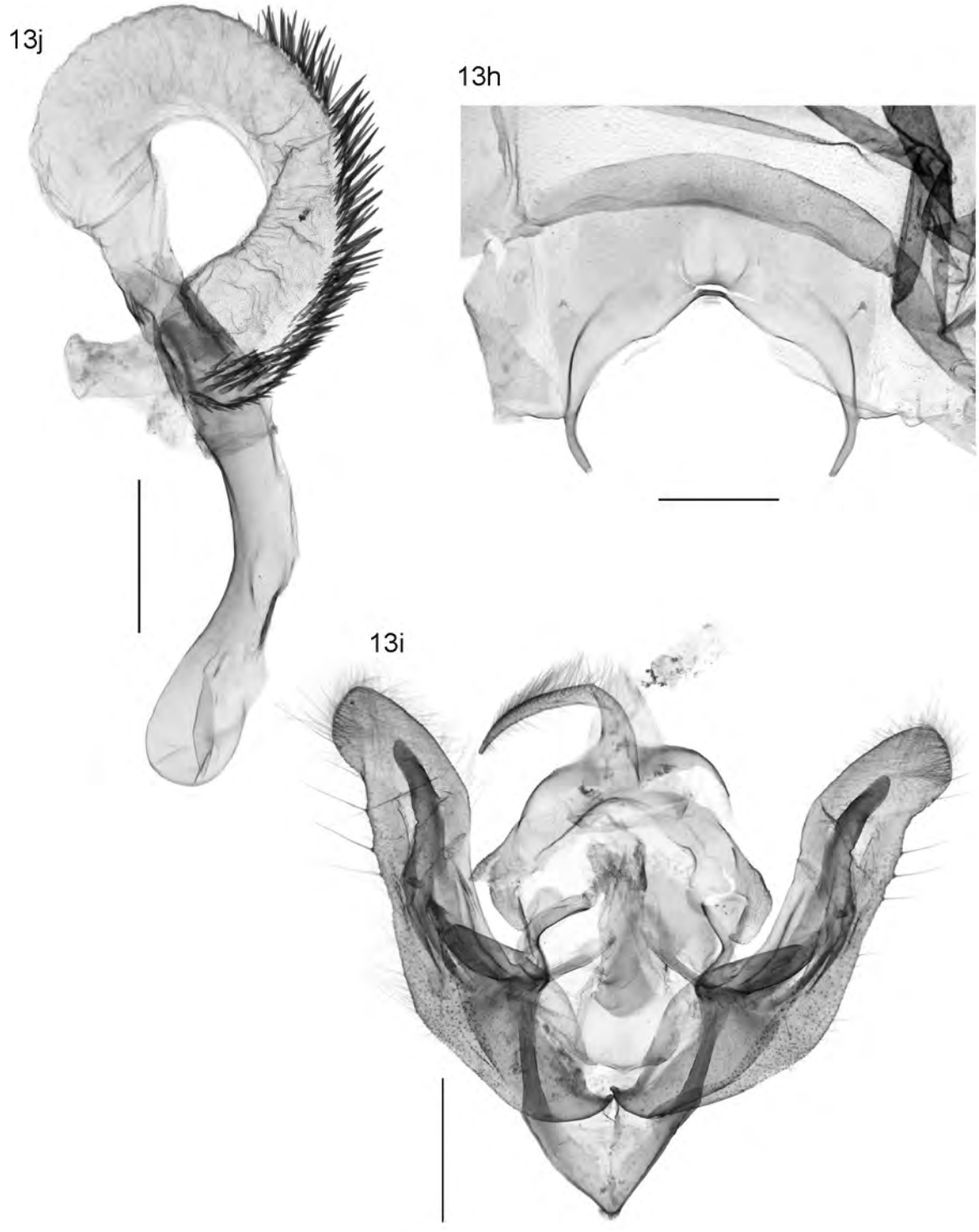


Fig. 13h, *Ichneutica panda* male abdominal base; **13i,** genital capsule; **13j,** phallus. (Holotype of *Aletia argentaria*, MONZ.)

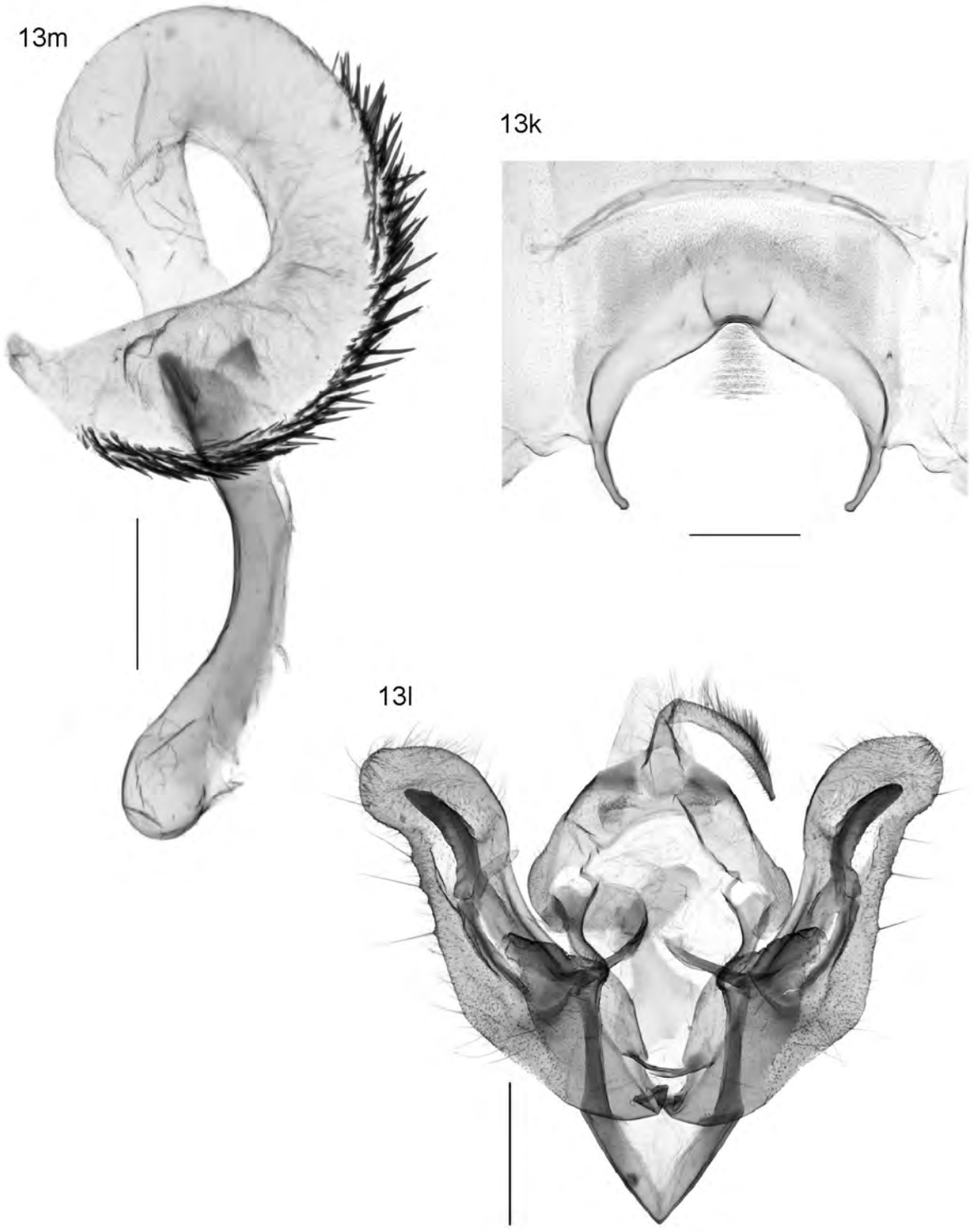


Fig. 13k, *Ichneutica panda* male abdominal base; **13l,** genital capsule; **13m,** phallus. (Slide NZAC Noct. 144.)

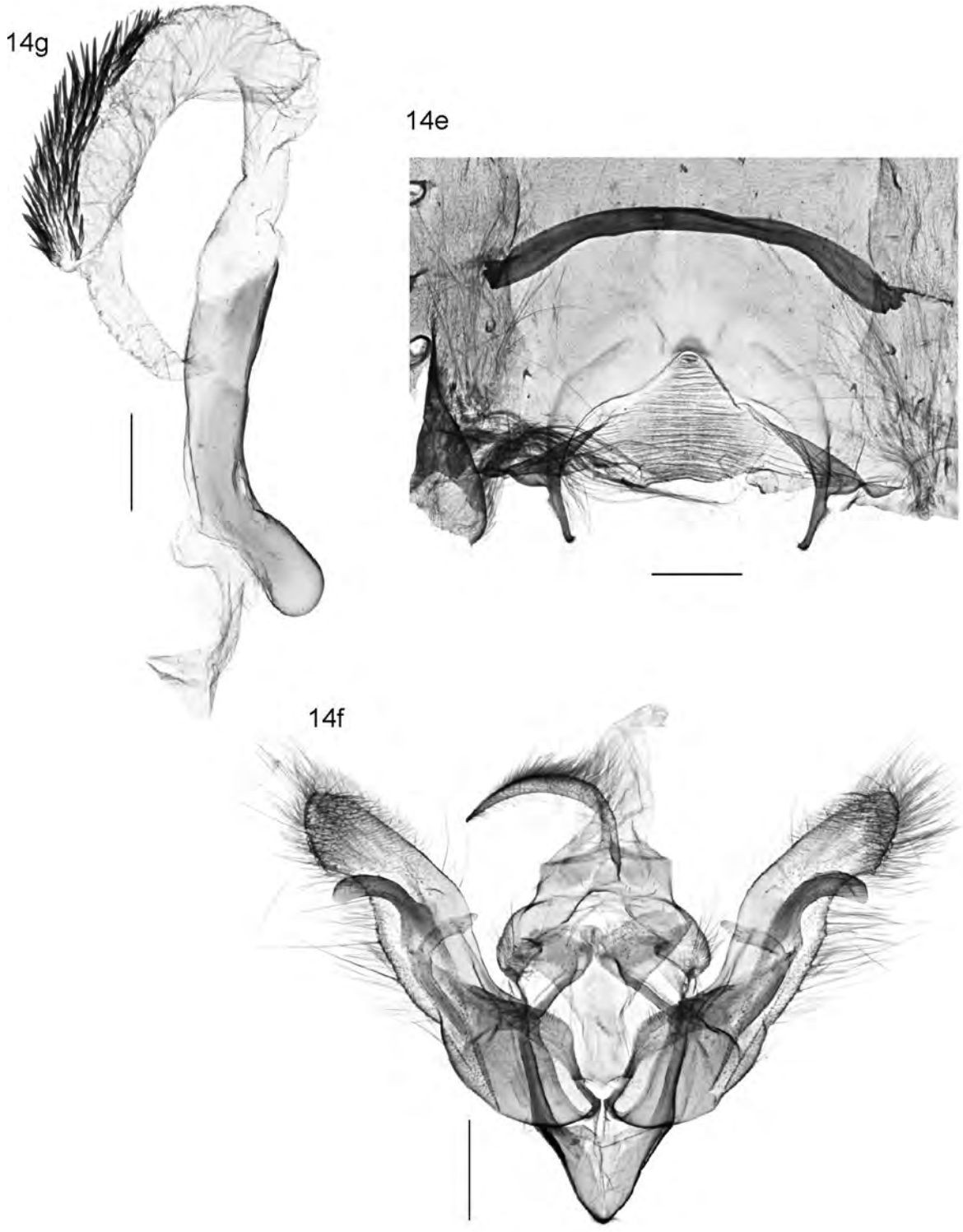


Fig. 14e, *Ichneutica purdii* male abdominal base; **14f,** genital capsule; **14g,** phallus. (Slide NZAC Noct. 507.)

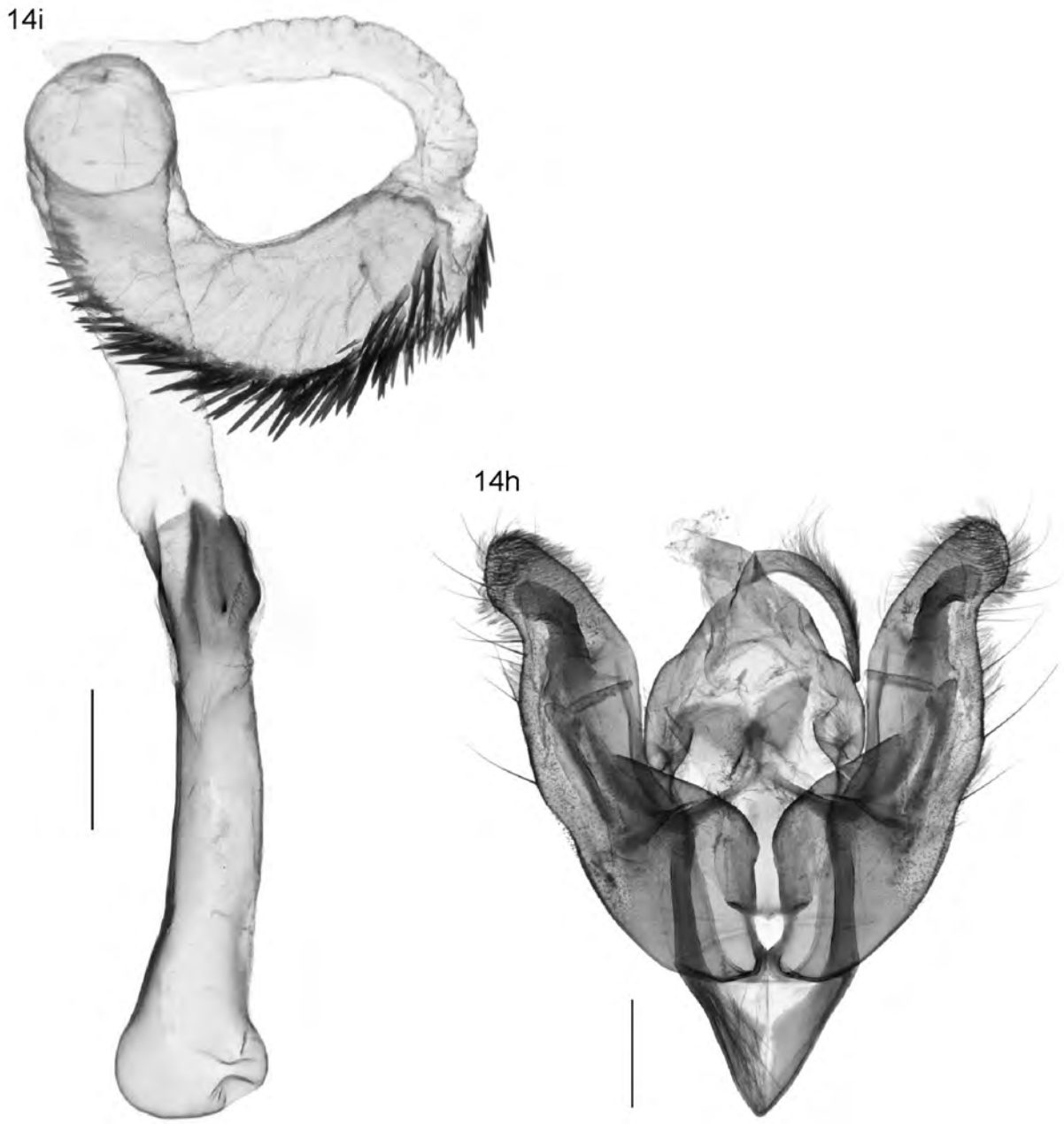


Fig. 14h, *Ichneutica purdii* male genital capsule; **14i,** phallus. (Slide NZAC Noct. 51.)

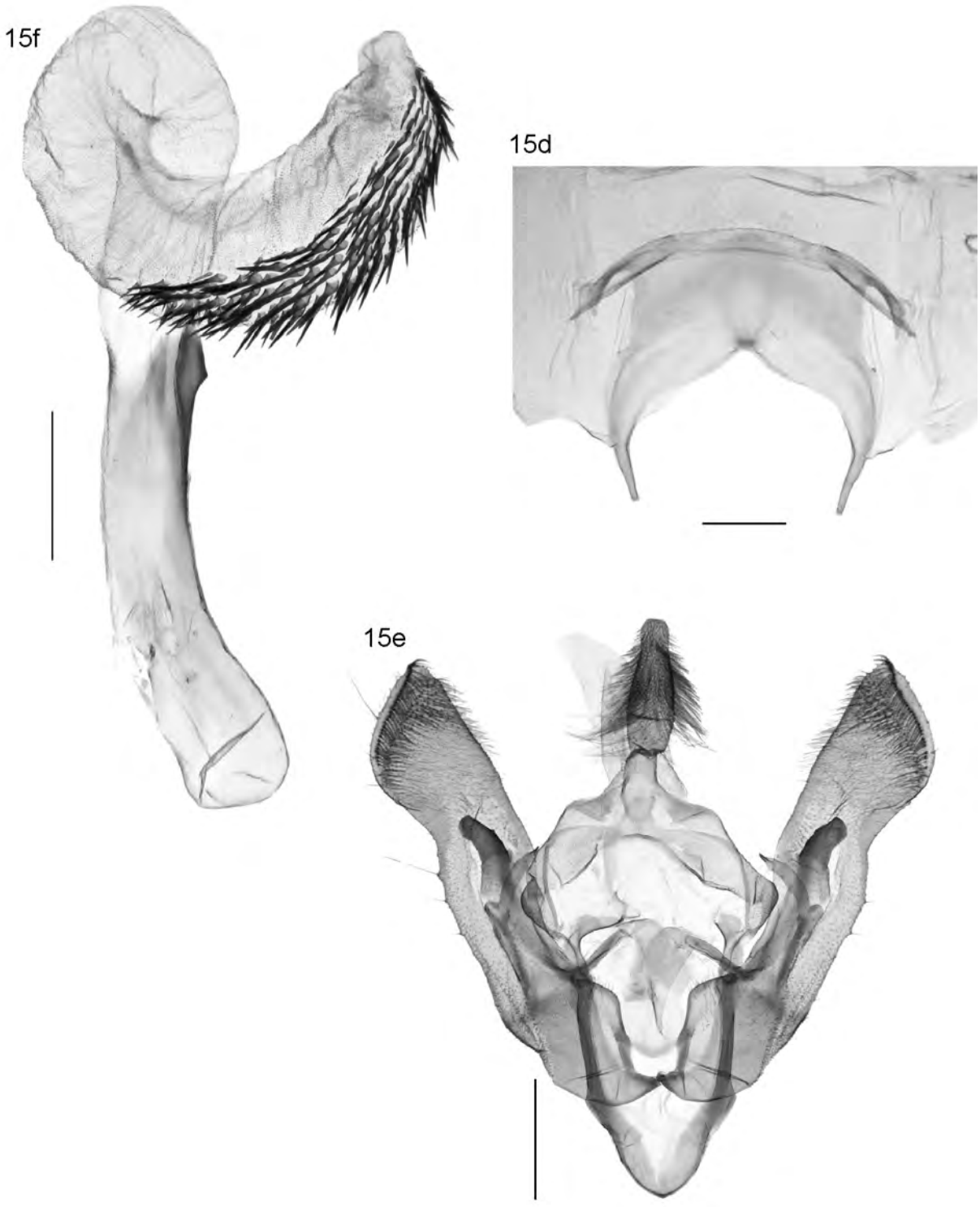


Fig. 15d, *Ichneutica nobilia* male abdominal base; **15e,** genital capsule; **15f,** phallus. (Slide NZAC Noct. 142.)

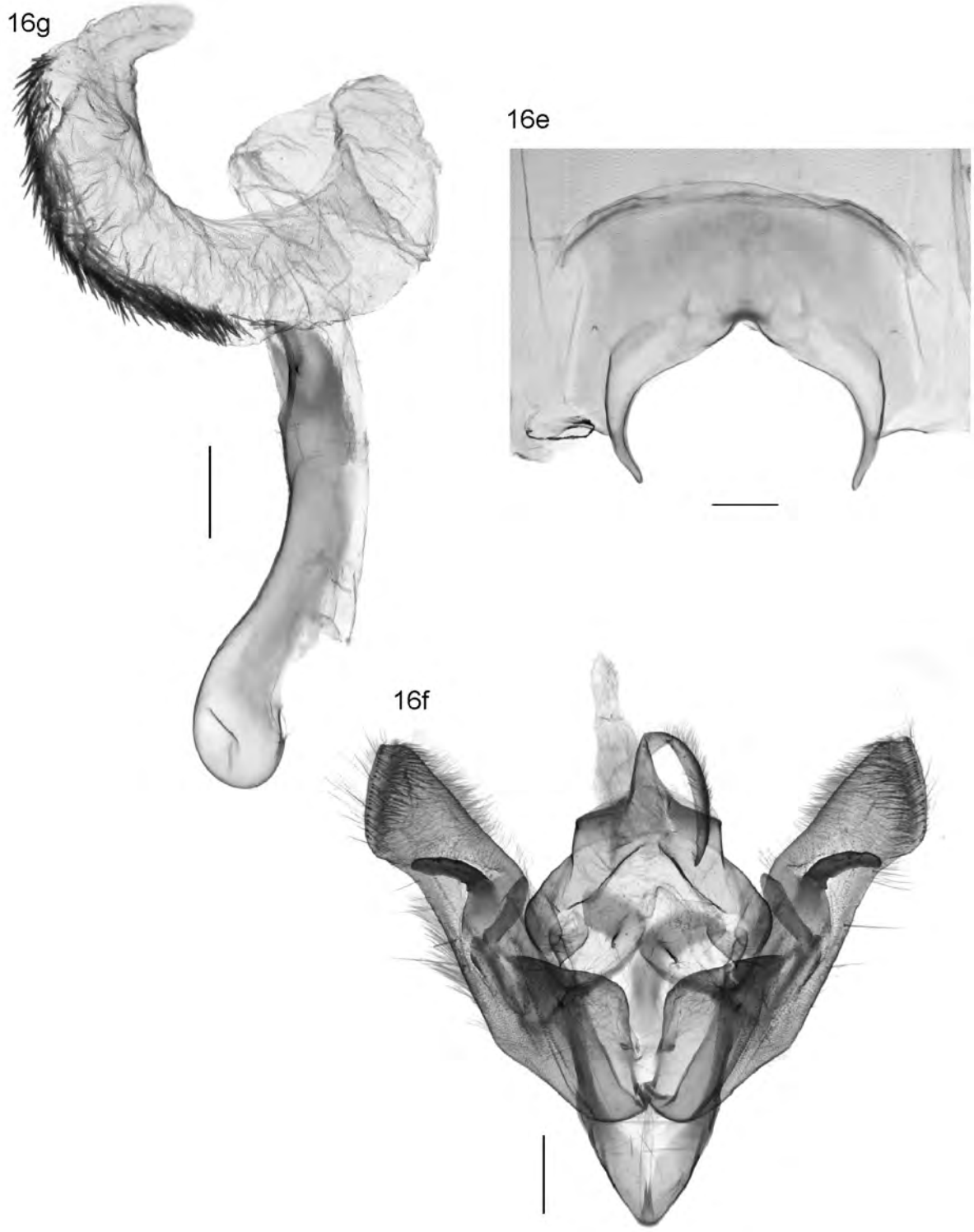


Fig. 16e, *Ichneutica nullifera* male abdominal base; **16f,** genital capsule; **16g,** phallus. (Slide NZAC Noct. 275.)

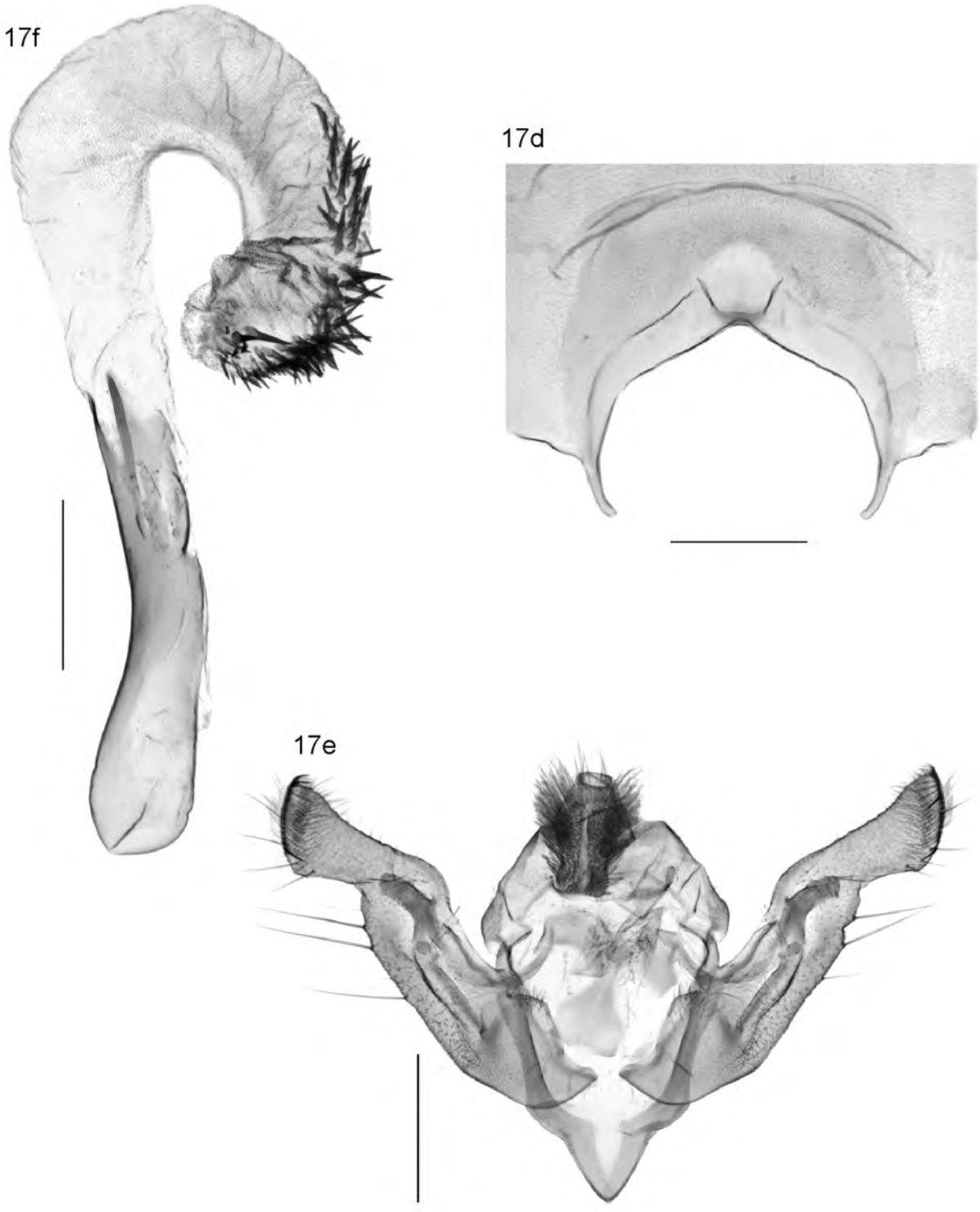


Fig. 17d, *Ichneutica lithias* male abdominal base; **17e,** genital capsule; **17f,** phallus. (Slide NZAC Noct. 54.)

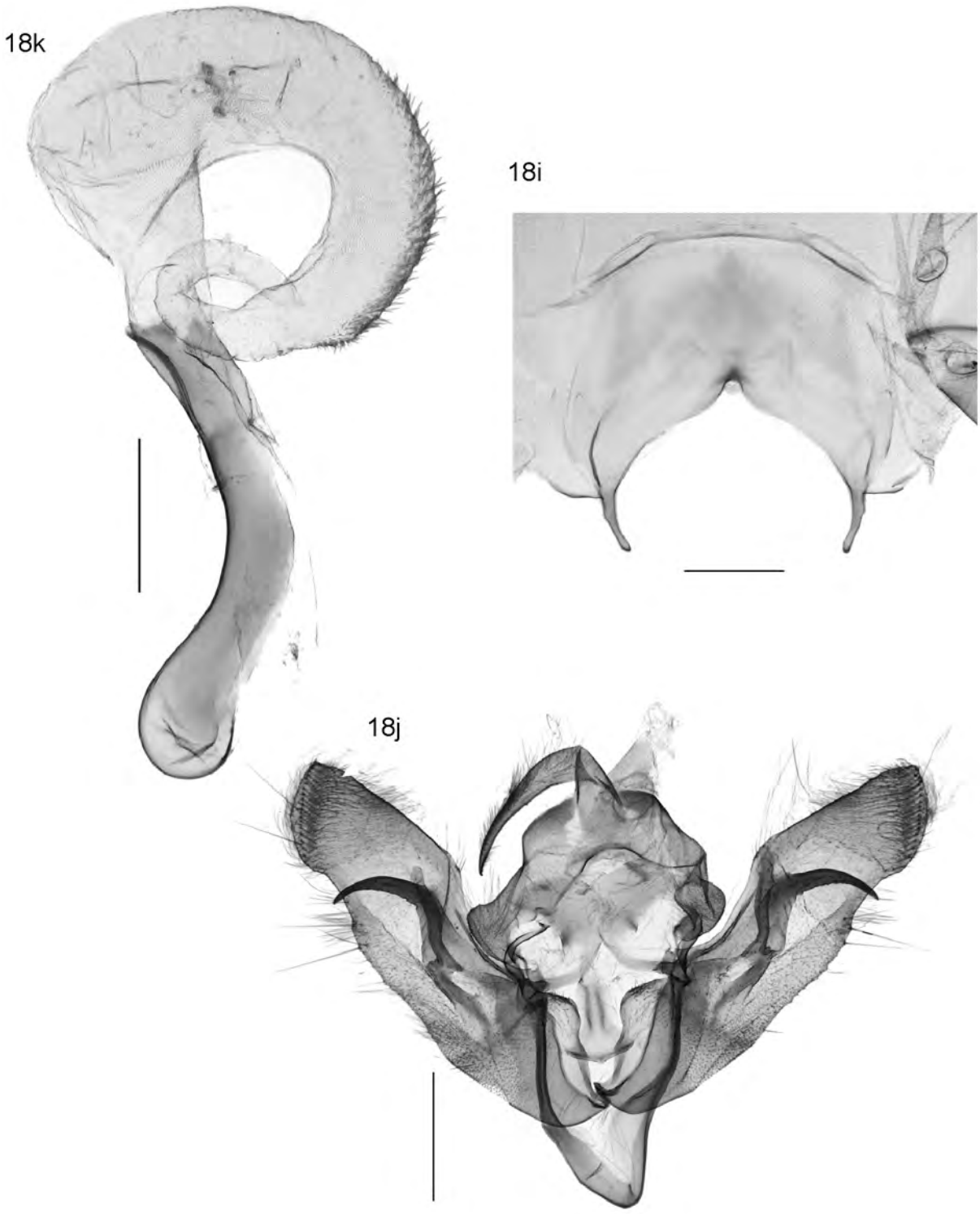


Fig. 18i, *Ichneutica marmorata* male abdominal base; **18j,** genital capsule; **18k,** phallus. (Slide NZAC Noct. 256.)

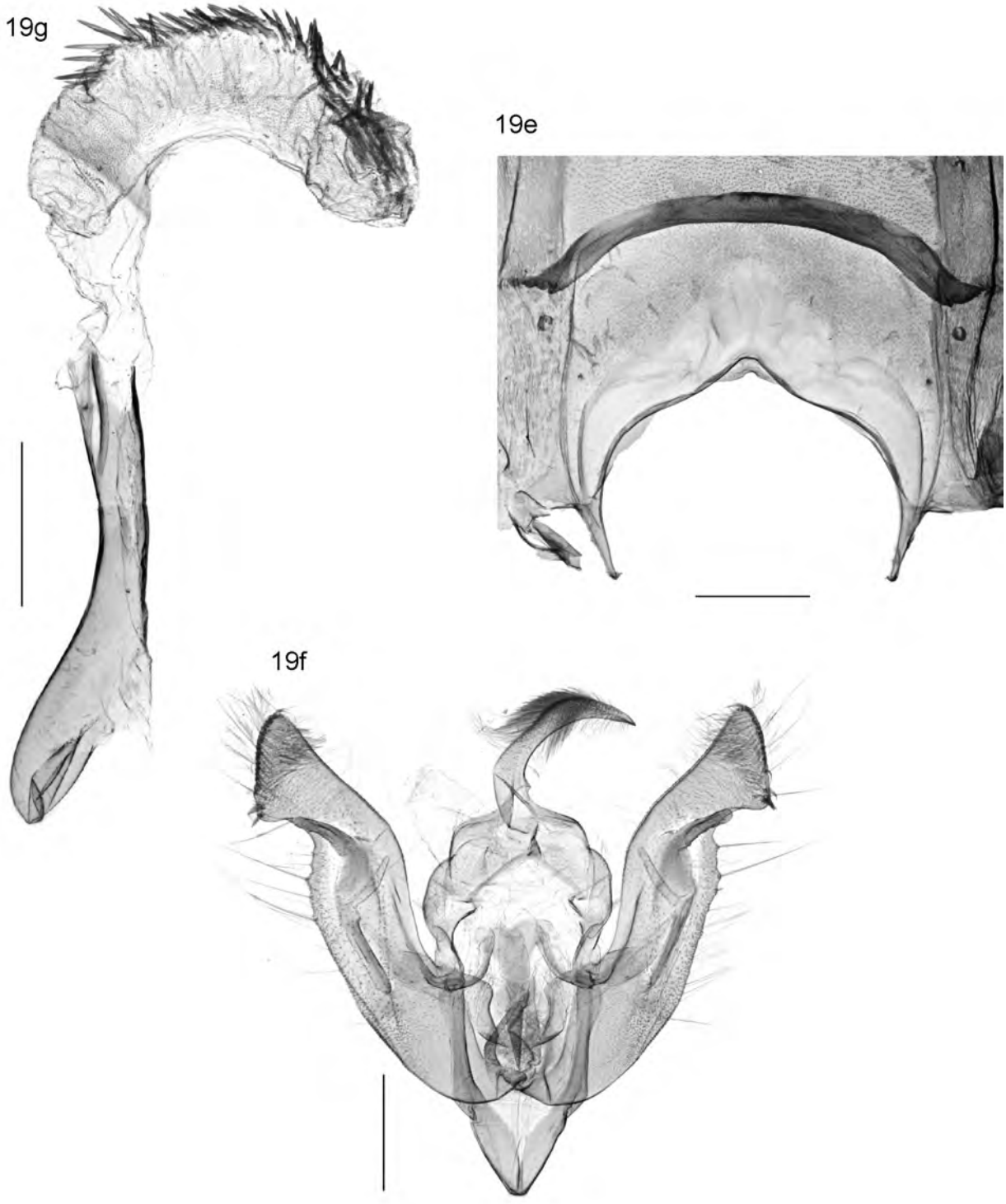


Fig. 19e, *Ichneutica disjungens* male abdominal base; **19f,** genital capsule; **19g,** phallus. (Slide NZAC Noct. 45.)

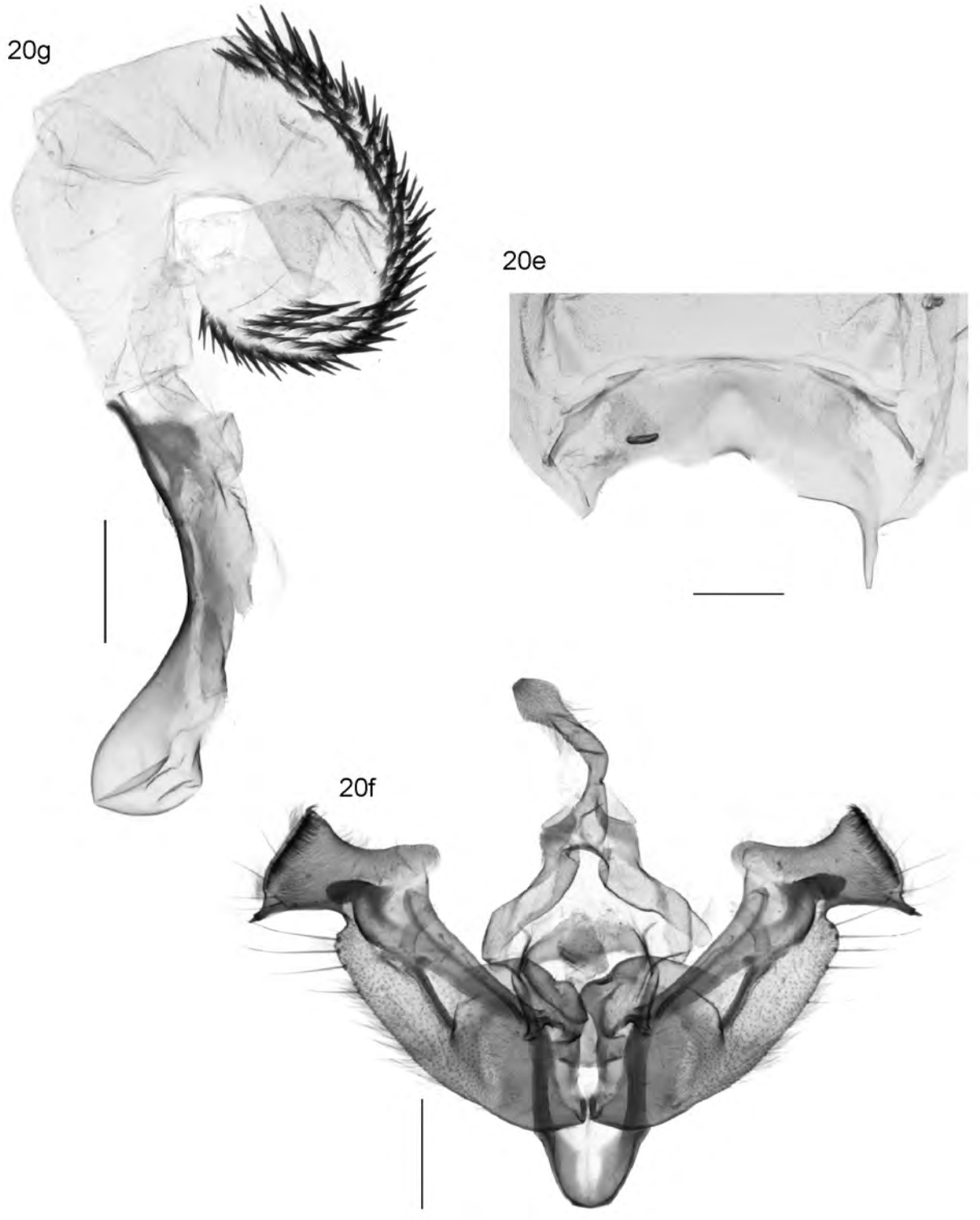


Fig. 20e, *Ichneutica moderata* male abdominal base; **20f,** genital capsule; **20g,** phallus. (Slide NZAC Noct. 140.)

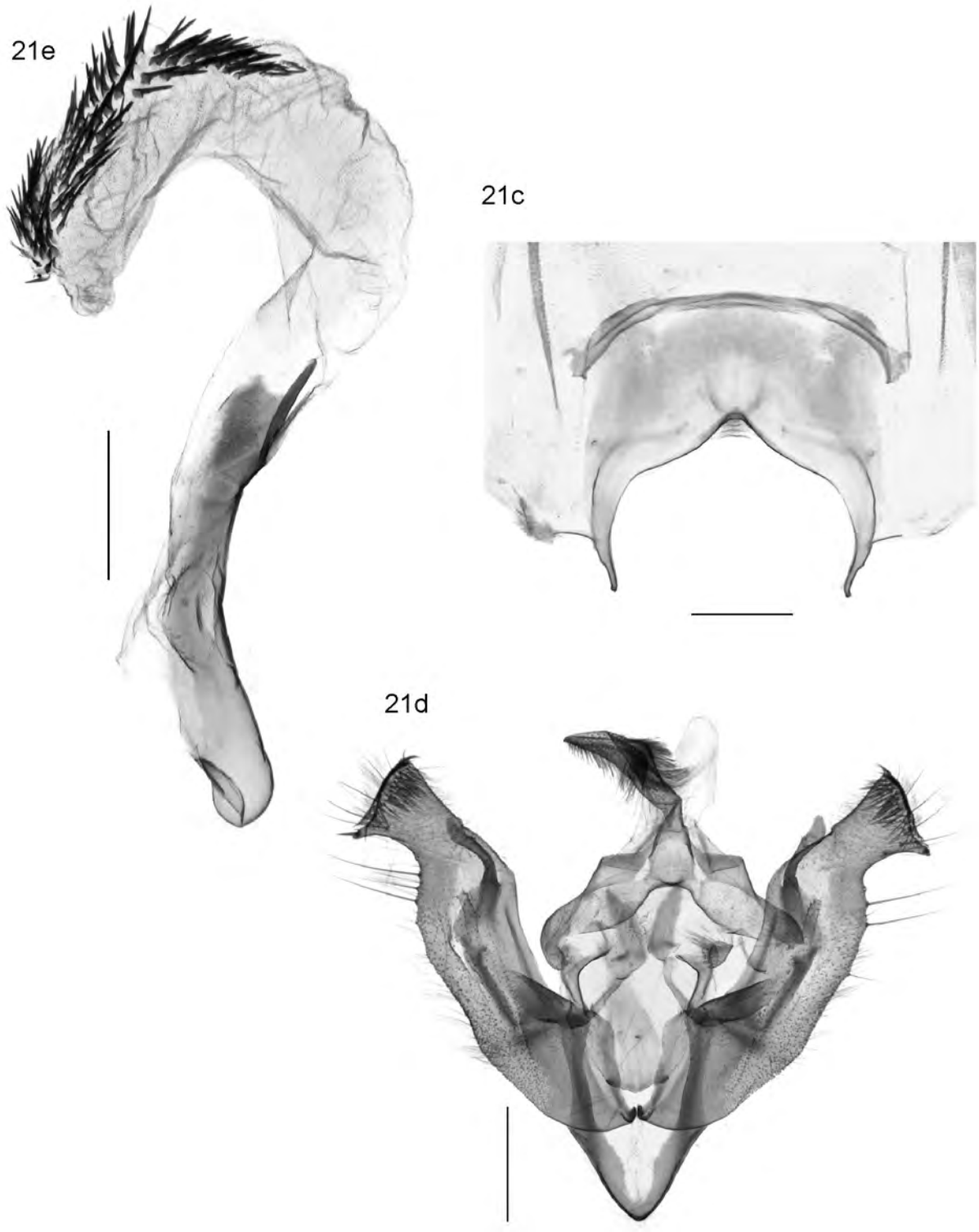


Fig. 21c, *Ichneutica oliveri* male abdominal base; **21d,** genital capsule; **21e,** phallus. (Slide NZAC Noct. 167.)

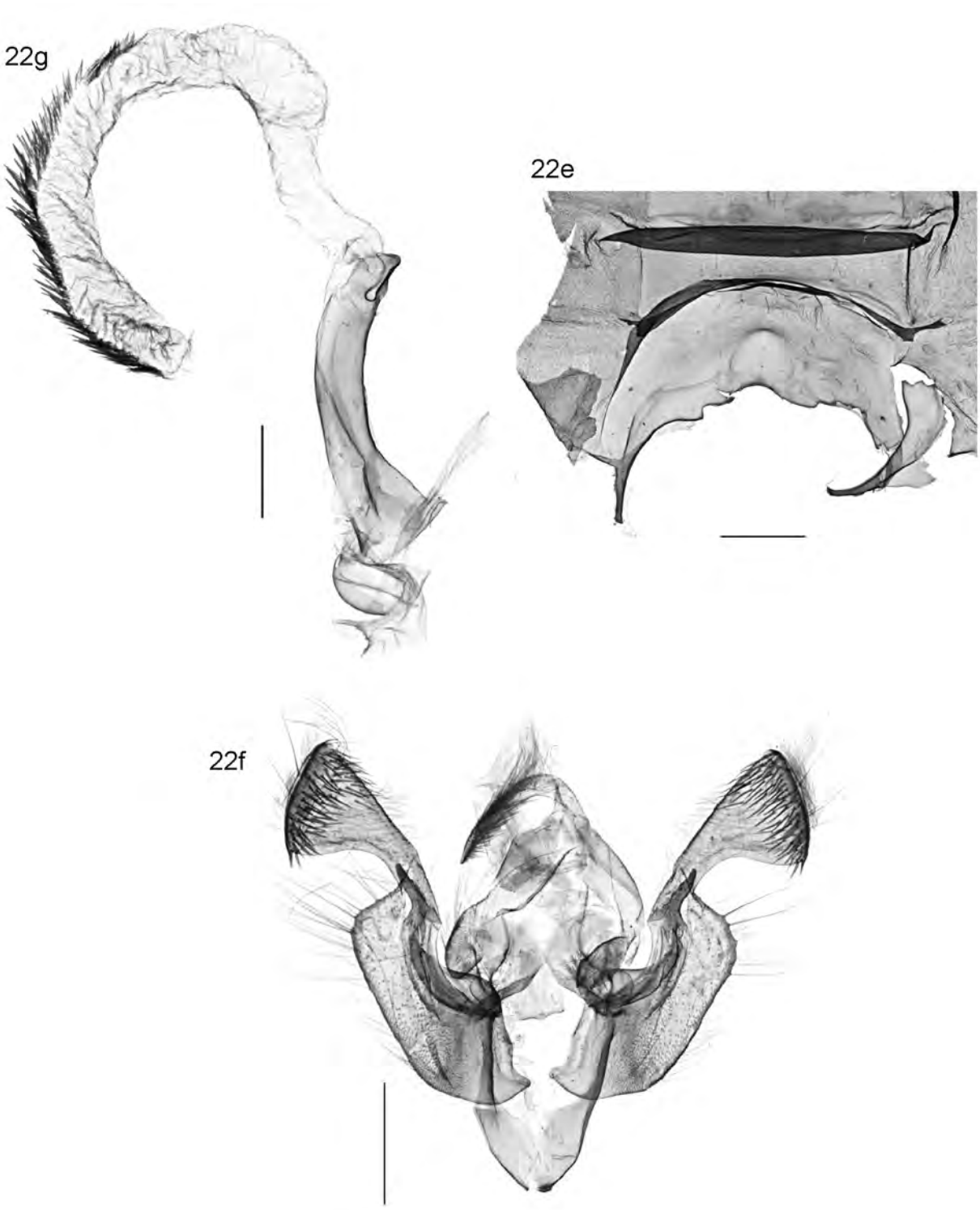


Fig. 22e, *Ichneutica averilla* male abdominal base; **22f,** genital capsule; **22g,** phallus. (Slide NZAC Noct. 512.)

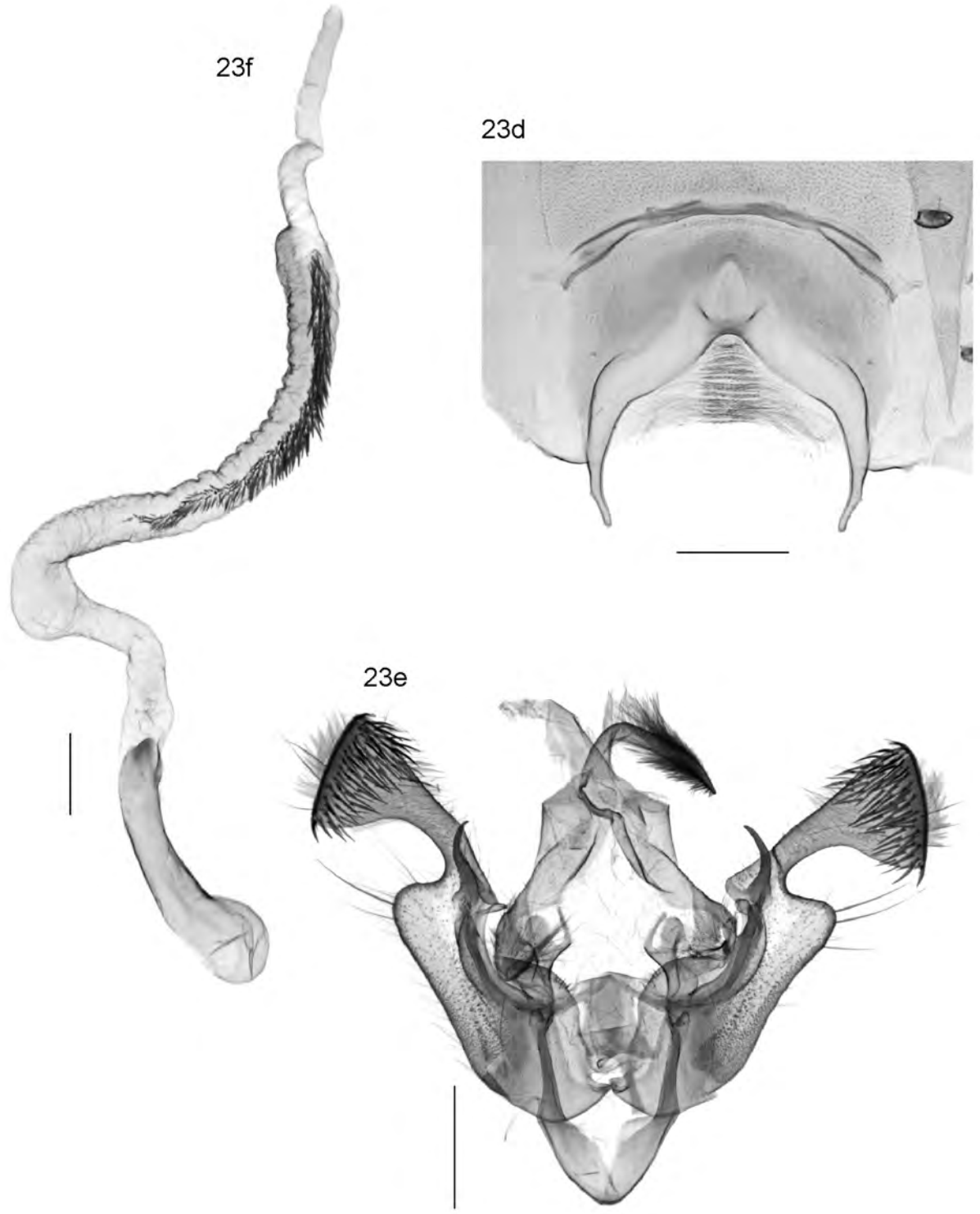


Fig. 23d, *Ichneutica bromias* male abdominal base; **23e,** genital capsule; **23f,** phallus. (Slide NZAC Noct. 159.)

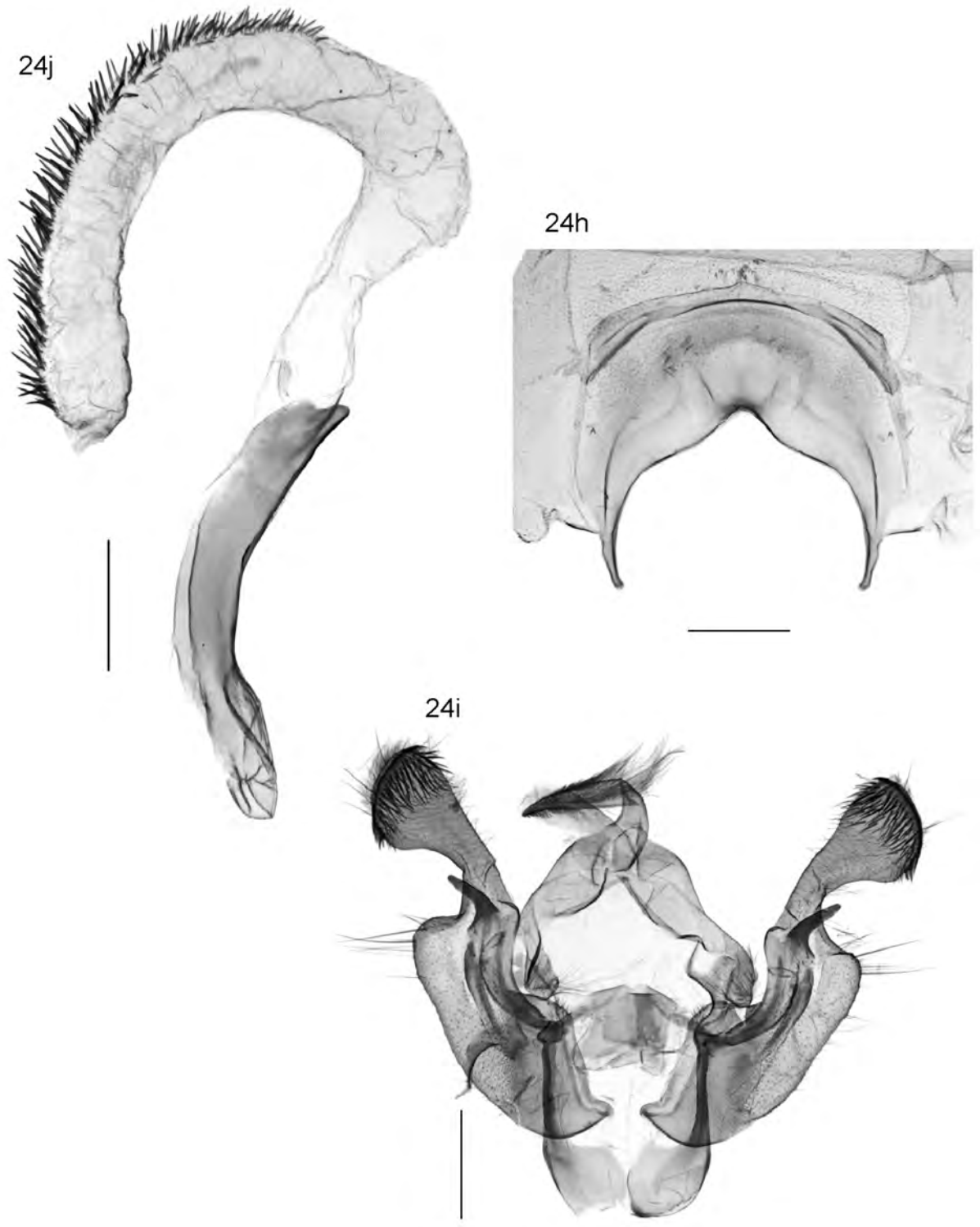


Fig. 24h, *Ichneutica erebia* male abdominal base; **24i,** genital capsule; **24j,** phallus. (Slide NZAC Noct. 183.)

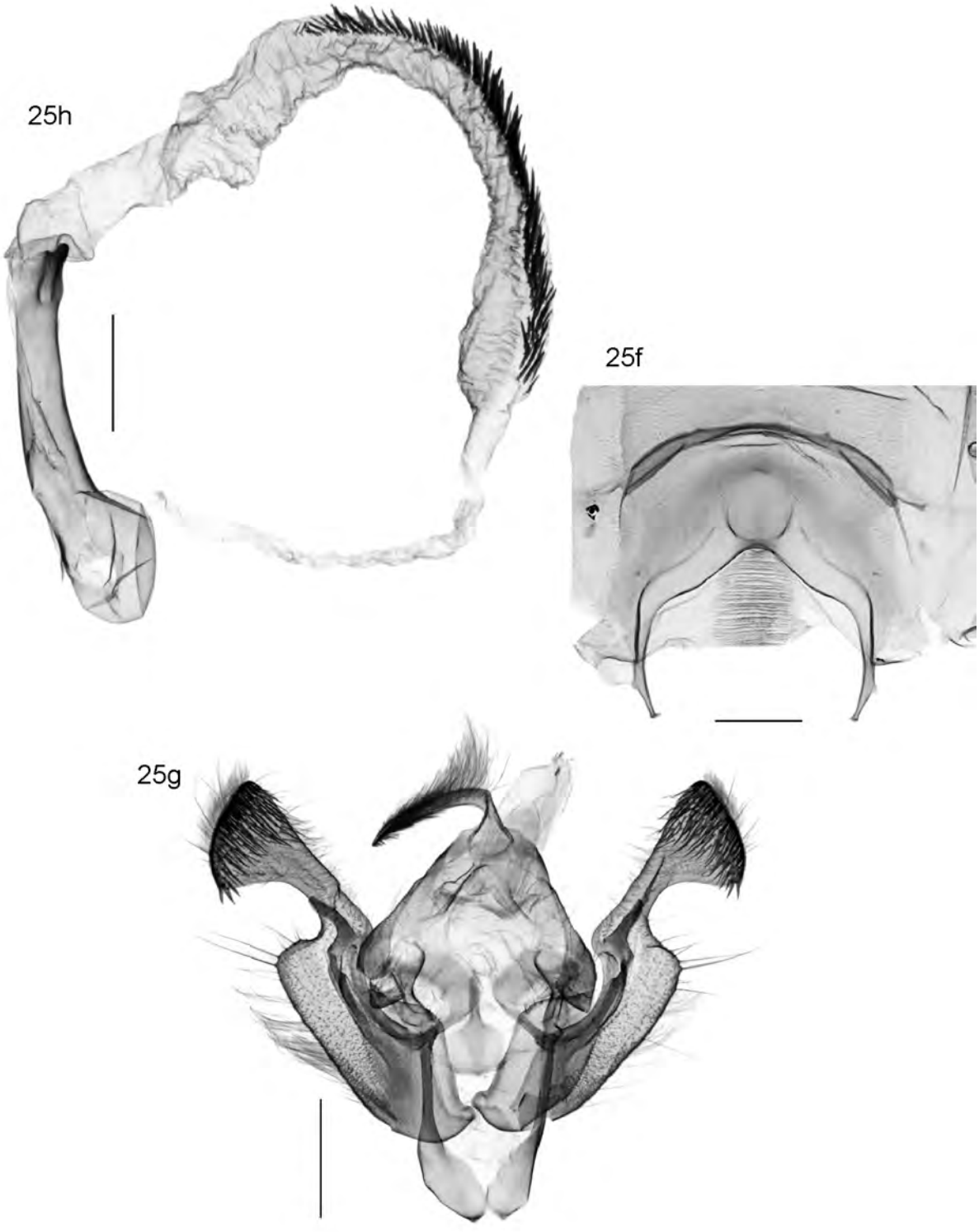


Fig. 25f, *Ichneutica mutans* male abdominal base; **25g,** genital capsule; **25h,** phallus. (Slide OMNZ IV42457.)

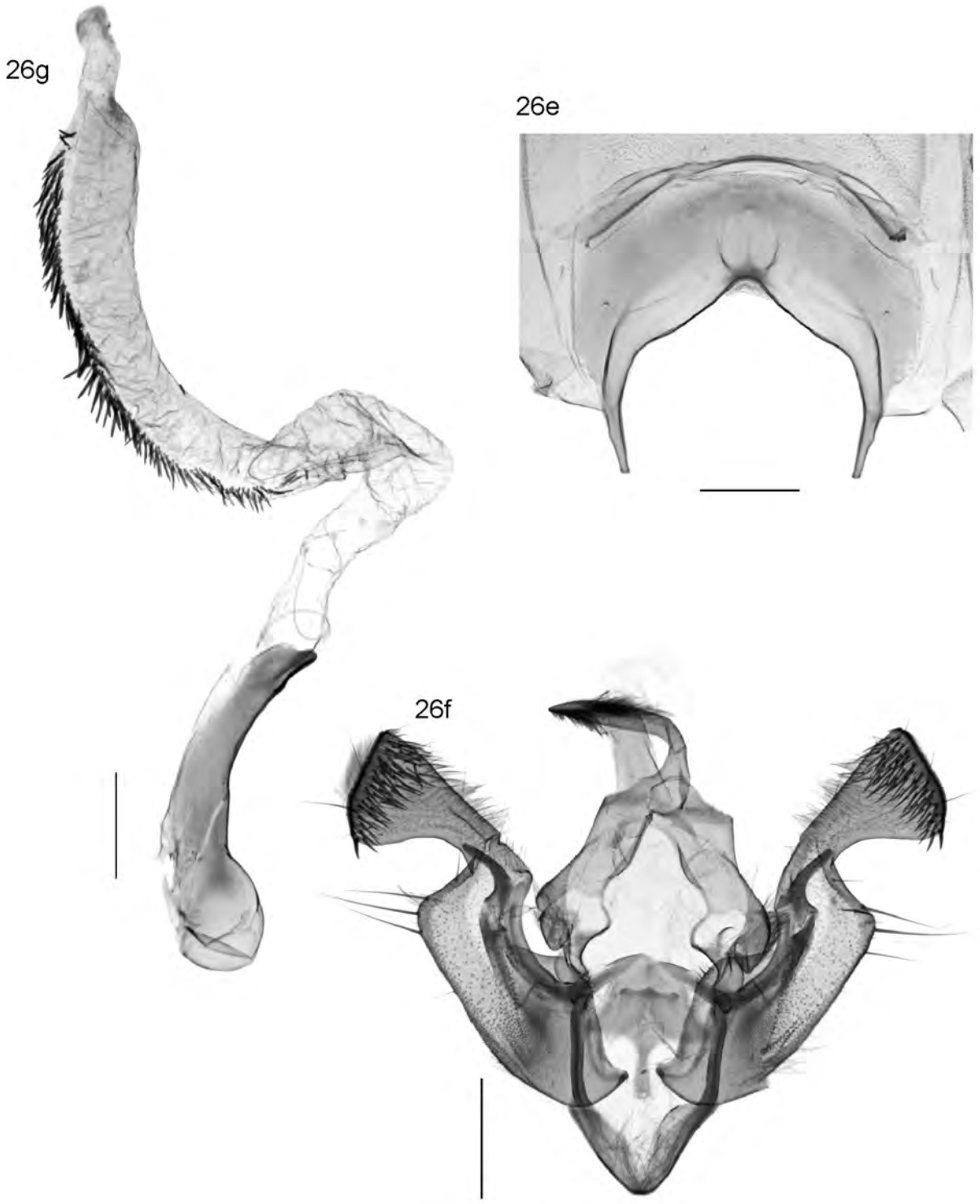


Fig. 26e, *Ichneutica petrograpta* male abdominal base; **26f,** genital capsule; **26g,** phallus. (Slide NZAC Noct. 182.)

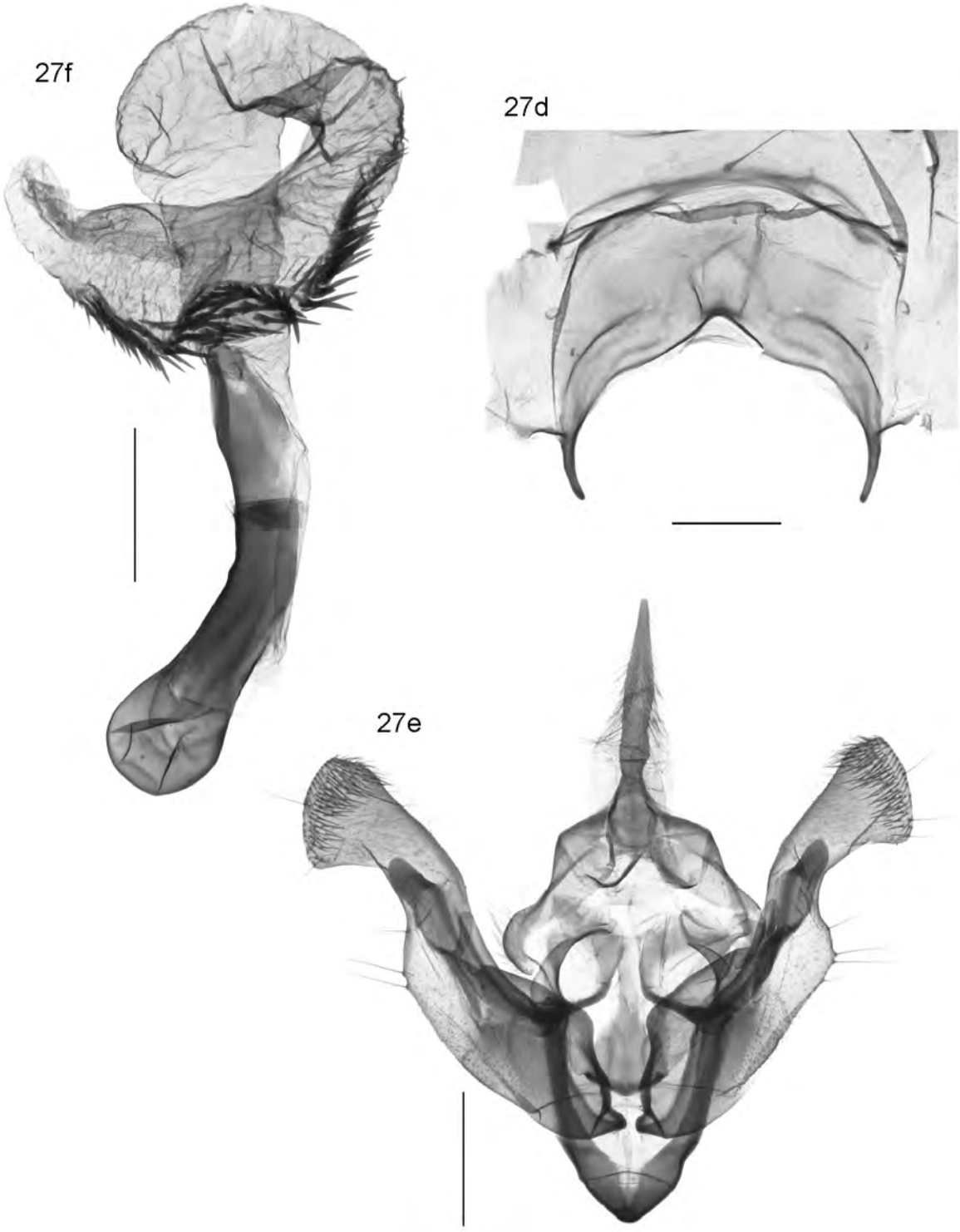


Fig. 27d, *Ichneutica brunneosa* male abdominal base; **27e,** genital capsule; **27f,** phallus. (Slide NZAC Noct. 322.)

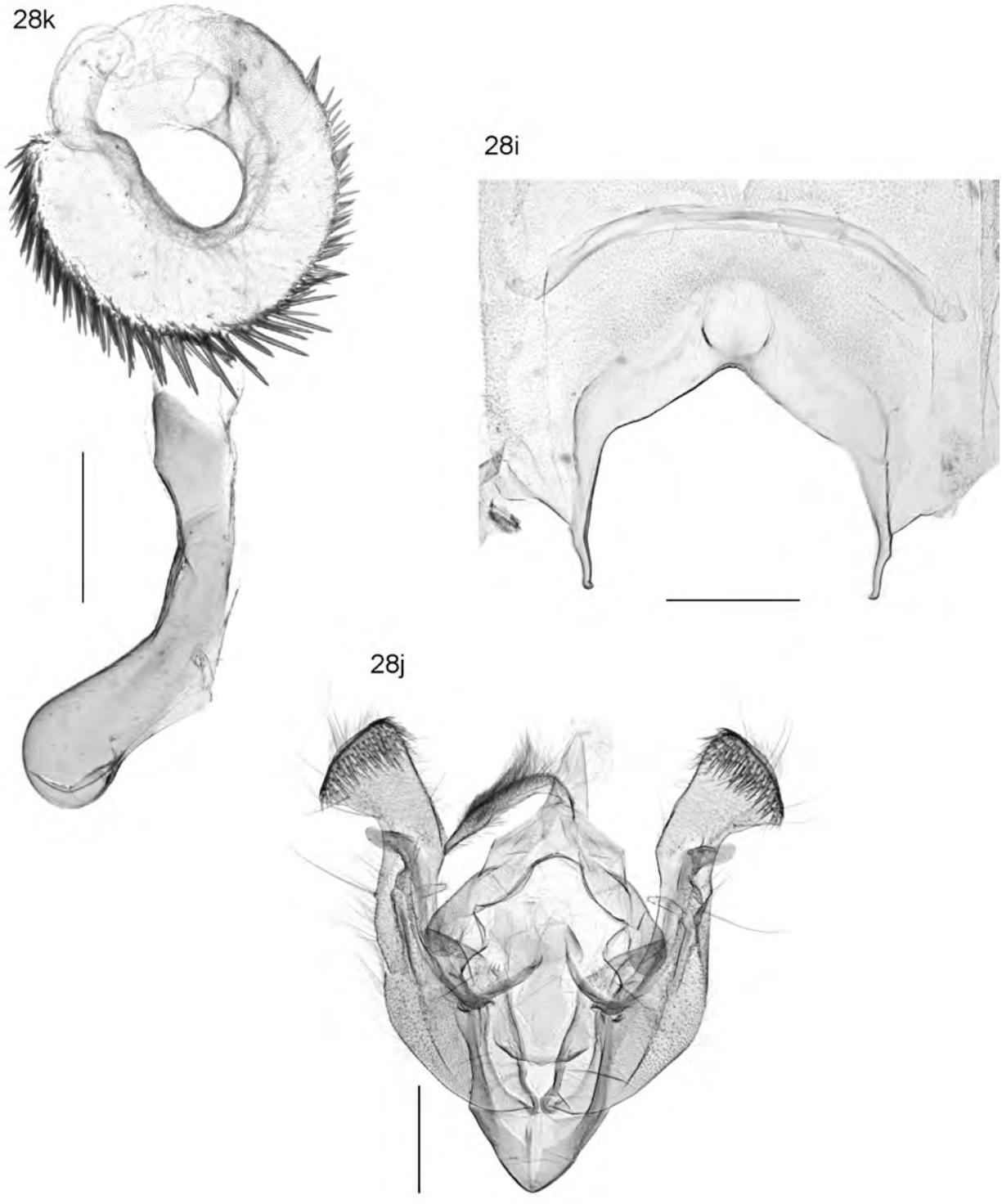


Fig. 28i, *Ichneutica chlorodonta* male abdominal base; **28j,** genital capsule; **28k,** phallus. (Slide NZAC Noct. 120.)

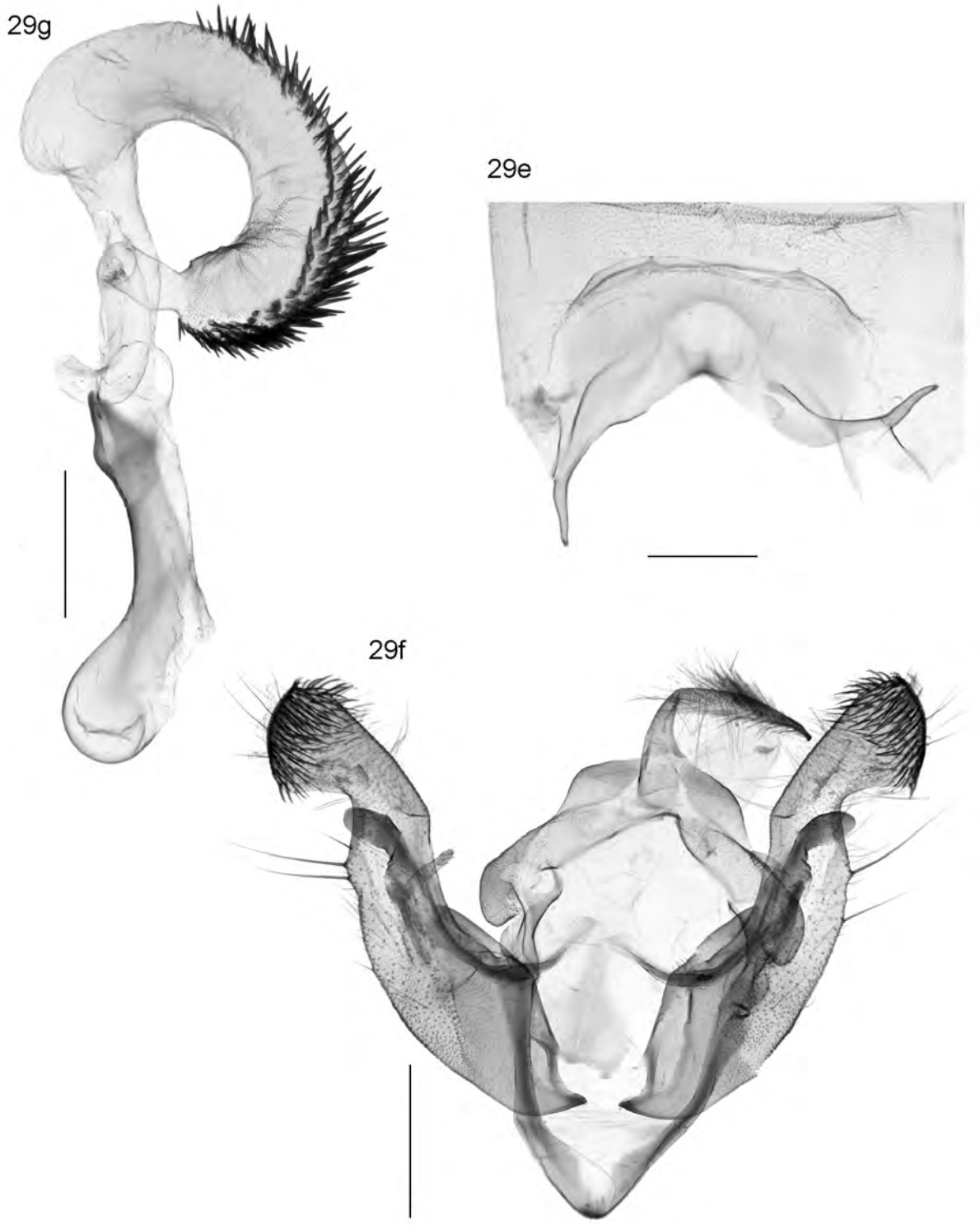


Fig. 29e, *Ichneutica subcyprea* male abdominal base; **29f,** genital capsule; **29g,** phallus. (Slide NZAC Noct. 119.)

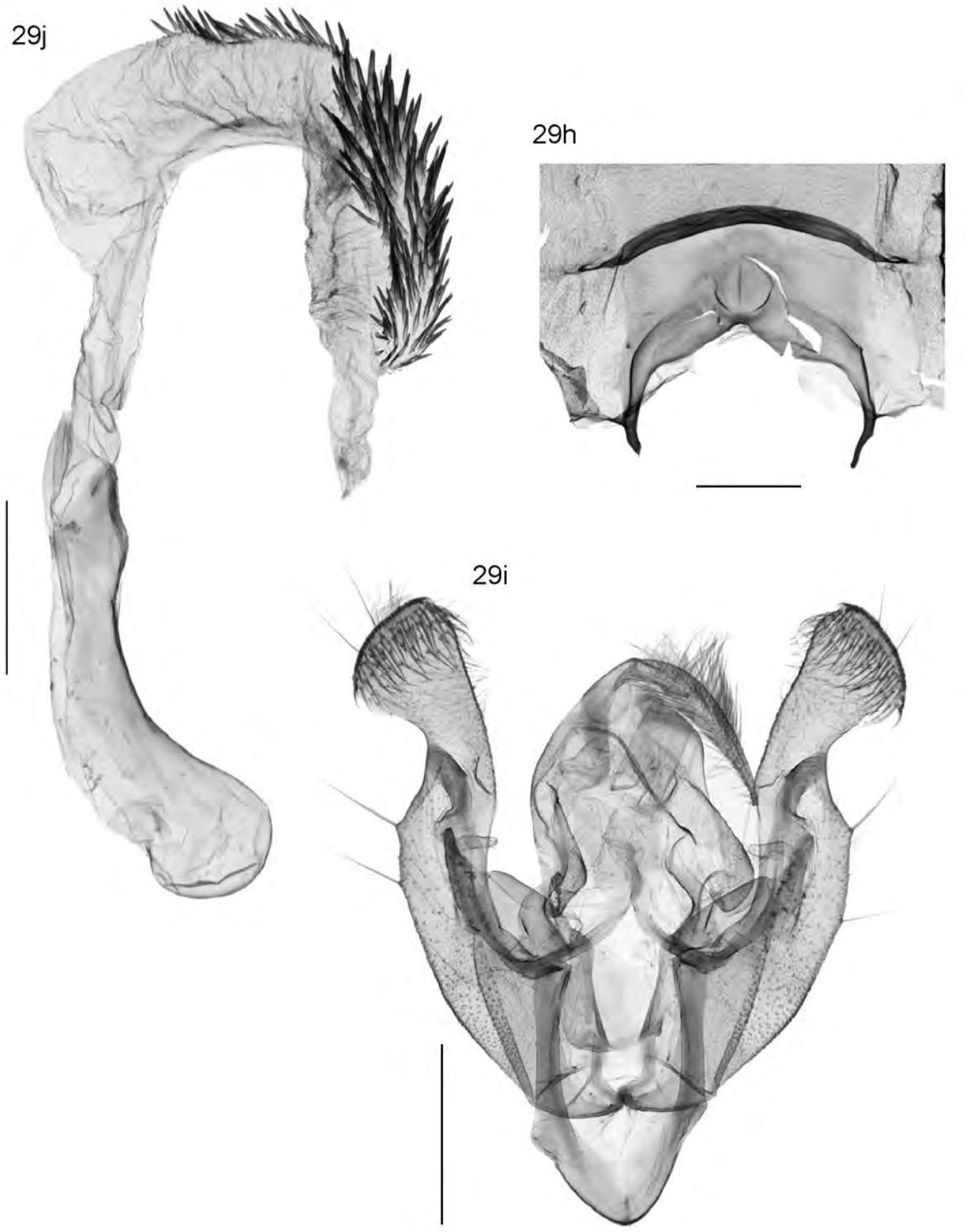


Fig. 29h, *Ichneutica subcyprea* holotype male abdominal base; **29i,** genital capsule; **29j,** phallus. (Slide NZAC Noct. 338.)

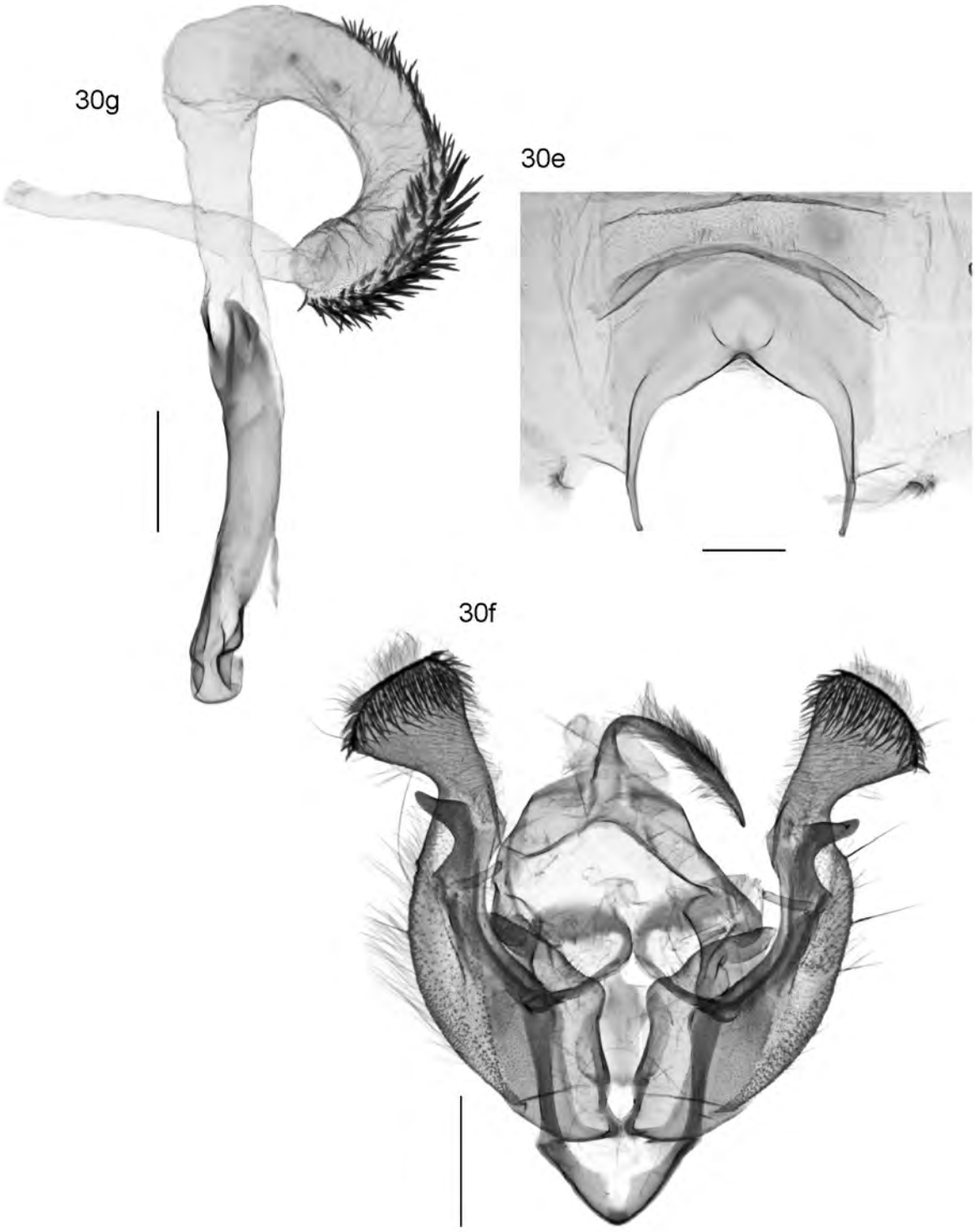


Fig. 30e, *Ichneutica dundastica* holotype male abdominal base; **30f,** genital capsule; **30g,** phallus. (Slide NZAC Noct. 157.)

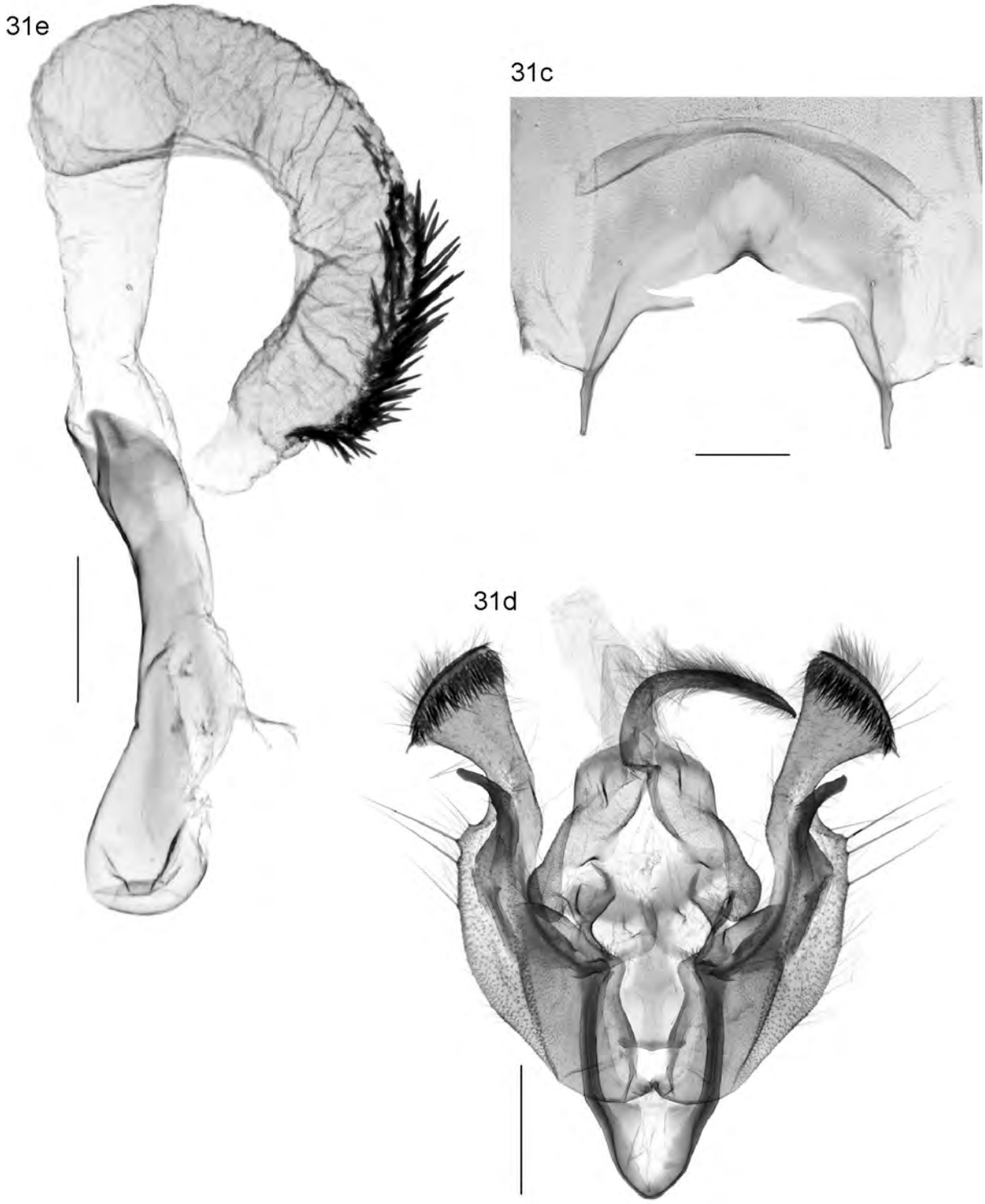


Fig. 31c, *Ichneutica fenwicki* male abdominal base; **31d,** genital capsule; **31e,** phallus. (Slide NZAC Noct. 161.)

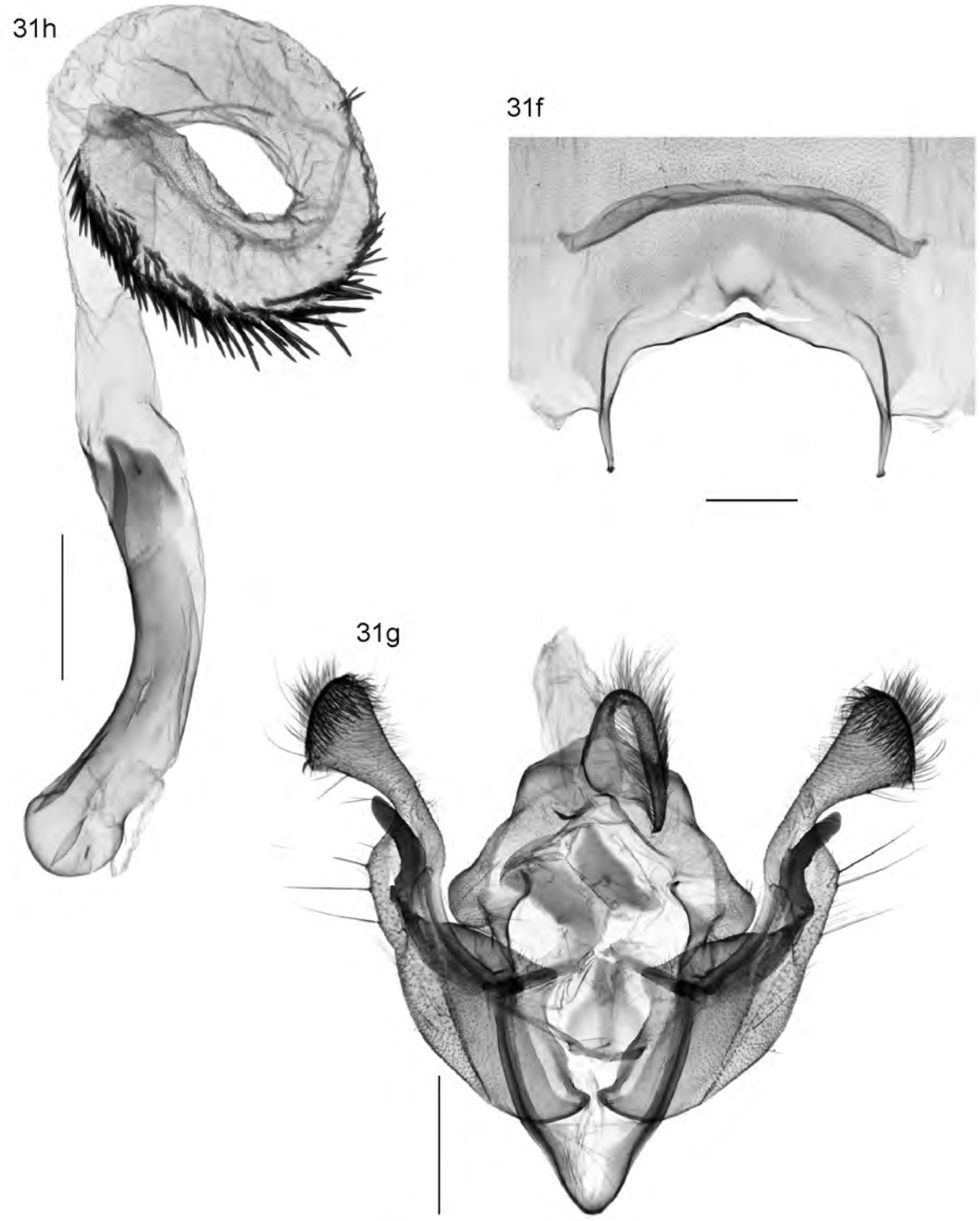


Fig. 31f, *Ichneutica fenwicki* male abdominal base; **31g,** genital capsule; **31h,** phallus. (Slide NZAC Noct. 403.)

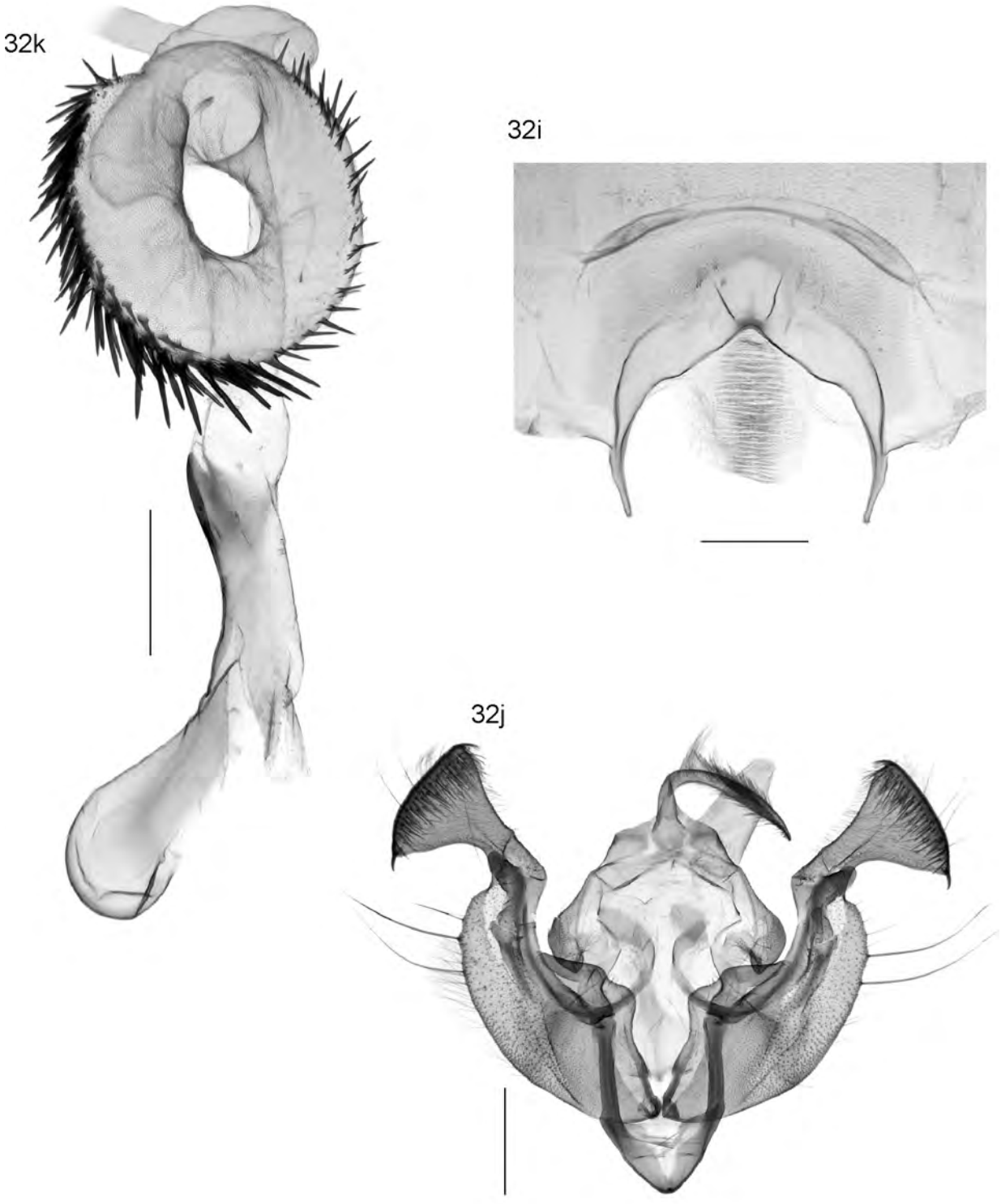


Fig. 32i, *Ichneutica insignis* male abdominal base; **32j,** genital capsule; **32k,** phallus. (Slide NZAC Noct. 118.)

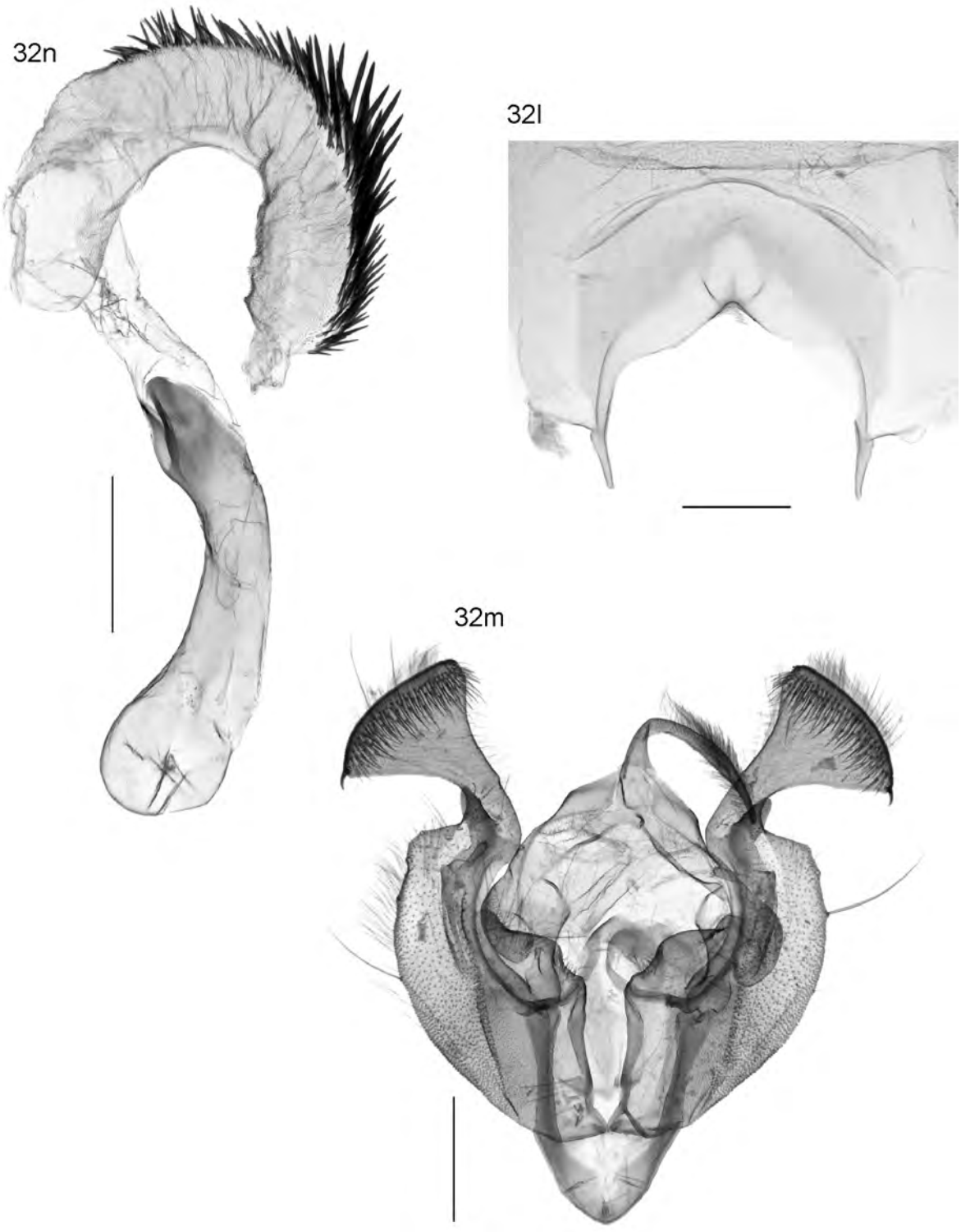


Fig. 32l, *Ichneutica insignis* male abdominal base; **32m,** genital capsule; **32n,** phallus. (Slide NZAC Noct. 124.)

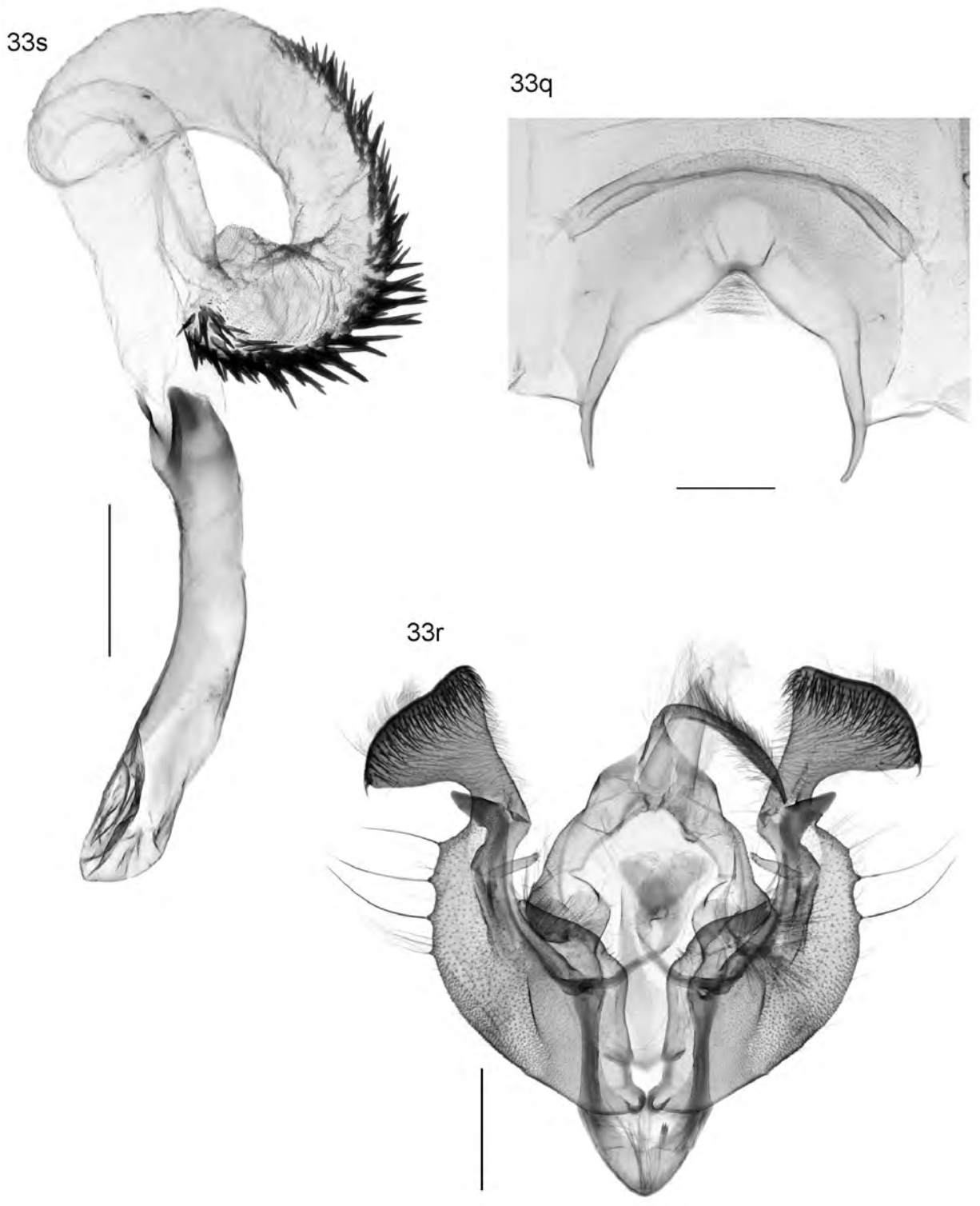


Fig. 33q, *Ichneutica plena* male abdominal base; **33r,** genital capsule; **33s,** phallus. (Slide NZAC Noct. 105.)

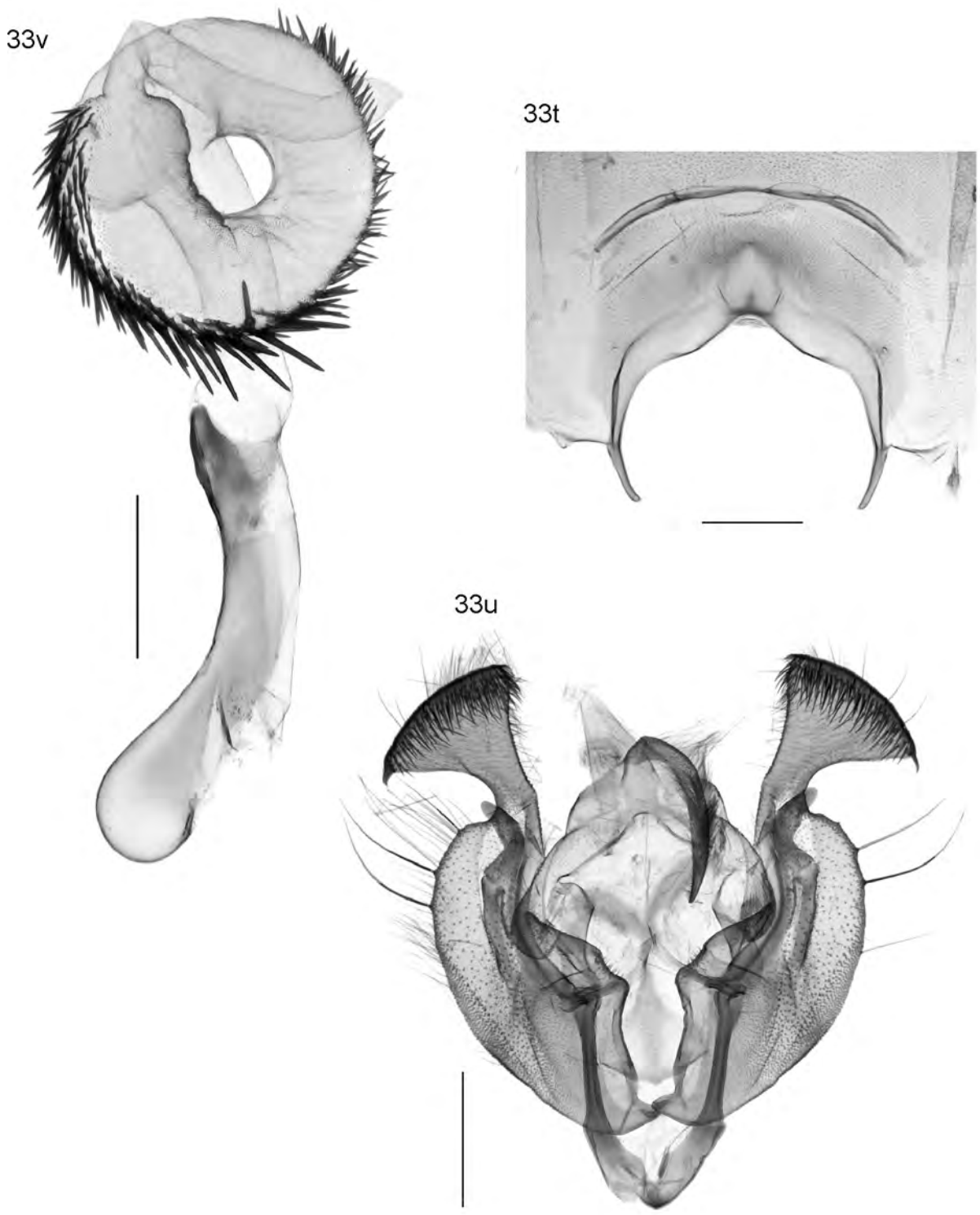


Fig. 33t, *Ichneutica plena* male abdominal base; **33u,** genital capsule; **33v,** phallus. (Slide NZAC Noct. 113.)

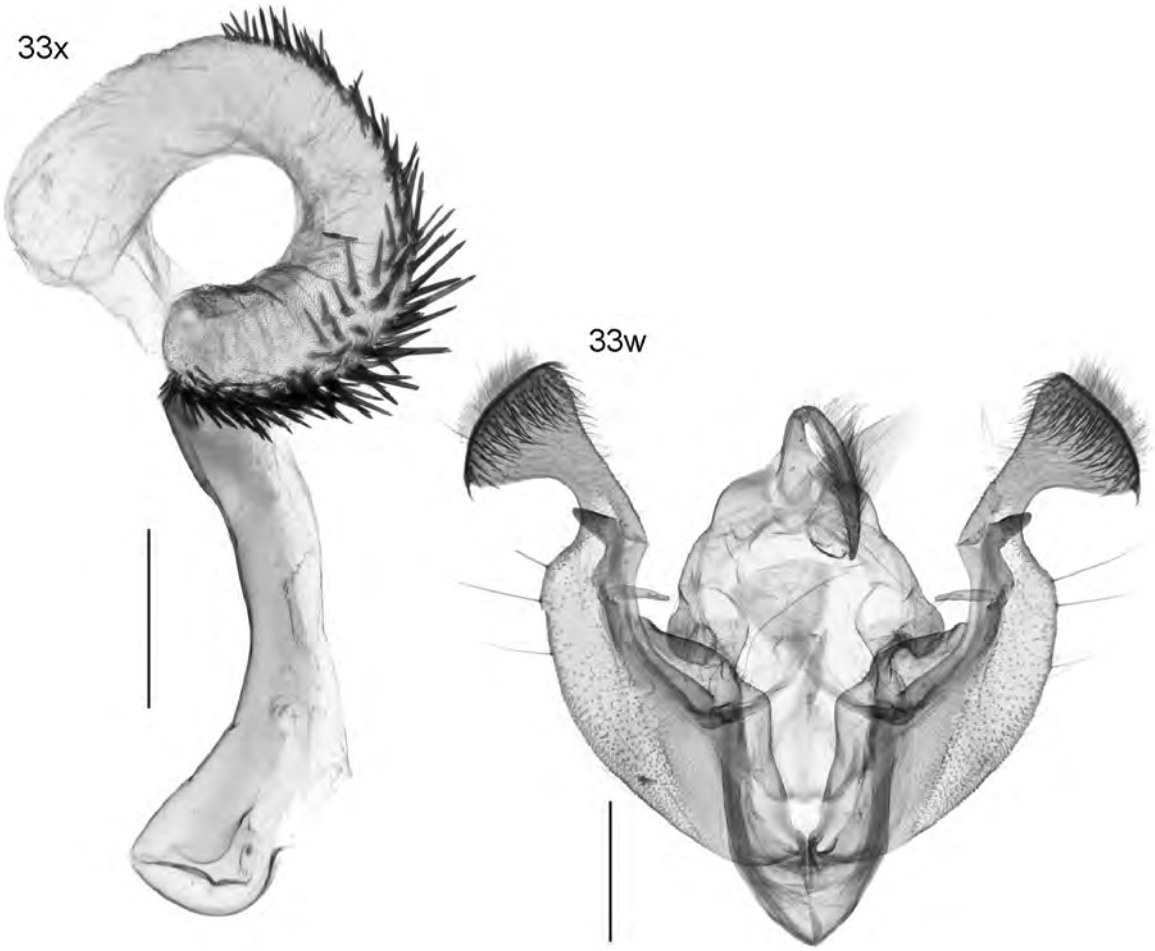


Fig. 33w, *Ichneutica plena* male genital capsule; **33x,** phallus. (Slide NZAC Noct. 116.)

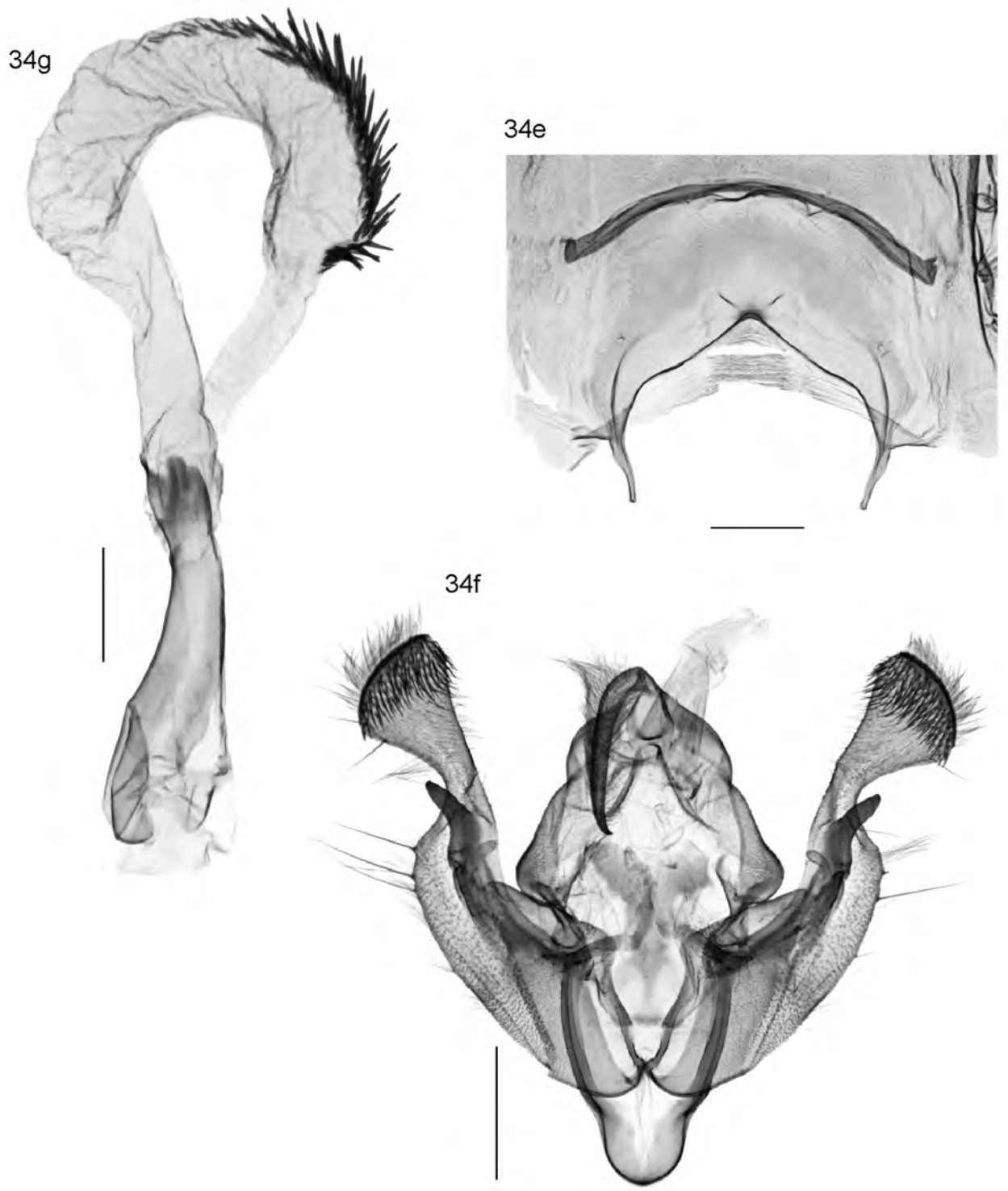


Fig. 34e, *Ichneutica naufraga* holotype male abdominal base; **34f,** genital capsule; **34g,** phallus. (Slide NZAC Noct. 374.)

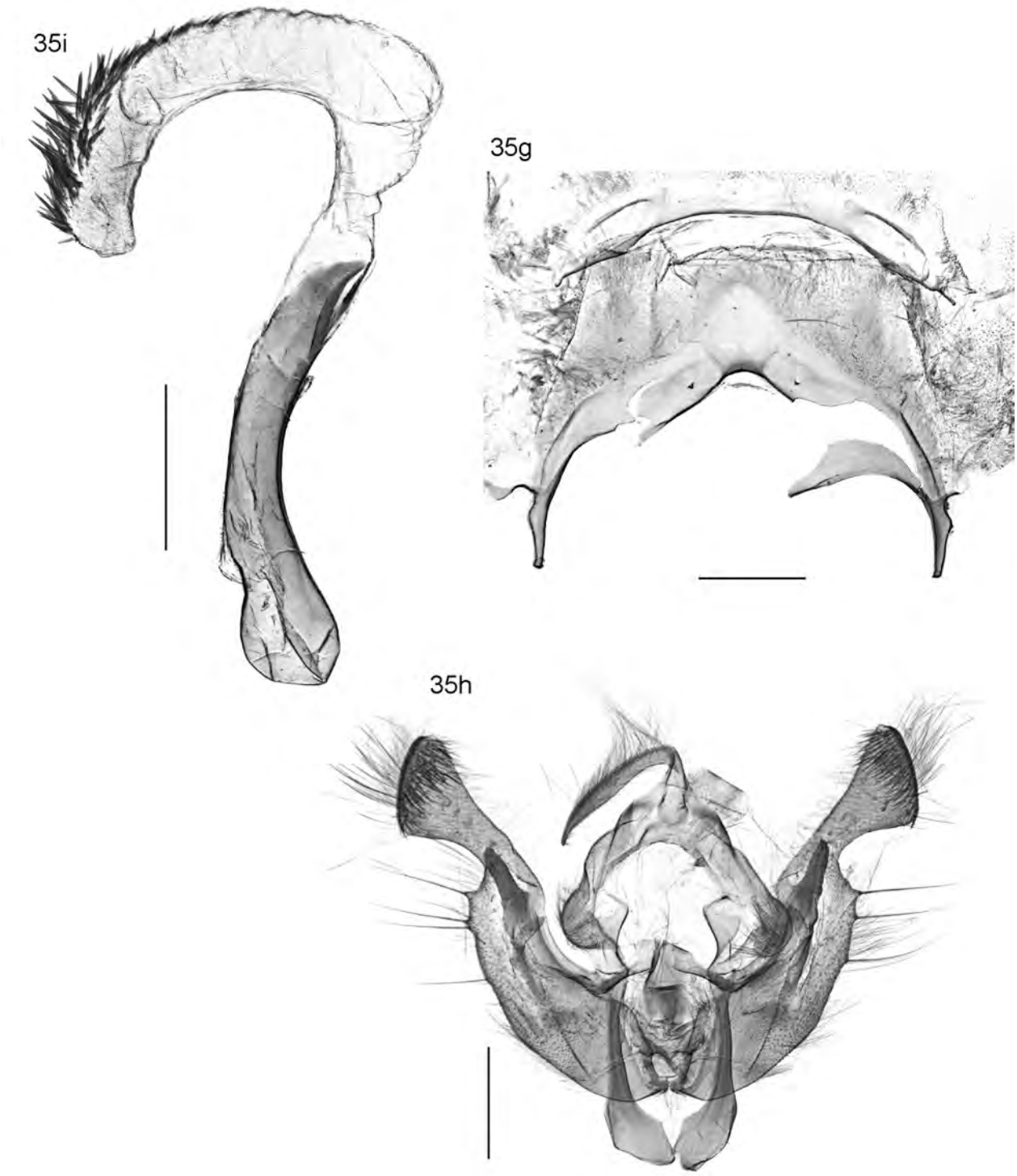


Fig. 35g, *Ichneutica pagaia* male abdominal base; **35h,** genital capsule; **35i,** phallus. (Slide AWE Noct. 15, NZAC.)

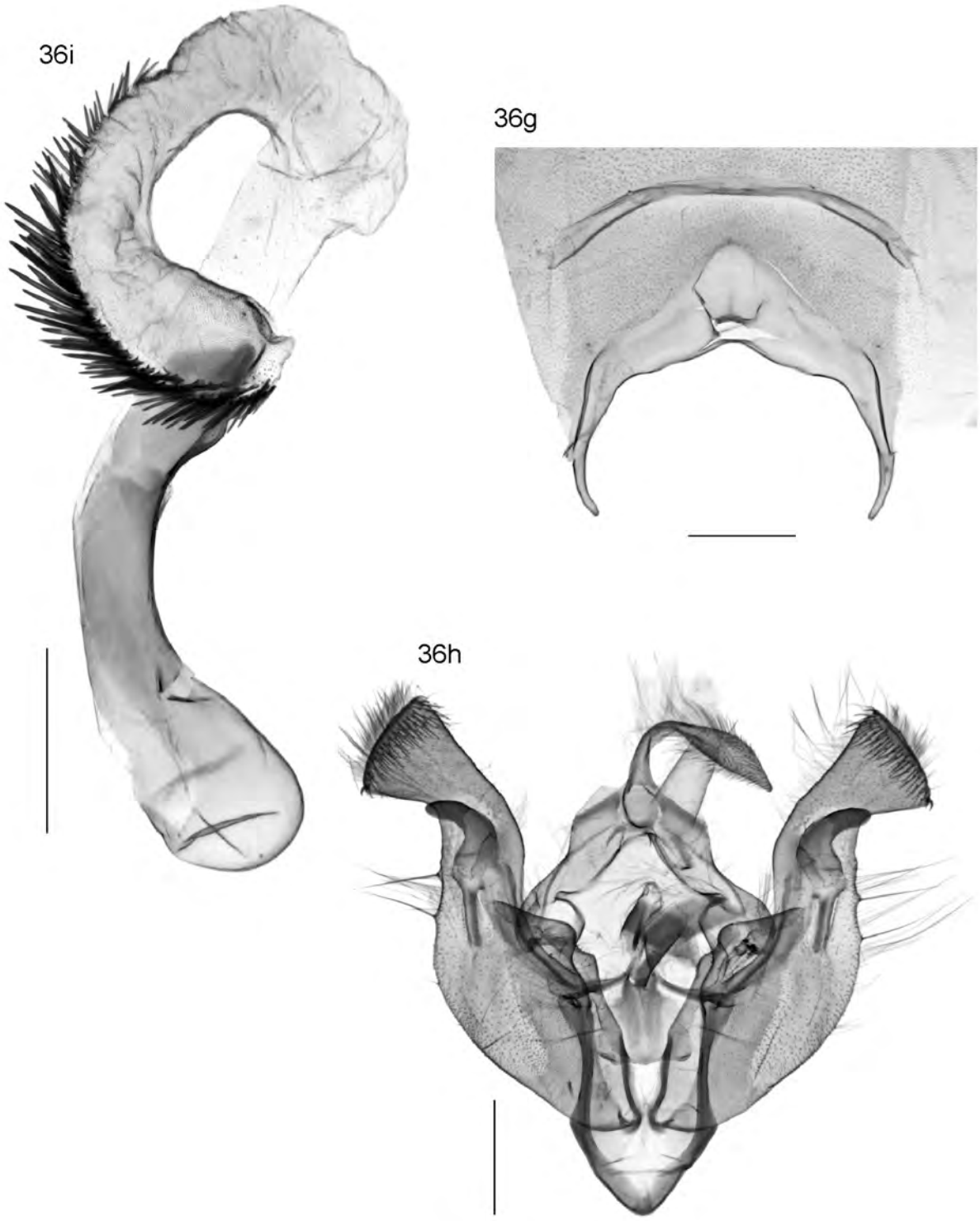


Fig. 36g, *Ichneutica pelanodes* male abdominal base; **36h,** genital capsule; **36i,** phallus. (Slide NZAC Noct. 122.)

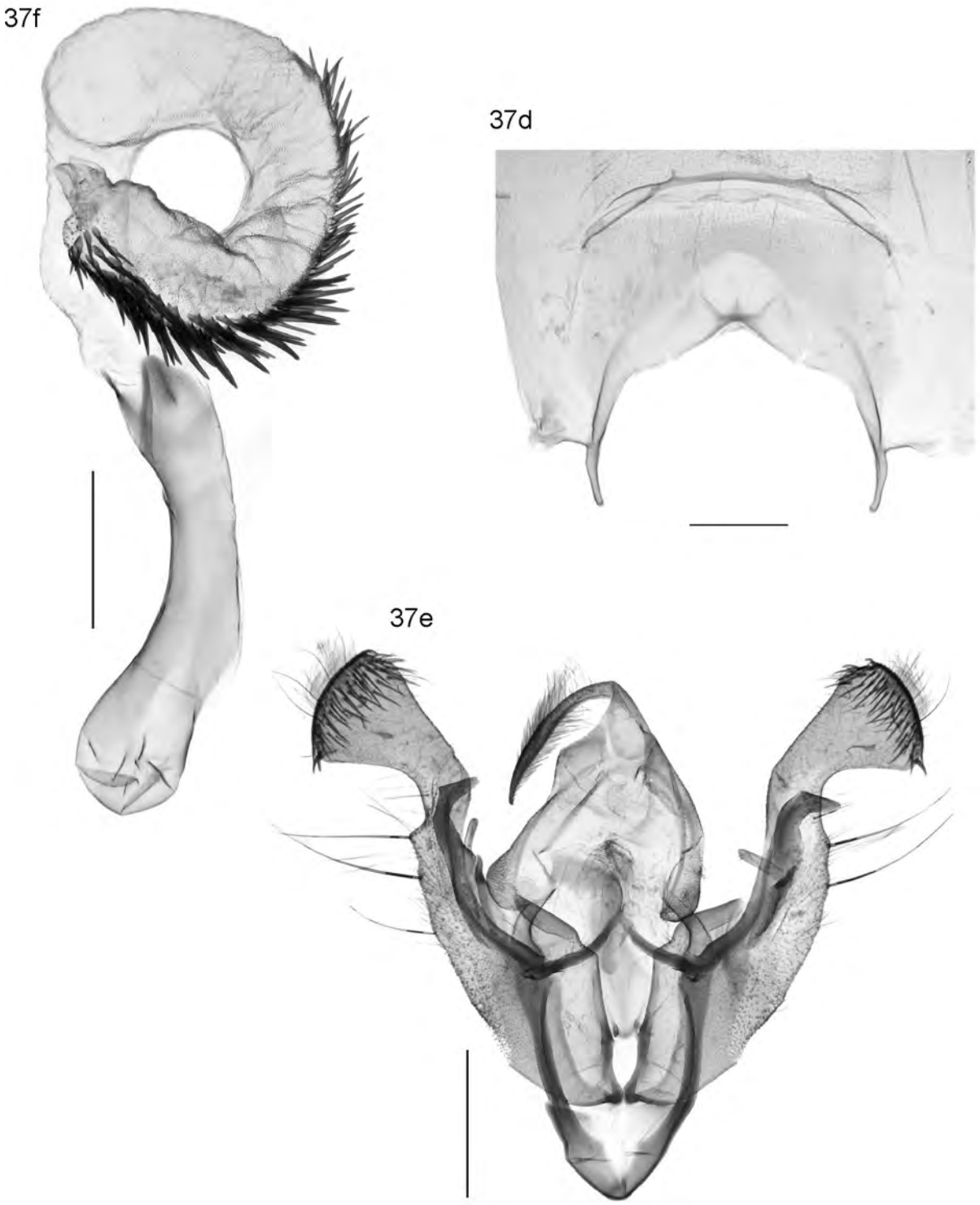


Fig. 37d, *Ichneutica peridotea* paratype male abdominal base; **37e,** genital capsule; **37f,** phallus. (Slide NZAC Noct. 104.)

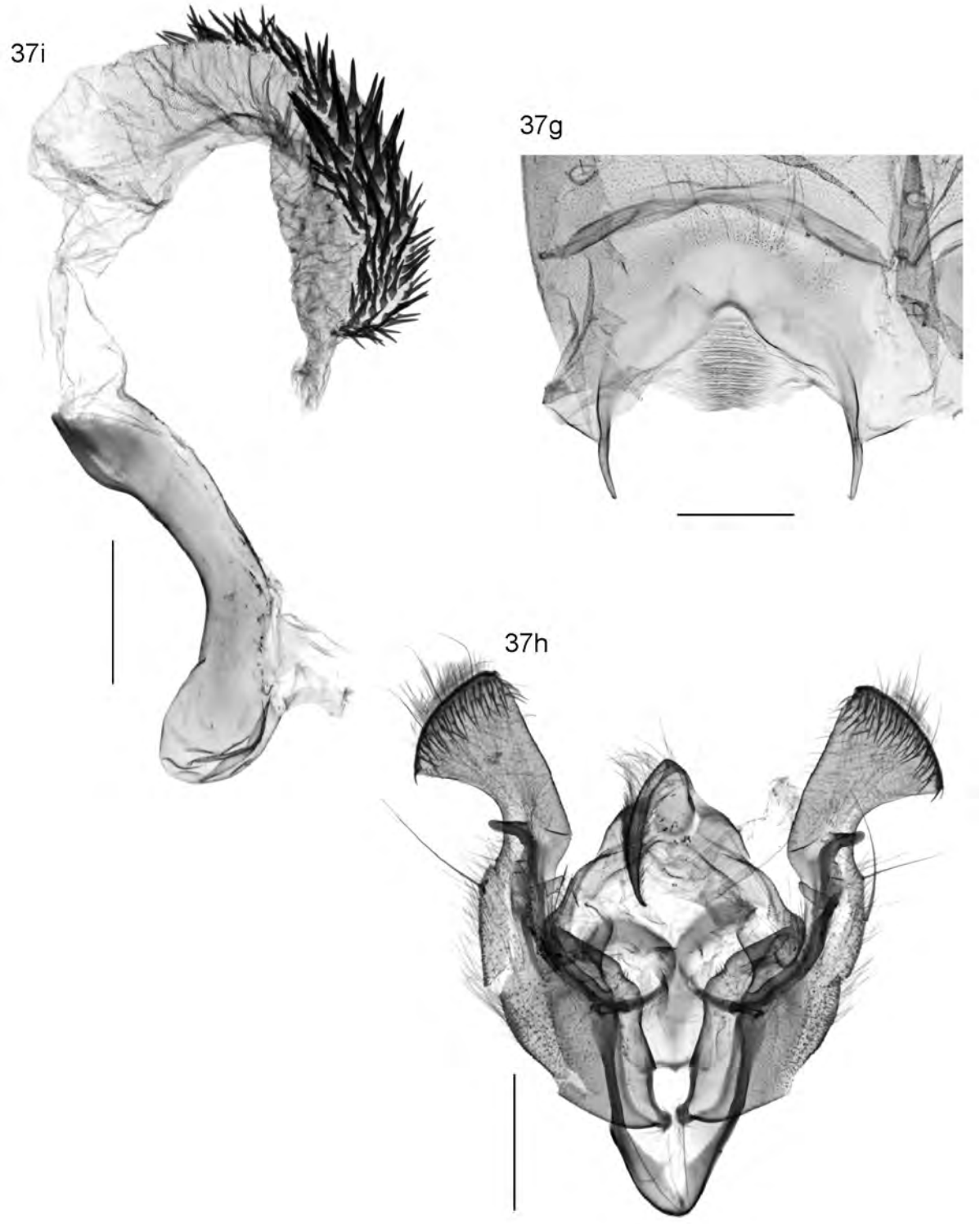


Fig. 37g, *Ichneutica peridotea* holotype male abdominal base; **37h,** genital capsule; **37i,** phallus. (Slide NZAC Noct. 397.)

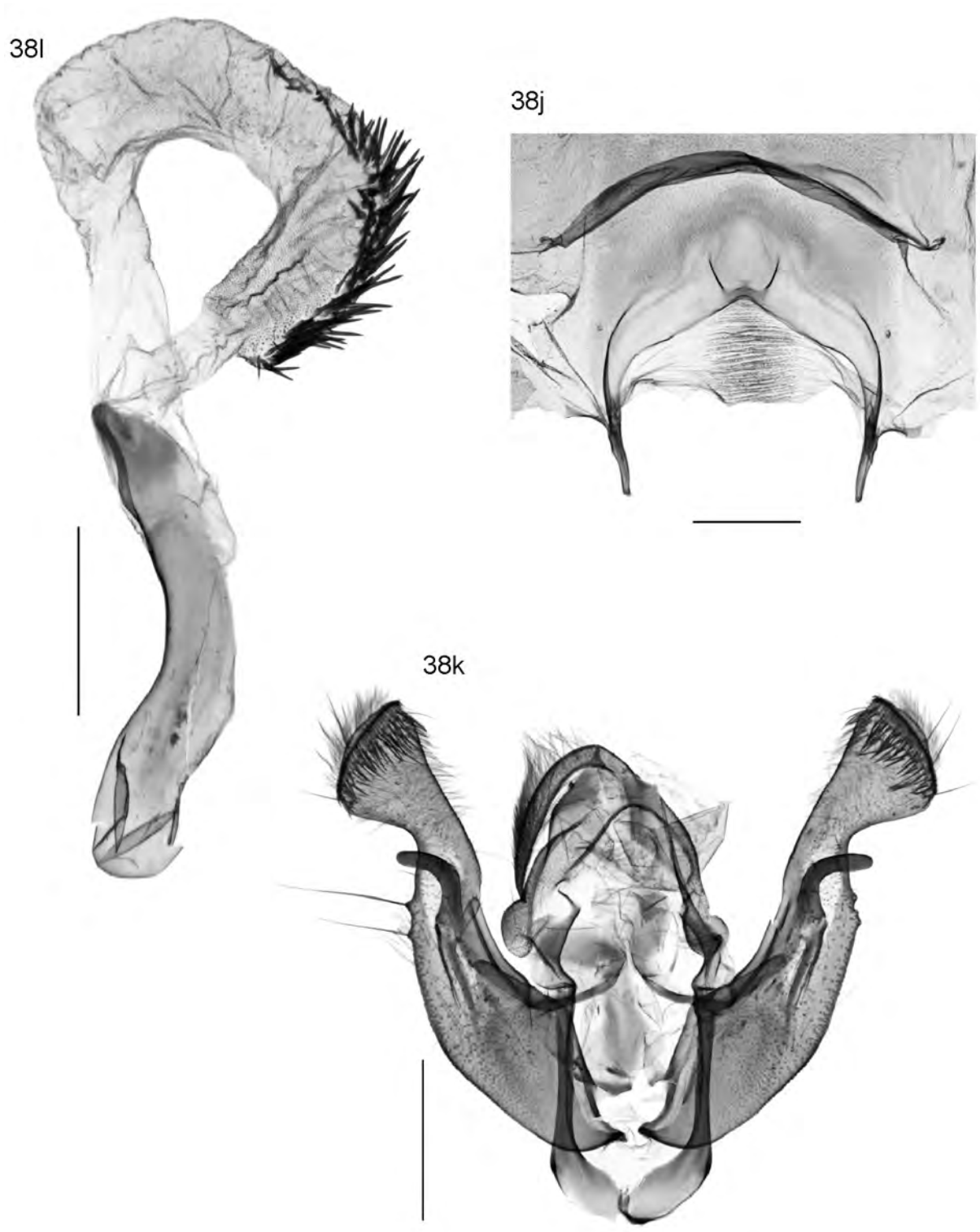


Fig. 38j, *Ichneutica scutata* male abdominal base; **38k,** genital capsule; **38l,** phallus. (Slide NZAC Noct. 402.)

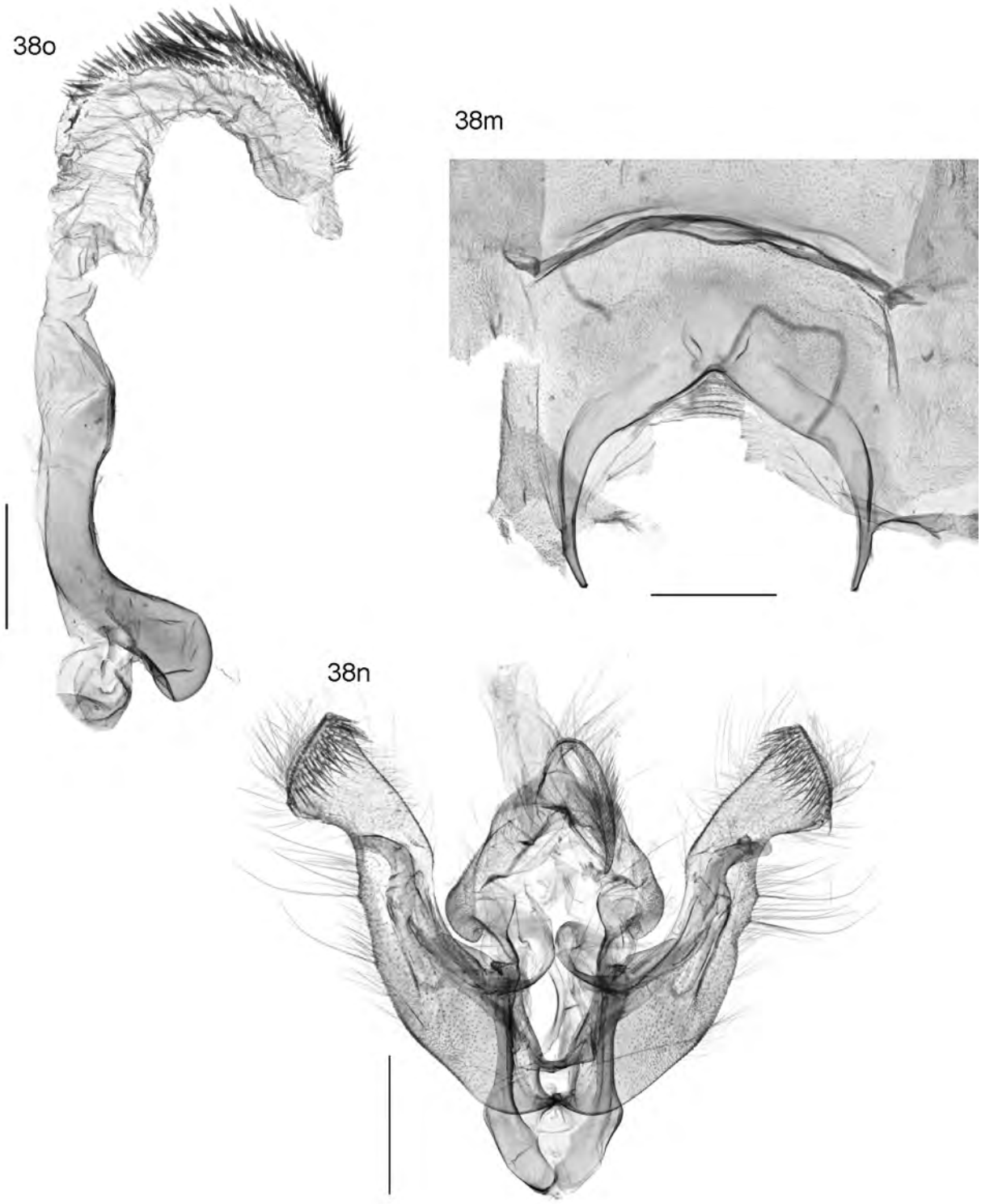


Fig. 38m, *Ichneutica scutata* male abdominal base; **38n,** genital capsule; **38o,** phallus. (Slide NZAC Noct. 479.)

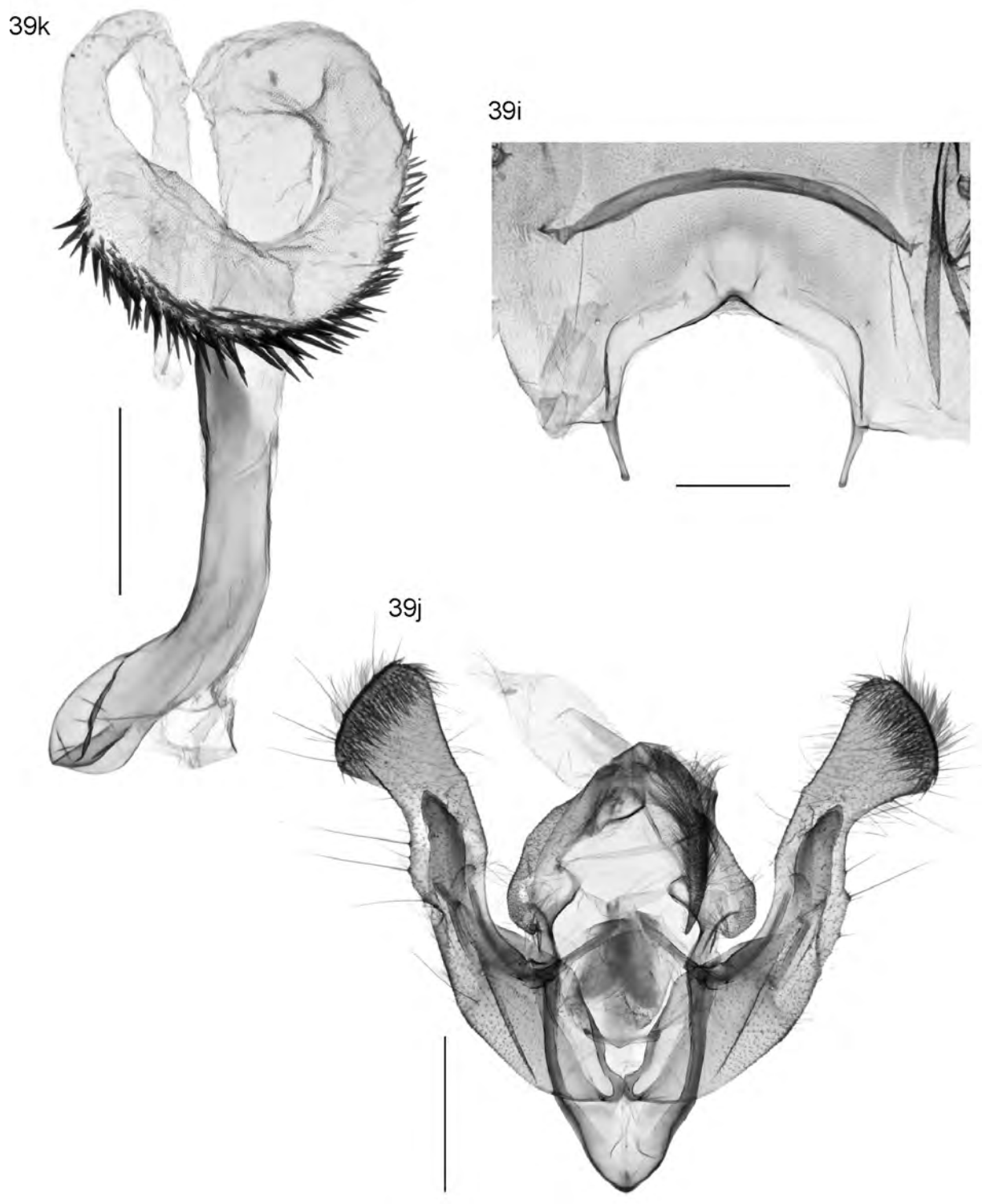


Fig. 39i, *Ichneutica sericata* male abdominal base; **39j,** genital capsule; **39k,** phallus. (Slide OMNZ IV42451.)

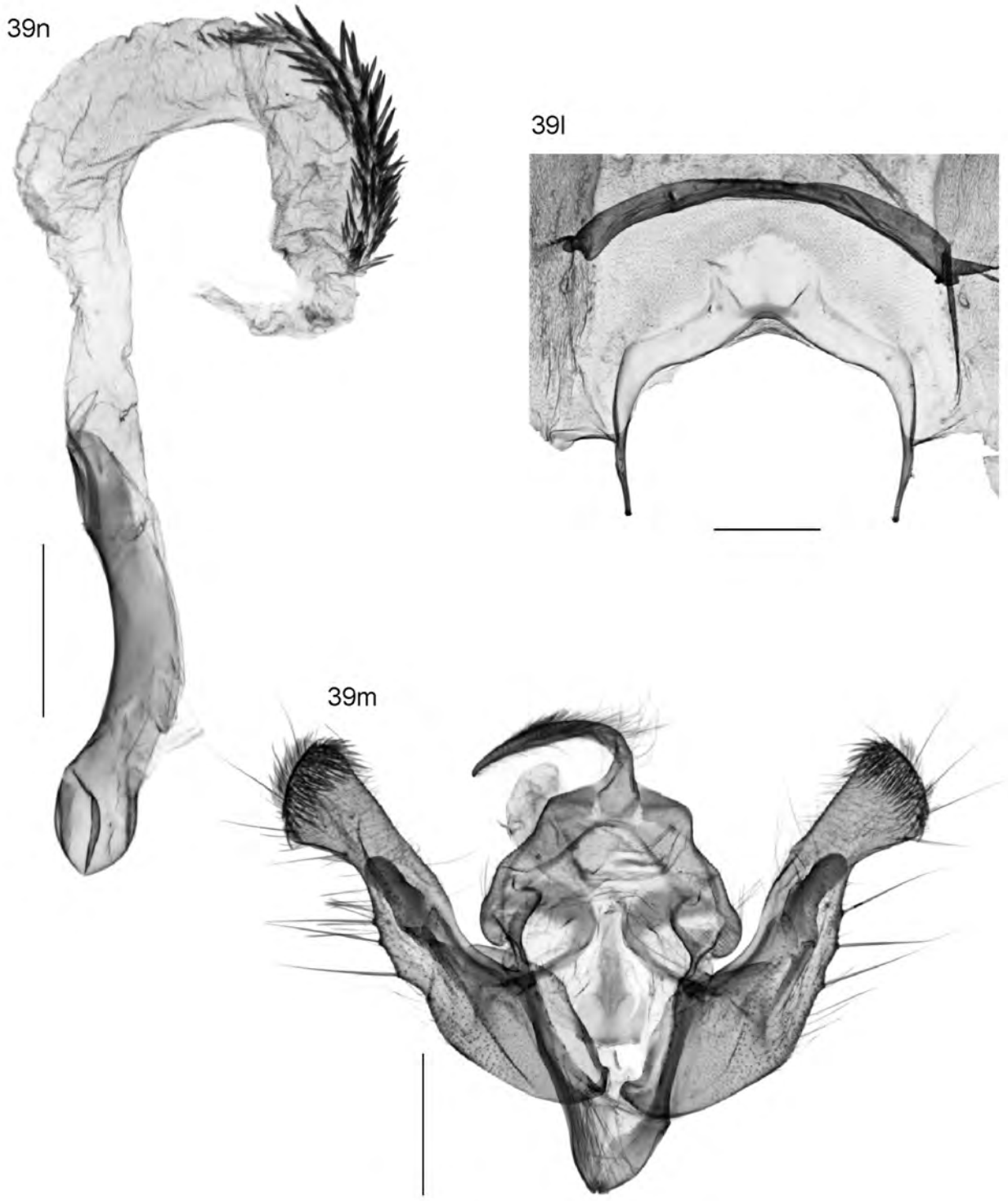


Fig. 39l, *Ichneutica sericata* male abdominal base; **39m,** genital capsule; **39n,** phallus. (Slide OMNZ IV42464.)

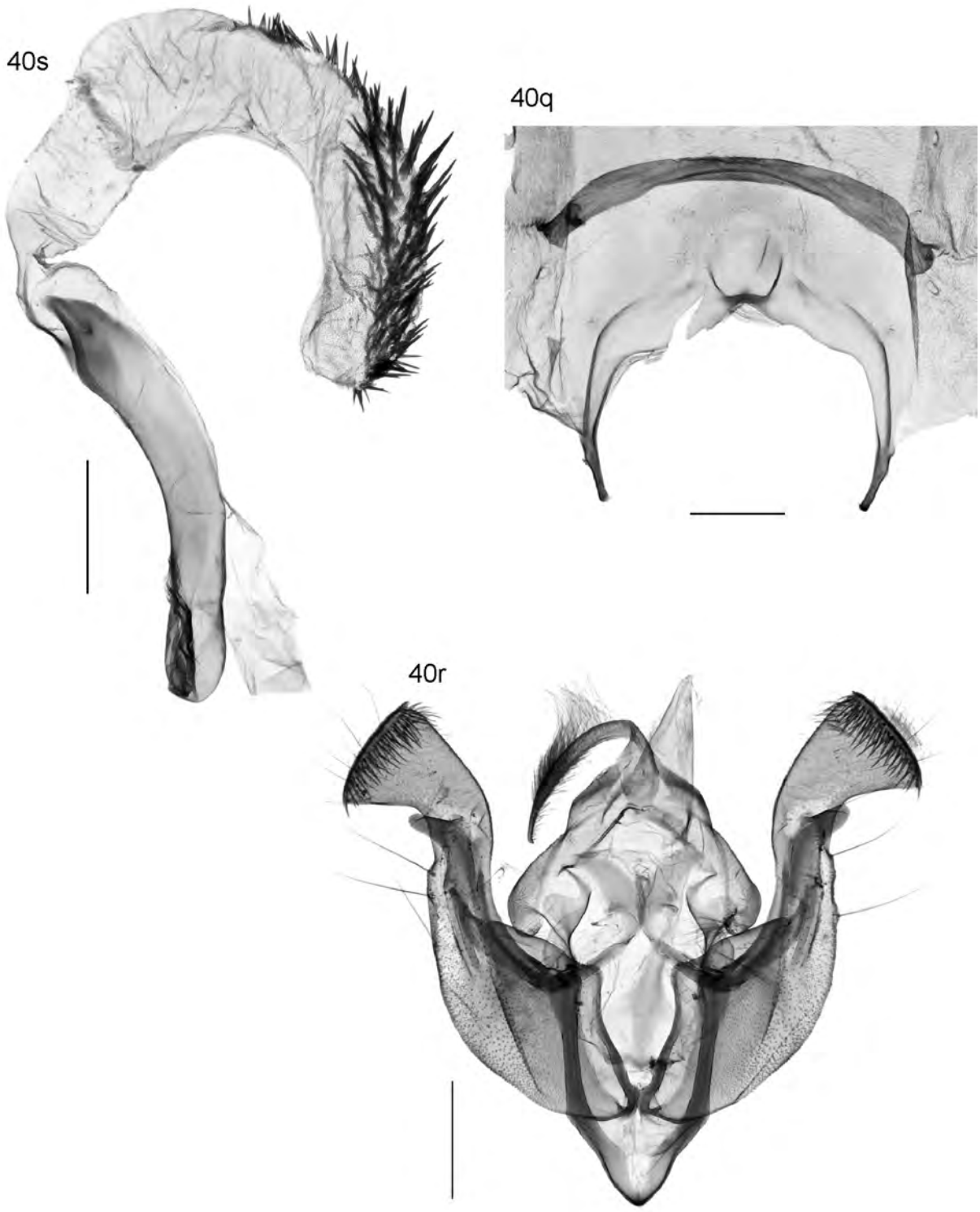


Fig. 40q, *Ichneutica skelloni* male abdominal base; **40r,** genital capsule; **40s,** phallus. (Slide OMNZ IV42476.)

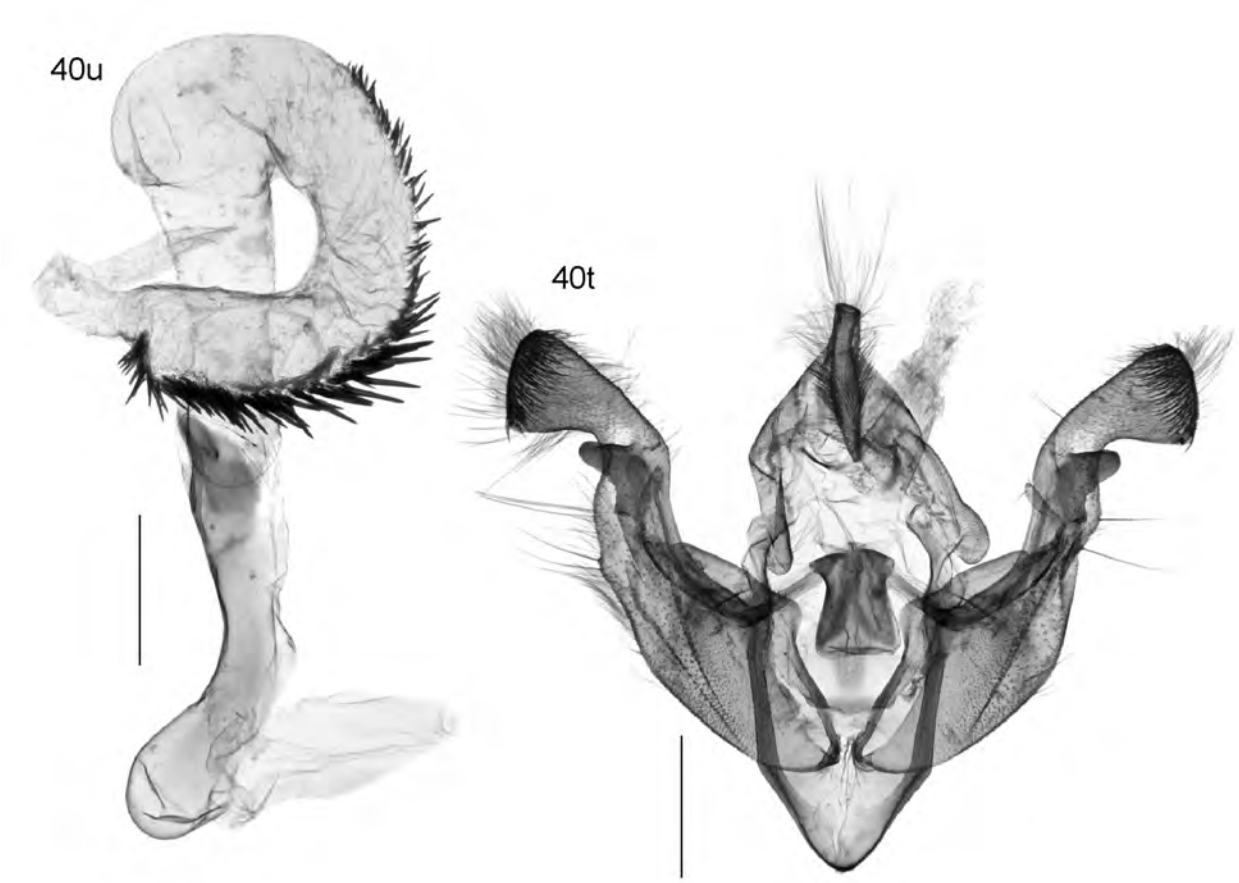


Fig. 40t, *Ichneutica skelloni* male genital capsule; **40u,** phallus. (Slide NZAC Noct. 394.)

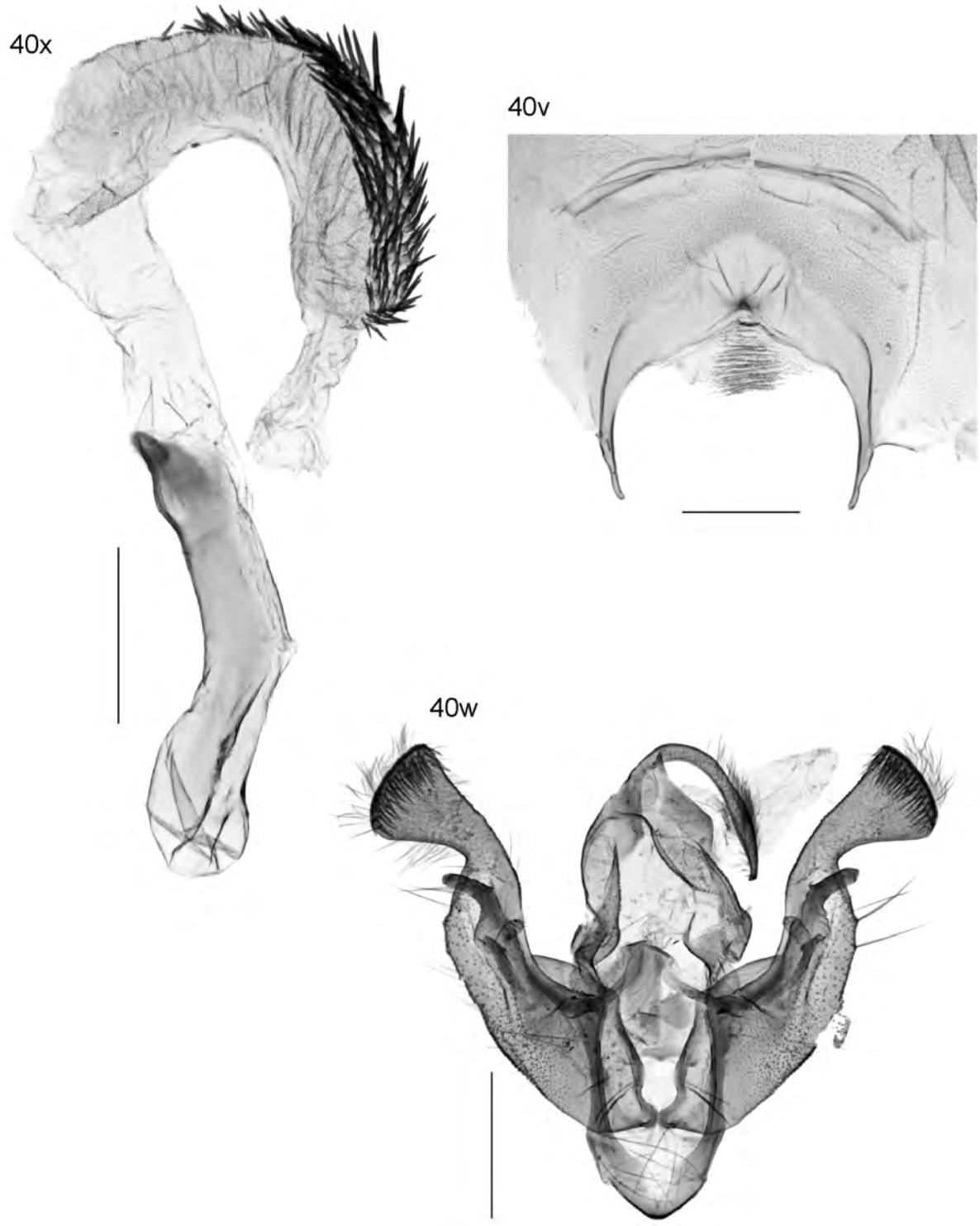


Fig. 40v, *Ichneutica skelloni* male abdominal base; **40w,** genital capsule; **40x,** phallus. (Slide NZAC Noct. 180.)

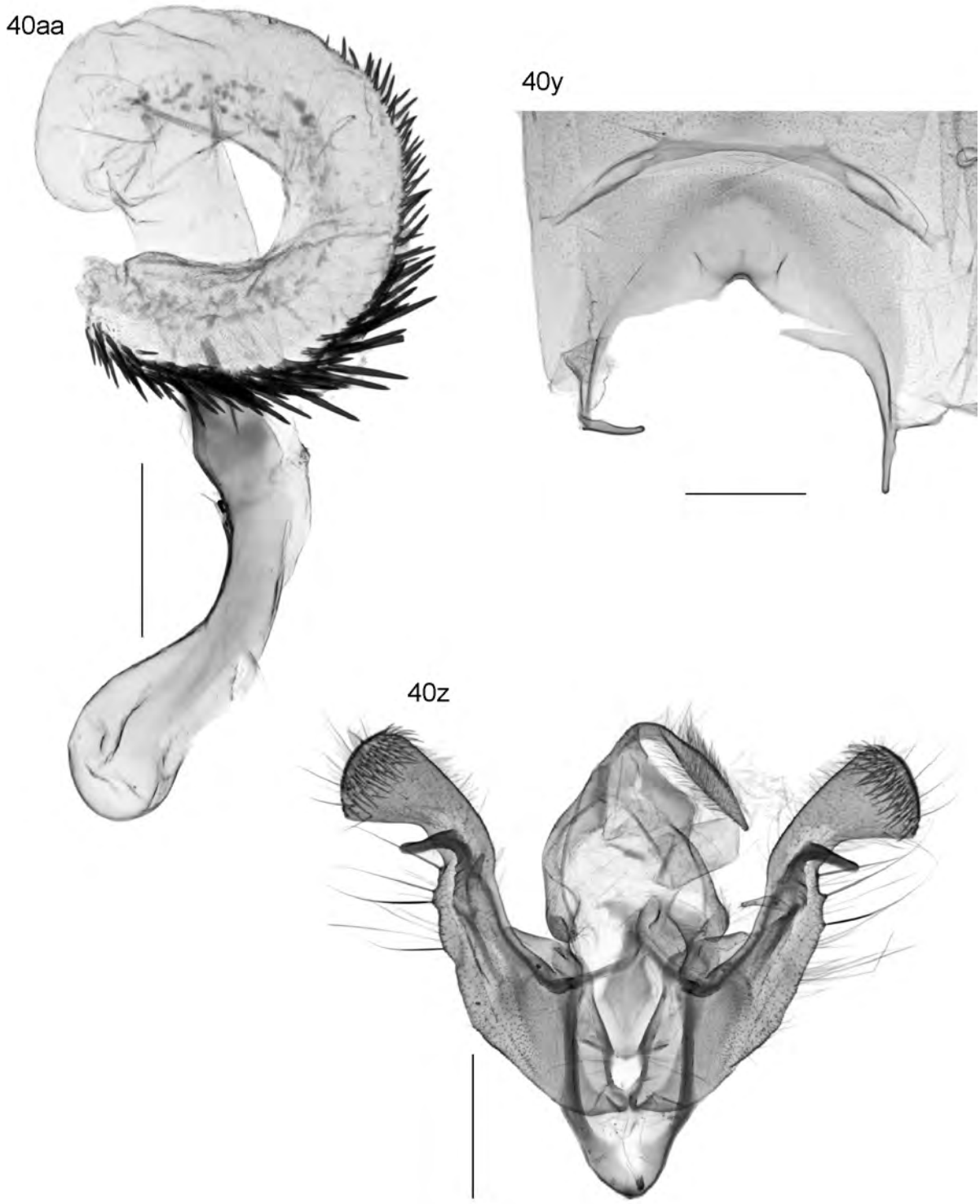


Fig. 40y, *Ichneutica skelloni* male abdominal base; **40z,** genital capsule; **40aa,** phallus. (Slide NZAC Noct. 181.)

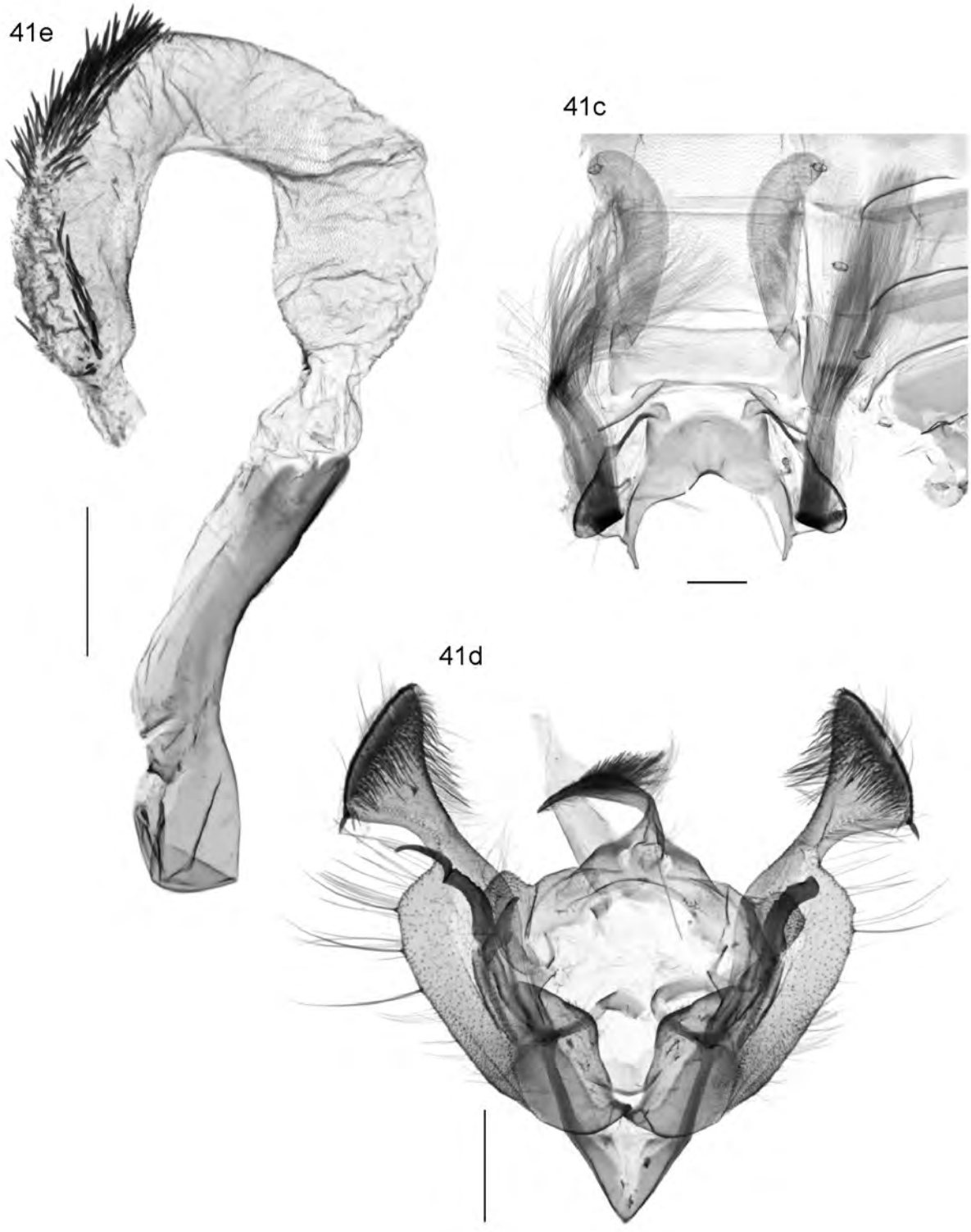


Fig. 41c, *Ichneutica barbara* holotype male abdominal base; **41d,** genital capsule; **41e,** phallus. (Slide NZAC Noct. 174.)

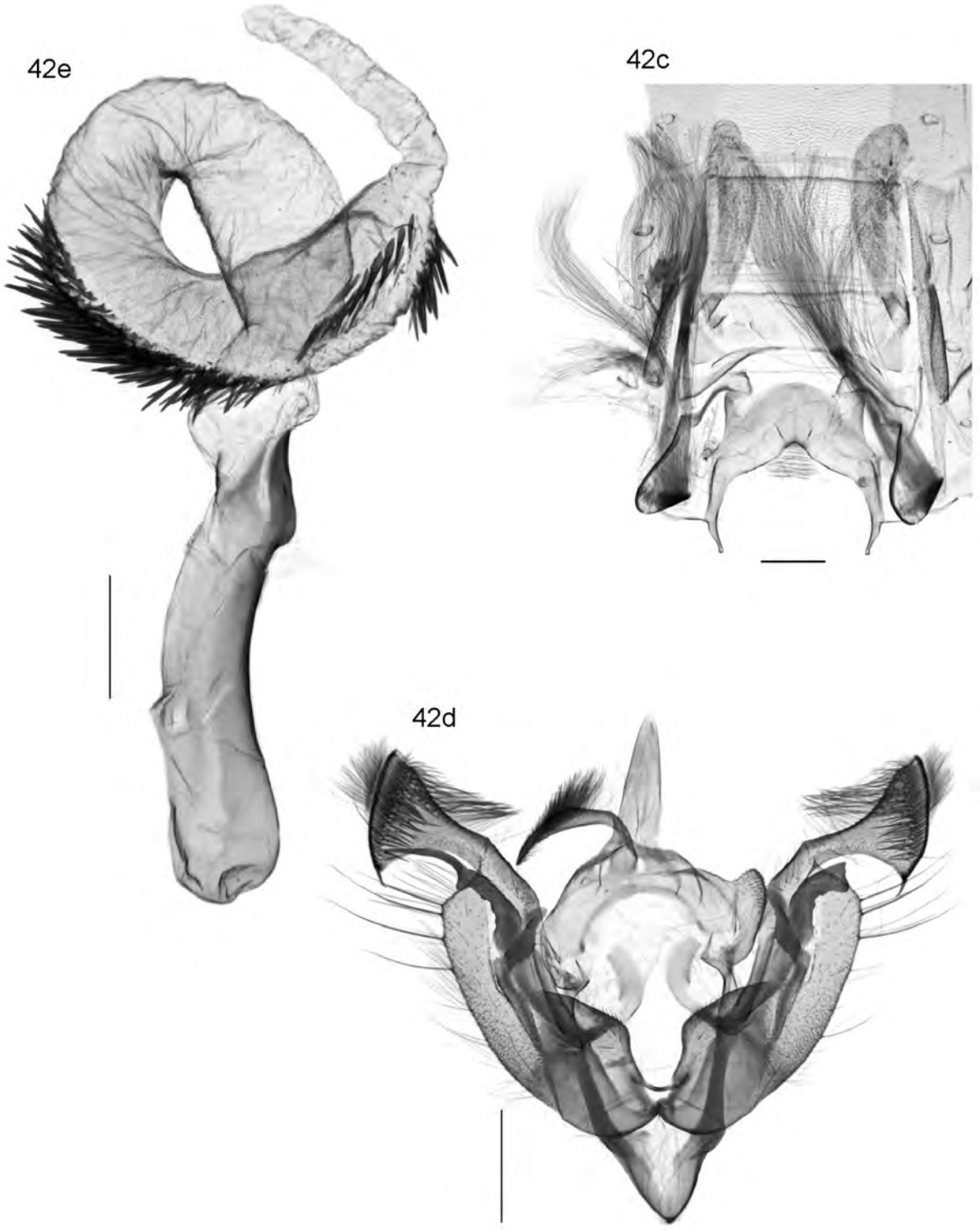


Fig. 42c, *Ichneutica omicron* male abdominal base; **42d,** genital capsule; **42e,** phallus. (Slide NZAC Noct. 169.)

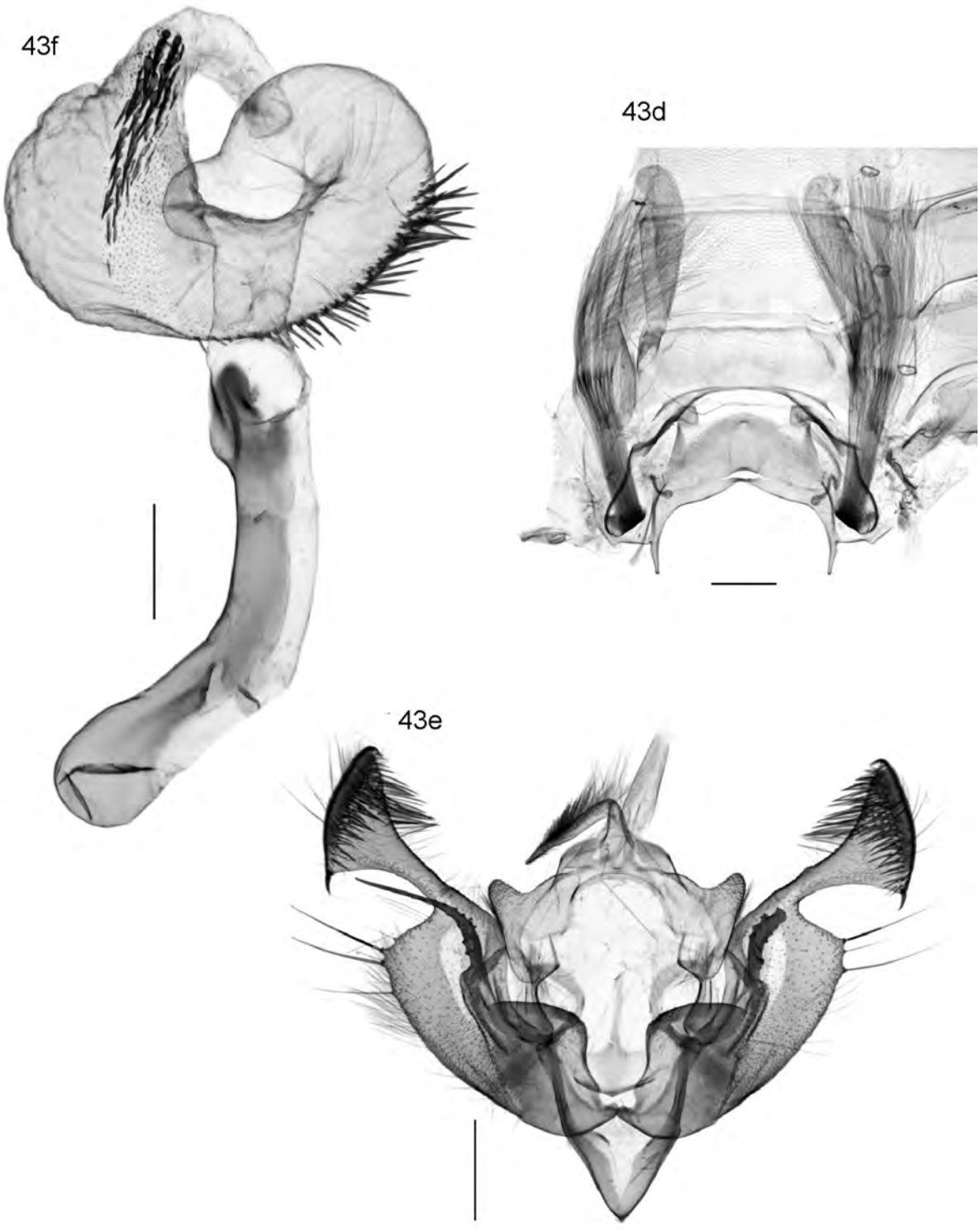


Fig. 43d, *Ichneutica sollennis* male abdominal base; **43e,** genital capsule; **43f,** phallus. (Slide NZAC Noct. 132.)

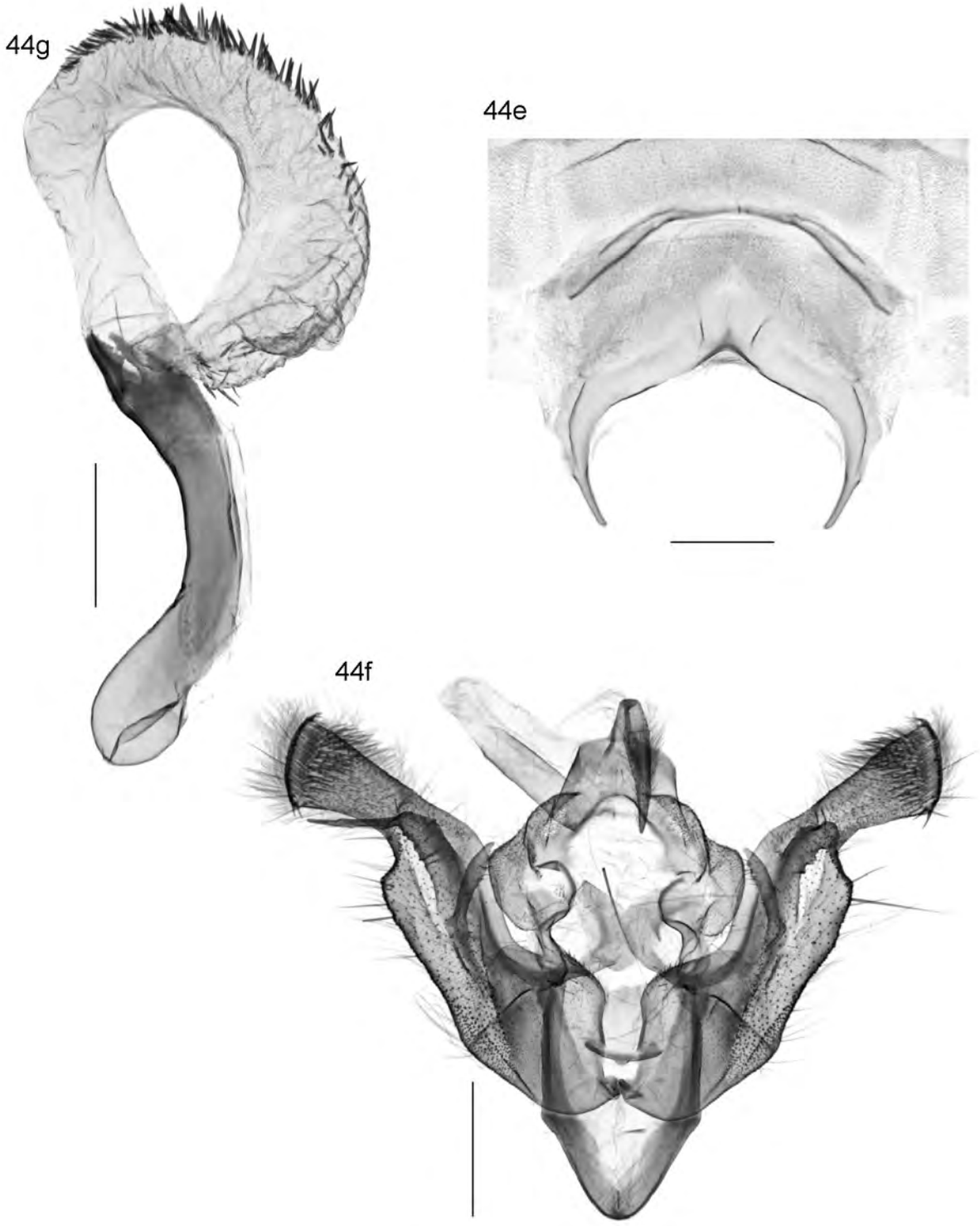


Fig. 44e, *Ichneutica cornuta* holotype male abdominal base; **44f,** genital capsule; **44g,** phallus. (Slide NZAC Noct. 234.)

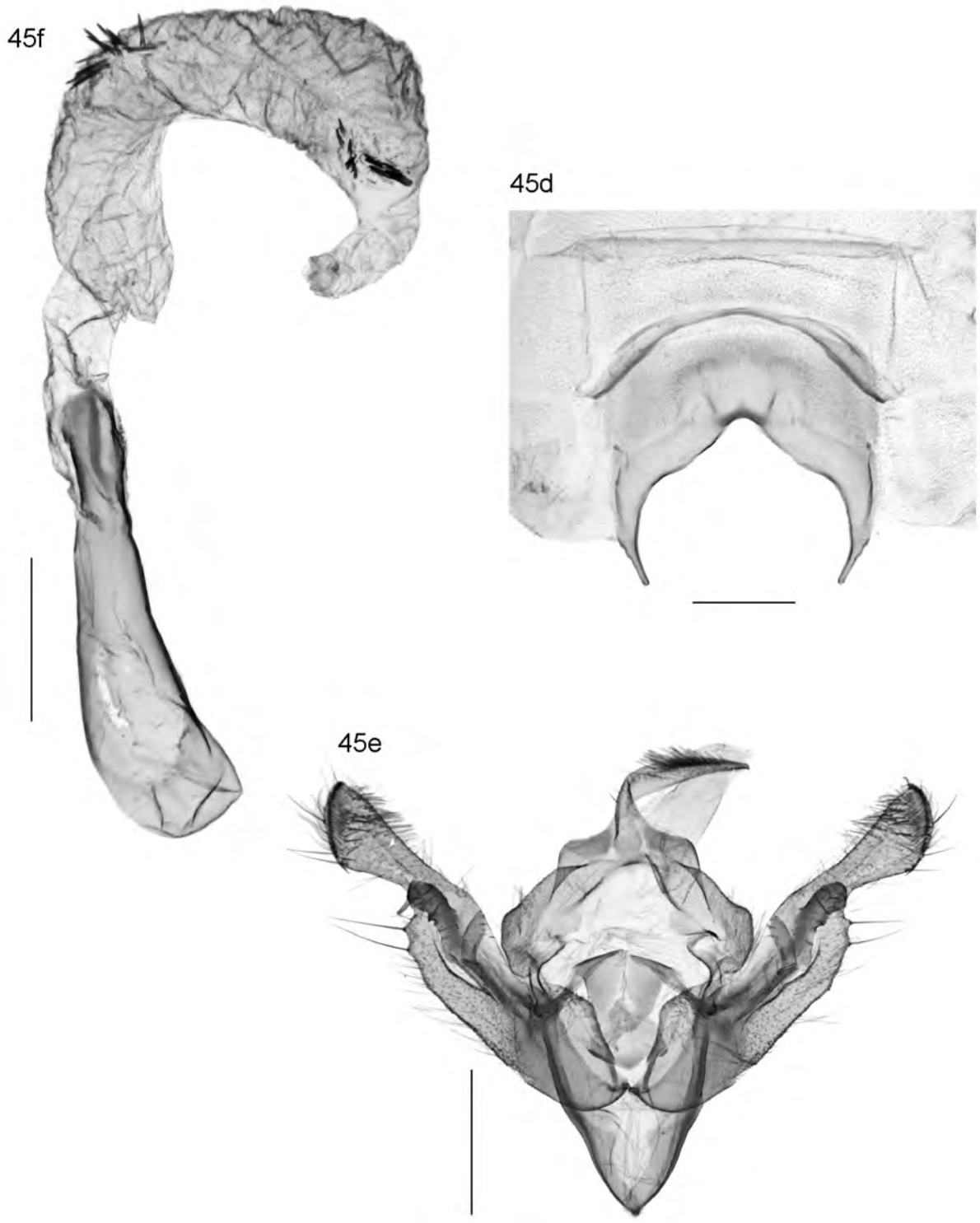


Fig. 45d, *Ichneutica lissoxyla* male abdominal base; **45e,** genital capsule; **45f,** phallus. (Slide NZAC Noct. 220.)

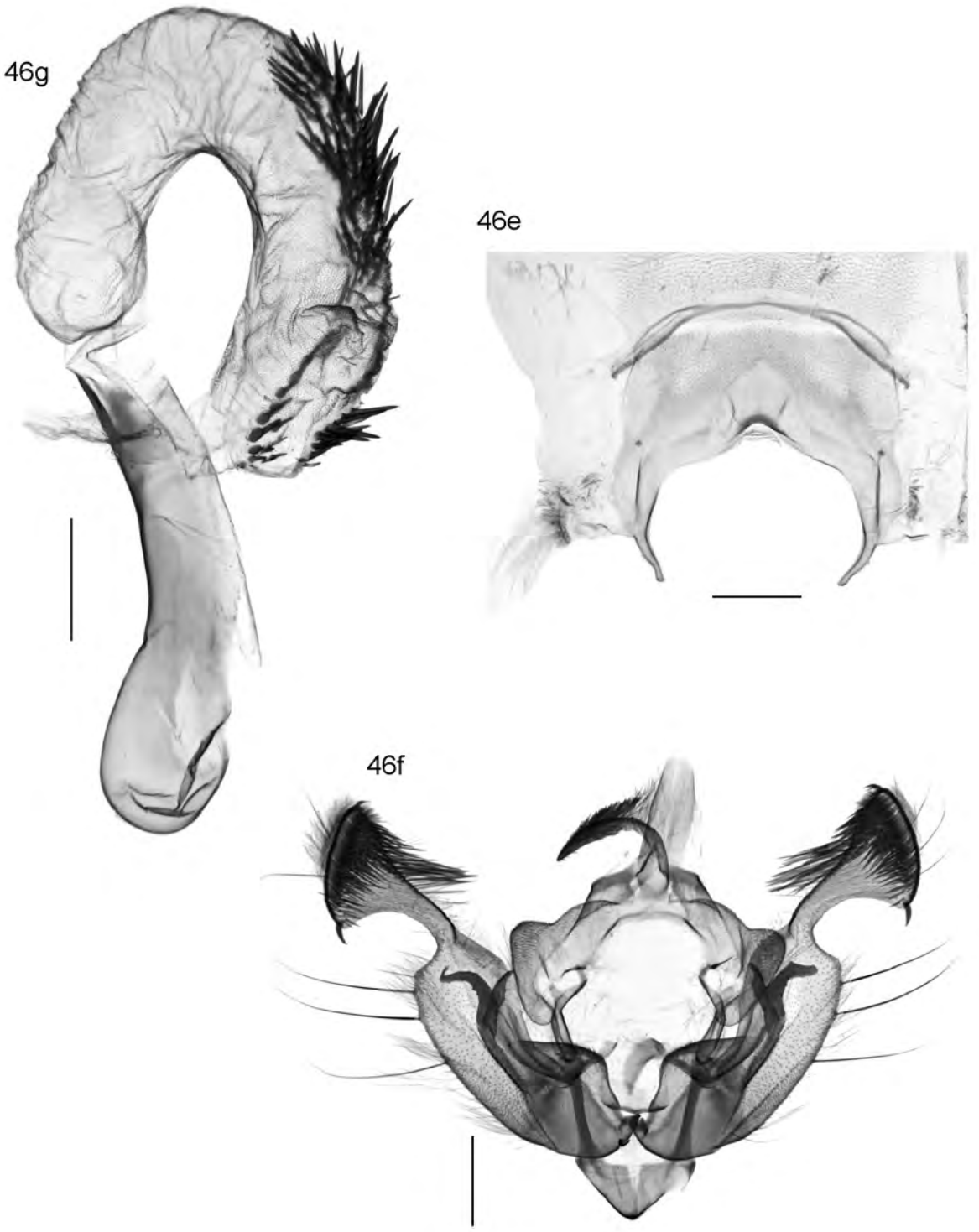


Fig. 46e, *Ichneutica micrastra* male abdominal base; **46f,** genital capsule (tip of left clasper probably broken off); **46g,** phallus. (Slide NZAC Noct. 134.)

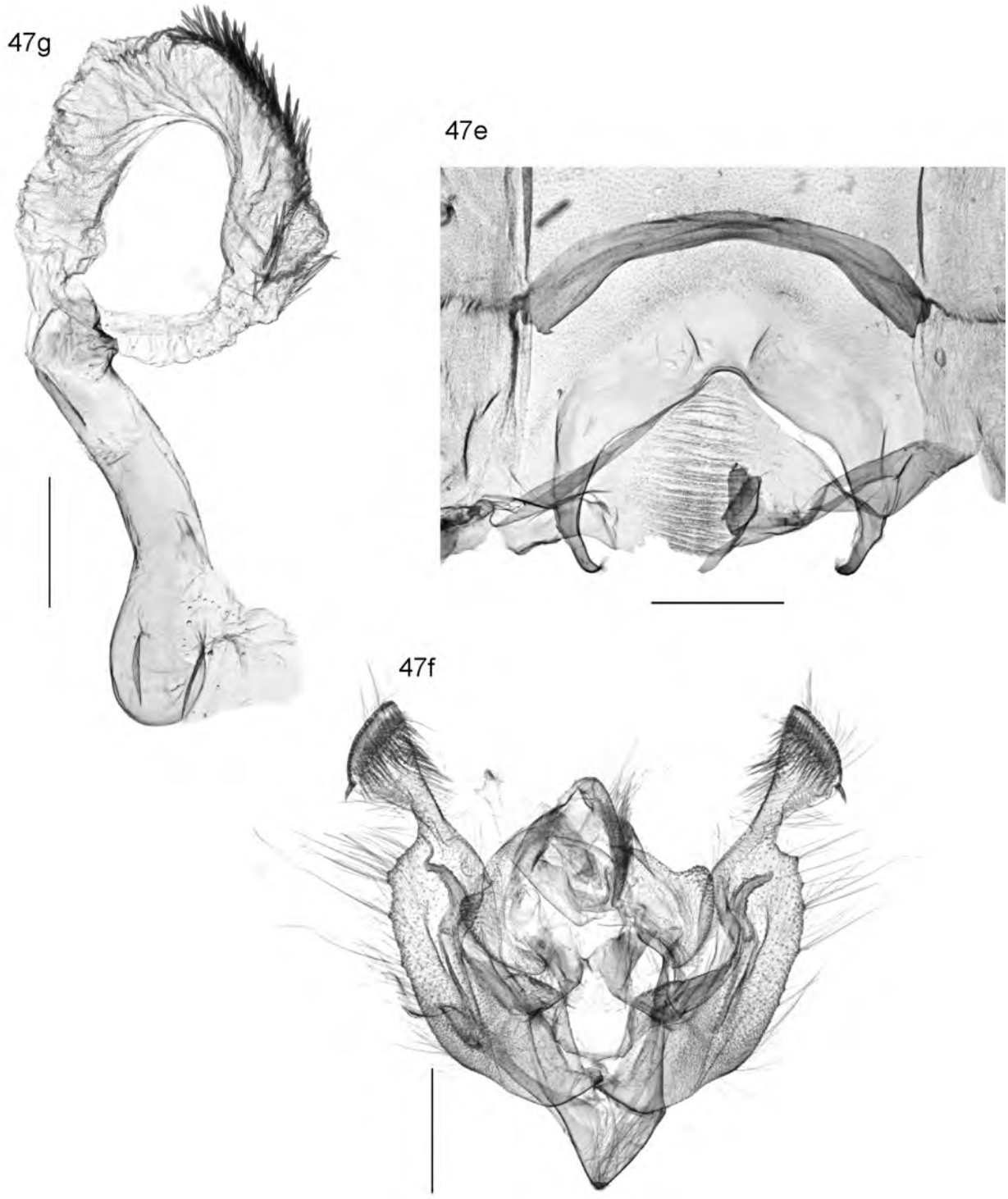


Fig. 47e, *Ichneutica sapiens* male abdominal base; **47f,** genital capsule; **47g,** phallus. (MONZ.)

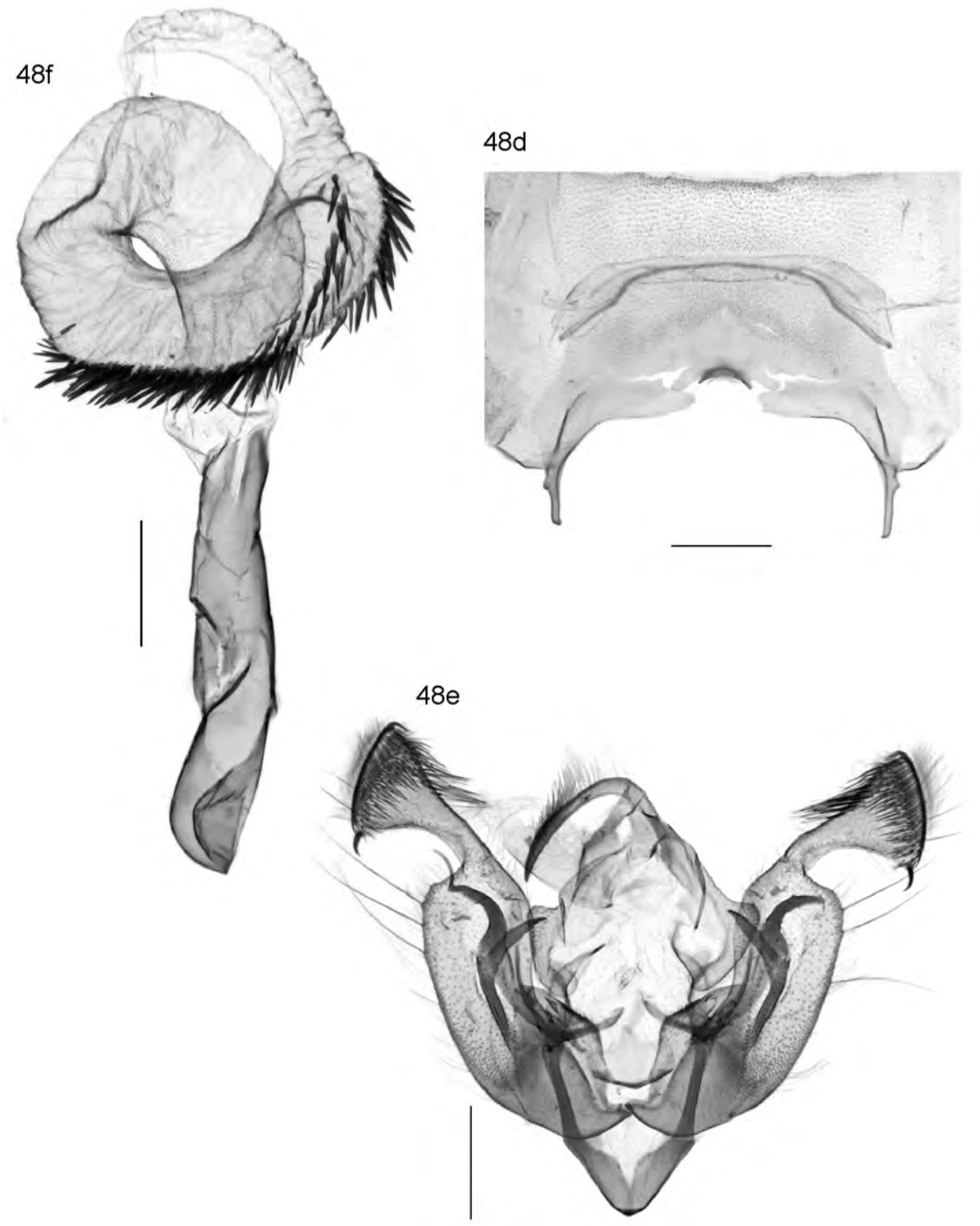


Fig. 48d, *Ichneutica phaula* male abdominal base; **48e,** genital capsule; **48f,** phallus. (Slide NZAC Noct. 138.)

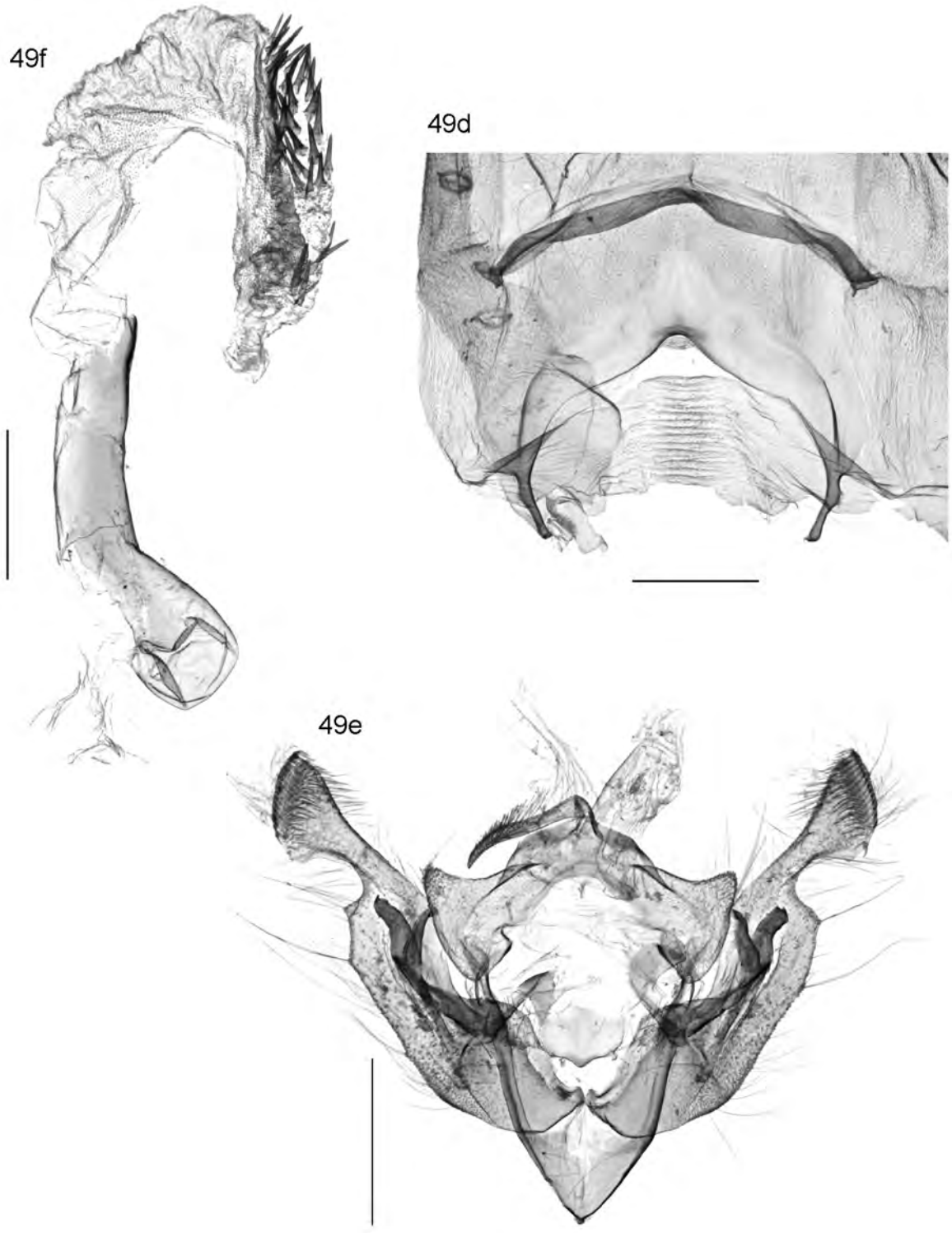


Fig. 49d, *Ichneutica toroneura* male abdominal base; **49e,** genital capsule; **49f,** phallus. (Slide NZAC Noct. 517.)

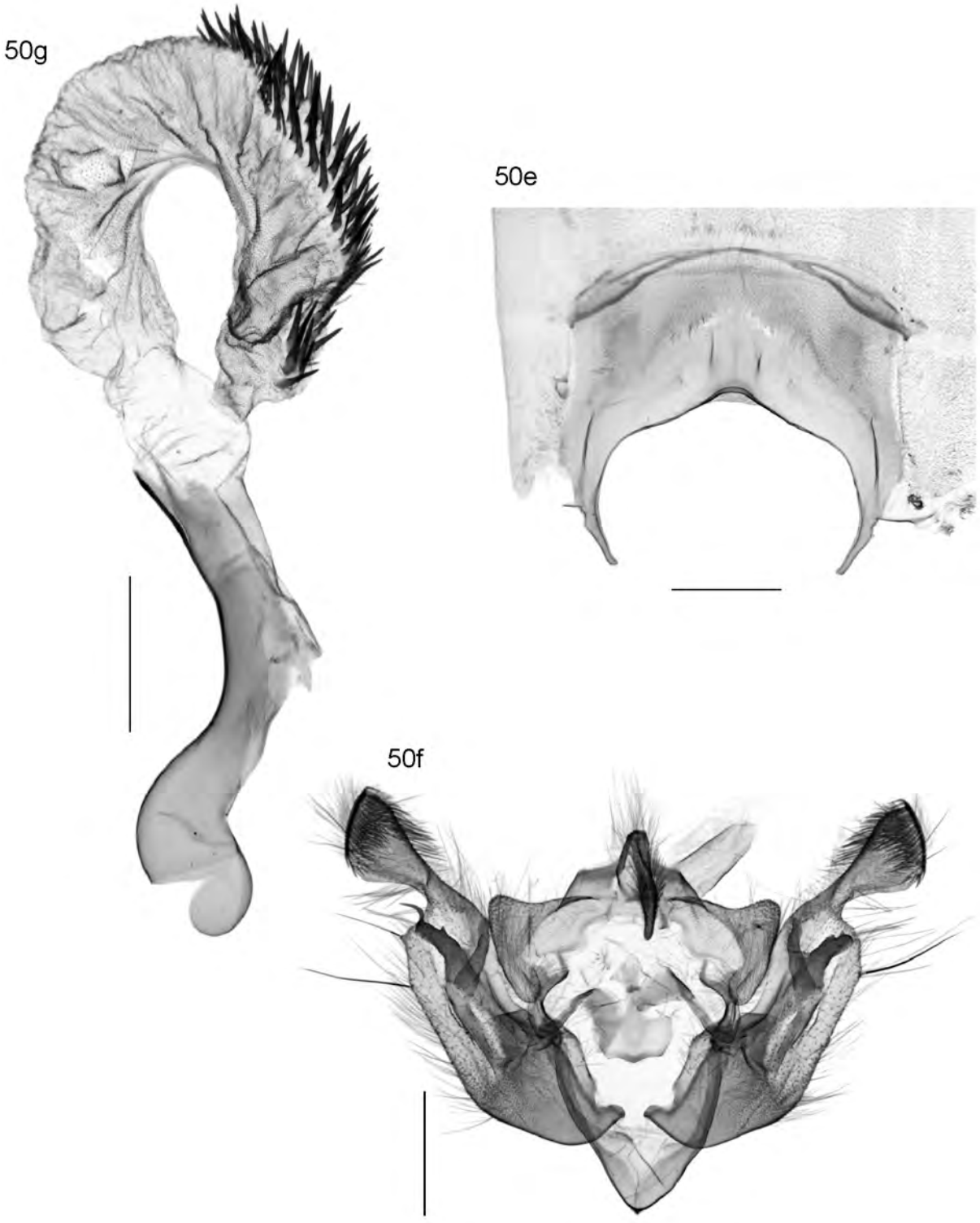


Fig. 50e, *Ichneutica unica* male abdominal base; **50f,** genital capsule; **50g,** phallus. (Slide NZAC Noct. 250.)

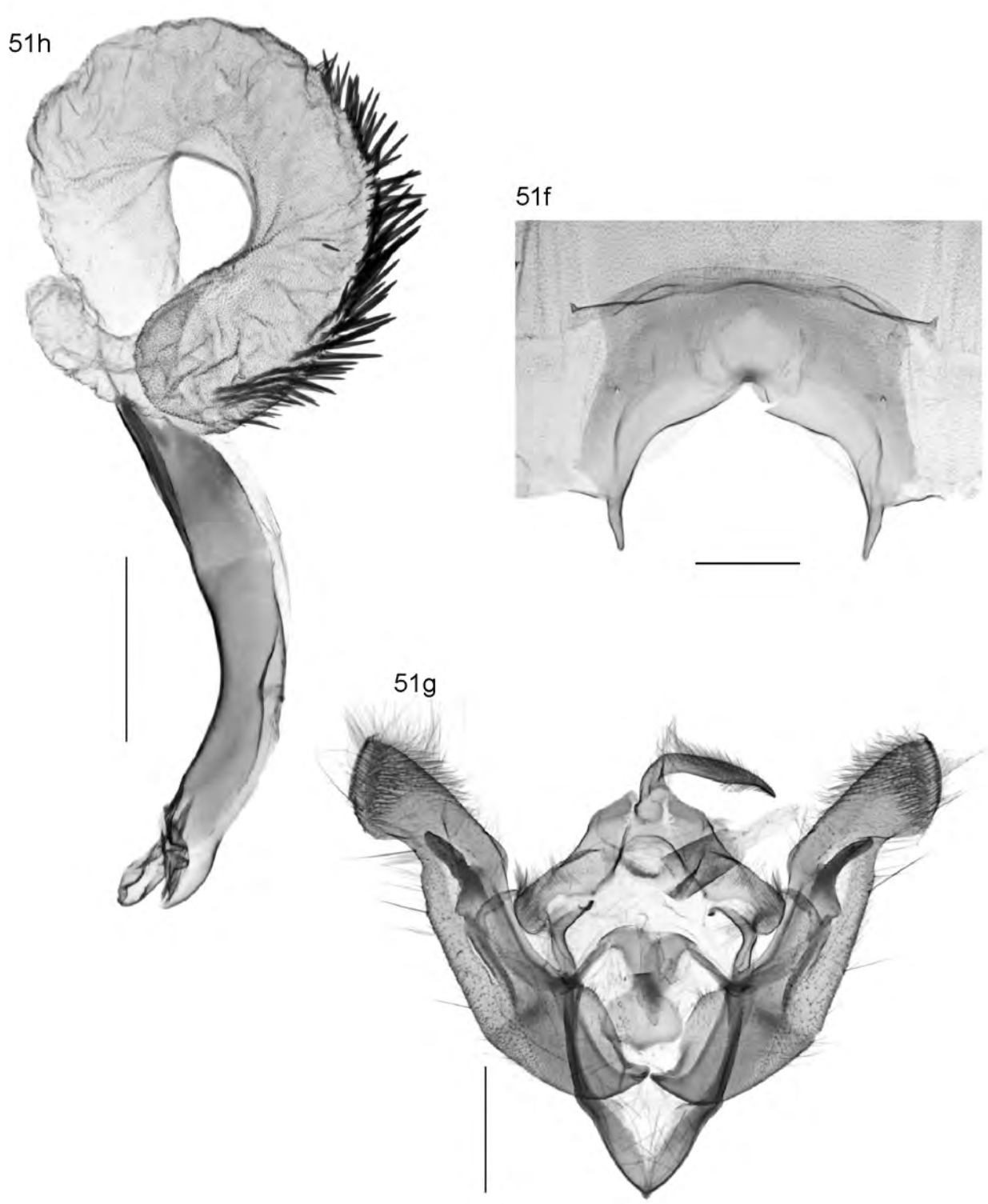


Fig. 51f, *Ichneutica acontistis* male abdominal base; **51g,** genital capsule; **51h,** phallus. (Slide NZAC Noct. 252.)

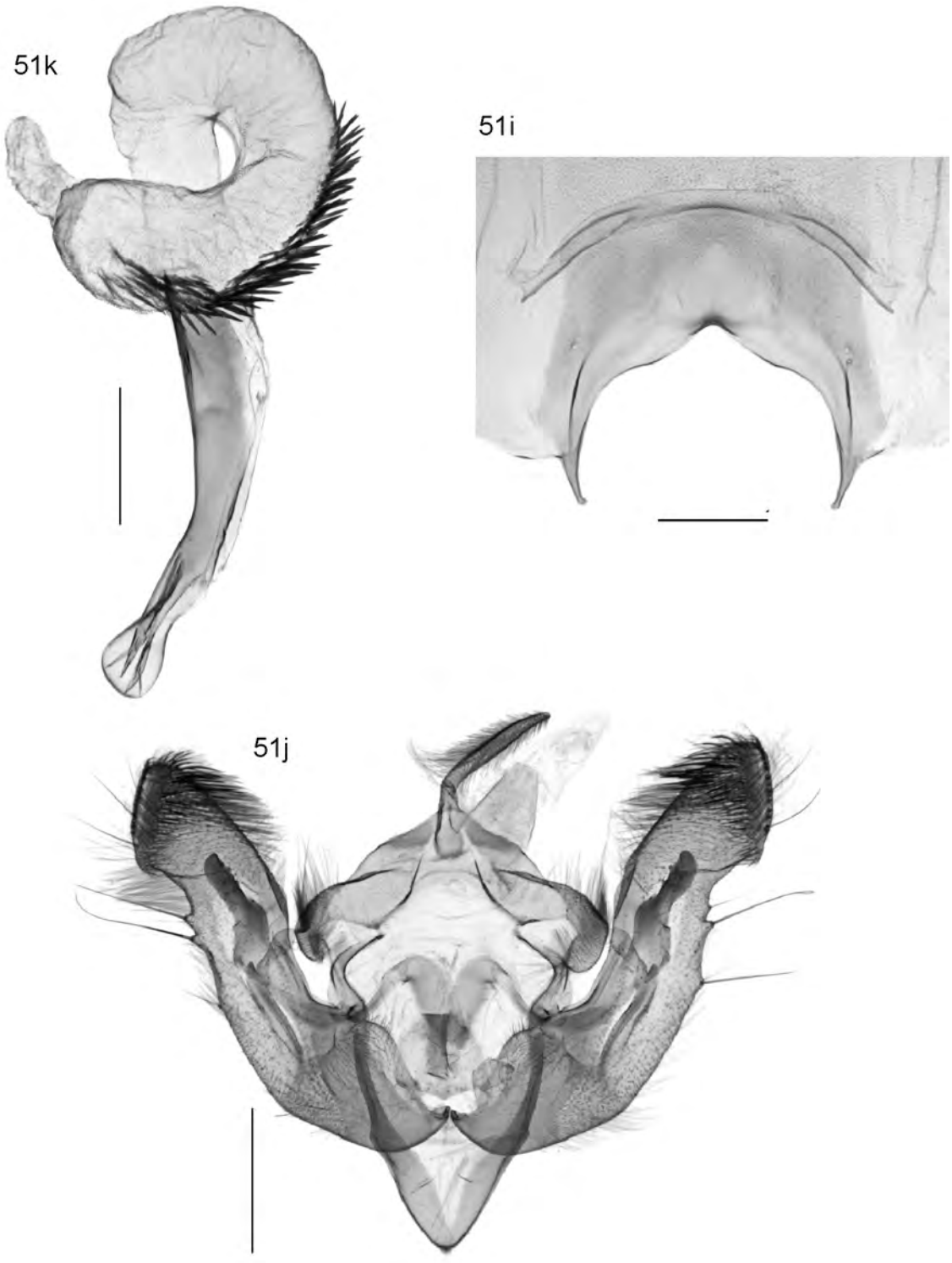


Fig. 51i, *Ichneutica acontistis* male abdominal base; **51j,** genital capsule; **51k,** phallus. (Slide NZAC Noct. 247.)

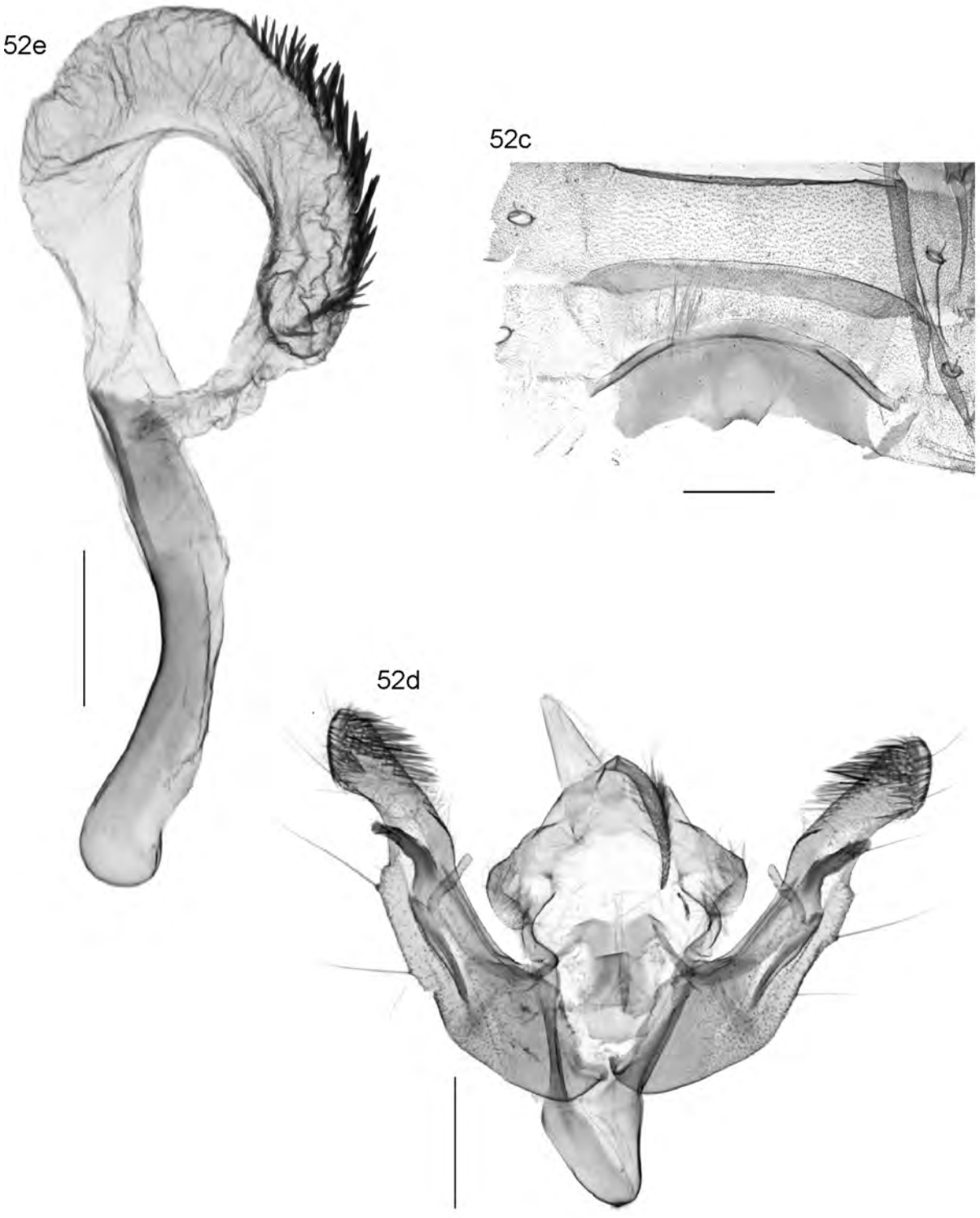


Fig. 52c, *Ichneutica emmersonorum* holotype male abdominal base (apodemes broken off); **52d,** genital capsule; **52e,** phallus. (Slide NZAC Noct. 277.) [53 *Ichneutica stulta*: male not examined; see text.]

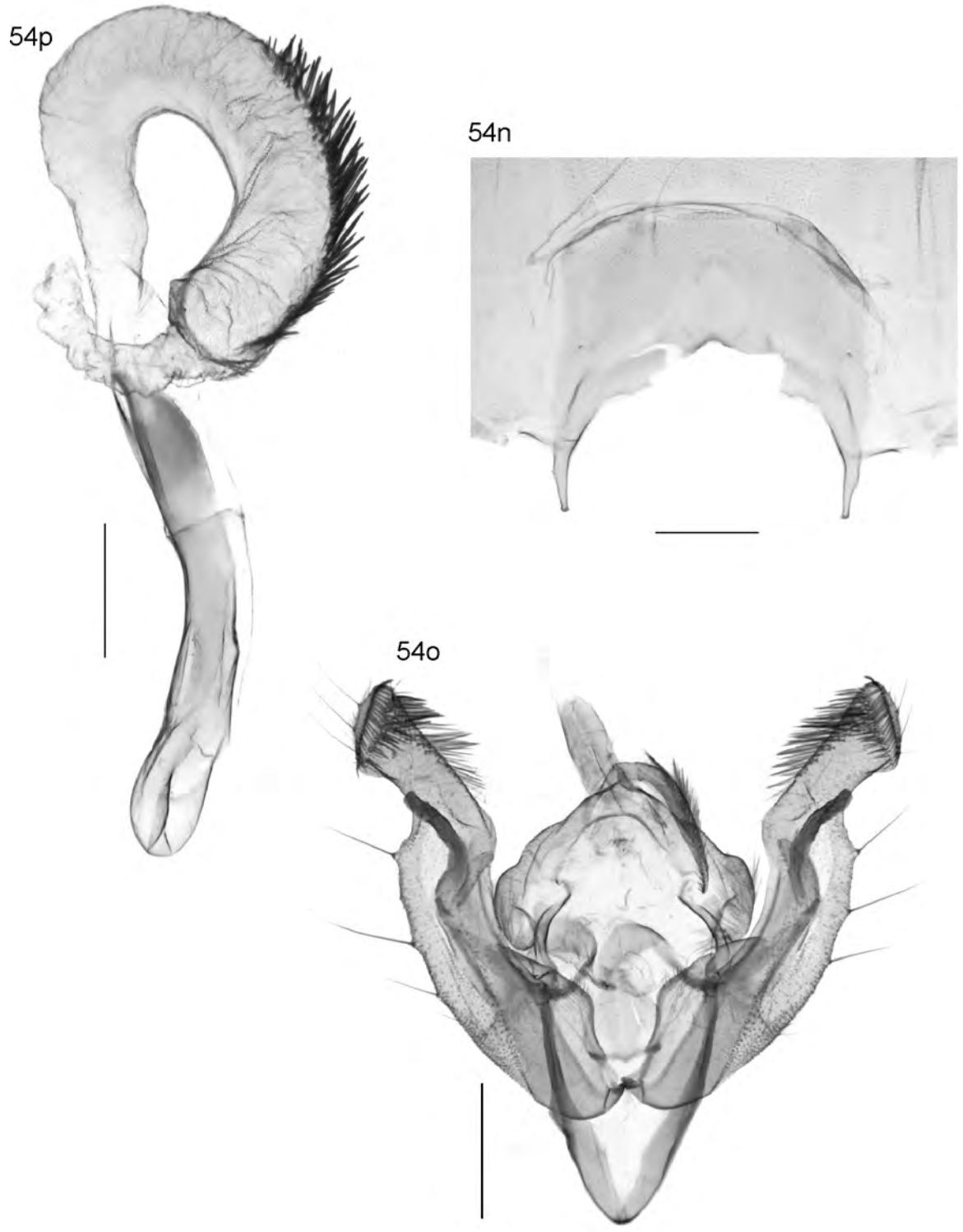


Fig. 54n, *Ichneutica arotis* male abdominal base; **54o,** genital capsule; **54p,** phallus. (Slide NZAC Noct. 232.)

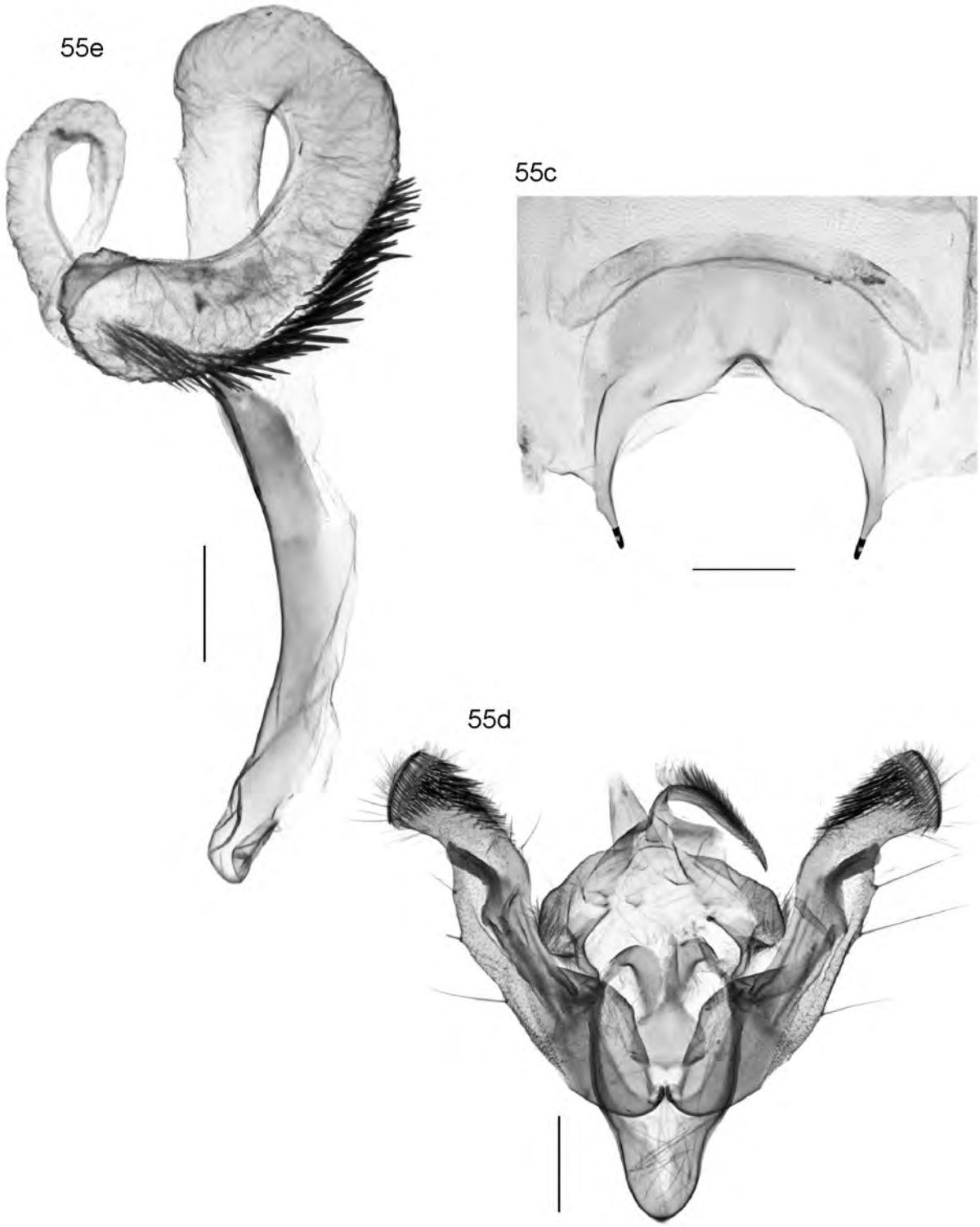


Fig. 55c, *Ichneutica theobroma* paratype male abdominal base; **55d,** genital capsule; **55e,** phallus. (Slide NZAC Noct. 229.)

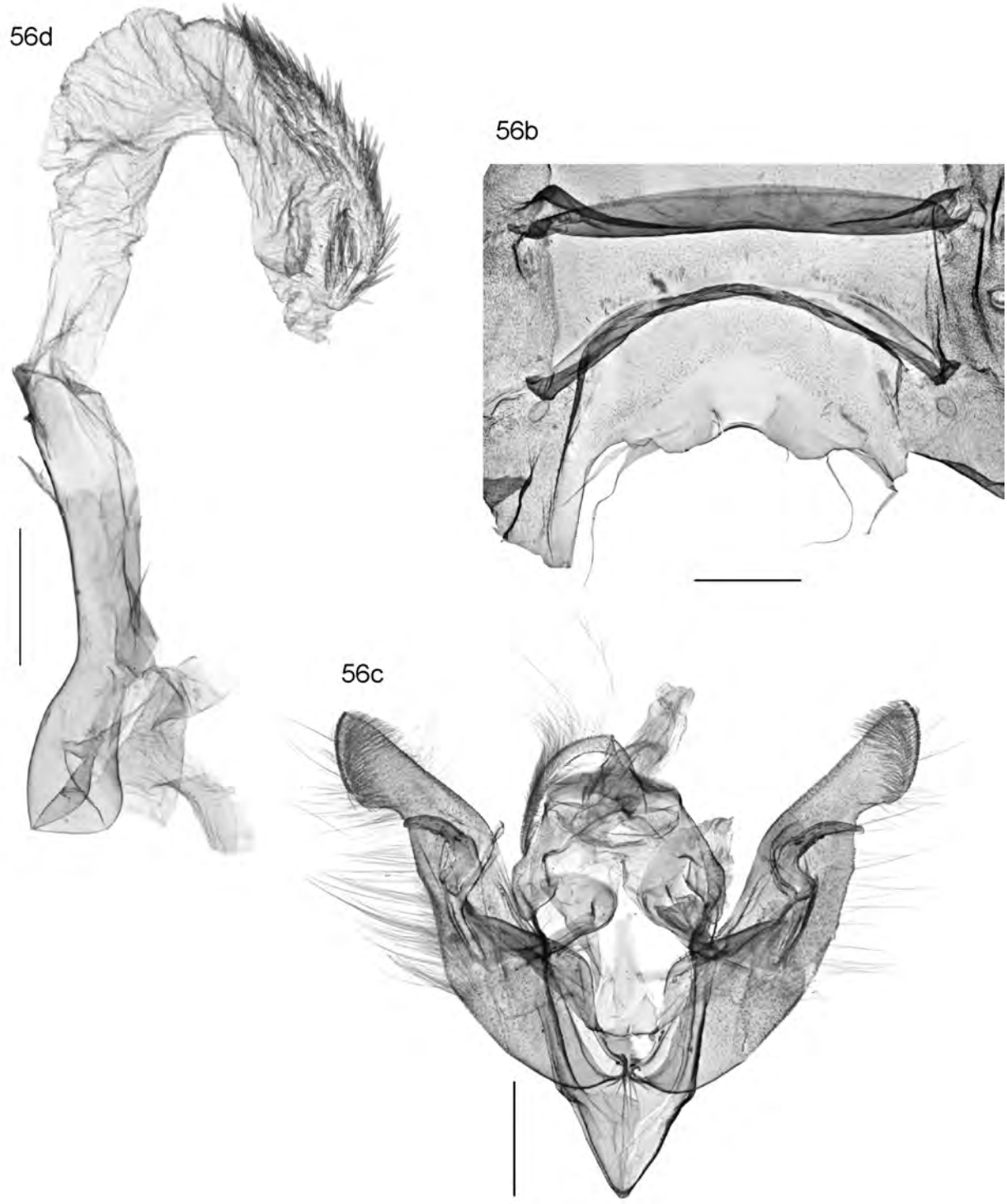


Fig. 56b, *Ichneutica lyfordi* holotype male abdominal base; **56c,** genital capsule; **56d,** phallus. (Slide NZAC Noct. 445.)

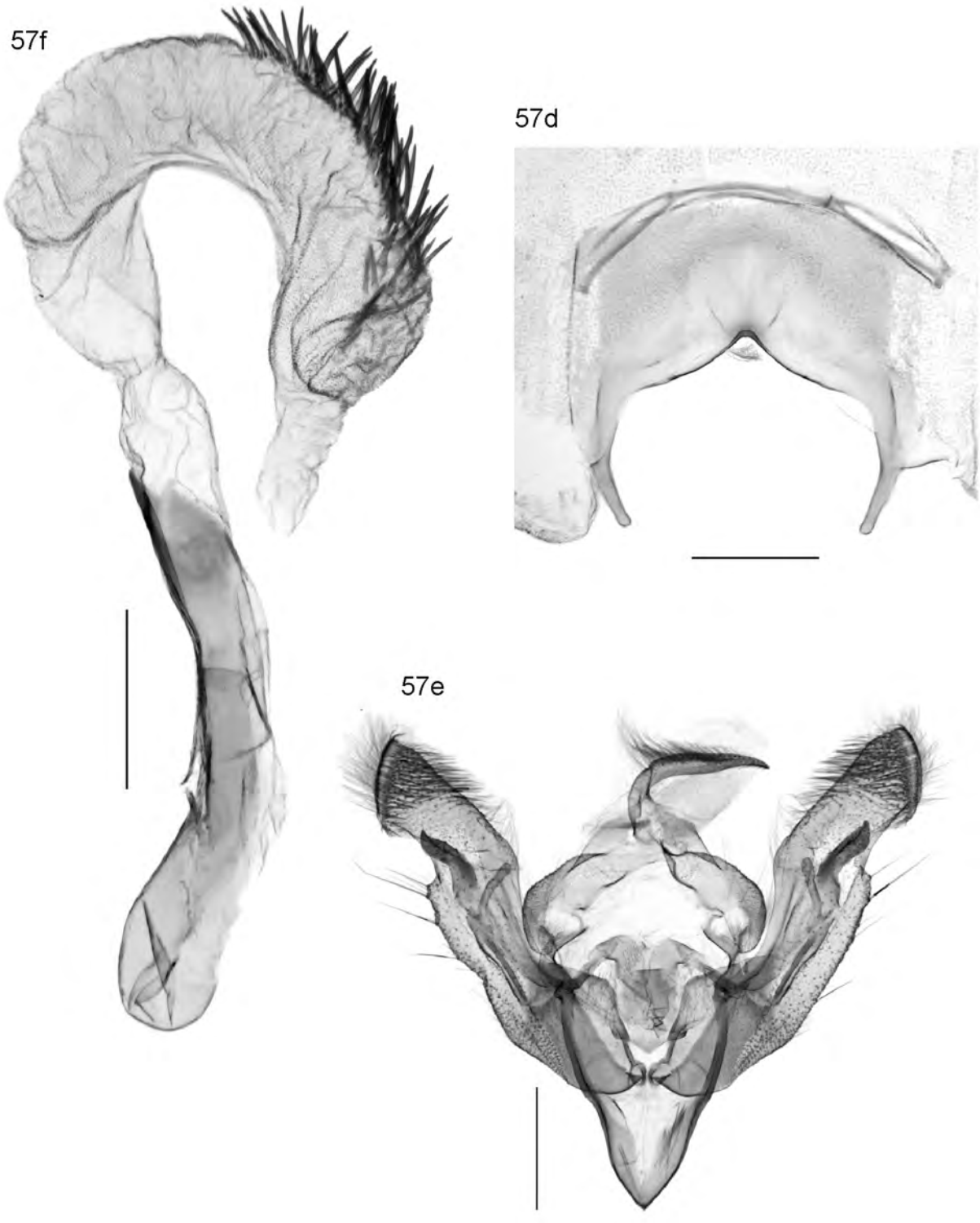


Fig. 57d, *Ichneutica paraxysta* male abdominal base; **57e,** genital capsule; **57f,** phallus. (Slide NZAC Noct. 239.)

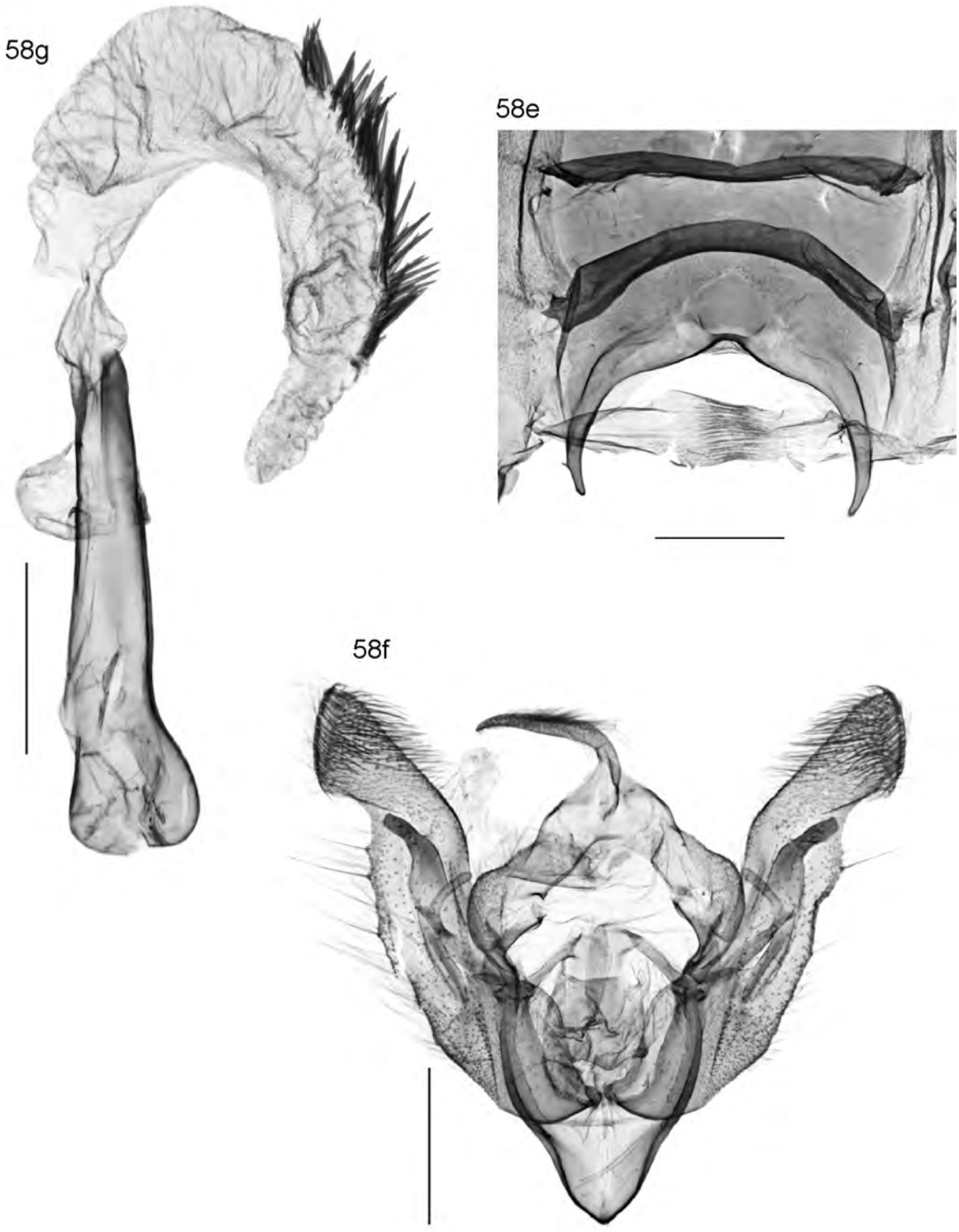


Fig. 58e, *Ichneutica prismatica* paratype male abdominal base; **58f,** genital capsule; **58g,** phallus. (Slide OMNZ IV42523.)

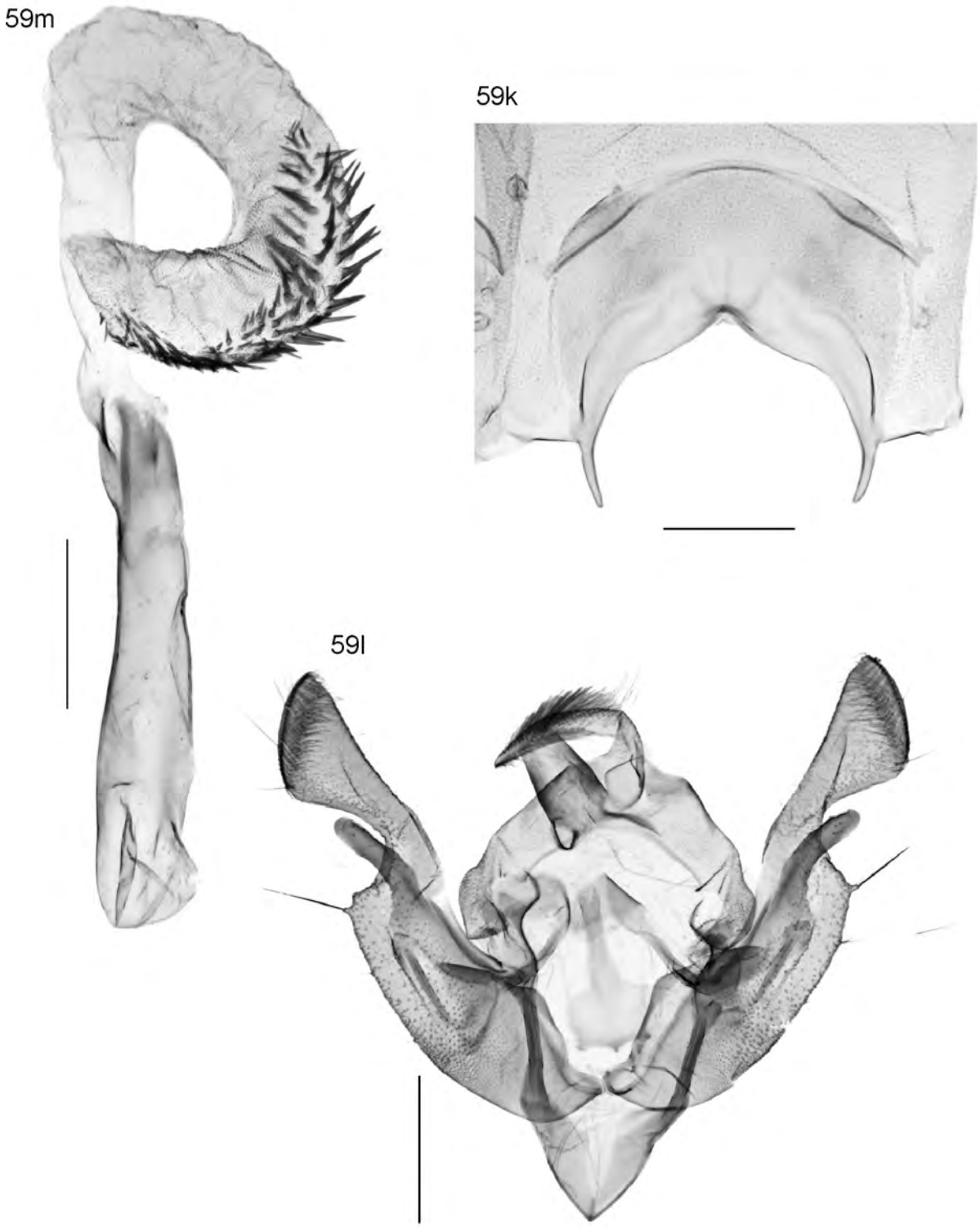


Fig. 59k, *Ichneutica sistens* male abdominal base; **59l,** genital capsule; **59m,** phallus. (Slide NZAC Noct. 130.)

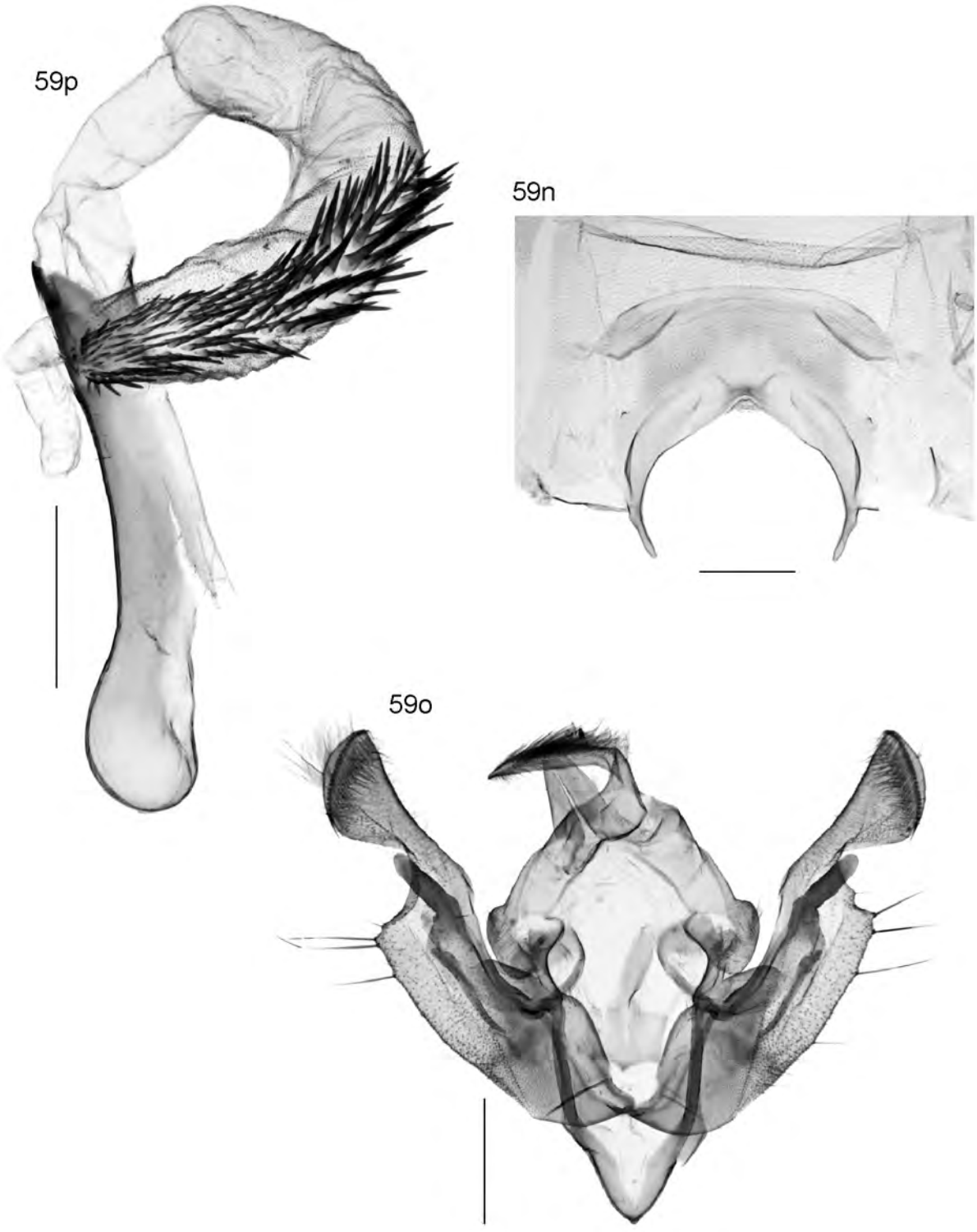


Fig. 59n, *Ichneutica sistens* male abdominal base; **59o,** genital capsule; **59p,** phallus. (Slide NZAC Noct. 133.)

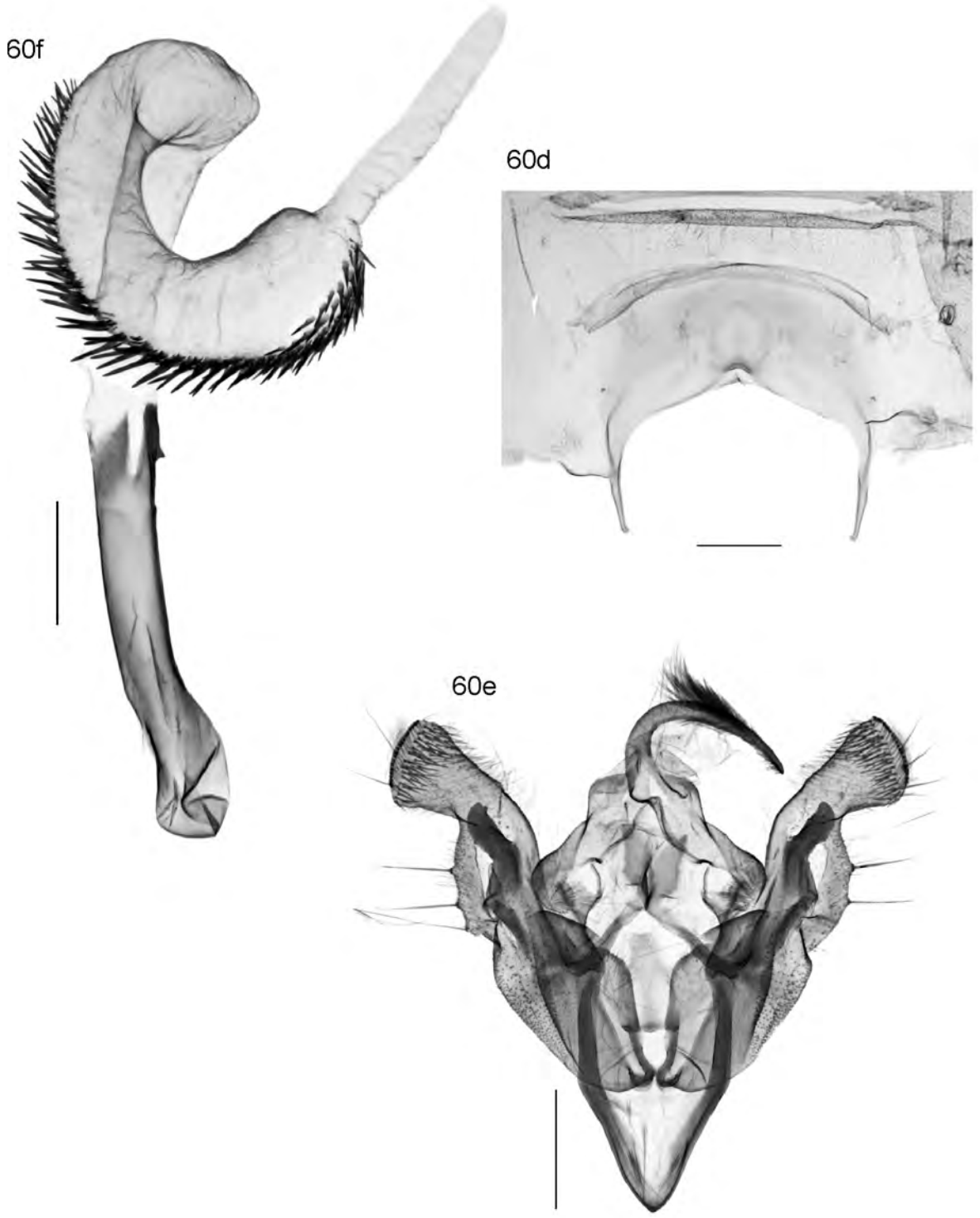


Fig. 60d, *Ichneutica maya* male abdominal base; **60e,** genital capsule; **60f,** phallus. (Slide NZAC Noct. 163.)

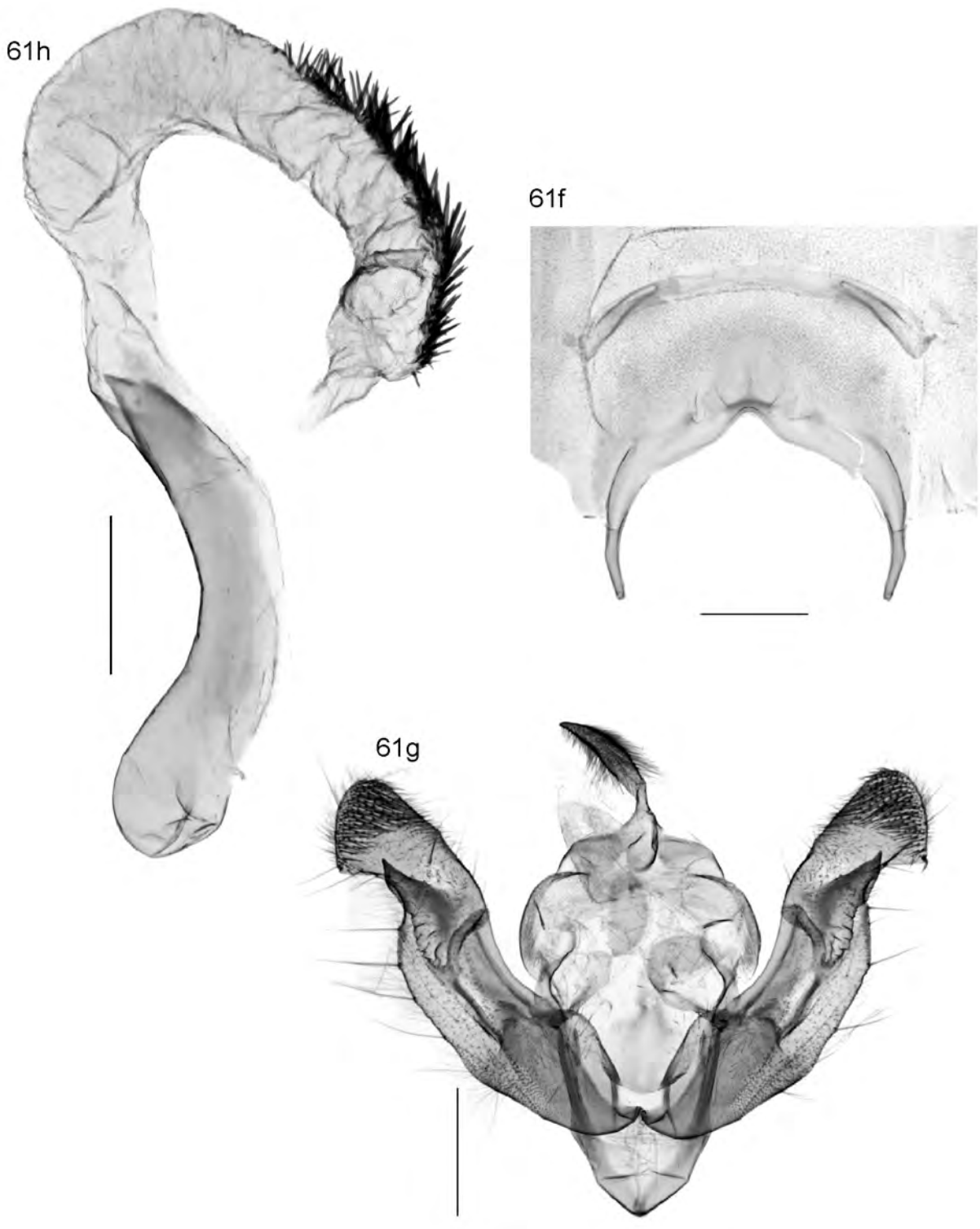


Fig. 61f, *Ichneutica paracausta* male abdominal base; **61g,** genital capsule; **61h,** phallus. (Slide NZAC Noct. 175.)

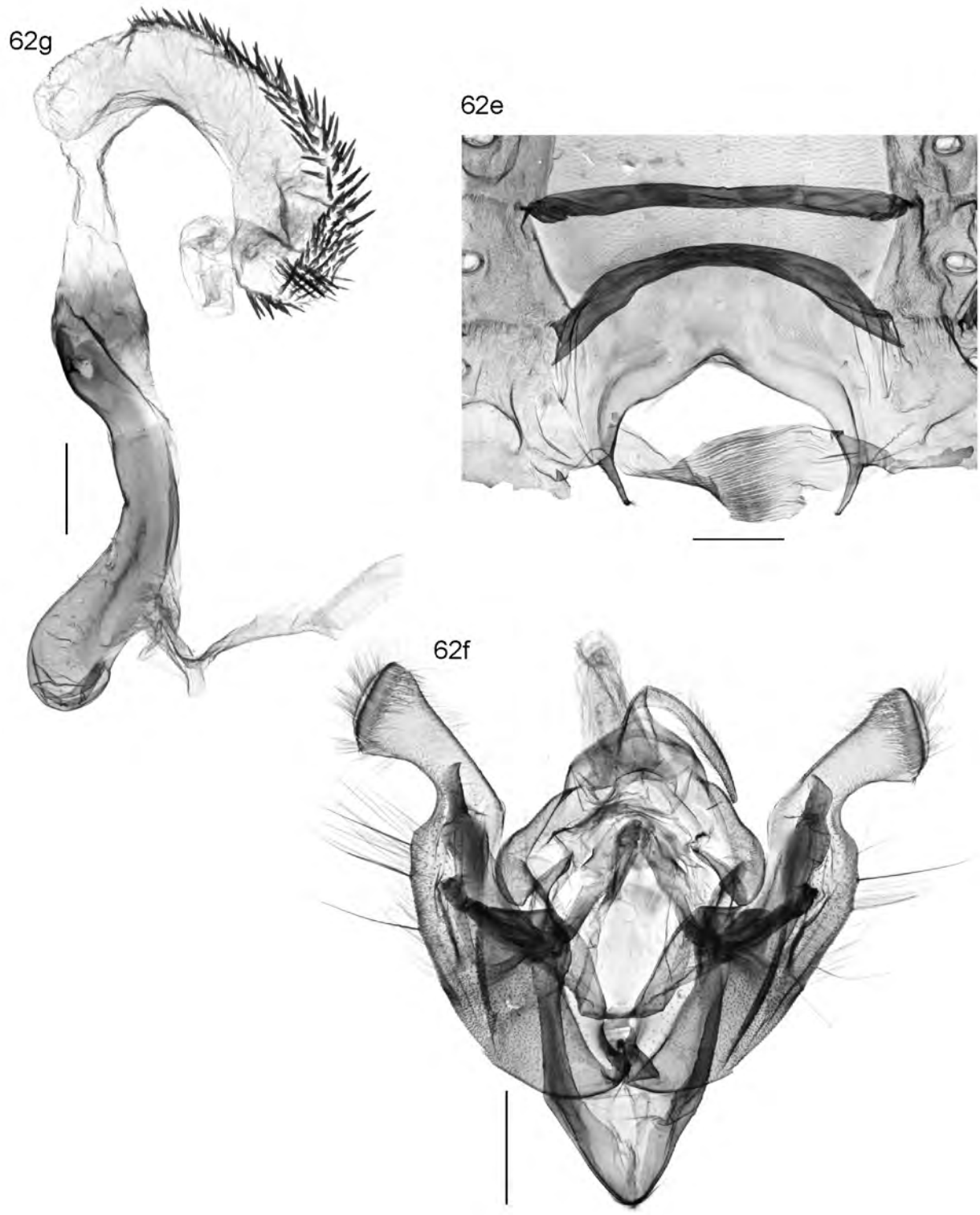


Fig. 62e, *Ichneutica rubescens* male abdominal base; **62f,** genital capsule; **62g,** phallus. (Slide NZAC Noct. 487.)

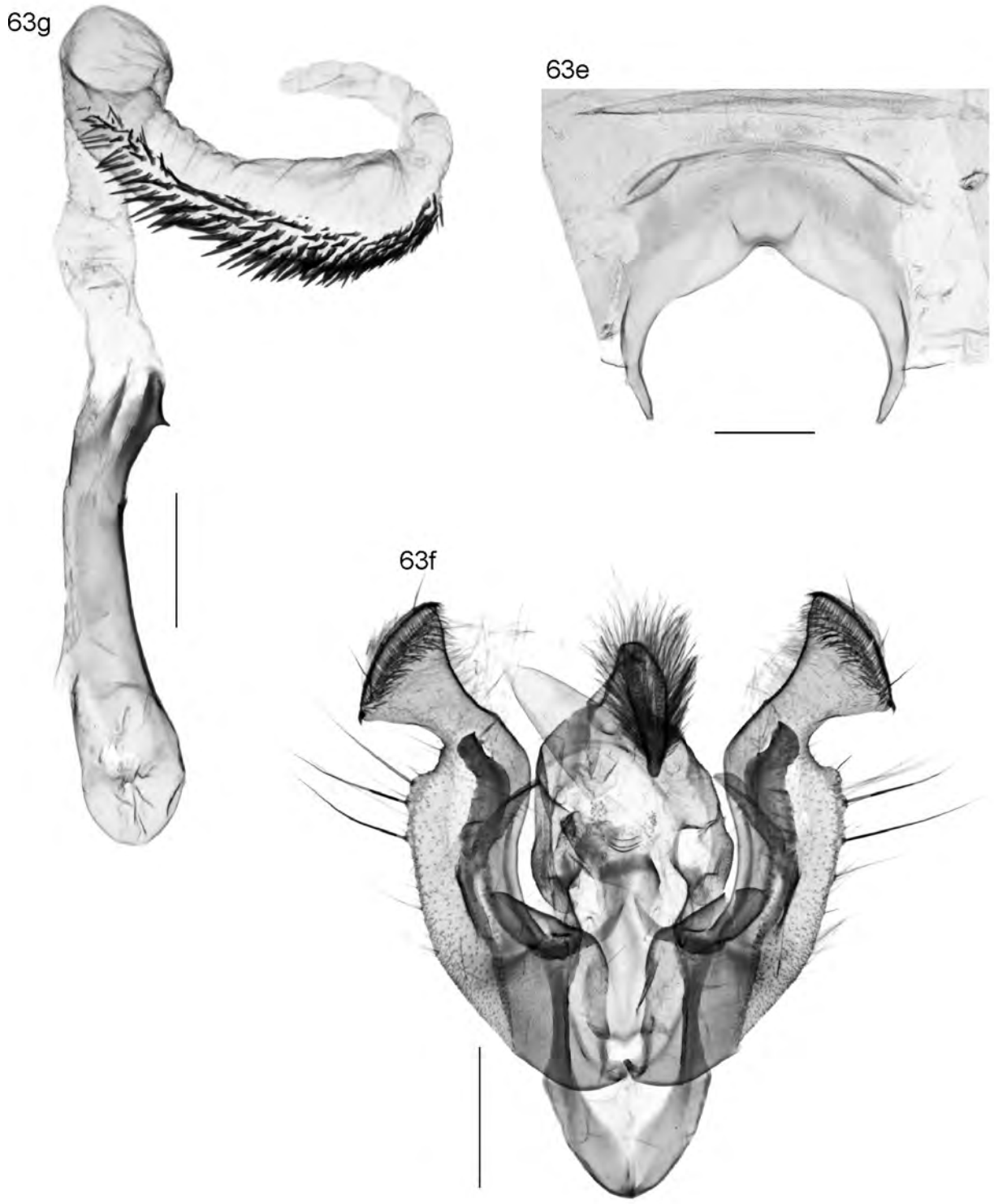


Fig. 63e, *Ichneutica cuneata* male abdominal base; **63f,** genital capsule; **63g,** phallus. (Slide NZAC Noct. 98.)

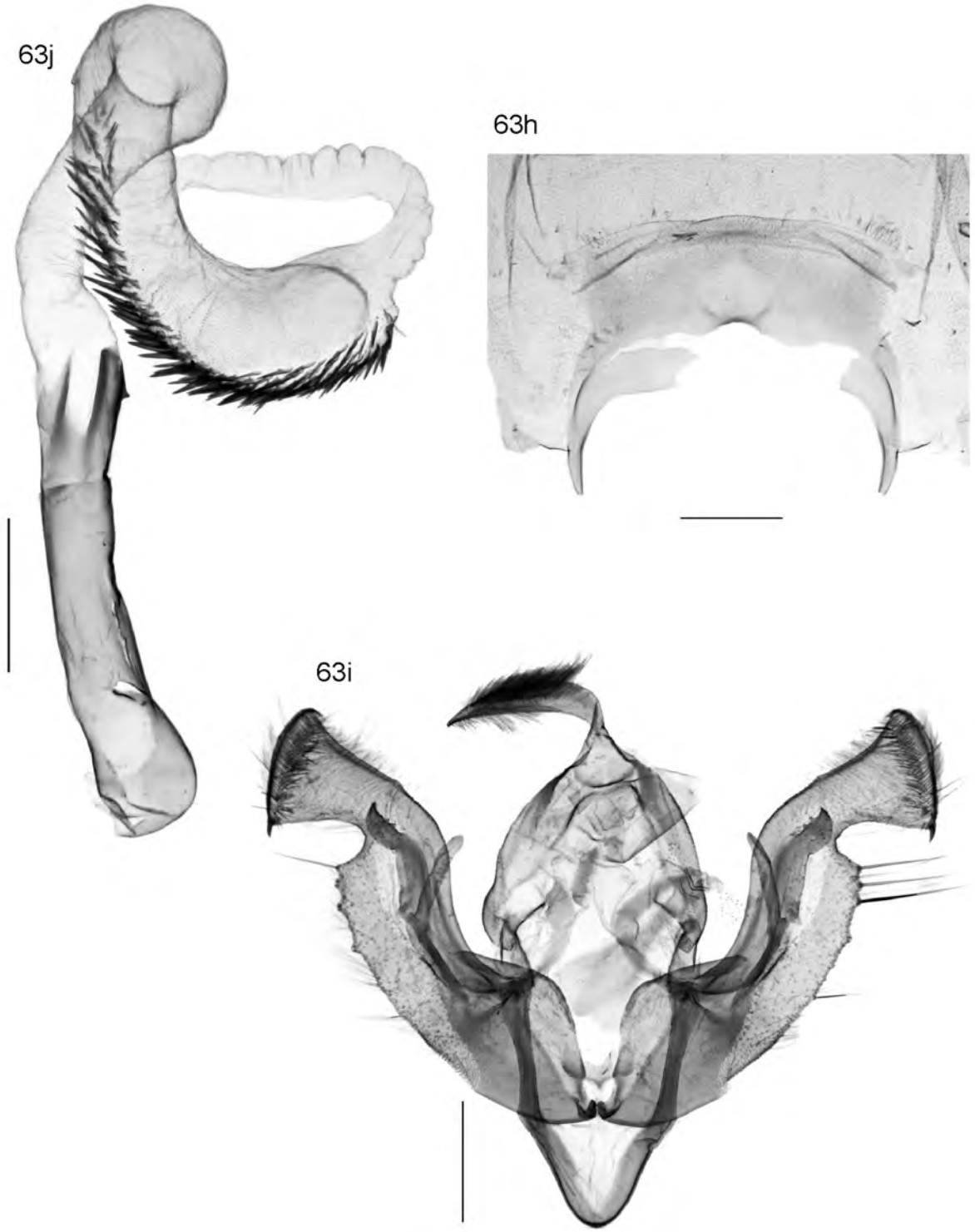


Fig. 63h, *Ichneutica cuneata* male abdominal base; **63i,** genital capsule; **63j,** phallus. (Slide NZAC Noct. 152.)

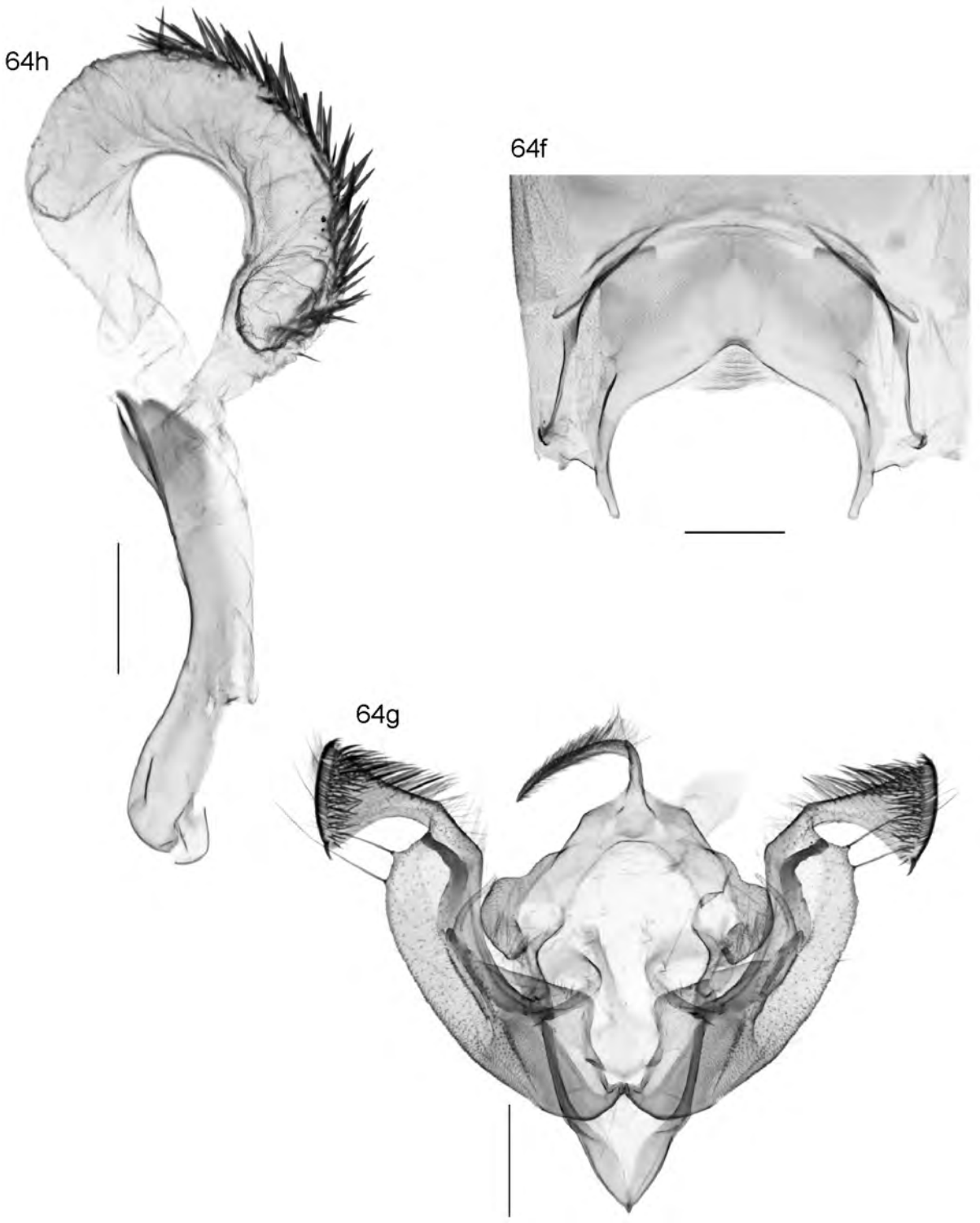


Fig. 64f, *Ichneutica epiastra* male abdominal base; **64g,** genital capsule; **64h,** phallus. (Slide NZAC Noct. 149.)

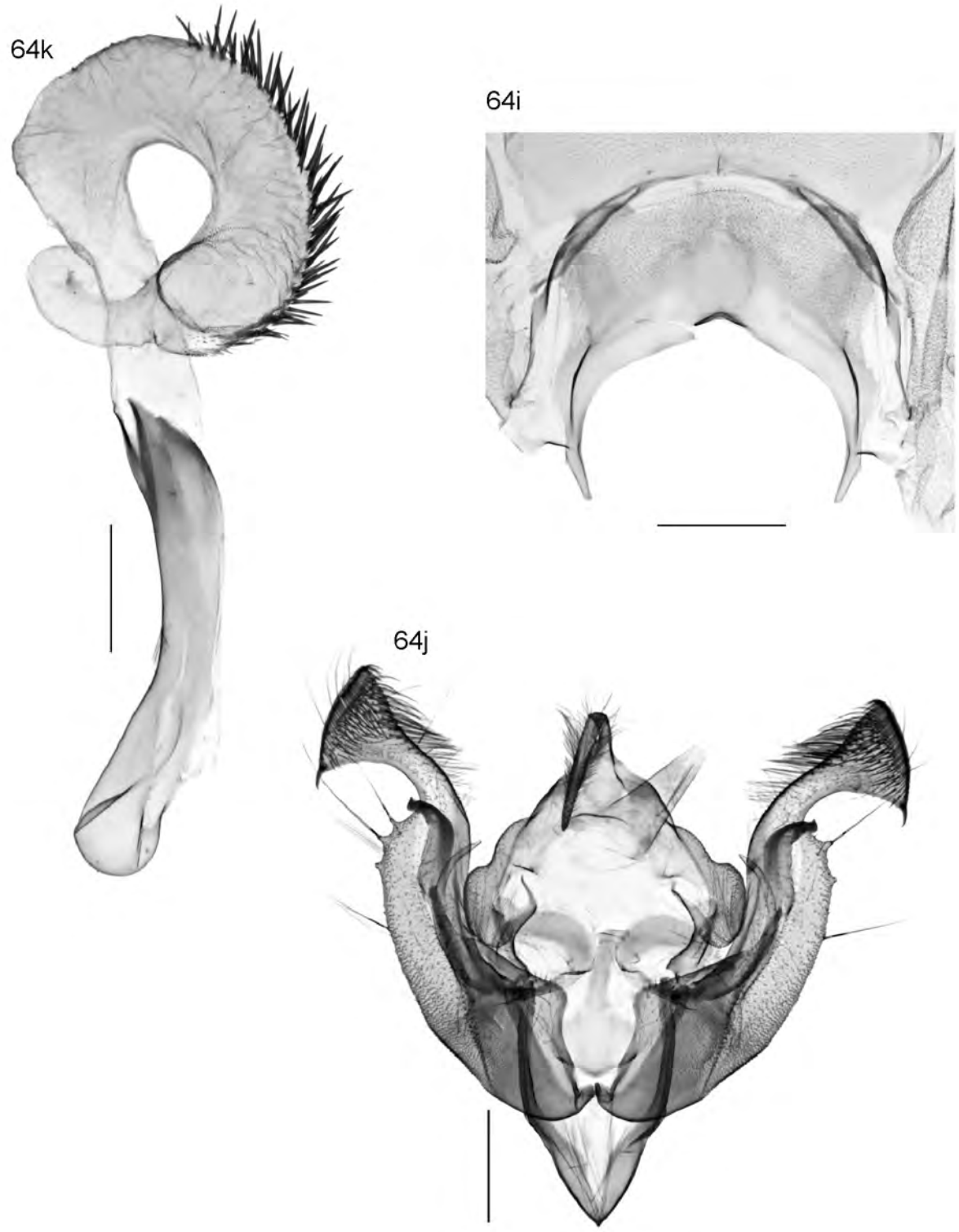


Fig. 64i, *Ichneutica epiastra* male abdominal base; **64j,** genital capsule; **64k,** phallus. (Slide NZAC Noct. 151.)

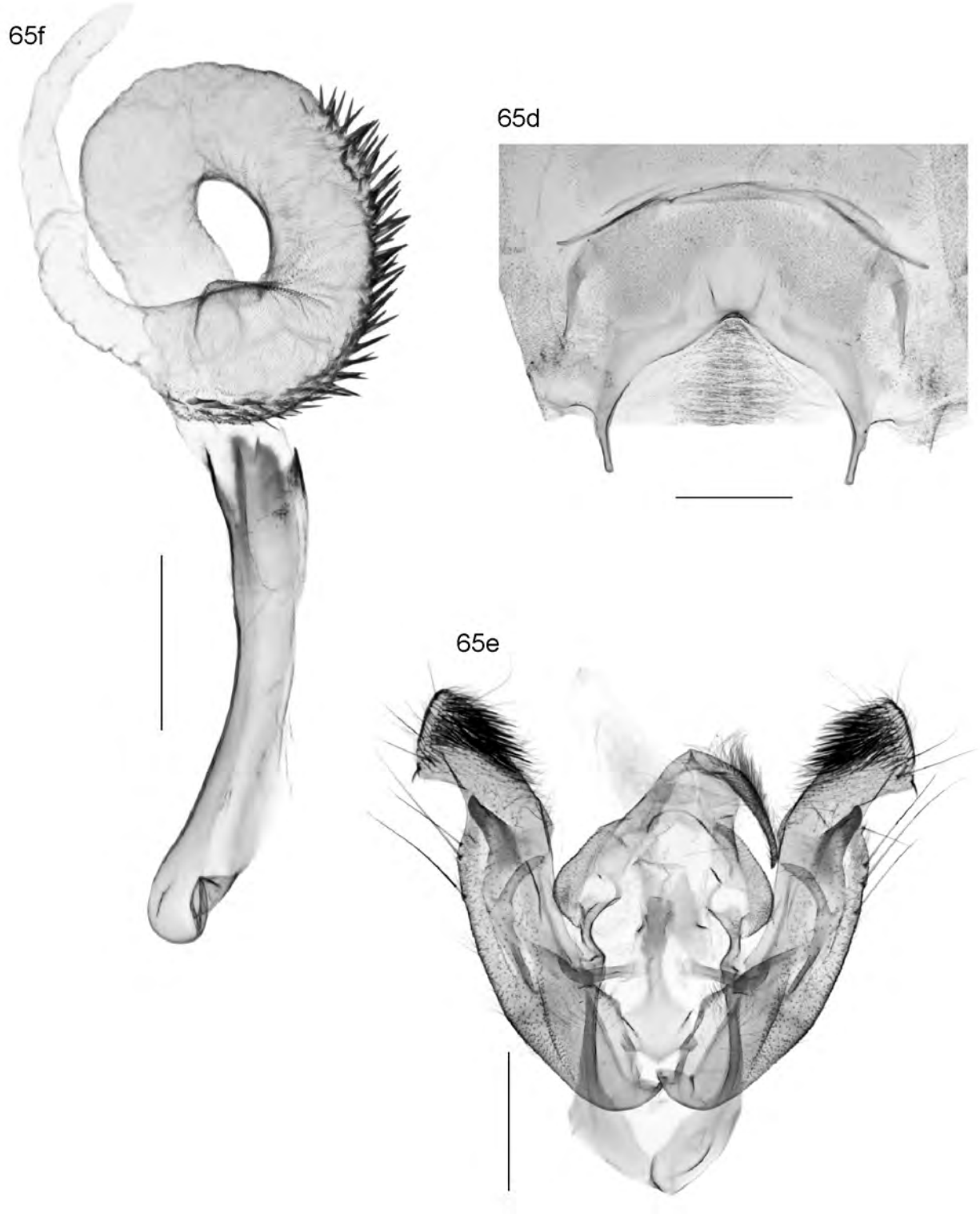


Fig. 65d, *Ichneutica haedifrontella* holotype male abdominal base; **65e,** genital capsule; **65f,** phallus. (Slide NZAC Noct. 153.)

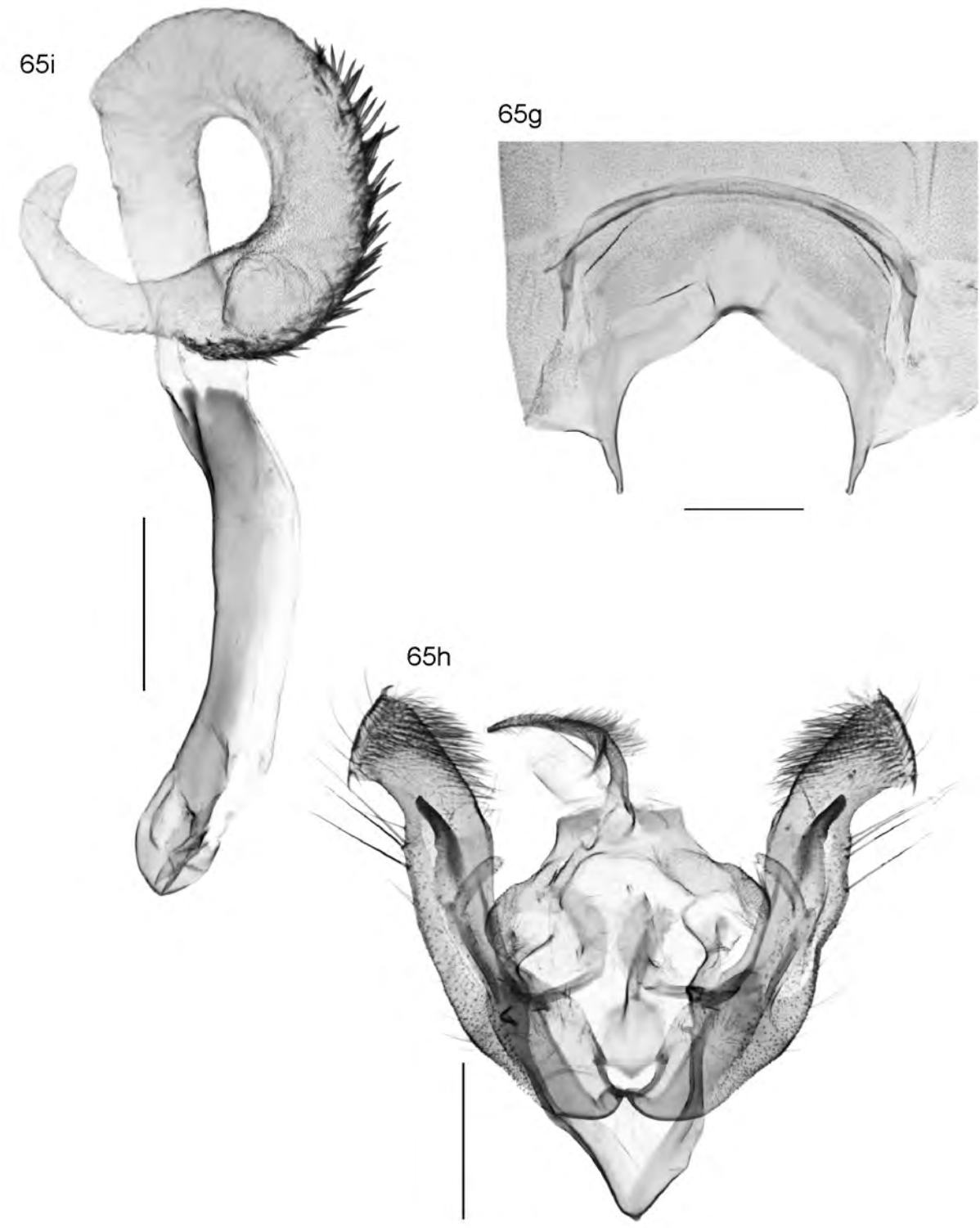


Fig. 65g, *Ichneutica haedifrontella* male abdominal base; **65h,** genital capsule; **65i,** phallus. (Slide NZAC Noct. 154.)

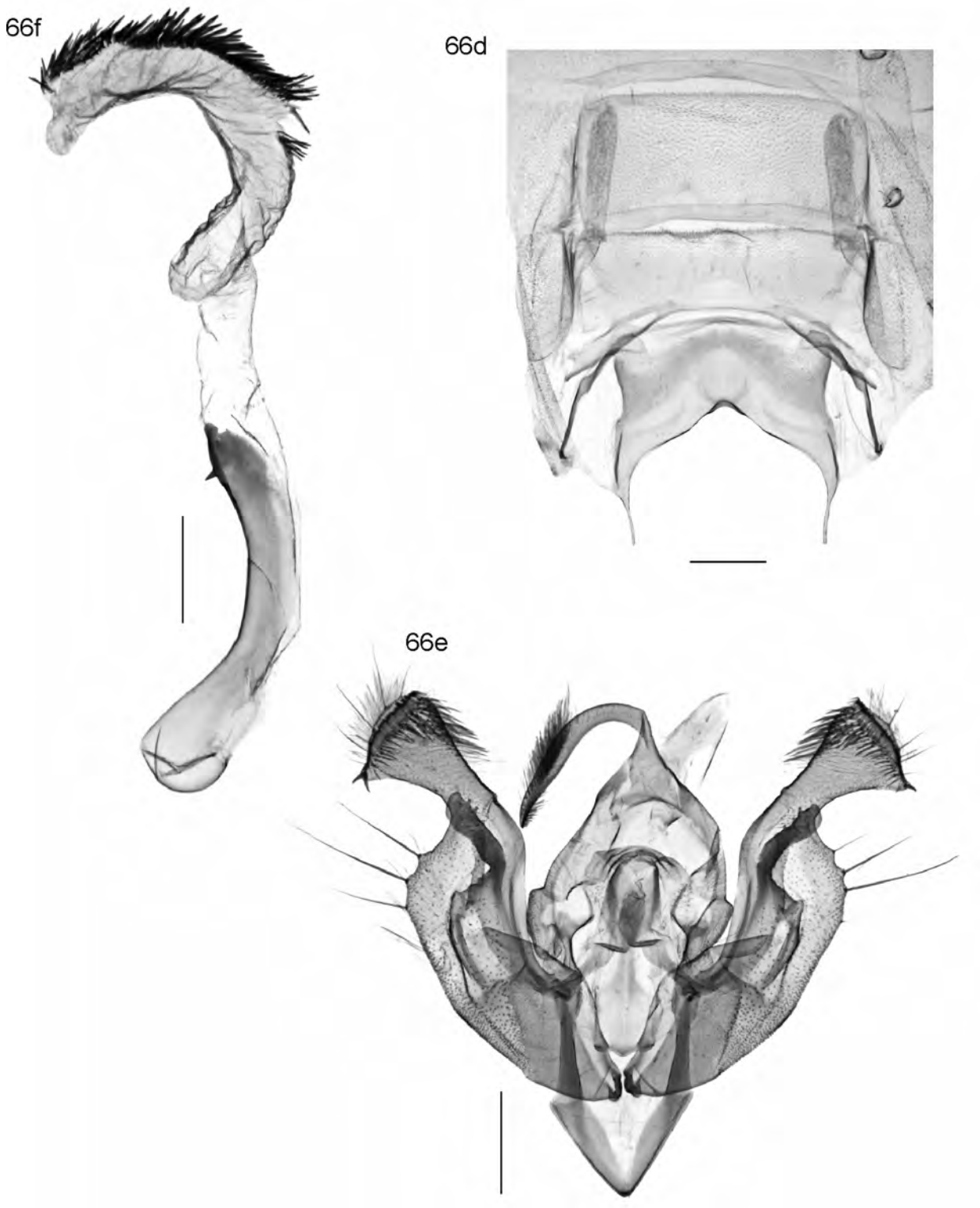


Fig. 66d, *Ichneutica lindsayorum* male abdominal base; **66e,** genital capsule; **66f,** phallus. (Slide NZAC Noct. 162.)

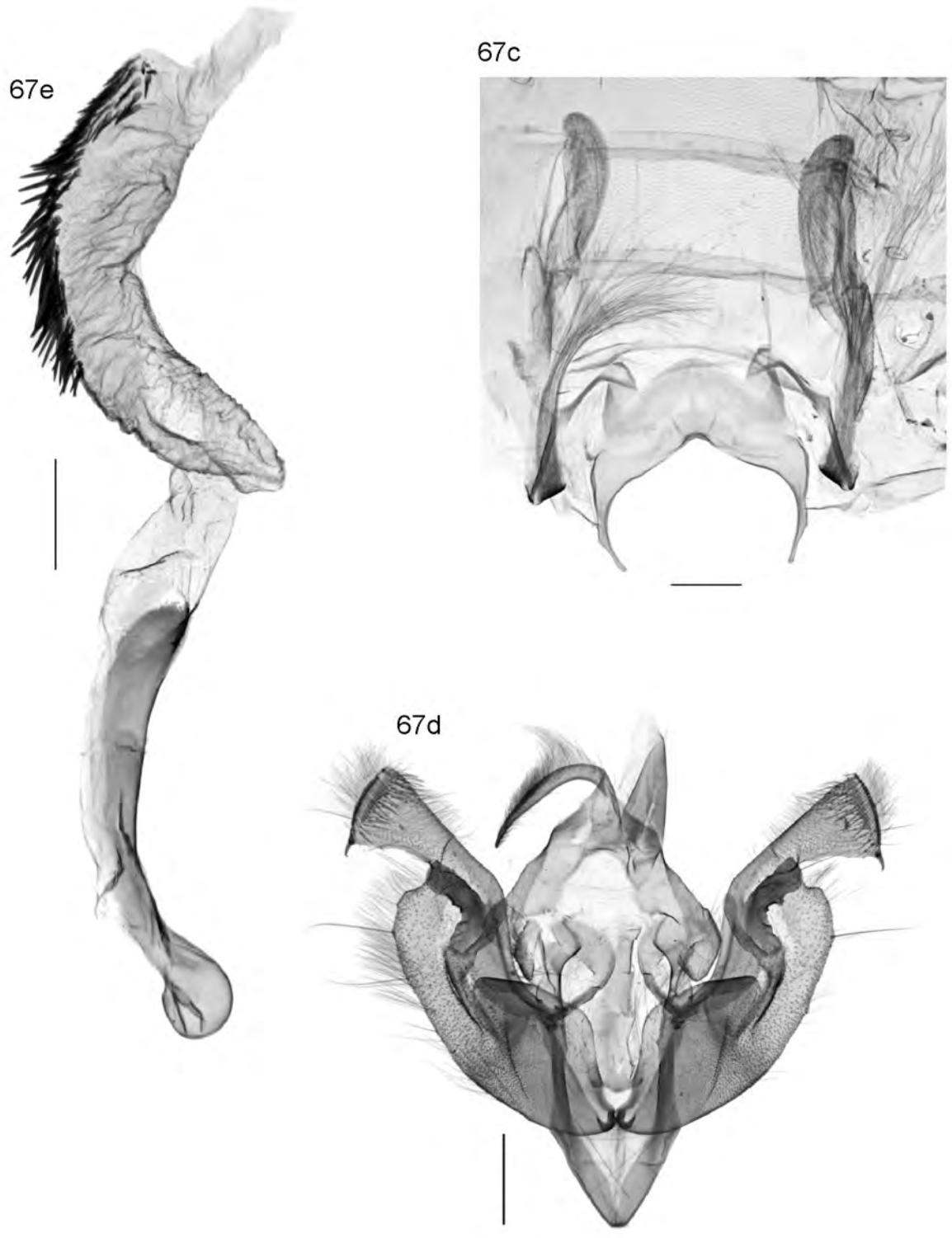


Fig. 67c, *Ichneutica olivea* male abdominal base; **67d,** genital capsule; **67e,** phallus. (Slide NZAC Noct. 166.)

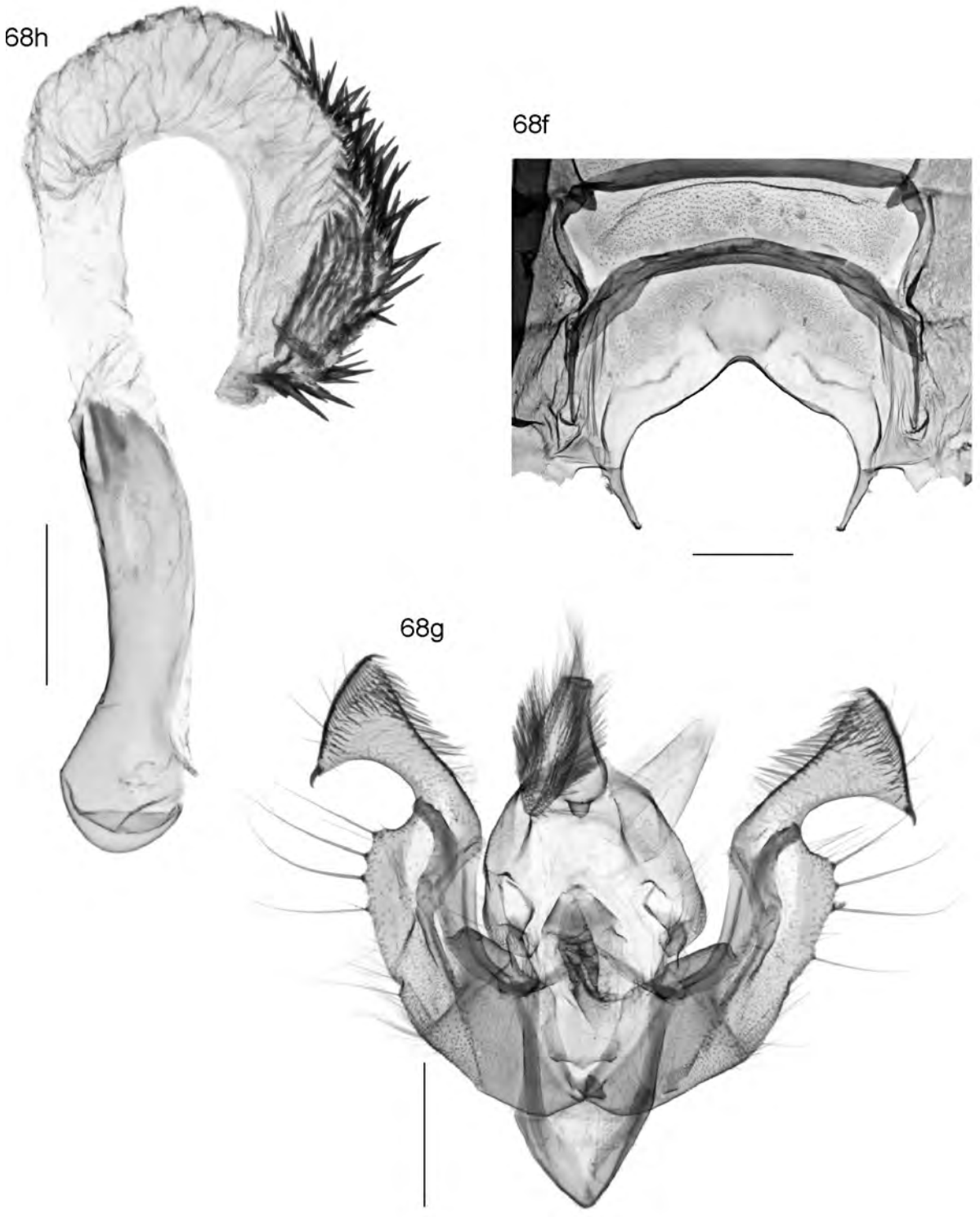


Fig. 68f, *Ichneutica propria* male abdominal base; **68g,** genital capsule; **68h,** phallus. (Slide NZAC Noct. 47.)

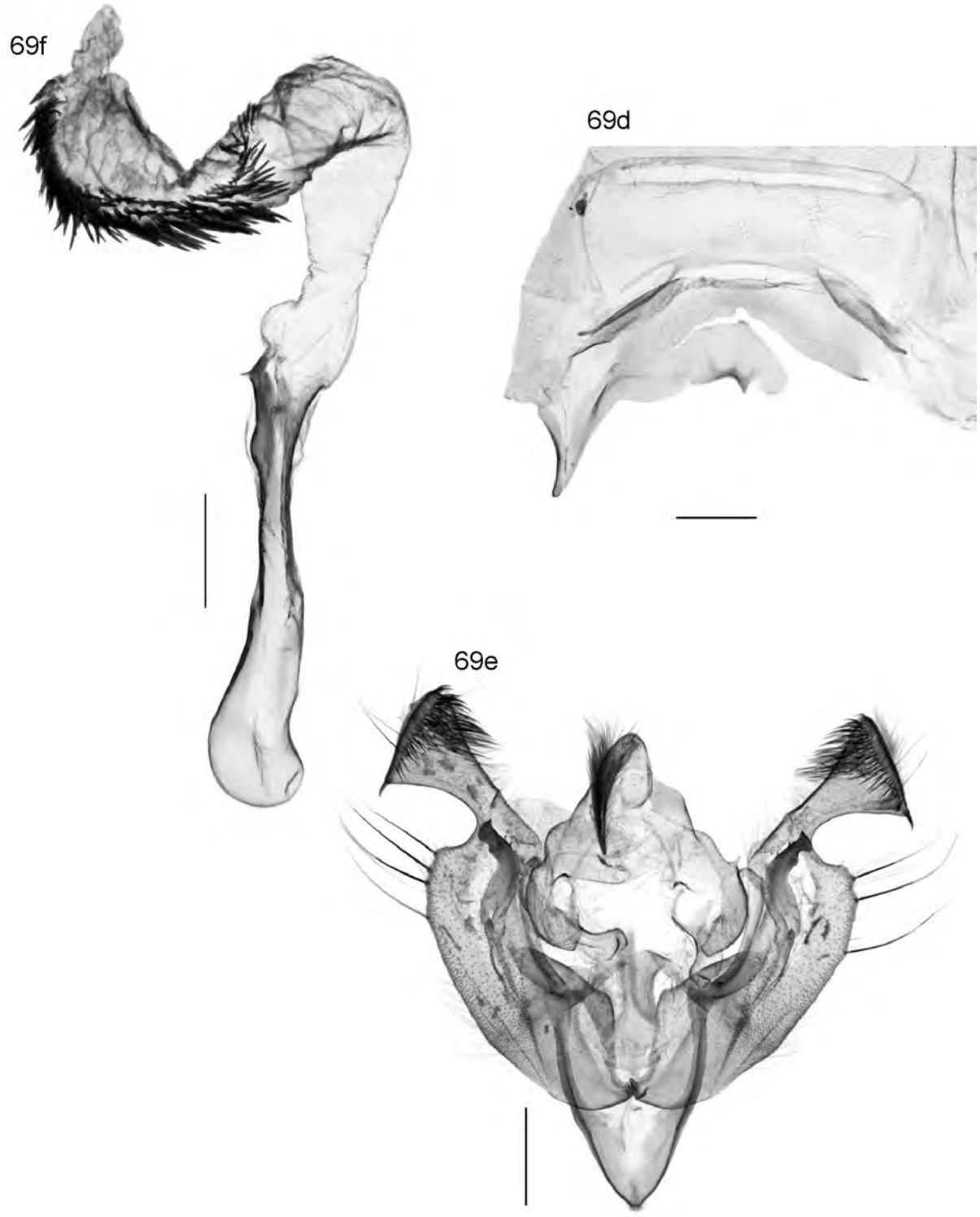


Fig. 69d, *Ichneutica seducta* paratype male abdominal base; **69e,** genital capsule; **69f,** phallus. (Slide NZAC Noct. 233.)

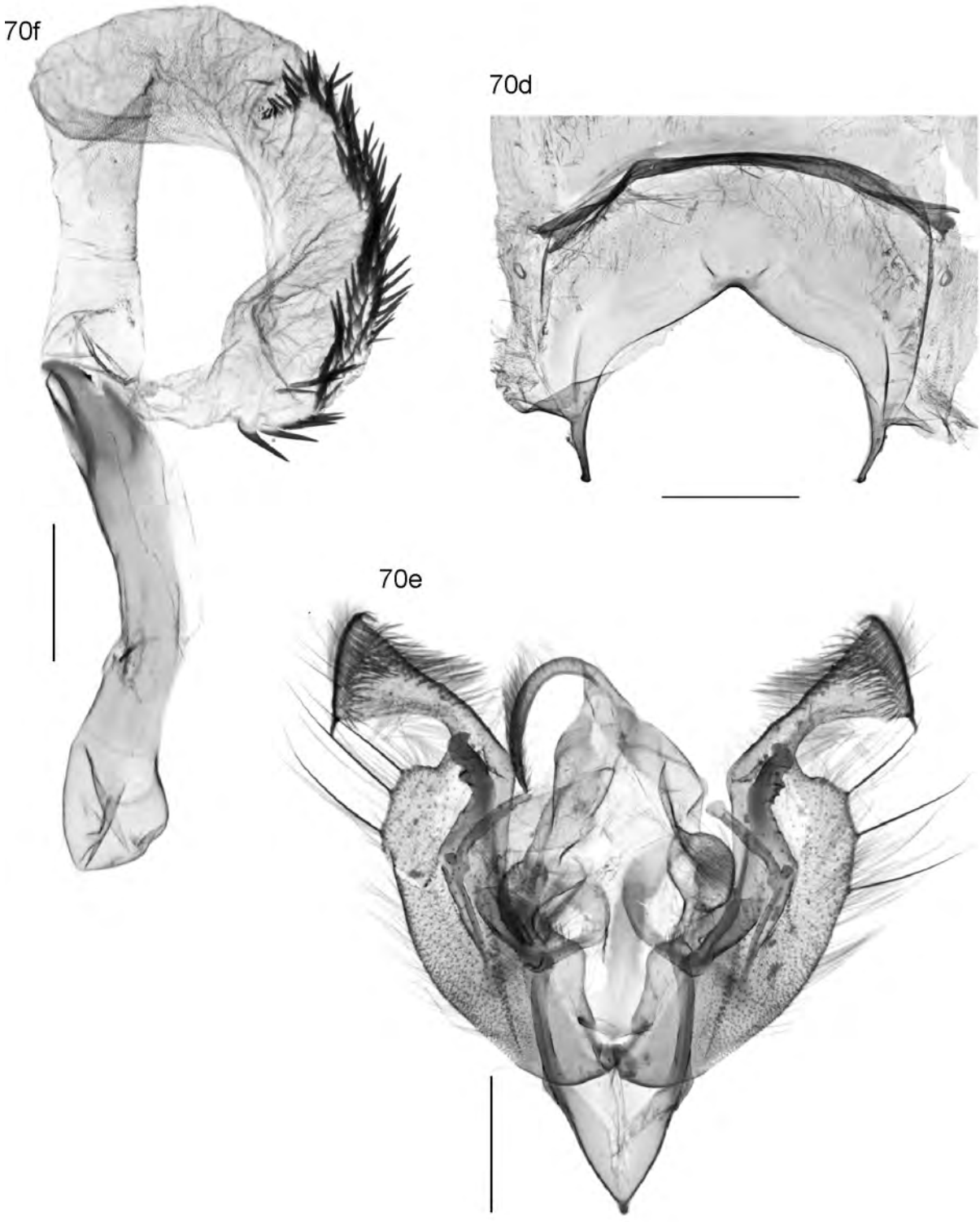


Fig. 70d, *Ichneutica semivittata* male abdominal base; **70e,** genital capsule; **70f,** phallus. (Slide NZAC Noct. 240.)

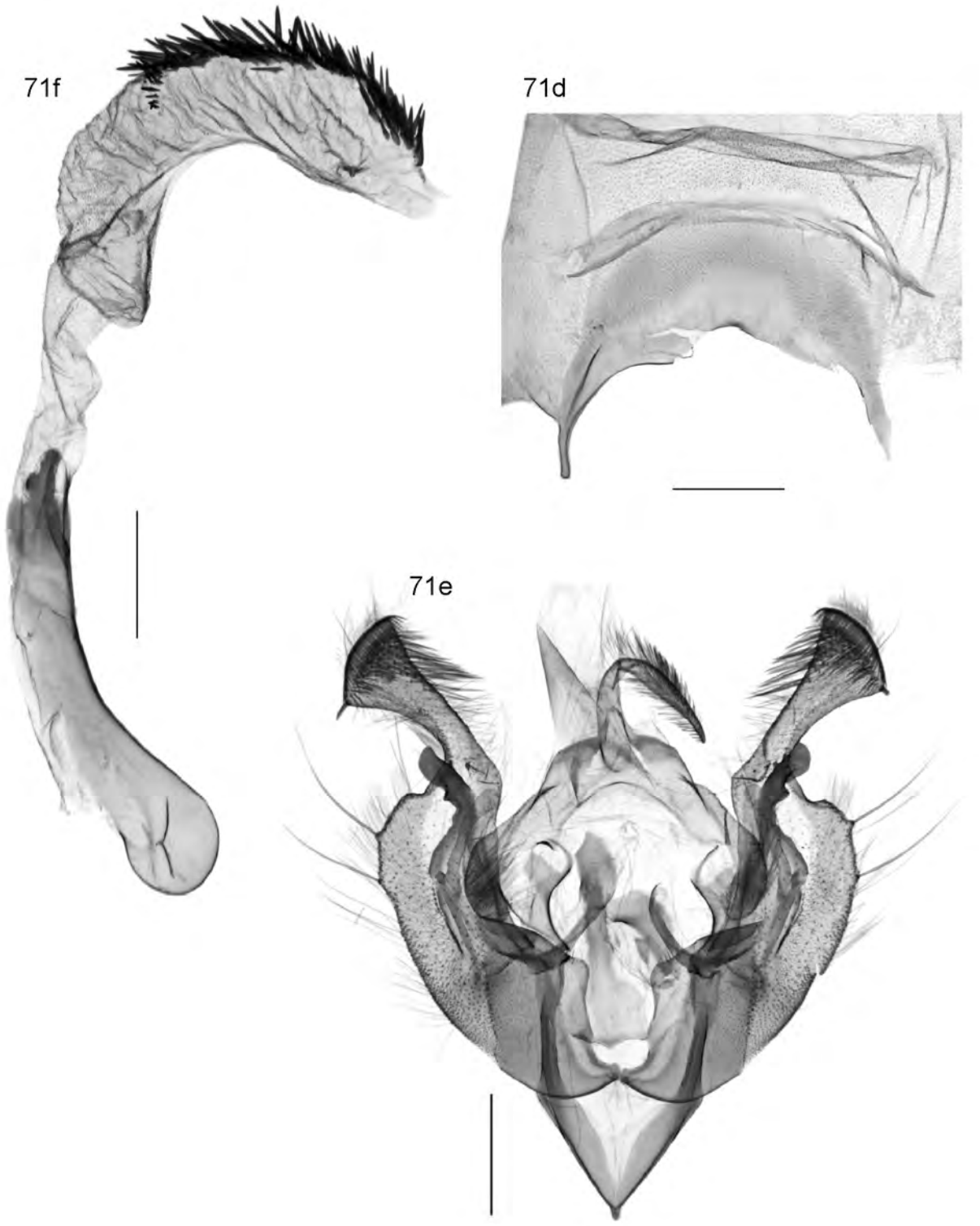


Fig. 71d, *Ichneutica similis* male abdominal base; **71e,** genital capsule; **71f,** phallus. (Slide NZAC Noct. 241.)

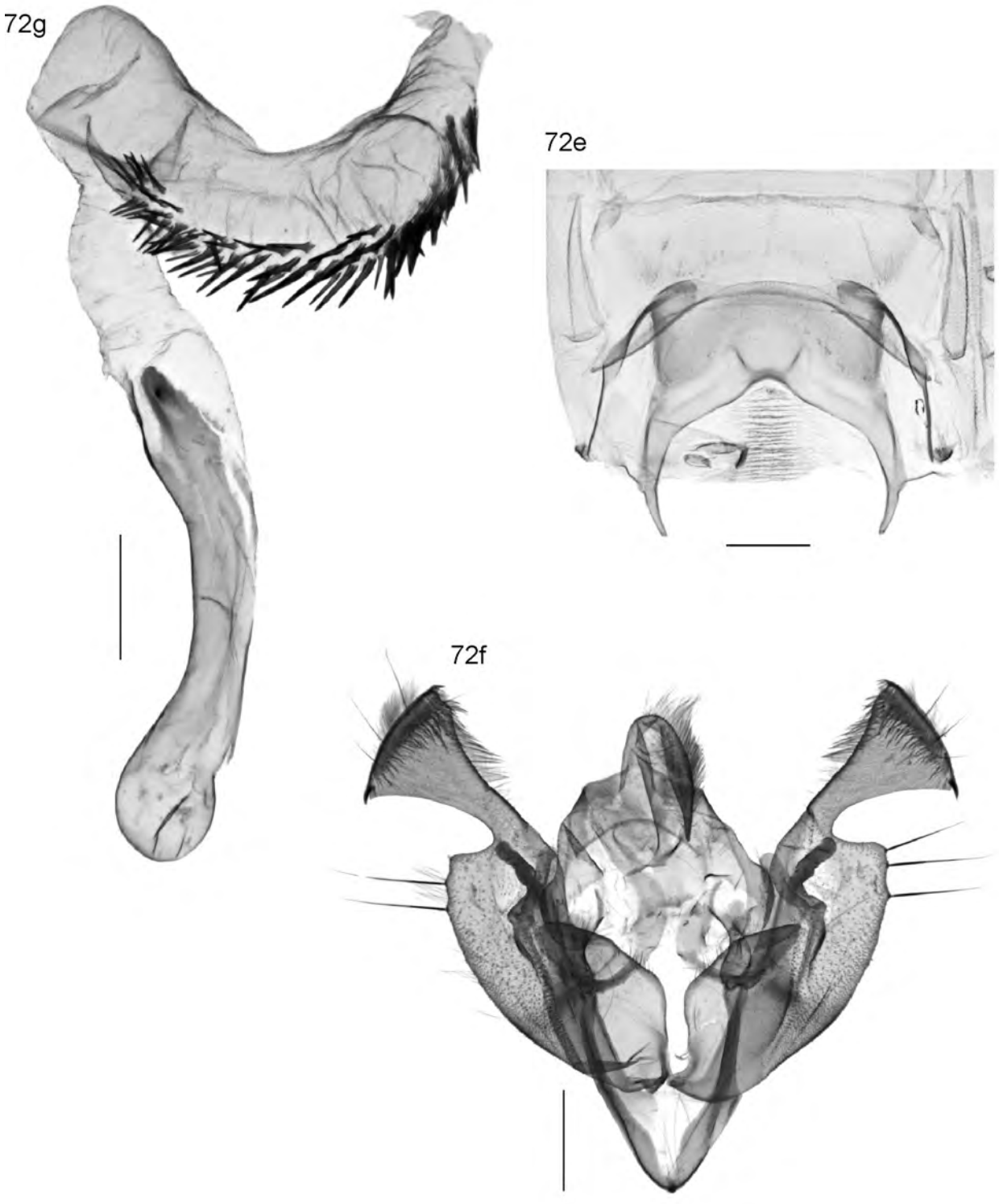


Fig. 72e, *Ichneutica virescens* male abdominal base; **72f,** genital capsule; **72g,** phallus. (Slide NZAC Noct. 147.)

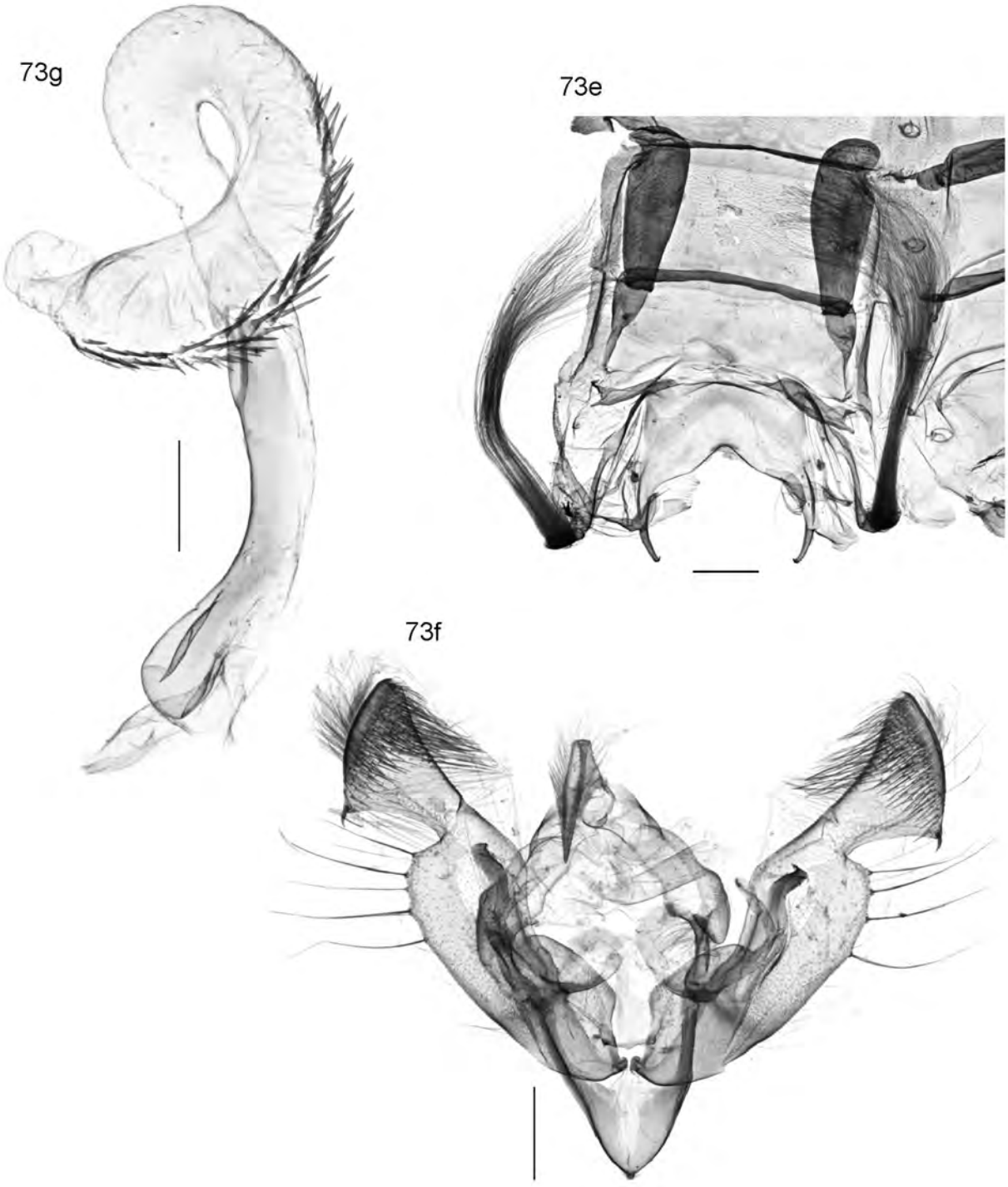


Fig. 73e, *Ichneutica alopa* male abdominal base; **73f,** genital capsule; **73g,** phallus. (Slide NZAC Noct. 519.)

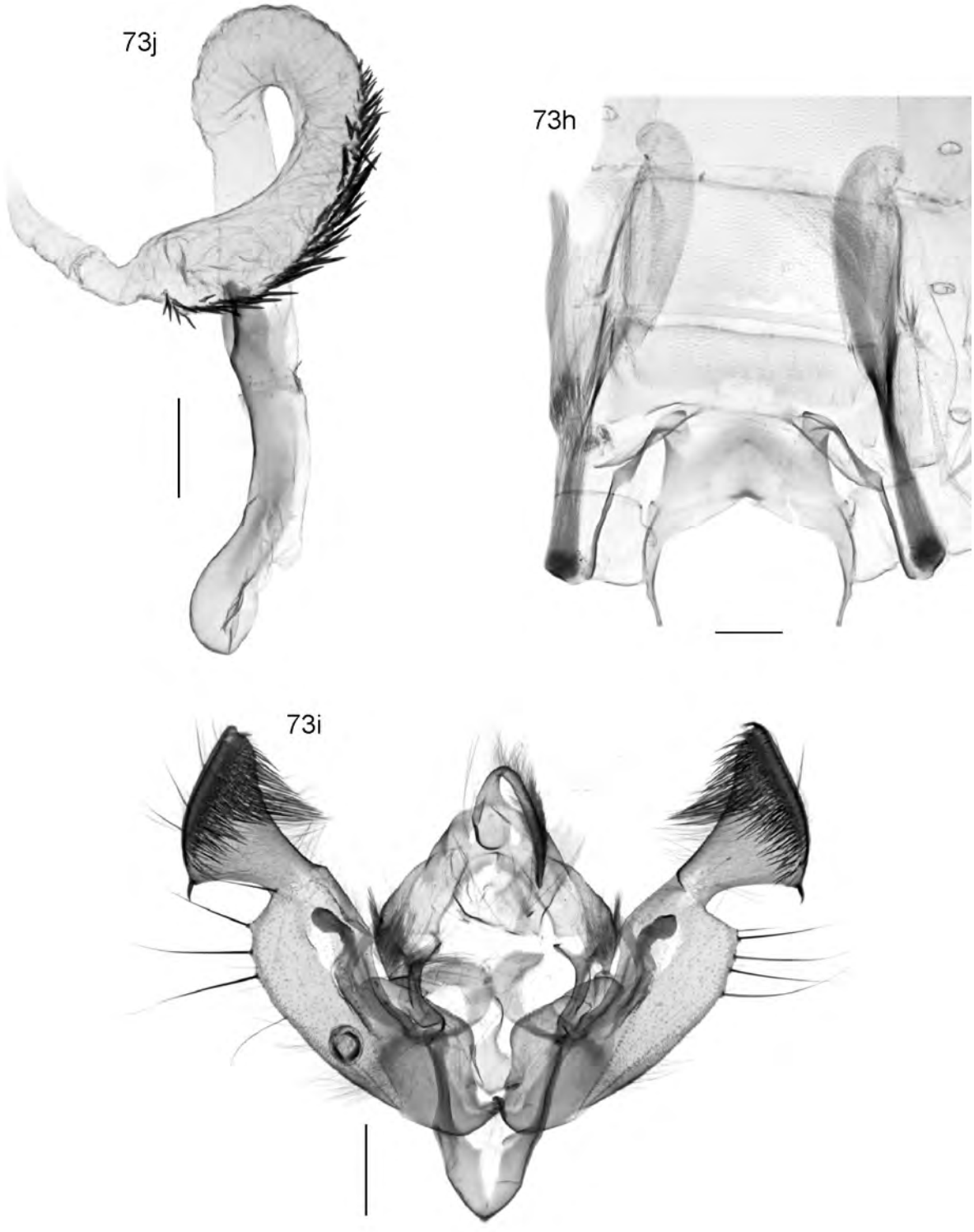


Fig. 73h, *Ichneutica alopa* male abdominal base; **73i,** genital capsule; **73j,** phallus. (Slide NZAC Noct. 227.)

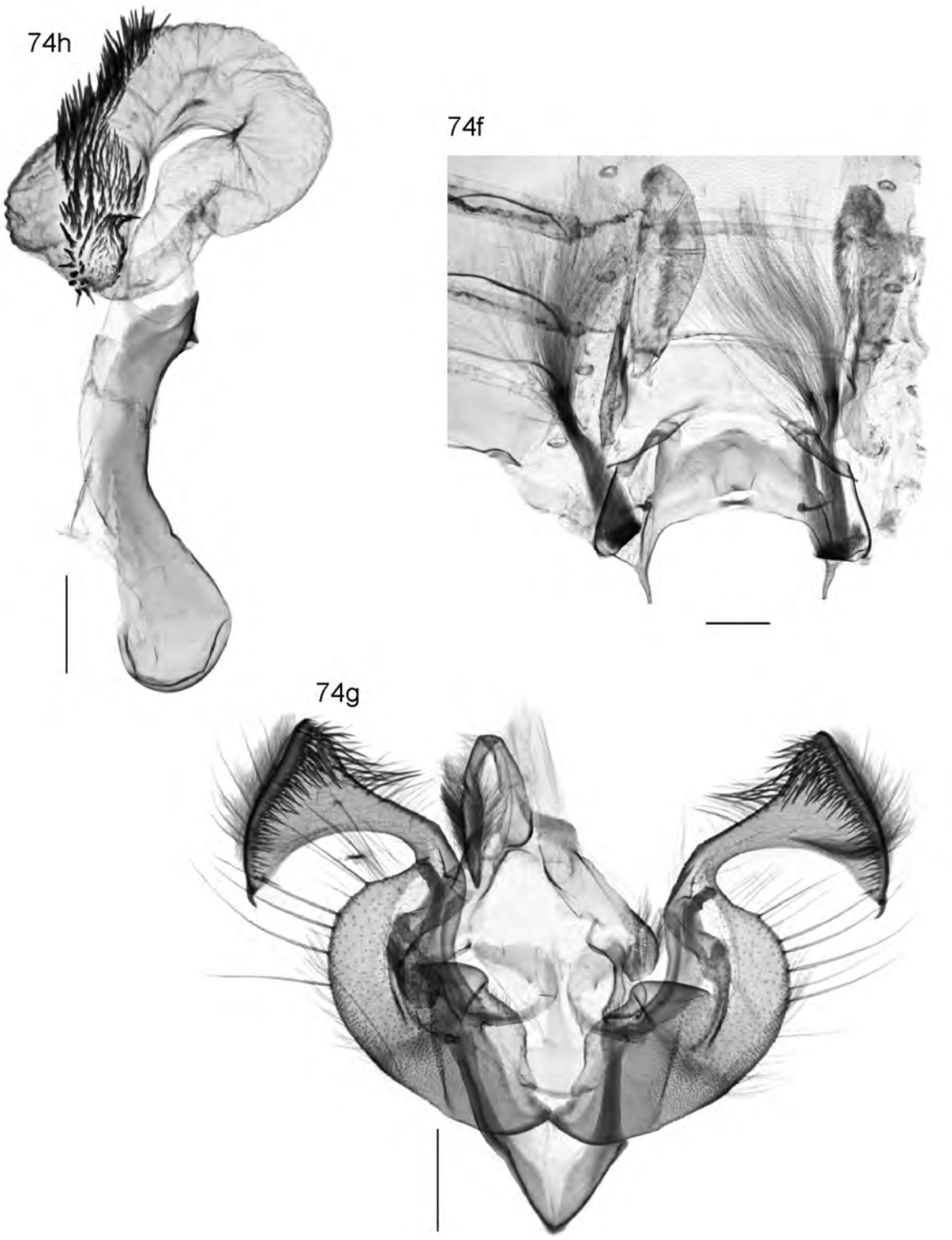


Fig. 74f, *Ichneutica atristriga* male abdominal base; **74g,** genital capsule; **74h,** phallus. (Slide NZAC Noct. 52.)

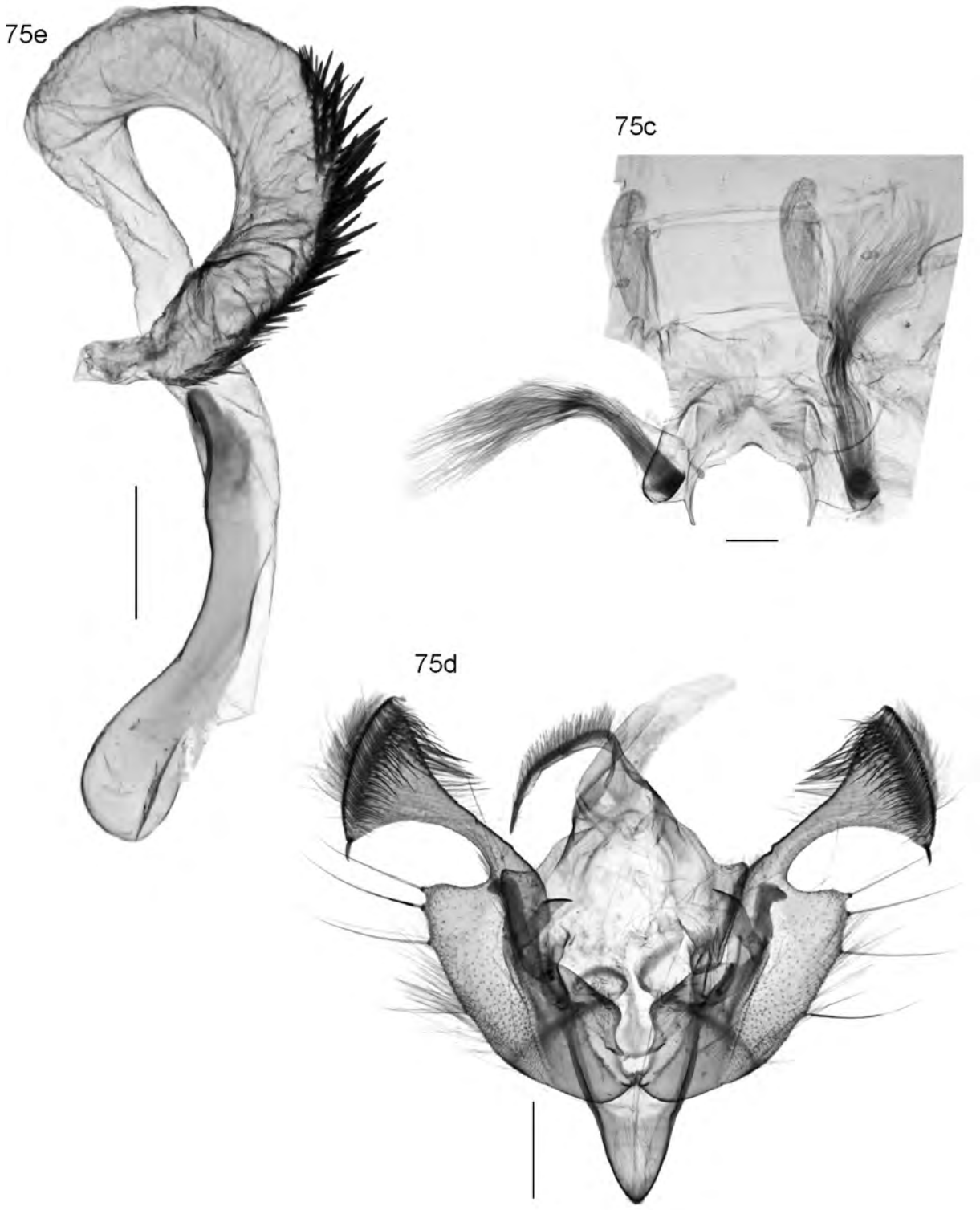


Fig. 75c, *Ichneutica blenheimensis* male abdominal base; **75d,** genital capsule; **75e,** phallus. (Slide NZAC Noct. 238.)

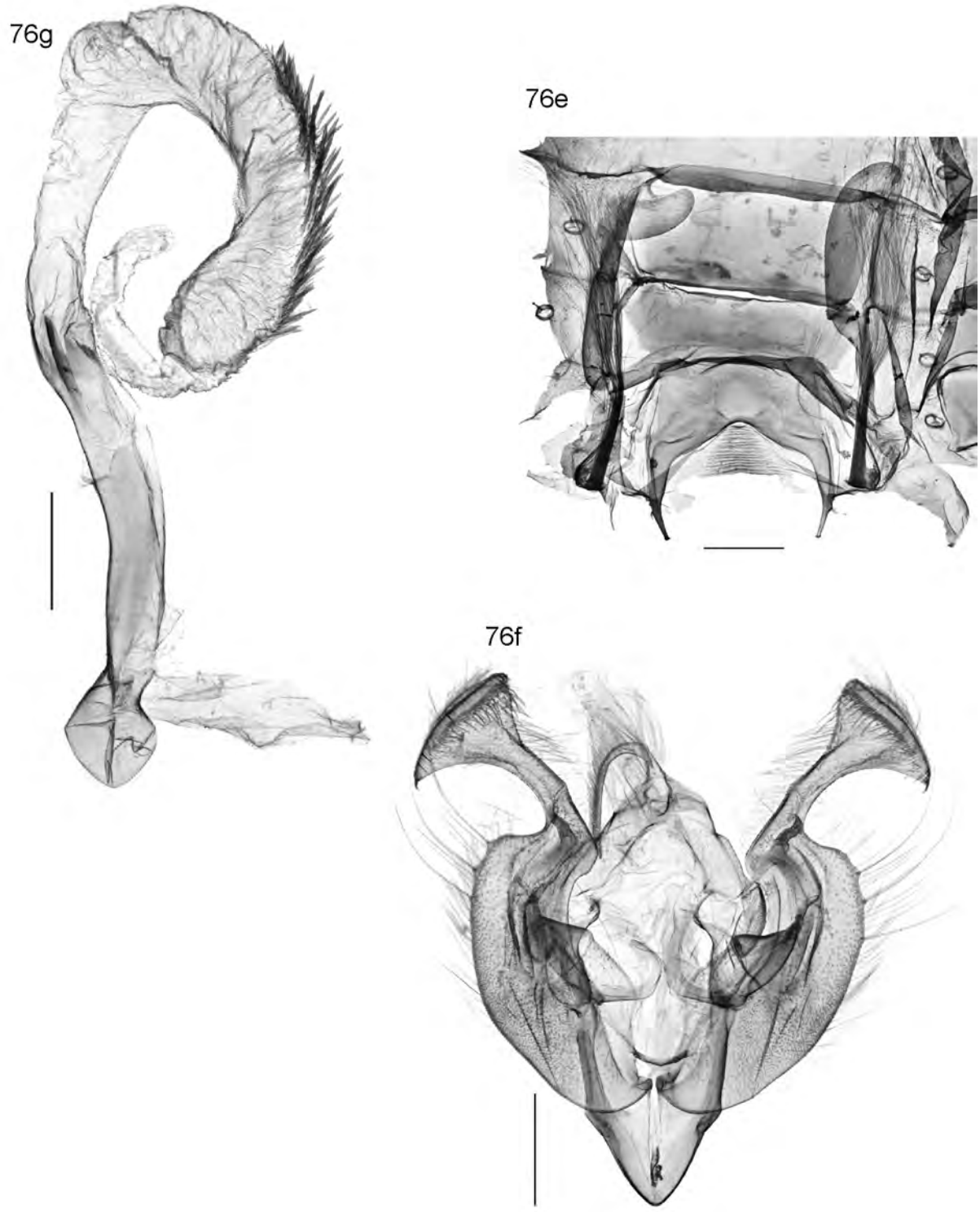


Fig. 76e, *Ichneutica infensa* male abdominal base; **76f,** genital capsule; **76g,** phallus. (Slide NZAC Noct. 471.)

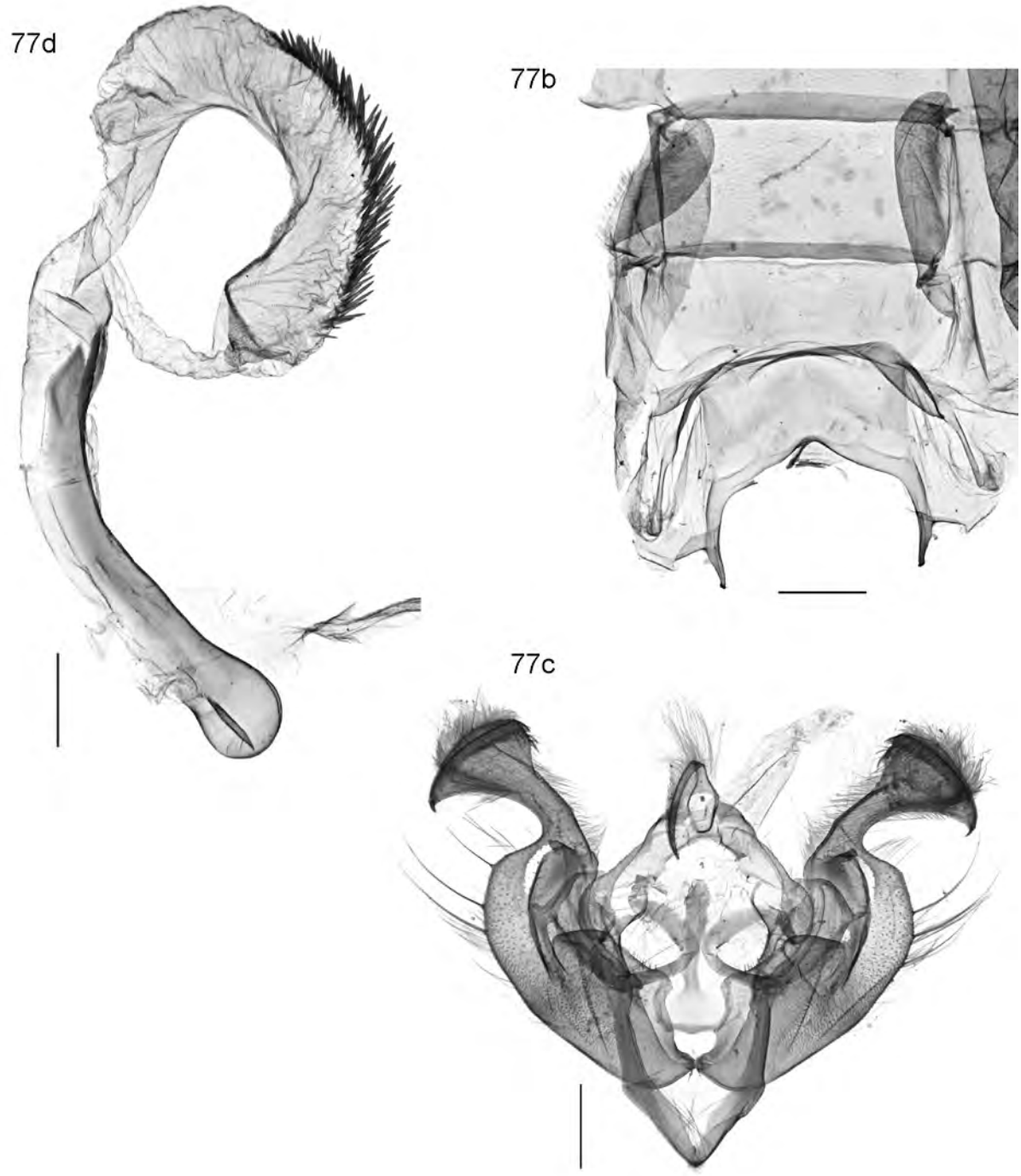


Fig. 77b, *Ichneutica inscripta* holotype male abdominal base; **77c,** genital capsule; **77d,** phallus. (Slide NZAC Noct. 468.)

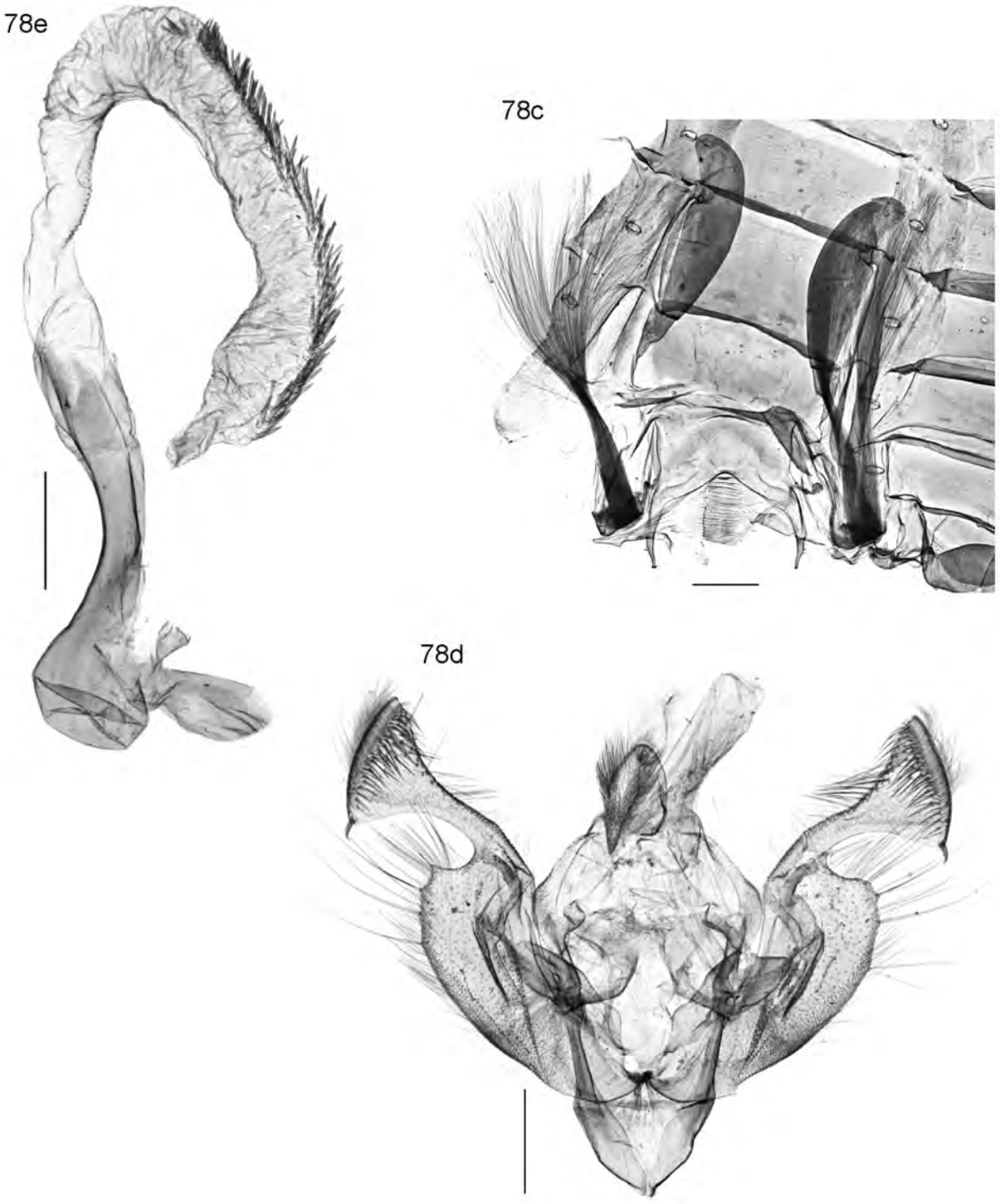


Fig. 78c, *Ichneutica lignana* male abdominal base; **78d,** genital capsule; **78e,** phallus. (Slide NZAC Noct. 469.)

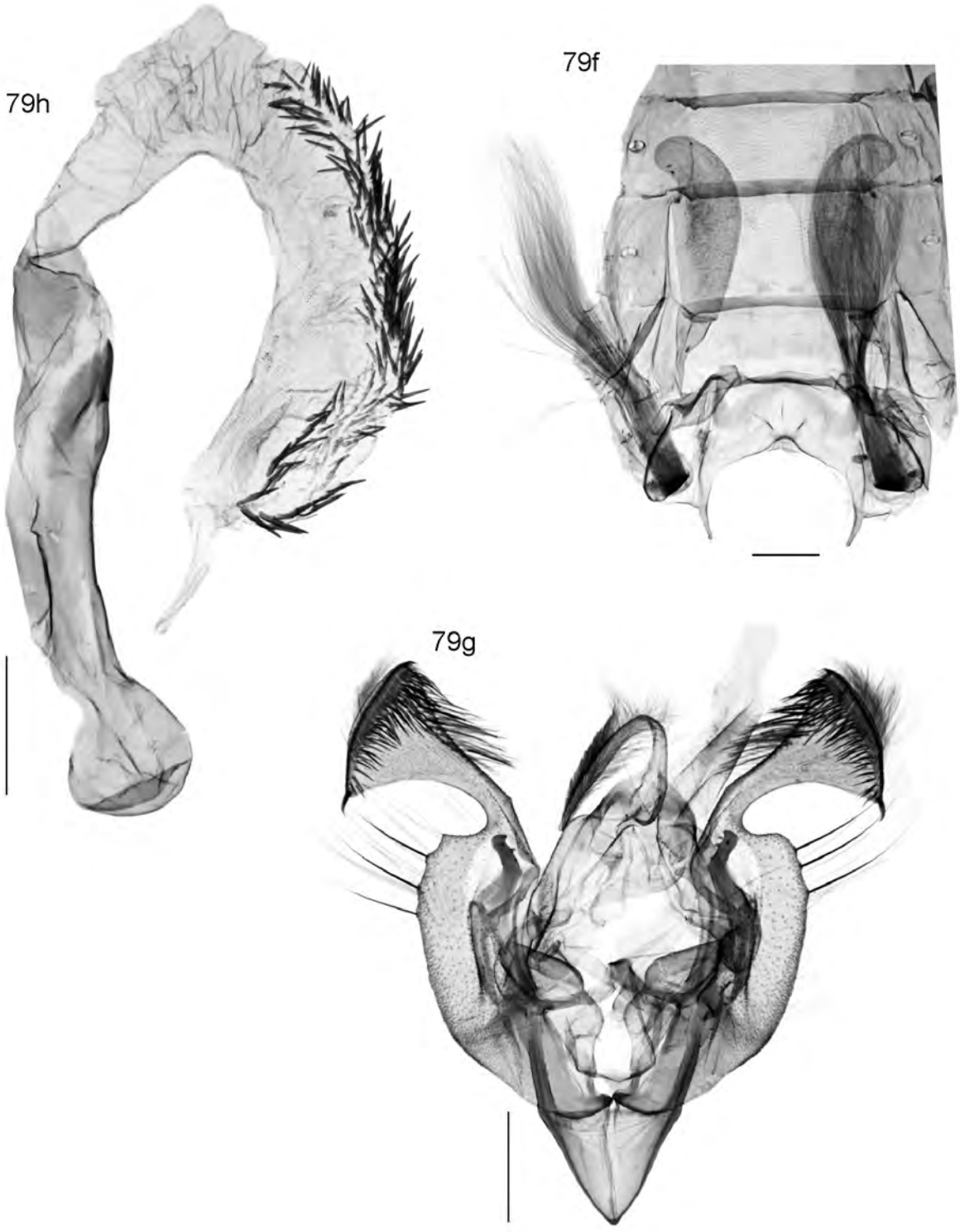


Fig. 79f, *Ichneutica morosa* male abdominal base; **79g,** genital capsule; **79h,** phallus. (Slide NZAC Noct. 300.)

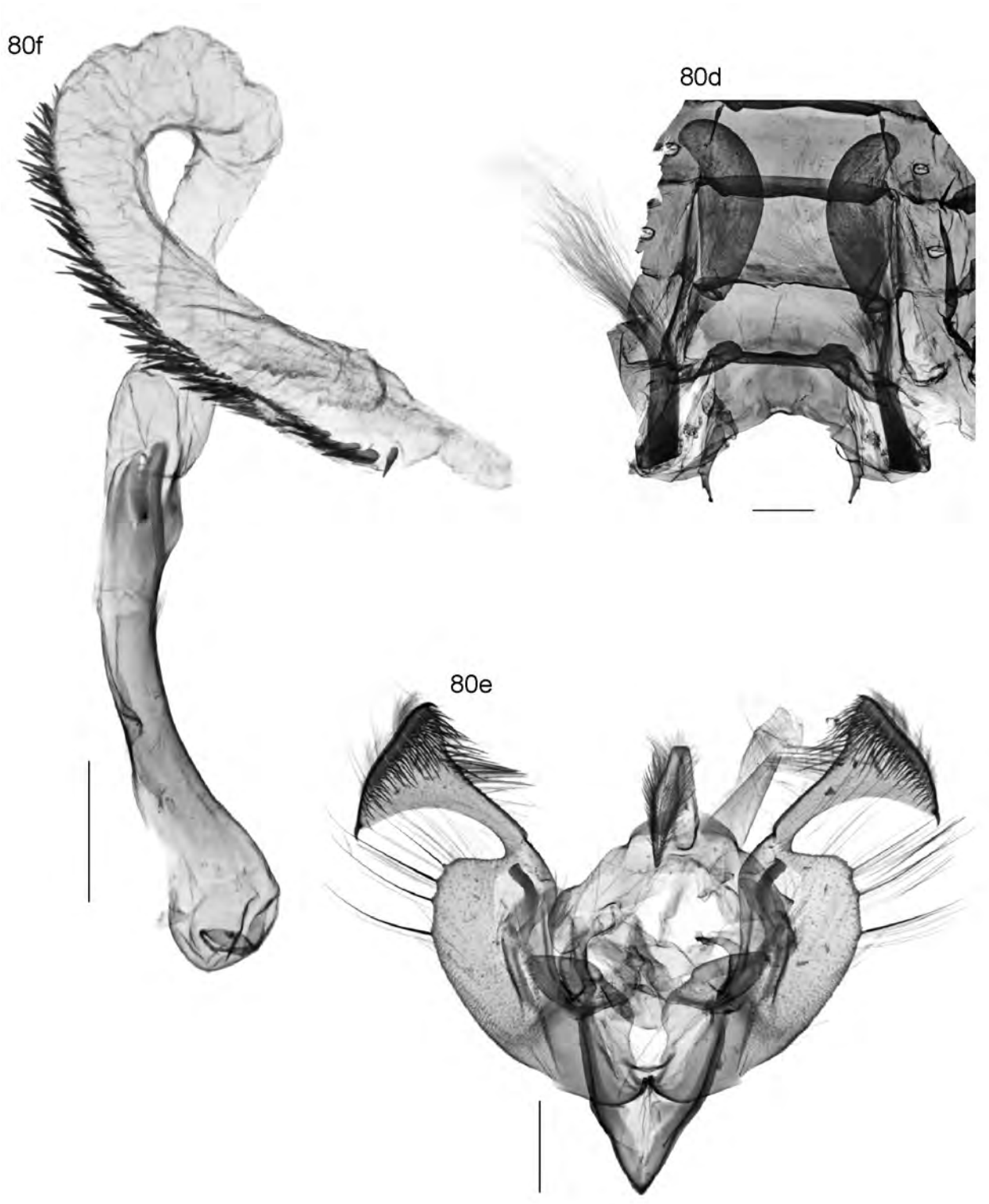


Fig. 80d, *Ichneutica mustulenta* holotype male abdominal base; **80e,** genital capsule; **80f,** phallus. (Slide NZAC Noct. 299.)

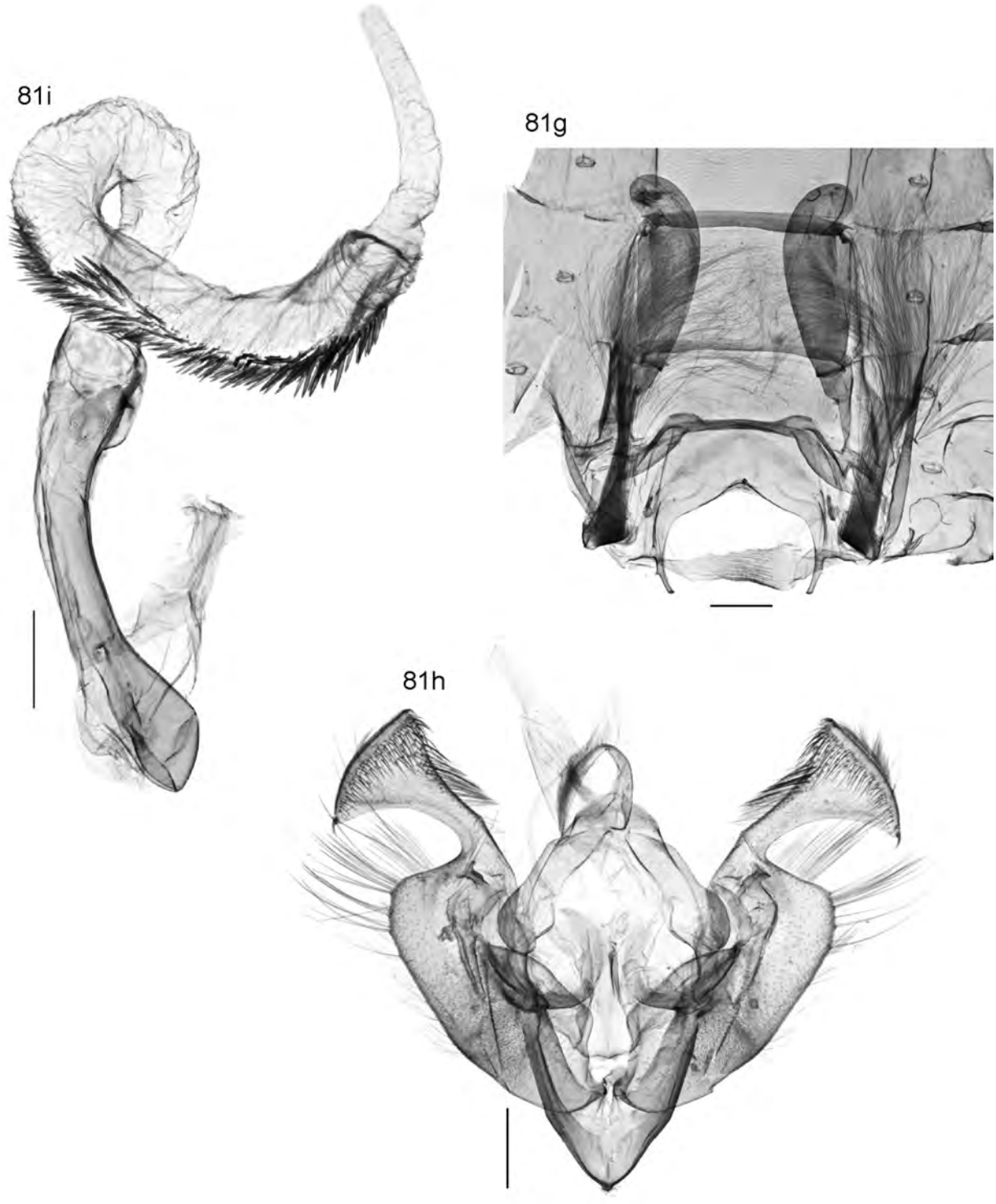


Fig. 81g, *Ichneutica omoplaca* male abdominal base; **81h,** genital capsule; **81i,** phallus. (Slide NZAC Noct. 472.)

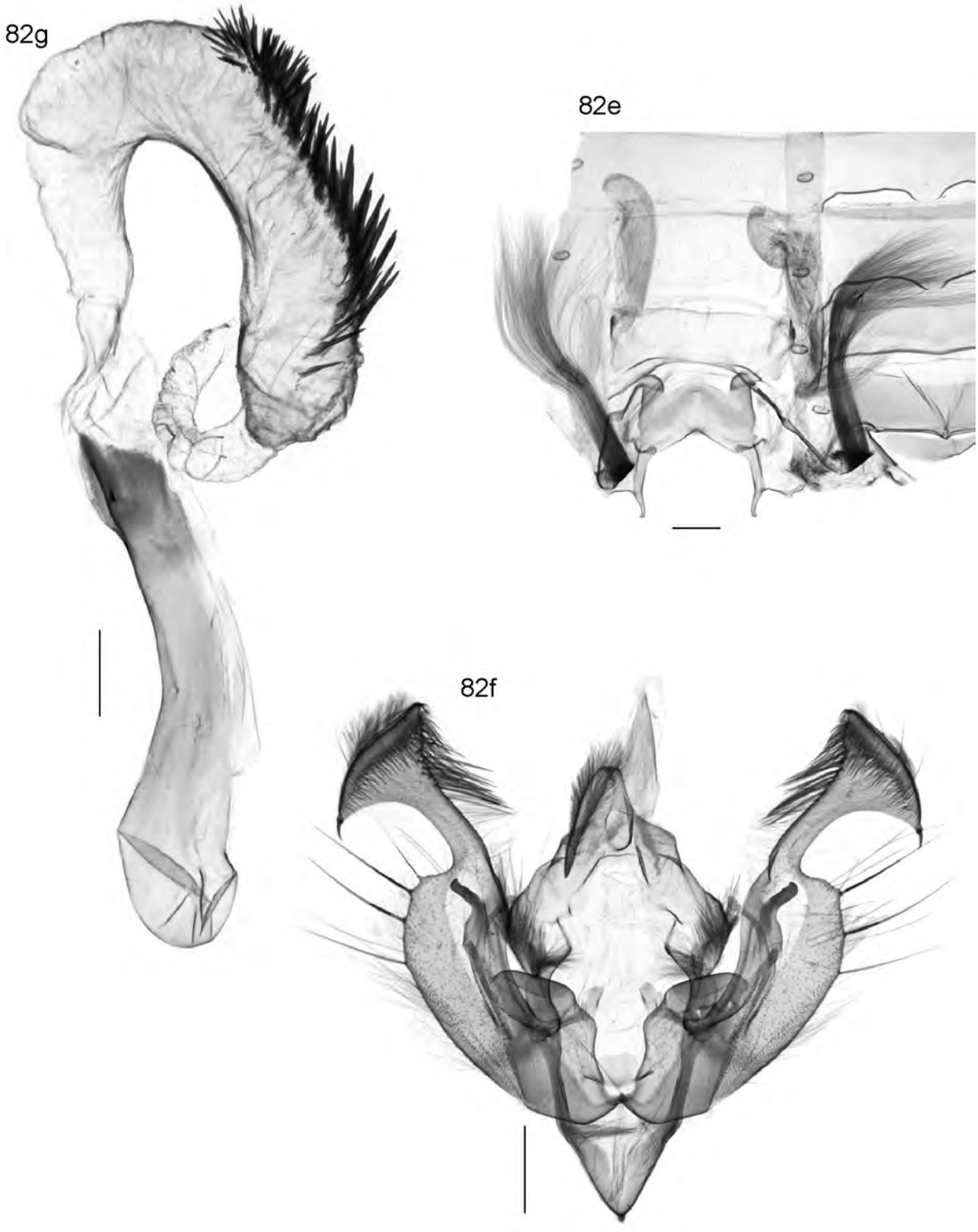


Fig. 82e, *Ichneutica steropastis* male abdominal base; **82f,** genital capsule; **82g,** phallus. (Slide NZAC Noct. 242.)

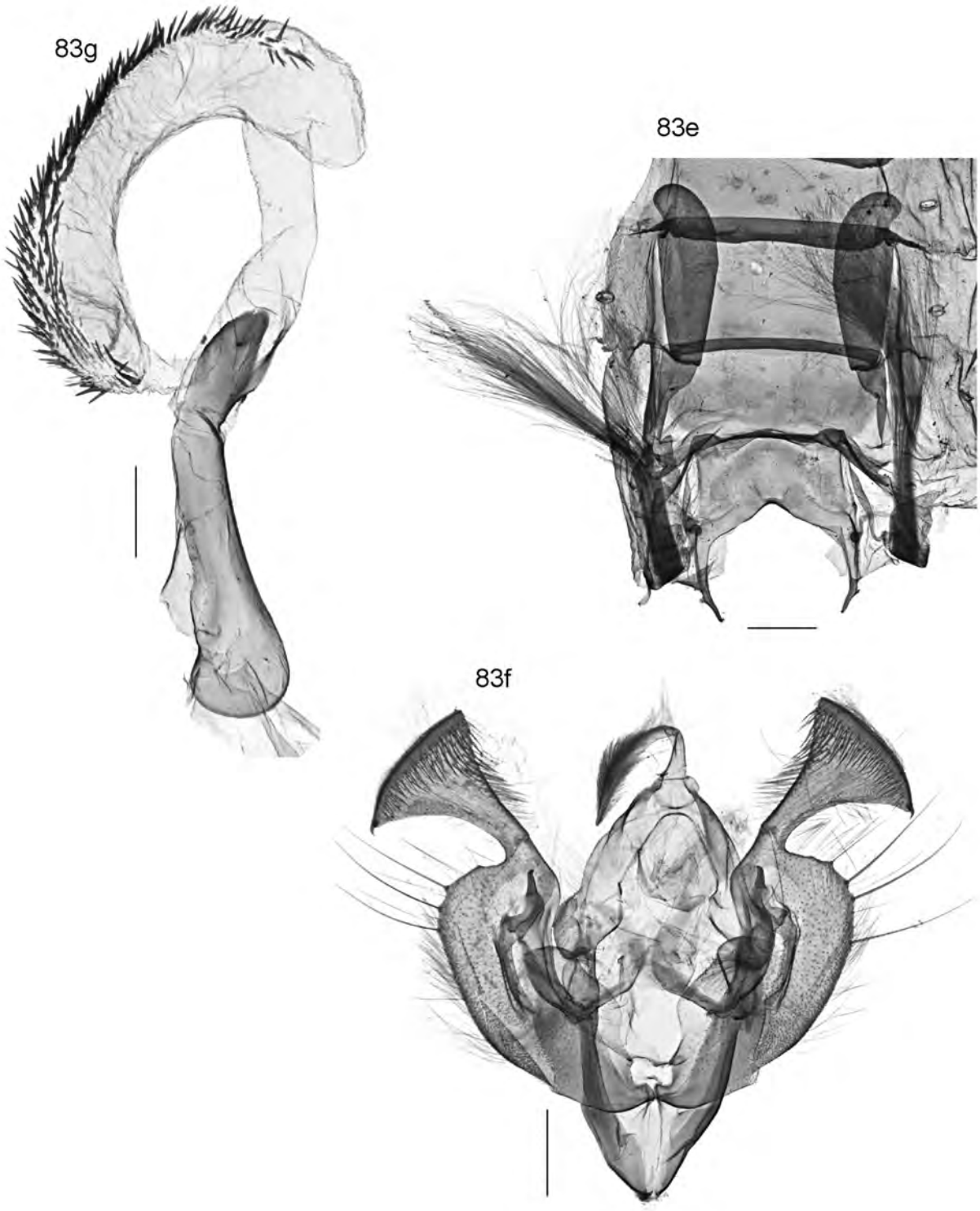


Fig. 83e, *Ichneutica sulcana* male abdominal base; **83f,** genital capsule; **83g,** phallus. (Slide NZAC Noct. 531.)

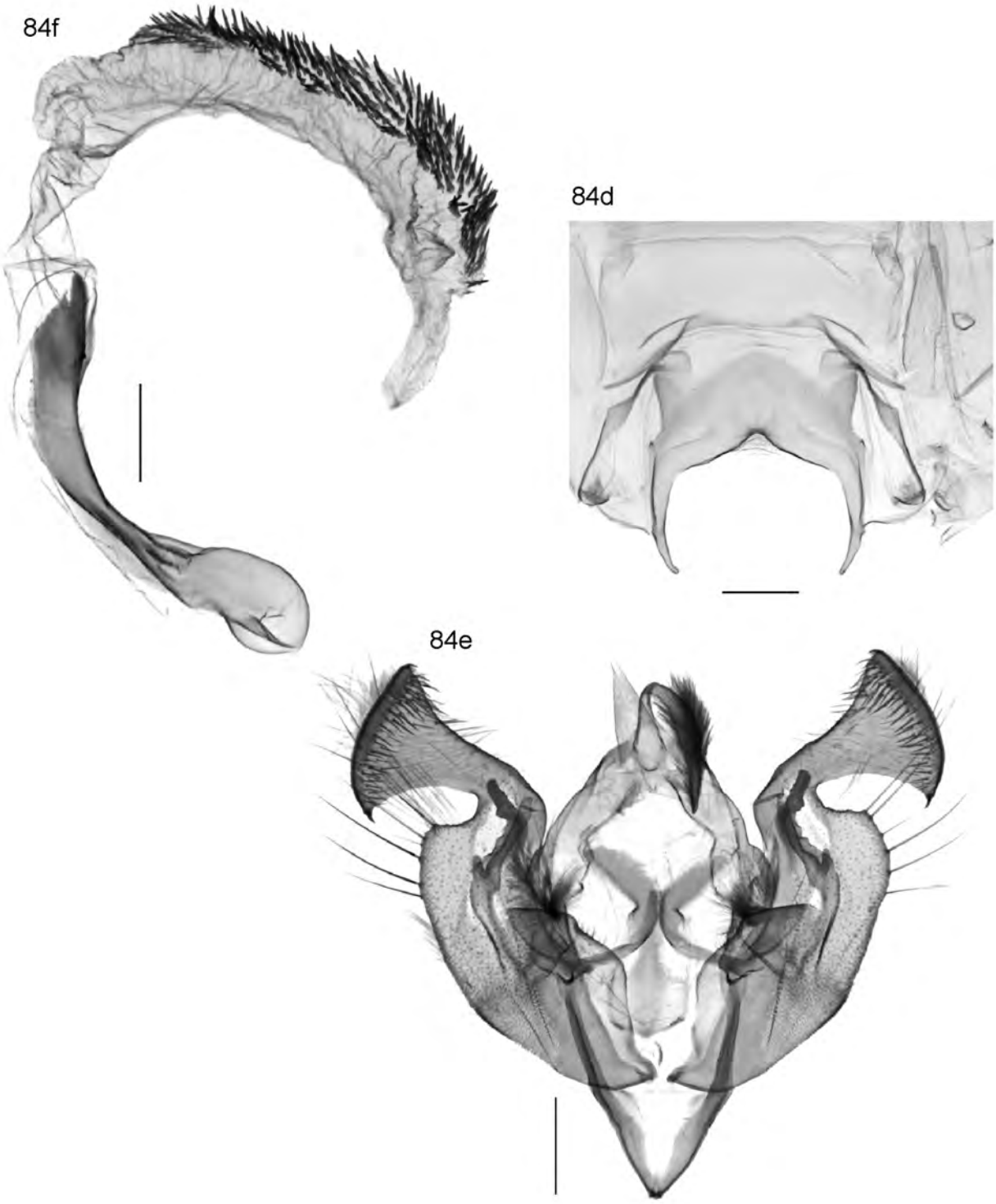


Fig. 84d, *Ichneutica supersulcana* holotype male abdominal base; **84e,** genital capsule; **84f,** phallus. (Slide NZAC Noct. 243.)

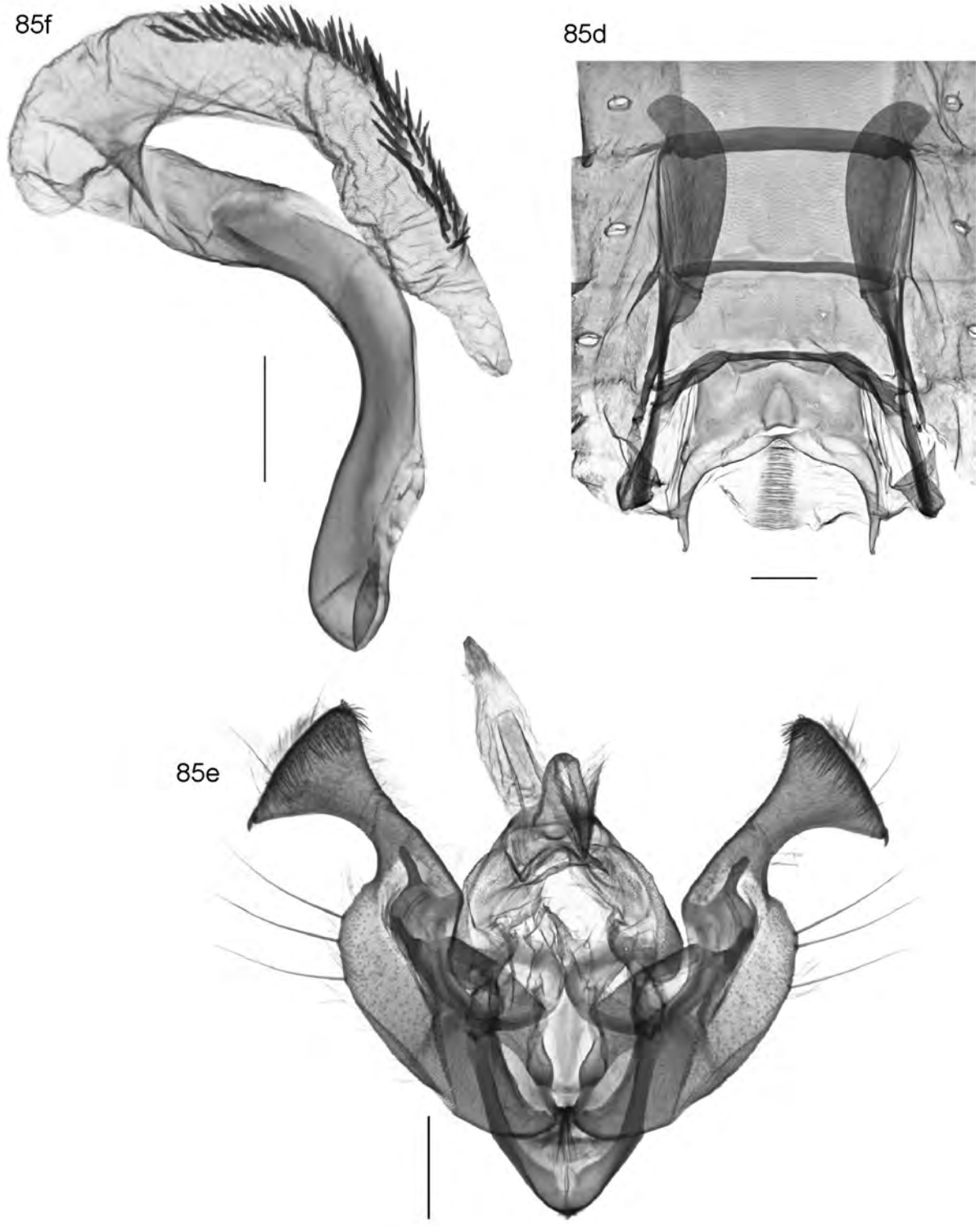


Fig. 85d, *Ichneutica rufistriga* holotype male abdominal base; **85e,** genital capsule; **85f,** phallus. (Slide OMNZ IV42482.)

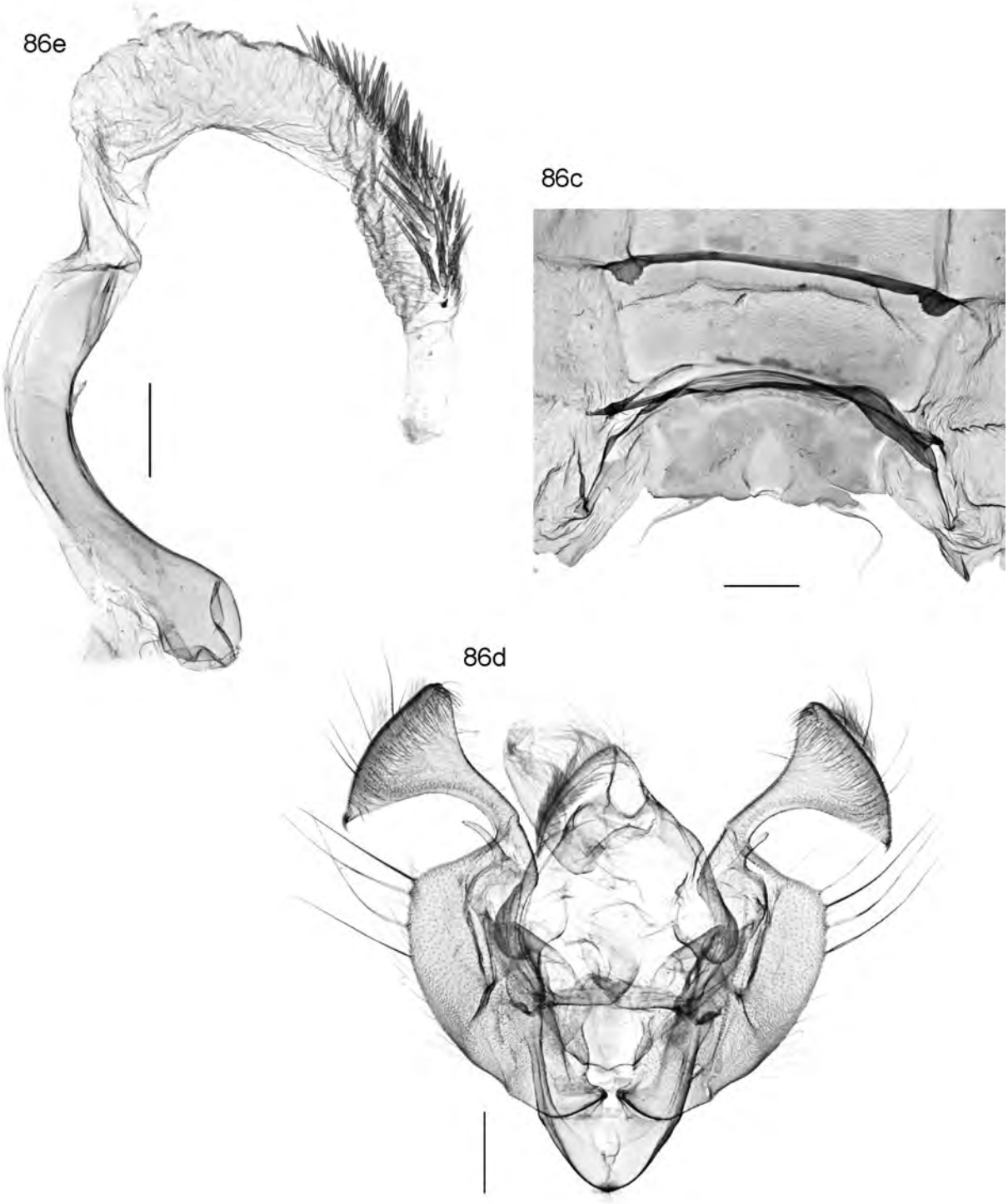


Fig. 86c, *Ichneutica thalassarche* holotype male abdominal base (apodemes broken off); **86d,** genital capsule; **86e,** phallus. (LUNZ.)

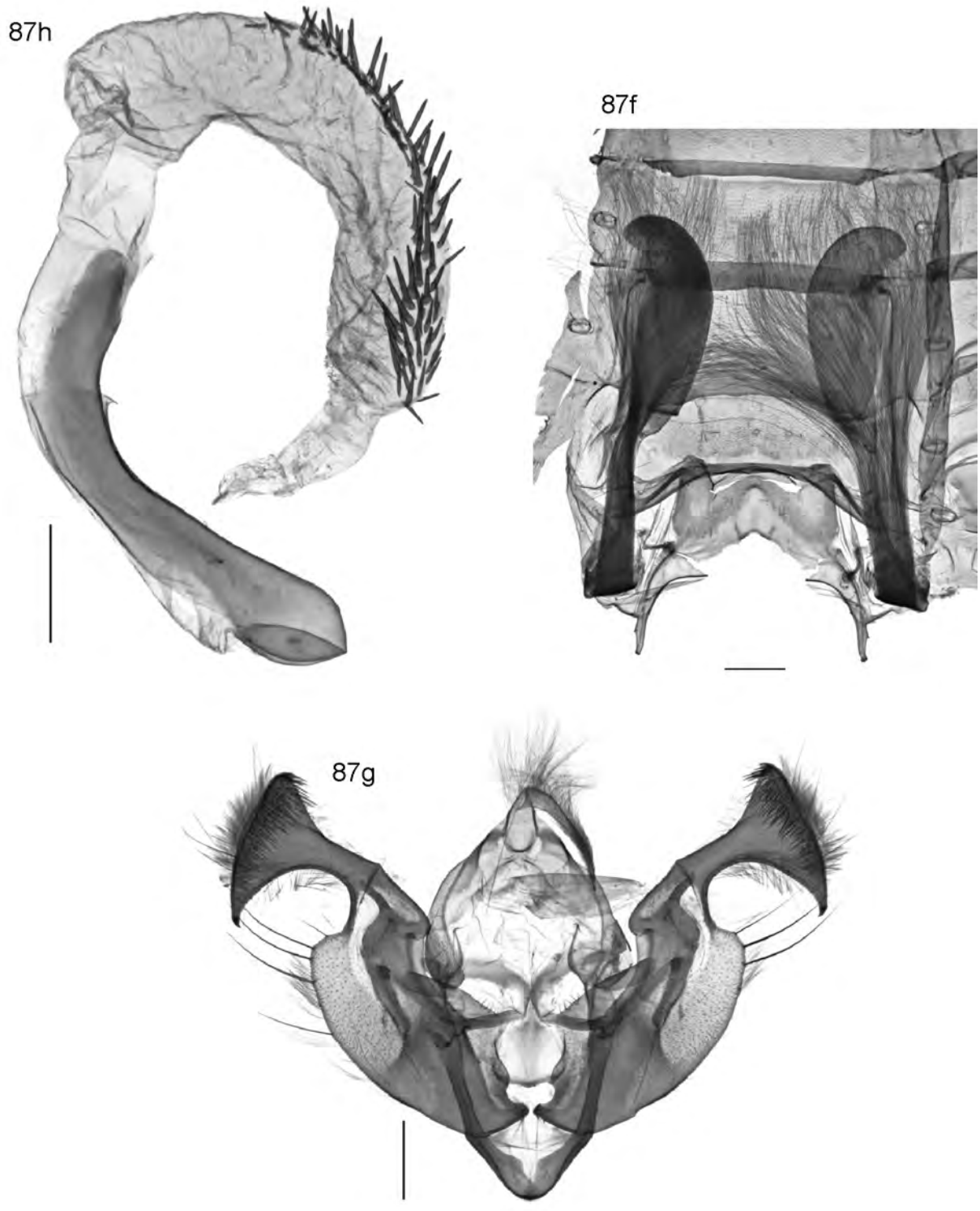


Fig. 87f, *Ichneutica ustistriga* male abdominal base; **87g,** genital capsule; **87h,** phallus. (Slide NZAC Noct. 419.)

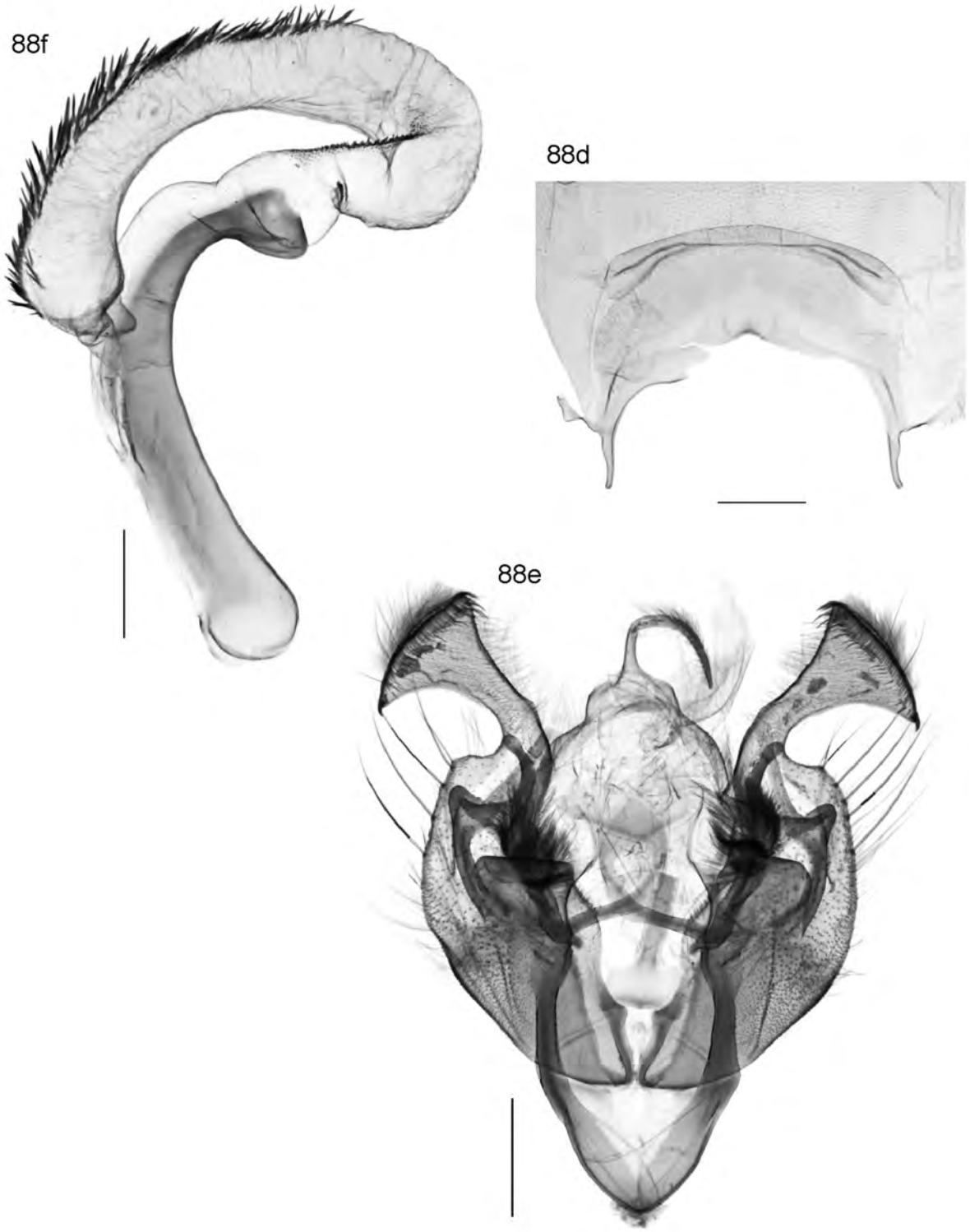


Fig. 88d, *Ichneutica mollis* male abdominal base; **88e,** genital capsule; **88f,** phallus. (Slide NZAC Noct. 164.)

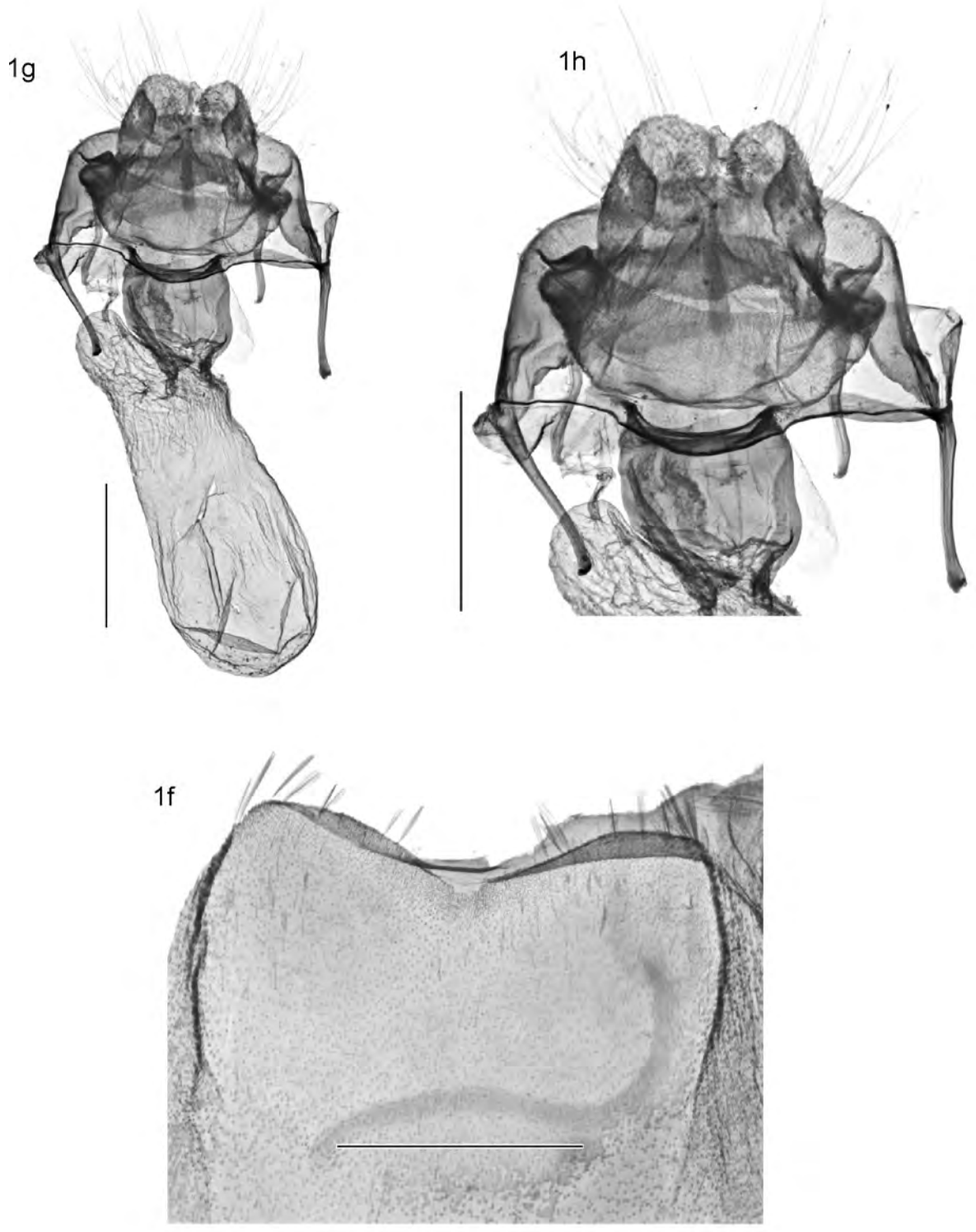


Fig. 1f, *Nivetica nervosa* female S7; **1g,** female genitalia; **1h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 466.)

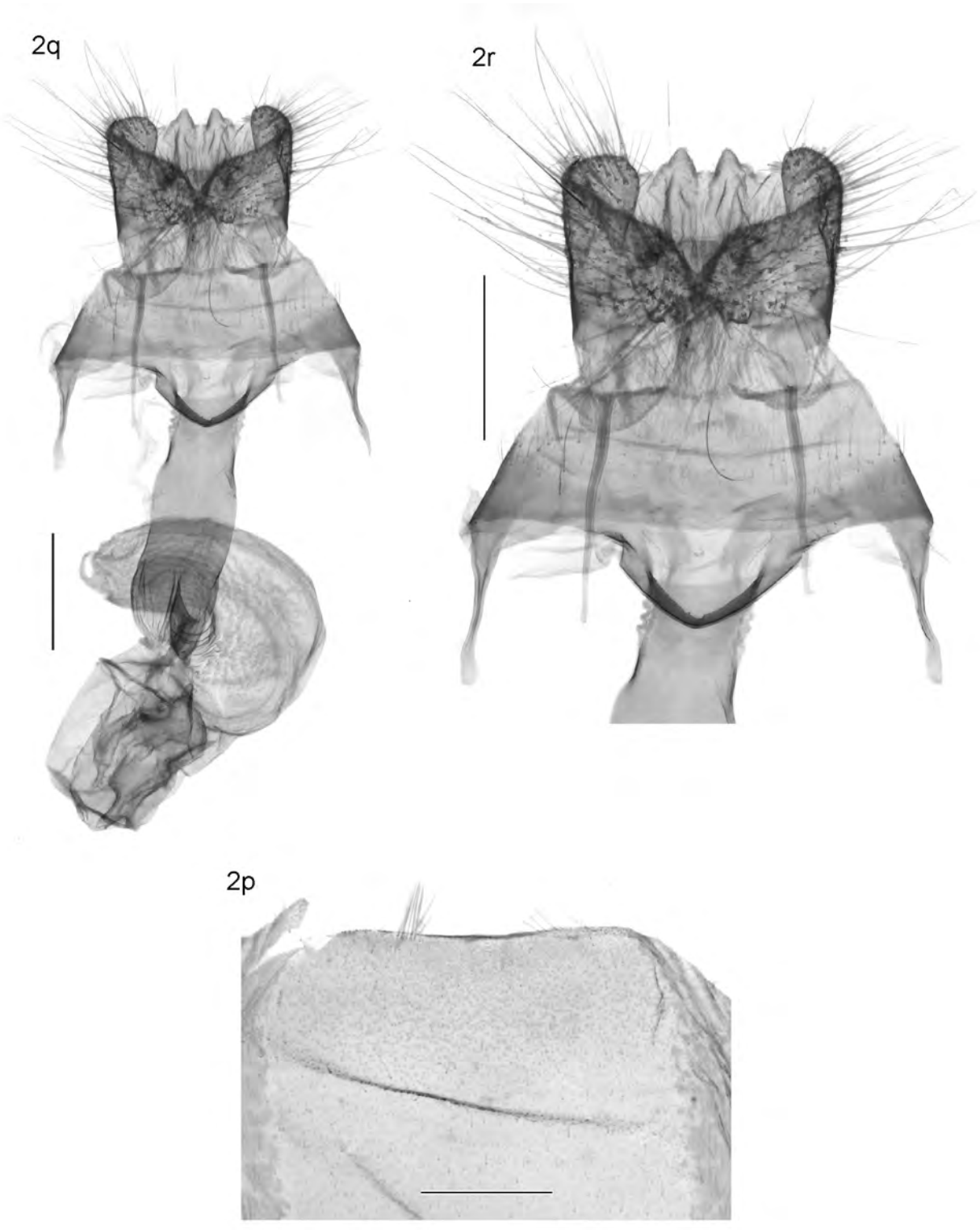


Fig. 2p, *Ichneutica ceraunias* female S7; **2q,** female genitalia; **2r,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 310.)

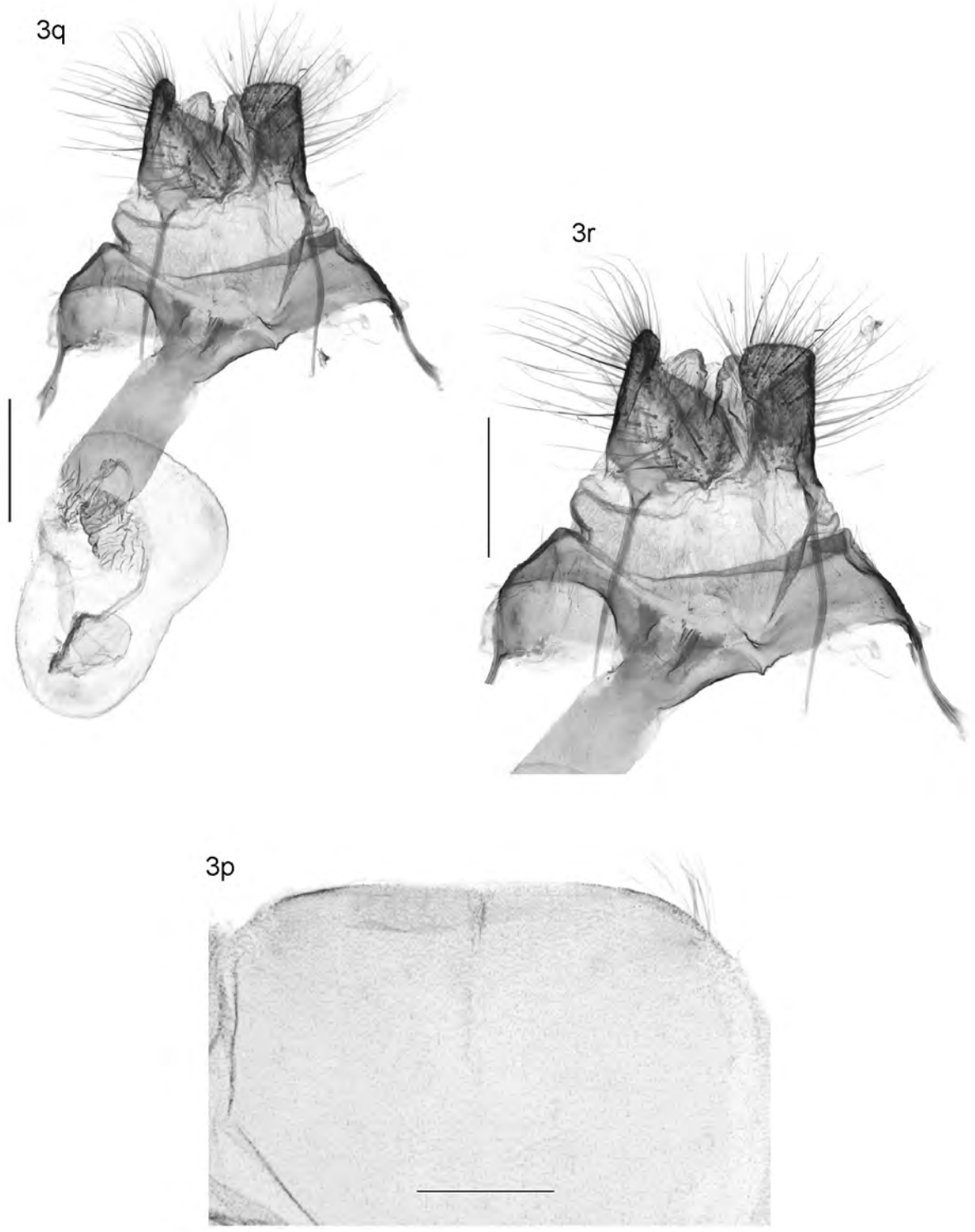


Fig. 3p, *Ichneutica dione* female S7; **3q,** female genitalia; **3r,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 187.)

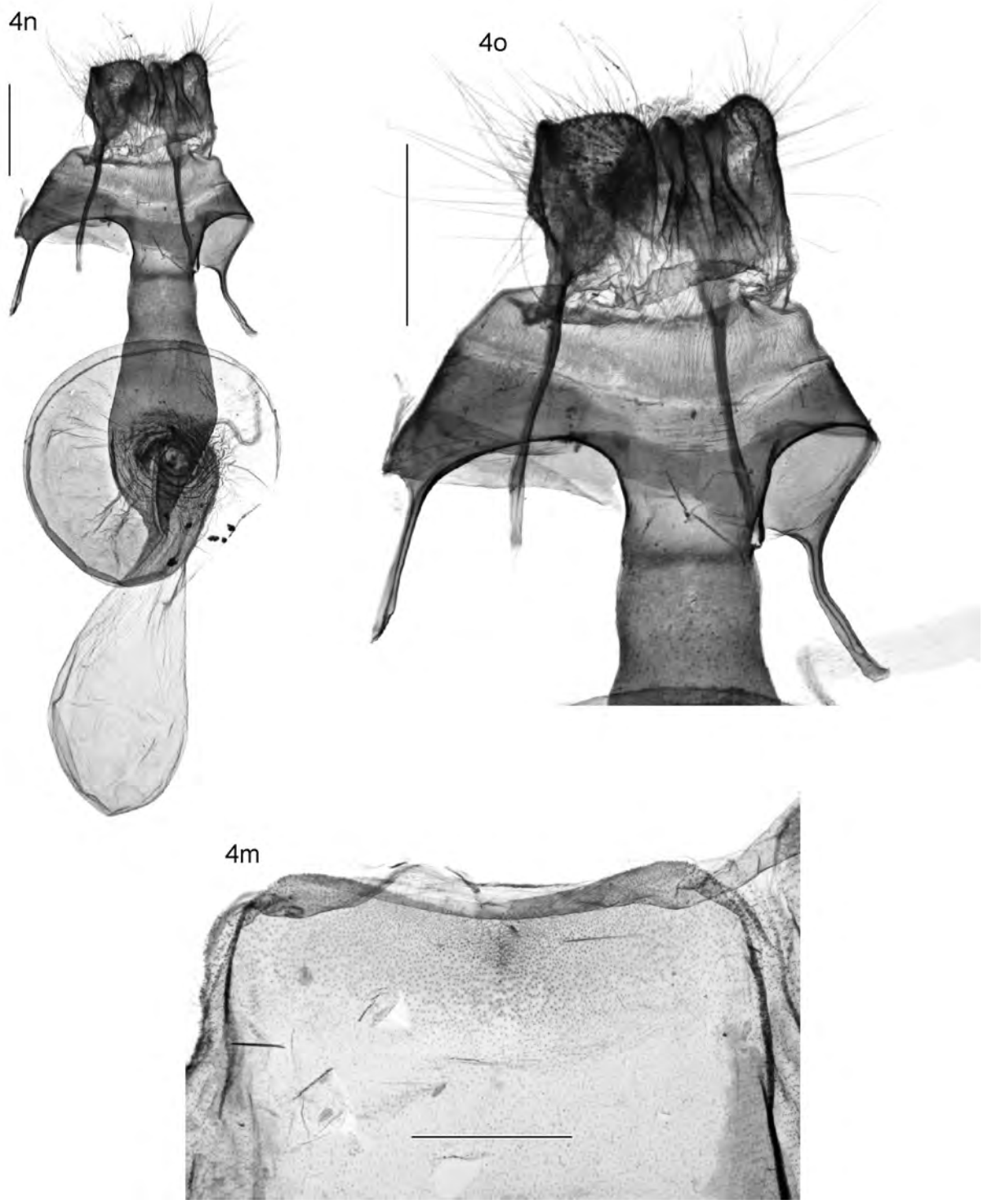


Fig. 4m, *Ichneutica cana* female S7; **4n,** female genitalia; **4o,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 536.)

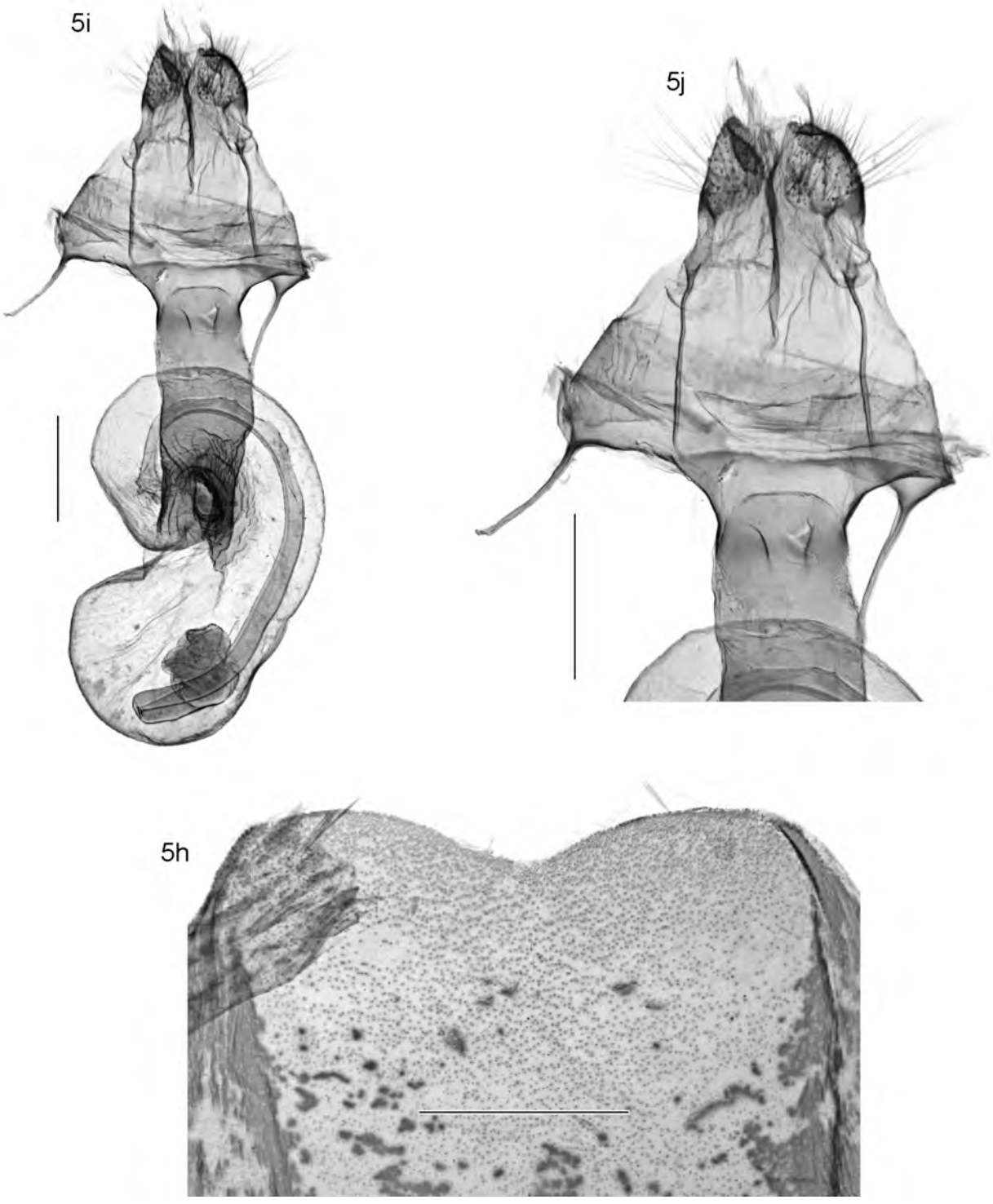


Fig. 5h, *Ichneutica eris* female S7; **5i,** female genitalia; **5j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 311.) [6 *Ichneutica schistella*: female unknown.]

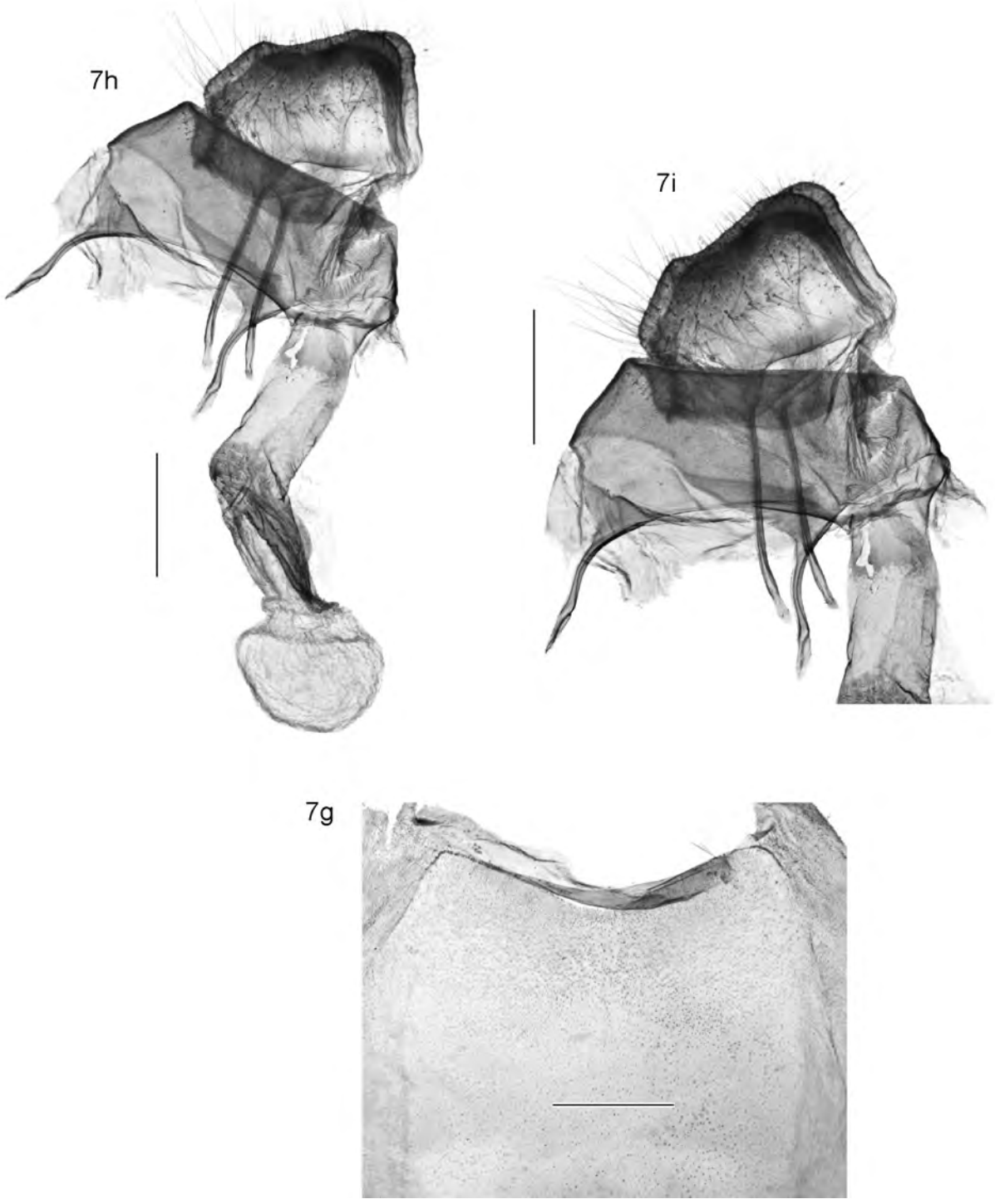


Fig. 7g, *Ichneutica notata* female S7; **7h,** female genitalia; **7i,** close-up of ovipositor, segment 8 and ostium. (FRNZ.)

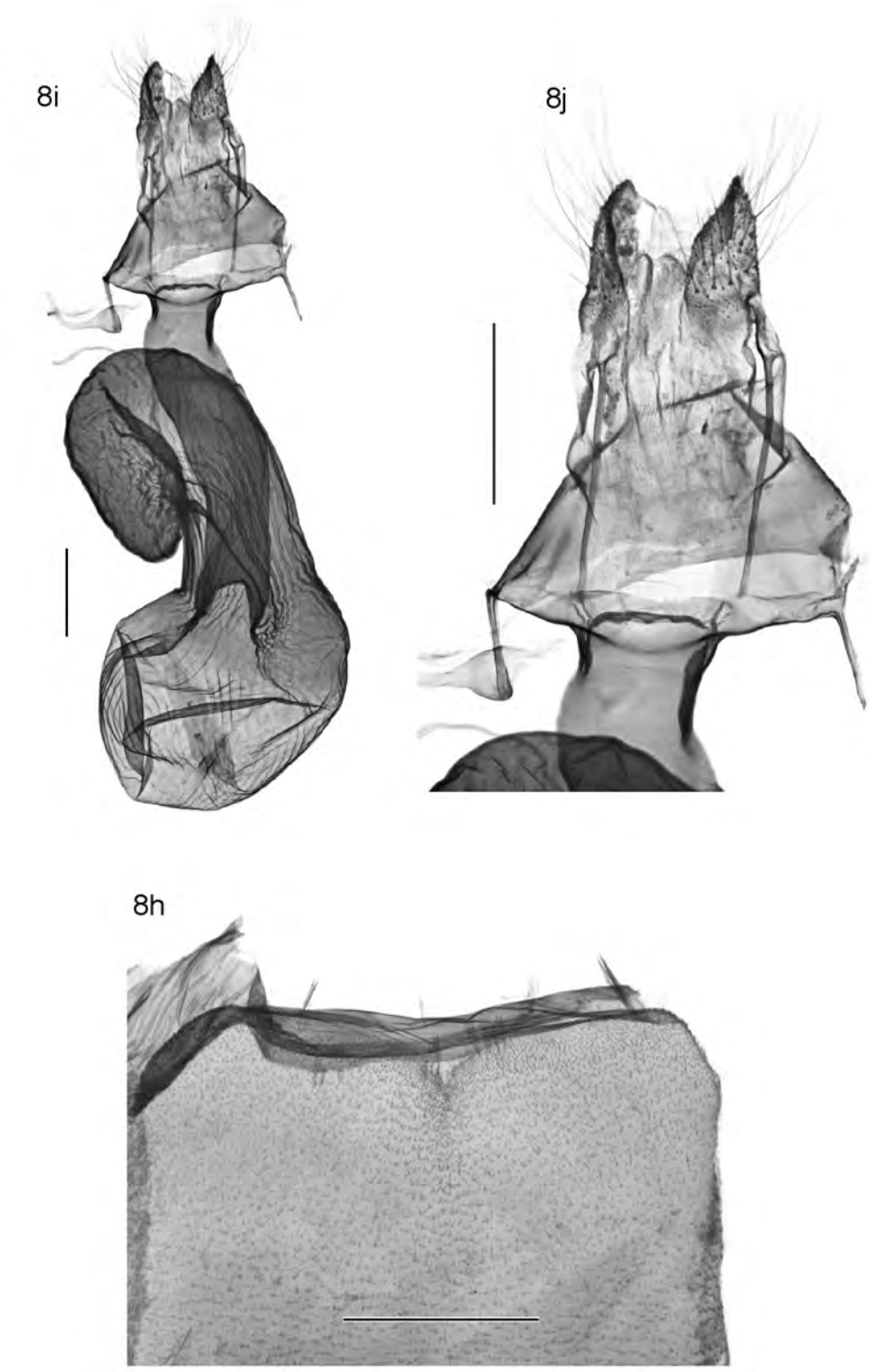


Fig. 8h, *Ichneutica agorastis* female S7; **8i,** female genitalia; **8j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 508.)

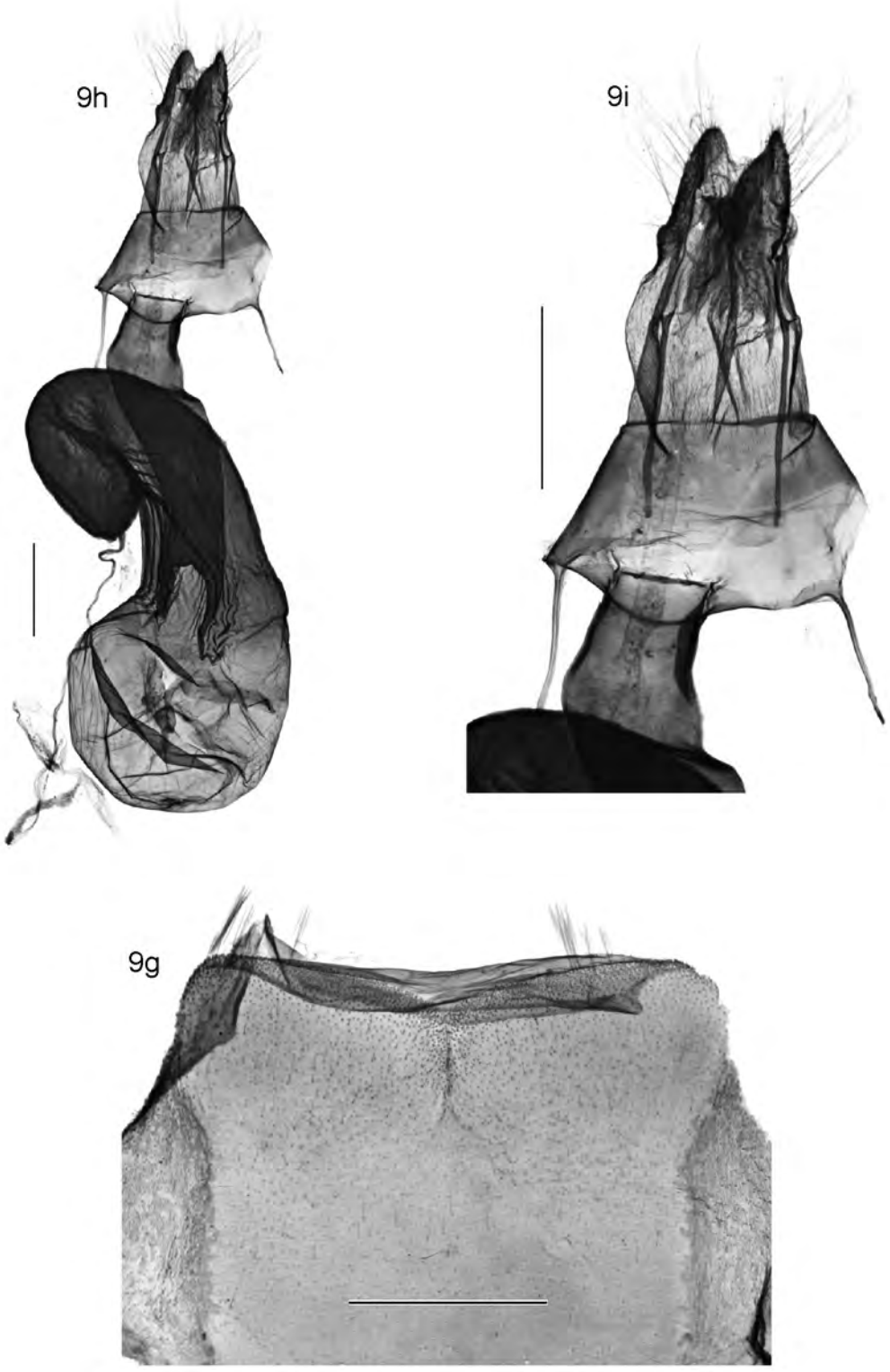


Fig. 9g, *Ichneutica hartii* female S7; **9h,** female genitalia; **9i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 509.)

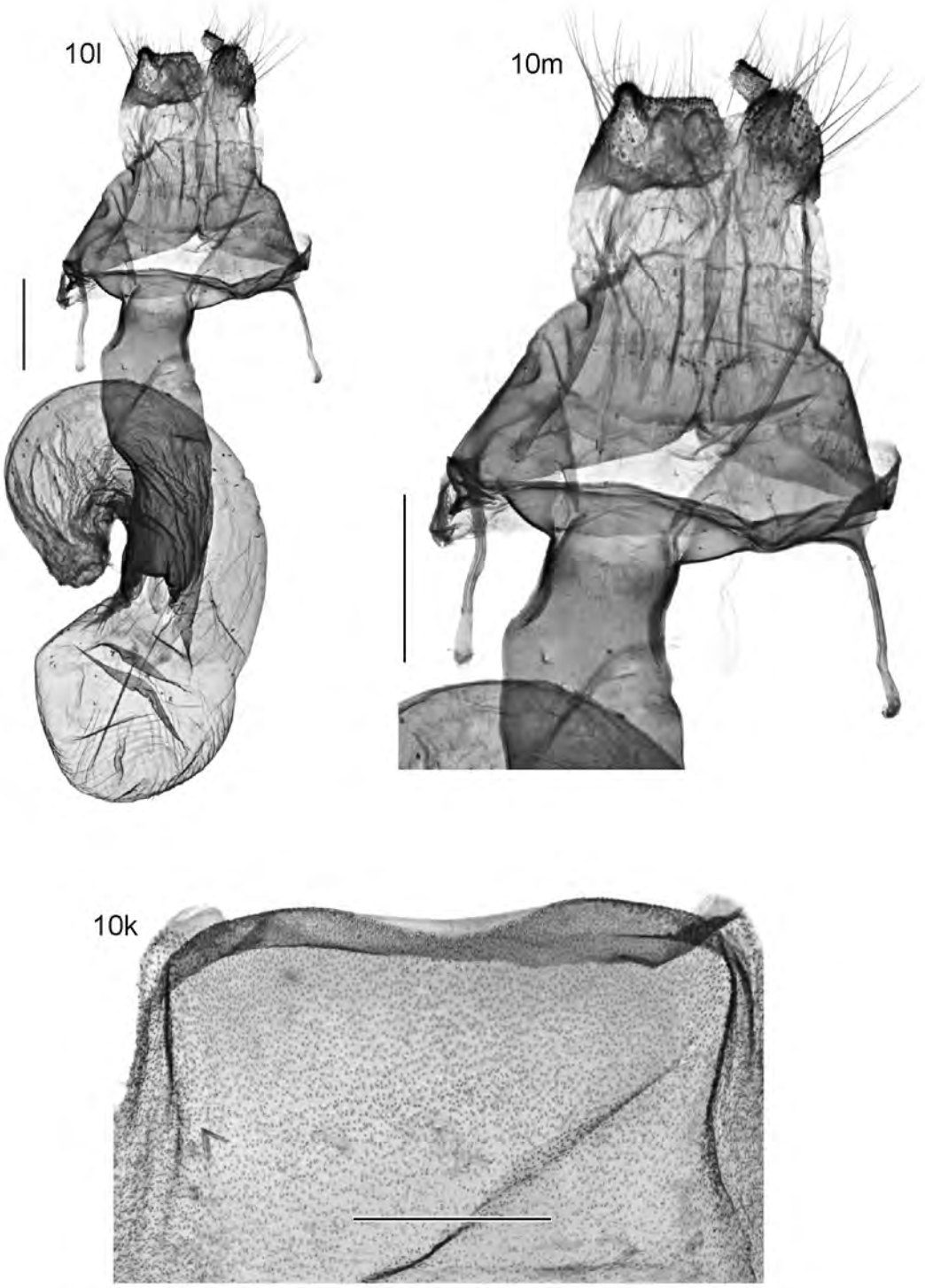


Fig. 10k, *Ichneutica chryserythra* female S7; **10l,** female genitalia; **10m,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 505.)

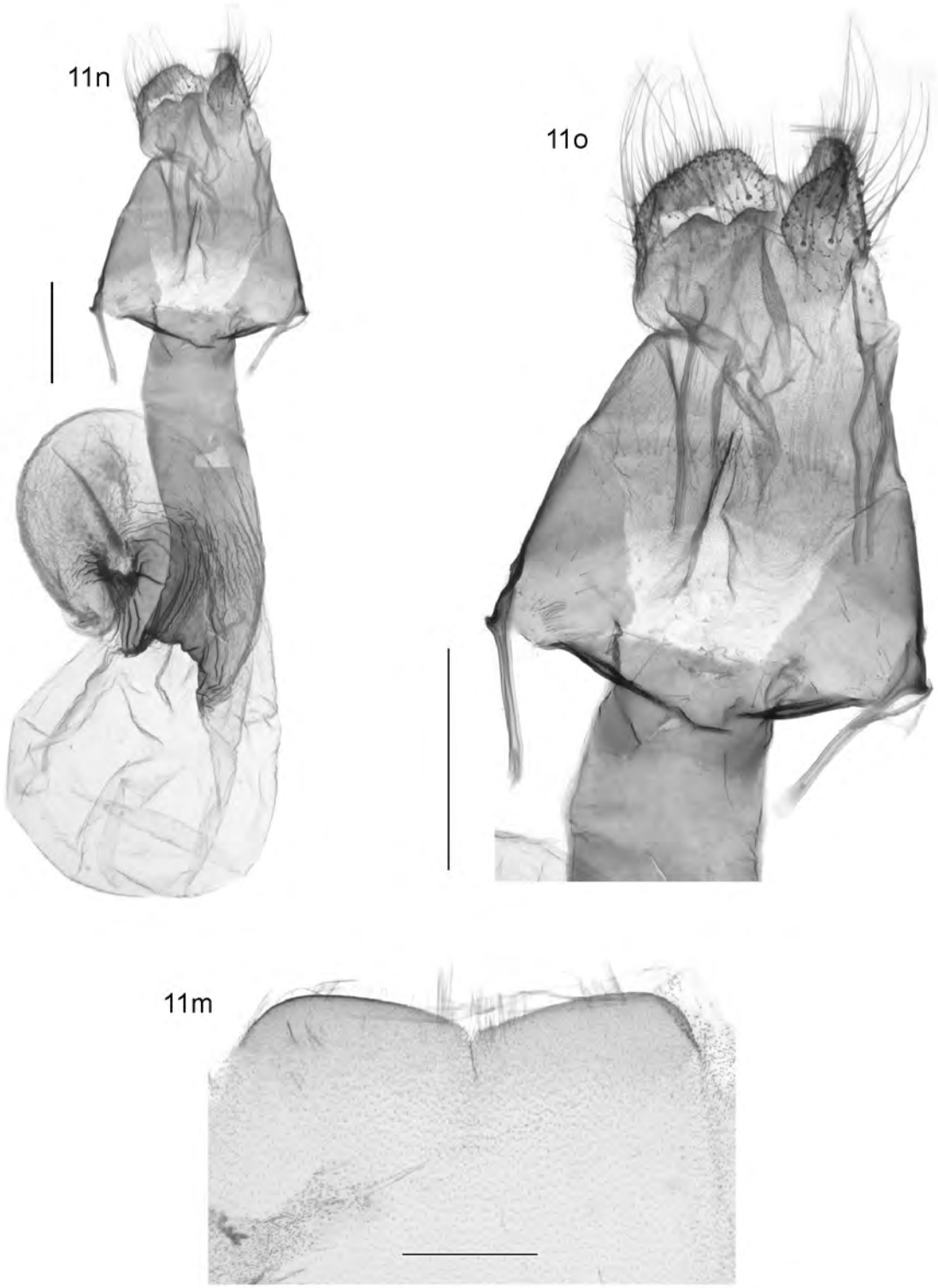


Fig. 11m, *Ichneutica falsidica* female S7; **11n,** female genitalia; **11o,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 100.)

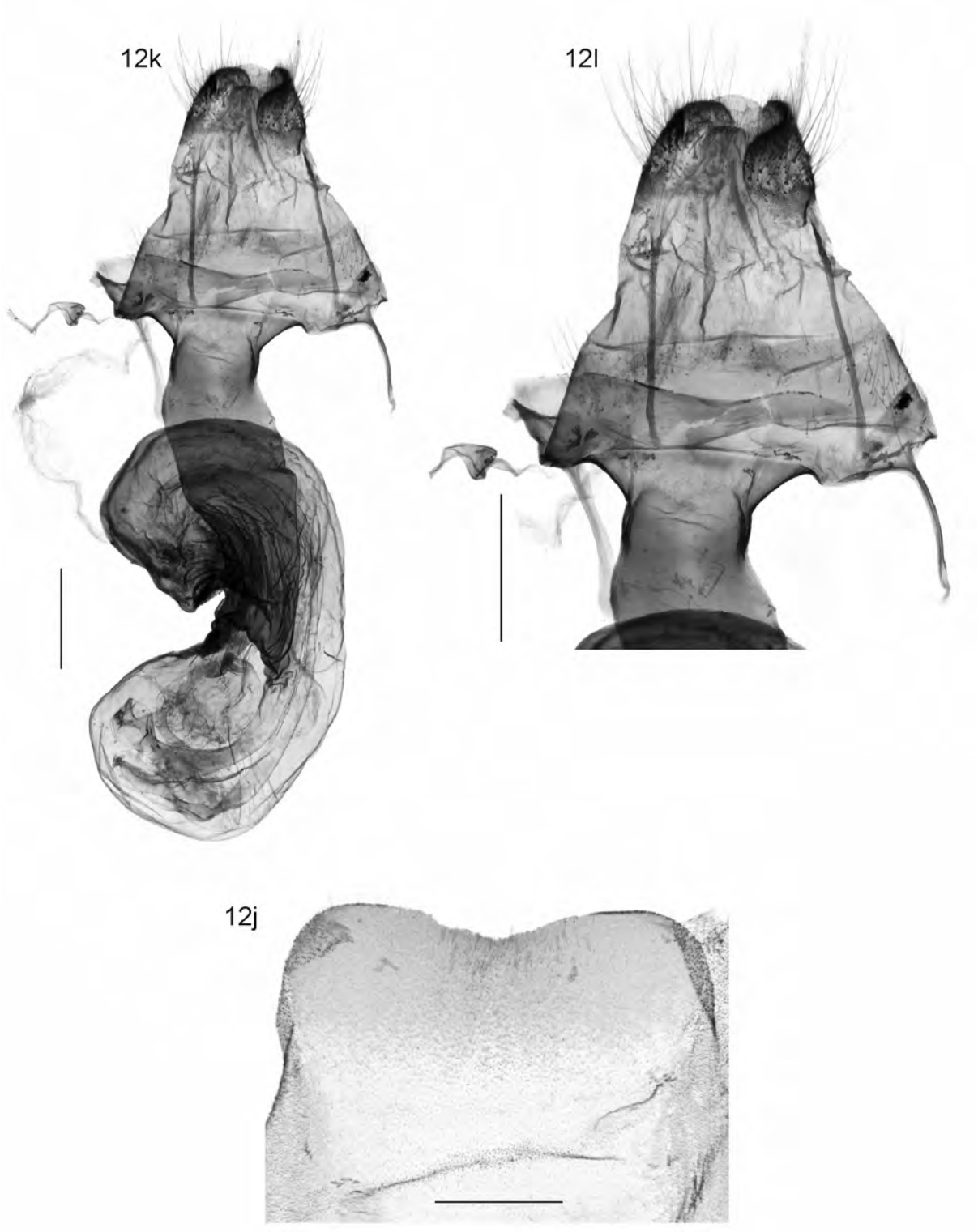


Fig. 12j, *Ichneutica fibriata* female S7; **12k,** female genitalia; **12l,** close-up of ovipositor, segment 8 and ostium. (Slide OMNZ IV42442.)

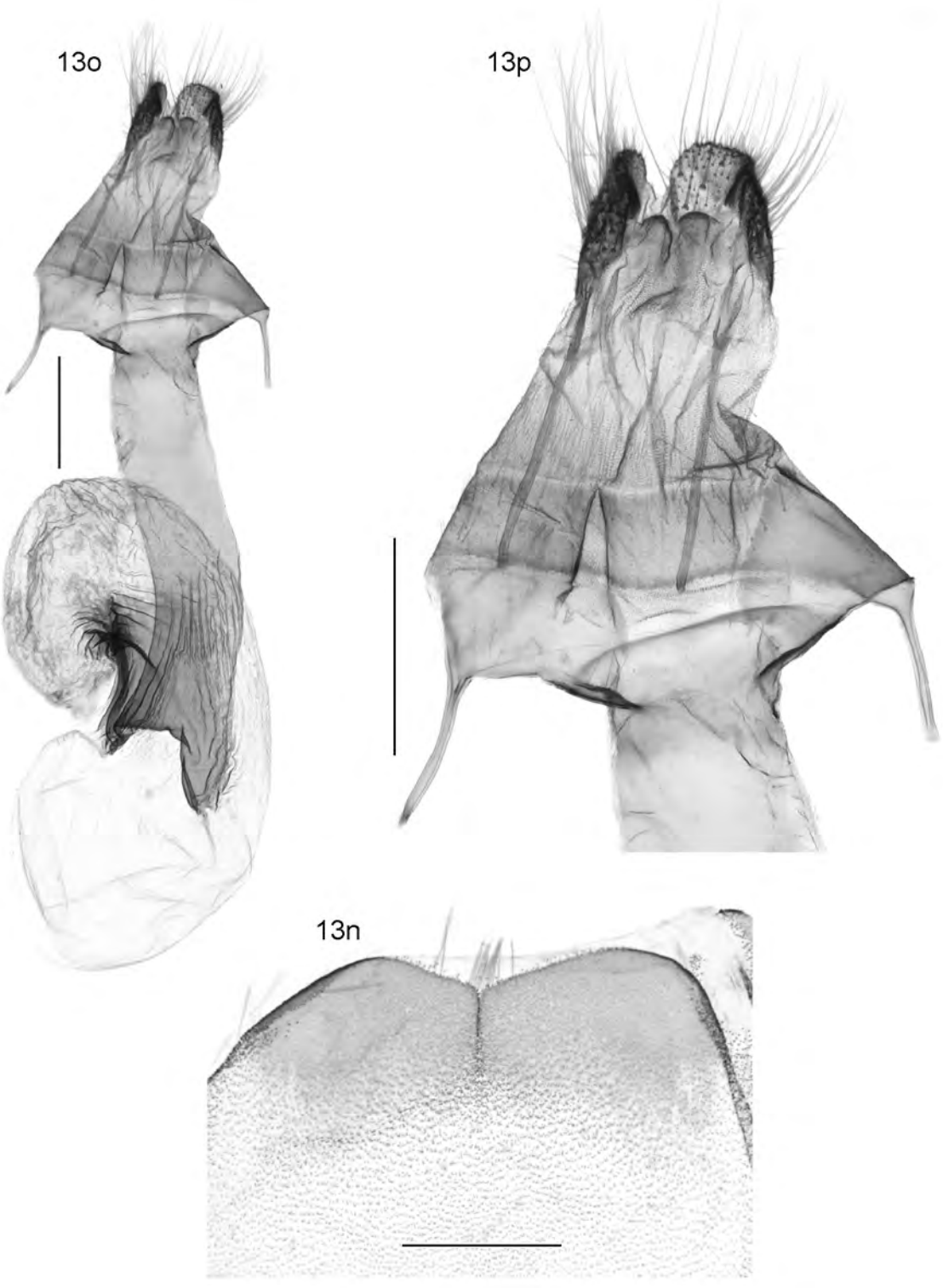


Fig. 13n, *Ichneutica panda* female S7; **13o,** female genitalia; **13p,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 145.)

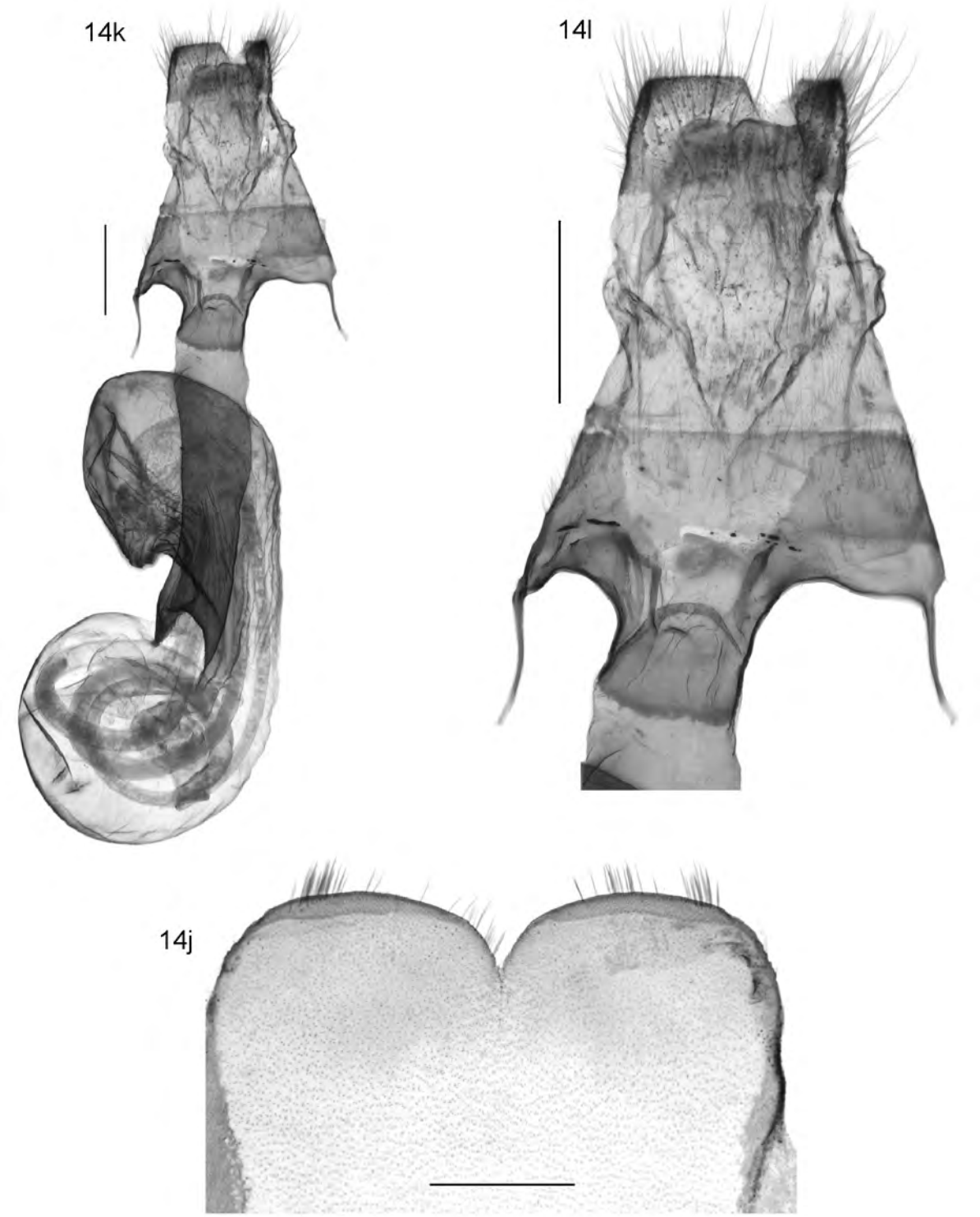


Fig. 14j, *Ichneutica purdii* female S7; **14k,** female genitalia; **14l,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 315.)

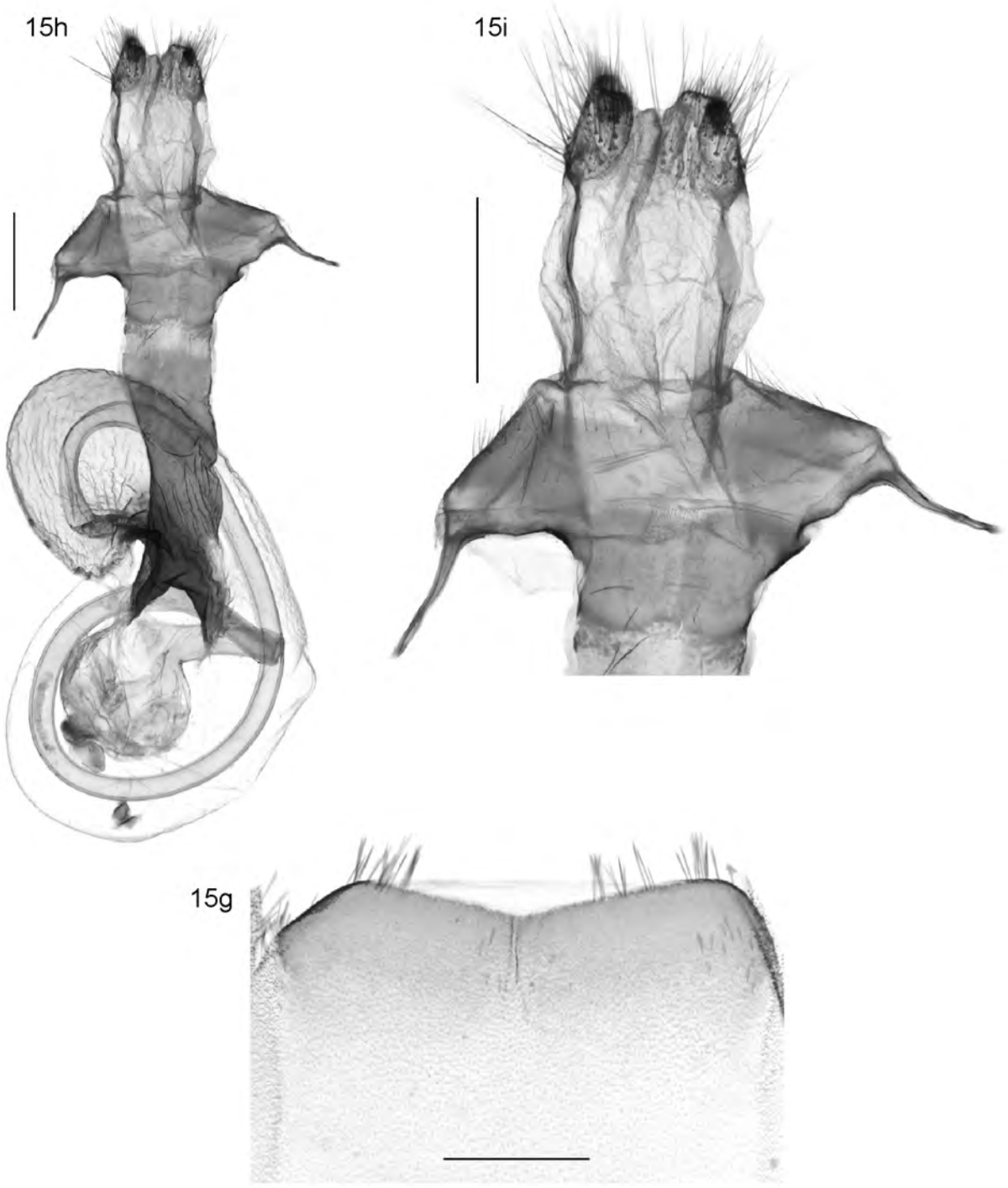


Fig. 15g, *Ichneutica nobilia* female S7; **15h,** female genitalia; **15i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 143.)

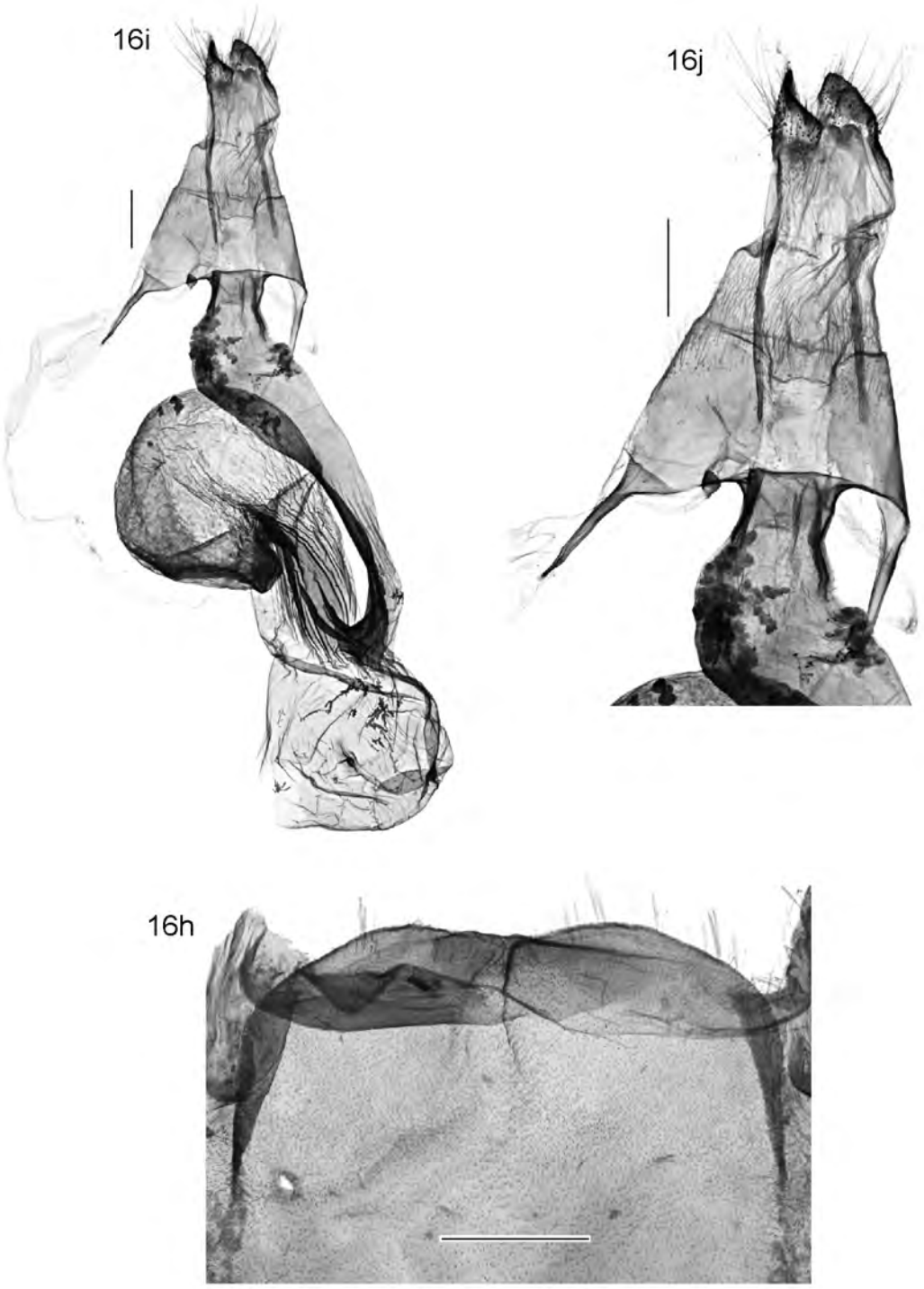


Fig. 16h, *Ichneutica nullifera* female S7; **16i,** female genitalia; **16j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 506.)

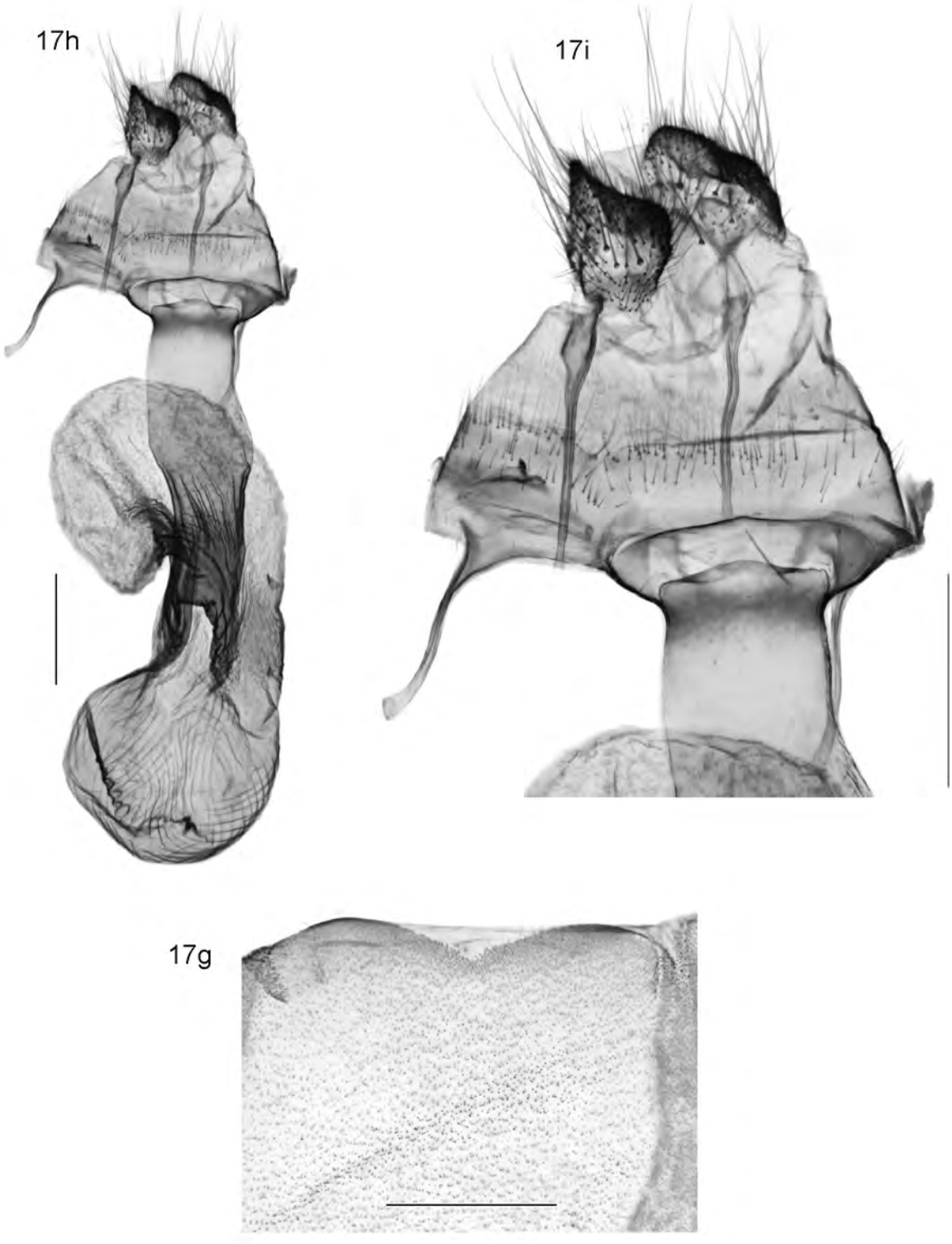


Fig. 17g, *Ichneutica lithias* female S7; **17h,** female genitalia; **17i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 353.)

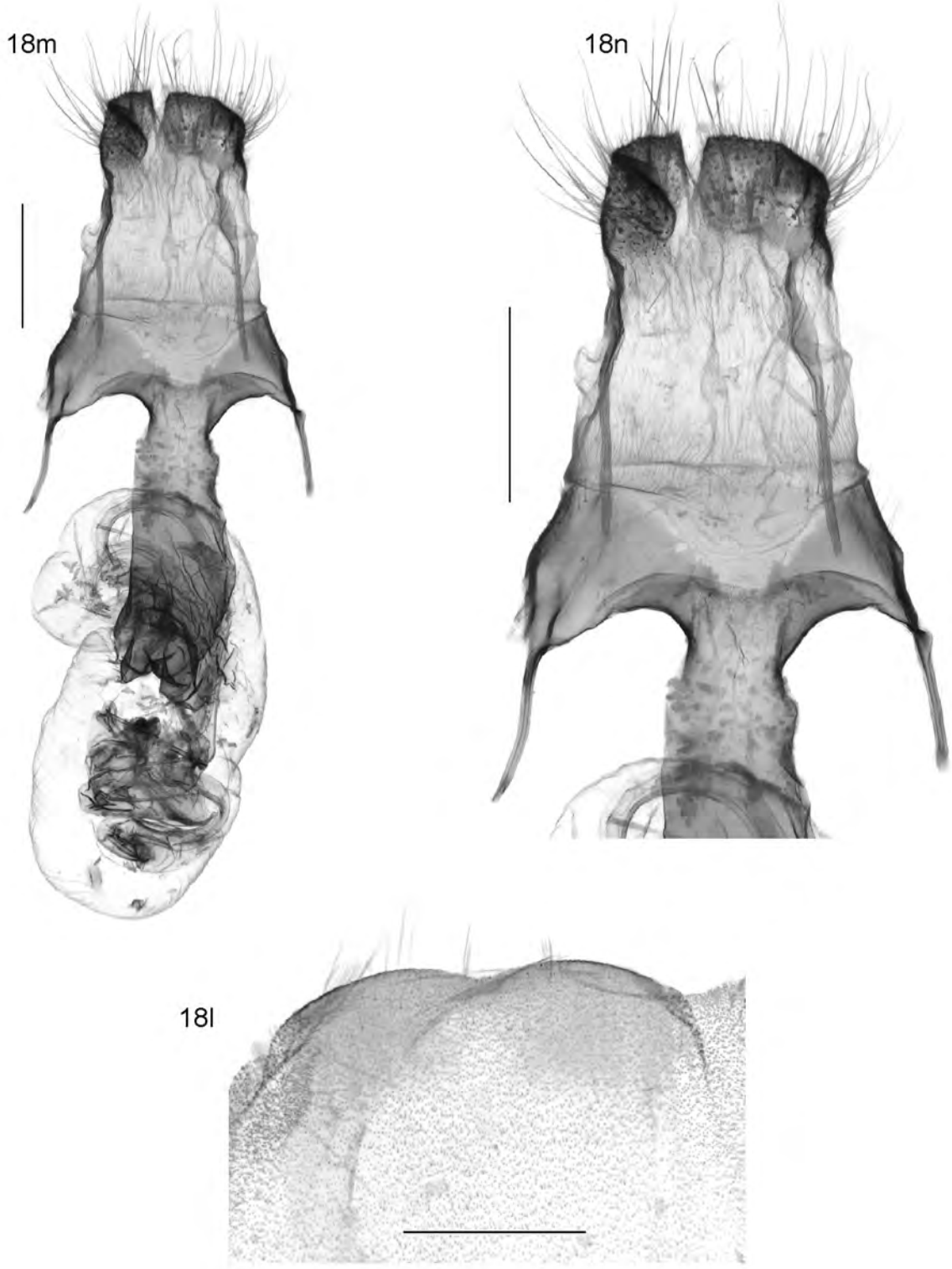


Fig. 18l, *Ichneutica marmorata* female S7; **18m,** female genitalia; **18n,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 64.)

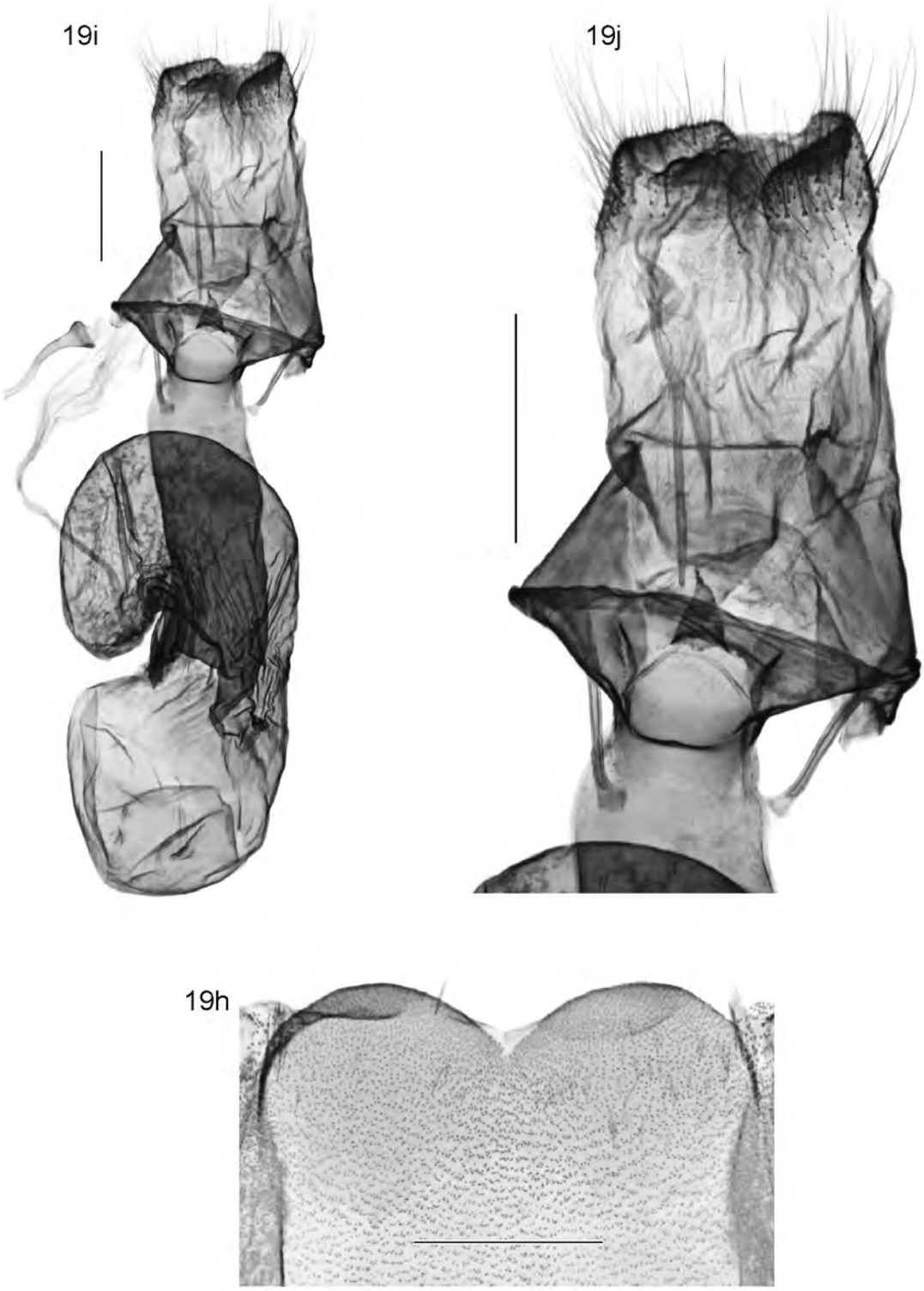


Fig. 19h, *Ichneutica disjungens* female S7; **19i,** female genitalia; **19j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 348.)

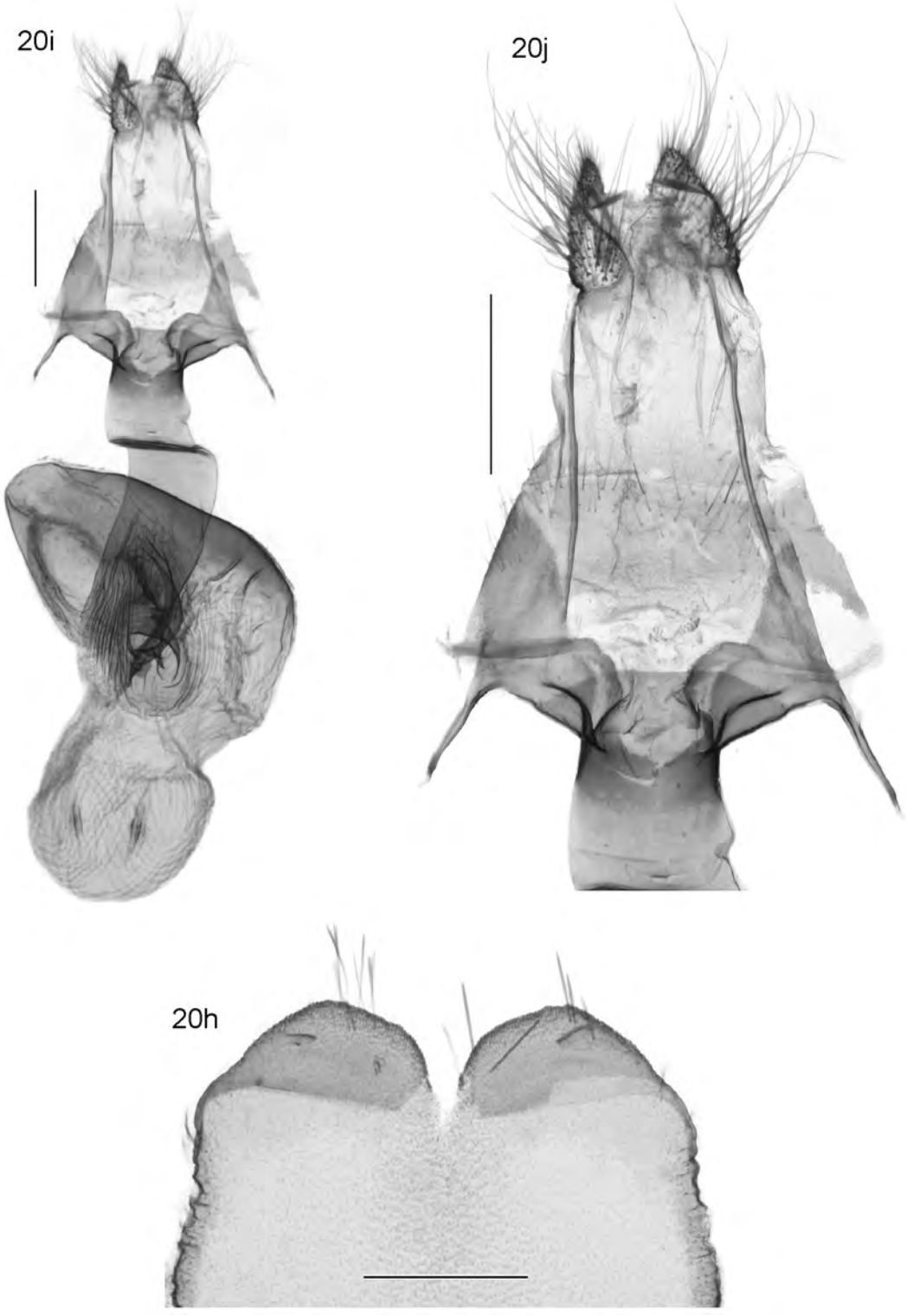


Fig. 20h, *Ichneutica moderata* female S7; **20i,** female genitalia; **20j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 141.)

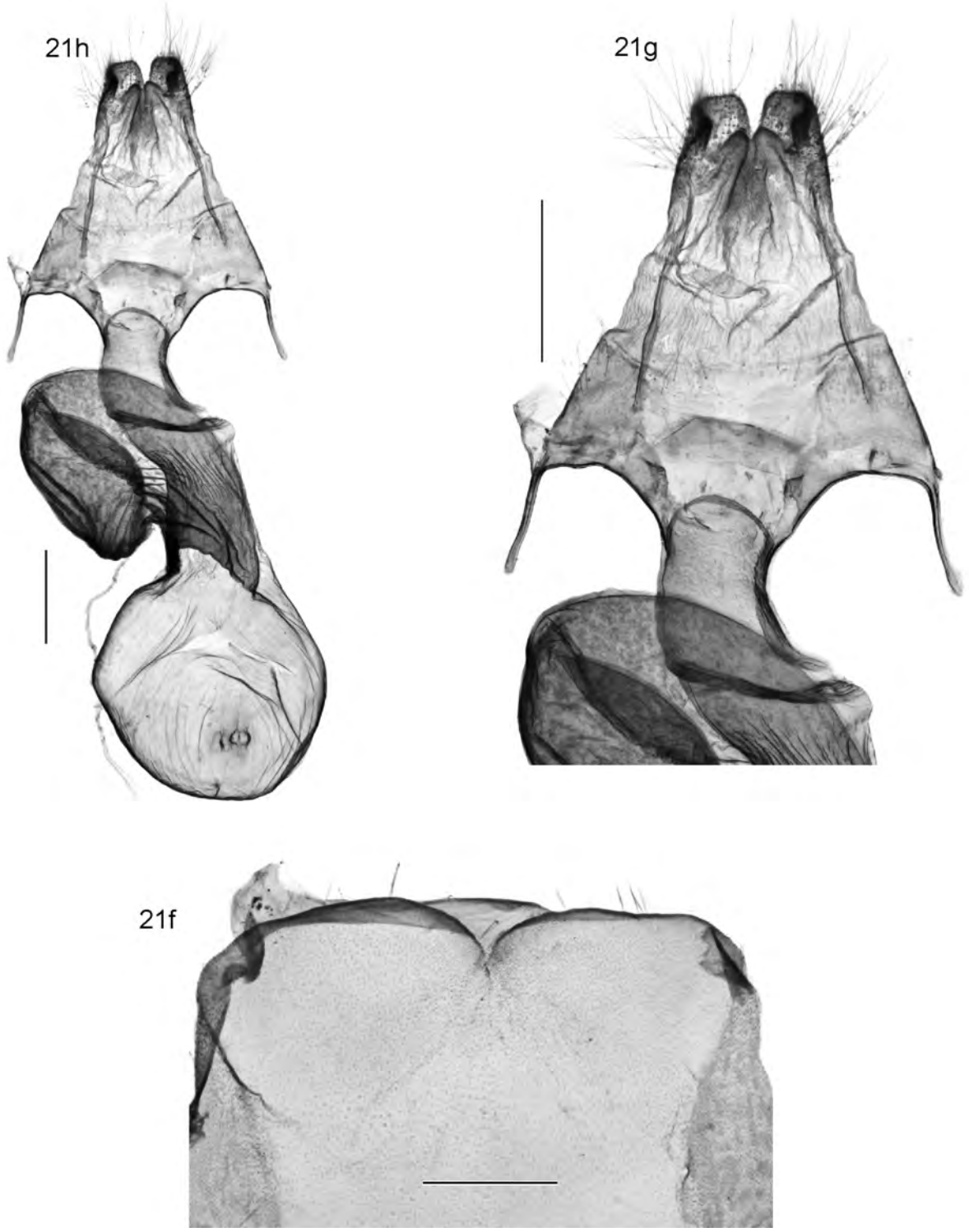


Fig. 21f, *Ichneutica oliveri* female S7; **21g,** female genitalia; **21h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 512.)

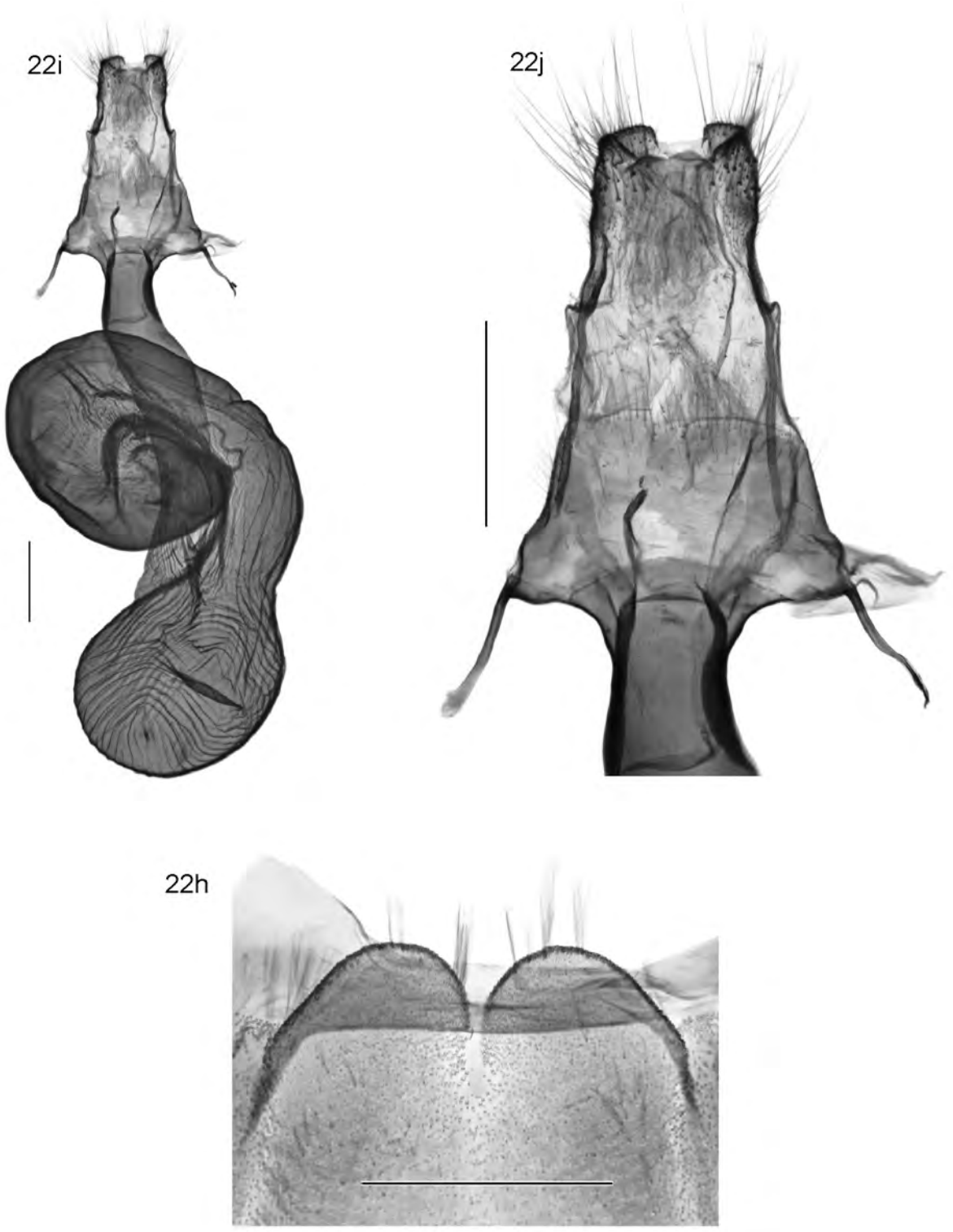


Fig. 22h, *Ichneutica averilla* female S7; **22i,** female genitalia; **22j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 342.)

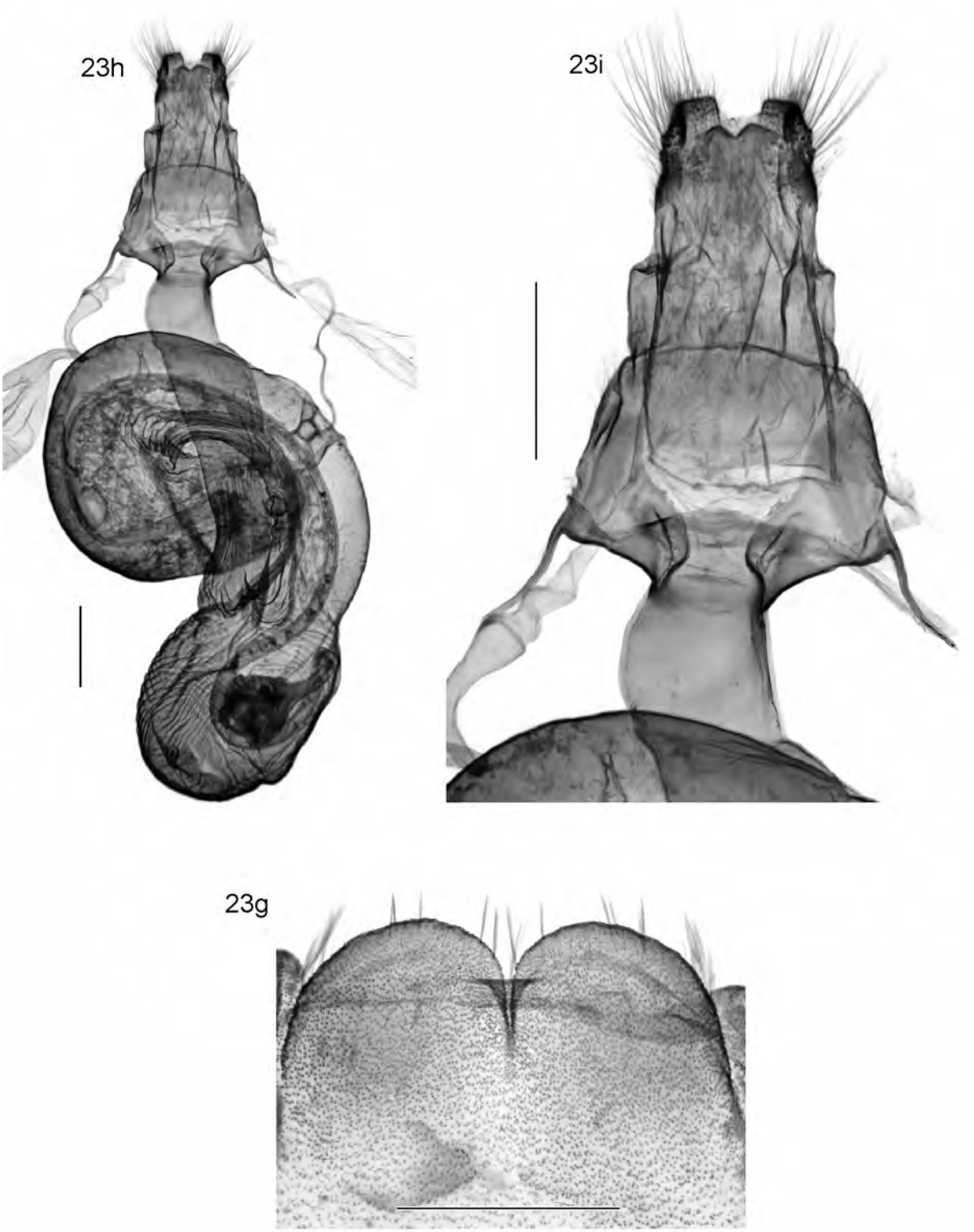


Fig. 23g, *Ichneutica bromias* female S7; **23h,** female genitalia; **23i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 344.)

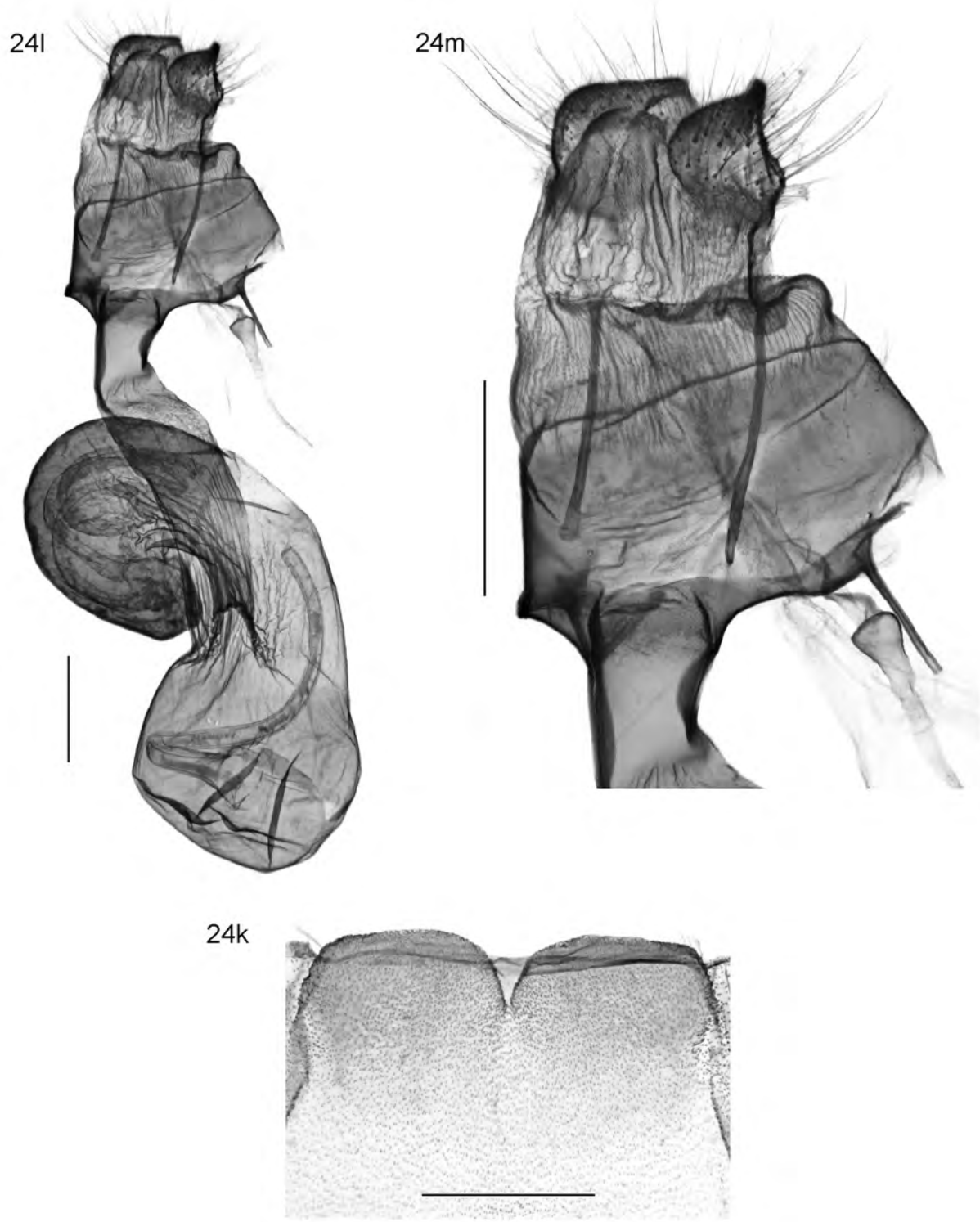


Fig. 24k, *Ichneutica erebia* female S7; **24l,** female genitalia; **24m,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 349.)

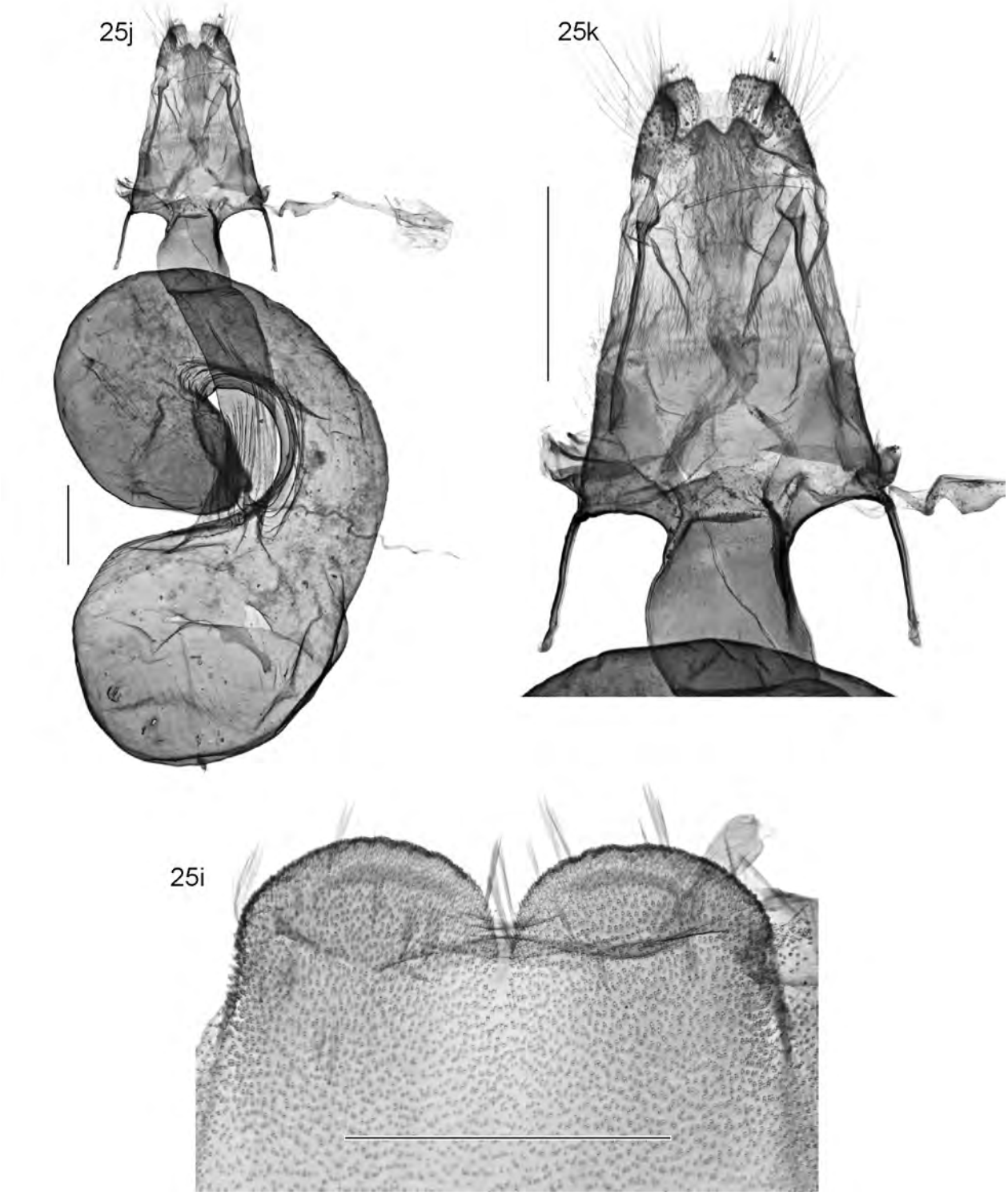


Fig. 25i, *Ichneutica mutans* female S7; **25j,** female genitalia; **25k,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 479.)

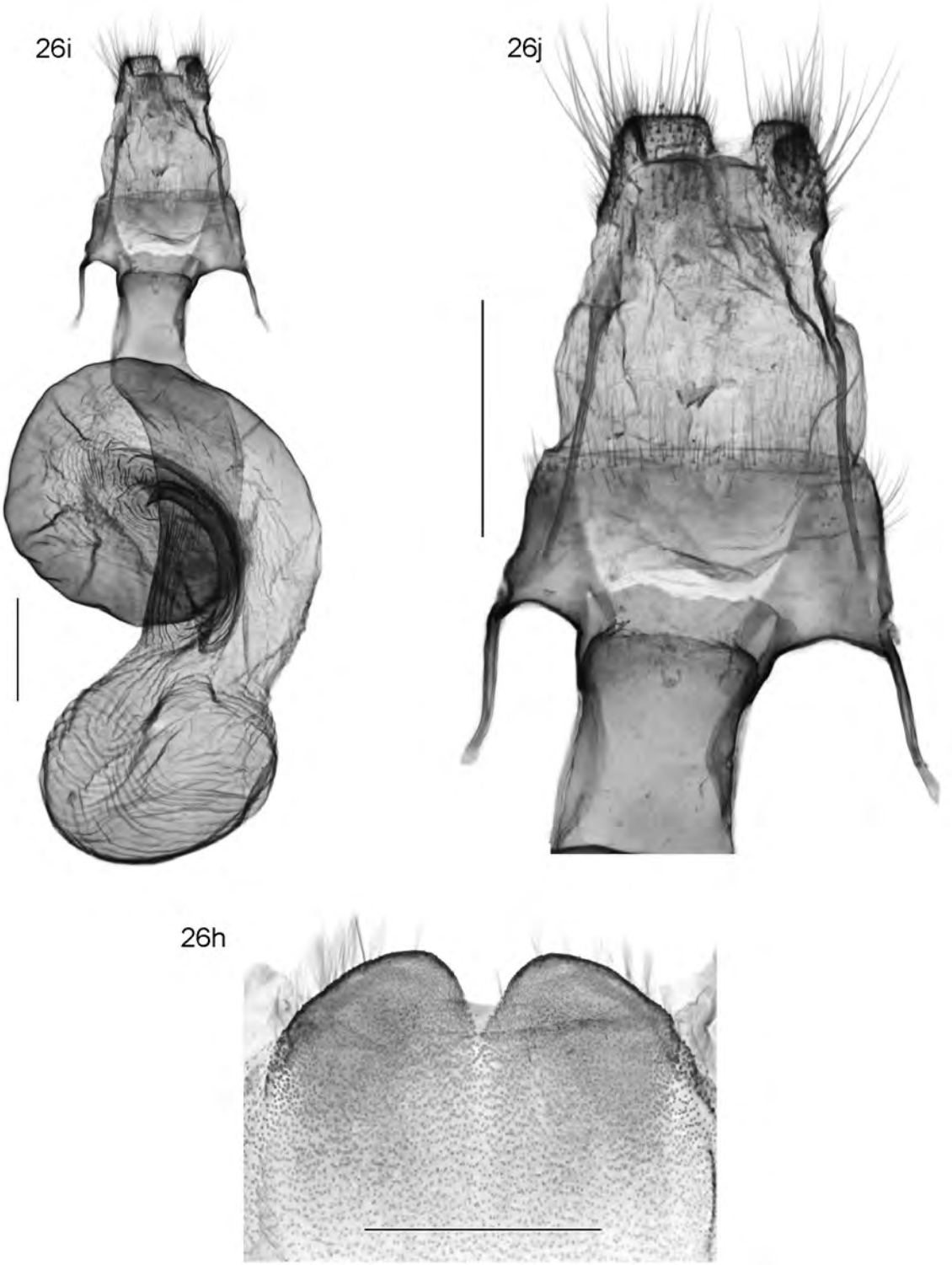


Fig. 26h, *Ichneutica petrograpta* female S7; **26i,** female genitalia; **26j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 366.)

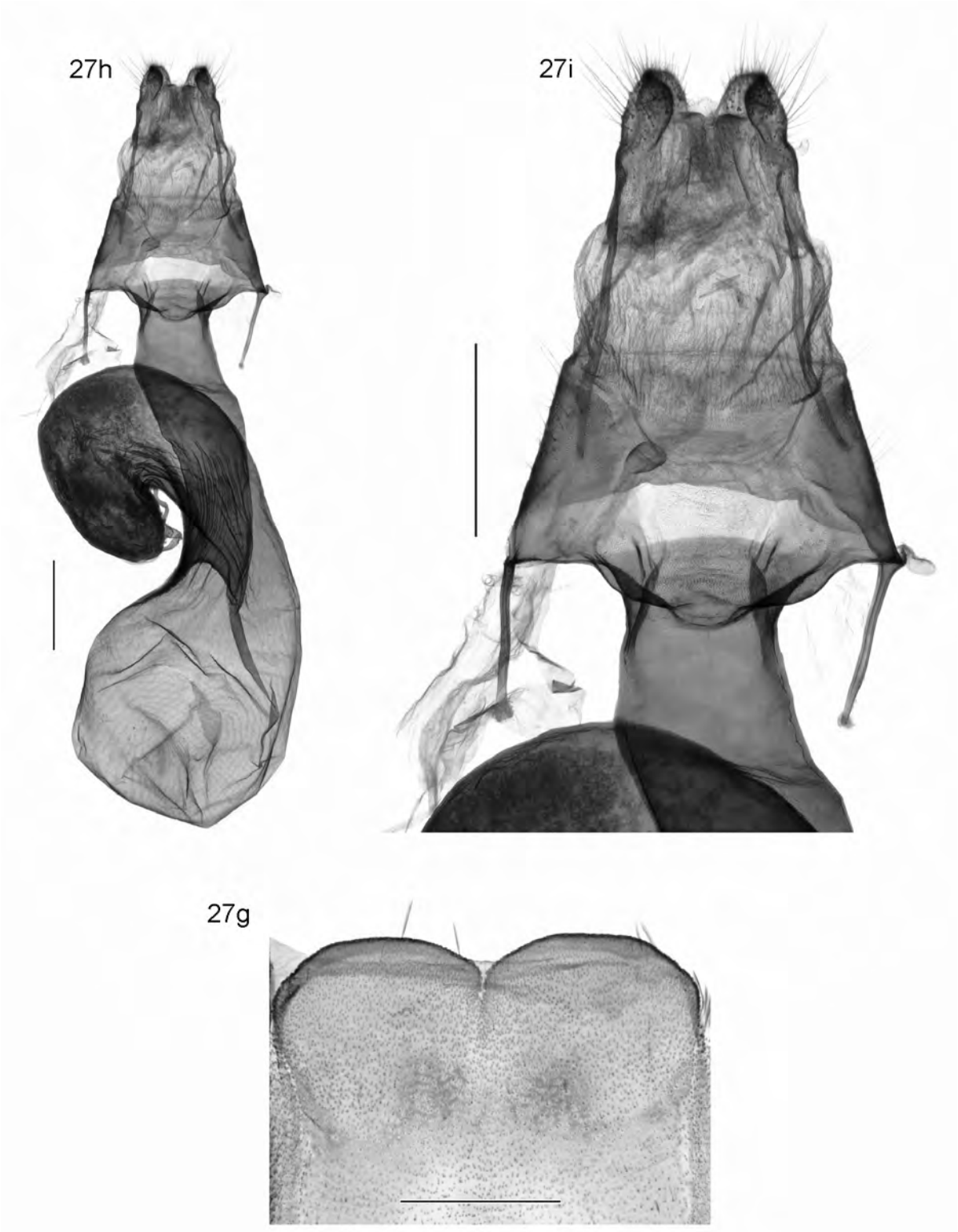


Fig. 27g, *Ichneutica brunneosa* female S7; **27h,** female genitalia; **27i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 345.)

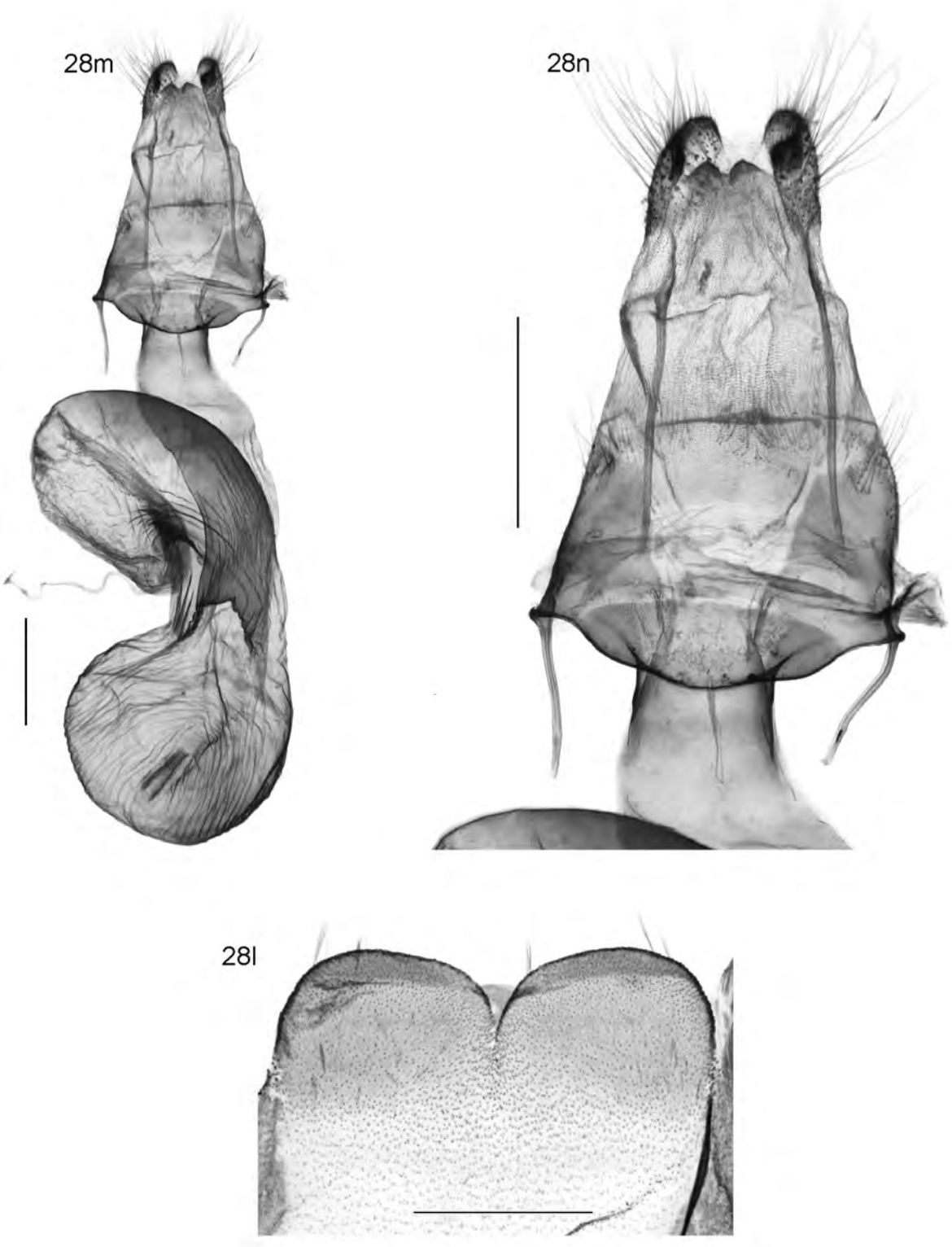


Fig. 28l, *Ichneutica chlorodonta* female S7; **28m,** female genitalia; **28n,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 385.)

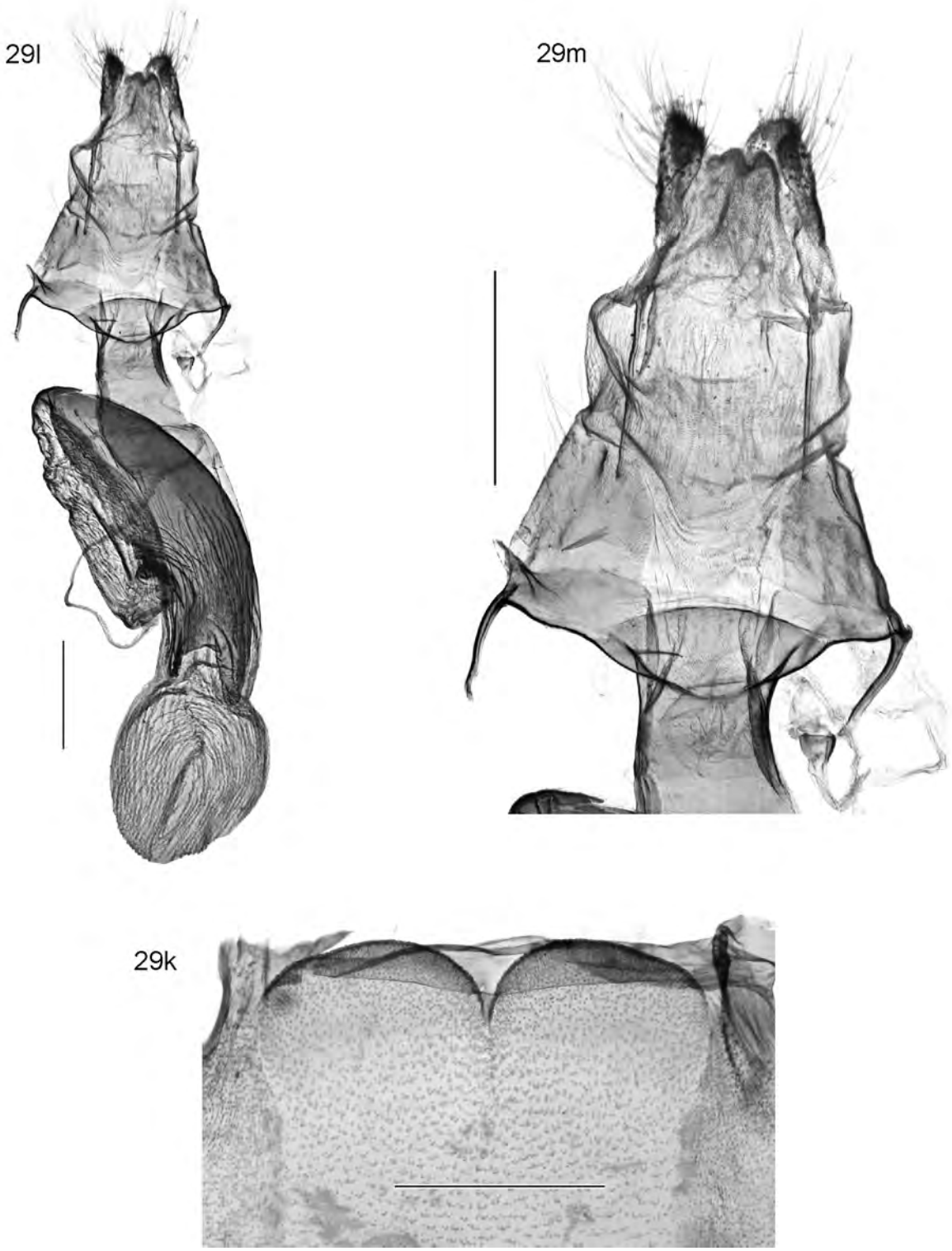


Fig. 29k, *Ichneutica subcyprea* paratype female S7; **29l,** female genitalia; **29m,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 478.)

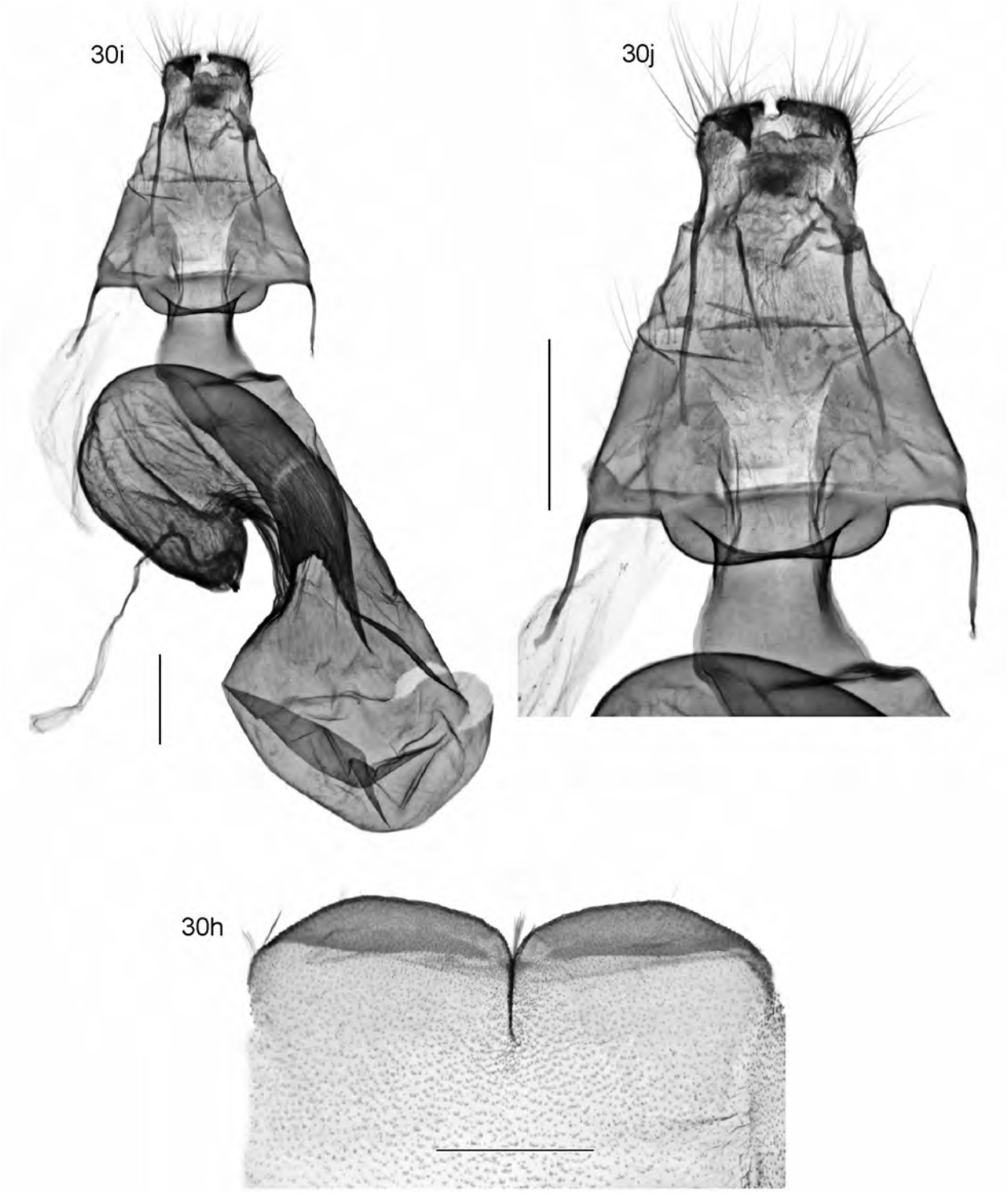


Fig. 30h, *Ichneutica dundastica* paratype female S7; **30i,** female genitalia; **30j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 364.)

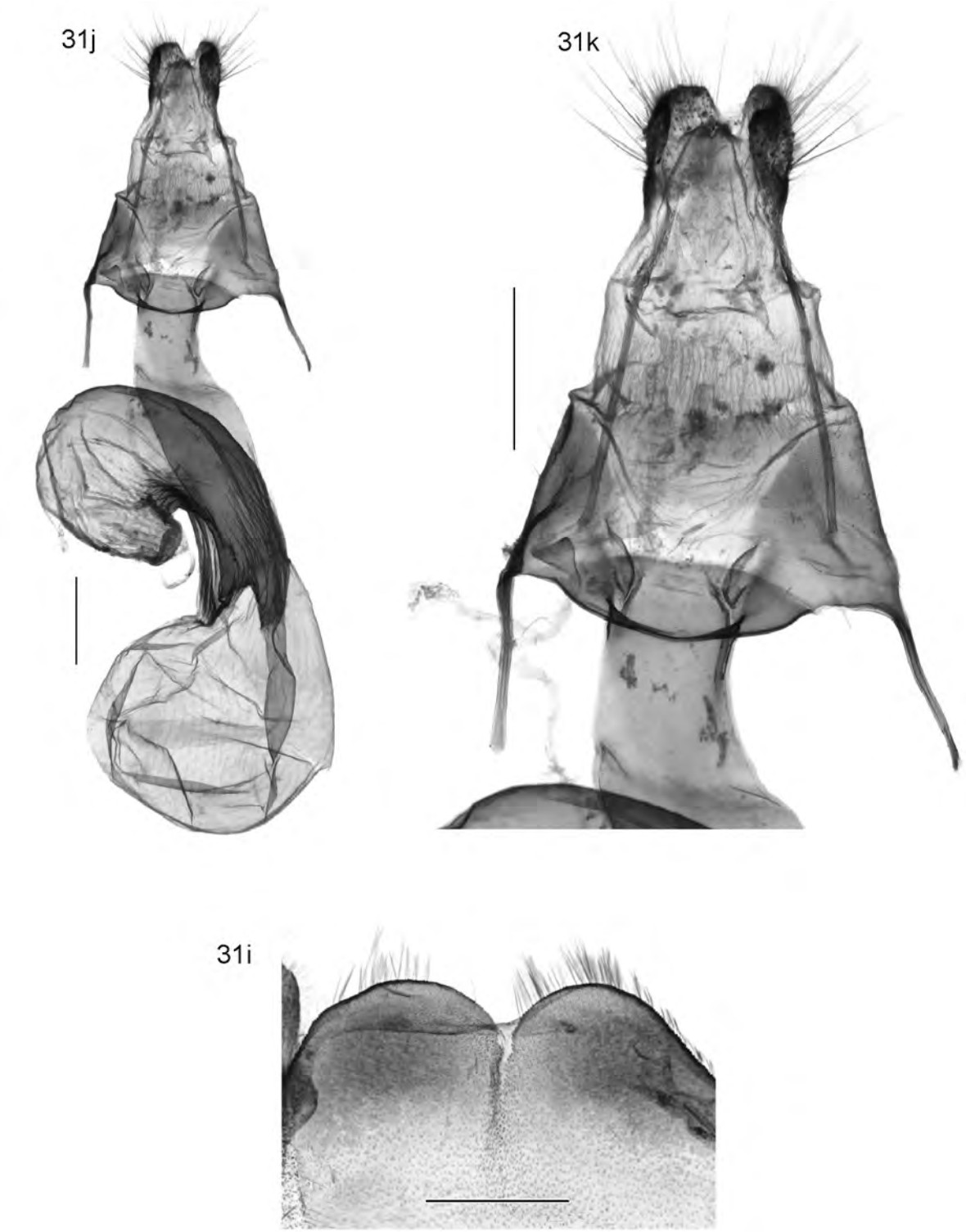


Fig. 31i, *Ichneutica fenwicki* female S7; **31j,** female genitalia; **31k,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 350.)

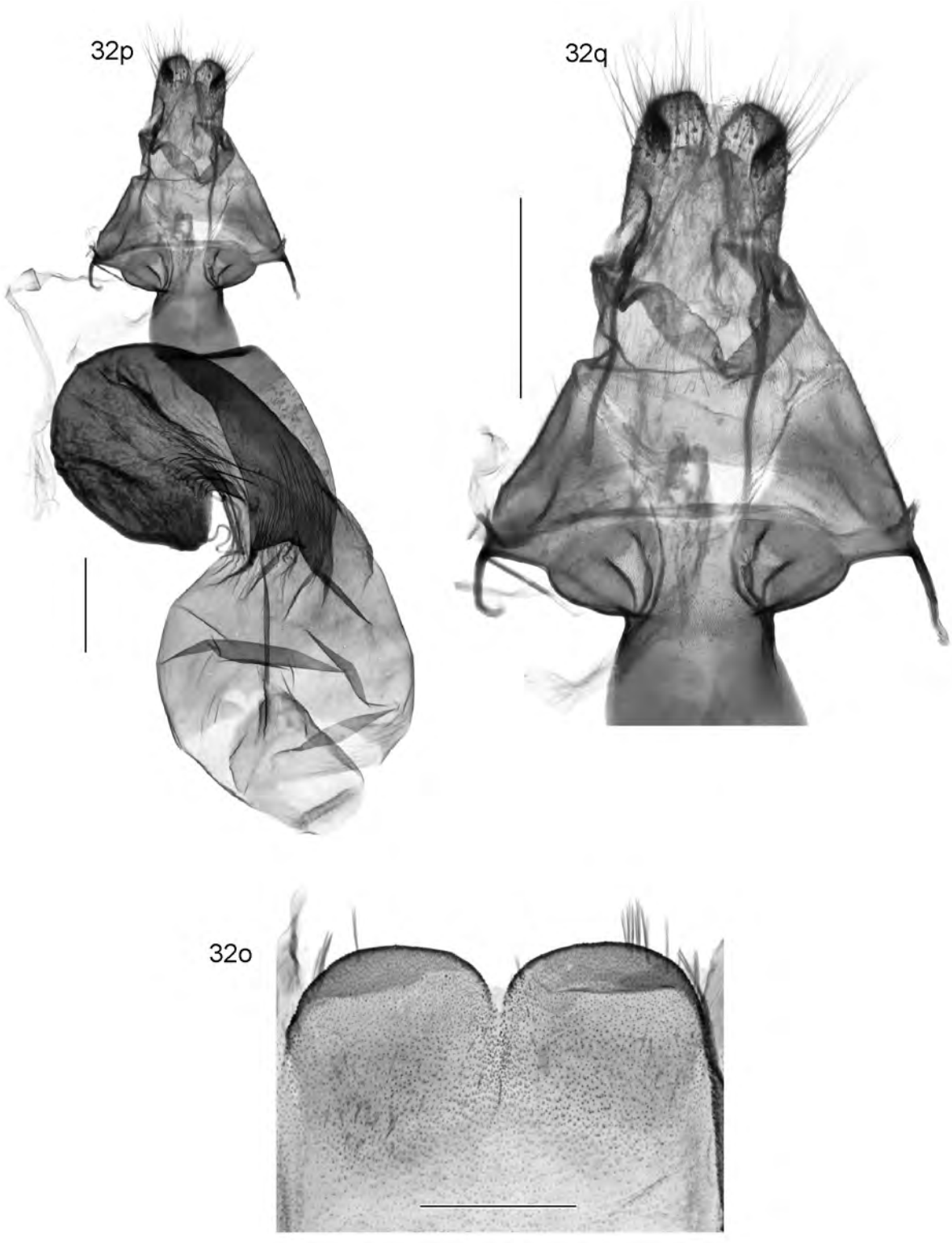


Fig. 32o, *Ichneutica insignis* female S7; **32p,** female genitalia; **32q,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 376.)

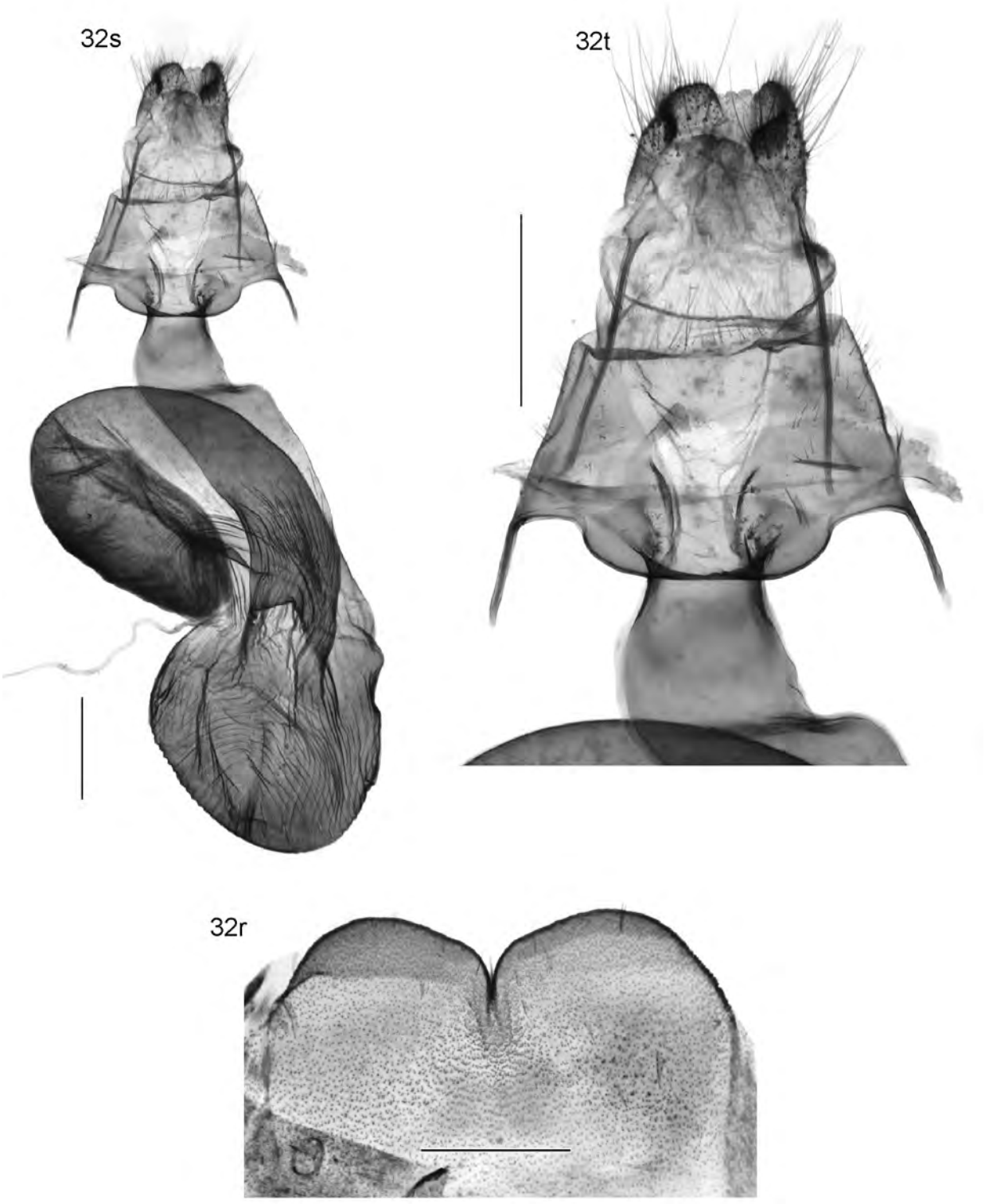


Fig. 32r, *Ichneutica insignis* female S7; **32s,** female genitalia; **32t,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 393.)

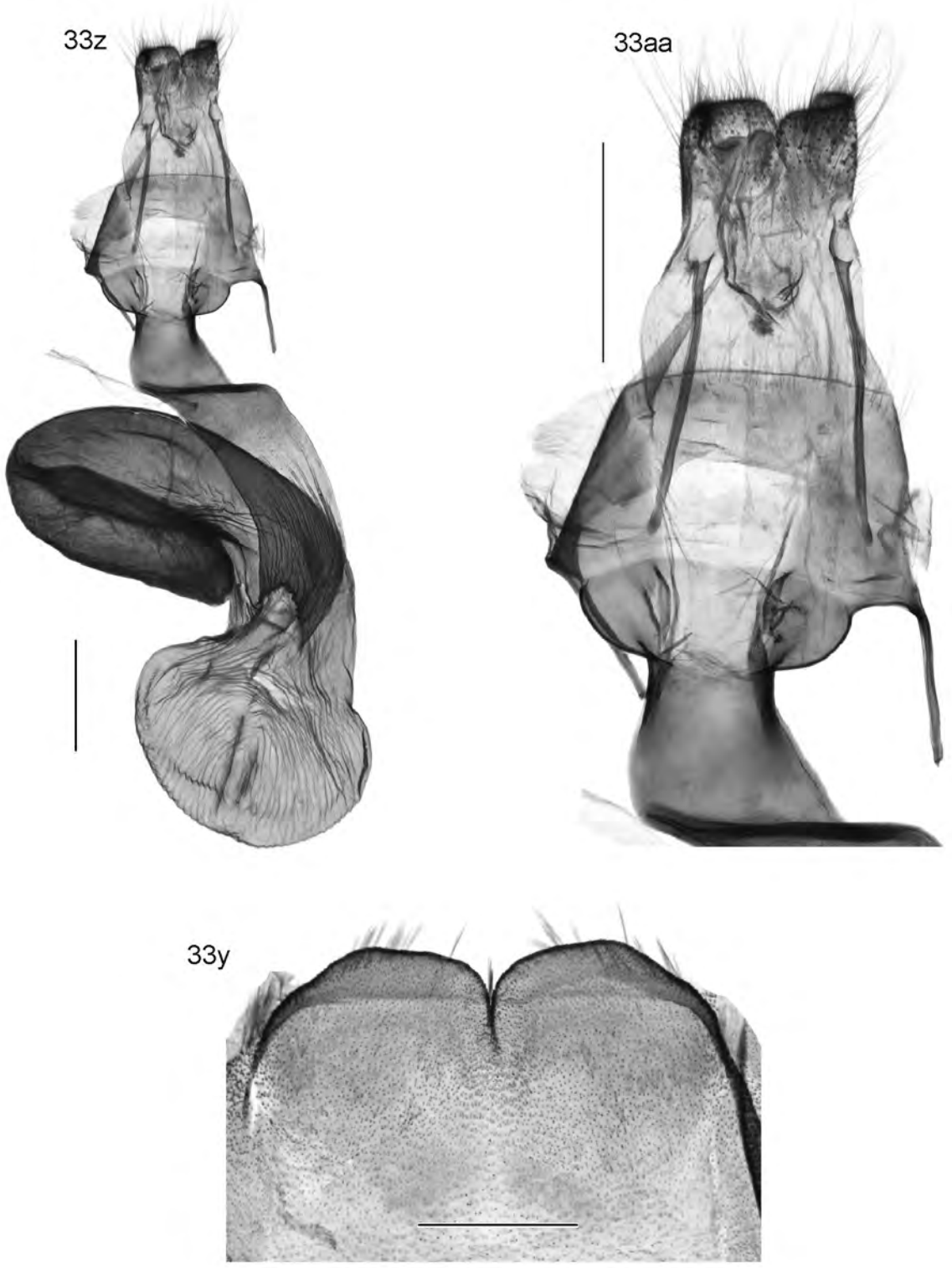


Fig. 33y, *Ichneutica plena* female S7; **33z,** female genitalia; **33aa,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 390.)

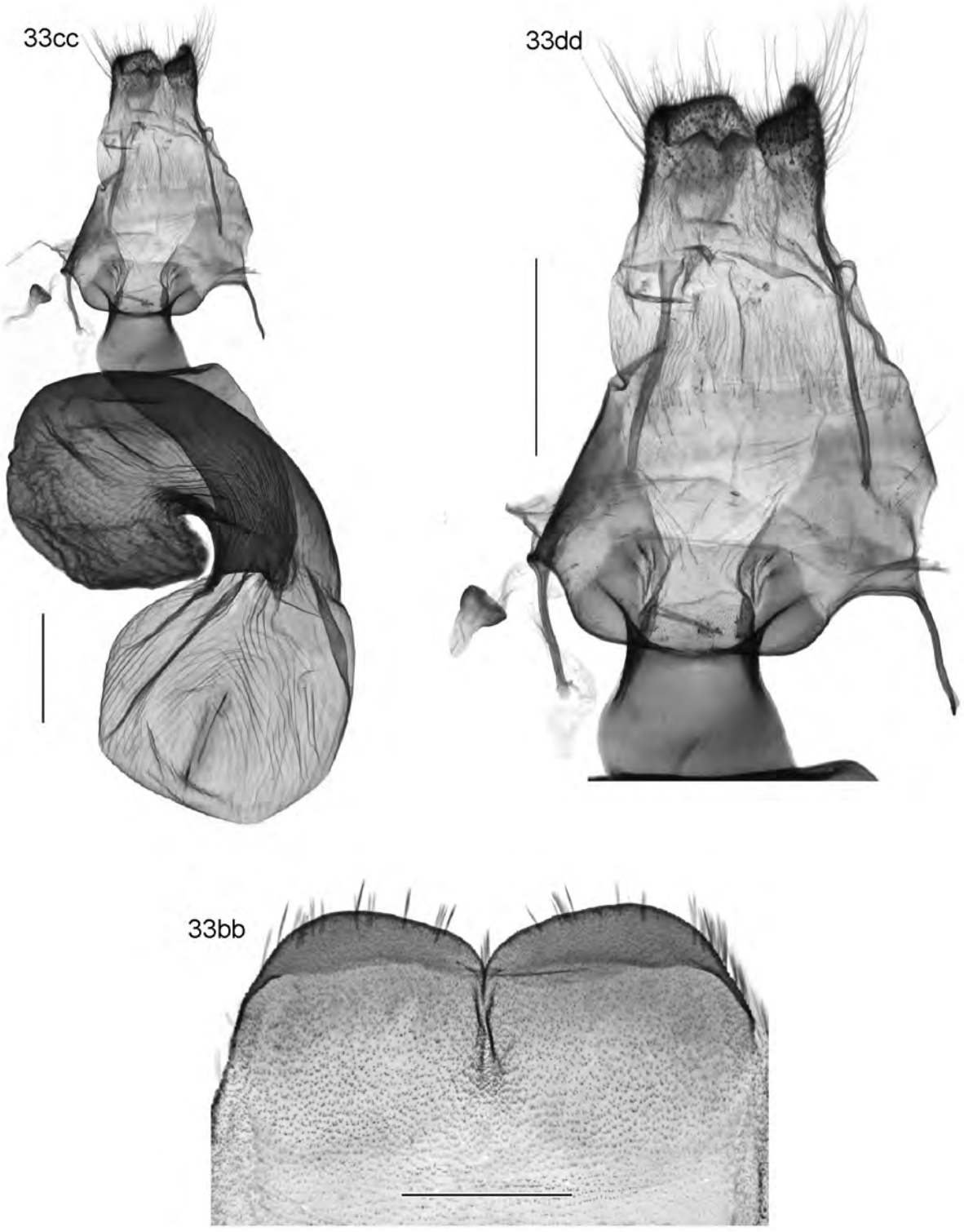


Fig. 33bb, *Ichneutica plena* female S7; **33cc,** female genitalia; **33dd,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 390.)

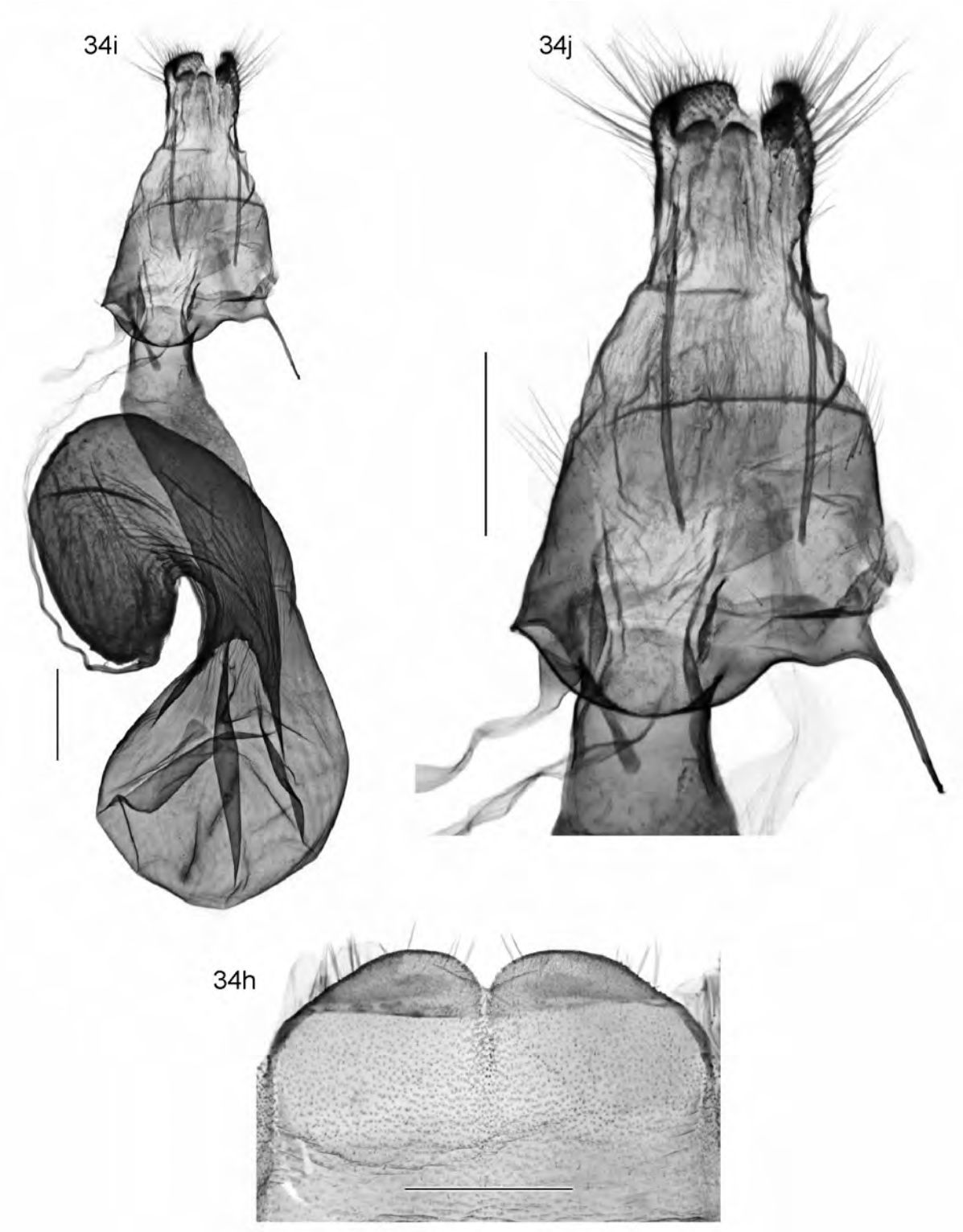


Fig. 34h, *Ichneutica naufraga* female S7; **34i,** female genitalia; **34j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 375.)

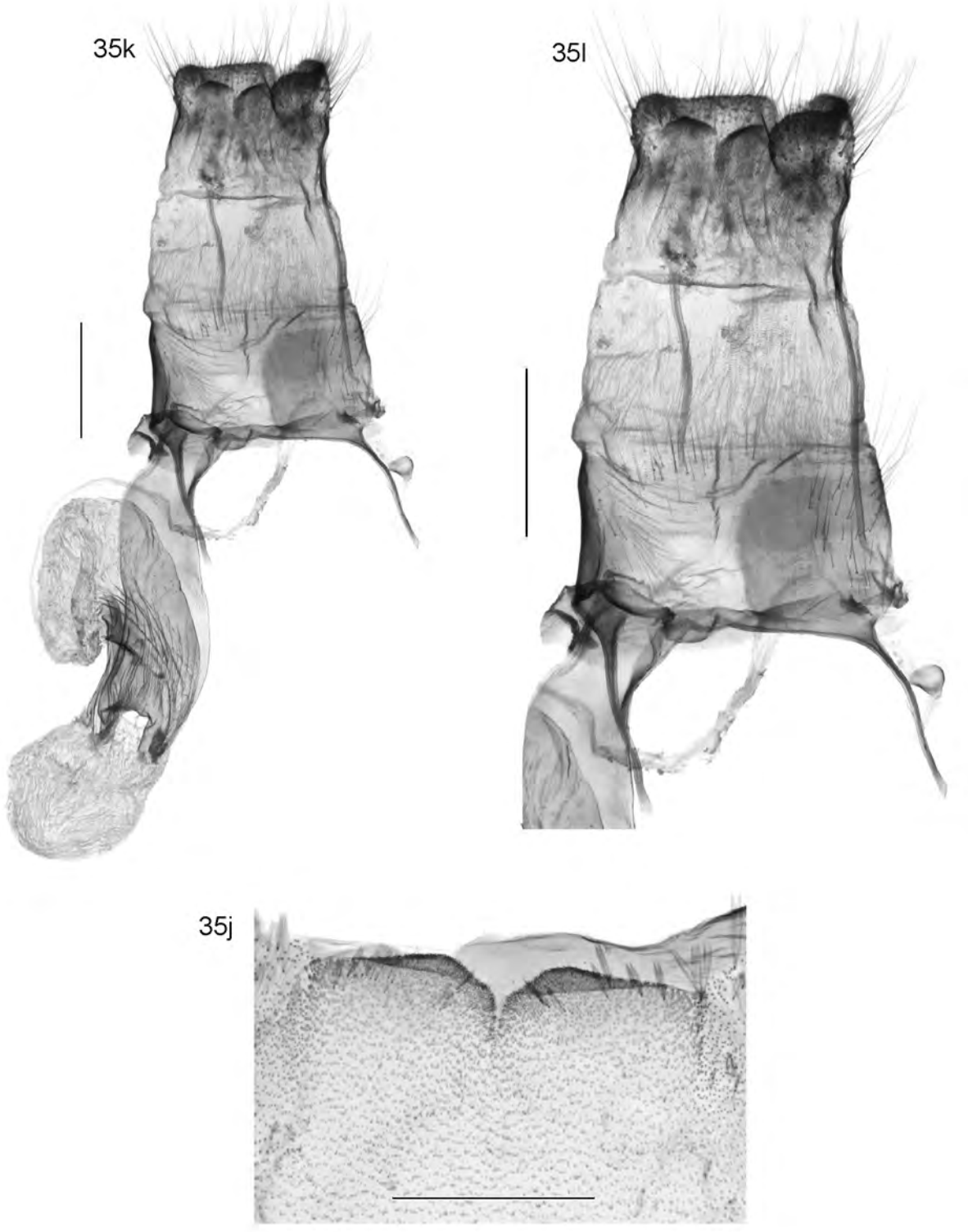


Fig. 35j, *Ichneutica pagaia* female S7; **35k,** female genitalia; **35l,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 362.)

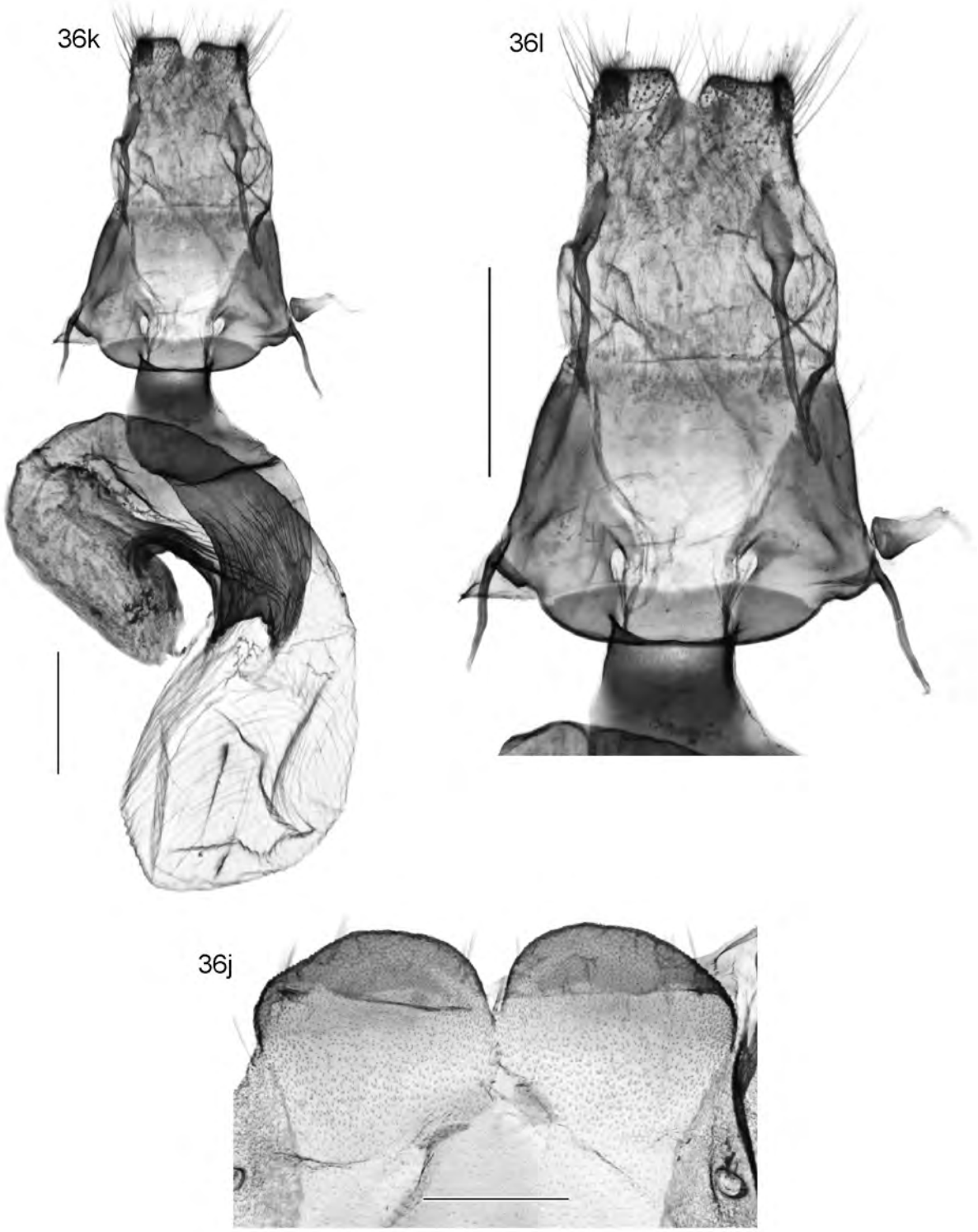


Fig. 36j, *Ichneutica pelanodes* female S7; **36k,** female genitalia; **36l,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 363.)

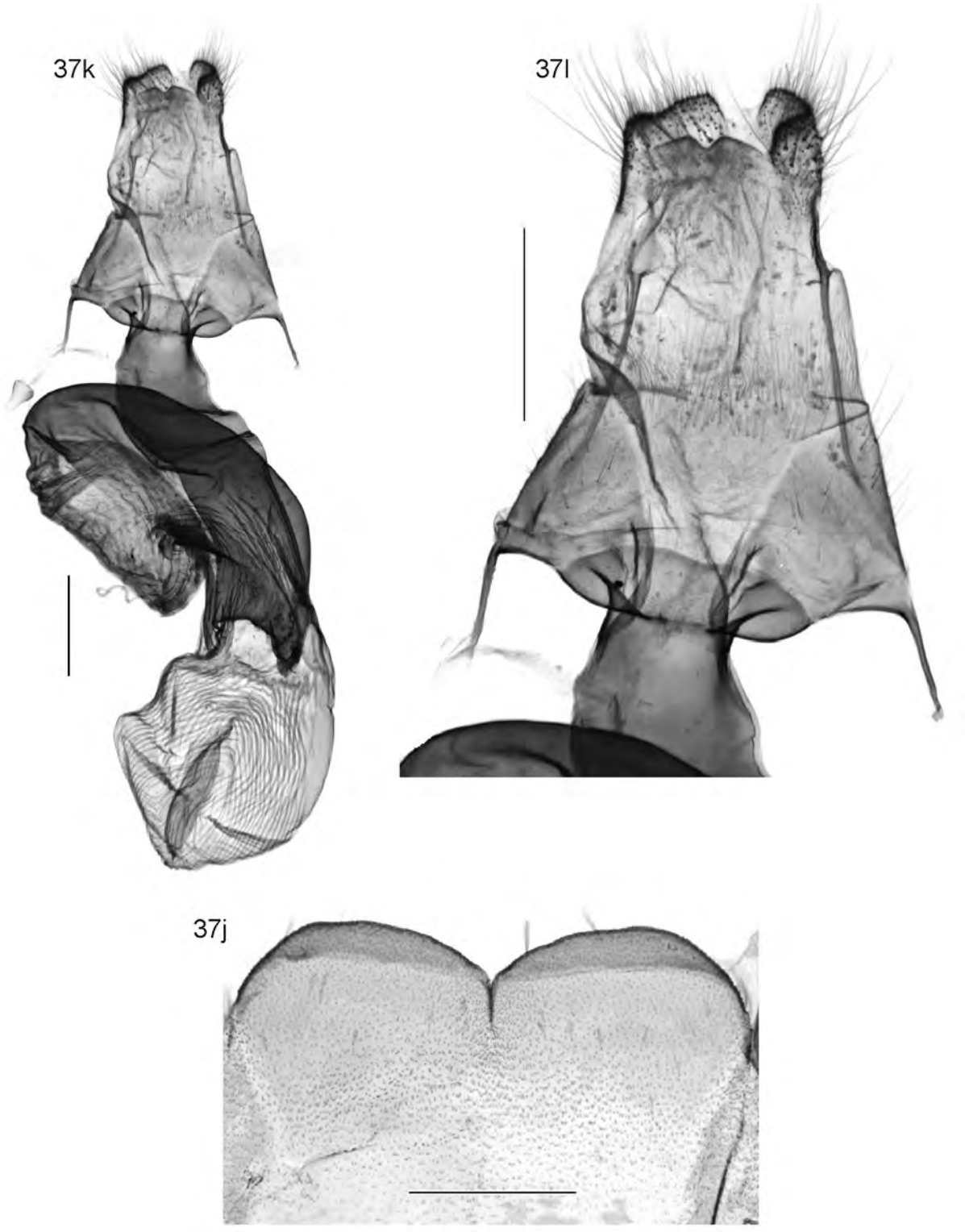


Fig. 37j, *Ichneutica peridotea* paratype female S7; **37k,** female genitalia; **37l,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 396.)

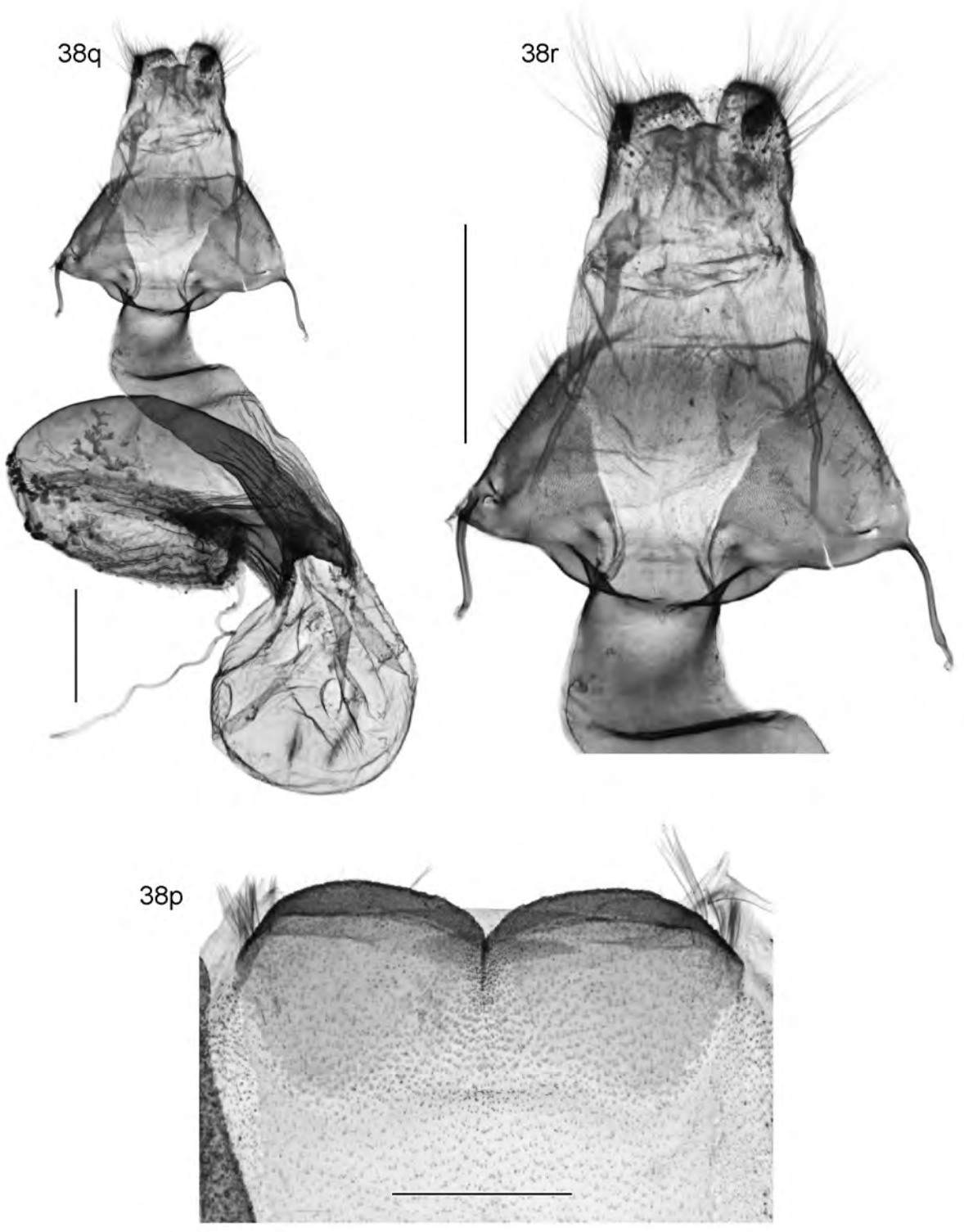


Fig. 38p, *Ichneutica scutata* female S7; **38q,** female genitalia; **38r,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 369.)

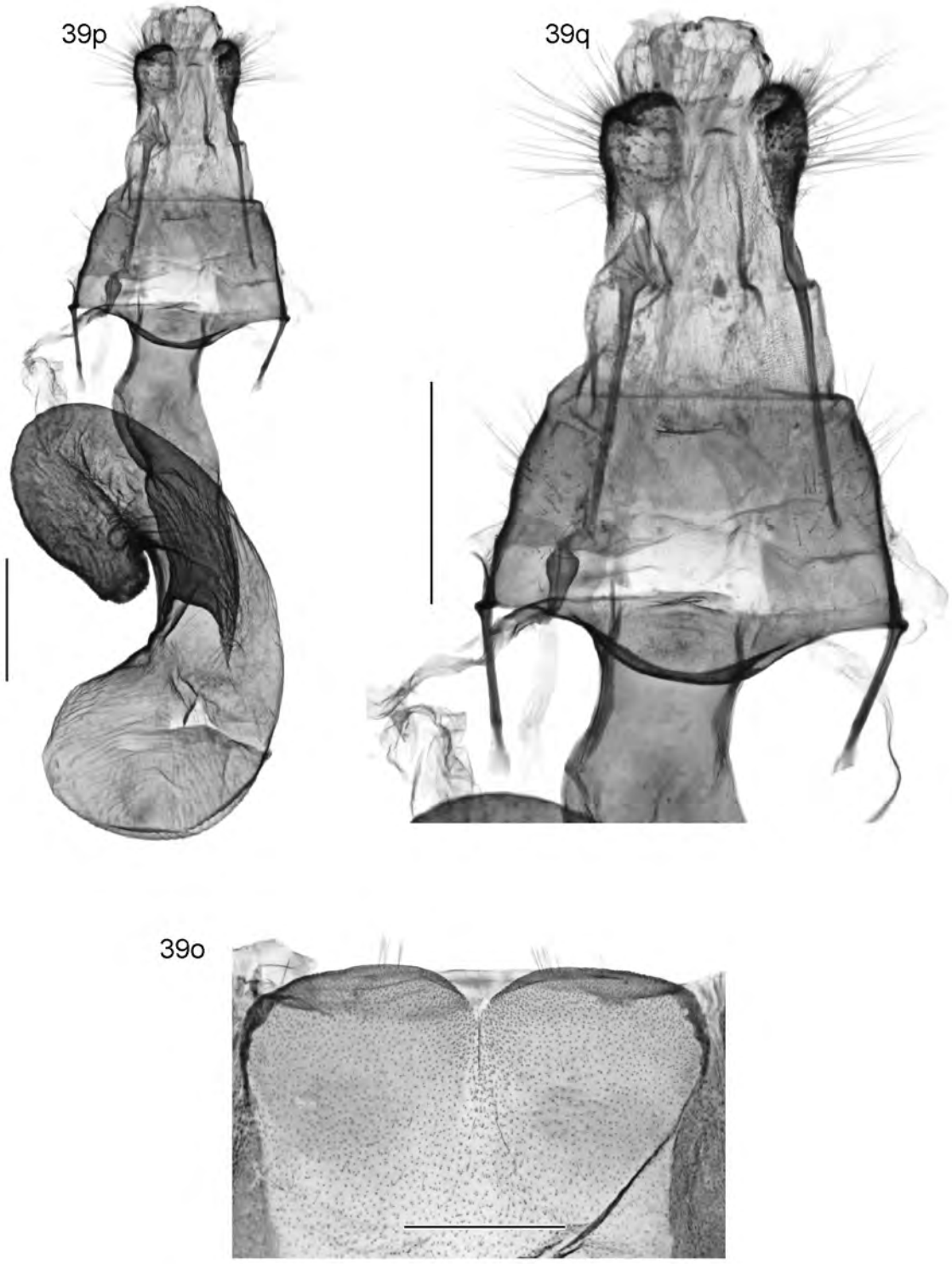


Fig. 39o, *Ichneutica sericata* female S7; **39p,** female genitalia; **39q,** close-up of ovipositor, segment 8 and ostium. (Slide OMNZ IV42544.)

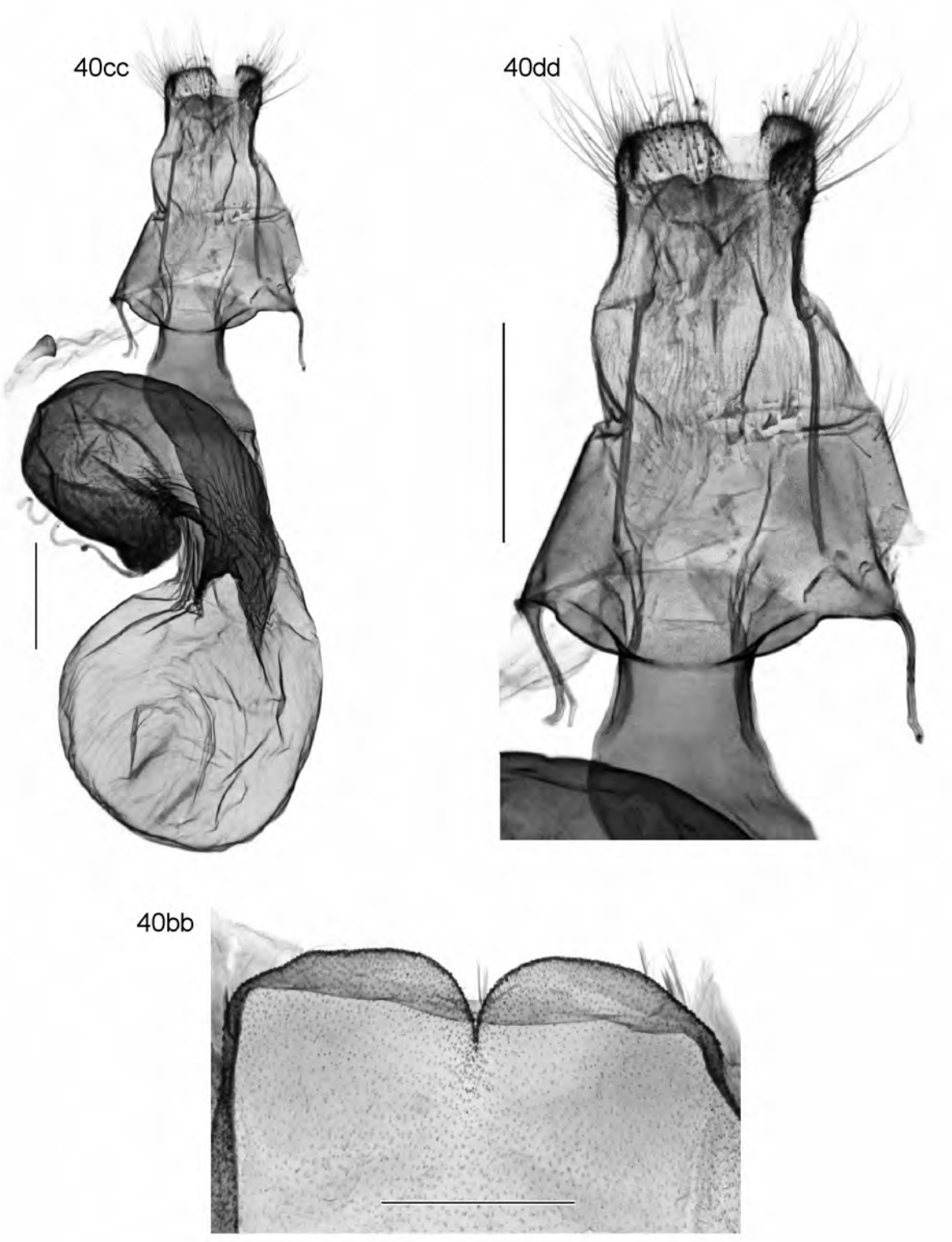


Fig. 40bb, *Ichneutica skelloni* female S7; **40cc,** female genitalia; **40dd,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 370.)

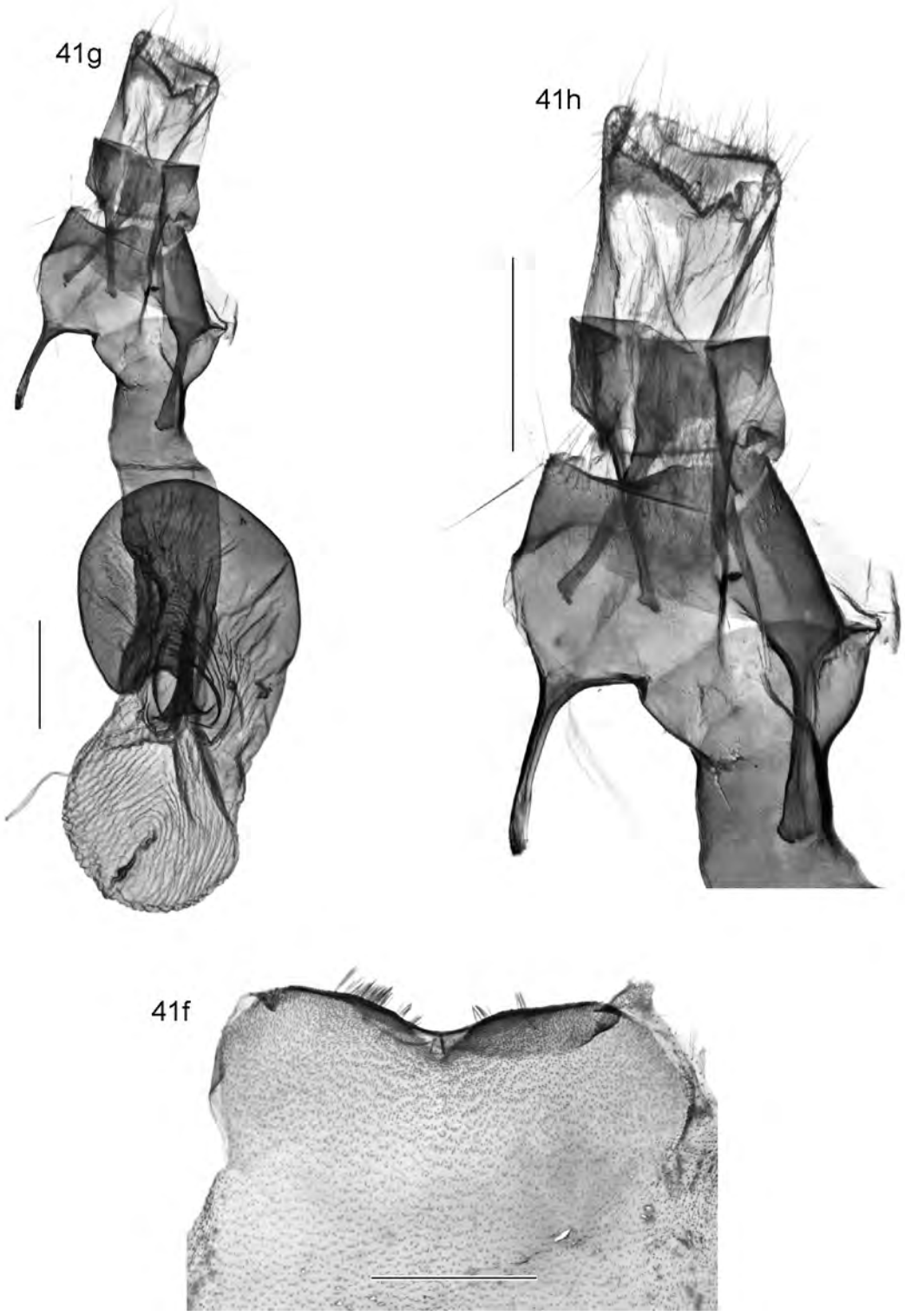


Fig. 41f, *Ichneutica barbara* paratype female S7; **41g,** female genitalia; **41h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 485.)

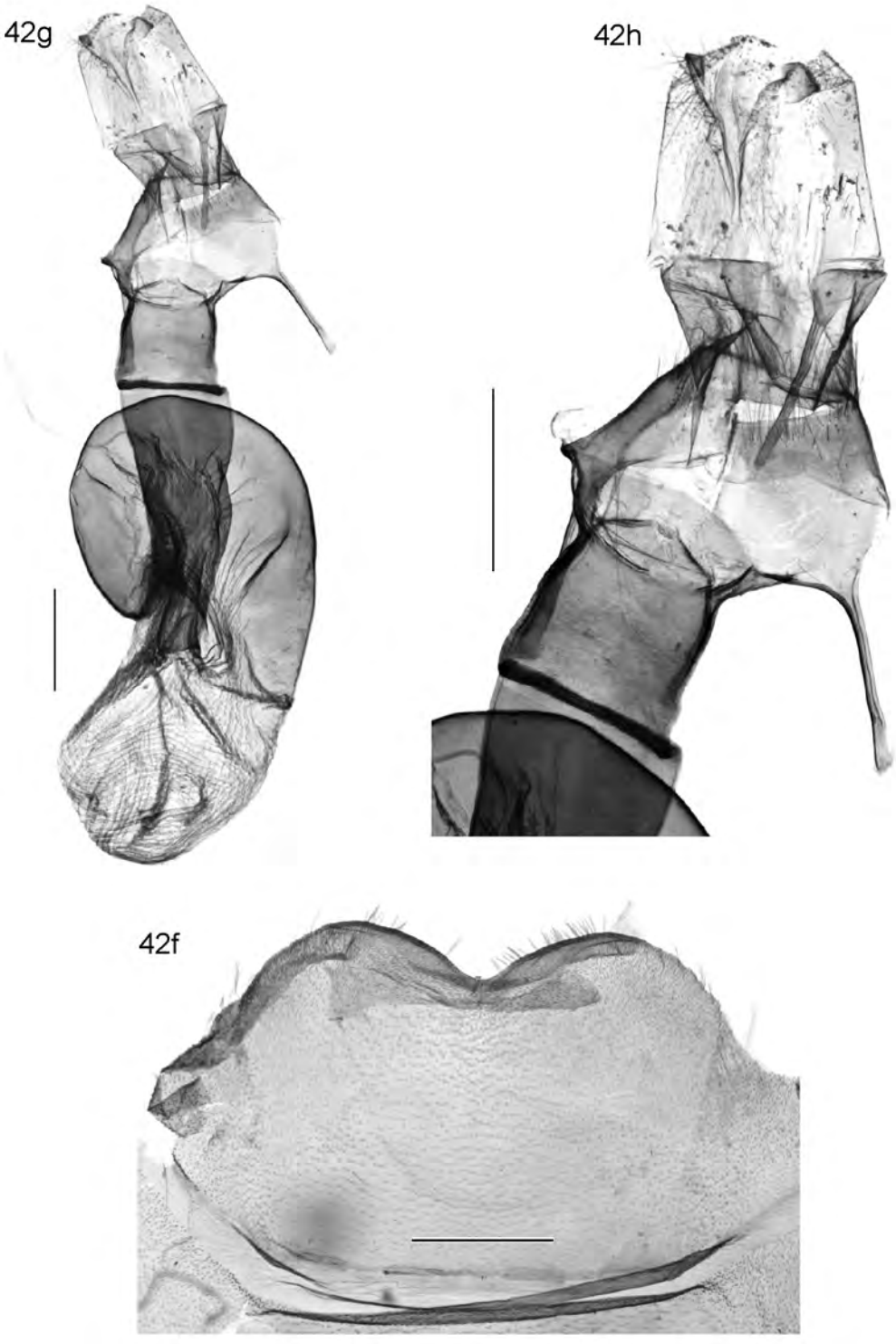


Fig. 42f, *Ichneutica omicron* female S7; **42g,** female genitalia; **42h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 484.)

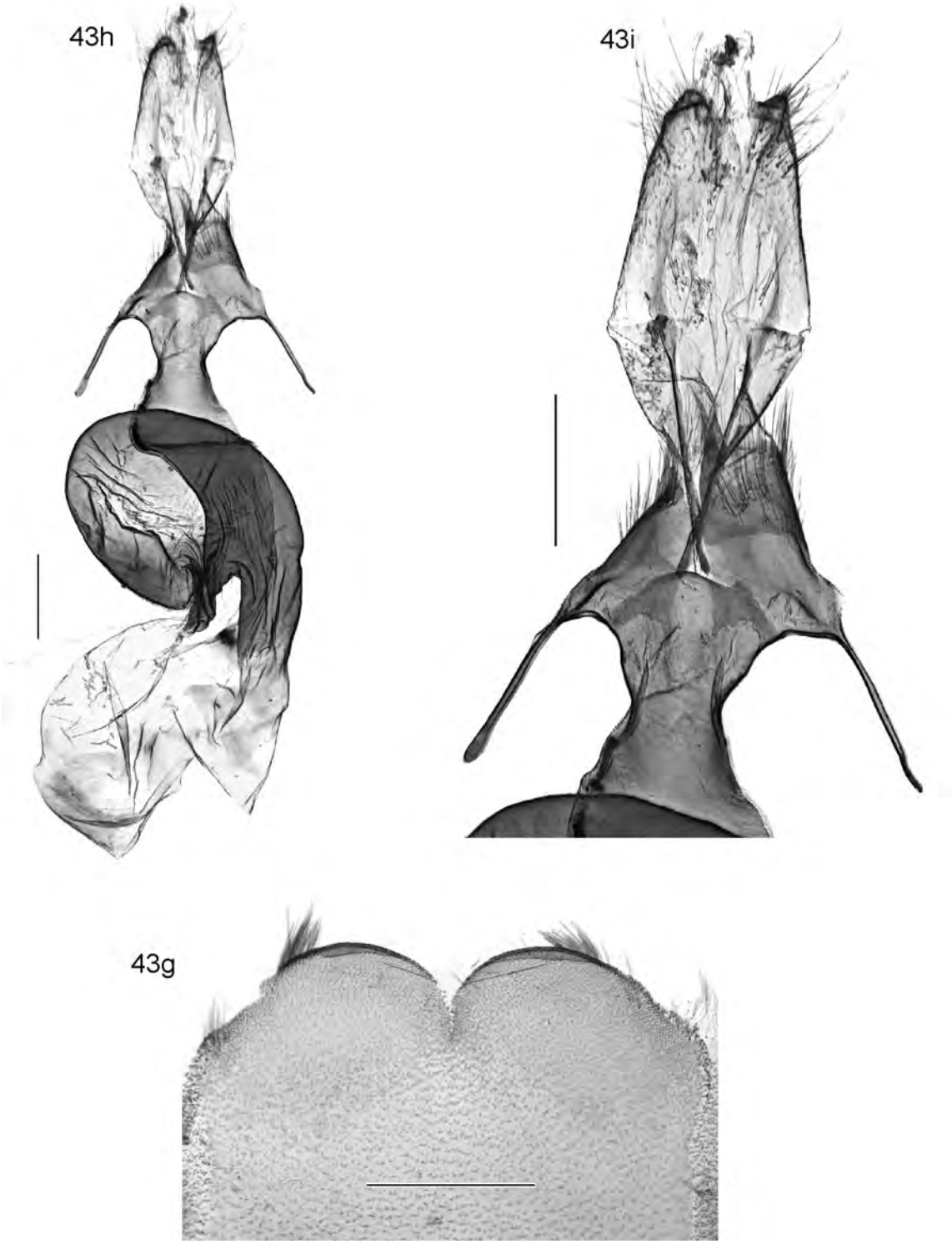


Fig. 43g, *Ichneutica sollennis* female S7; **43h,** female genitalia; **43i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 139.)

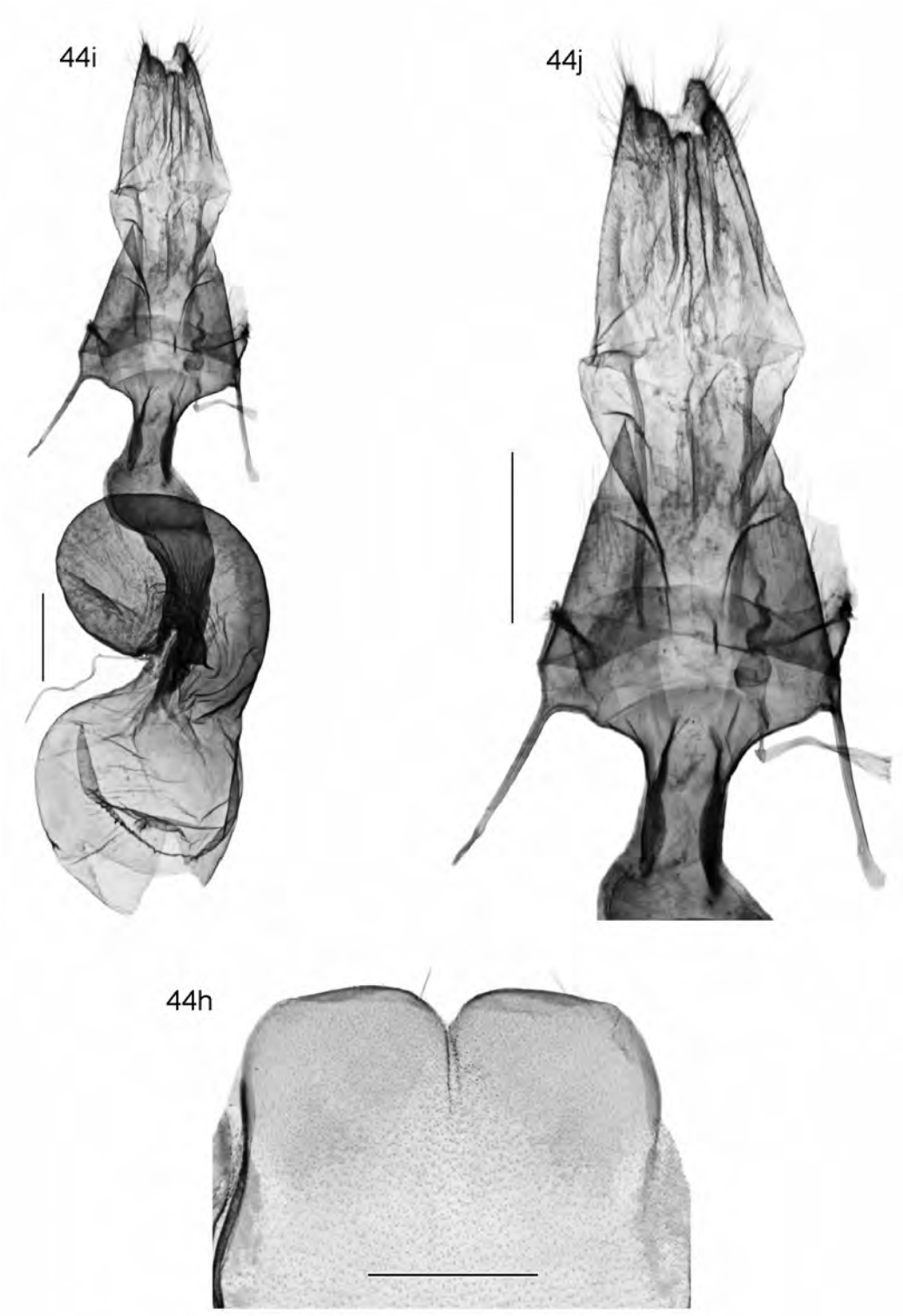


Fig. 44h, *Ichneutica cornuta* paratype female S7; **44i,** female genitalia; **44j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 339.)

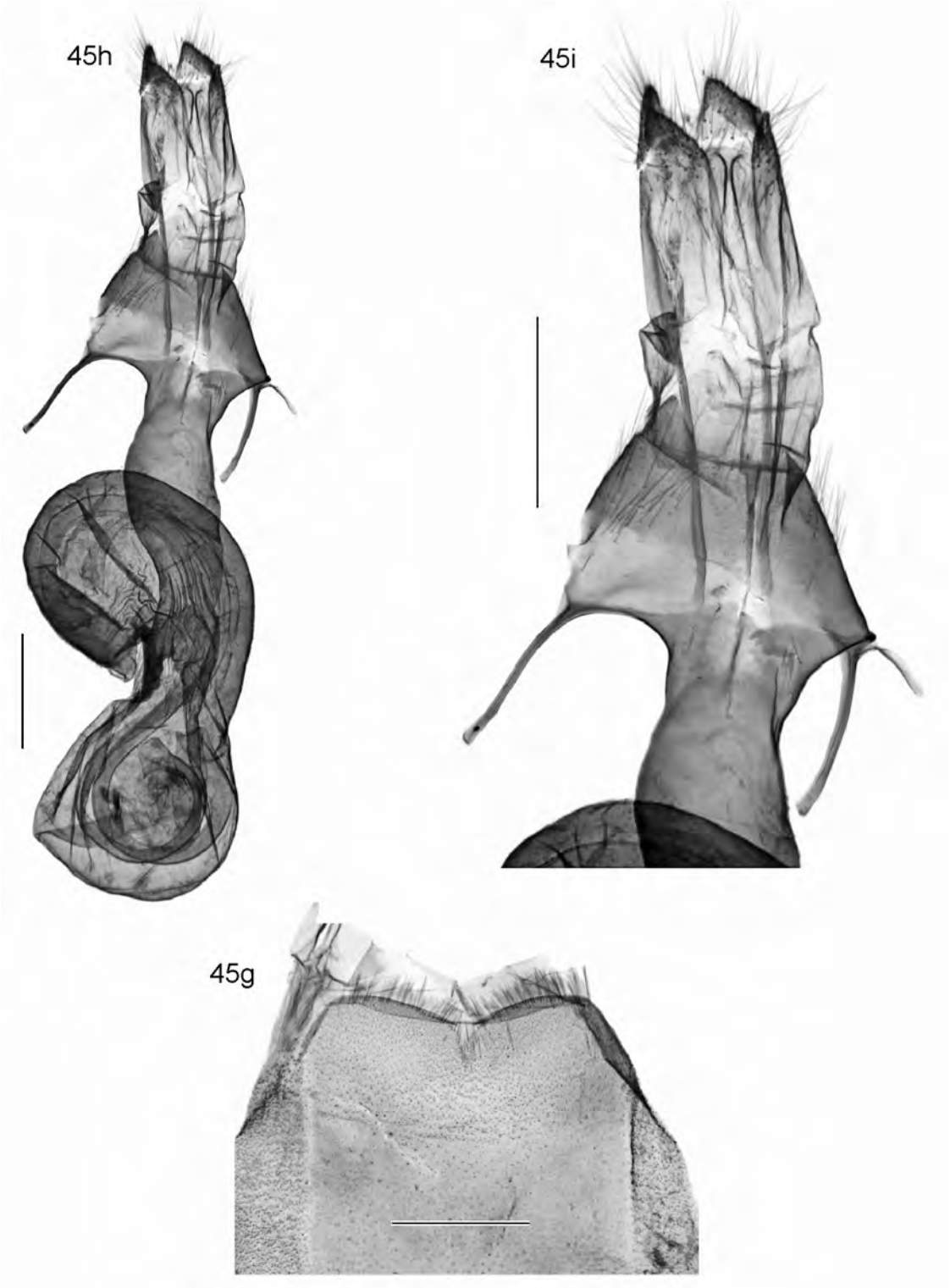


Fig. 45g, *Ichneutica lissoxyla* female S7; **45h,** female genitalia; **45i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 333.)

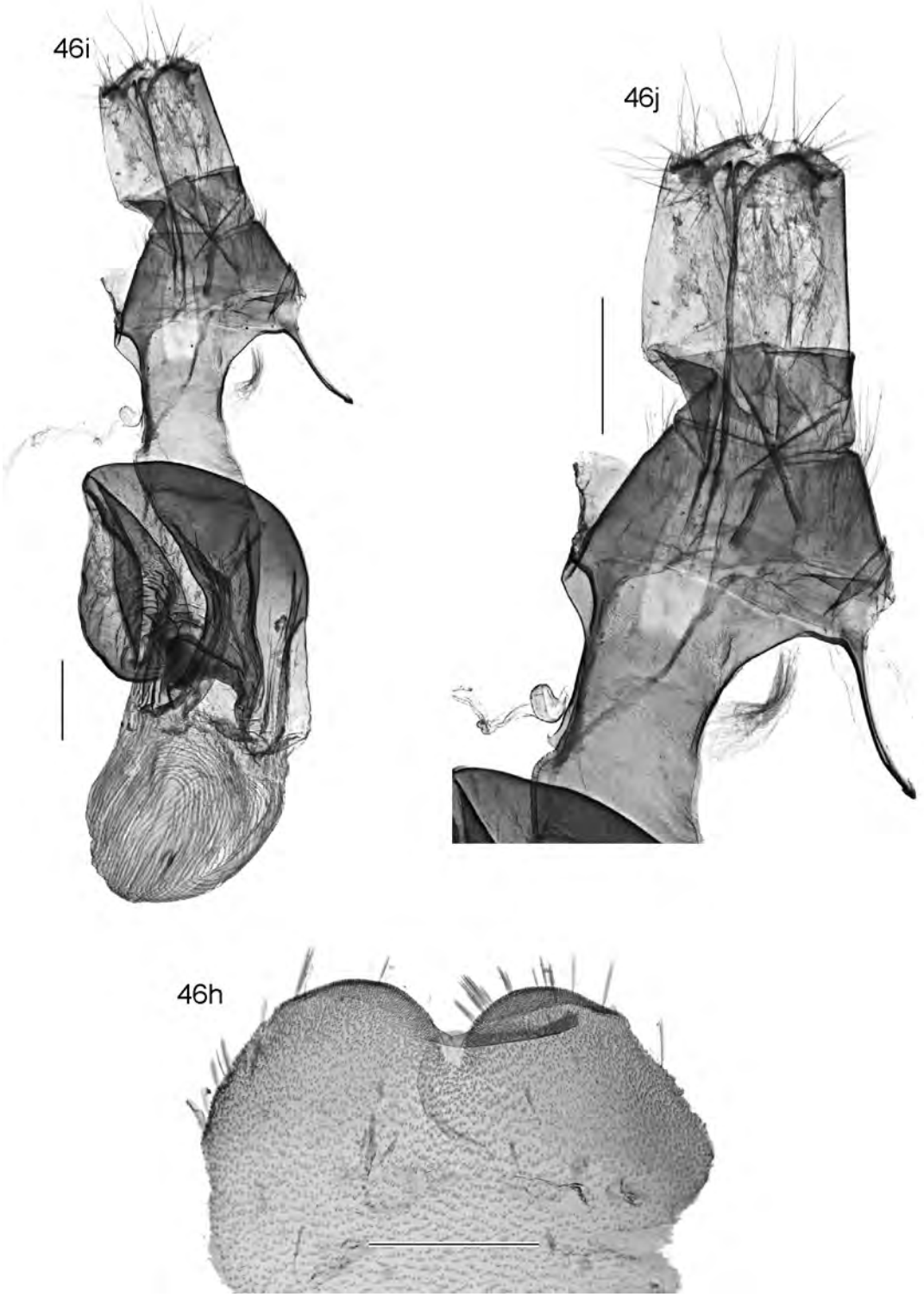


Fig. 46h, *Ichneutica micrastra* female S7; **46i,** female genitalia; **46j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 482.)

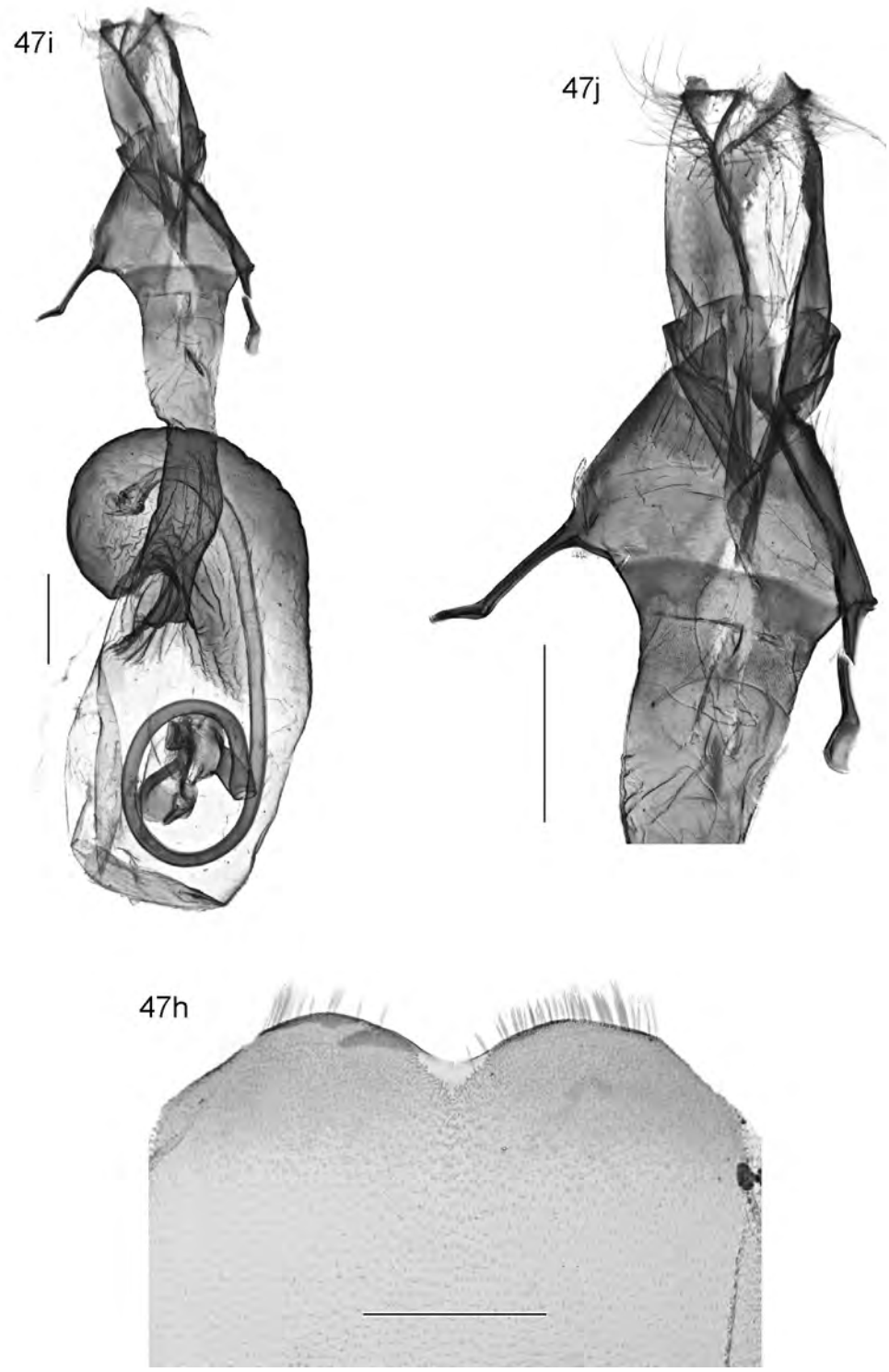


Fig. 47h, *Ichneutica sapiens* female S7; **47i,** female genitalia; **47j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 137.)

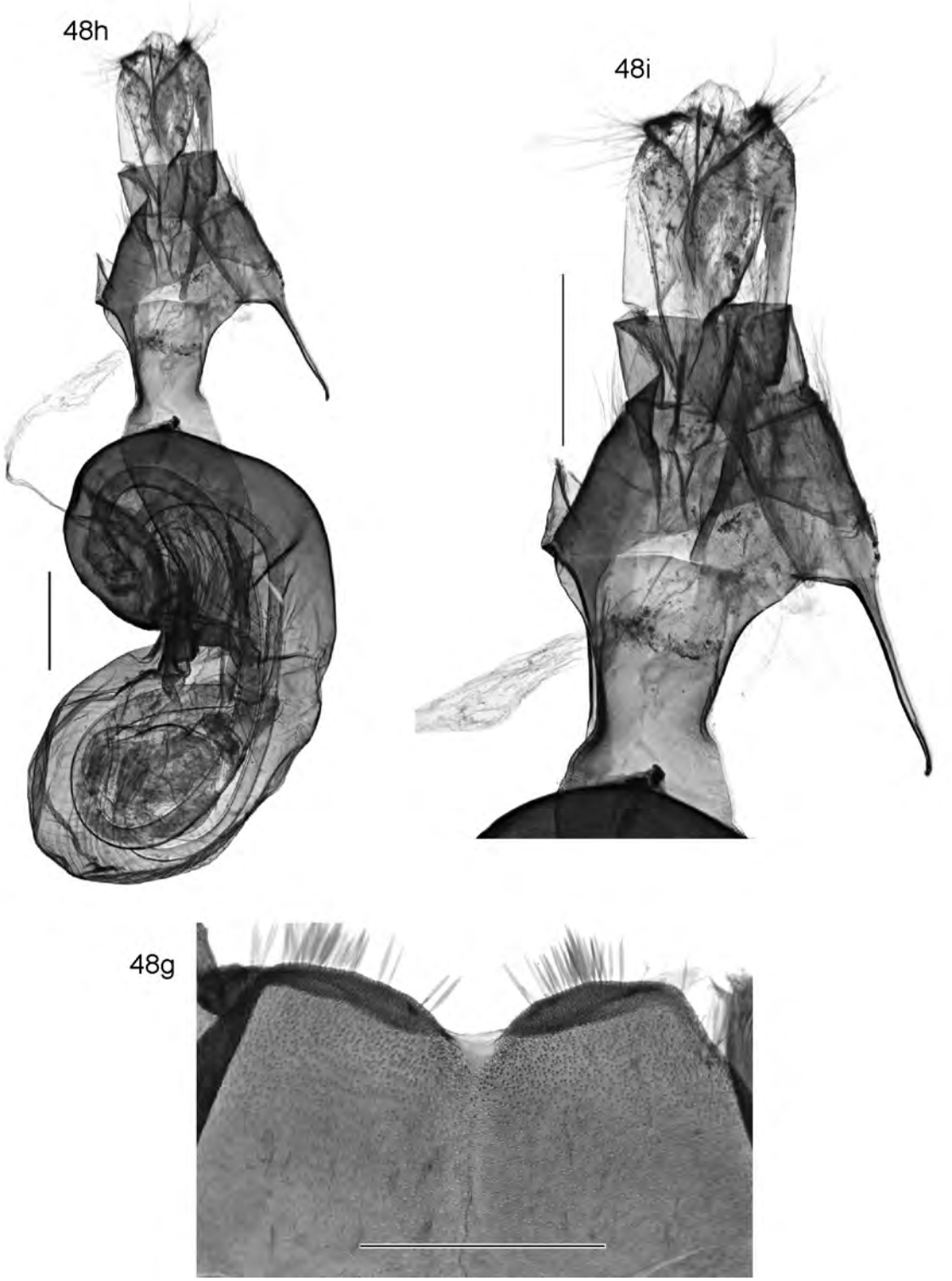


Fig. 48g, *Ichneutica phaula* female S7; **48h,** female genitalia; **48i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct.335.)

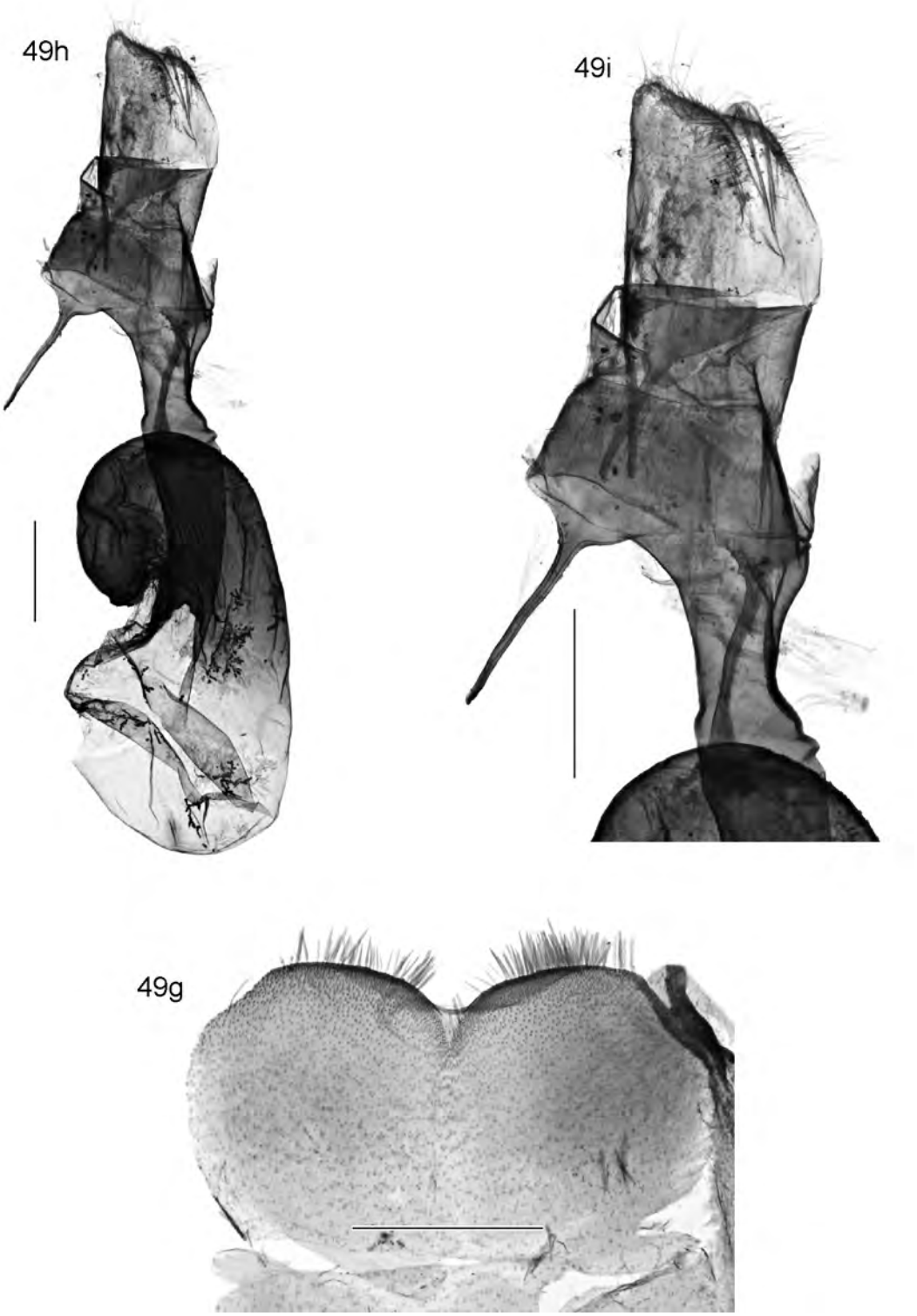


Fig. 49g, *Ichneutica toroneura* female S7; **49h,** female genitalia; **49i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 518.)

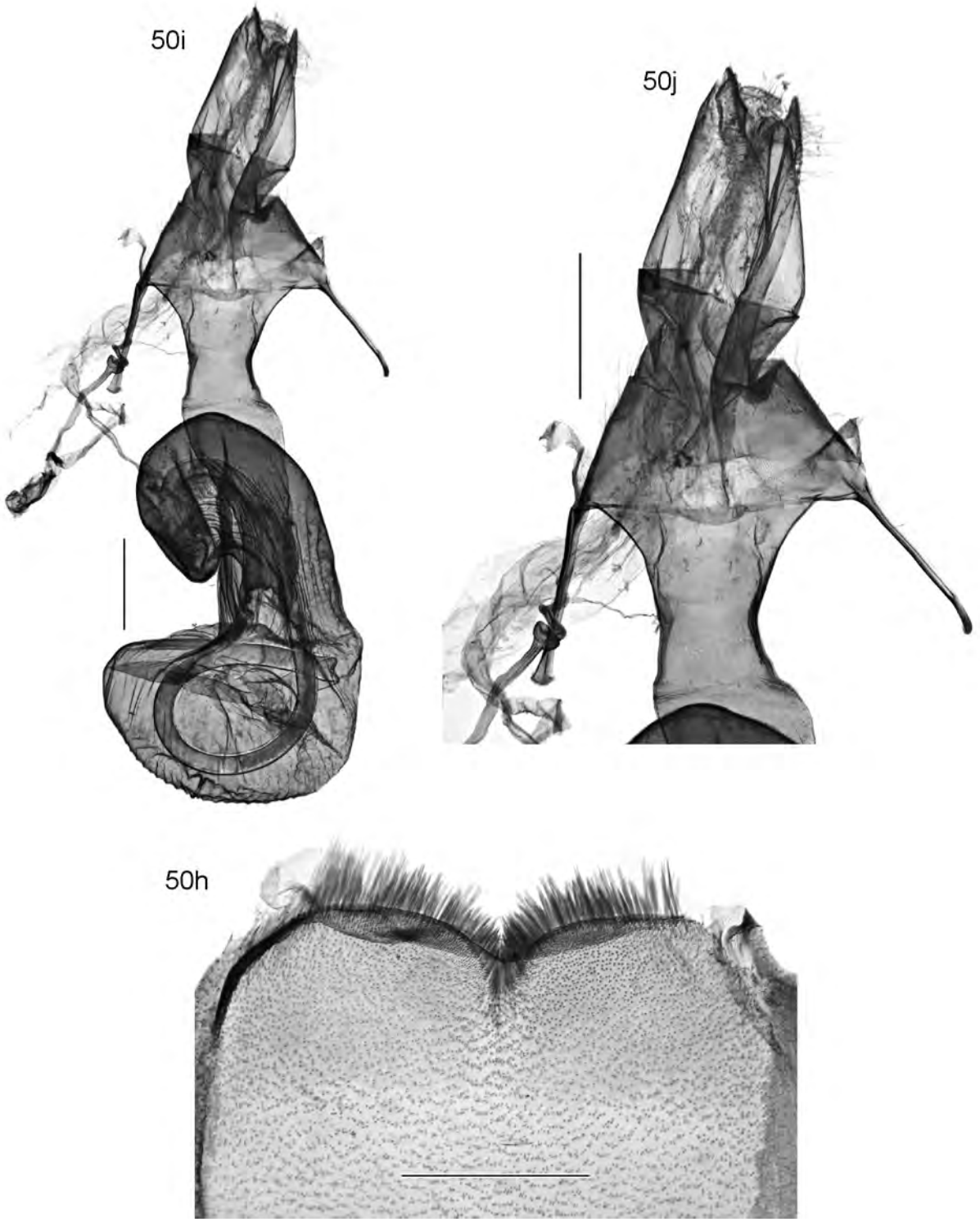


Fig. 50h, *Ichneutica unica* female S7; **50i,** female genitalia; **50j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 336.)

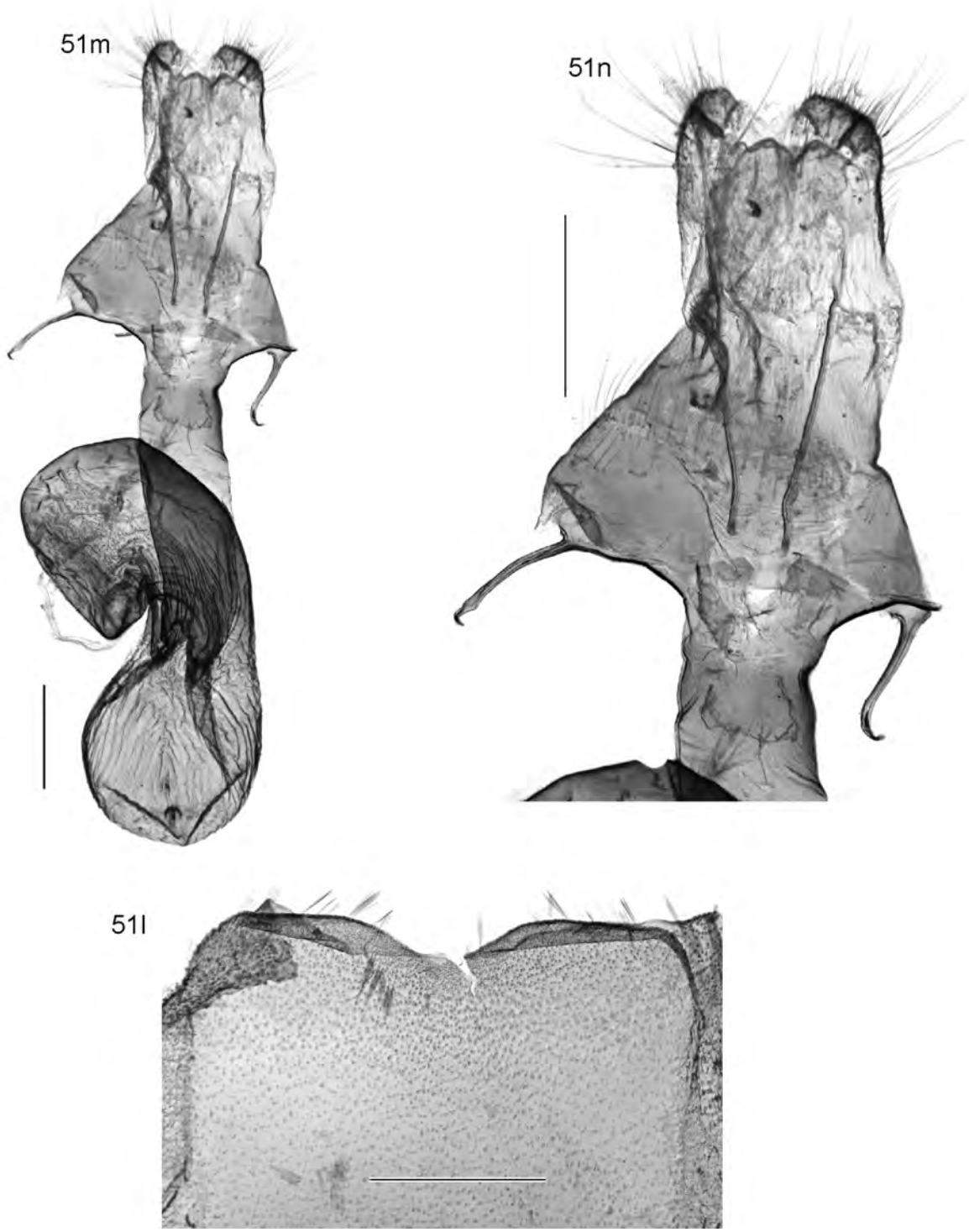


Fig. 51l, *Ichneutica acontistis* female S7; **51m,** female genitalia; **51n,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 457.)

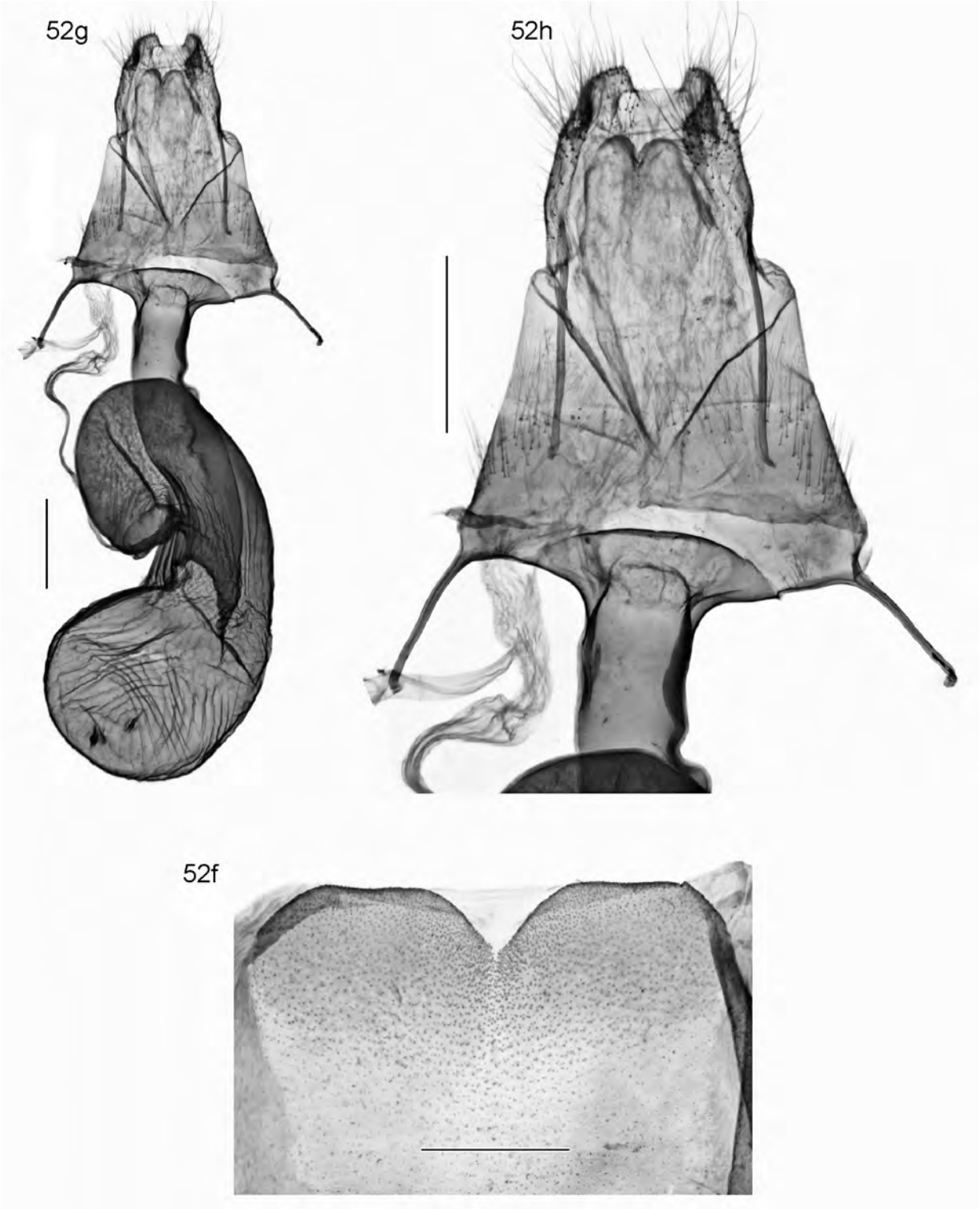


Fig. 52f, *Ichneutica emmersonorum* paratype female S7; **52g,** female genitalia; **52h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 373.)

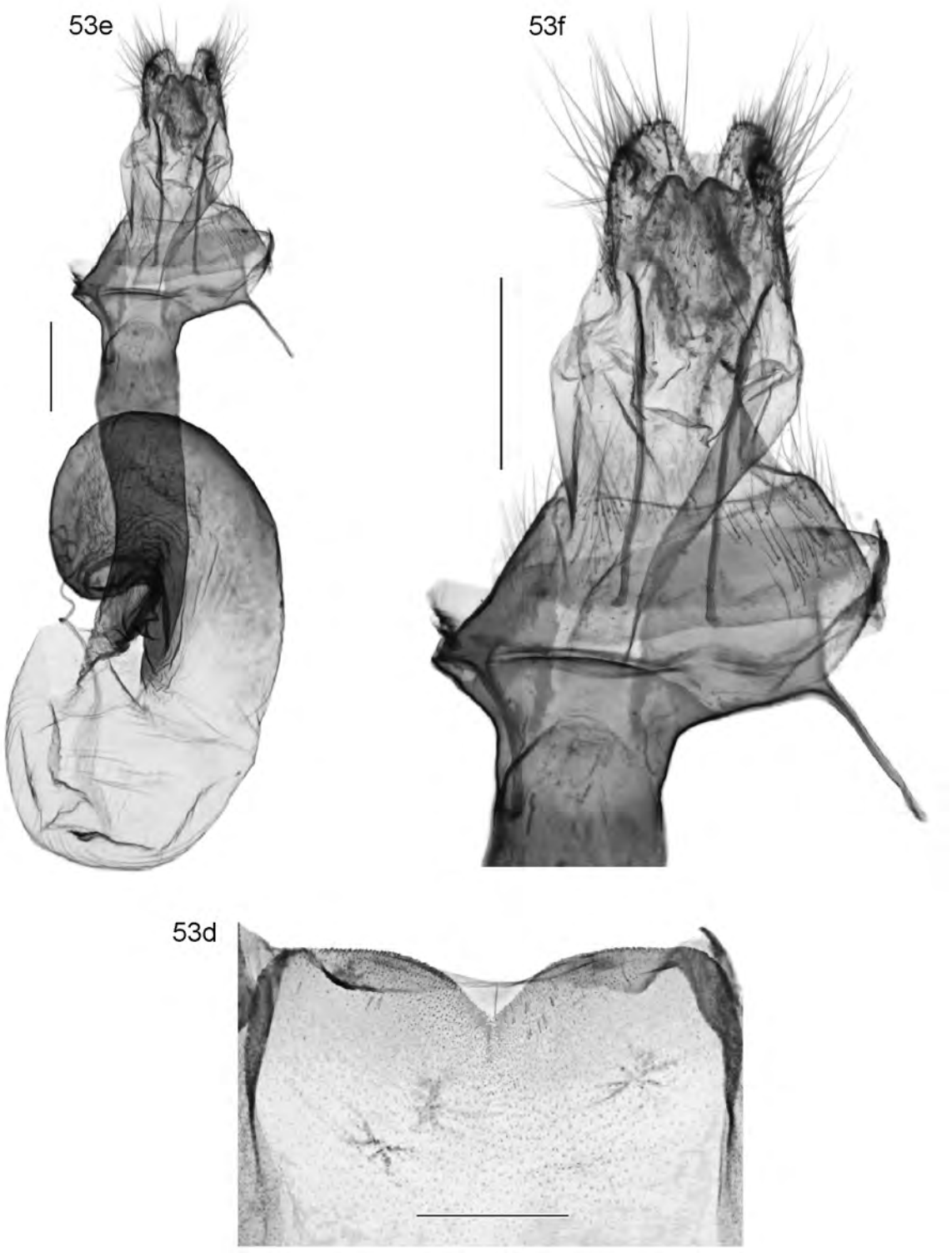


Fig. 53d, *Ichneutica stulta* lectotype female S7; **53e,** female genitalia; **53f,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 326.)

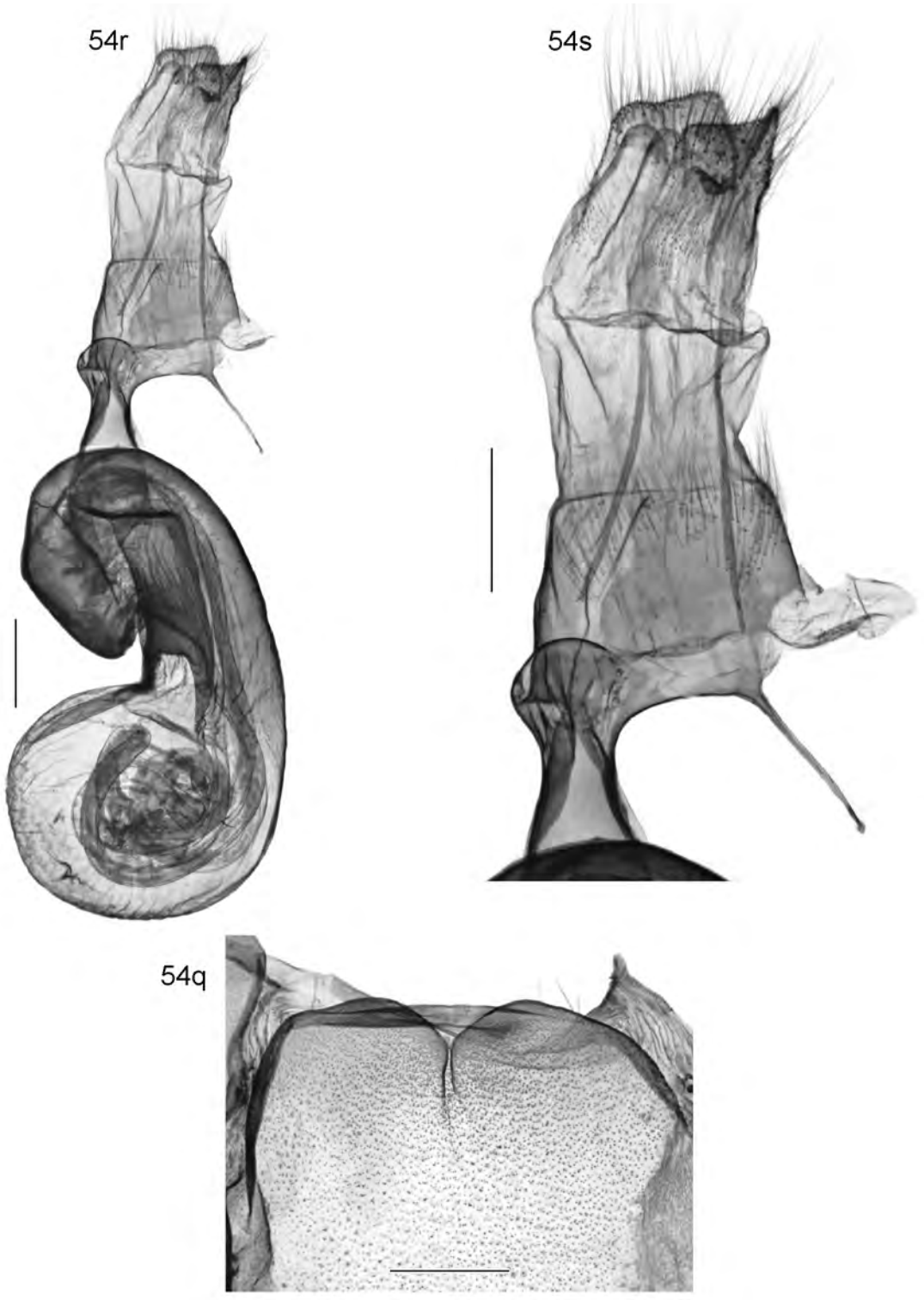


Fig. 54q, *Ichneutica arotis* female S7; **54r,** female genitalia; **54s,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 340.)

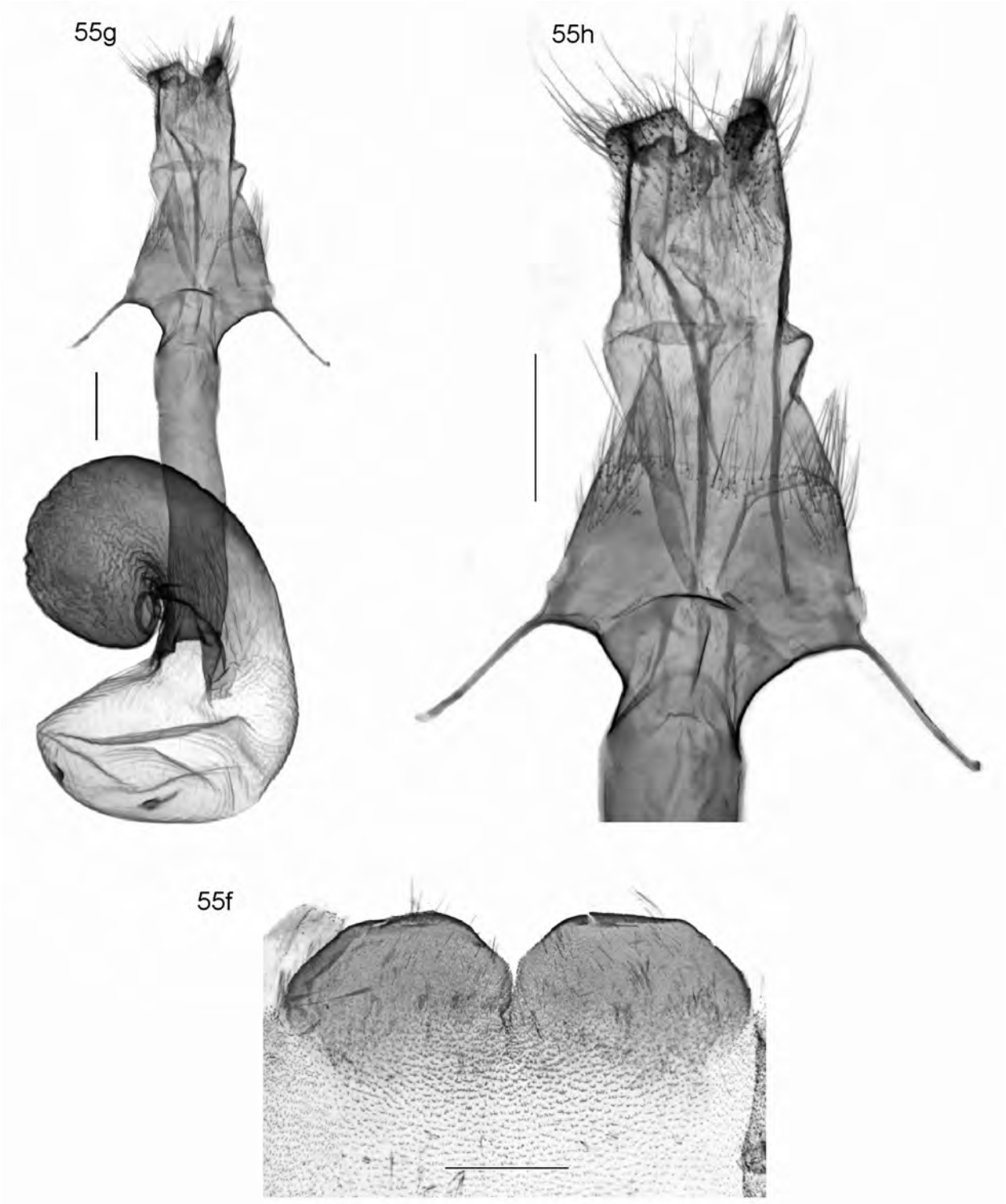


Fig. 55f, *Ichneutica theobroma* female S7; **55g,** female genitalia; **55h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 231.) [56 *Ichneutica lyfordi*: female unknown.]

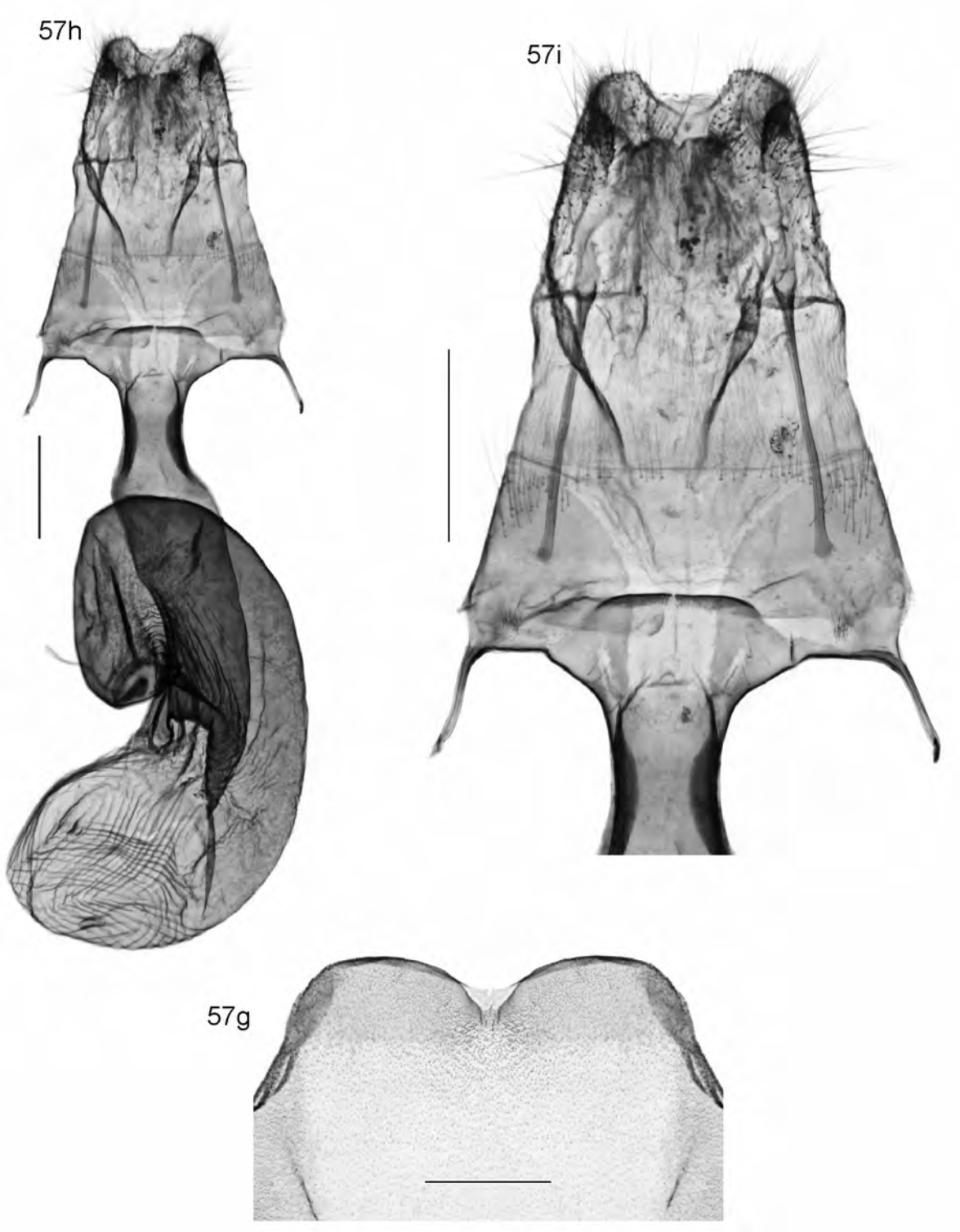


Fig. 57g, *Ichneutica paraxysta* female S7; **57h,** female genitalia; **57i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 365.)

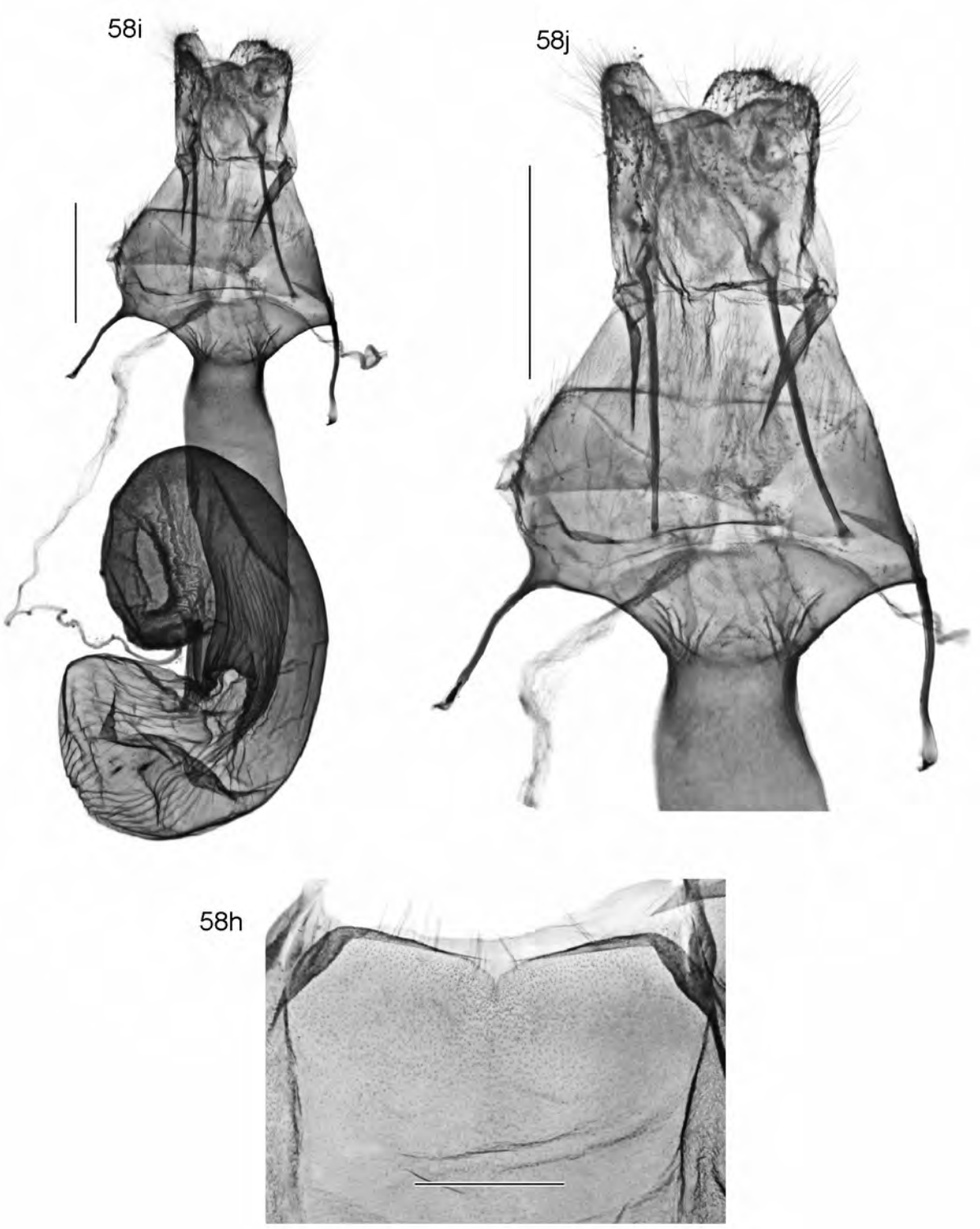


Fig. 58h, *Ichneutica prismatica* paratype female S7; **58i,** female genitalia; **58j,** close-up of ovipositor, segment 8 and ostium. (Slide OMNZ IV42524.)

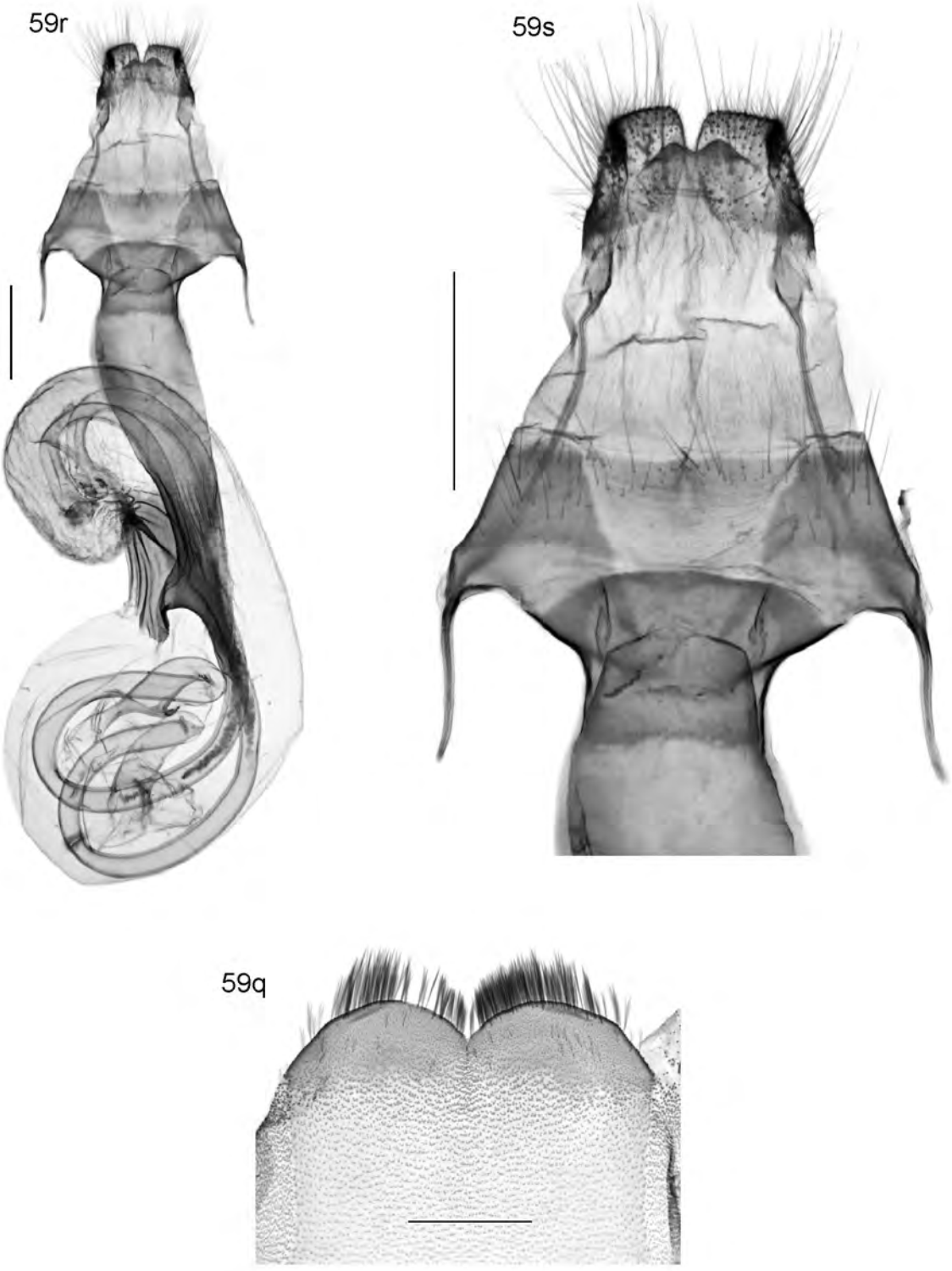


Fig. 59q, *Ichneutica sistens* female S7; **59r,** female genitalia; **59s,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 126.)

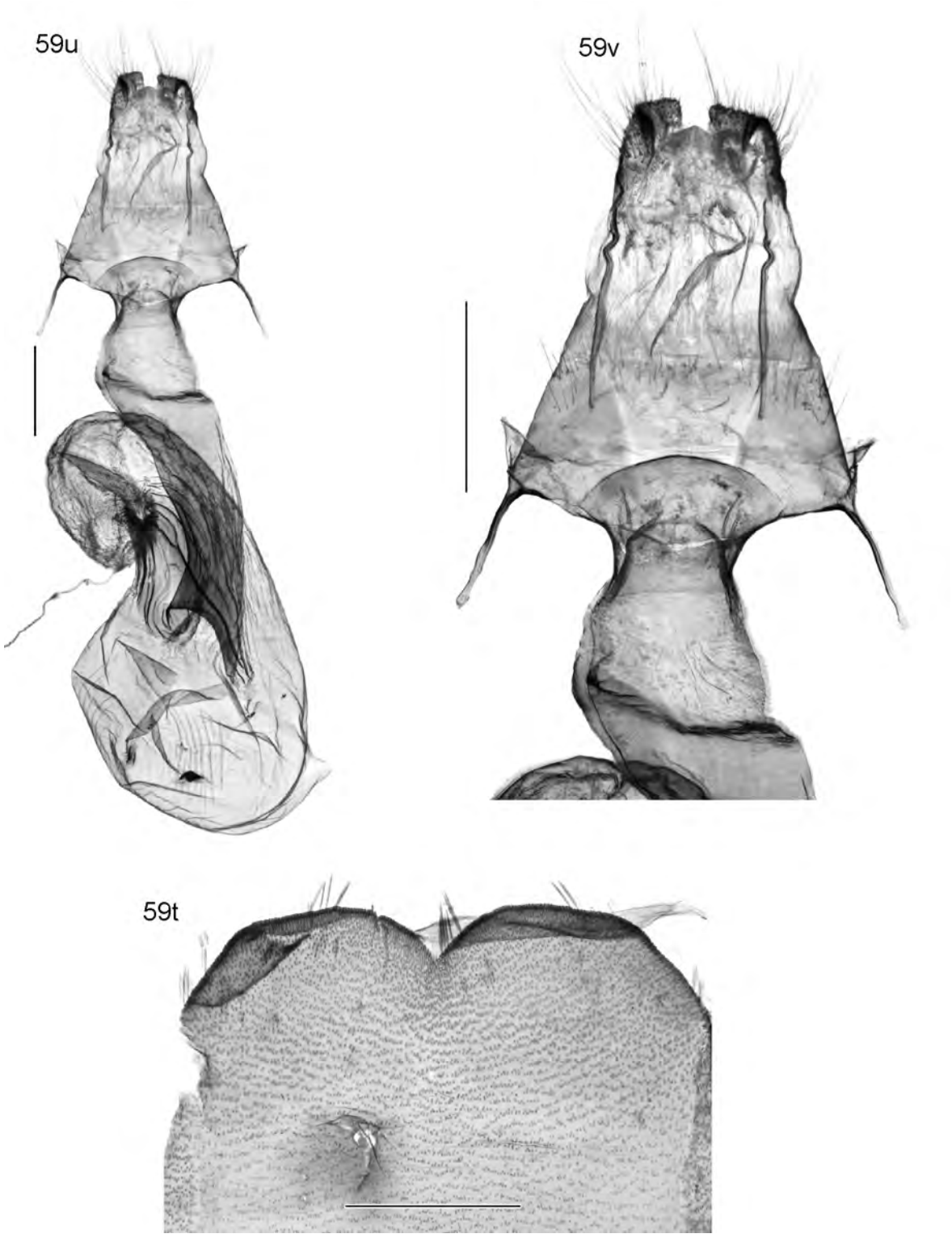


Fig. 59t, *Ichneutica sistens* female S7; **59u,** female genitalia; **59v,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 524.)

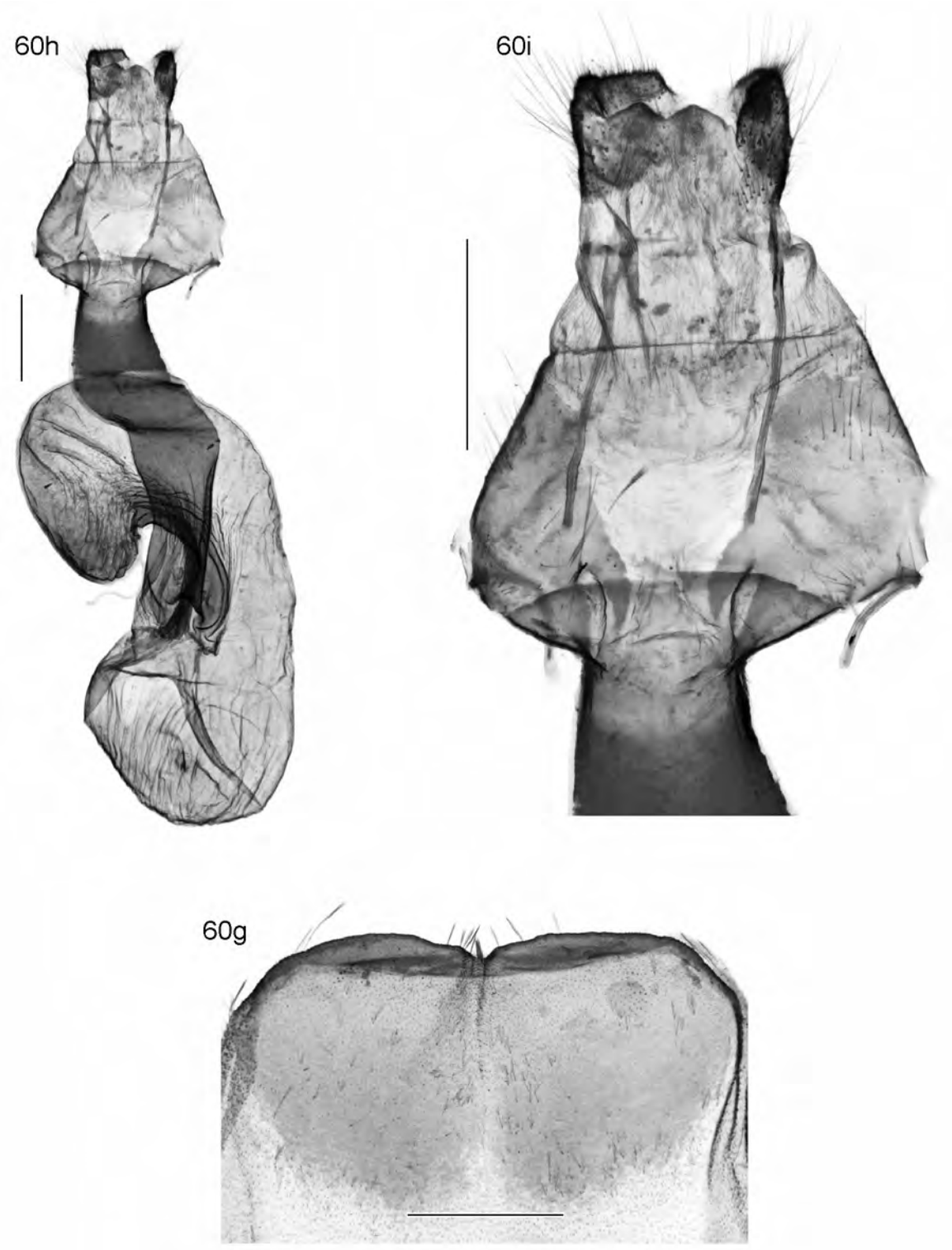


Fig. 60g, *Ichneutica maya* female S7; **60h,** female genitalia; **60i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 354.)

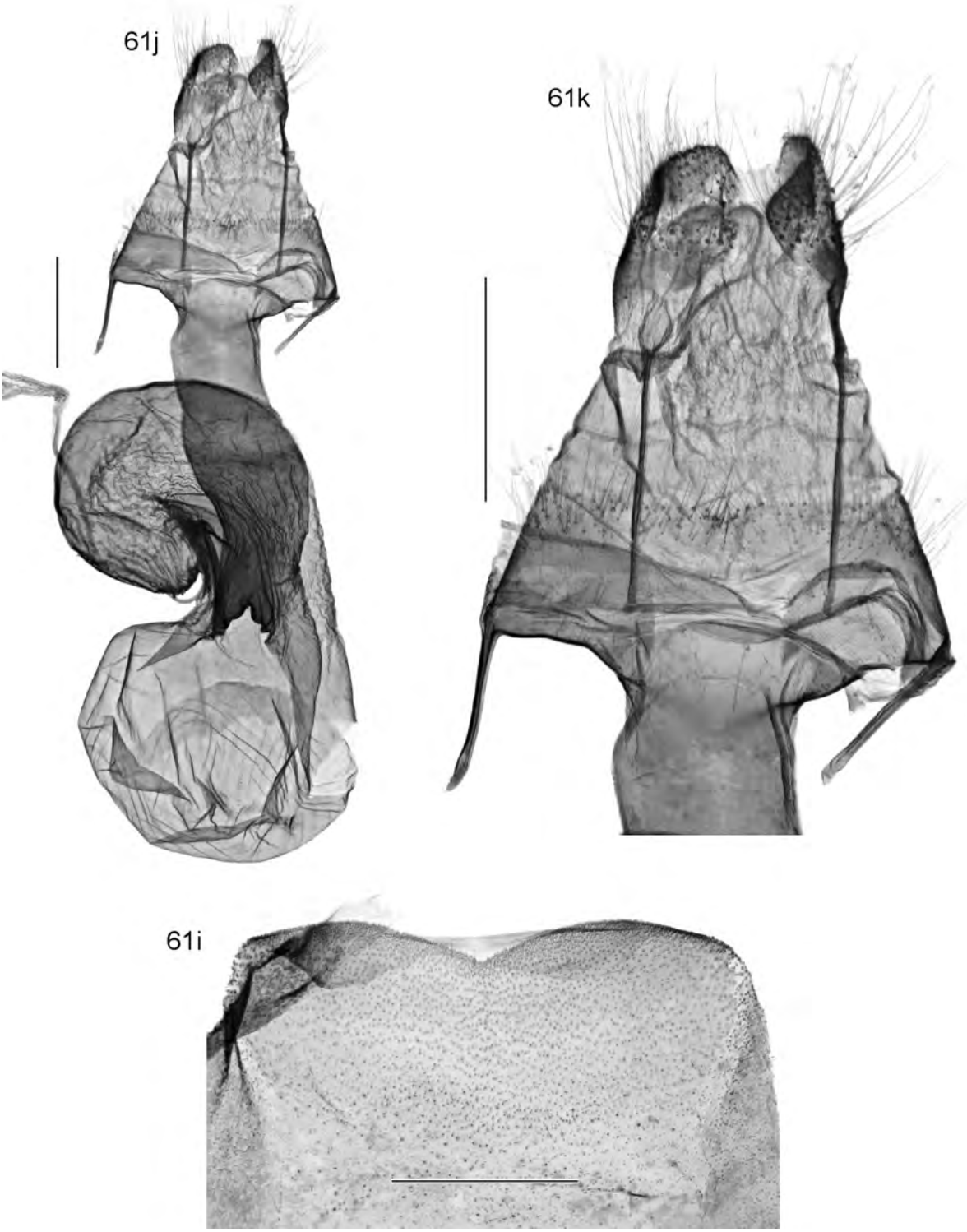


Fig. 61i, *Ichneutica paracausta* female S7; **61j,** female genitalia; **61k,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 537.)

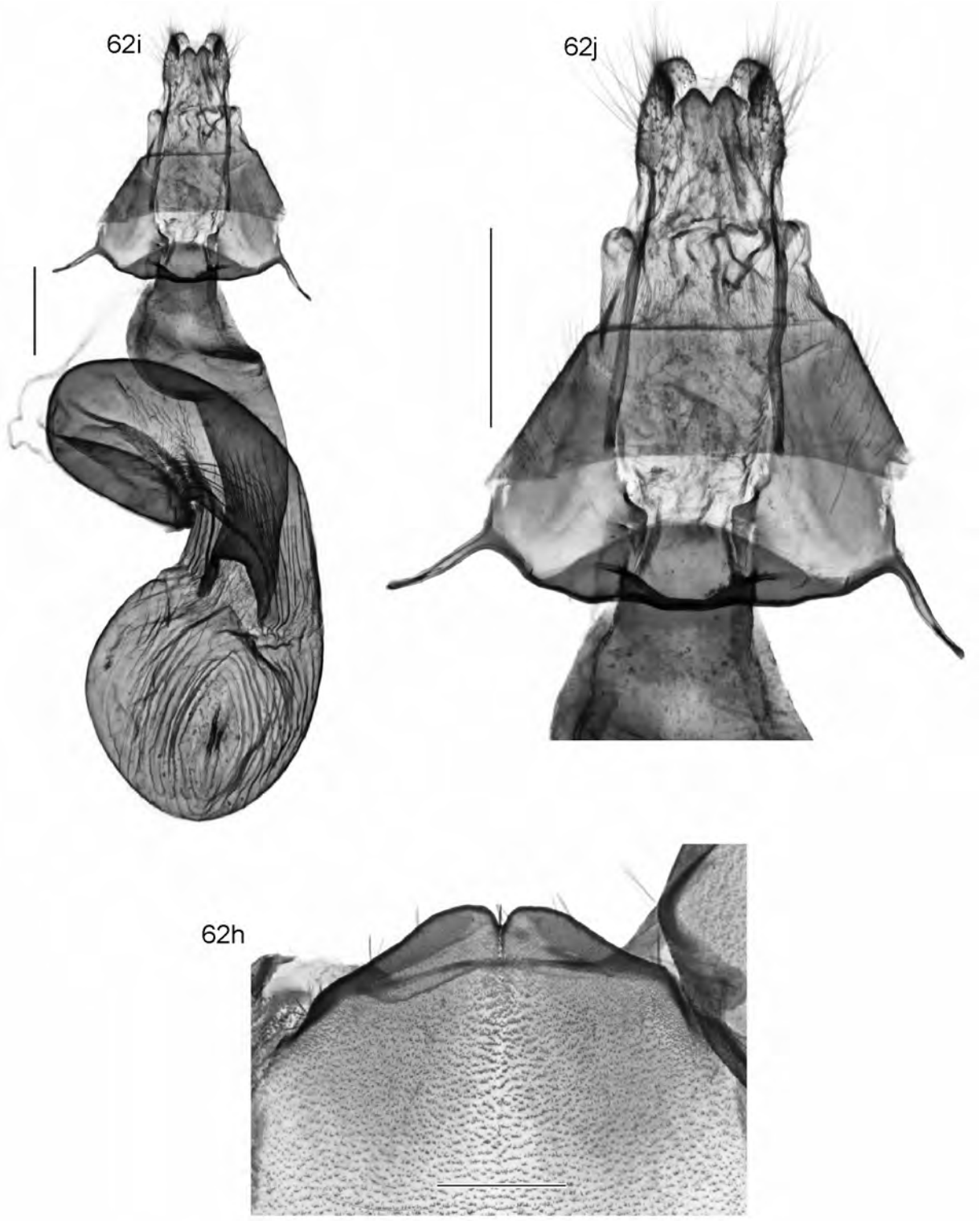


Fig. 62h, *Ichneutica rubescens* female S7; **62i,** female genitalia; **62j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 368.)

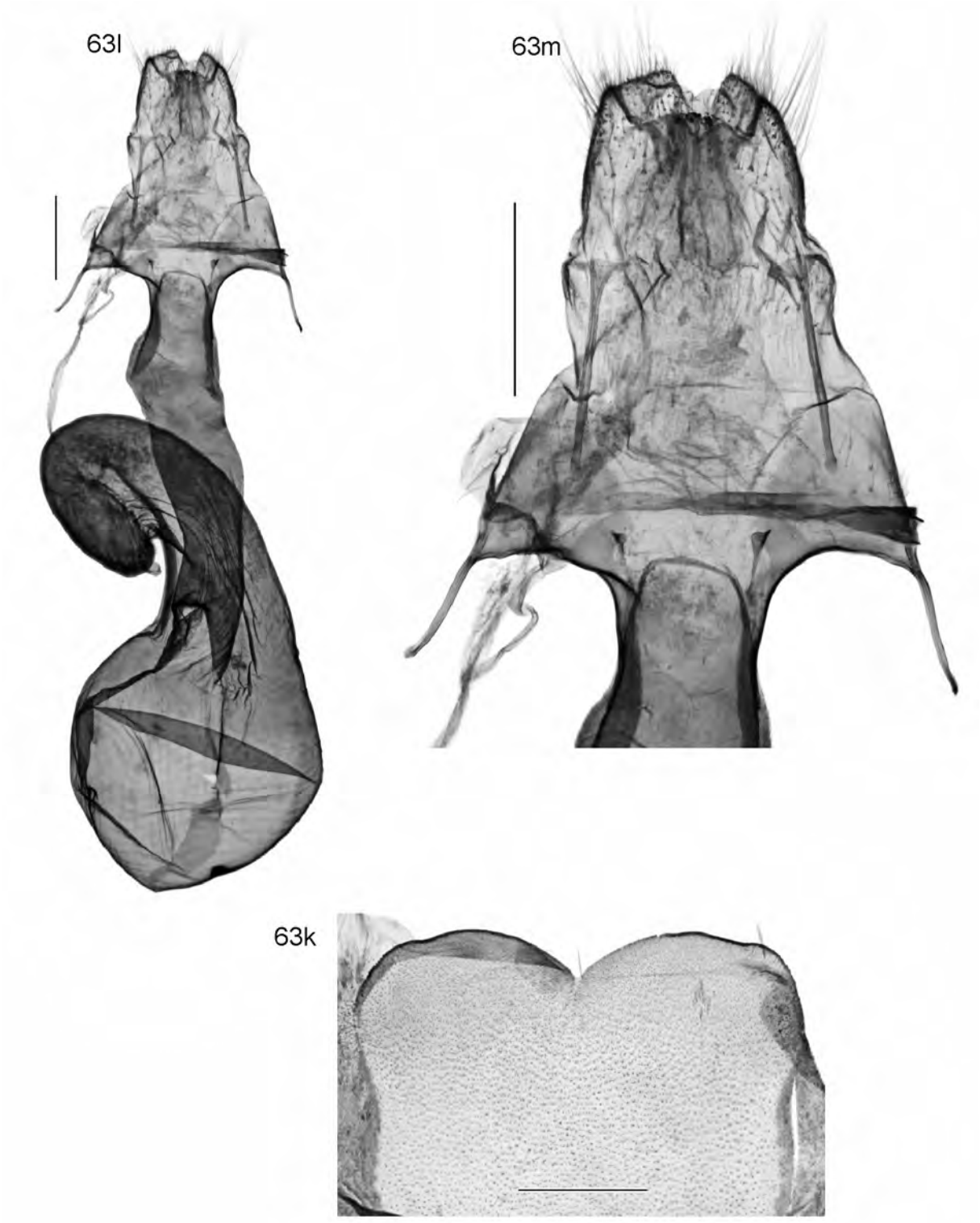


Fig. 63k, *Ichneutica cuneata* female S7; **63l,** female genitalia; **63m,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 347.)

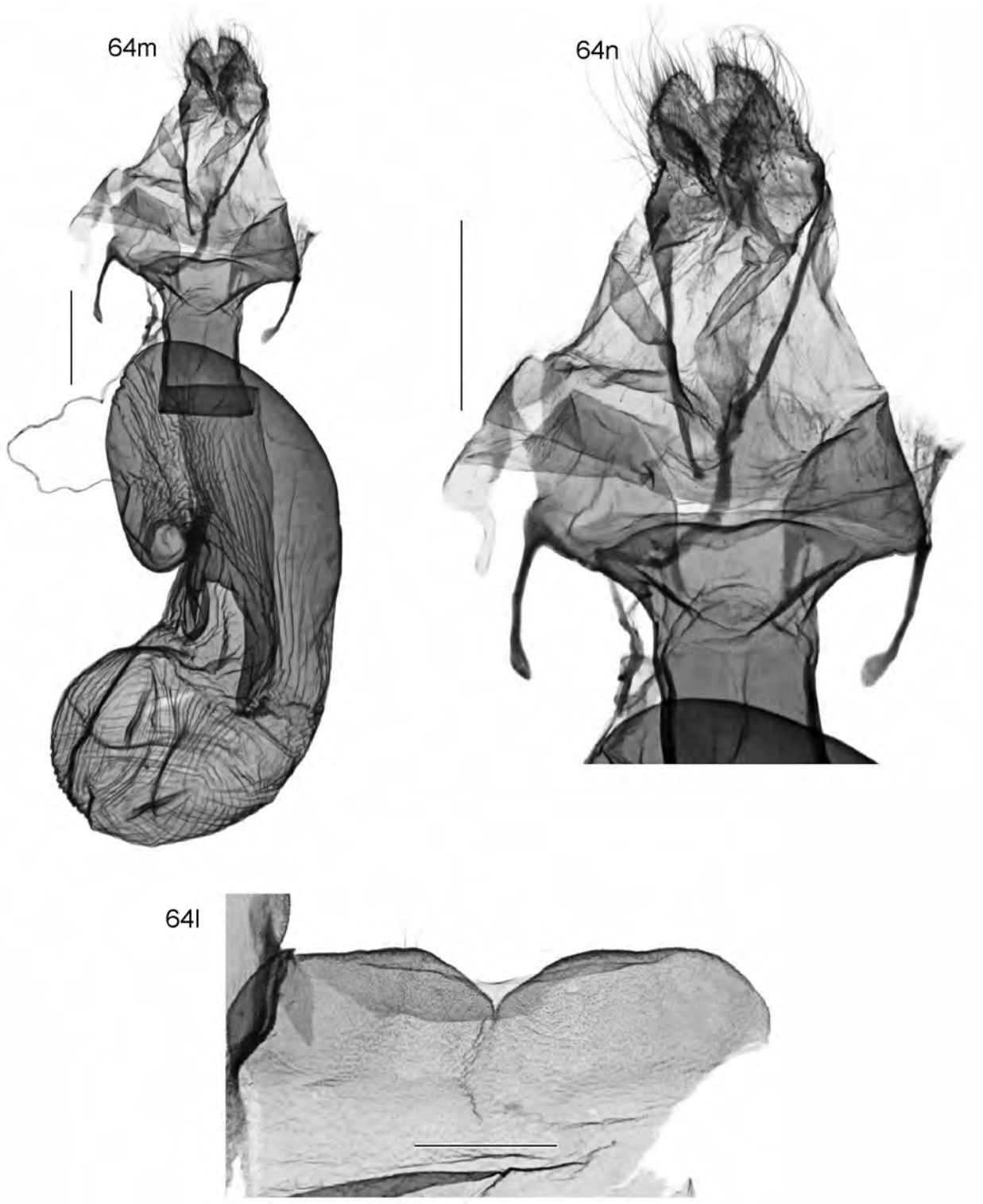


Fig. 64l, *Ichneutica epiastra* female S7; **64m,** female genitalia; **64n,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 358.)

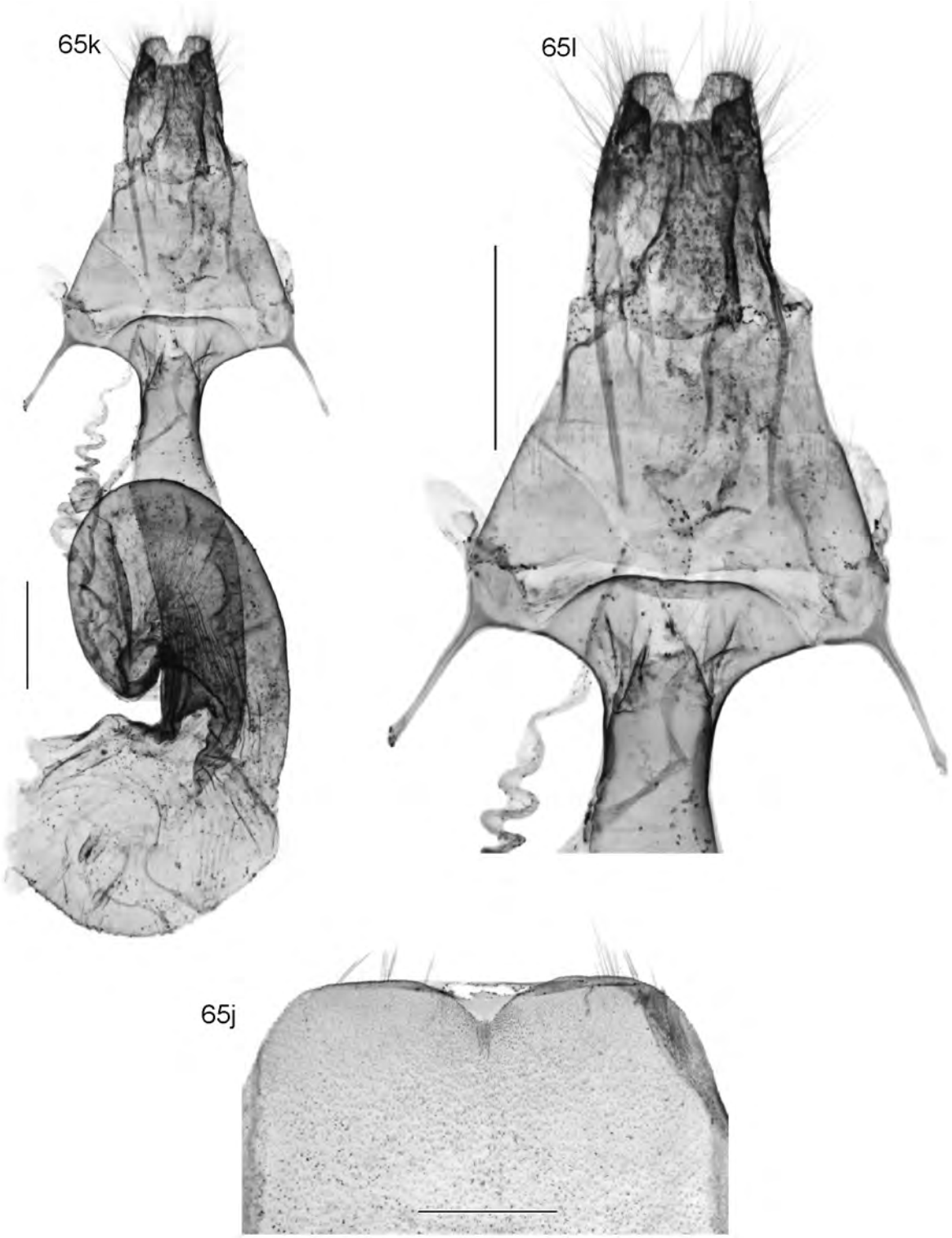


Fig. 65j, *Ichneutica haedifrontella* female S7; **65k,** female genitalia; **65l,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 321.)

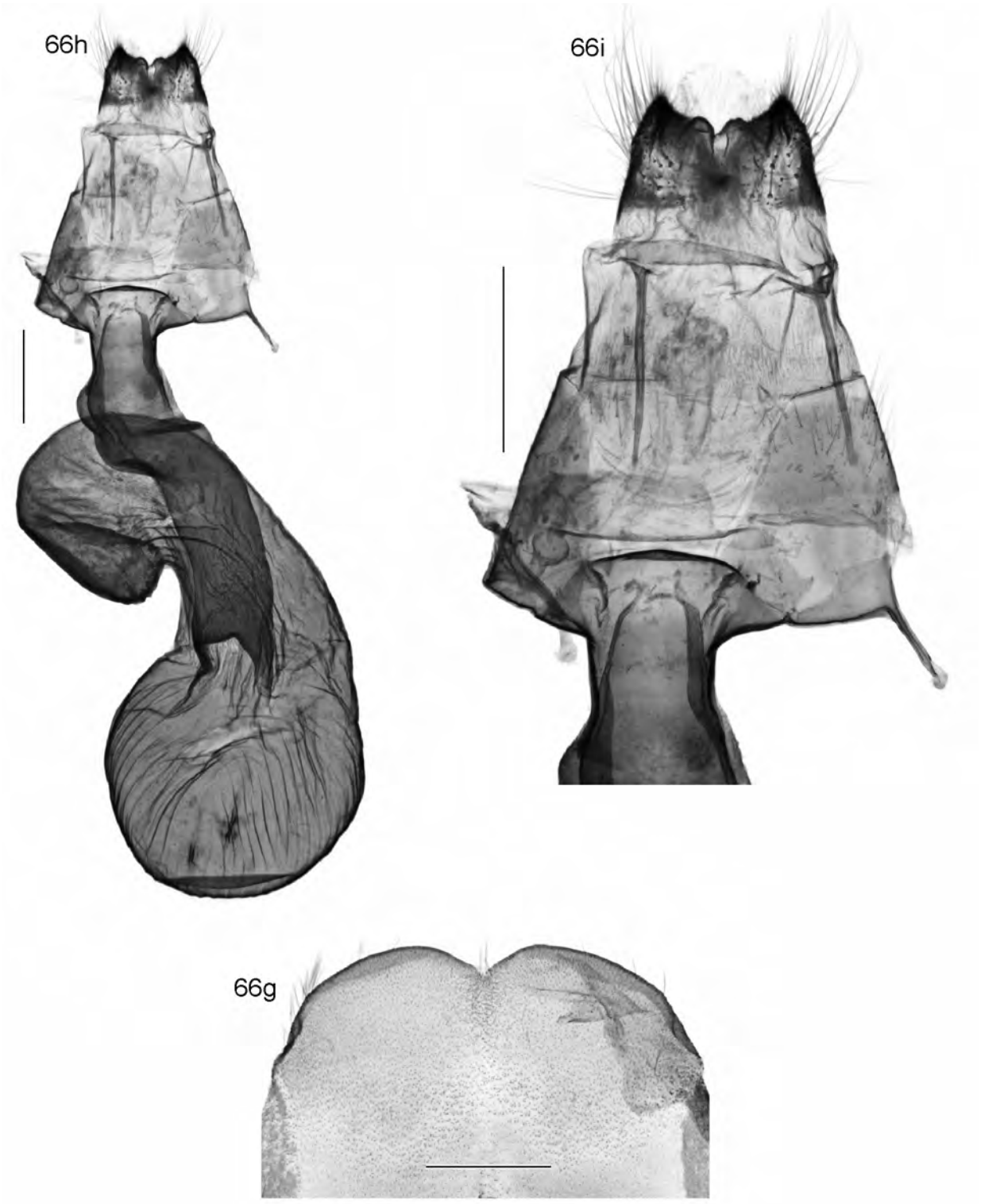


Fig. 66g, *Ichneutica lindsayorum* female S7; **66h,** female genitalia; **66i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 360.)

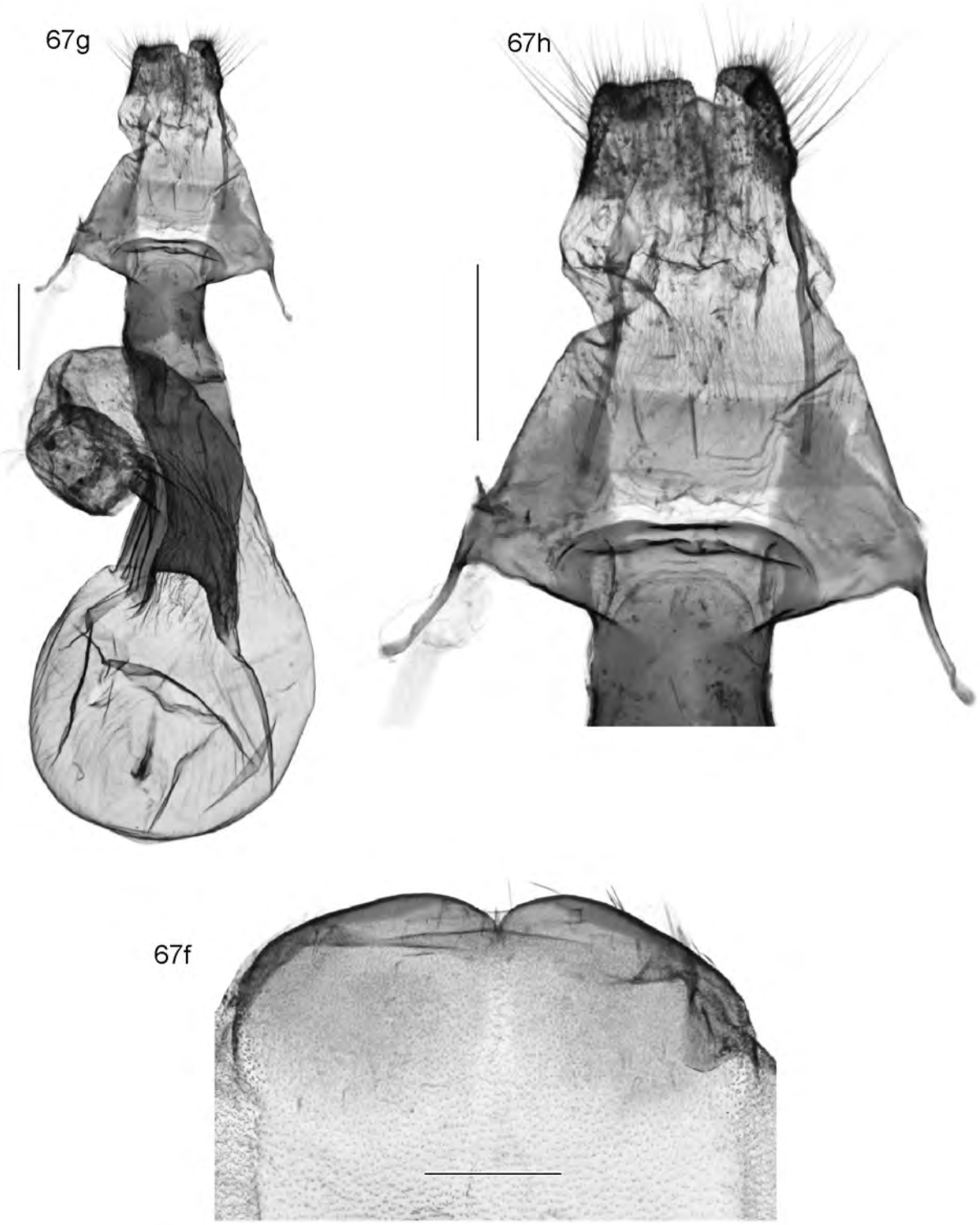


Fig. 67f, *Ichneutica olivea* female S7; **67g,** female genitalia; **67h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 357.)

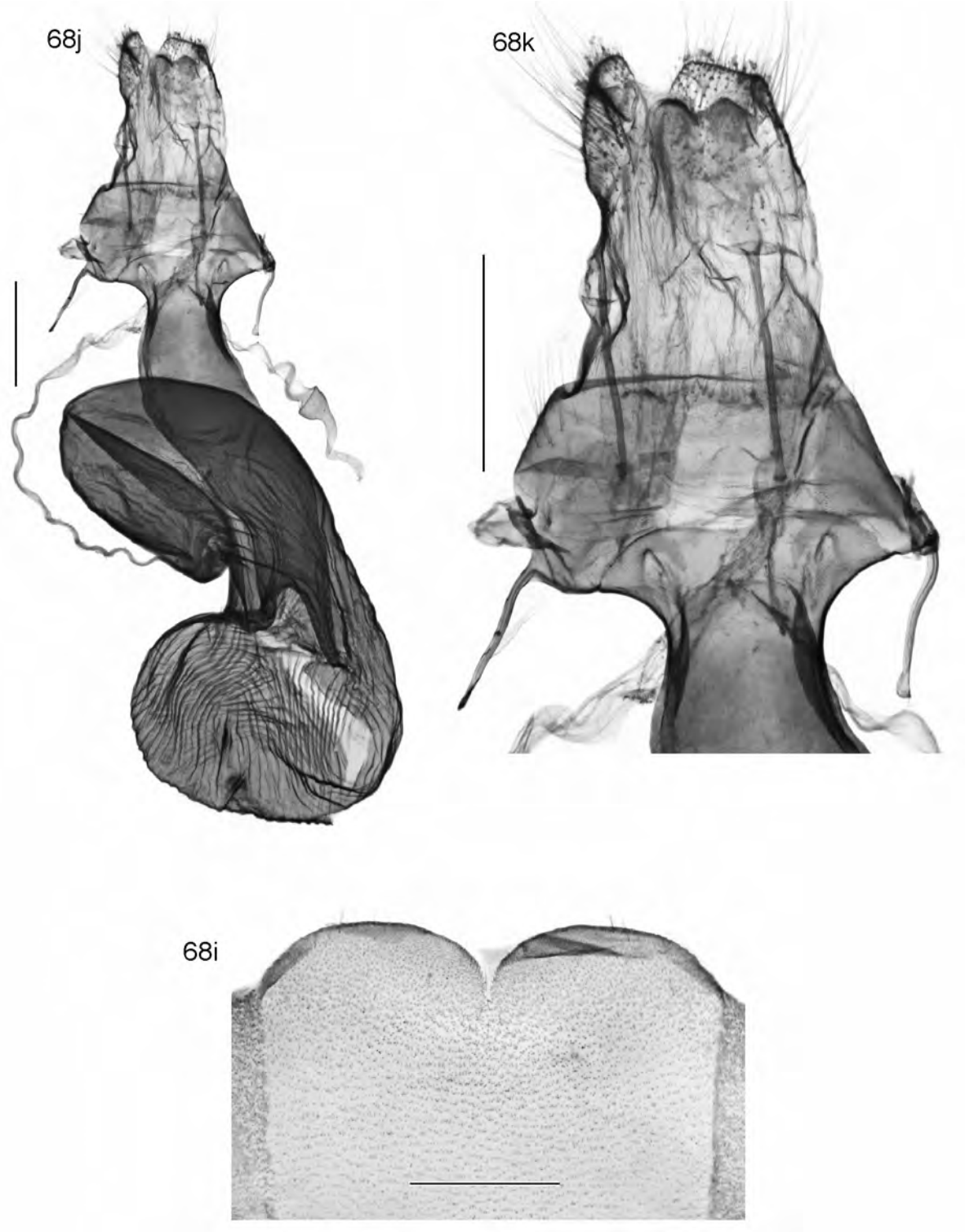


Fig. 68i, *Ichneutica propria* female S7; **68j,** female genitalia; **68k,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 367.)

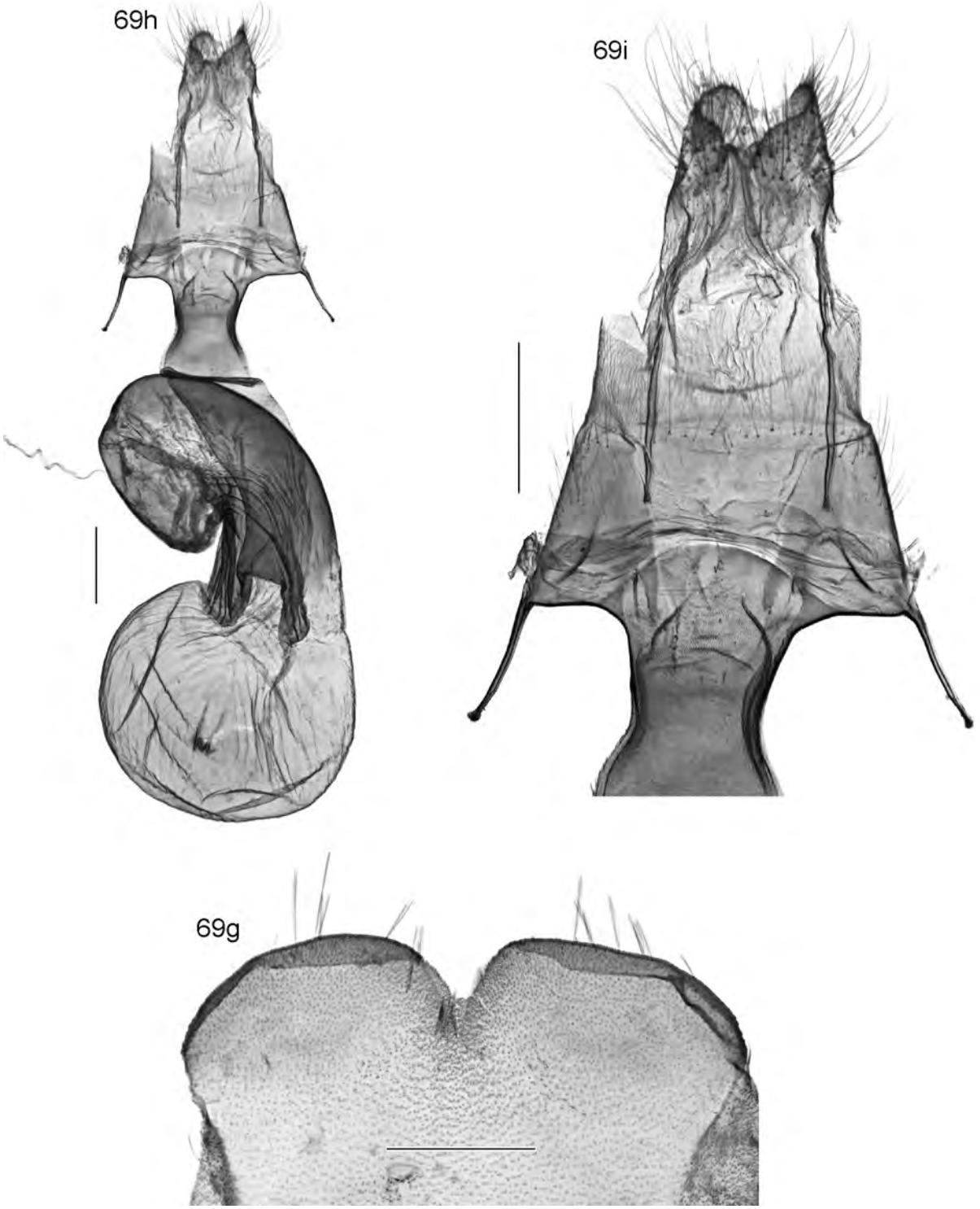


Fig. 69g, *Ichneutica seducta* paratype female S7; **69h,** female genitalia; **69i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 498.)

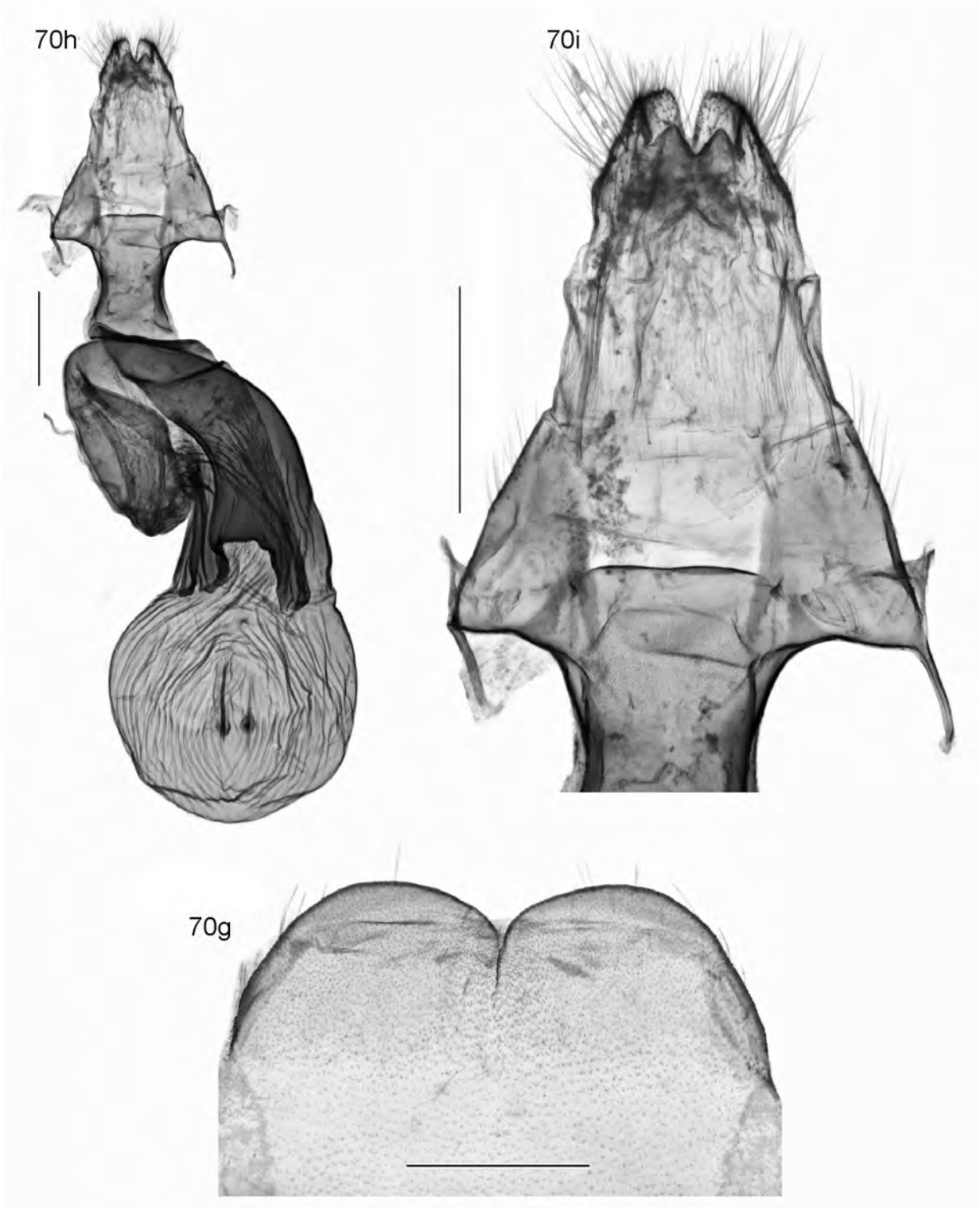


Fig. 70g, *Ichneutica semivittata* female S7; **70h,** female genitalia; **70i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 371.)

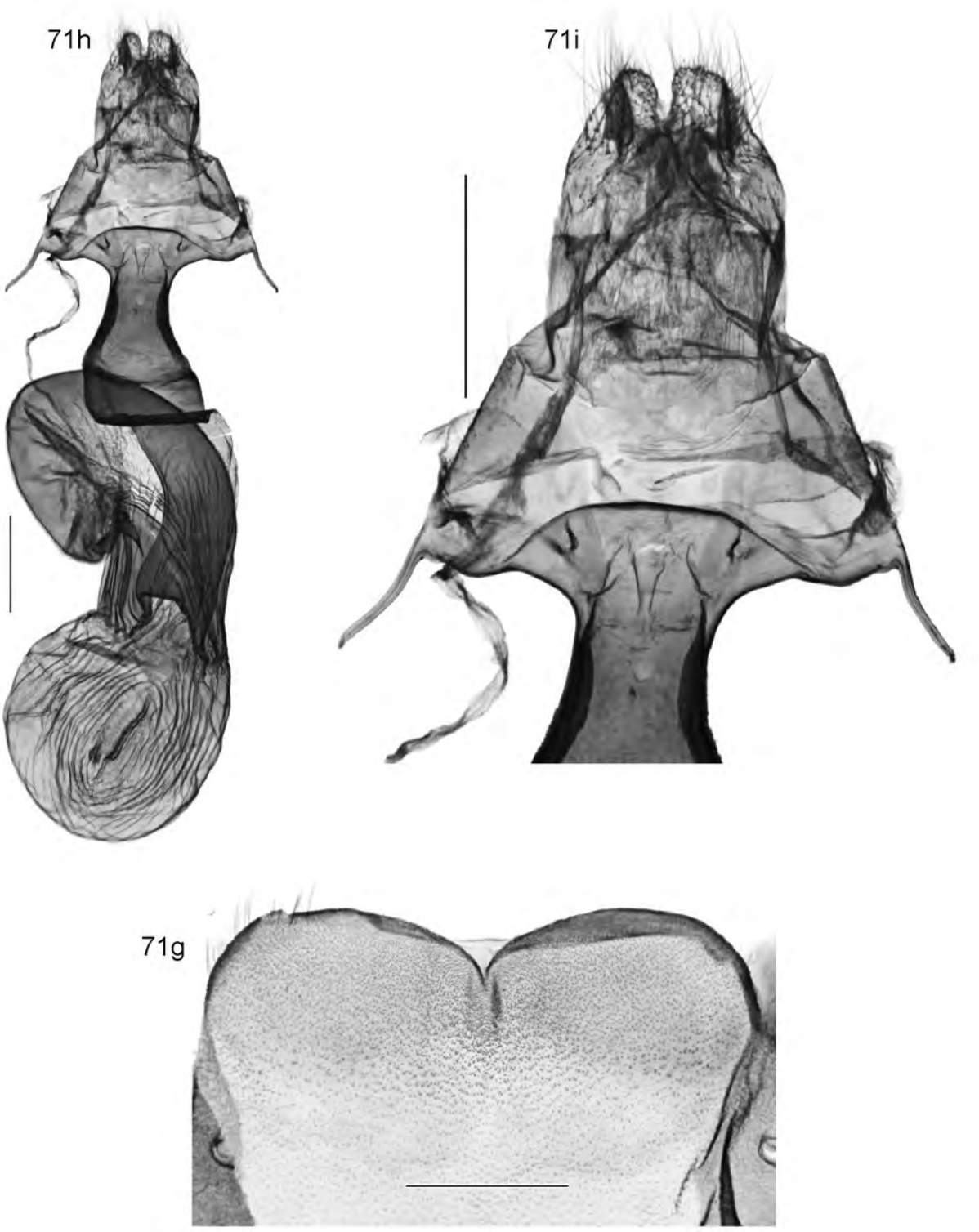


Fig. 71g, *Ichneutica similis* female S7; **71h,** female genitalia; **71i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 372.)

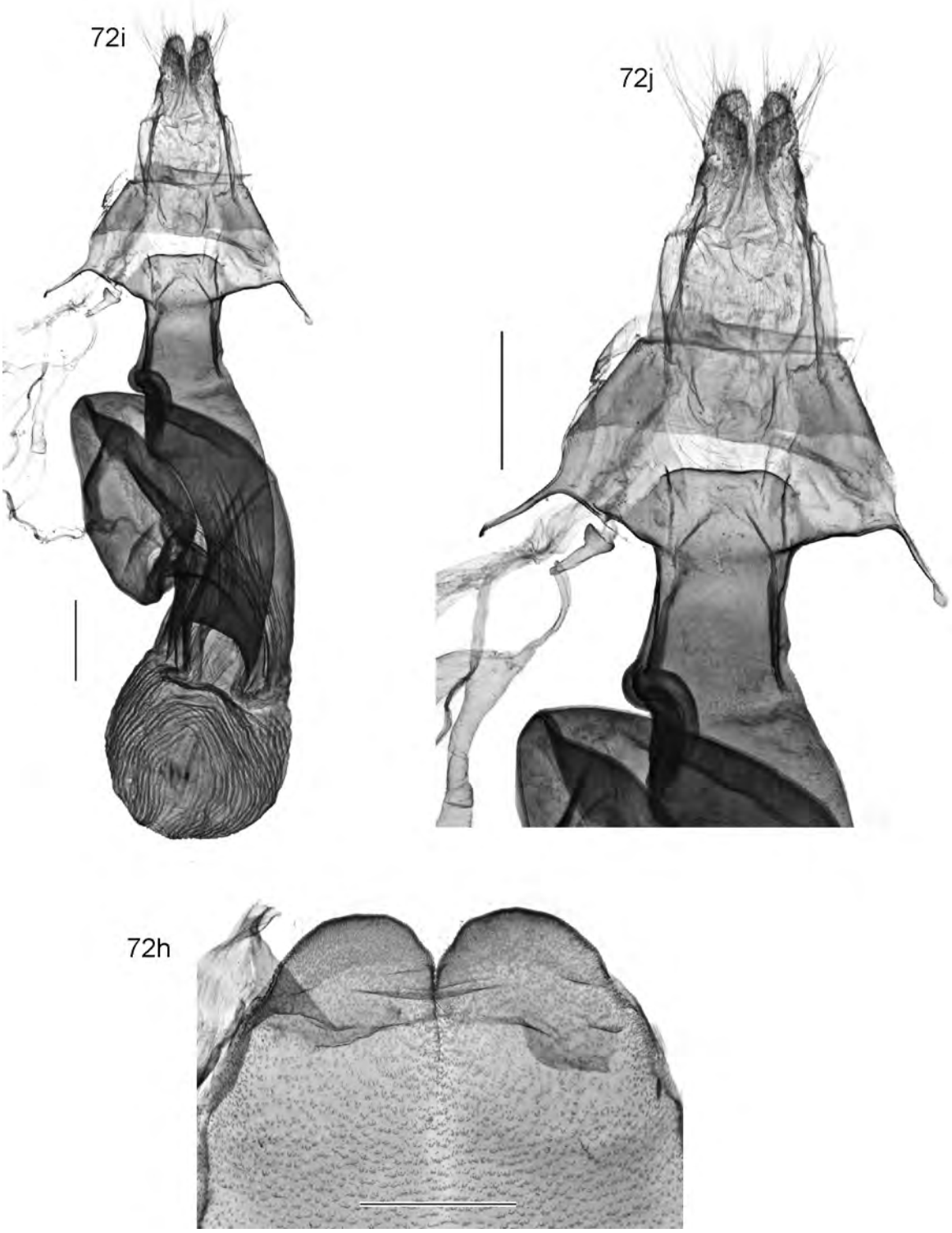


Fig. 72h, *Ichneutica virescens* female S7; **72i,** female genitalia; **72j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 527.)

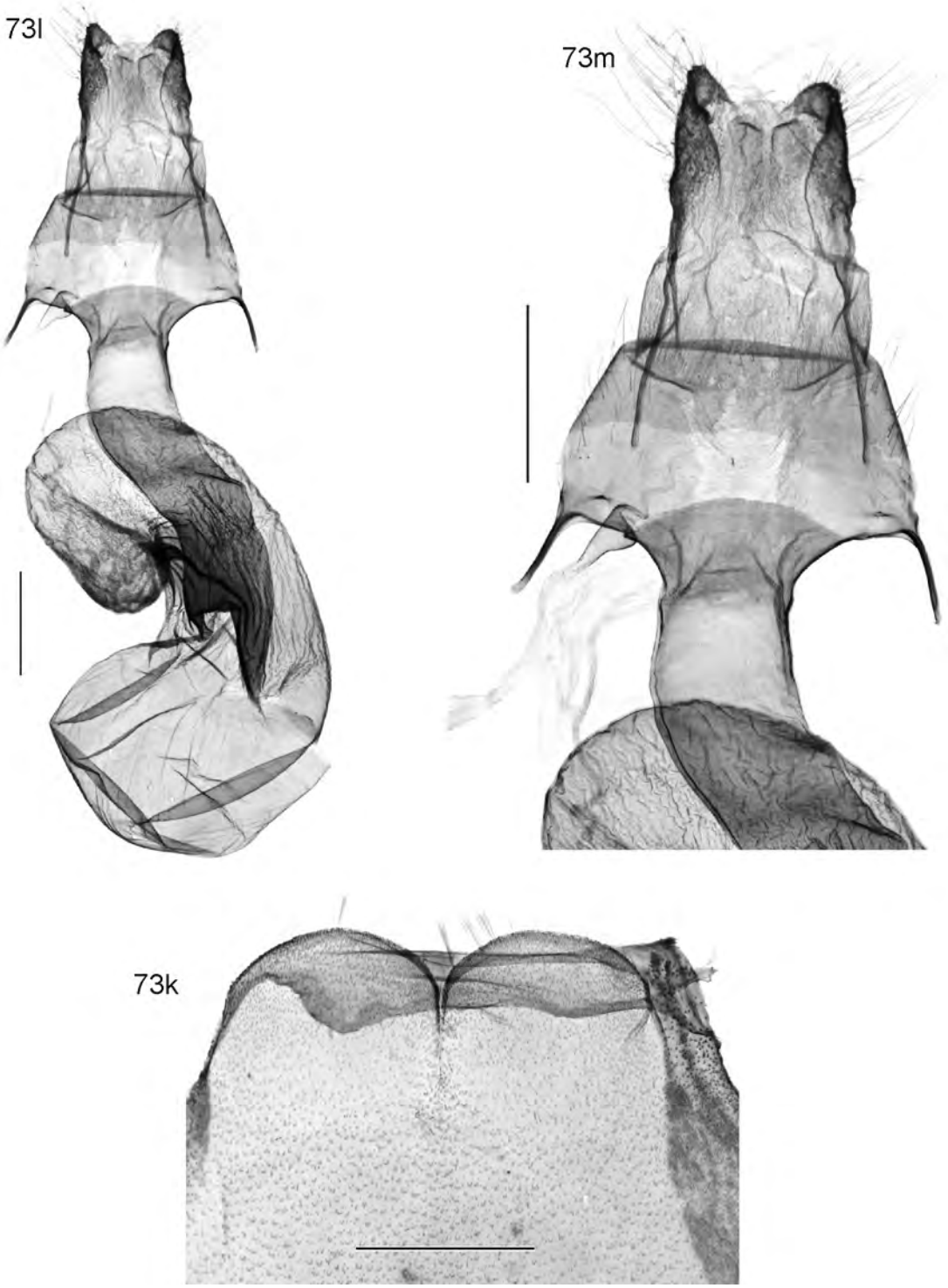


Fig. 73k, *Ichneutica alopa* female S7; **73l,** female genitalia; **73m,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 520.)

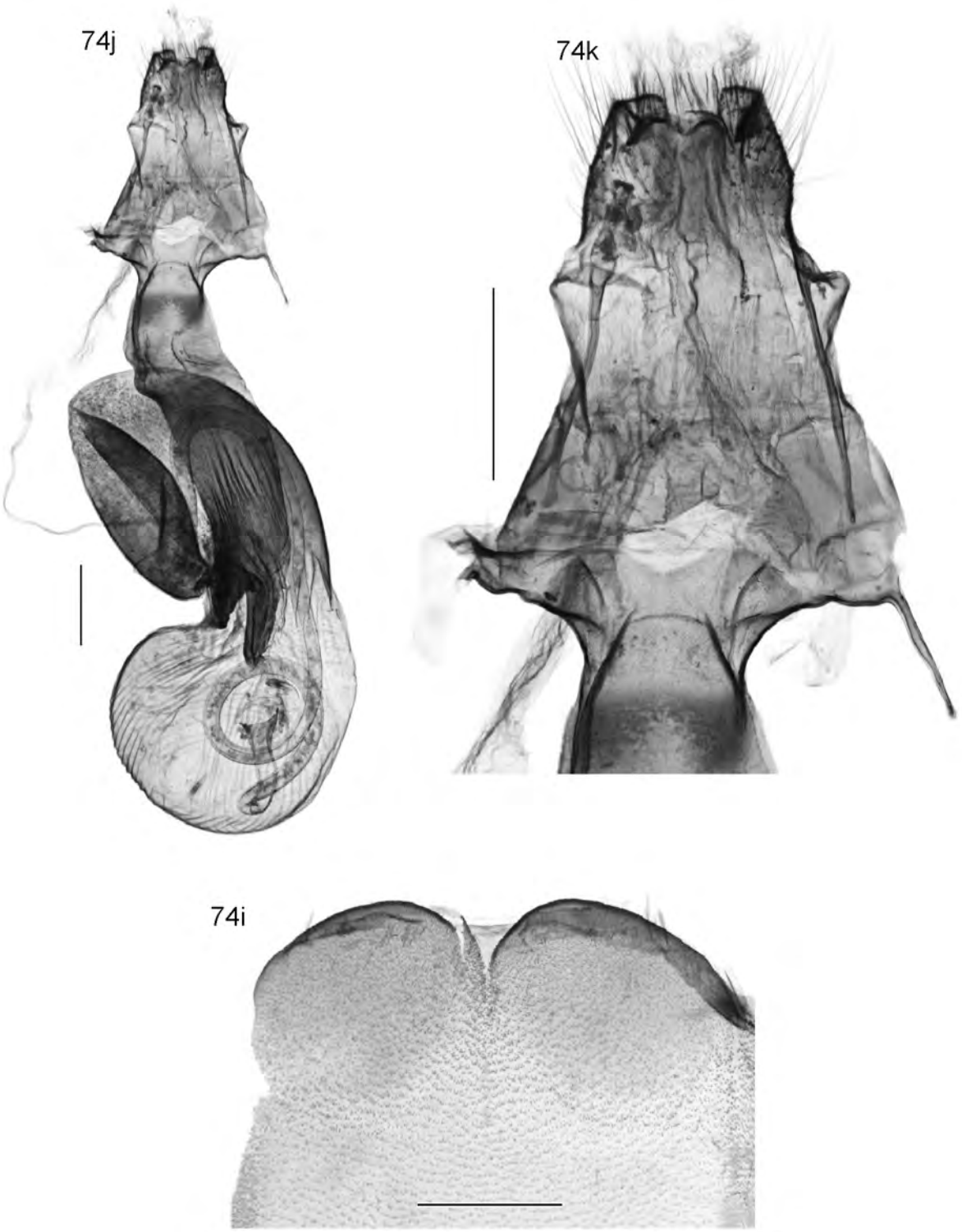


Fig. 74i, *Ichneutica atristriga* female S7; **74j,** female genitalia; **74k,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 341.)

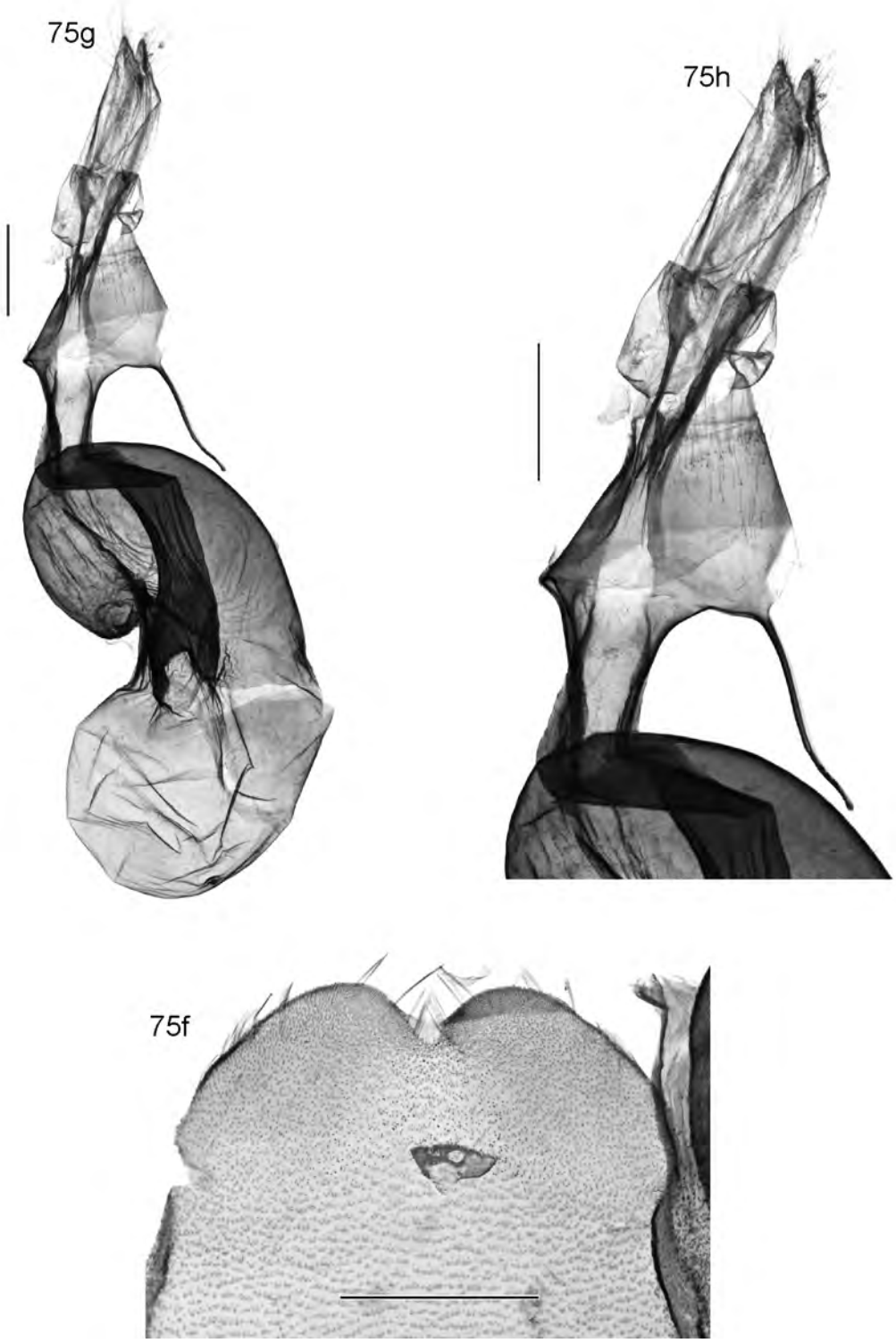


Fig. 75f, *Ichneutica blenheimensis* female S7; **75g,** female genitalia; **75h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 523.)

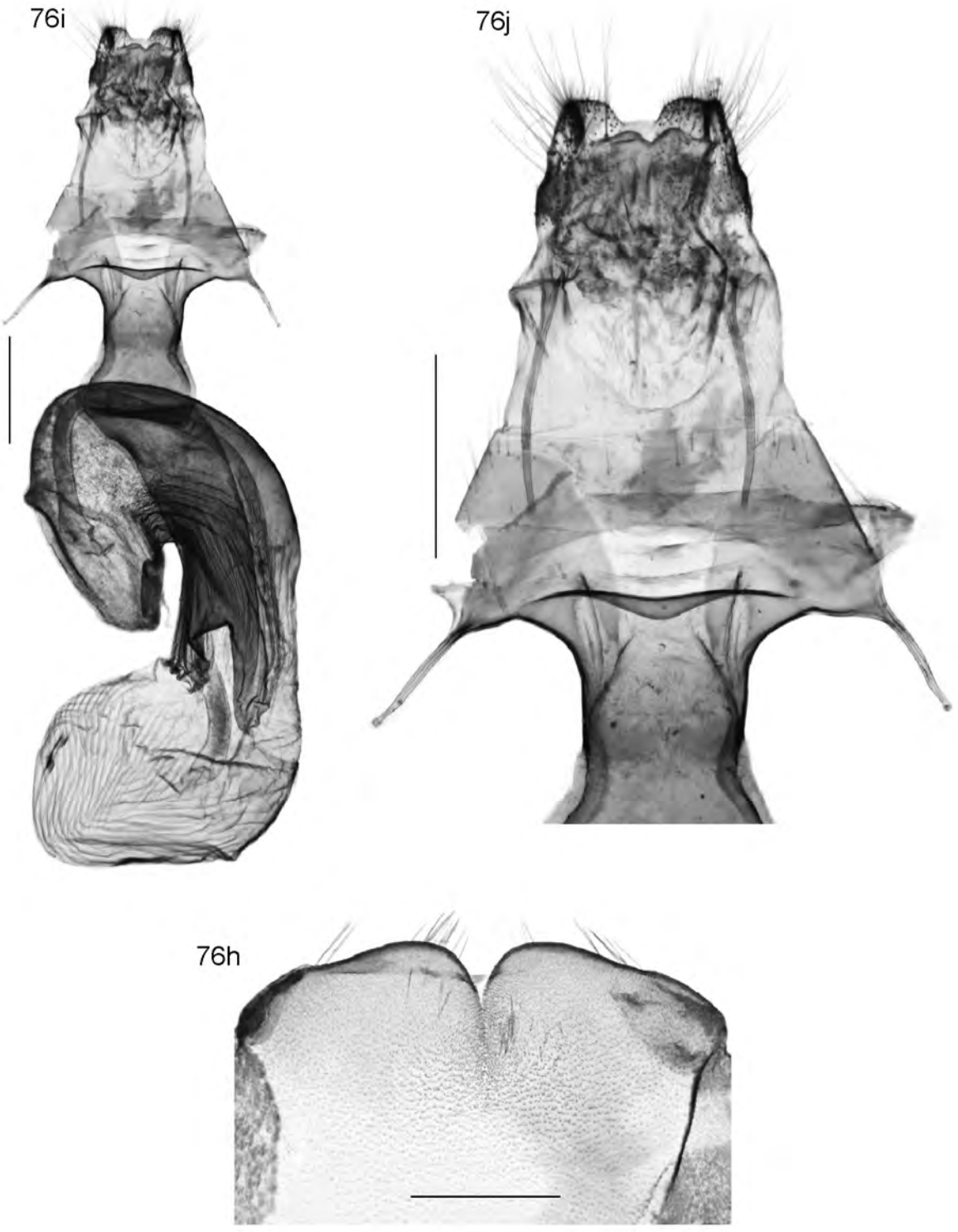


Fig. 76h, *Ichneutica infensa* female S7; **76i,** female genitalia; **76j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 351.)

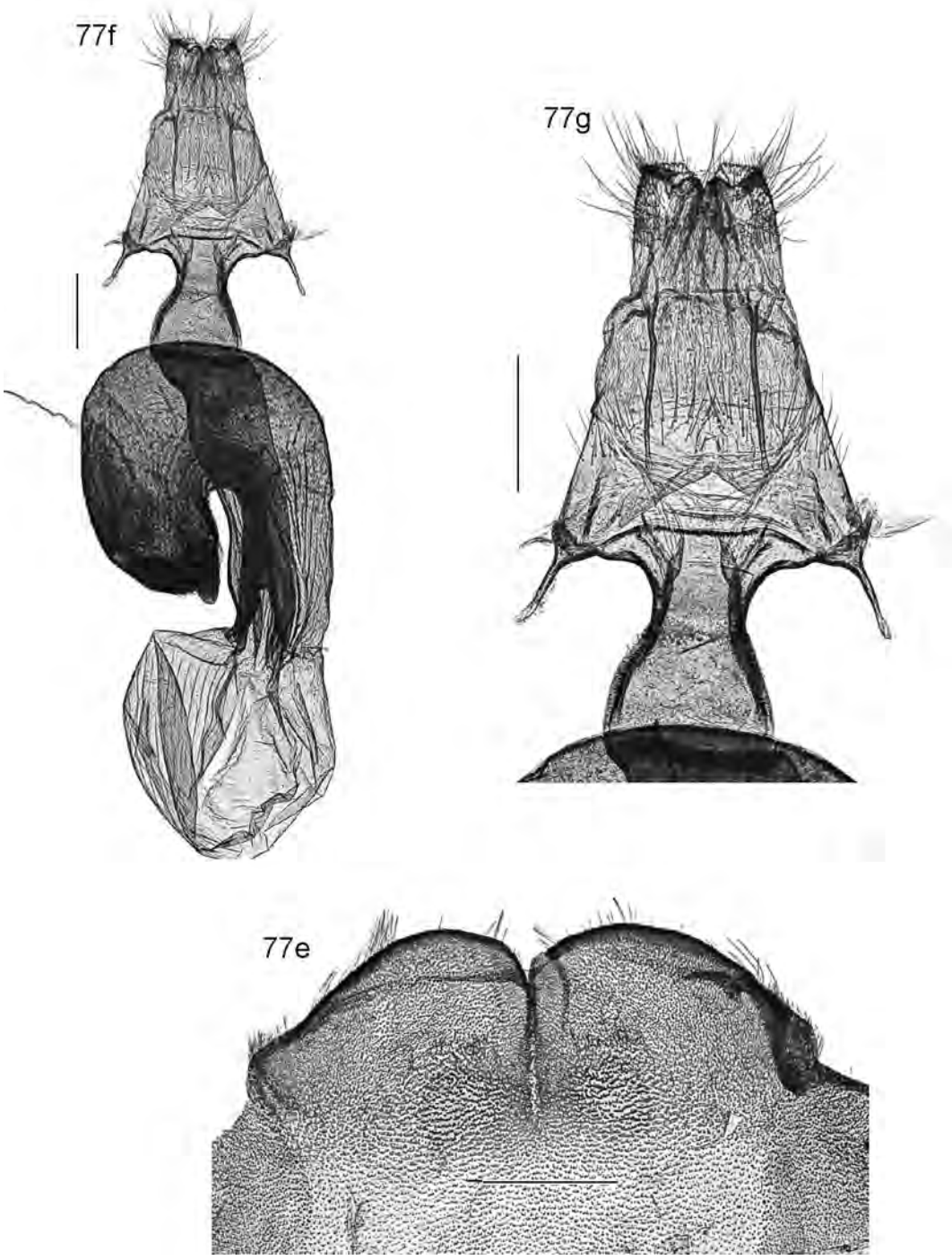


Fig. 77e, *Ichneutica inscripta* paratype female S7; **77f,** female genitalia; **77g,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 539.)

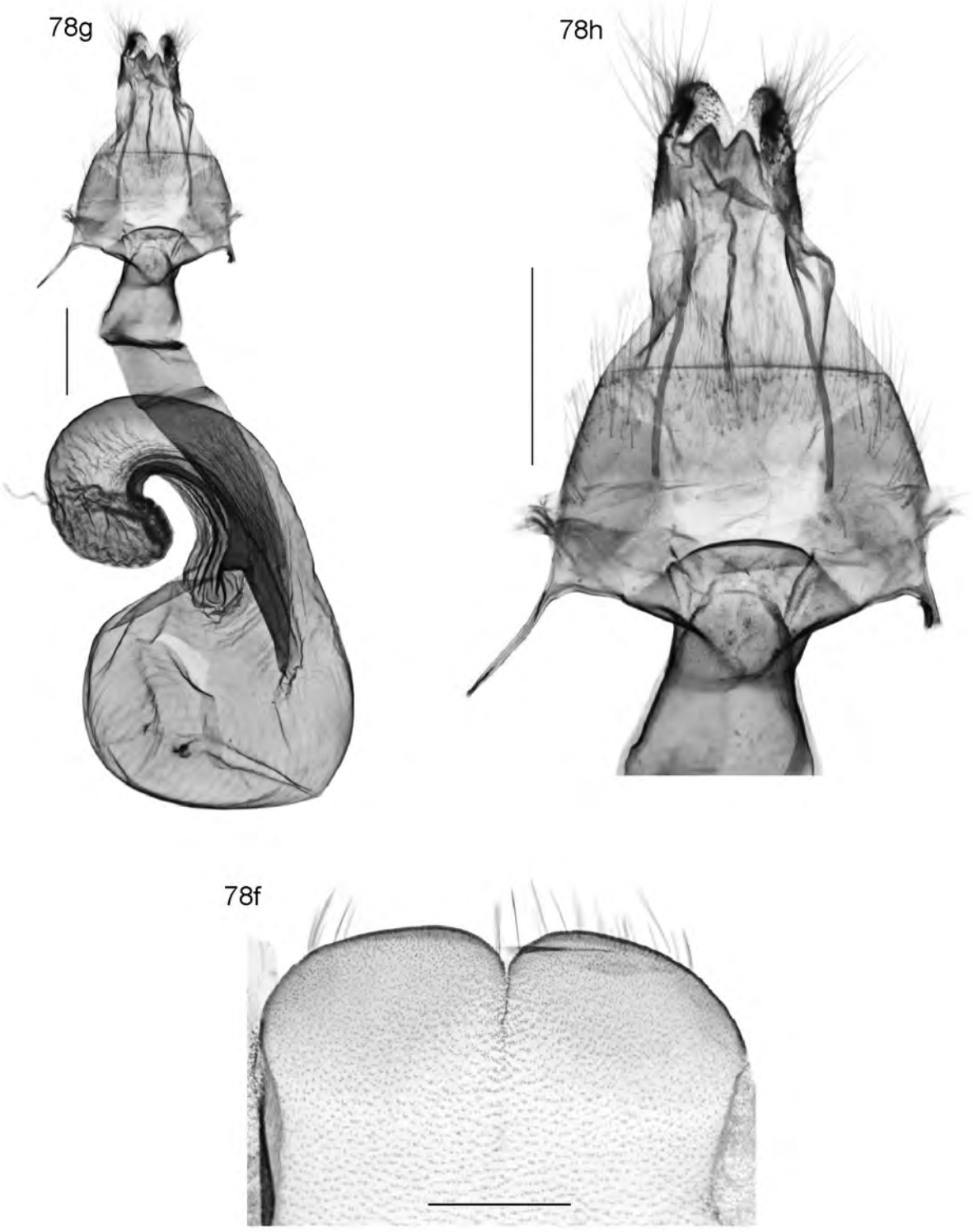


Fig. 78f, *Ichneutica lignana* female S7; **78g,** female genitalia; **78h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 352.)

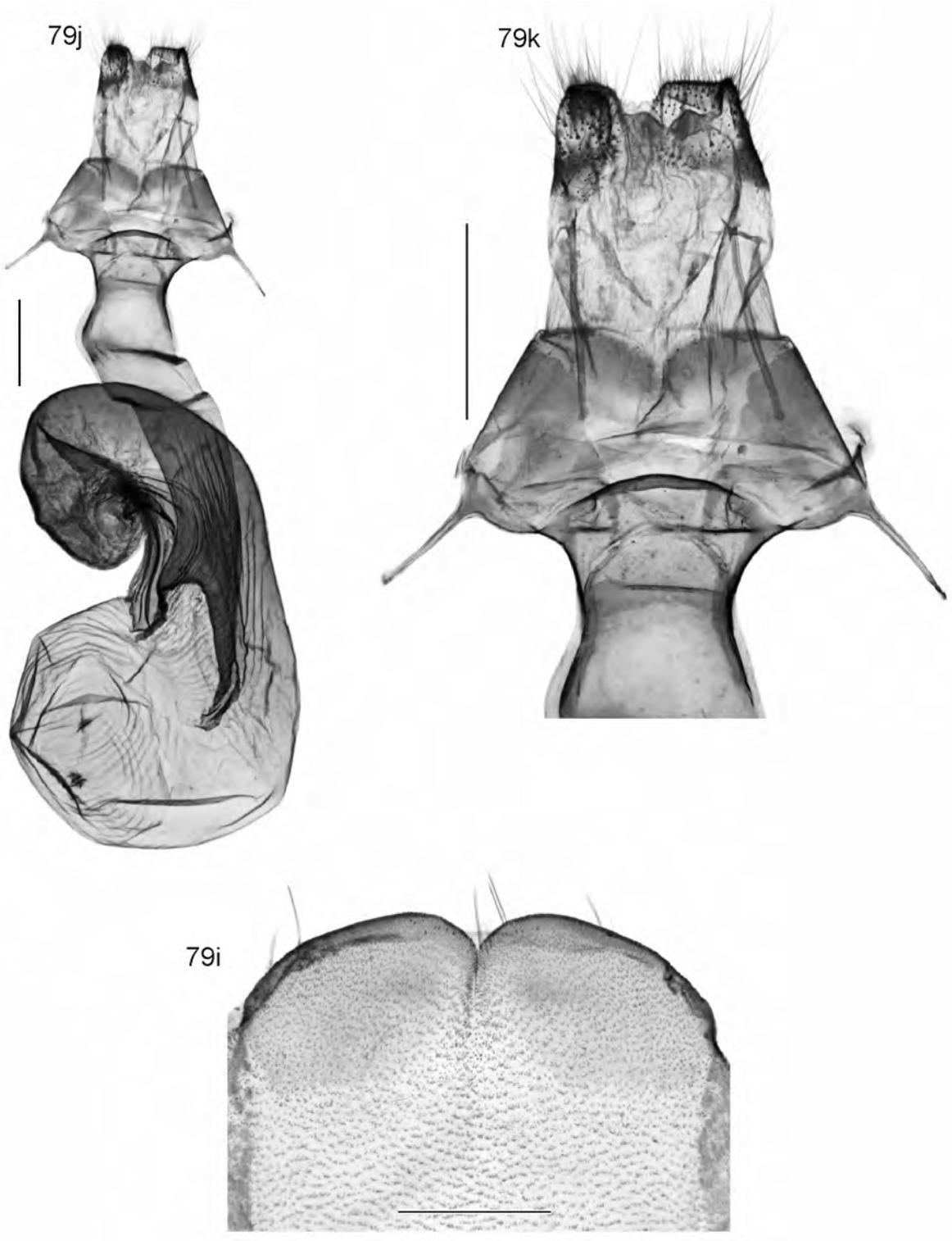


Fig. 79i, *Ichneutica morosa* female S7; **79j,** female genitalia; **79k,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 355.)

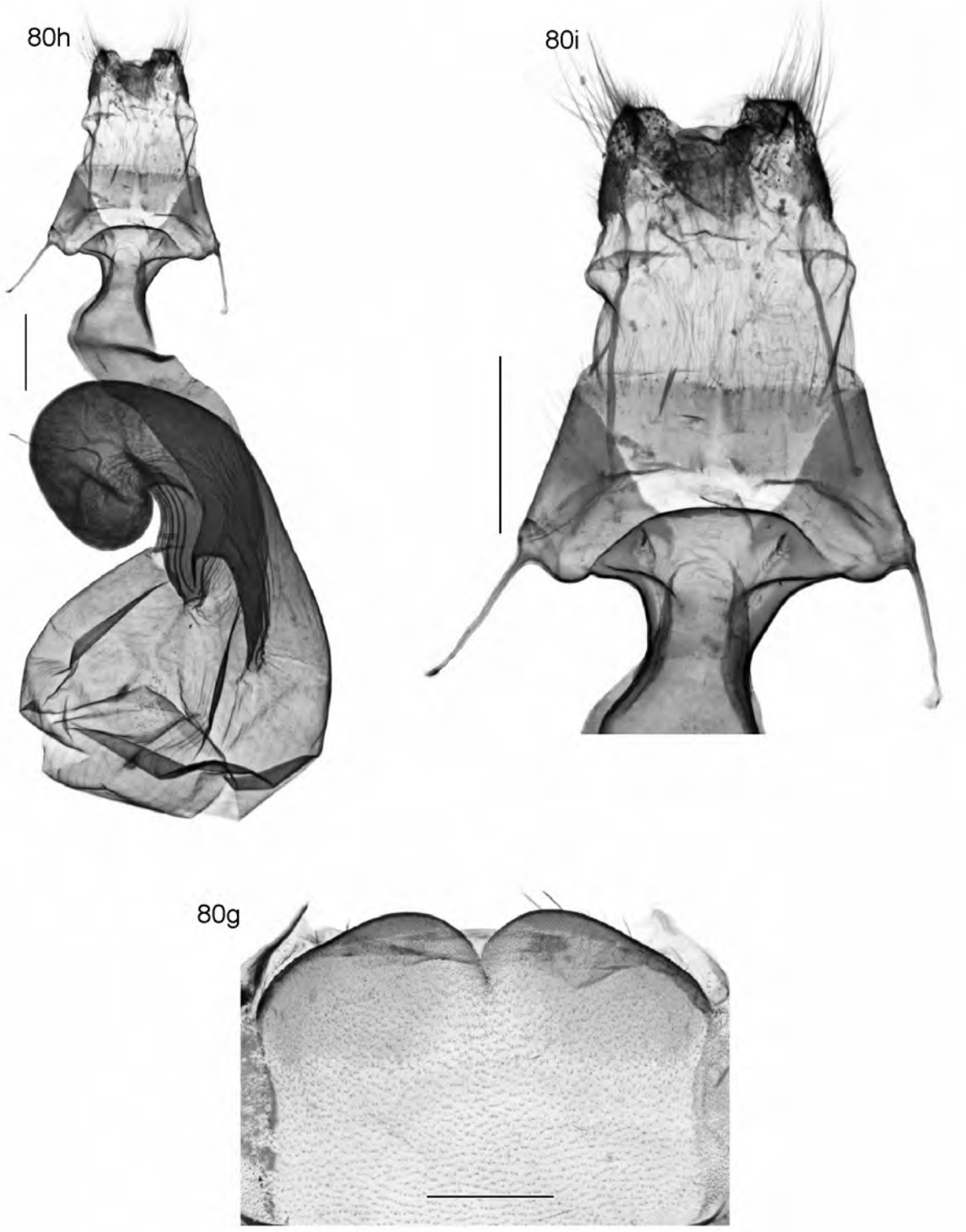


Fig. 80g, *Ichneutica mustulenta* paratype female S7; **80h,** female genitalia; **80i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 356.)

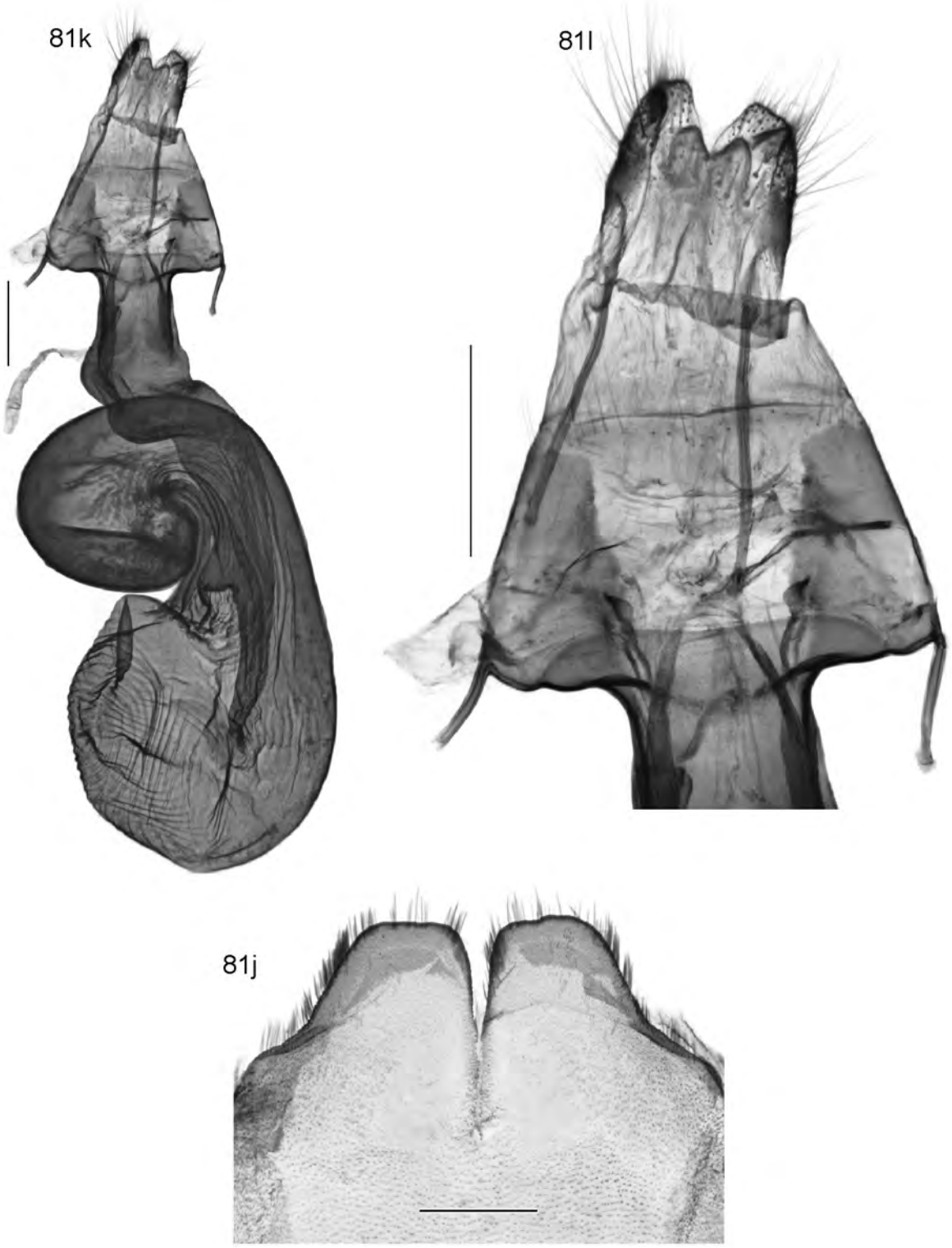


Fig. 81j, *Ichneutica omoplaca* female S7; **81k,** female genitalia; **81l,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 361.)

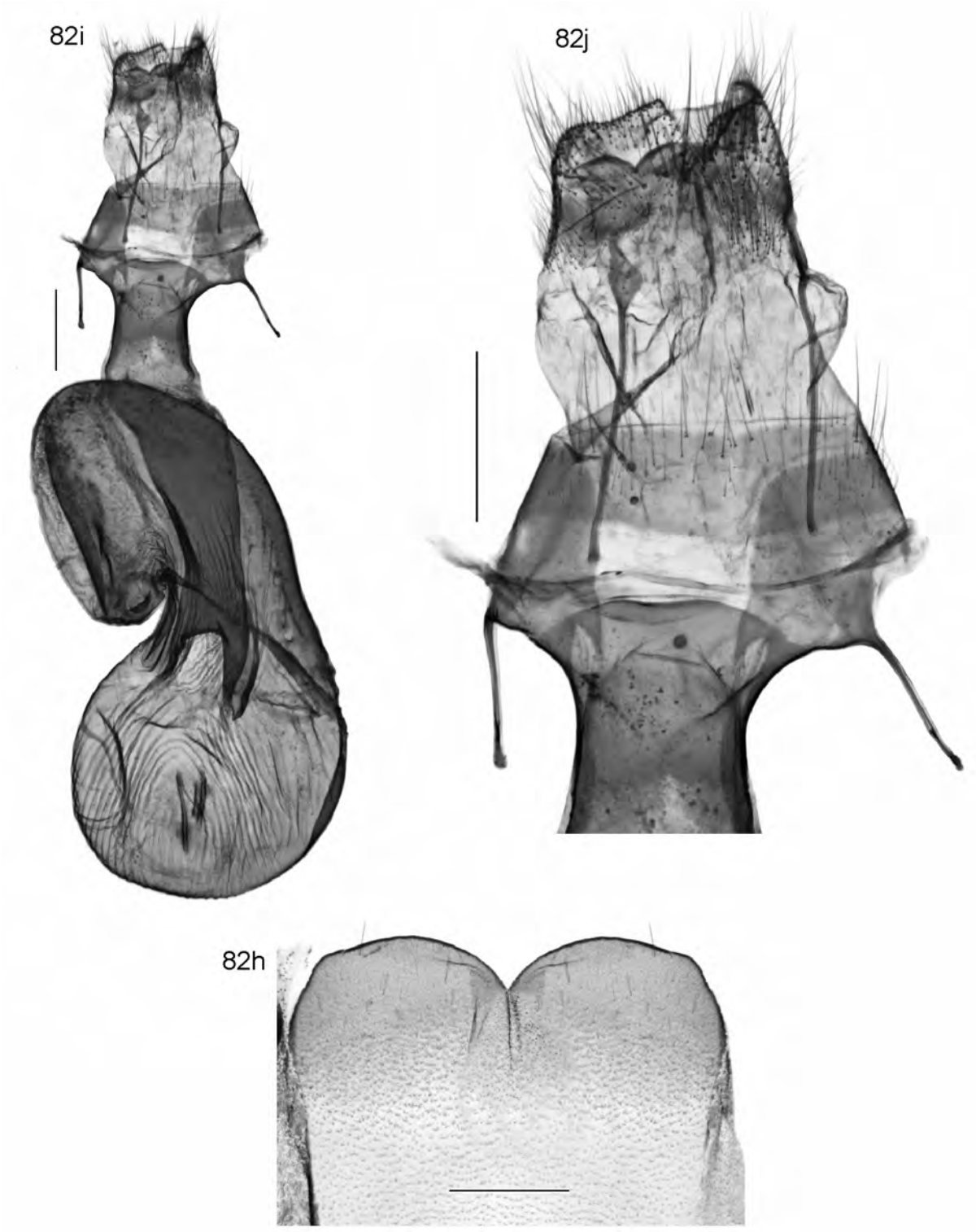


Fig. 82h, *Ichneutica steropastis* female S7; **82i,** female genitalia; **82j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 417.)

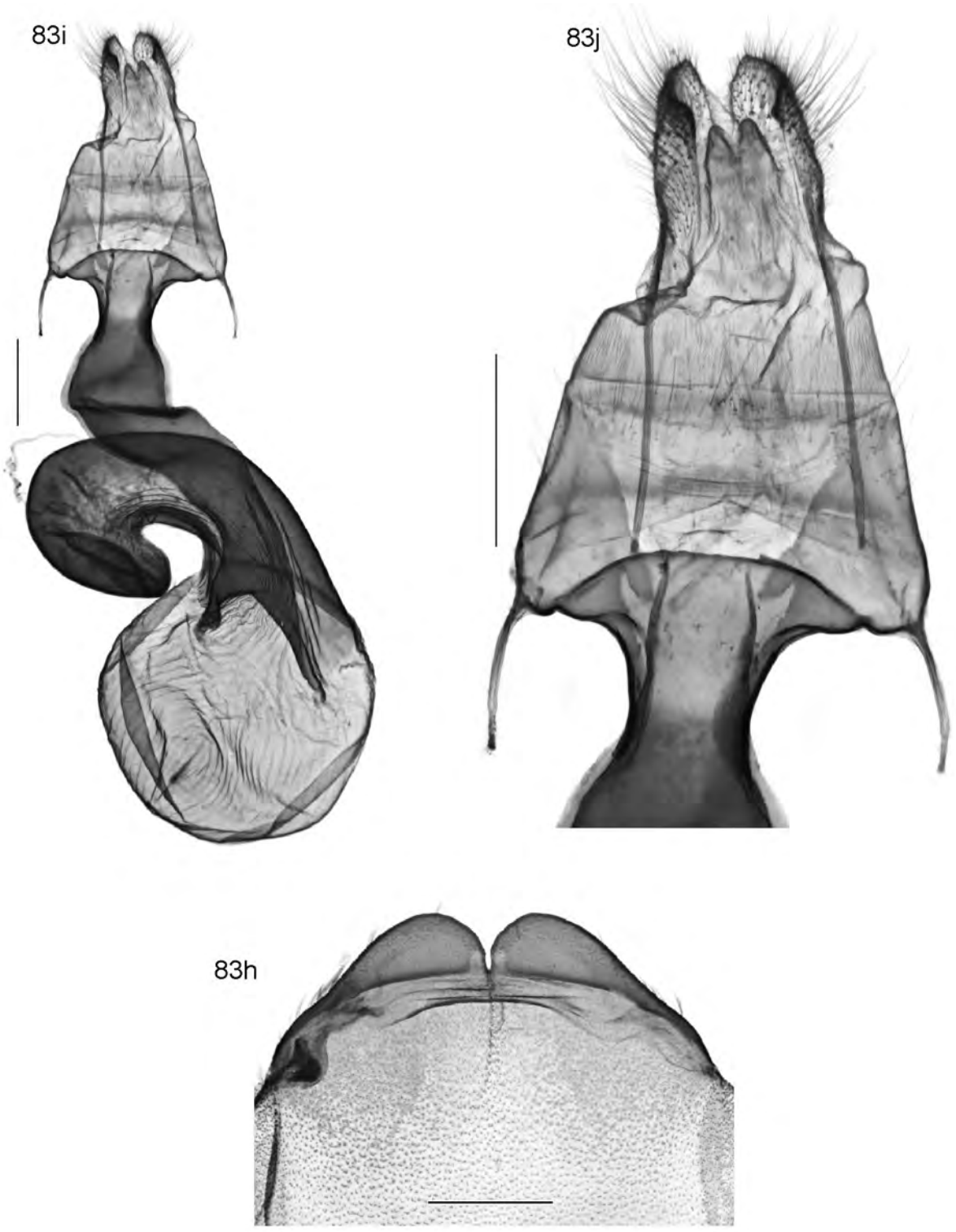


Fig. 83h, *Ichneutica sulcana* female S7; **83i,** female genitalia; **83j,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 418.)

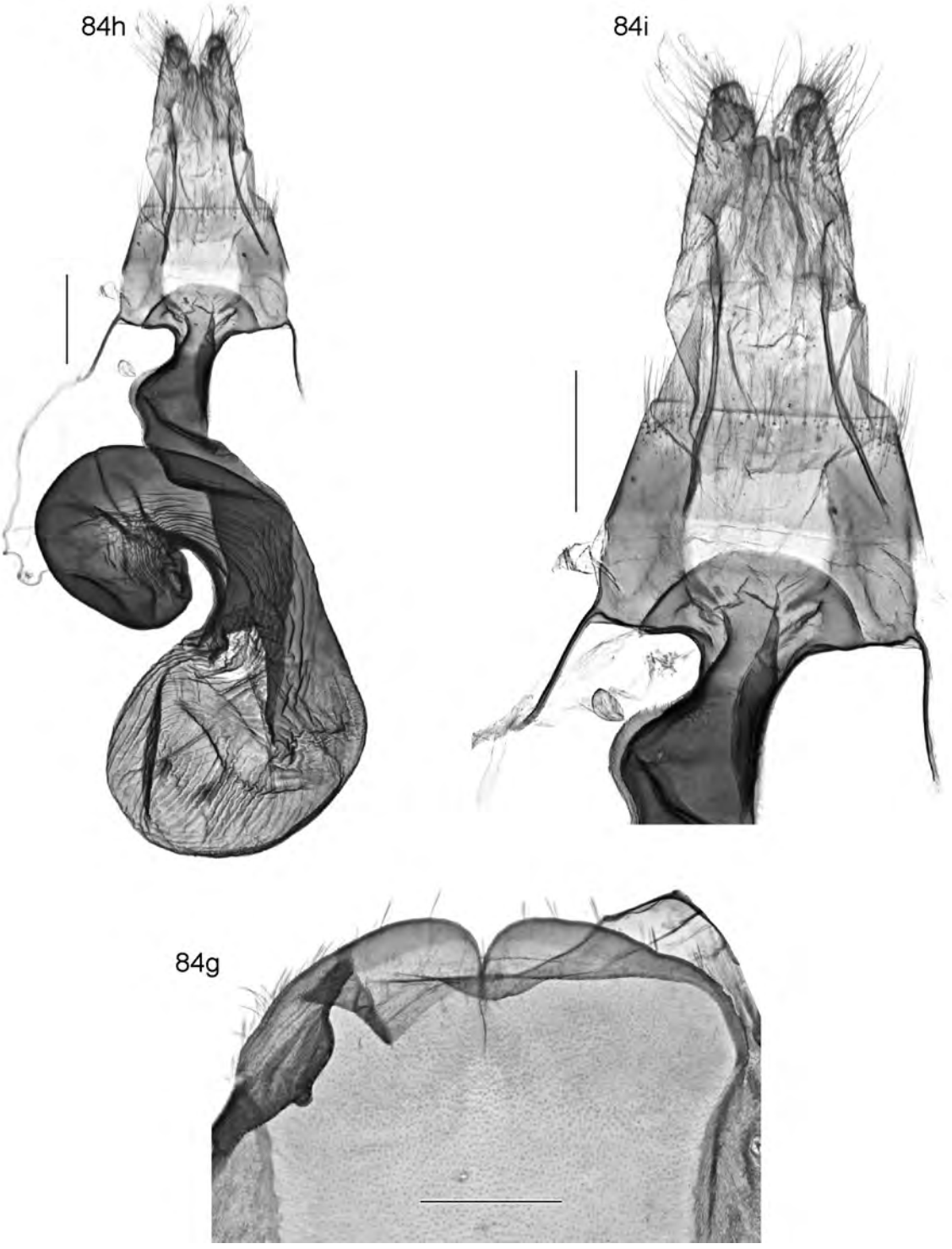


Fig. 84g, *Ichneutica supersulcana* paratype female S7; **84h,** female genitalia; **84i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 535.)

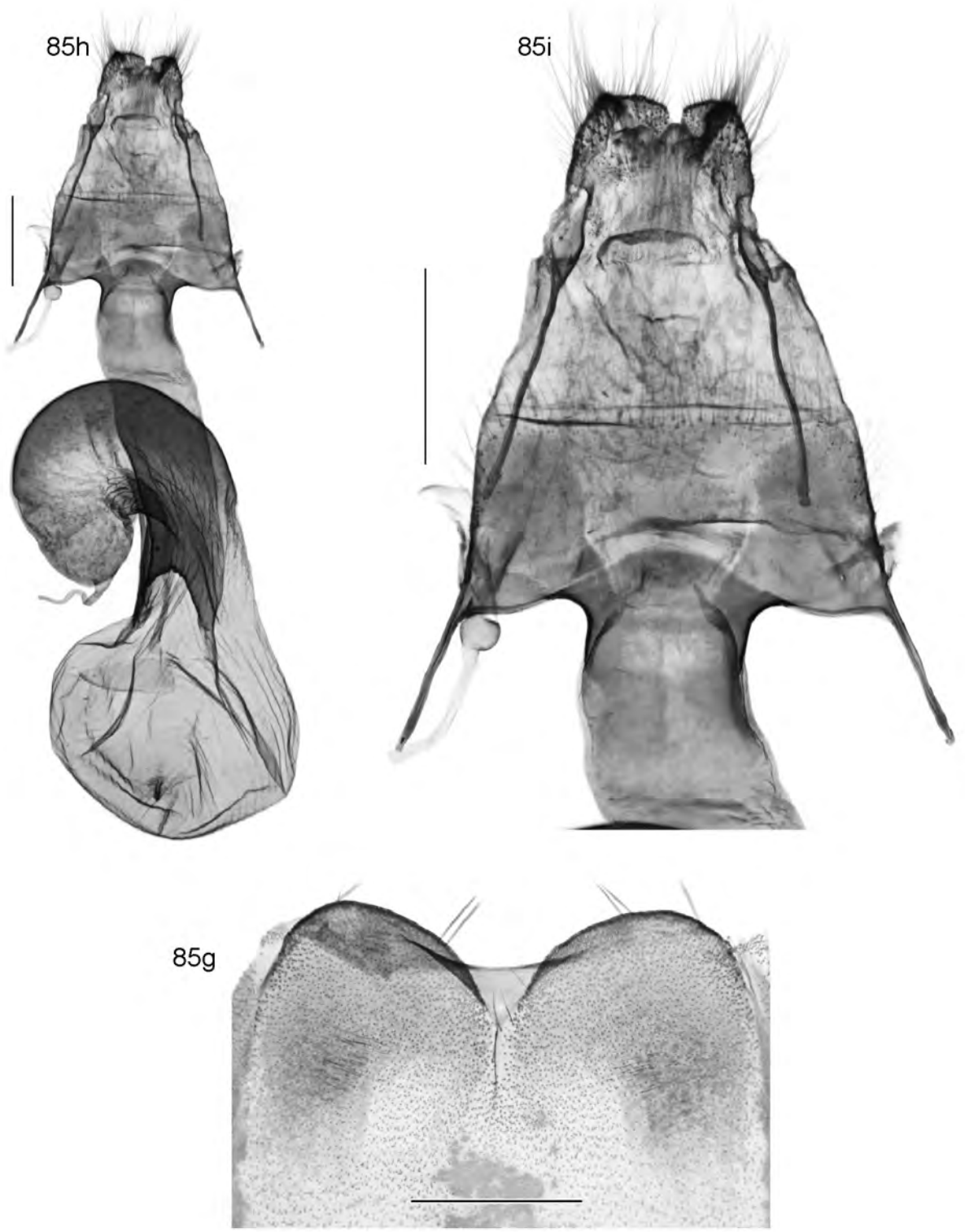


Fig. 85g, *Ichneutica rufistriga* female S7; **85h,** female genitalia; **85i,** close-up of ovipositor, segment 8 and ostium. (Slide OMNZ IV42486.)

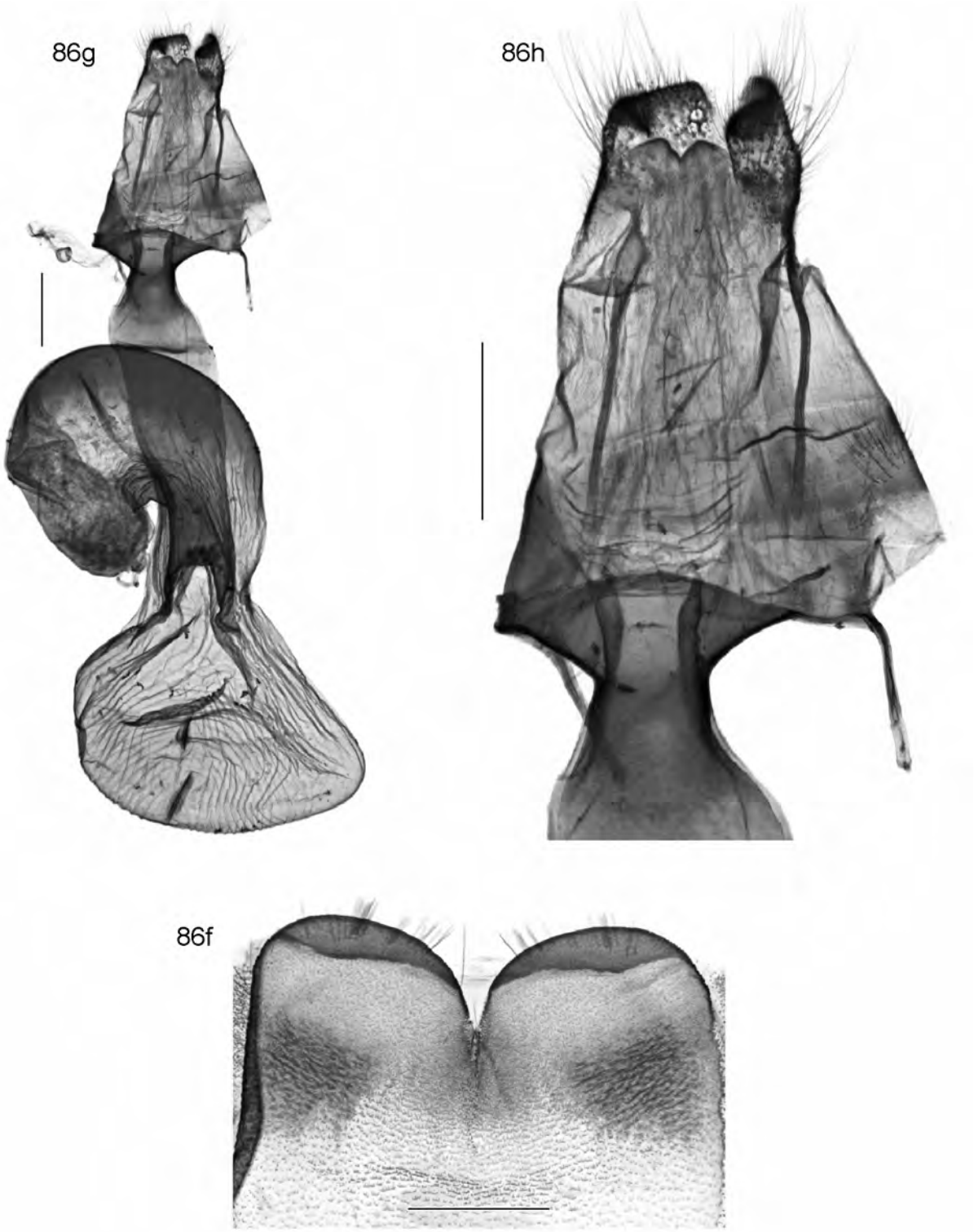


Fig. 86f, *Ichneutica thalassarche* paratype female S7; **86g,** female genitalia; **86h,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 378.)

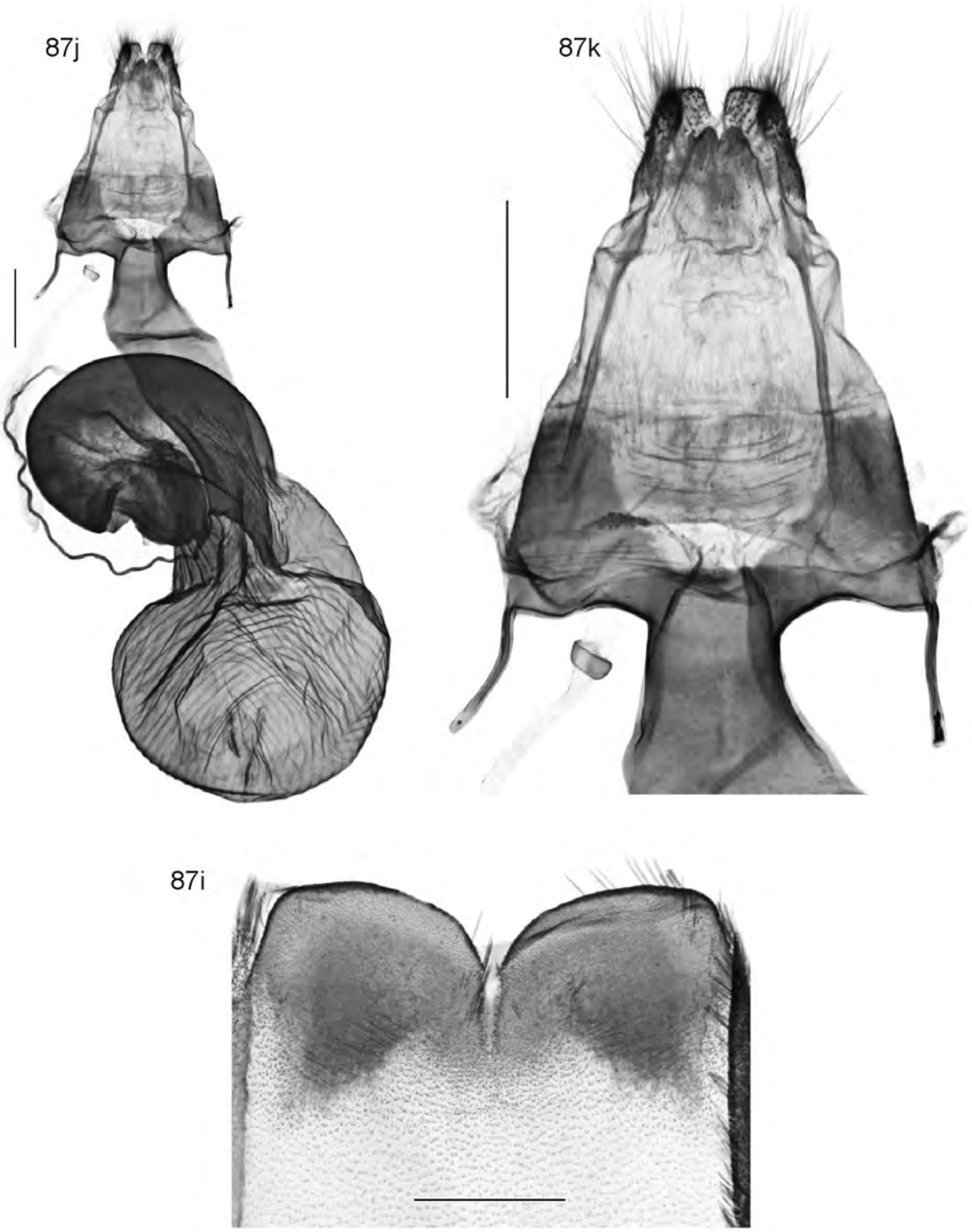


Fig. 87i, *Ichneutica ustistriga* female S7; **87j,** female genitalia; **87k,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 420.)

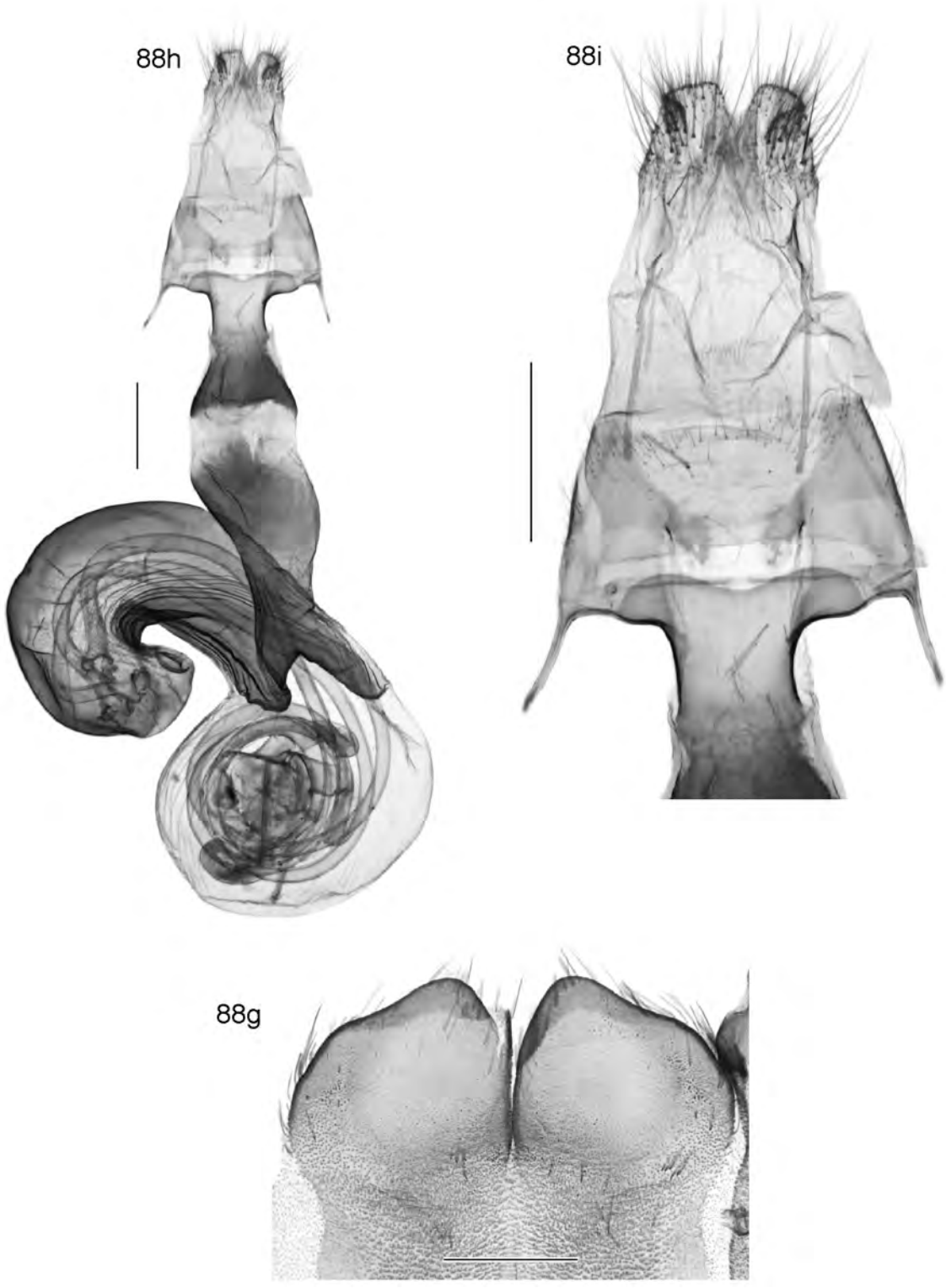
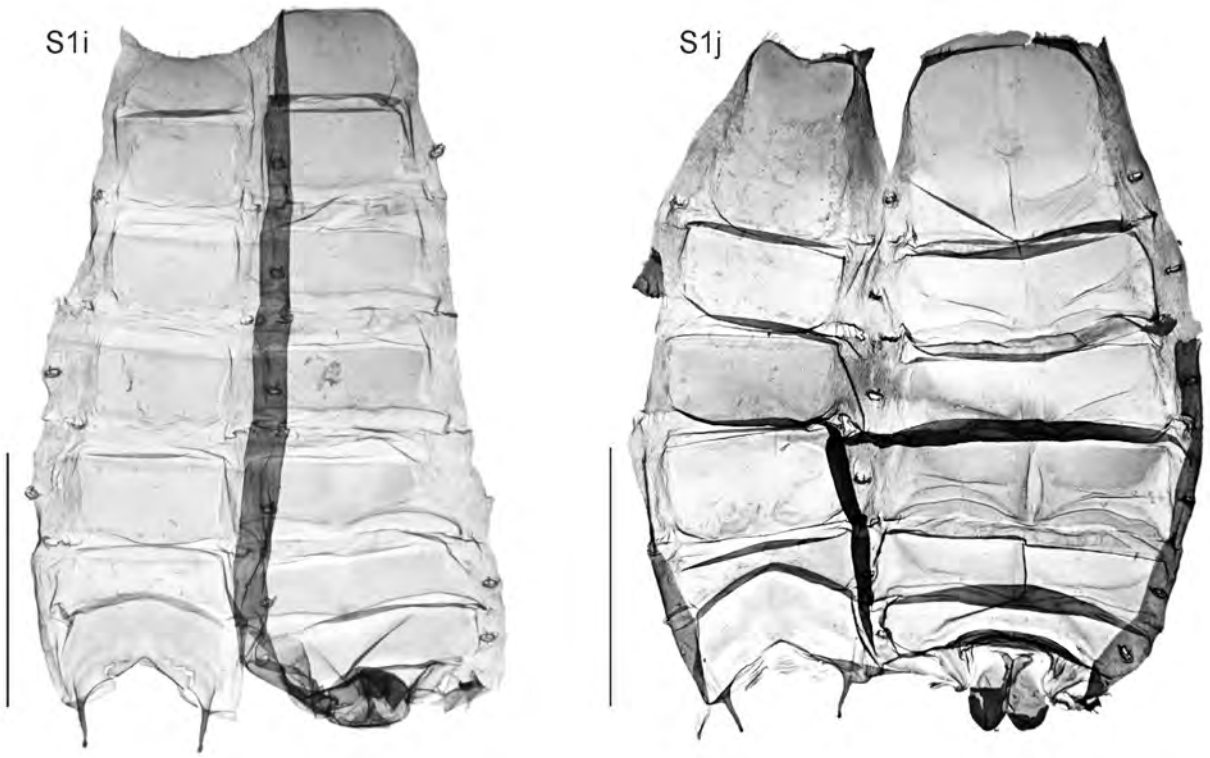


Fig. 88g, *Ichneutica mollis* female S7; **88h,** female genitalia; **88i,** close-up of ovipositor, segment 8 and ostium. (Slide NZAC Noct. 165.)



Figs S1i, S1j, *Nivetica nervosa* descaled abdominal cuticles: **S1i,** male; **S1j,** female. Scale bars = 1 cm.

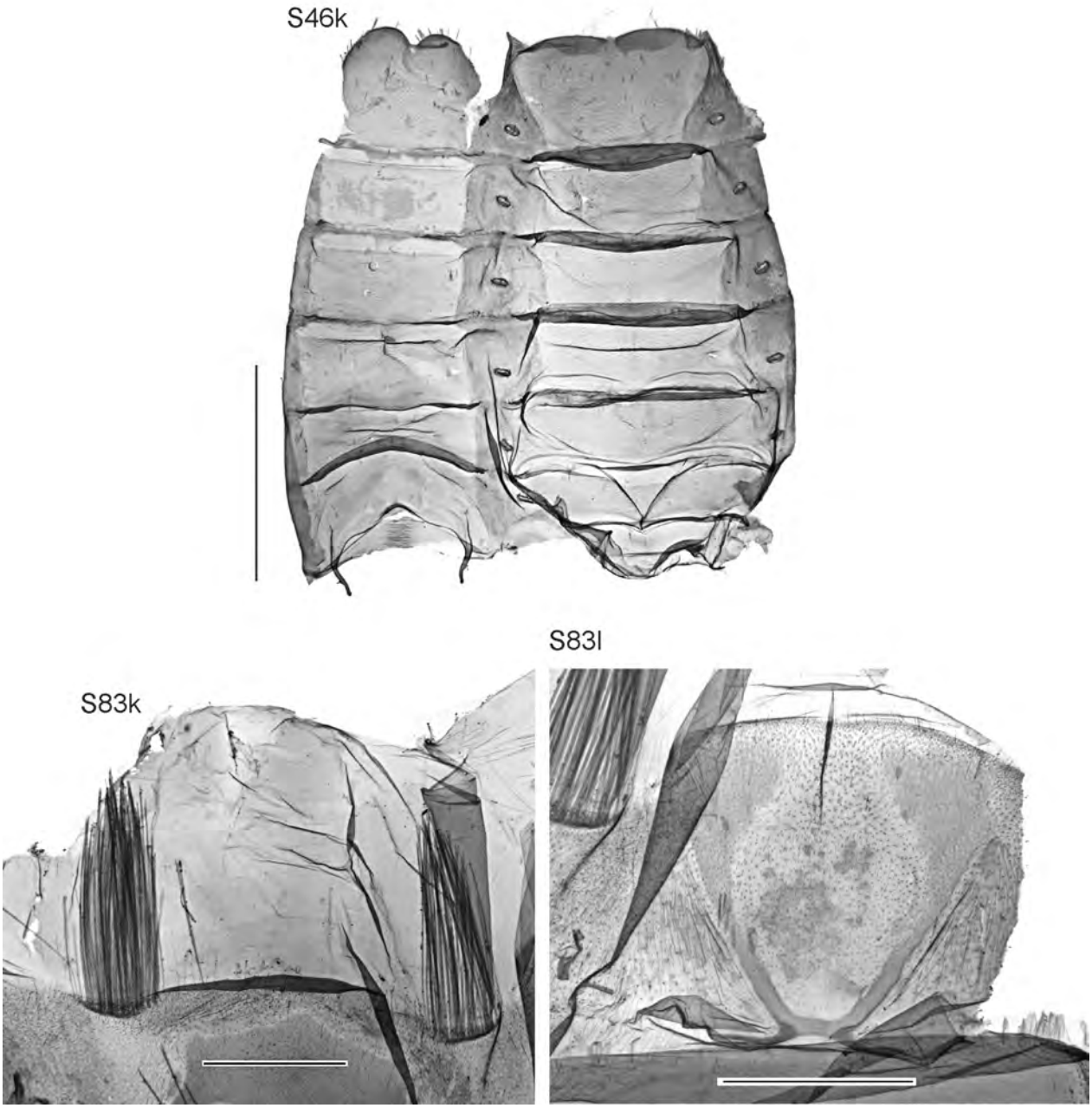
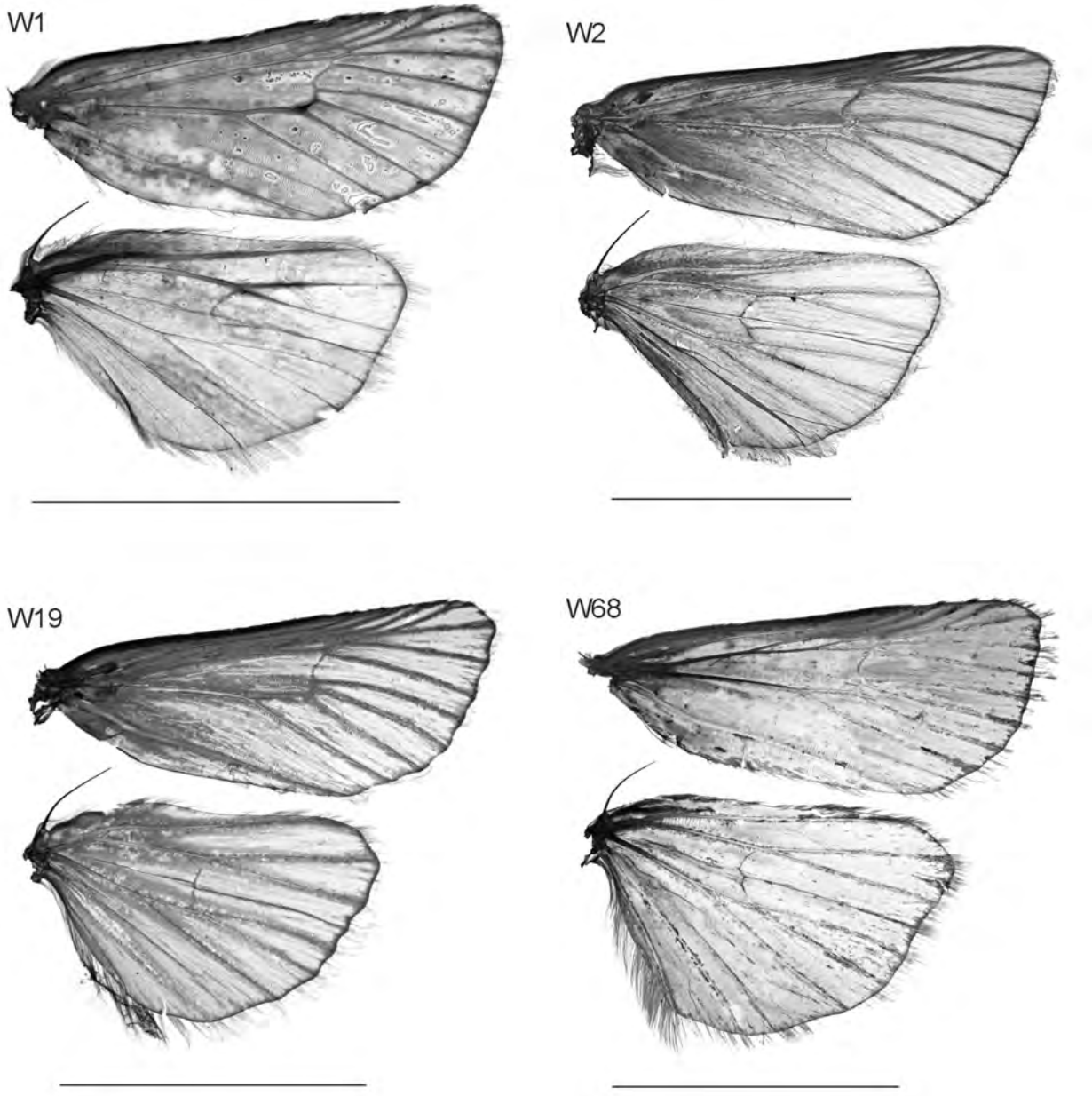


Fig. S46k, *Ichneutica micrastra* male, descaled abdominal cuticle; **S83k,** *I. sulcana* male sternite 8; **S83l,** *I. sulcana* male tergite 8. Scale bar, Fig. S46k = 1 cm; S83k, l = 1 mm.



Figs W1, 2, 19, 68, Wing venation (males): **W1,** *Nivetica nervosa*; **W2,** *Ichneutica ceraunias*; **W19,** *I. disjungens*; **W68,** *I. propria*. Scale bars = 1 cm.

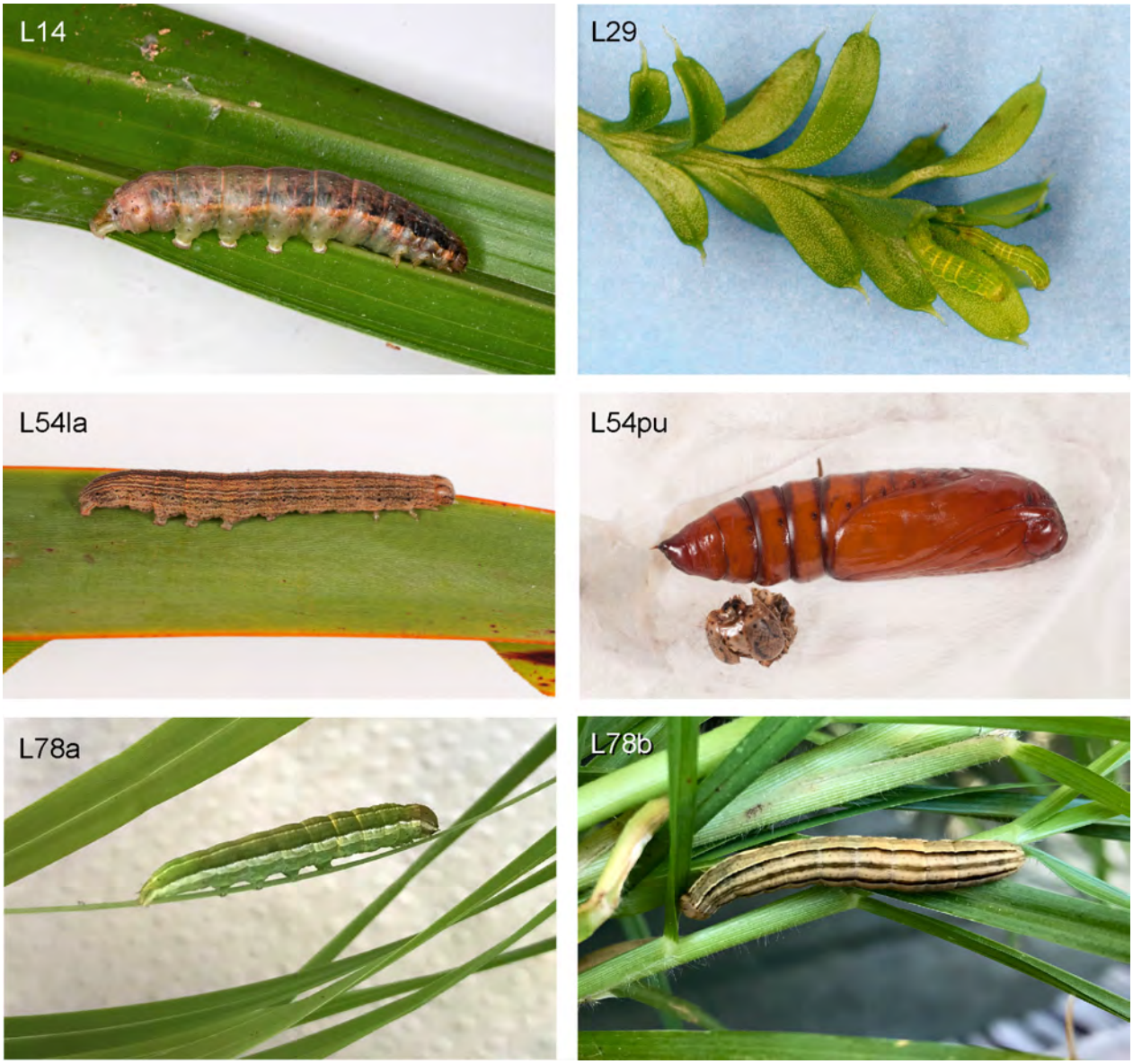
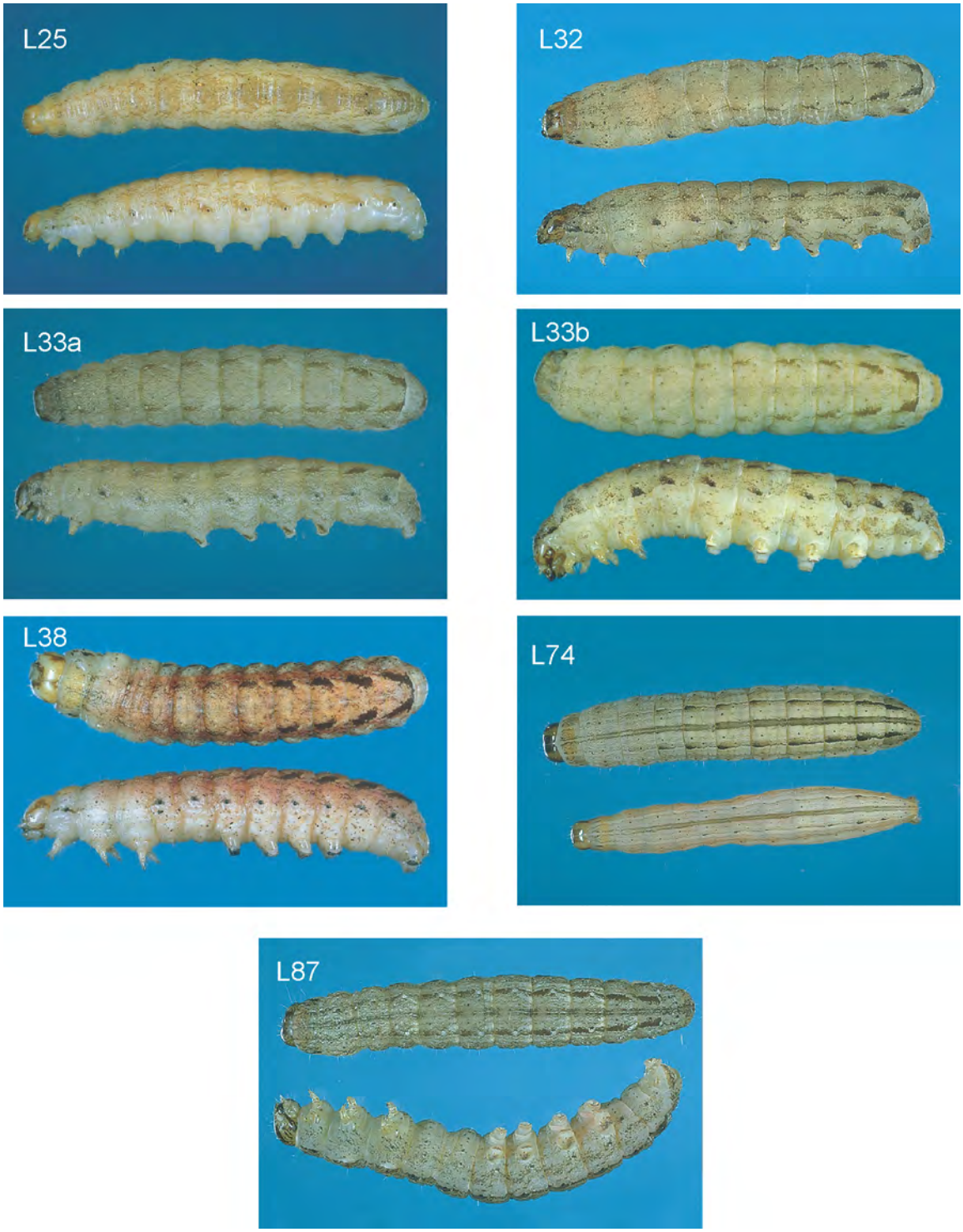
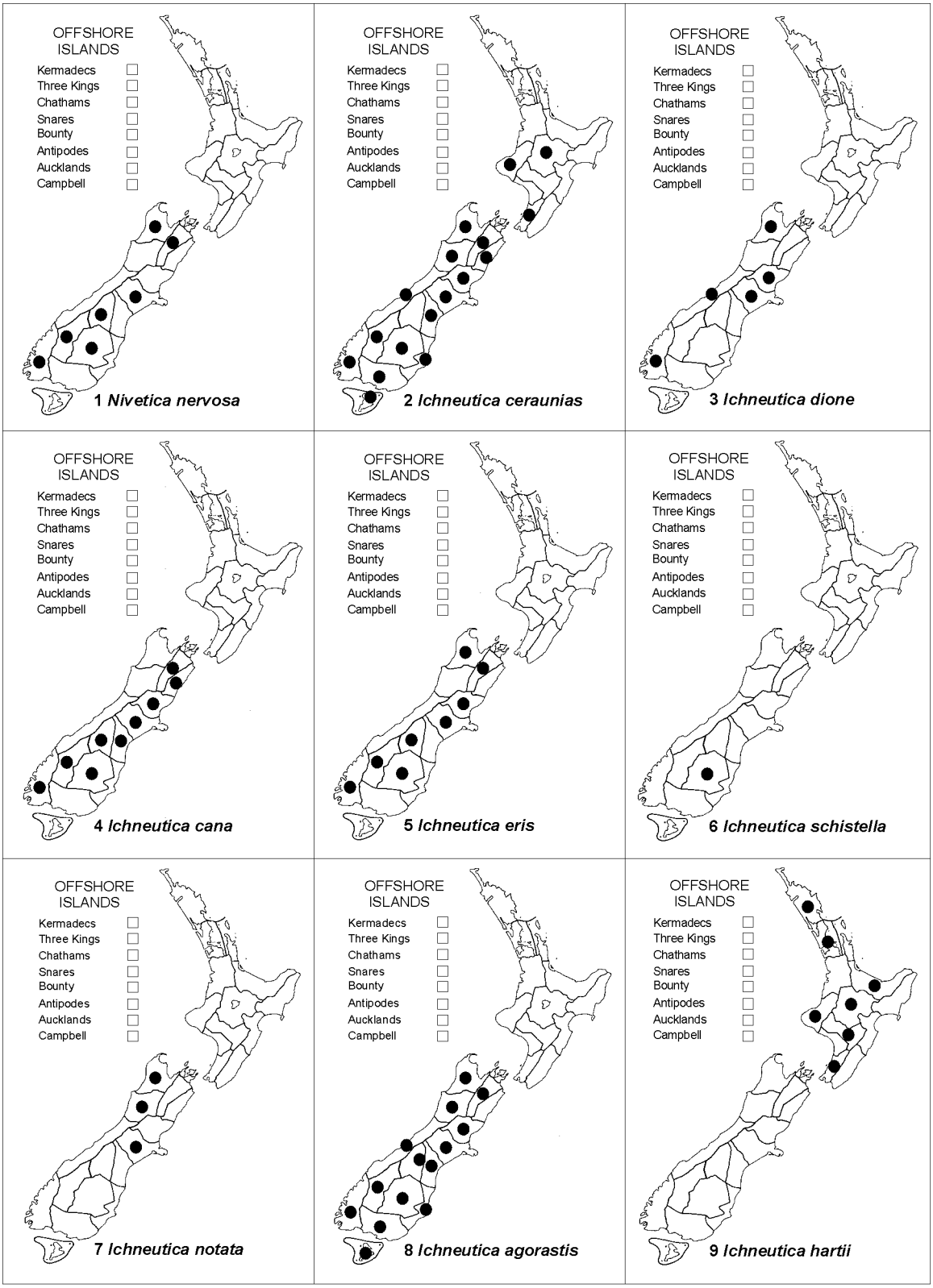


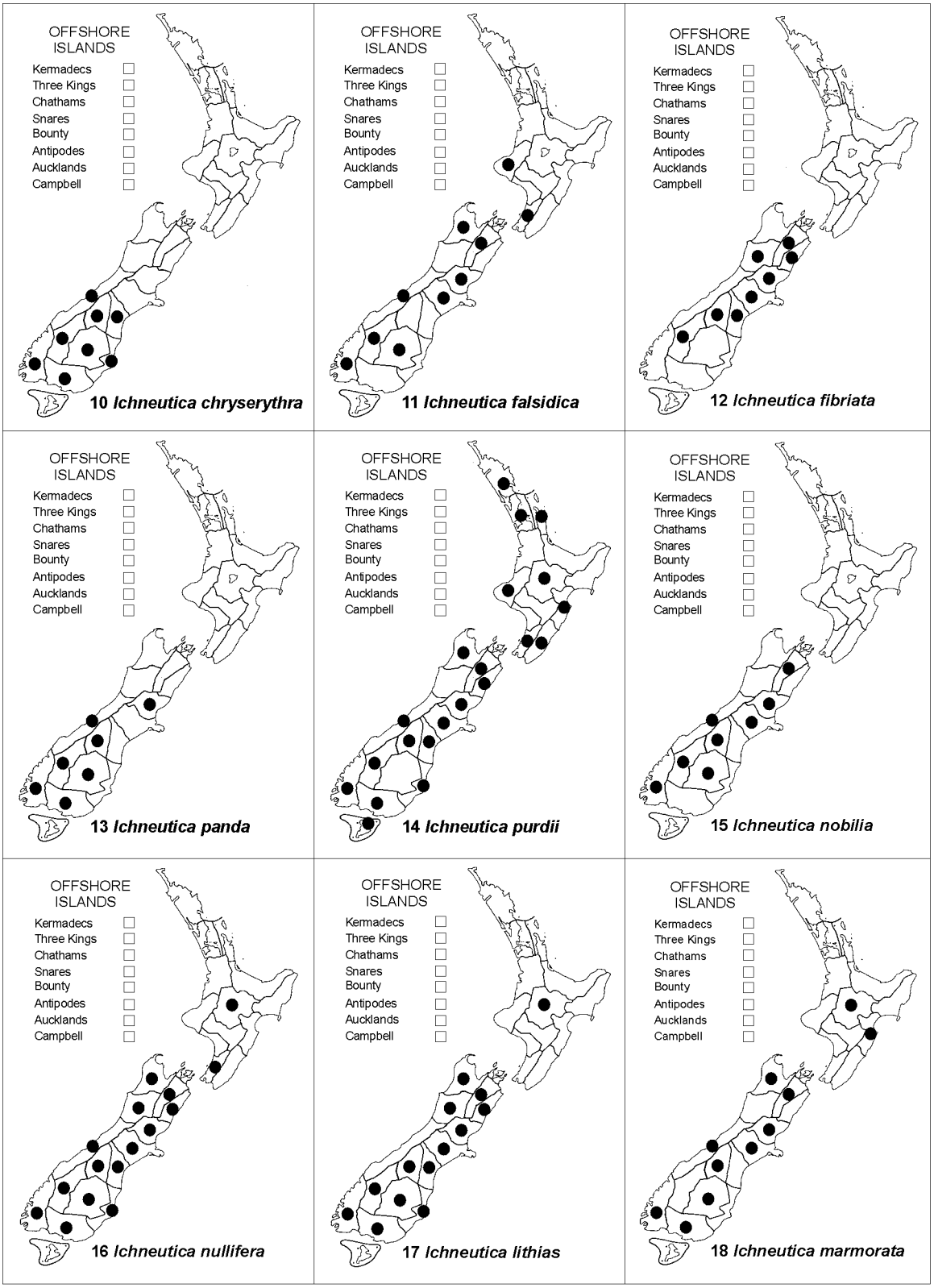
Fig. L14, *Ichneutica purdii* larva on *Astelia hastata*; **L29,** *I. subcyprea* young larvae on *Tmesipteris tannensis*; **L54la,** *I. arotis*, larva on Phormium tenax; **L54pu,** *I. arotis* pupa; **L78a,** *I. lignana* young larva on *Poa anceps*; **L78b,** *I. lignana*, older larva.



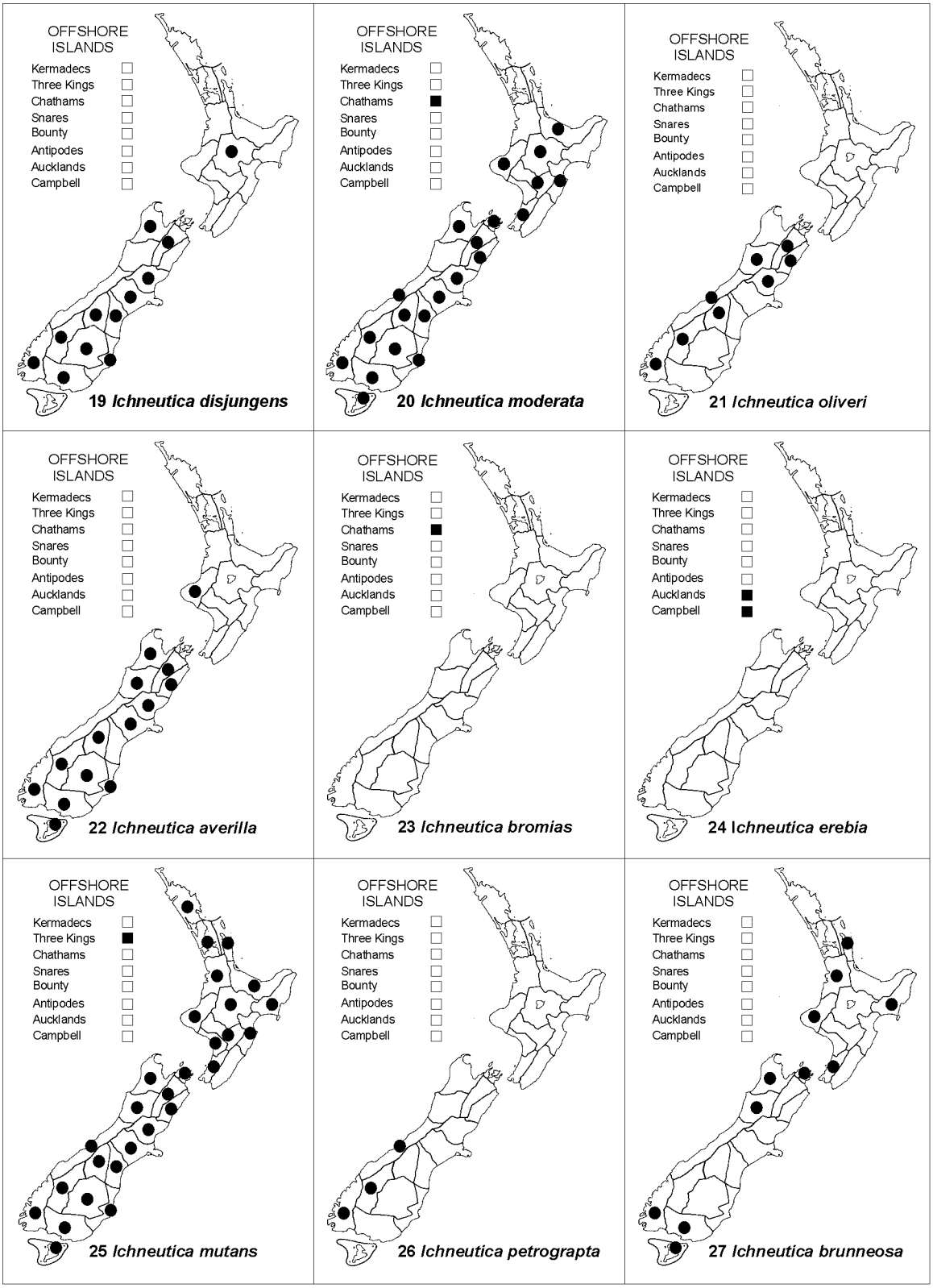
Figs L25–87, Preserved *Ichneutica* larvae (photographs reproduced with permission from Bejakovich & Dugdale ([1998]): **L25,** *I. mutans*; **L32,** *I. insignis*; **L33a,** *I. plena*; **L33b,** *I. plena s.l.* (see text); **L38,** *I. scutata*; **L74,** *I. atristriga*; **L87,** *I. ustistriga.*



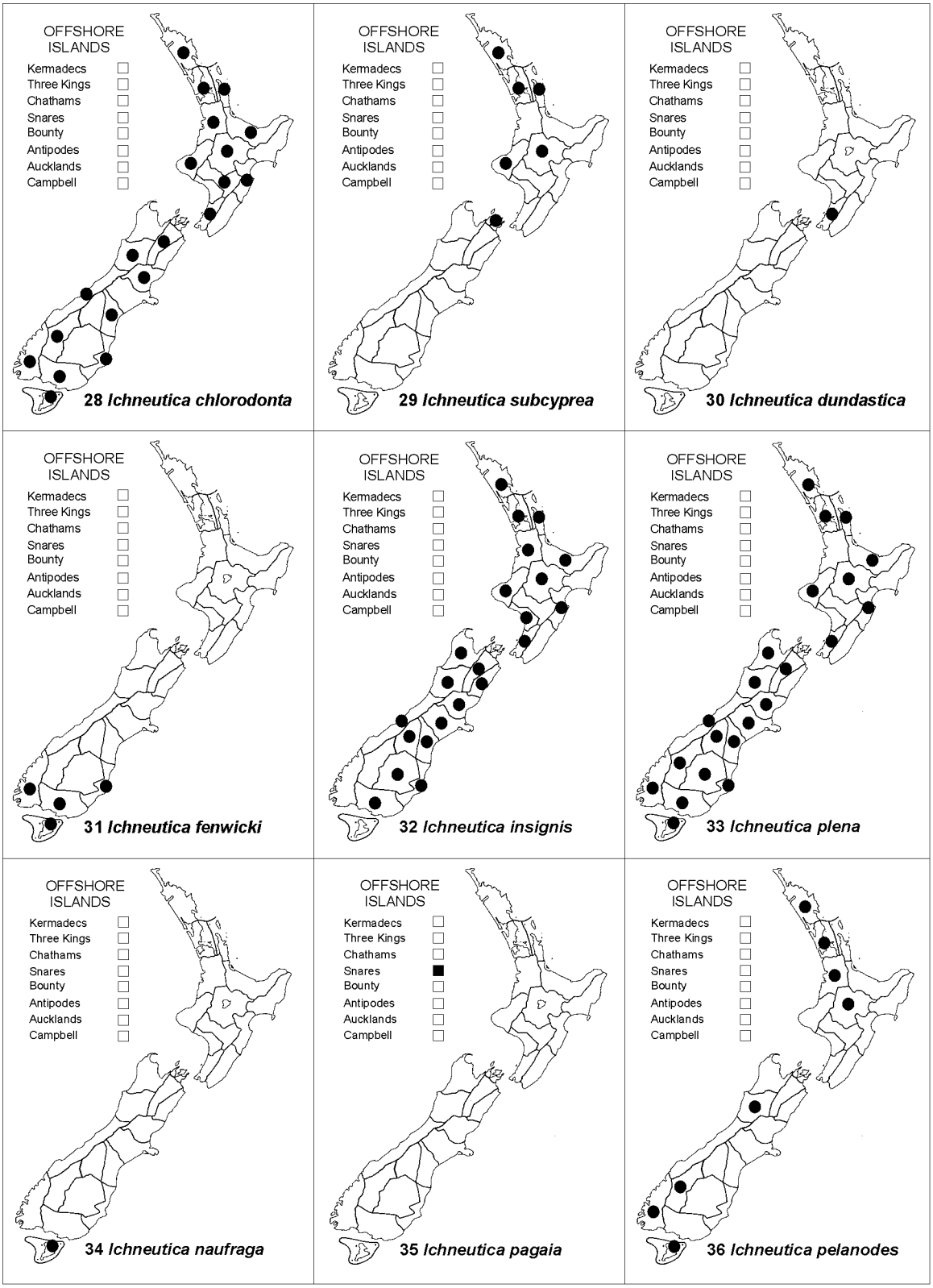
Maps 1–9. *Nivetica nervosa*, *Ichneutica ceraunias* to *I. hartii*.



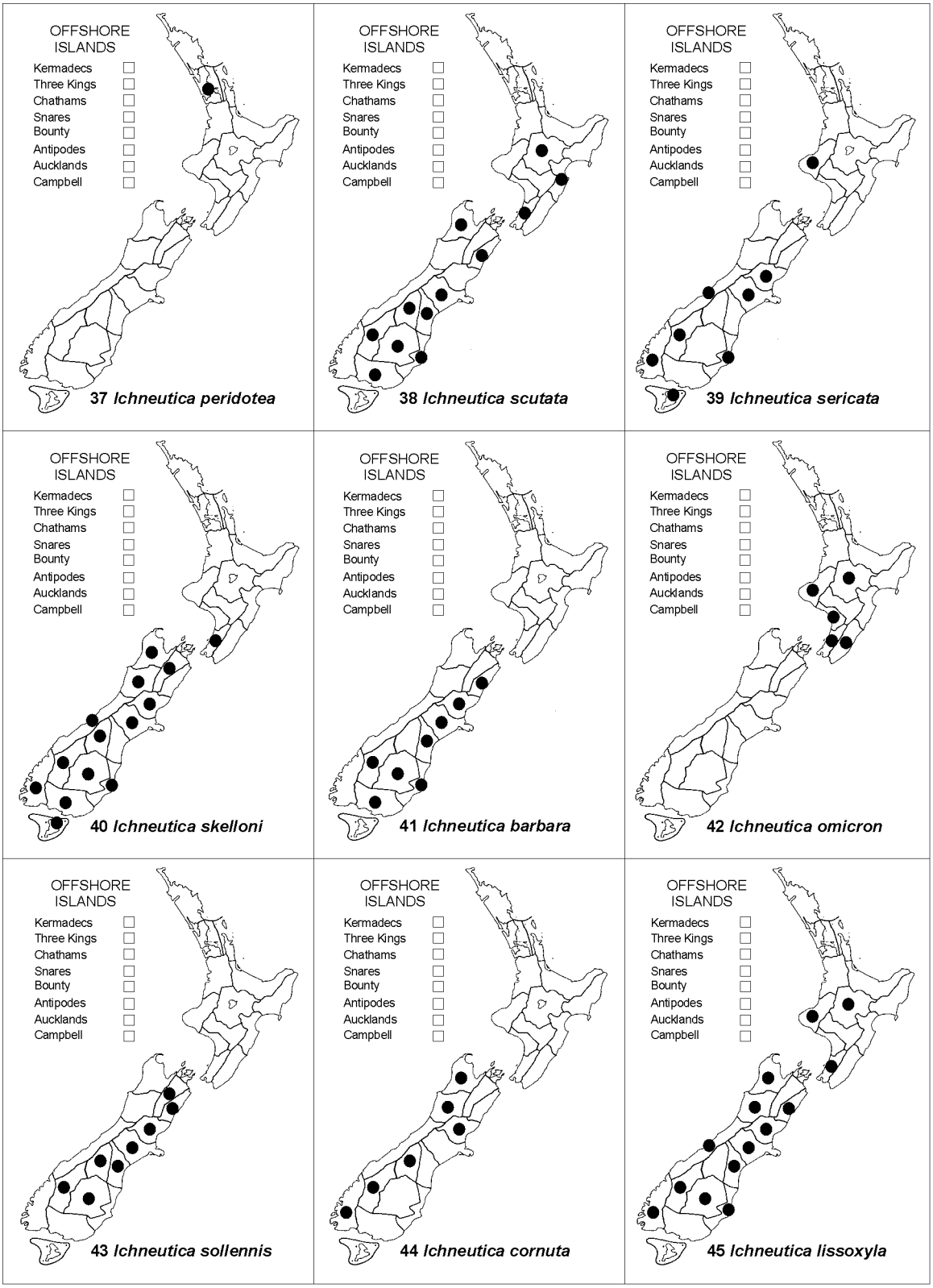
Maps 10–18. *Ichneutica chryserythra* to *I. marmorata.*



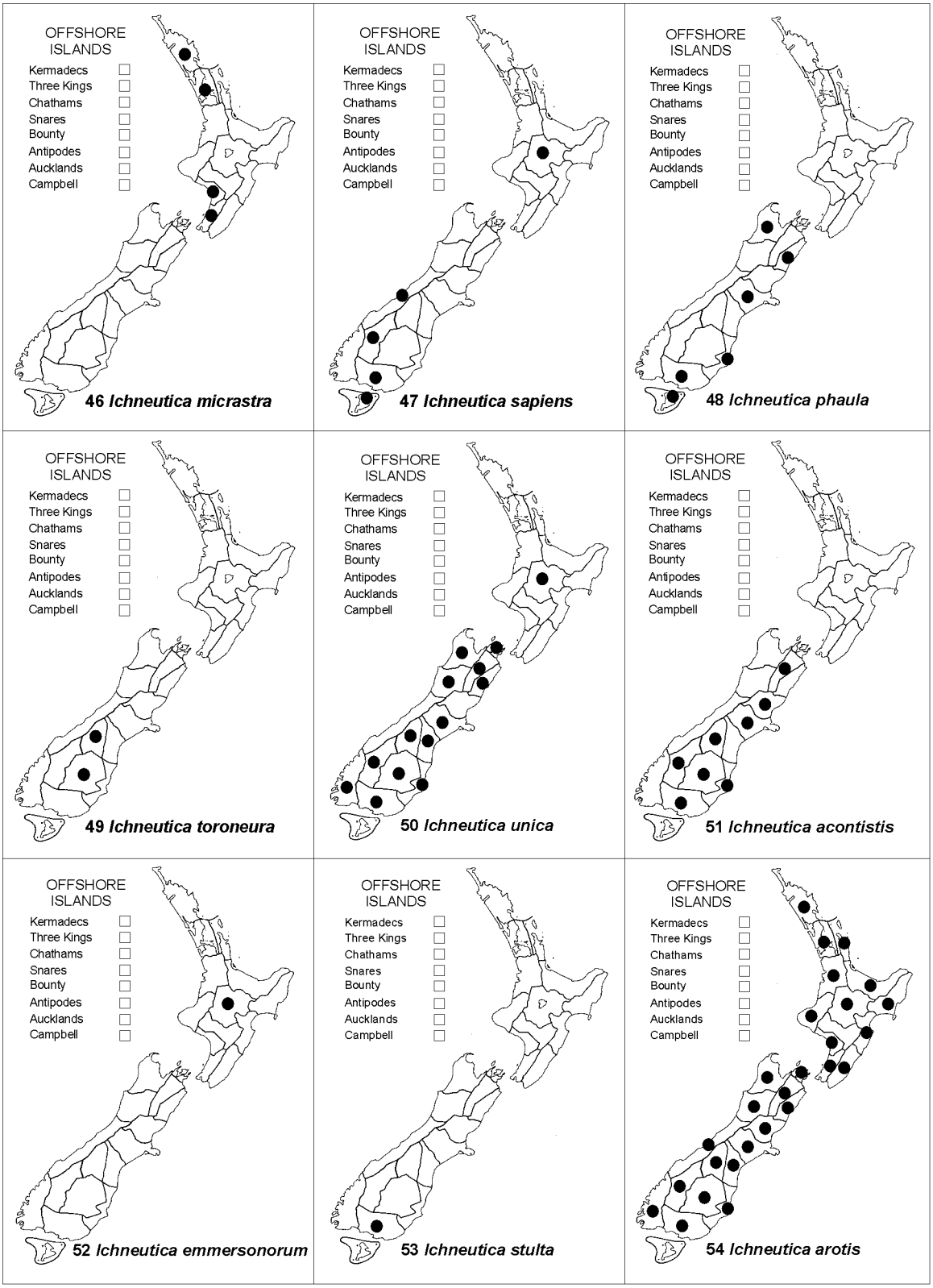
Maps 19–27. *Ichneutica disjungens* to *I. brunneosa.*



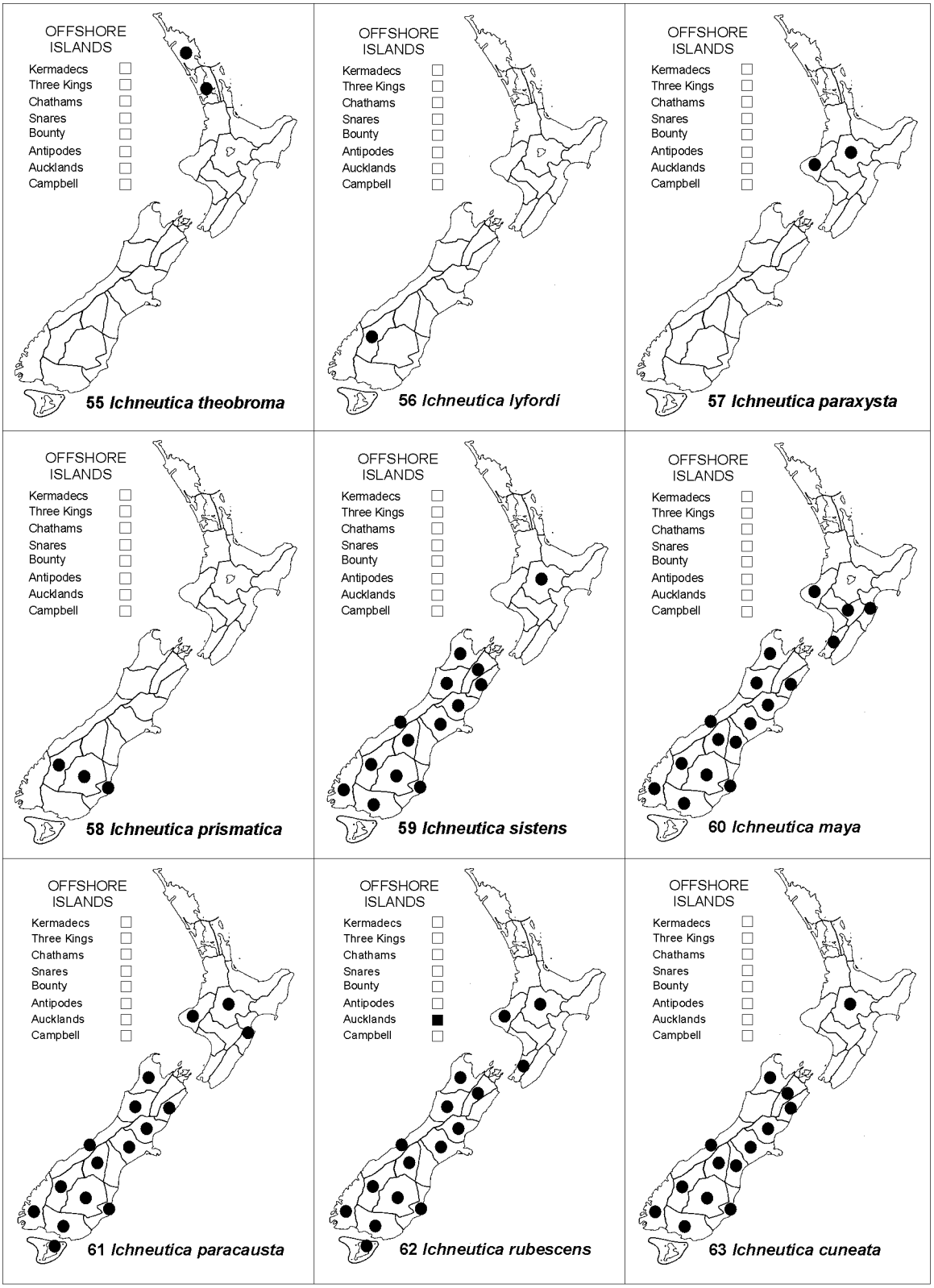
Maps 28–36. *Ichneutica chlorodonta* to *I. pelanodes*.



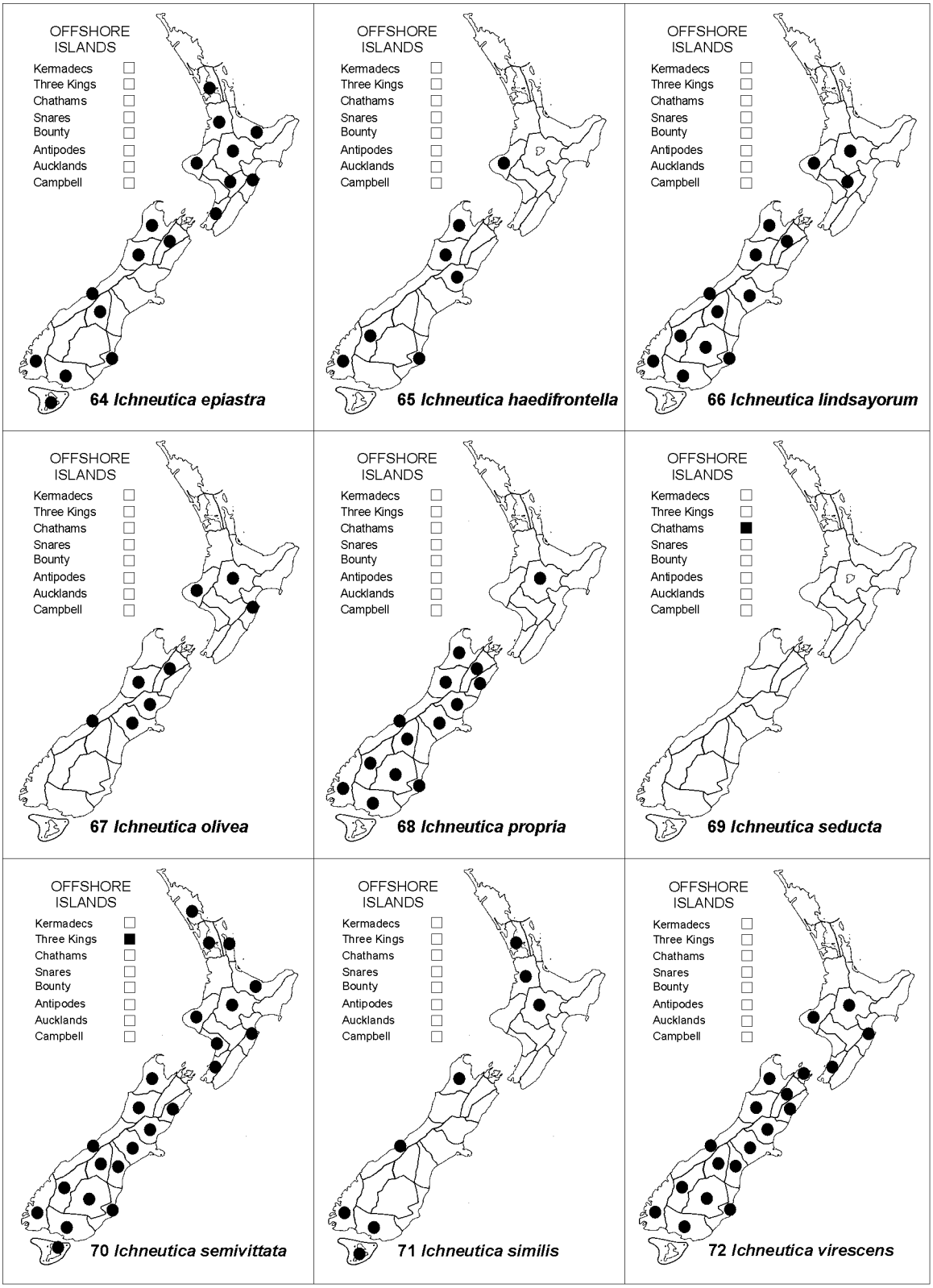
Maps 37–45. *Ichneutica peridotea* to *I. lissoxyla*.



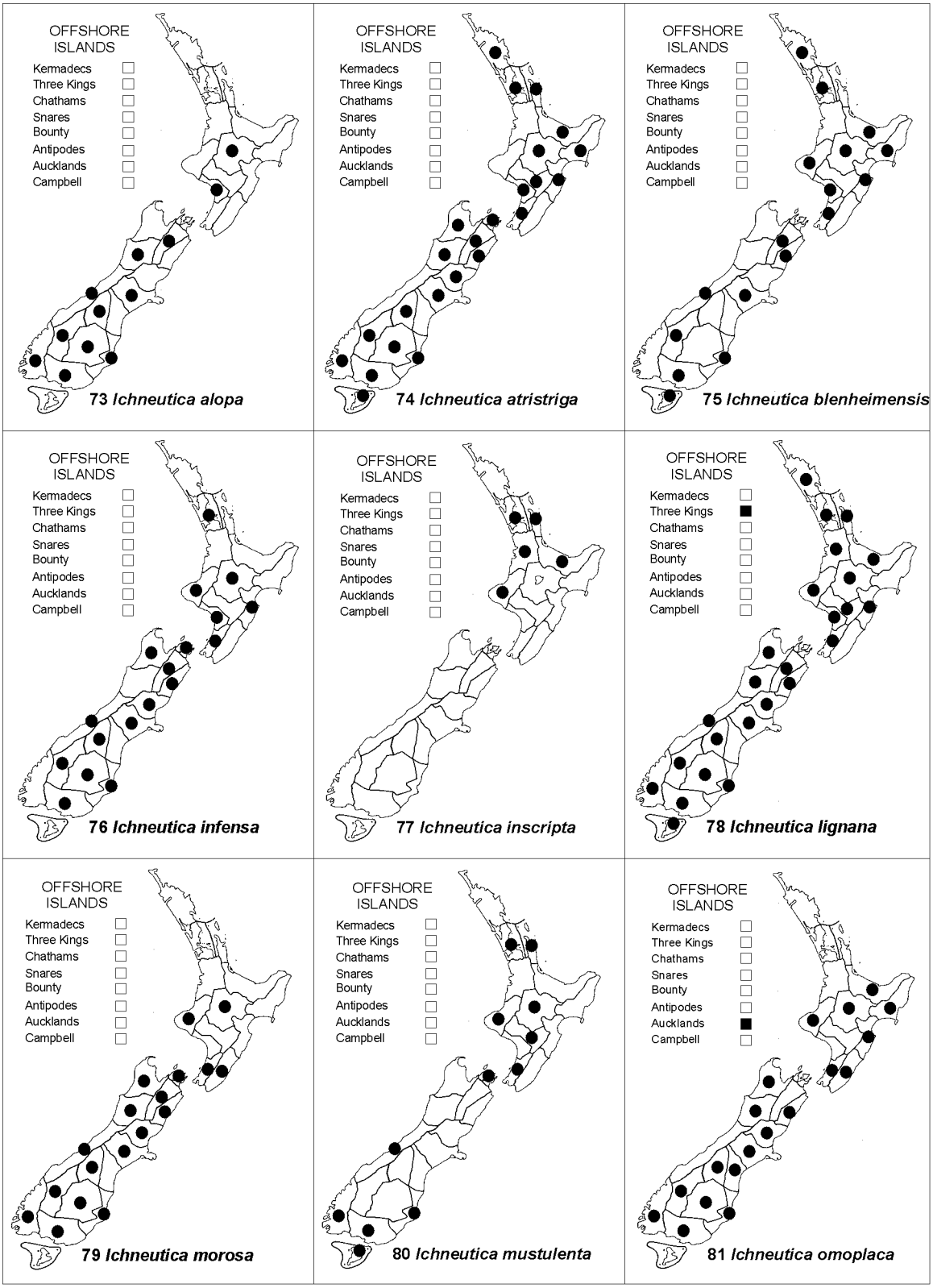
Maps 46–54. *Ichneutica micrastra* to *I. arotis*.



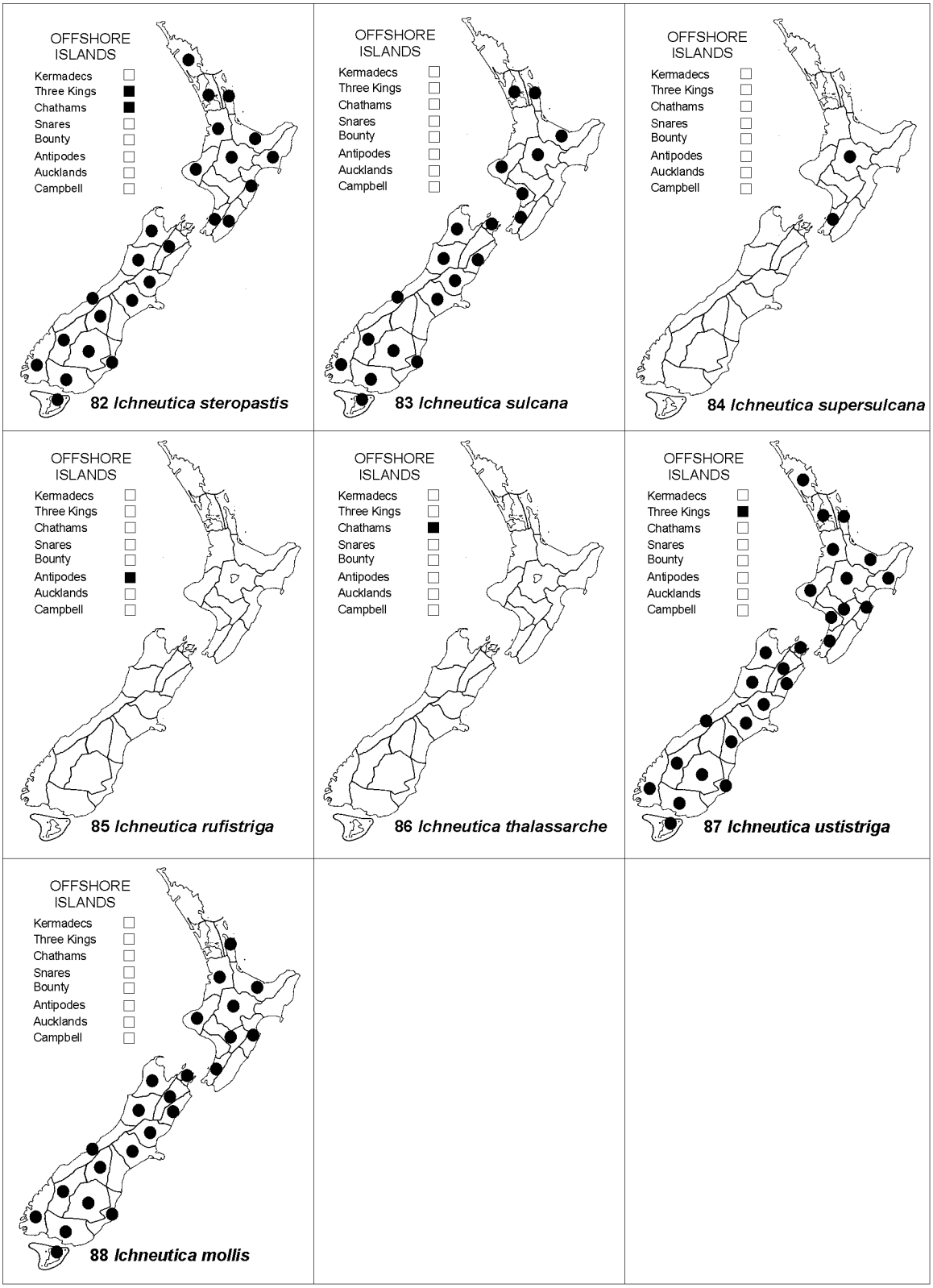
Maps 55–63. *Ichneutica theobroma* to *I. cuneata.*



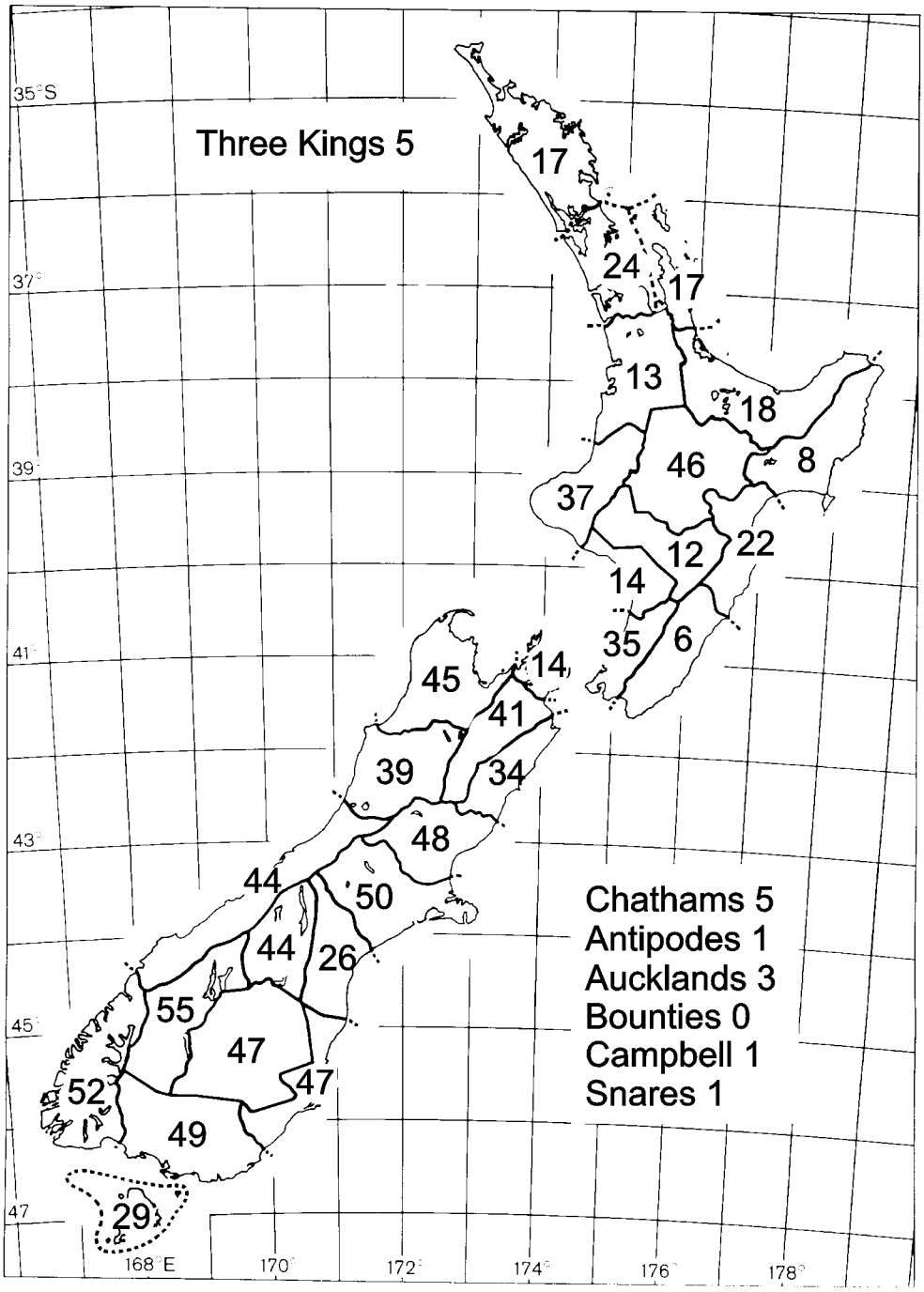
Maps 64–72. *Ichneutica epiastra* to *I. virescens.*



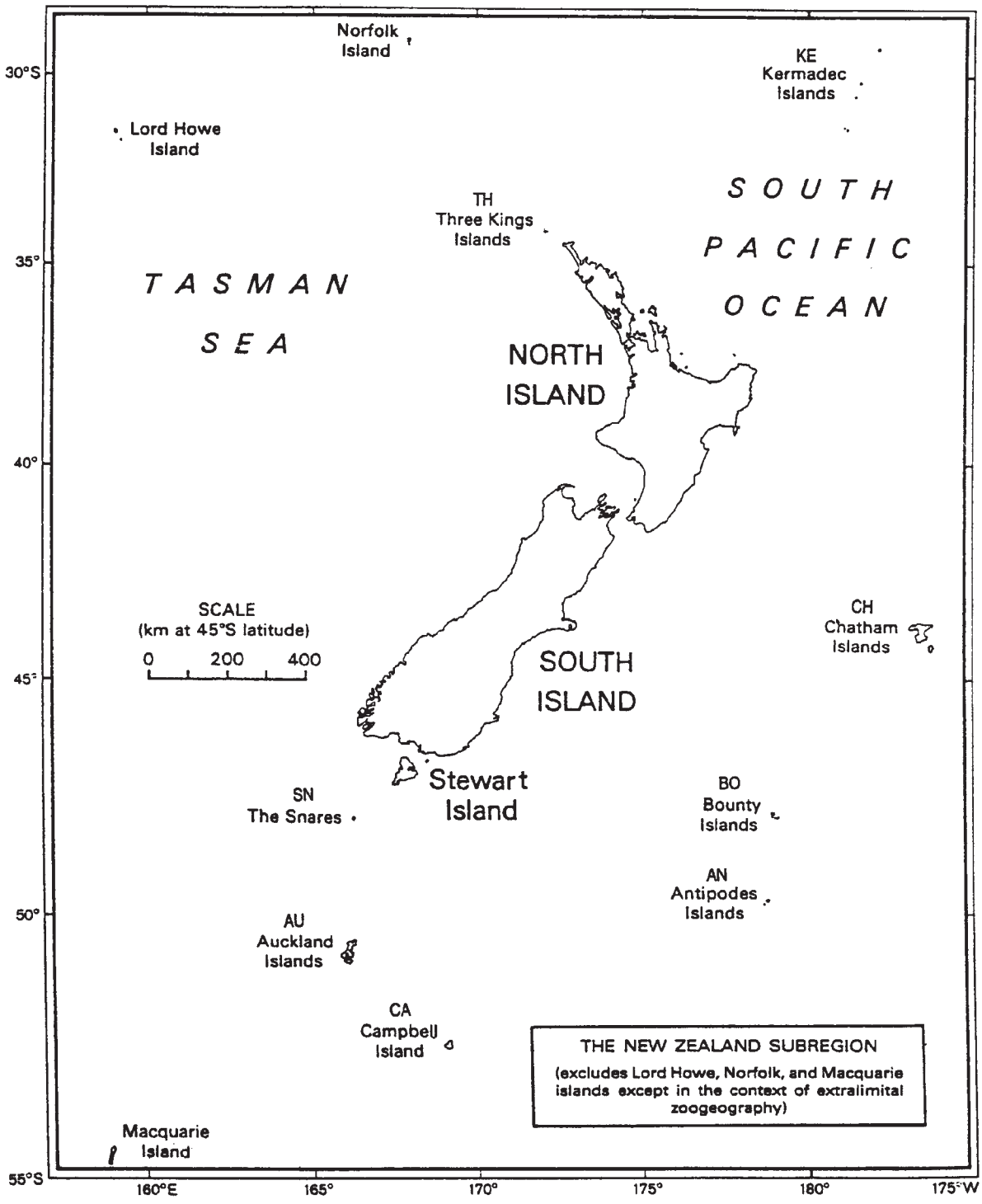
Maps 73–81. *Ichneutica alopa* to *I. omoplaca*.



Maps 82–88. *Ichneutica steropastis* to *I. mollis*.



Map 89. Known diversity of *Ichneutica* species by New Zealand subregion.


Norfolk Island
KE Kermadec Islands
Lord Howe Island
TH Three Kings Islands
SOUTH PACIFIC OCEAN
TASMAN SEA
NORTH ISLAND
SCALE (km at 45°S latitude)
0 200 400
SOUTH ISLAND
CH Chatham Islands
Stewart Island
SN The Snares
BO Bounty Islands
AN Antipodes Islands
AU Auckland Islands
CA Campbell Island
THE NEW ZEALAND SUBREGION
(excludes Lord Howe, Norfolk, and Macquarie islands except in the context of extralimital zoogeography)
Macquarie Island
30°S
35°
40°
45°
50°
55°S
160°E
165°
170°
175°
180°
175°W

Taxonomic index

This index covers the nominal invertebrate taxa mentioned in the text, regardless of their current status in taxonomy. Taxa in **bold** are those included in the checklist. Page numbers in **bold** indicate main entries. Page numbers in *italics* indicate figures. The letter '**p**' after a page indicates **habitus photographs** of adults or larvae, the letter '**k**' indicates a **key**, and the letter '**m**' indicates a **distribution map**.

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He titiro whāiti tā tēnei pukapuka ki ngā mea noho whenua, kāore he tuarā; i pēnei ai i te mea kei te mōhio whānuitia ngā mea whai tuarā, ā, ko ngā mea noho moana, koirā te tino kaupapa o te huinga pukapuka *NIWA Biodiversity Memoirs*.

Ka āhei te tangata ki te **whakauru tuhituhinga** mehemea kei a ia ngā tohungatanga me ngā rauemi e tutuki pai ai tana mahi. Heoi anō, e wātea ana te Kohinga Angawaho o Aotearoa hei āta tirotiro mā te tangata mehemea he āwhina kei reira.

Me whāki te kaituhi i ōna whakaaro ki tētahi o te Kāhui Ārahi Whakarōpūtanga Tuarā-Kore, ki te Ētita rānei i mua i te tīmatanga, ā, mā rātou a ia e ārahi mō te wāhi ki tana tuhinga.