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**Ko te Aitanga Pepeke
o Aotearoa**

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*Manaaki Whenua - Landcare Research
Biodiversity & Conservation Group
Mount Albert Research Centre
Private Bag 92170, Auckland,
New Zealand*

Fauna of New Zealand
Ko te Aitanga Pepeke o Aotearoa
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Anthicidae

(Insecta: Coleoptera)

F. G. Werner[†]

**Department of Entomology
College of Agriculture
University of Arizona
Tucson AZ 85721, U.S.A.**

[[†]deceased]

and

D. S. Chandler

**Department of Entomology
College of Life Sciences and Agriculture
University of New Hampshire
Durham, NH 03824, U.S.A.**



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EDITOR'S PREFACE

Floyd G. Werner died on 20 December 1992, nearly 20 years after he unknowingly initiated this project by agreeing to identify some introduced anthicids for Willy Kuschel. Floyd always enjoyed a challenge, and had nearly completed his study of the entire New Zealand anthicid fauna at the time of his death. One of his last acts was to make certain that this contribution would be finished, by bringing in as co-author his former student Donald S. Chandler.

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Front cover: The beetle depicted is *Anthicus hesperi* (Illustrator: D.W. Helmore)

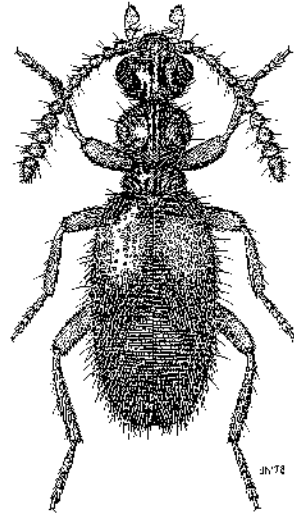
Aro mua: Ko te pītara nei ko *Anthicus hesperi* (Kai-whakaāhua: D.W. Helmore)

Class / Karaaihe Insecta
Order / Oota Coleoptera

Family/ Whaamere **Anthicidae**

Ant-like flower beetles

Illustration: *Cotes crispi* (Illustrator: D.W. Helmore)
Whakaāhua: *Cotes crispi* (Ka-whakaāhua: D.W. Helmore)



Anthicidae are most commonly called the 'ant-like flower beetles,' though in fact relatively few species are commonly collected on flowers, and no New Zealand species are found frequenting flowers. These small, active beetles are readily recognised by their sharply constricted neck, which is often combined with a lateral constriction of the pronotum. The pattern of these constrictions superficially suggests an ant-like appearance, which is particularly enhanced by their busy, short-legged gait when alive.

Some species in other countries are commonly collected with ants, and are quite difficult to distinguish when moving about in ant runs. Presumably they mimic the ants as a protective measure while searching for food.

Adults are scavengers or predators, feeding on small invertebrates or on vegetative debris. A few species in North America have been investigated for their value in biological control, because they feed on the eggs and small larvae of several insect pests.

Anthicidae are often found beneath objects lying on sand or soil, or running about on vegetation during the day. Some species are strongly associated with coastal sand dunes.

The immatures are not well known, and apparently have a diet similar to that of the adults. Adults from many species are strongly attracted to cantharidin, the irritant produced by beetles of the family Meloidae, and use of cantharidin or drying meloid beetles can be quite effective when trapping adult Anthicidae. Acquisition of this chemical is believed to enhance mating success and decrease predation. Attraction

Ko nga Anthicidae ka mōhio whānuitia he 'pua pōpokorua pāpapa,' akuanei iti noa iho nga momo whānui ka kohi-kohia mai i nga putiputi, arā kī hai nei he momo i Niu Tīreni e kitea ana e noho putiputi ana. Ko ēnei pāpapa iti kaha korikori kamōhiotia tonutia mai i te kakī kukuti koi ngatahi me te kotaha, me nga tauira kutia o te kōiwi. Ko nga tauira o aua kūkutinga, i runga noa iho ka hanga rite ki te āhua o te pōpokorua, ka kitea rawa atu i te kamakama titaha haere i ō rātou wae poto i te wā e ora ana.

Ko ētahi momo i ētahi atu whenua ka kohi whānuitia me nga pōpokorua, kanui anō te pakeke i te kitea i te wā e omaoma haere ana me nga pōpokorua. He whakapaengia ana ka whakarite i nga tikanga pōpokorua, he āhua ārai i a rātou i te wā e rapurapu kai ana.

Ko nga pakeke he hamuhamu he kaitukituki, ka kaikai i nga para ngārara tūāra kore, toenga otaota rānei. Ko ētahi momo i te Kōtiū o Āmerika kua rangahautia kia kitea ai te painga hei toa whawhai mo te taiāo, na te mea, ka kaikai i nga hēki me nga iro iti o nga ngārara orotā.

Ko nga mea kī hai anō kia pakari kāore anō kia mōhio rawatia, heoi, engari e hanga rite anō nga kai ki nga mea matua kua pakeke.

Kanui te kitea o Anthicidae i raro i nga mea e takoto noa iho ana i te onepū, i te oneone rānei e omaoma haere ana, i te rā, i roto i nga otaota. Ko ētahi momo ko o rātou tino wāhi ka kitea ko te tahataha moana me nga tupetupe hau onepū.

Ko nga pakeke o te nuinga o nga momo ka kaha i te whai 'cantharidin,' he mea whakahōha i puta mai i te whānau

(continued overleaf)

(ara haere tonu)

note sculpture of body
concealed under hairs

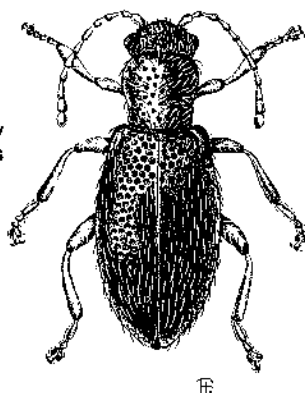


Illustration: *Lagrioida brouni* (Illustrator: A.C. Harris)
Whakāhau: *Lagrioida brouni* (Kai-whakāhau: A.C. Harris)

tion to cantharidin has not yet been tested for the New Zealand species.

Twenty-six species of Anthicidae are now known from New Zealand. Nine of these have been introduced, probably through human commerce—seven are from Australia, and the other two are cosmopolitan species associated with human settlements. The seventeen native species are frequently associated with endemic species of monocotyledonous plants.

Two species are found only on the South Island, and four are found only on the North Island. Members of the genera *Cotes* and *Zealanthicus* are restricted to New Zealand, and are closest to genera found in Australia and South America. The faunal relationships of the New Zealand Anthicidae are clearly closest to Australia, and more remotely to temperate South America.

Floyd G. Werner was born in Illinois, educated at Harvard University, and received his PhD there in 1950. In 1954 he moved to Arizona, where he spent the rest of his life. He was a specialist on the beetle families Meloidae, Anthicidae, and Aderidae, lived in an area where these families are quite diverse, and consequently authored/co-authored 100 or so papers with faunal, systematic, and ecological treatments of these and many other groups of insects.

Donald S. Chandler was born and initially educated in California, following with an MS at the University of Arizona under Floyd Werner and a PhD at The Ohio State University. In 1981 he joined the Department of Entomology at The University of New Hampshire, and continued research on the systematics of Anthicidae and Pselaphidae, and effects of disturbance on forest floor beetles. He has authored 55 papers covering systematics, faunal, and ecological treatments of several beetle families.

pāpapa Meloidae. Ko te painga o cantharidin, me te whakamaroke i a pāpapa meloid kanui te tōtika i te wā e hopu ana ki a mau te matua pakeke o Anthicidae. E whakaponotia ana ko te whiwhinga i taua ranu ka pai rawa atu te whai hoa me te whakaiti i nga āhua patupatu. Kāhore anō kia whakamātauahia e pēhea te āhua pai kia cantharidin mo nga momo e noho nei i Niu Tīreni.

He rua tekau mā ono nga momo e mōhiotia ana, no Niu Tīreni. He iwa me mau mai ki konei, he whakapaingia ana na te hunga mahi kaupakihi—whitu no Ahitereiria, me te toenga e rua he momo no te katoa e pā ana ki nga wāhi nohoanga iwi. Ko nga momo tūtūru tekau mā whitu kanui nga pānga ki nga momo otaota tūtūru o 'monocotyledonous.'

E rua anō nga momo ka kitea i Te Wai Pounamu, ā, e whā hoki momo ka kitea i Te Ika A Māui. Ko nga mea i heke iho mai i te tātai *Cotes* me *Zealanthicus* ka kitea i Niu Tīreni anake, engari e pātata ana ki nga momo e kitea ana i Ahitereiria, me te Tonga o Āmerika. Ko nga āhuatanga whanaungatanga ngārara o te Anthicidae o Niu Tīreni ka pātata ki nga mea o Ahitereiria, ā, he ititi noa te pānga kinga takiwā akuanei mahana o te Tonga o Āmerika.

Floyd G. Werner, ka whanau i te whenua o Illinois, ka whai i tōna mātauranga i te Whare Wānanga i Harvard, i reira ka riro mai tana tohu tākuta PhD i te tau 1950. I te tau 1954 ka neke ki Arizona, i reira ia ka noho mo ake tonu. He tino tohunga ia mo nga momo whānau pāpapa momo Meloidae, Anthicidae, me Aderidae, ka noho i nga wāhi maha nga whānau me te rerekē anō. Na taua āhua ka puta mai i a ia, me ētahi atu tēnā mea i te pepa i tuhia, eke atu i te kotahi rau, e hāngai ana ki te ngārara, nga whakatanga, me nga tikanga tangotango taiao o ēnei mea, ā, puta atu hoki ki nga rōpu maha o nga ngārara.

Donald S. Chandler ka whanau, ka tī mata tuatahi tōna whaingā mātauranga i te whenua o California, a muri atu he MS i te Whare Wānanga O Arizona i raro i a Floyd Werner, ā, ka riro mai te tohunga tākuta PhD, i te Whare Wānanga Ohio State. I te tau 1981 ka hono atu ia ki te Tari Ngārara, i te Whare Wānanga O New Hampshire, ā, ka whai tonu i nga rangahau e pā ana ki nga tikanga momo ngārara Anthicidae rāua ko Pselaphidae, ā, me nga puta o nga āhuatanga whakararu pāpapa e noho ana i te papa ngahere. Ko ia te kaituhi rima tekau mā rima pepa e pā ana ki nga āhua tātai nahanaha ngārara me nga tangotango taiao o ētahi whānau pāpapa.

ABSTRACT

The Anthicidae of New Zealand are revised for the first time, and their taxonomic affinities are discussed. Twenty-six species have been found, eight of them undescribed, and eight new synonymies were discovered. Nine of these species are introduced, seven of them originating from Australia; the other two are cosmopolitan anthropogenic species. Members of genus *Cotes* are all restricted to New Zealand, as is the monotypic new genus *Zealanthicus*. The known seasonality, biological associations, and geographic distribution of the species are summarised, with maps indicating locality records. A key to their identification is given, and most species are illustrated.

CHECKLIST OF TAXA

Subfamily ANTHICINAE

Genus <i>Anthicus</i> Paykull, 1798	16
(a) <i>Anthicus</i> sensu stricto	
<i>hesperi</i> King, 1869	16
<i>kreusleri</i> King, 1869	17
(b) <i>australis</i> -group	
<i>gushi</i> new species	18
<i>troilus</i> Hinton, 1945	18
<i>elegans</i> Lea, 1895	
(c) <i>strictus</i> -group	
<i>glaber</i> King, 1869	19
<i>minor</i> Broun, 1886	19
<i>flavitaris</i> Broun, 1914 new synonymy	
<i>otagensis</i> new species	20
(d) Subgenus <i>Omonadus</i> Mulsant & Rey	21
<i>floralis</i> (Linnaeus, 1758)	21
<i>fallax</i> Broun, 1893	
<i>formicarius</i> (Goeze, 1777)	21
Genus <i>Sapintus</i> Casey, 1895	22
<i>aucklandensis</i> new species	22
<i>deitzi</i> new species	24
<i>obscuricornis</i> (Broun, 1880) new combination	24
<i>anthracinus</i> (Broun, 1893) new synonymy	
<i>pellucidipes</i> (Broun, 1880) new combination ..	25
Subfamily LAGRIODINAE	
Genus <i>Lagrioida</i> Fairmaire & Germain, 1860	25
<i>brouni</i> Pascoe, 1876	26
Subfamily LEMODINAE	
Genus <i>Cotes</i> Sharp, 1877	26
<i>bullata</i> Broun, 1923	27
<i>crispi</i> (Broun, 1880)	27
<i>punctata</i> Broun, 1893 new synonymy	
<i>gourlayi</i> new species	28

<i>Cotes halliana</i> Broun, 1923	28
<i>optima</i> Broun, 1893	29
<i>proxima</i> Broun, 1893 new synonymy	
<i>proba</i> Broun, 1881	30
<i>dorsalis</i> Broun, 1893 new synonymy	
<i>rufa</i> Broun, 1893	30
<i>insignis</i> Broun, 1912 new synonymy	
<i>vestita</i> Sharp, 1877	31
<i>distincta</i> Broun, 1893 new synonymy	
Genus <i>Trichanancea</i> Blackburn, 1891	31
<i>fulgida</i> new species	32
<i>Zealanthicus</i> new genus	33
<i>sulcatus</i> new species	33
Subfamily MACRATRIINAE	
Genus <i>Macratrion</i> Newman, 1838	34
<i>aotearoa</i> new species	34
<i>exilis</i> Pascoe, 1877	35
<i>verticalis</i> Sharp, 1877	
<i>flavipes</i> Broun, 1893 new synonymy	

CONTENTS

Acknowledgments	8
Introduction	8
Morphology	8
Biology	10
Methods and conventions	11
Systematics	12
Key to genera and species	13
Descriptions	16
References	35
Illustrations	39
Distribution maps	45
Taxonomic index	58

ACKNOWLEDGMENTS

Guillermo Kuschel effectively initiated this study when he contacted FGW in 1974 about identifying some introduced anthicids collected during a study of the beetle fauna of the Auckland suburb of Lynfield. This request led over the intervening years to a revision of the entire New Zealand anthicid fauna. With the death of FGW on 20 December 1992, completion of this project was undertaken by DSC.

During the lengthy period of this study we have enjoyed understanding co-operation in arranging loans of specimens, including types, by a succession of individuals at several institutions. We here thank them, and they are listed with their respective institutions in the section on abbreviations. In particular we would like to acknowledge Guillermo ('Willy') Kuschel, Trevor Crosby, and Charles Watt of the New Zealand Arthropod Collection for their unfailing encouragement and co-operation. Tymone Duval assisted greatly through association of specimen localities with their area codes, and in preparation of the maps. D.W. Helmore (Landcare Research, Auckland) and Gene Hall (University of Arizona, Tucson) prepared many of the habitus illustrations. R. Marcel Reeves, John F. Burger (University of New Hampshire), and John F. Lawrence (CSIRO, Australia) read all or parts of the manuscript. Stefan Cover (Harvard University) identified ants associated with Neotropical *Acanthinus* species.

DSC was able to travel to Australia and New Zealand in 1993 through the award of a University Travel Grant by the Department of Ecosystem Management, University of New England, Armidale, N.S.W., Australia. This grant allowed travel to the Australian museums that hold type material of species introduced to New Zealand, and permitted a visit to the New Zealand Arthropod Collection in Auckland. Fieldwork in Australia was enhanced through the award of a Newholme Research Fellowship by the University of New England, which allowed documentation of the habitat of one of the introduced Australian species.

INTRODUCTION

Members of the Anthicidae, the ant-like flower beetles, are most commonly associated with riparian areas and savannahs, and to a lesser extent forests. Their fauna is generally well known for North America and Eurasia, and somewhat less so for Africa and South America. The Oriental, Australian, and New Zealand faunas have all been largely neglected since the early 1900s, and though many species have been described, there haven't been any synthetic treatments of any part of the fauna from these areas other than Kreckich-Stassoldo's limited work in the Philippines (1925, 1929).

Systematic work on the New Zealand Anthicidae certainly reflects this pattern. Previous treatments of New Zealand anthicids consist of isolated species descriptions by Broun (18 species), Pascoe (2 species), and Sharp (2 species) from 1876 to 1923. Other than their listing in catalogues (Hutton 1904, Pic 1911a, b, Hudson 1923, Blair 1928a, b), the only subsequent paper dealing with the New Zealand fauna was the synonymy of *Anthicus fallax* under *Anthicus floralis* by Buck (1950). Placement of the precinctive genus *Cotes* has been particularly enigmatic, since few specimens of this genus exist outside of collections in New Zealand or in the British Museum (Natural History), and few specialists on Anthicidae have ever seen any specimens.

Twenty-six species are now known from New Zealand. Nine are definite or suspected introductions from other countries; seven from Australia—*Anthicus glaber*, *A. gushi*, *A. hesperi*, *A. kreusleri*, *A. troilus*, *Sapintus deitzi*, and *Trichananca fulgida*, with the last two and *A. gushi* undescribed; and two cosmopolitan, *Anthicus floralis* and *A. formicarius*. Five species from the remaining seventeen are here described as new. The genera *Sapintus* and *Trichananca* are now recognised from New Zealand, and a precinctive new genus, *Zealanthicus*, is defined. *Cotes*, the only other truly precinctive genus, has several species with the flight wings reduced.

While little is known about species relationships within the large cosmopolitan genera *Anthicus*, *Sapintus*, and *Macratia*, the other species either belong to genera unique to New Zealand (*Cotes* and *Zealanthicus*) or are in genera found only in Australia, New Zealand, and southern South America (*Lagrioida* and *Trichananca*). *Cotes*, *Trichananca*, and *Zealanthicus* are members of the Lemodinae, a subfamily most diverse at the generic and specific levels in Australia. The two native species of *Anthicus* are here placed as members of the *strictus*-group, which is also most diverse in Australia. The biogeographic affinities of the New Zealand anthicid fauna clearly indicate an ancient origin in common with the Australian fauna, with members of two of these genera sparsely represented in southern South America.

MORPHOLOGY

The following general description of the family is based on members of all the subfamilies except Ischaliinae and Afreminae. While we question the placement of these groups and the Lagrioidinae in the Anthicidae, New Zealand has one species of Lagrioidinae, *Lagrioida browni*. It is treated as an anthicid in this revision following continued inclusion of the Lagrioidinae in the family by Lawrence &

Newton (1995). Sources for this section are Crowson (1955), Lawrence (1982), and Lawrence & Britton (1991).

The most striking feature of the Anthicidae may be the disjointed appearance of many of the species. The head is sharply constricted behind the eyes to form a narrow neck, the pronotum is almost always constricted laterally near the base, the pronotal base is narrower than the elytral base, with their junction slightly constricted, and the elytral postbasal transverse impression is often pale-coloured, rendering the visual effect of a further constriction. The body is typically tan, brown, or dark brown, and frequently has pale bands or spots on the elytra, though members of *Lemodes* Boheman and *Lagriomorpha* Champion (Australia and Papua-New Guinea) may be coloured a brilliant red and purple, and some African members of *Formicomus* LaFerté-Sénéctère may be metallic blue or green. Species range from 1.2 mm to 15.0 mm in length.

Features frequently useful in identifying species are based on dorsal colour pattern, orientation of setae, and density and distinctness of punctation. Colour patterns can be quite variable, and should be used with care. Discrimination of the type and orientation of setae is critical for accurate identification in many groups.

Tactile setae are erect to suberect stiff hairs that usually project above the other hairs. They are generally sparse, and appear to form ordered rows on the elytra when they can be clearly seen. In some groups the tactile setae are quite short and difficult to see (such as on members of the subgenus *Omonadus* of *Anthicus*). The hairs that are shorter and angled lower than the tactile setae are referred to as the 'setae,' and are usually much denser. The setae can be dense or sparse on different areas of the elytra, oriented in different directions, and raised at a characteristic angle from the surface of the body with a limited range of variation if the specimen has not been roughly handled. Setal angles are usually most clearly visible on the elytra. The average angle of a line drawn from the setal shaft near the base to near the apex in reference to the elytral surface may be given in degrees, or characterised more generally as: 'appressed', the tip of the slightly curved seta touching the body surface; 'subdecumbent', slightly raised, the general angle of the shaft 10–20°; 'decumbent', clearly raised, 20–40°; 'suberect', 40–60°; or 'erect', 60–90°. A few groups, such as the Lemodinae and *Sapinus* in the Anthicinae, have a third layer of dense hairs that we have called 'undersetae.' These are usually appressed, and may be oriented in various directions to give a swirled appearance, often in conjunction with the orientation of the setae.

Patterns of punctation are often critical in species recognition. The head may lack punctures in a narrow longitudinal zone on the front, or the disc may be evenly punctured. The size, density, and depth of the punctures may vary

between head, pronotum and elytra. Some groups have serial punctures on the elytra, while in others the punctures are confused.

Body length is the distance from clypeal apex to elytral apex. In some species the abdomen may extend noticeably beyond the elytra, but since it may be quite variably extended or contracted it is not included in length measurements.

Full description of adult morphology

Head deflexed, strongly constricted behind eyes to form a neck one-half or less of head width (barely constricted in Lagrioidinae); form of head base quite variable, and useful in characterising species and many genera. Eyes transversely oval, entire, often with short setae originating between facets. Antennal bases exposed; antennae inserted at side of frons, 11-segmented, with antennomeres decreasing in length from 3rd to last; terminal 3 segments sometimes shortened and/or broadened enough to suggest a weak club (*Macratia*, and some Notoxini) or a strong club (*Lagrioida*). Frontoclypeal suture distinct. Mandibles small, strongly curved. Maxillary palps with 4 segments, the last usually securiform (except in *Lagrioida*) and with unique and characteristic form for some groups; intermediate segments with inner margins projecting in a few groups.

Prothorax elongate to trapezoidal, widest anteriorly, with lateral fovea dorsal to procoxae indicating origin of apodeme forming internal closure of procoxal cavities (absent in *Lagrioida* and Steropinae). Procoxal cavities open posteriorly (except in 2 genera of Eurygeniinae); procoxae conical, prominent, contiguous. Pronotum with lateral margins usually rounded, rarely acutely angulate; a thin, well defined sulcus often originating at lateral foveae and extending posterodorsally to cross dorsum just anterior to base; a weak to distinct lateral constriction along lateral course of this sulcus, extending across dorsum as a shallow to deep groove in some groups; pronotal apex with a flanged rim or 'collar' in Macratinae and Anthicini; Notoxini (Anthicinae) with anterodorsal margin strongly projecting to form a 'horn' used to dig in sand and soil (Chandler 1982).

Mesosternum broadly triangular, rounded to angulate anteriorly, with mesepisterna nearly meeting (rounded) or meeting (angulate) at middle of anterior margin, and with a posteromedial extension separating mesocoxae in almost all groups. Mesosternal-mesepisternal suture distinct (except in Macratinae). Lateral and posterior margins of mesepisterna greatly bowed or angled in some groups to almost cover mesepimera. Fringes or patches of dense or long setae sometimes found on anterior or posterior margin of mesepisterna, and when densely fringed often with

mesepimera recessed and not visible, with a medial fovea originating from recessed mesepimera in *Sapintus* species and 1 or 2 foveae in the *strictus*-group of *Anthicus*. Mesocoxae open laterally. Metacoxae with a short internal flange; metacoxal cavities separate. Metendosternite with stalk wide, shorter than lateral arms, with laminae; anterior tendons arising on a stalk well above junction with laminae. Mesoscutellum small, usually triangular (quadrate in some Lemodinae). Elytra usually with humeral angles distinct; flightless species (some *Cotes* and other genera) lacking these angles. 'Omoplates' (raised, rounded areas at centre of each elytron near base) not apparent in flightless species to spinose in some members of *Acanthinus* LaFerté-Sénéctère (Anthicini, Neotropical). Postbasal transverse impression posterior to omoplates usually broad and vague, often with a pale band or spots, not apparent in many flightless species. Lateral curve of elytra with a longitudinal groove in members of *Macratia*. Flight wings with a well developed postcubital patch. Tibiae with apical spurs simple to absent. Tarsi with antepenultimate tarsomeres simple, penultimate tarsomeres lobed to some extent; claws simple to appendiculate.

Abdomen with 5 fully exposed, free sterna (morphological segments 3-7); basal 2 sterna fused in *Lagrioida*. Males of many groups with pygidium (morphological tergum 8) at least slightly visible, but completely covered by tergum 7 in other groups. Males often with 5th visible sternite bearing apical modifications (truncate, impressed, emarginate, with tufts of setae). Sternite 8 usually simple, modified in *Macratia* and some Anthicini (such as *Formicomus*, Asia and Africa). Sternite 9 usually Y-shaped, with long basal stalk and shorter arms (without basal stalk in Steropinae); apical arms articulated in some groups and lost in others (T-shaped), present as a thin rod in Tomoderinae. Aedeagus with separate parameres and penis in members of groups such as Macratrinae, Eurygeniinae, and Notoxini (Anthicinae). Parameres fused to form a tegmen in groups such as Lagrioidinae, Lemodinae, Copobaeninae, Tomoderinae, and Anthicini (exception: members of *Ischyropalpus* LaFerté-Sénéctère, Anthicini, New World). Phallobase separate in all groups except Copobaeninae, Lemodinae, and Tomoderinae (fused but distinct in *Pseudotomoderus* Pic, Old World). Penis longer than rest of aedeagus in Lemodinae and Copobaeninae. Internal sac often with patches of spines of varying width and length. Primary gonopore often with armature in Anthicini.

Females with sternite 5 (morphological sternum 7) usually broadly rounded. Genitalia usually based on a long tubular ovipositor. Coxites very close together in midventral region and partly divided ventrally; styli small, borne on unsegmented or incompletely 2-segmented coxites.

BIOLOGY

Anthicids occur worldwide, and are often common in semi-arid areas ranging from woodlands to deserts, or on foliage in forests. Species from a number of genera have adapted to the xeric environment of coastal and inland sand dunes, or saline/alkaline mud flats. The few ecological studies of anthicids have dealt with the zonation of species of coastal beach faunas (Ronchetti *et al.* 1986, Somalia; Colombini *et al.* 1985, 1991, Italy), biology and behaviour of *Tanarthrus* Casey in alkaline lakes of the western United States (Peterman 1973, Chandler 1975), and seasonality in Botswana (Forchhammer 1986). While members of several large genera such as *Anthicus* and *Sapintus* are commonly found on the ground in litter or under low-lying plants in riparian areas, others such as *Macratia* may be found crawling about on vegetation during the day. In temperate regions usually only a few species scattered through several genera may be commonly found on tree vegetation (the large Palearctic genus *Microhoria* Chevrolat is an exception), though the fauna found on tree foliage in the tropics is much more diverse. In forested areas of Brazil (FGW) and Panama (DSC) we found the greatest number of species while beating/sweeping tree foliage along trails or at clearing margins, while only a few species could be found on the ground. A limited survey of the foliage fauna of sandalwood (*Santalum album*) in India produced 20 species (Heberdey 1934).

Adults of those species living on the ground are thought to be scavengers and opportunistic predators, feeding on organic debris and small or weakened invertebrates that they can subdue (Werner 1964, Chandler 1982). The anthicid species found during studies of biological control agents on the vegetation of cotton (Butler 1966, Orphanides *et al.* 1971) and Monterey pine (*Pinus radiata*) (Landwehr 1977) have been primarily predaceous, feeding on mites, scales, or other small invertebrates. While on vegetation they are also known to feed on pollen (Landwehr 1977), on exudates from glands (Smith 1942), or on fungal hyphae and spores (Fisher 1918, Hinton 1945).

Larvae have been found on the ground in decaying vegetation, where they are omnivorous or mycetophagous on hyphae or spores (Hinton 1945, Kitayama 1982, Young 1991b) or are opportunistic predators (Nearctic *Anthicus heroicus* Casey on eggs of Corydalidae (Davidson & Wood 1969); Nearctic *Malporus cinctus* (Say) on Diptera puparia (Kitayama 1982)). The immatures of one North American species, *Notoxus monodon* (Fabricius), are known to bore into sweet potato tubers (Cuthbert 1967).

The commonly used name for this family, the 'ant-like flower beetles,' is somewhat misleading in that only a small number of species are at all frequently collected in

flowers. The constrictions of the neck and pronotum, and the frequent marking of the elytral postbasal impression with a pale band, all suggest a disjointed and ant-like appearance. This perception is particularly enhanced by the behaviour of anthicids when alive. They have a busy, short-legged gait that is quite suggestive of ant movements. While only a small number of species are known to be myrmecophiles (Wasmann 1894, Kistner 1982), DSC observed members of the large Neotropical genus *Acanthinus* occurring with ants on vegetation (*A. continuus* Werner with ant *Crematogaster* sp. in Panama) or on the ground (*A. ornatus* (Heberdey) with ants *Forelius* sp. and *Brachymyrmex* sp. in Mexico) that he found quite similar in appearance and pattern of movement, such that he had difficulty in recognising that anthicids were present when examining beating sheets or ant runs.

Certain genera of anthicids have many species that are attracted to cantharidin, the irritating fluid exuded by a variety of blister beetles (Meloidae) (Young 1984a, Schätz & Dettner 1992). The adults, usually males, will feed on dead meloid beetles or cantharidin crystals to obtain this material, which is then stored in the body. Cantharidin is believed to act as a feeding deterrent (Carrel & Eisner 1974), decreasing predation on individuals that can find a source. Eisner (1988) has shown that in the closely related family Pyrochroidae, males with access to cantharidin will have increased reproductive success. Females will mate more readily with these cantharidin-rich individuals, and have this material passed to them during mating within the spermathecal fluids. The cantharidin is then incorporated into the eggs, and eventually the larvae. This feeding deterrent is thus passed on to protect the more vulnerable stages. Anthicids are presumed to derive the same benefits from ingesting cantharidin, and increased mating success has been shown for some species of which the males seek and feed on cantharidin sources (Schätz & Dettner 1992).

METHODS AND CONVENTIONS

Collecting, preparation, and curation

Anthicids typically are found on the ground either crawling about or hiding under objects, or busily crawling around on vegetation. Members of *Anthicus*, *Sapintus*, *Lagrioida*, and to a smaller extent *Cotes* occur most frequently on the ground, and may be obtained through a cautious search under objects such as matted plants or plant debris, boards, beach wrack, and cow dung. These sources can all be quite fruitful, particularly when either the ground or the covering material is slightly damp. An aspirator or a wetted finger can be used to pick up specimens to place in a vial. Individuals can change direction quickly, but seem to have

only one constant speed when being chased. They can hide effectively in cracks and debris if given the opportunity. Pitfall traps can be quite productive for some of these species, and flight-intercept traps may work well for those with fully developed wings. Sweeping riparian vegetation will produce members of groups such as *Macratia*, and possibly also *Zealanthicus*. Beating low tree branches and bushes can be the most profitable collecting procedure in tropical forests and woodlands.

One of the most productive collecting techniques is based on the attraction of many species to ultraviolet and white lights (Werner 1964), but we have seen very few specimens from New Zealand collected by this means. Many members of some large genera are attracted to drying meloid beetles and cantharidin in North America (Chandler 1976), Europe (Gömitz 1937), Africa (van Hille 1954, Forchhammer 1986), and Southeast Asia (Young 1984b), but traps designed to exploit this attraction (Chandler 1976, Young 1984b) are yet to be tested in New Zealand.

Specimens are typically collected into 70% ethanol, and stored until they are prepared. A few species in some genera are large enough to be pinned, but most are either glued on triangular points in the American style or mounted on cards with a water-soluble glue in the European style. It is important when mounting on cards that the glue does not wet the elytra, where it may mat down the pubescence as it dries. We definitely prefer point-mounted specimens, particularly when working with largely unknown faunas. Examination of the male genitalia is important to confirm identification of a few New Zealand species, and it can be impossible to recognise males of the Lemodinae and Macratriniinae when they are mounted on cards, since the pygidium is hidden by the preceding tergite and the form of the fifth sternite can't be seen. However, there should be little problem in identifying most New Zealand specimens even if they are mounted on cards.

For members of *Macratia* and the *vestita*-group of *Cotes* the male genitalia should be examined until one is familiar with their subtle external differences. Soften the whole specimen in hot water for at least 10 minutes, then place it in a small dish in 70% ethanol. Gently lift up the elytra and grasp the abdomen near the middle with a pair of forceps. Using an insect pin with a curved tip create a slit separating the tergites and sternites completely on one side. The male genitalia can then be teased out using the curved pin, or grasped with another set of forceps and pulled out. Members of *Cotes* can be difficult because the penis and ninth sternite are as long as the abdomen, and the slit may have to be enlarged in order to completely pull out the genitalia. Once these are free of the body, detach the associated membranes and ninth sternite until the tegmen and phallobase (if present) can be clearly seen, also the

eighth sternite in *Macratia*. Dry and remount the adults, with the parts of the male genitalia stored in glycerol in a microcapsule pinned through the stopper beneath the specimen labels, or glued on the point or card using a water-soluble glue.

Abbreviations

The two-letter code used at the beginning of records or in the summary of distribution refers to areas of New Zealand defined by Crosby *et al.* (1976). Abbreviations of repositories are derived from Watt (1979) and Arnett *et al.* (1993).

- AMNZ Auckland Institute and Museum, Auckland, New Zealand (J.W. Early)
- AMSA The Australian Museum, Sydney, N.S.W., Australia (B.J. Day, M. Moulds)
- ANIC Australian National Insect Collection, CSIRO, Canberra, A.C.T., Australia (J.F. Lawrence)
- BMNH The Natural History Museum, London, U.K. (C.M.F. von Hayek, L. Jessop, R.D. Pope, E. De Boise, J. Beard)
- CMNC Canada Museum of Nature, Ottawa, Ontario, Canada (R.S. Anderson, F. Génier)
- CMNZ Canterbury Museum, Christchurch, New Zealand (C.A. Muir, R.A. Savill)
- LUNZ Lincoln University, Canterbury, New Zealand (R.M. Emberson, C.A. Muir, J. Marris)
- MAMU Macleay Museum, Sydney University, Sydney, N.S.W., Australia (D.S. Horning Jr, T. Gush)
- MCZC Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A. (P.D. Perkins)
- NMNZ Museum of New Zealand (formerly National Museum, Wellington, New Zealand (R.W. Hornabrook, R.G. Ordish, R.L. Palma, P. Sirvid)
- NZAC N.Z. Arthropod Collection, Mt Albert Research Centre, Auckland, New Zealand (T.K. Crosby, G. Kuschel, J.C. Watt)
- SAMA South Australian Museum, Adelaide, South Australia, Australia (E.G. Matthews)
- UAIC University of Arizona, Tucson, Arizona, U.S.A. (C.A. Olson)
- UNHC University of New Hampshire, Durham, New Hampshire, U.S.A. (collection of D.S. Chandler)
- ZMHB Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (M. Uhlig)

Collection data

Full data for material examined are available electronically and as hard copy from NZAC.

SYSTEMATICS

Composition of the family Anthicidae has varied considerably over the last 100 years, and is still not completely settled. The subfamily Anthicinae forms the core of the family, and is based on *Anthicus* Paykull and 44 associated genera in the Anthicini, plus those included in the Notoxini (*Notoxus* Geoffroy, *Mecynotarsus* LaFerté-Sénéctère, and three other genera). Until recently the Tomoderinae (*Tomoderus* LaFerté-Sénéctère, *Pseudotomoderus* Pic, and three other genera) were treated as a tribe in the Anthicinae, but are now recognised as a distinct subfamily (Lawrence & Newton 1995). Almost all papers by anthicid specialists have treated just these three groups as composing the family, as is found in the last world catalogue (Pic 1911b) and major faunal treatments by Bonadona (1958, Madagascar; 1971–90, France), Bucciarelli (1980, Italy), and Uhlmann (1992, Iberian Peninsula).

However, a variety of other groups have been referred to the Anthicidae, and while aware of these placements (Uhlmann 1976, 1978) anthicid specialists have ignored them, though ironically the current composition is very close to that found in the last world revision of the family (LaFerté-Sénéctère 1848). The Pedilidae have often been recognised as a distinct family (Pic 1911a, Arnett 1963) holding the subfamilies Pedilinae, Eurygeniinae, Macratrinae, and Steropinae. Crowson (1955) subsumed the Pedilidae entirely within the Anthicidae, but this was not universally accepted. More recently Pollock & Young (1991) effectively dismembered this family by definitively transferring the Pedilinae (*Pedilus* Fischer and *Anisotria* Young) to the Pyrochroidae and confirming placement of the other three subfamilies as Anthicidae. Some genera formerly placed as Pyrochroidae are now considered to be anthicids, such as members of the Lemodinae (Blair 1913, Britton 1970) and Ischaliinae (Young 1985). Recent additions are the Copobaeninae (*Copobaenus* Fairmaire & Germain) from Chile (Abdullah 1969) and the Afreminae (*Afremus* Levey) from southern Africa (Levey 1984). Two groups that have been briefly placed in the Anthicidae and are now considered to be members of the Pyrochroidae are the Agnathinae (= Cononotinae, genera *Agnathus* and *Cononotus*) (Doyen 1979, Young 1991a) and the Pili-palpiniae (= Techmessinae) (Pollock 1994). The currently accepted higher classification for the Anthicidae is given by Lawrence & Newton (1995).

Though Broun (1880) initially placed *Macratia* in the Pedilidae, the limits of the family for New Zealand have remained stable in the New Zealand literature through the inclusion of *Macratia* by Hutton (1904) and Hudson (1923) in subfamily Pedilinae of the Anthicidae. Abdullah & Abdullah (1968) added to the family by transferring

Lagrioida (originally placed as *Lagriidae* and subsequently as *Melandryidae*, *Oedemeridae*, and *Cononotidae*) to the *Anthicidae* as the sole constituent of the *Lagrioidinae*. In our opinion this group does not belong in the *Anthicidae*, but we follow the classification of Lawrence & Newton (1995) in treating it here. *Anthicids* have the base of the head strongly constricted to form a distinct neck, have a frontoclypeal suture, the pronotum possesses lateral foveae that mark the origin of the internal apodeme posteriorly closing the procoxal cavities (except in *Steropes*), and the first two visible abdominal sternites are freely articulated. *Lagrioida* has the head base only slightly constricted, lacks a frontoclypeal suture, lacks the lateral pronotal foveae, and the first two visible abdominal sternites are fused. This group does have the short internal flange of the hind coxae found in members of the *Anthicidae*. The following short characterisation of anthicid adults and larvae does not include the conflicting features of *Lagrioida* covered in the preceding sentences.

Diagnostic characters

Adults. Head sharply constricted posterior to eyes to form a distinct neck; frontoclypeal suture present; antennal insertions exposed. Pronotum widest anteriorly; many groups with a lateral constriction near base, with lateral foveae indicating origin of internal apodeme forming posterior margin of procoxal cavities; procoxal cavities open externally, closed internally (closed externally for 2 genera of *Eurygeniinae*, open internally and externally for *Steropinae*); lateral margins of pronotum usually rounded. Mesosternum narrowed anteriorly; mesepisterna meeting or almost meeting at anterior margin. Exposed abdominal sternites freely articulated. Lawrence (1982) gives the most recent diagnosis of the adults.

Larvae. Terrestrial, subcylindrical, lightly sclerotised except for mouthparts and tips of urogomphi (when present). Head usually with a single ocellus on either side, occasionally with more (*Lagrioida* with 5) or none; epicranial stem short or absent; a single median endocarina present. Mandibles with a well developed penicillus or brush of spine-like setae at base of mola. Urogomphi (when present) lacking a pair of median pits. Larval diagnoses are given by Lawrence (1982) and Young (1991a, b).

Kitayama (1982) characterised the larvae of ten genera of *Anthicini* found in North America. The other subfamilies either have the larva of a member of only one genus described (*Steropinae*, *Eurygeniinae*), or no larvae are described (*Copobaeninae*, *Lagrioidinae*, *Lemodinae*, *Macratriinae*).

Four subfamilies are represented in New Zealand: *Anthicinae*, *Lagrioidinae*, *Lemodinae*, and *Macratriinae*.

The *Lemodinae* and *Lagrioidinae* are based on southern temperate groups occurring in Australia, New Zealand, and southern South America, with the *Lemodinae* extending to the tropics in Papua-New Guinea. The subfamilies have not been thoroughly defined, and a phylogenetic analysis of the higher categories is badly needed. John Lawrence (CSIRO, Canberra, Australia) and DSC are initiating a phylogenetic analysis of these higher groups.

The subfamilies found in New Zealand can be separated by the following features.

- **Lagrioidinae:** head feebly constricted posterior to eyes, not forming a distinct neck; antennae with an apical club, lacking lateral pronotal foveae; first 2 abdominal sternites fused; male genitalia with phallobase, penis, and parameres present.

The following three subfamilies have a distinct narrow neck, distinct lateral pronotal foveae, and free abdominal sternites.

- **Anthicinae:** pronotum with an apical collar in *Anthicini* (lacking in *Notoxini*); mesosternum and mesepisterna separate; elytra lacking a lateral groove; male genitalia with phallobase present, and penis not extending anteriorly beyond phallobase.

- **Lemodinae:** pronotum lacking an apical collar; mesosternum and mesepisterna separate; male genitalia lacking a phallobase, and penis longer than tegmen.

- **Macratriinae:** pronotum with an apical collar; mesosternum and mesepisterna indistinguishably fused; elytra with a longitudinal groove at lateral angle; male genitalia with phallobase and parameres present, penis tripartite and not extending beyond phallobase.

KEY TO ANTHICIDAE KNOWN FROM NEW ZEALAND

- 1 Head only slightly narrowed posterior to eyes, lacking a distinct neck (Fig. 6); prothorax flat in area posterodorsal to procoxae, lacking a fovea; pronotum with lateral margins straight in dorsal view, lacking constriction near base ... (*Lagrioidinae*, p. 25) .. *Lagrioida browni*
 — Head sharply constricted posterior to eyes to form a neck one-half or less as wide as head across eyes (Fig. 1–5); prothorax with a fovea or dimple posterodorsal to procoxae; pronotum at least slightly constricted laterally near base ... 2
- 2(1) Elytra with a longitudinal sulcus arising at humeral angle and extending at least half of elytral length; antennae with apical 3 segments widened to form a

- club (Fig. 5); mesosternum indistinguishably fused with mesepisterna ... (Macratrinae, *Macratraria*) .. 3
- Elytra lacking a longitudinal sulcus near lateral margins; antennae lacking a distinct club (Fig. 1-4); mesosternum and mesepisterna clearly separate ... 4
- 3(2) Elytral setae suberect, raised at 30-40°, and punctures weakly defined; male 8th sternite with a shallow notch at broad apex (Fig. 47)... (p. 34) .. *Macratraria aotearoa*
- Elytral setae subdecumbent, raised at about 15-20°, and punctures sharply defined; male 8th sternite with a deep notch at narrow apex (Fig. 48)
- ... (p. 35) .. *Macratraria exilis*
- 4(2) Prothorax with apex set off as a distinct collar (Fig. 1, 2) ... (Anthicinae) .. 5
- Prothorax with at most an obscure rim around apex, not constricted at base to form a collar (Fig. 3, 4, 10)
- ... (Lemodinae) .. 17
- 5(4) First visible abdominal sternum with a narrow transverse cavity posterior to each coxa, the cavity covered by a dense horizontal row of incurved yellow setae; mesosternum with lateral margins slightly curved; mesepisternum with posterior margin bearing a dense fringe of setae (Fig. 23); elytra with appressed to subdecumbent and obliquely directed undersetae
- ... (*Sapintus*) .. 6
- First visible abdominal sternum lacking cavities or a row of setae; mesosternum with lateral margins straight or strongly bowed or angled; mesepisternum with posterior margin lacking dense setae, or if apparently densely setose then mesosternum with lateral margins strongly bowed laterally (Fig. 20-22); elytra lacking undersetae
- ... (*Anthicus*) .. 9
- 6(5) Elytral humeri obsolete; body orange; elytra with brown bands at base, middle, and apex (Fig. 2); length 2.44-2.80 mm ... (p. 22) .. *Sapintus aucklandensis*
- Elytral humeri distinct ... 7
- 7(6) Body dark brown, with elytra lacking markings (Fig. 18); legs usually pale; length 3.72-4.20 mm
- ... (p. 24) .. *Sapintus obscuricornis*
- Elytra with some pale and dark markings ... 8
- 8(7) Head base semicircular; pronotal disc with lateral portions sparsely punctate, middle distinctly punctate; elytra pale with a brown band across middle interrupted at suture (Fig. 19), varying to brown with isolated pale marks; length 3.15-3.68 mm
- ... (p. 25) .. *Sapintus pellucidipes*
- Head base subtruncate; pronotum coarsely punctate over disc; elytra pale, with a brown band across middle and some brown at base and apex (Fig. 17); length 2.9-3.1 mm
- ... (p. 24) .. *Sapintus deitzi*
- 9(5) Body with setae appressed, short (0.04 mm long), and short tactile setae inconspicuous; head and pronotum with reticulate microsculpture; elytra brown to black, reddish across base (Fig. 16) ... (subg. *Omonadus*) .. 10
- Form and colour variable, usually with distinct tactile setae or long pubescence, and lacking microsculpture on head and pronotum ... 11
- 10(9) Mesosternum with lateral margins strongly bowed laterally, with an outer fringe of setae appressed to mesepisternum (Fig. 22); pronotum with a pair of small bumps near midline behind anterior margin; length 3.10-3.70 mm ... (p. 21) .. *Anthicus floralis*
- Mesosternum with lateral margins slightly bowed laterally, lacking any fringe of setae; pronotum smooth anteriorly; length 3.10-3.70 mm
- ... (p. 21) .. *Anthicus formicarius*
- 11(9) Mesosternum with lateral margins straight, lacking dense setae at hind angle of mesepisterna
- ... (*Anthicus sensu stricto*) .. 12
- Mesosternum with lateral margins bowed or angularly projecting; hind angle or lateral margin of mesepisterna with row or tuft of setae (Fig. 20, 21) ... 13
- 12(11) Larger, 3.0-3.5 mm long (Fig. 1); elytral tactile setae erect, conspicuous, half again as long as subdecumbent setae ... (p. 16) .. *Anthicus hesperi*
- Smaller, 1.80-2.40 mm long (Fig. 11); elytral tactile setae erect, inconspicuous, half as long as subdecumbent setae
- ... (p. 17) .. *Anthicus kreusleri*
- 13(11) Mesosternum broadly lobed laterally (Fig. 20); lateral margins of mesepisterna with a fringe of setae elevated above surface, partly visible from above; dark brown, with 2 white bands on elytra; body clothed with short, appressed pubescence ... (*australis*-group) .. 14
- Mesosternum angularly projecting to near elytral margin, with a long tuft of dorsally directed setae arising from mesepisterna near angulation (Fig. 21)
- ... (*strictus*-group) .. 15
- 14(13) Head base lacking temporal angles, rounded; pronotum lacking an antebasal transverse sulcus; elytra with postmedian white band broader than postbasal band (Fig. 12); length 2.56-2.73 mm
- ... (p. 18) .. *Anthicus troilus*

- Head base broadly subtruncate, with distinct temporal angles; pronotum with an antebasal transverse sulcus; elytra with postmedian and postbasal white bands of equal width; length 2.96 mm
... (p. 18) .. *Anthicus gushi*
- 15(13) Pronotum with transverse sulcus thin but distinct across base, and lateral margins sharply angulate in distal half, nearly carinate; uniformly tan (Fig. 13); elytral humeri and wings well developed; length 2.40–2.56 mm
... (p. 19) .. *Anthicus glaber*
- Pronotum without a transverse sulcus at base, or sulcus represented by a small, oval impression, and lateral margins narrowly to broadly rounded; brown, sometimes with paler markings
... 16
- 16(15) Pronotum with a small oval impression near base, apparently a remnant of basal sulcus; elytra with at least obscure paler marks at proximal and distal third (Fig. 14); head base broadly subtruncate; length 2.26–2.52 mm
... (p. 19) .. *Anthicus minor*
- Pronotum smoothly curved near base, without a trace of antebasal sulcus; entirely brown, or elytra obscurely paler at base (Fig. 15); head oval behind eyes; length 2.29–2.72 mm
... (p. 20) .. *Anthicus otagensis*
- 17(4) Pronotum with a distinct, narrow, transverse sulcus across disc near base (Fig. 10); body brown; portion of mesosternum separating mesocoxae depressed posteriorly, the mesocoxae appearing contiguous through posterior half of length; mesoscutellum emarginate at apex; length 4.08–4.72 mm
... (p. 33) .. *Zealanthicus sulcatus*
- Pronotum lacking a transverse sulcus at base, possibly with an extension of lateral constriction across disc (Fig. 3, 4); mesosternum meeting metasternum medially, clearly separating mesocoxae
... 18
- 18(17) Mesoscutellum shallowly emarginate at apex; pronotal disc with a vague longitudinal impression, flattened dorsal to lateral antebasal constriction (Fig. 4); length 3.30–3.68 mm
... (p. 32) .. *Trichananca fulgida*
- Mesoscutellum rounded to subtruncate at apex; pronotal disc rounded, often with lateral constriction continuing across dorsum (Fig. 3, 7–9)
... (Cotes) .. 19
- 19(18) Pronotal disc with reticulate microsculpture, and punctures nearly as large as eye facets; orange-brown; length 5.12–5.16 mm
... (p. 28) .. *Cotes halliana*
- Pronotal disc appearing impunctate or with dense, fine punctation
... 20
- 20(19) Pronotal disc with dense, minute punctures, and with antebasal constriction not continuing across disc; brown; length 6.03–7.20 mm
... (p. 29) .. *Cotes optima*
- Head and pronotum appearing impunctate; antebasal constriction extending dorsally across disc, with constriction distinct in lateral view
... 21
- 21(20) Pronotal base wider than disc, with a yellow band across postbasal impression; pubescence in band on disc directed obliquely laterally, and on sides directed dorsally; elytral humeri prominent (Fig. 9); length 5.66–5.86 mm
... (p. 30) .. *Cotes rufa*
- Pronotal disc as wide as base or wider; elytra with coloration variable, pubescence often directed posteriorly in sinuate swirls, and humeri weak to absent (Fig. 3, 8)
... 22
- 22(21) Smaller, 3.20–4.20 mm; body shining
... 23
- Larger, 4.16–7.52 mm; dull orange to brown
... 24
- 23(22) Elytra brown, usually with distinct, circular, yellow raised areas near lateral margins of distinct postbasal impression (Fig. 7); mesosternum and mesepisterna with 1 or 2 coarse punctures; length 3.20–3.60 mm
... (p. 27) .. *Cotes bullata*
- Elytra with brown basal and median bands, and with postbasal impression barely evident (Fig. 3); mesosternum and mesepisterna coarsely punctate; length 3.40–4.20 mm
... (p. 27) .. *Cotes crisp*
- 24(22) Elytral disc with erect tactile setae distinct, more than twice as long (0.18 mm) as suberect setae (0.07 mm); humeral angles small but distinct; head base broadly subtruncate, with temporal angles rounded but distinct (Fig. 8); pronotal disc convex; male genitalia with tegmen bearing preapical lateral lobes (Fig. 40); length 4.16–7.52 mm
... (p. 28) .. *Cotes goursleyi*
- Elytral disc with erect tactile setae hard to find, about as long as suberect setae; head base shallowly curved, lacking vertexal angles to feebly subtruncate
... 25
- 25(24) Pronotal disc nearly flat, in same plane as elytral disc, and base dark; elytra often with a median brown spot, and with small but distinct humeral angles; male genitalia with tegmen bearing preapical lateral lobes (Fig. 42); length 5.84–6.72 mm
... (p. 30) .. *Cotes proba*
- Pronotal disc shallowly convex, raised above plane of elytral disc; elytra unicolorous, lacking humeral angles; male genitalia with lateral preapical margins of tegmen parallel (Fig. 44); length 4.72–6.00 mm
... (p. 31) .. *Cotes vestita*

DESCRIPTIONS

Subfamily ANTHICINAE

Genus *Anthicus* Paykull

Anthicus Paykull, 1798: 253. Type species *Meloe antherinus* Linnaeus, by designation of Bonadona (1958: 46).

Frontoclypeal sulcus represented by a fine line; pronotum with a distinct apical collar; procoxal cavities open externally, closed internally; notopleural sulcus brief, and usually faintly defined above procoxae; mesocoxae separated by projections of mesosternum and metasternum; elytra lacking undersetae; visible sternites free; 9th sternite Y-shaped, with articulated extensions at apex of short lateral arms; tegmen and phallobase separate, with penis shorter than these two combined.

Remarks. *Anthicus* is difficult to characterise in that many disparate taxa were originally described in this genus, and have not been subsequently removed. It is a large and heterogeneous group, world-wide and species-rich. It is undoubtedly paraphyletic, but attempts to break it into monophyletic units have thus far been disappointing. The few generalisations that can be made to characterise *Anthicus* are listed above.

Anthicus is represented by nine species in New Zealand. Two species are placed in *Anthicus* sensu stricto—*hesperi* and *kreusleri*, both introductions from Australia. Members of this worldwide group are recognised by the straight to slightly bowed lateral margins of the mesosternum, lack of undersetae on the elytra, pronotum with only a faint lateral constriction, presence of a basal transverse sulcus that angles anteriorly at the lateral margins to the pronotal foveae, and lack of setose grooves on the first visible abdominal sternite.

Anthicus gushi and *A. troilus* are distinctive, closely related species also introduced from Australia, and here placed in a group based on *australis* (King) and other Australian species. They clearly do not belong in *Anthicus* on the basis of their broadly lobed mesosternum with an accompanying fringe of setae on the lateral margins of the mesepisterna (Fig. 20). We are not familiar with all the genera known from Southeast Asia and Australia, and so prefer to leave this distinctive group in *Anthicus* until a definitive statement can be made on its generic placement.

Three species—*glaber*, *minor*, and *otagensis*—are members of a species-group proposed here that is based on *strictus* Erichson and other Australian species. Both *minor* and *otagensis* appear to be restricted to New Zealand, with *glaber* an introduction from Australia. This distinctive group is characterised by the sharp constriction of the

pronotum in the proximal third, the lateral angulation of the mesosternum near its posterior margin, the tuft of dorsally directed setae arising from the mesepisterna near this angulation, the recessed mesepimera that have 1 or 2 internally directed foveae (Fig. 21), the lack of undersetae on the elytra, and 1–4 lateral setae near the tegmen apex.

The last two species, *floralis* and *formicarius*, are cosmopolitan introductions commonly placed in the genus *Omonadus* Mulsant & Rey by European authors, though here treated as a subgenus of *Anthicus*. Members of *Omonadus* are generally easy to recognise as a distinct group with their short, appressed setae, very short tactile setae, microsculpture of the forebody, and general colour pattern. However, each of these distinguishing features on its own is shared with some members of *Anthicus* sensu stricto, such that it is impossible to present an exclusive characterisation of the group as a genus. *Omonadus* species do differ from *Anthicus* sensu stricto in lacking the apical arms of the ninth sternite, which forms a simple rod with short lateral extensions at the apex.

All *Anthicus* species, whether introduced or native, are probably diurnal. The introduced species are strongly associated with disturbed areas near human habitation.

Anthicus sensu stricto

Anthicus hesperi King

Fig. 1, 24; Map 1

hesperi King, 1869: 18 (*Anthicus*). Pic 1911b: 52. Lea 1922: 472 (Australian synonymies listed below). *mastersii* MacLeay, 1872: 307 (*Anthicus*). *similis* Lea, 1895a: 614 (*Anthicus*).

Length 3.0–3.5 mm. Body shining; head dark brown; prothorax orange to brown; elytra dark brown with 2 narrow yellow to orange transverse bands; band in postbasal transverse impression sometimes reaching lateral margins and at least vaguely interrupted at suture; slightly postmedian band not reaching lateral margins and narrowly interrupted at suture; strongly marked individuals sometimes with a broader anterior band, but this often reduced to a vague indication in dark individuals with posterior band distinct; legs brown with femoral base orange.

Head and pronotum with scattered short, erect tactile setae; setae decumbent. Head base subquadrate, with a weak median indentation; disc smooth, with evenly spaced distinct punctures approx. 0.04 mm apart; frontoclypeal sulcus indicated by a fine line. Eyes small, lacking obvious setae between facets.

Prothorax broadest at distal fourth; margins almost evenly convergent from widest part to base, only very

feebly convex in dorsal view; punctation similar to that of head; transverse antebasal sulcus extending anteroventrally at lateral margins to lateral pronotal foveae.

Elytra just perceptibly widening to middle; humeral angles prominent; postbasal transverse impression and omoplates weak; sutural area with adjacent fine lateral lines defining a raised area in distal half; erect tactile setae distinct, 0.12 mm long; setae suberect and directed obliquely laterally, 0.08 mm long, raised at about 40°. Lateral mesosternal margins straight. Wings fully developed.

Fore femora swollen in both sexes. Males with hind trochanters medially angulate on posterior margin, and last visible sternite broadly emarginate. Genitalia: tegmen with a short apical expansion; internal sac lacking modifications.

Type data. *Anthicus hesperi*; syntype labelled "Parramatta, RLK/ K35052" (AMSA); also described from Gawler, South Australia. *A. mastersi* was described from Gayndah, Queensland and *A. similis* was described from Queanbeyan, N.S.W. New Zealand specimens were compared with the type material of *A. hesperi* by DSC.

Material examined. Type specimens, plus 118 non-type examples (LUNZ, MAMU, NMNZ, NZAC, UAIC, UNHC).

BP, ND, AK, CL, GB, HB, WA, WN / SD, NN, MB.

Collected throughout the year.

Recorded primarily from near sea level.

Common in pastures, and most easily found under cow dung. The earliest records are for Auckland (1915) and Nelson (1935). Found in straw, lawns, compost, garden leaf litter, under seaweed, on ferns, and in the nest of a song thrush, *Turdus philomelos*. At Lynfield (AK) found in paddocks, under piles of coarse prunings, and sometimes in stream beds in bush areas (Kuschel 1990: 34, 66).

Remarks. *A. hesperi* is generally similar in appearance to *A. kreusleri* but is larger, the punctation of the head and pronotum is larger and less dense, and the anterior pale band of the elytra is narrow, about the same width as the brown basal band. Indigenous to Australia.

Anthicus kreusleri King

Fig. 11, 25; Map 2

Kreusleri King, 1869: 18 (*Anthicus*). Pic 1911b: 57. Lea 1922: 472.

Length 1.80–2.40 mm. Body shining; head red-brown to brown, contrasting with orange prothorax; elytra with

yellow to orange bands; band across weak postbasal transverse impression tending to extend posteriorly along suture to postmedian band, and reaching lateral elytral margins; postmedian band interrupted at suture in darkest individuals, and not reaching elytral margins; legs, antennae, and mouthparts orange.

Head and pronotum with setae appressed, lacking tactile setae. Head with base subquadrate, broadly impressed medially; punctures small but sharply defined, approx. 0.03 mm apart, absent from midline; frontoclypeal sulcus indicated by a fine line. Eyes with setae not apparent between facets.

Prothorax broadest at distal fourth, where sides evenly rounded and then gently convex back to distinct lateral constriction; punctures slightly denser, 0.02 mm apart; distinct transverse antebasal sulcus extending anteroventrally at margins to pronotal pits.

Elytra slightly widened to middle; humeral angles prominent; omoplates not apparent; sutural area with adjacent longitudinal line to each side outlining elevated area to near base; short, erect tactile setae scattered, 0.04 mm long; setae decumbent at 10–15°, 0.07 mm long. Mesosternal margins slightly bowed laterally. Wings fully developed.

Males with hind trochanters briefly angulate on posterior margin; last visible sternite broadly rounded. Genitalia: internal sac covered with lightly sclerotised, short, broad spines.

Type data. Holotype labelled "Gawler, RLK/ K35057" (AMSA). New Zealand specimens were compared with the holotype by DSC.

Material examined. Holotype and 50 non-type examples (NZAC, UNHC).

ND, AK, CL, WO, BP / NN.

Collected throughout the year.

Recorded primarily from near sea level.

Found in a variety of habitats in disturbed areas, such as lawn compost, garden leaf litter, under cow dung, and in pastures, with a record each from nests of southern black-backed gull (*Larus dominicanus*) and starling (*Sturnus vulgaris*). The earliest New Zealand record is from Lynfield (AK) on 17 August 1974 under *Phormium cookianum* in a garden. Common on the ground in bush and open areas in leaf litter at Lynfield, and occasionally found in stream beds of bush areas (Kuschel 1990: 34, 66).

Remarks. *A. kreusleri* is smaller than *A. hesperi*, with the punctures on the head and pronotum denser, the impunctate midline of the head distinct, and the anterior pale band of the elytra twice as long as the basal brown band. Indigenous to Australia.

australis-group

Anthicus gushi new species

Fig. 26; Map 3

Length 2.92–2.96 mm. Body dark brown; pronotum with collar and base posterior to antebasal sulcus orange; elytra with postbasal and postmedian white bands, the postmedian band slightly the narrower, neither band reaching suture, both reaching lateral margins of elytra, and dark base as wide as the following postbasal band; femora brown, orange at base; remainder of legs and antennae orange to reddish brown; setae dense and appressed, pale brown; tactile setae sparse and erect, difficult to see.

Head with base broadly subtruncate, margins posterior to eyes slightly curved to broadly rounded temporal angles; disc convex, polished; punctures small, distinct, approx. 0.02 mm apart; frontoclypeal suture faint, indicated as a fine line. Eyes small, prominent, apparently lacking setae between facets.

Pronotum trapezoidal, widest at distal fifth, with lateral margins linearly convergent to slight lateral antebasal constriction; a distinct transverse antebasal sulcus, angled anteroventrally at lateral margins to polished depression above procoxae; disc slightly convex, with lateral margins sharply rounded to sides along area of greatest width.

Elytra flattened on disc, faintly microreticulate in proximal half; lateral margins subparallel posterior to prominent humeri; omoplates and postbasal transverse impression faint; apices more broadly and conjointly rounded; tactile setae 0.01 mm long; setae 0.06 mm long, briefly swirled laterally in area of postbasal impression. Mesosternum with lateral margins broadly lobed laterally, with a fringe of long, sparse setae on lateral and posterior edges not appressed to narrowly exposed mesepimera. Femora large, clavate. Wings fully developed.

Males with last sternite broadly truncate. Genitalia: apex broadly spatulate, nearly as wide as tegmen base; internal sac with a zone of dense spines in proximal third and another just beyond middle; 9th sternite with apical articulated arms very short.

Type data. Holotype male (NMNZ) and 1 male paratype (MAMU), [GB] Te Karaka, 20 January 1991, T. Gush.

Material examined. Type specimens only.

GB / —.

Collected in January.

Found beneath a dead hedgehog (*Erinaceus europaeus*).

Remarks. Comparison of *A. gushi* with a syntype from Parramatta of *A. australis* (King)—a species widespread in Australia—showed them to be very similar. *A. gushi* is

dark brown, has the lateral temporal margins posterior to the eyes slightly curved, and the spatulate apex of the tegmen is nearly as wide as the tegmen base. *A. australis* is brown, the lateral temporal margins are parallel, and the spatulate tegmen apex is much narrower, about one-third the width of the tegmen base.

A. gushi is separated from *A. troilus* by its broadly subtruncate head base, trapezoidal pronotum, basal transverse sulcus on the pronotum, clavate femora, and the pale bands on the elytra that are equally wide. All three species have a similar appearance based on their shared colour pattern, appressed dark setae coupled with very short tactile setae, dense punctation, and form and setal pattern of the mesosternum and mesepisterna.

This species is named for the collector of the type series, Tom Gush.

Anthicus troilus Hinton

Fig. 12, 20, 27; Map 4

elegans Lea, 1895b: 270 (*Formicomus*). Not *Anthicus elegans* Steven, 1806: 161. Pic 1911b: 45.

troilus Hinton, 1945: 200 (*Anthicus*). Replacement name for *elegans* Lea, a junior secondary homonym in *Anthicus*.

Length 2.56–2.70 mm. Body dark brown, dull; elytra with pale yellow postbasal and postmedian bands; postmedian band the wider, reaching lateral margins of elytra and crossing broadly at suture; postbasal band interrupted at suture; antennae orange; legs with femora brown, tibiae and tarsi orange; dorsum minutely and densely punctate; tactile setae erect, very short, 0.01 mm long; dense setae pale brown, short and appressed.

Head with base elongate, evenly rounded, lacking temporal angles; disc faintly longitudinally strigose; punctures on frons approx. 0.01 mm apart, narrowly absent from midline; frontoclypeal sulcus distinct. Eyes small, prominent; setae between ocular facets about 0.01 mm long.

Pronotum elongate, widest at distal fourth; lateral margins clearly sinuate at faint lateral antebasal constriction; disc nearly flat dorsal to constriction, faintly microreticulate; transverse antebasal sulcus absent.

Elytra flattened on disc, broadly and separately rounded apically; lateral margins slightly widening to middle; humeri prominent; omoplates and postbasal transverse impression indistinct; setae directed laterally in area of postbasal impression. Mesosternum with lateral margins broadly lobed, with a fringe of long, sparse setae on lateral and posterior edges, these not appressed to mesepimera. Femora elongate, linear, not swollen. Wings fully developed.

Males with last sternite broadly truncate. Genitalia: tegmen with apex abruptly hooked ventrally; internal sac with a broad zone of dense, thin spines in distal half narrowing to middle basally.

Type data. Described from Northwestern Australia. Type material (SAMA) was examined by DSC in 1993.

Material examined. Type material, plus 11 non-type specimens (NMNZ, NZAC, UNHC).

—/KA, MC.

Collected January, February.

Recorded from near sea level.

Found on sandy mud along a lake margin, and in tussock litter.

Remarks. *A. troilus* is quite distinct in lacking a basal transverse sulcus on the pronotum, in the elongate head with the base evenly rounded, and the wide postmedian band meeting broadly at the elytral suture. It is certainly close to *A. australis* in the form of the mesosternum and the dense punctation, appressed setae, and very short tactile setae over the body. Both species are clearly not members of *Anthicus*, but we cannot place them in a more appropriate genus at this time.

strictus-group

Anthicus glaber King

Fig. 13, 28; Map 5

glaber King, 1869: 14 (*Anthicus*). Pic 1911b: 50. Kuschel 1990: 65.

Length 2.40–2.56 mm. Body orange; elytra somewhat translucent and lacking markings; legs and elytra yellow.

Head and pronotum with disc flattened, setae appressed and inconspicuous; head base evenly curved to distinct temporal angles; frontoclypeal suture distinct; punctures small but distinct, approximately 0.02 mm apart, but midline narrowly impunctate. Eyes prominent, lacking setae between facets.

Pronotum anterior to constriction explanate; disc nearly semicircular from collar to constriction in dorsal view, widest at distal third; lateral margins carinate at greatest width of disc; basal transverse sulcus angled anteriorly at lateral margins to foveae above procoxae; punctures large and distinct, particularly in proximal third of disc, 0.03 mm apart.

Elytra with disc flattened, lacking omoplates or a postbasal transverse impression; humeral angles distinct; punctures fainter than on pronotum, 0.04 mm apart, finer towards apex; raised sutural margins distinct in distal half;

tactile setae short and erect, 0.03 mm long; setae appressed, 0.04 mm long, mostly directed obliquely laterally. Mesosternum with lateral margins angularly projecting to near elytral margin. Mesepisterna with a long tuft of setae near mesosternal angulation. Wings fully developed.

Males with last sternite broadly rounded. Genitalia: tegmen with lateral rows of 4 spines near apex; internal sac with a broad zone of short, truncate spines grading to long, thin spines at base and apex, and with a narrow zone at middle lacking spines.

Type data. Holotype labelled "Gawler, RLK/ K35048" (AMSA). New Zealand specimens were compared with the holotype by DSC.

Material examined. Holotype, plus 17 non-type examples (NZAC, UNHC).

ND, AK, CL / —.

Collected October–July.

Recorded from sea level to 600 m.

Most commonly found in urban areas in garden leaf litter, and by sweeping grass and weeds. The earliest known New Zealand record is 25 January 1975, from Lynfield (AK), where specimens have been found in a paddock on *Pinus radiata* and amongst *Cortaderia* and *Pennisetum* (Kuschel 1990: 34, 65).

Remarks. *A. glaber* is distinct by its pale colour and flattened pronotal disc, with the lateral margins strongly angulate. It is fairly common in Australia.

Anthicus minor Broun

Fig. 14, 21, 29; Map 6

minor Broun, 1886: 930 (*Anthicus*). Hutton 1904: 190. Pic 1911b: 61. Hudson 1923: 385.

flavivarsis Broun, 1914: 119 (*Anthicus*). Hudson 1923: 385. New synonymy.

Length 2.26–2.52 mm. Body shiny; head and pronotum red-brown to brown, the head usually slightly darker; elytra brown, with base and usually an obscure postmedian band tan.

Head and pronotum with setae sparse, appressed to decumbent, and tactile setae sparse, short. Head with basal margins nearly straight posterior to eyes for one-fourth of head length, temporal angles broadly rounded, and base broadly subtruncate; disc broadly convex, smooth; punctures fine, 0.04 mm apart, but absent from frontal midline; setae directed mesally, 0.05 mm long; tactile setae suberect, 0.04 mm long; frontoclypeal suture thin. Eyes small, not prominent, lacking visible setae between facets.

Prothorax widest at distal third; margins almost semicircular from collar to antebasal constriction; sides narrowly rounded laterally; disc flattened; a small, oval fovea in area of basal transverse sulcus; punctures deeper than on head, especially along midline from base to middle.

Elytra with disc flattened, surface smooth; humeri distinct; omoplates and postbasal transverse impression not apparent; disc with fine punctures 0.06 mm apart, deeper towards base; suture slightly elevated in distal third, with a fine longitudinal line to either side marking border of raised area; tactile setae not apparent; setae sparse and directed obliquely on disc, subdecumbent at 20–30°, 0.09 mm long. Wings usually reduced.

Males with hind tibiae just perceptibly curved through distal half of flexor surface, without long setae; hind trochanters angulate on posterior margin; last visible sternite broadly truncate, its disc flat or slightly convex. Genitalia: tegmen with a single spine near middle of lateral margins; internal sac with a narrow zone of thin spines at base, and with 2 patches of short, broad spines near apex.

Type data. *Anthicus minor*: lectotype female labelled "1670/[AK] Howick/ minor" (Broun Coll., BMNH), here designated by FGW.

Anthicus flavitarsis: holotype female labelled "3437/[SL] Wallacetown, 15.4.10/ *Anthicus flavitarsis*" (Broun Coll., BMNH), examined by FGW.

Material examined. Type specimens of *minor* and *flavitarsis*, plus 129 non-type examples (AMNZ, LUNZ, MAMU, NMNZ, NZAC, UAIC, UNHC).

Three Kings Is/ND, AK, WO, BP, GB, TO, HB, RI, WI, WN/SD, NN, MB, NC, KA, MC, MK, CO, SL/Chatham Is.

Collected throughout the year.

Recorded from sea level to 1670 m.

Found in a wide variety of habitats, usually on the ground in moss or under mat plants but also on logs, under bark, beating tussocks, on lichens, on *Cordyline* flowers, on dead *Muehlenbeckia*, and on *Disphyma australe*.

Remarks. Some specimens from northern localities are paler. *A. minor* is closer in appearance to *Anthicus strictus* Erichson from Australia than to any other species seen in Australian museums, and these may prove to be sister species when a phylogenetic analysis is performed. The holotype of *strictus* (ZMNB) was examined by DSC, and confirmed the distinctness of the two species. The elytral setae of *strictus* are consistently shorter and denser, and the elytral punctation is correspondingly denser.

Anthicus otagensis new species

Fig. 15, 30; Map 7

Length 2.29–2.72 mm. Body shining, dark brown.

Head and pronotum with disc evenly rounded; setae appressed; tactile setae short and erect, visible only on head and pronotum; punctures sparse and fine. Head base with margins posterior to eyes nearly straight for a distance equivalent to eye length, then broadly semicircular in outline, lacking temporal angles; punctures 0.04 mm apart, absent from frontal midline; tactile setae 0.04 mm long; frontoclypeal suture just perceptible. Eyes small, not prominent, apparently lacking setae between facets.

Pronotum widest at distal third; lateral margins nearly semicircular from collar to antebasal constriction; sides rounded; basal transverse sulcus absent.

Elytra with margins nearly parallel; disc evenly rounded and smooth; punctures moderately fine, finer toward apex, 0.06 mm apart; omoplates and postbasal transverse impression absent; humeri weakly evident; elytral suture slightly elevated in distal half; setae subdecumbent at about 20°, 0.09 mm long, fine and dark, directed obliquely laterally on disc. Lateral mesosternal margins straight, lobed posteriorly, with a tuft of setae on mesepisterna near lobe. Wings reduced to narrow strips.

Males with hind tibiae feebly excavated beyond middle of flexor surface, with a tuft of long setae just before excavation about 0.14 mm long; last visible sternite broadly truncate, with a vague transverse impression before apex. Genitalia: tegmen with 2 lateral spines before abruptly widened apex; internal sac lacking spines.

Type data. Holotype: male, [CO] Cromwell Beetle Reserve, 17 March 1975, J.C. Watt, *Raoulia australis* 75–129 (NZAC).

Paratypes (21 males, 16 females; NZAC, UNHC). South I. MC. Ashburton (1). CO. Alexandra: Knobby Range, 9 Sep 1968, Dugdale, *Raoulia* (6); Raggedy Range, 9 Sep 1968, Dugdale, *Raoulia australis* (2); Lookout Point, 8 Nov 1968, Townsend, on *Raoulia* (2). Cromwell: 10 Sep and 10 Oct 1968, Dugdale, mat plants (3); 19–28 Nov 1974, Watt, pit trap (5); type locality, Watt – 17 Mar 1973, *Raoulia australis* (1); 17 Nov 1977, pit trap (1); Cemetery Rd, 17 Nov 1977, moss (1); 9 Mar 1979, under dead tussock (1); 13 Mar 1979, litter and debris (2). Moa Basin (1). Old Man Range, Dugdale: N end, 12 Sep 1968, mat plants (9); 12 Nov 1968, *Raoulia* mat and litter (1). Wanaka, Luggate, 26 Mar 1967, Walker, mat plants (1).

Material examined. Type series only.

—/MC, CO.

Collected September–March.

Most commonly collected under *Raoulia australis*; also in moss, and under mat plants.

Remarks. The lack of a basal transverse sulcus on the pronotum, the dark colour, and the smoothly curved pronotal disc with rounded lateral margins readily separate *A. otagensis* from the other members of the *strictus*-group. The name is taken from the province of Otago.

Subgenus *Omonadus* Mulsant & Rey

Anthicus (Omonadus) floralis (Linnaeus)

Fig. 16, 22, 31; Map 8

floralis Linnaeus, 1758: 420 (*Meloe*). LaFerté-Sénéctère 1848: 150 (in part) (*Anthicus*). Pic 1911b: 47. Hudson 1923: 385. Bonadona, 1953: 101–103, fig. 25, 27 (extensive bibliography, synonymy). Kuschel 1990: 65. *fallax* Broun, 1893: 1168 (*Anthicus*). Hutton 1904: 190. Hudson 1923: 385. Buck 1950: 94 (synonymy under *floralis*).

Length 3.1–3.7 mm. Head red-brown; pronotum orange; elytra with basal band orange, remainder red-brown to brown; legs red-brown to orange, paler basally; tactile setae erect, short and sparse over body, 0.04 mm long; setae very short and appressed over body, 0.03 mm long.

Head and pronotum microreticulate, more faintly on pronotum. Head cordate; base widest at posterior margin of eyes; margins slightly converging basally before broadly rounded temporal angles, with a broad median basal indentation; frons with small, distinct punctures 0.03 mm apart, these less dense in narrow midline; frontoclypeal sulcus distinct. Eyes lacking visible setae between facets.

Prothorax trapezoidal, broadest at distal fourth, where sides slightly concave to faint lateral constriction just anterior to base; a sharply defined basal transverse sulcus angled anteriorly at lateral margins into constriction; broadest part of disc with a pair of low median bumps; punctures similar to those on head.

Elytra with disc slightly convex; humeri prominent; omoplates gently convex; punctures larger than on forebody, 0.04 mm apart, particularly strong in faint postbasal impression just posterior to omoplates, becoming indistinct towards apex; suture flanked with fine lines only in distal third. Mesosternum with lateral edges broadly and semicircularly expanded, not raised above level of mesepisterna, fringed with short setae 0.03 mm long appressed to mesepisterna. Wings fully developed.

Males with last visible sternite broadly emarginate; setae at lateral angles slightly elongate. Genitalia: tegmen

abruptly constricted near broad apex; internal sac with heavily sclerotised curved armature near primary gonopore.

Type data. *Meloe floralis*: type material ("Europae") presumed to be in the collection of the Linnaean Society of London.

Anthicus fallax: holotype male labelled "2074/ [AK] Howick/ *Anthicus fallax*" (Broun Collection, BMNH).

Material examined. Holotype of *fallax*, plus 64 non-type examples (AMNZ, LUNZ, NMNZ, NZAC).

ND, AK, WO, BP, TO, HB, WI, WA, WN/NN, NC, SC, SL, FD.

Collected October–June.

Recorded primarily from near sea level.

Most common from urban environments. Hinton (1945: 200) reported that both adults and larvae would feed on decaying plants and ingest spores with fungal hyphae, and also feed on the remains of insects and mites. Collection records in New Zealand are from copra, hay, oats, gardens, cocksfoot seed, and pastures. Common on the ground in open areas, henhouse straw, garden compost, and piles of prunings in a paddock at Lynfield (AK) (Kuschel 1990: 34, 65). The earliest known New Zealand specimen, Broun's type of *fallax*, was collected at Howick in a puriri log.

Remarks. *A. floralis* is separated from *A. formicarius* by its broader head, laterally bowed mesosternal margins, and the presence of two low bumps near the anterior margin of the pronotum. It is a cosmopolitan species that probably originated from Africa.

Anthicus (Omonadus) formicarius (Goeze)

Fig. 32; Map 9

formicarius Goeze, 1777: 706 (*Meloe*). Pic 1911b: 49.

Bonadona 1953: 103 (*Anthicus*) (extensive bibliography and synonymy).

Length 3.10–3.70 mm. Head red-brown to brown; pronotum red-brown grading to orange near base; elytra orange in proximal fourth, brown apically; legs orange, with apical portion of femora darker; tactile setae sparse over body, short and erect, 0.03 mm long; setae short and appressed over body, 0.04 mm long.

Head and pronotum microreticulate, more faintly but still distinctly on pronotum. Head with margins behind eyes briefly parallel; temporal angles broadly rounded to a shallow median notch; disc with distinct, dense punctures 0.03 mm apart, but midline narrowly impunctate; frontoclypeal suture distinct. Eyes large, with very short setae visible between facets on ventral half, 0.01 mm long.

Pronotum trapezoidal, widest at distal fourth, slightly constricted laterally just anterior to base; a sharply defined basal transverse sulcus angled anteriorly at lateral margins into constriction; disc densely punctate.

Elytra with prominent humeri; omoplates distinct; postbasal impression faint; punctures deeper and larger than on pronotum, particularly in postbasal impression, progressively fainter towards apex; suture flanked by fine lines except in proximal third. Mesosternum with lateral margins straight, lacking a fringe of setae along junction with mesepisterna. Wings fully developed.

Males with fore trochanters angulate near apex; last visible sternite broadly emarginate, the emargination with a recessed straight ledge at middle, with a group of longer setae at lateral angles. Genitalia: internal sac lacking spines.

Type data. Probably described from Europe. Location of type material unknown to us.

Material examined. Twenty-one non-type examples (NZAC).

AK, WI / MB, MC.

Collected November–April.

Recorded primarily from near sea level.

Found in a compost heap, seed waste heap, and in ryegrass seed.

Remarks. *A. formicarius* is very similar to *A. floralis*, but the pronotum lacks the small anterior bumps, the lateral mesosternal margins are straight and lack a setal fringe, and the male genitalia are very different, lacking the complex armature found near the primary gonopore in *floralis*. Cosmopolitan, and typically found associated with vegetable debris in urban environments.

Genus *Sapintus* Casey

Sapintus Casey, 1895: 732. Type-species *Anthicus pubescens* LaFerté-Sénéclère, by subsequent designation of Werner (1962: 493).

Body with setae suberect to erect and tactile setae more erect, sometimes difficult to separate from setae. Elytra with short undersetae appressed to subdecumbent, often directed obliquely laterally.

Head with frontoclypeal sulcus a thin line; maxillary palps with 2nd segment elongate, 3rd short and angular on mesal margin, 4th widest at middle, with apex oblique. Eyes large, with easily visible curved setae arising between facets, those from posterior half of eye longest.

Pronotum with an apical collar; basal transverse sulcus angled anteriorly at lateral margins, widened and densely

setose in constriction to foveae above procoxae, the constriction weakly defined laterally, not extending onto disc; disc convex; notopleural sulcus sharply defined above coxae, variably extended posteriorly; procoxal cavities open externally, closed internally.

Mesoscutellum truncate at apex. Elytra with punctures confused; lines adjacent to suture extending from scutellum to apex. Lateral mesosternal margins nearly straight, with a slight lateral curve to middle. Lateral margins of mesepisterna with a fringe of long setae covering mesepimera; mesepimera deeply recessed as a cavity extending from mesocoxae to humeral angle, with a distinct fovea projecting into body cavity as an invagination from mesepimera. Mesocoxal cavities separated by mesosternum, which narrowly meets metasternum medially. First sternite with narrow transverse cavities immediately posterior to metacoxae invaginated as foveae, with an obscuring fringe of setae. Male genitalia with 9th sternite T-shaped, the lateral apical arms articulated; phallobase and tegmen distinct, with penis shorter than the two combined. Native New Zealand species all with lateral preapical rows of setae on tegmen.

Remarks. *Sapintus* is a large genus, most diverse in the Gondwana continents, and penetrating to a limited extent into North America and southern Eurasia. It is readily recognised by the combination of setae with undersetae on the elytra, the deep linear groove at the posterior margin of the mesepisterna that is invaginated as a fovea and obscured by a fringe of setae from the mesepisterna, and the transverse grooves at the base of the first visible abdominal sternite that are obscured by pubescence and are also invaginated as a single fovea on either side.

Species worldwide are typically associated with wet leaf litter in forested riparian habitats, often with monocots present.

Sapintus aucklandensis new species

Fig. 2, 33; Map 10

"*Anthicus aucklandensis* Pic" in collections; apparently never described.

Length 2.44–2.80 mm. Body shining, orange to pale brown; elytra with base, a median band, and a broad apical zone brown, the median band often interrupted at suture and not reaching lateral margins; antennae brown, with basal and apical antennomeres orange.

Head with disc smooth, convex; basal margins subparallel briefly behind eyes, with temporal angles rounded and vertex slightly truncate; frons with punctures fine, barely visible, approx. 0.05 mm apart, absent from a narrow

longitudinal zone on midline; frontoclypeal suture barely indicated on surface, clearly indicated as a dark line; tactile setae scattered; setae suberect. Eyes with ocular setae as long as 0.04 mm.

Pronotum with surface and setae similar to those of head, but punctures approx. 0.04 mm apart; lateral margins evenly rounded from strong collar to antebasal constriction, widest at distal third; basal transverse sulcus deep, extending ventrally into constriction, where pubescence obscures both it and pronotal foveae.

Elytra somewhat inflated; humeri weak; omoplates faint; postbasal impression absent; punctures on elytra larger, distinct in proximal half, approx. 0.06 mm apart, finer towards apex; tactile setae long and erect, 0.16 mm long; setae suberect at about 45°, 0.13 mm long; appressed undersetae 0.06 mm long. Mesosternum with lateral margins slightly bowed outwards. Wings reduced to straps.

Both sexes with a dense brush of setae on posterior margin of 1st hind tarsomere. Males with hind tibiae bearing dense, longer pubescence in a feeble excavation from before middle to apex of flexor surface; sternum 8 weakly sclerotised, broadly emarginate at apex, with lateral angles bearing long, curved setae. Genitalia: tegmen with lateral rows of setae in distal half; internal sac with short, broad spines in distal fifth.

Type data. Holotype: male, [AK] Lynfield, Tropicana Drive, 29 September 1974, G. Kuschel, litter no. 74/50 (NZAC).

Paratypes: 245 (LUNZ, NMNZ, NZAC, UAIC, UNHC). **Three Kings Is.** Great I.: Castaway Camp, litter, Nov 1970, Kuschel (7), 29 Nov 1970, Ramsay (1); Tasman Vly, 25 Nov 1970, Kuschel, litter (2).

North I. ND. Kawakawa, 14 May 1951, decaying vegetation (8). Mokohinau Is: Burgess I., Mar 1978, Kuschel (3); Fanal I., Mar 1978, Kuschel, sifted litter and ground plants (8); no other data (2). Ruakaka, beach, 13 Dec 1951, A.E. Brookes (4); 6 Feb 1976, C. Butcher, pit trap under kikuyu (26). Spirits Bay, 17 Jan 1966, litter (1). Tutukaka, 12 Sep 1980, J.C. Watt, litter and nest (8). Whangarei, Western Hills, 23 Oct 1926, Brookes (5). Whangarei Heads: Ocean Beach, 7 Dec 1958, Wise, under *Muehlenbeckia* (1); Bream Islet, 24 Oct 1968, Watt, litter and under stones (6). **AK.** Auckland: 29 Mar 1941, Spiller (1); Apr 1947, under garden rubbish (4); Nov–Feb, R. Thaxter (2). Grafton Gully, 15 Oct 1941, D. Spiller (1). Hunua, Broun (2). Leigh, Pakiri Beach, 20 Aug 1961, B.M. May, under dry cow dung (1). Lynfield, Tropicana Drive, Kuschel: 29 Aug 1974 (1); 27 Dec 1976, seashore (1); 15 Jan 1977, wrack (1); 27 Feb 1977 (1). Mt Albert: 1914, Brookes (1); May 1941, D. Spiller, under stones (3); 24 Sep 1944, D. Spiller, sieved (2). Mt Wellington, lava fields, 12 Nov

1948, Ramsay (1). Muriwai Beach, 27 Oct 1974, Watt, dry sand (1). Noises Is, Motuoropapa I., Tocker, pit trap: Jun–Aug 1978 (1); Oct–Dec 1978 (9); Oct–Dec 1979 (2); Dec 1979–Feb 1980 (12). Owairaka: 8 Jun 1941, Spiller (3); 22 Mar 1942, McKenzie (1). Takapuna, Brookes Coll.: 13 Mar 1915 (1); 13 Mar 1925 (2). Titirangi: 21 Nov 1914, Brookes Coll. (1); 25 Apr 1942, M.W. Carter (1). Waiheke I., 9 Apr 1944, D. Spiller, on beach (1). Woodhill: 27 Feb 1976, Butcher, pitfall traps (29; 11 in pasture, 15 in ryegrass pasture); 9 Mar 1976 (5; 1 Butcher). **CL.** Little Barrier I., 11 Mar 1974, Dugdale, litter (11). **BP.** Karewa I., 2 Nov 1972, L. Moran, litter (7). **TO.** Tokaanu, Te Ponanga Bush, 30 May 1976, B.M. May, recently fallen *Podocarpus spicatus* (1). **TK.** New Plymouth, Paritutu, 19 May 1941, M.S. Luxton, flax litter (1). **WN.** Makara: 18 Oct 1919, A.C. O'Connor (1); 10 Aug 1935, Hudson Coll. (1). Paekakariki Beach, 2 May 1938, Hudson Coll. (2). Titahi Bay, 7 Dec 1941, D. Spiller (1). Wellington: Botanical Gardens, Oct 1887, Hudson Coll. (4); Tinakori Range, 10 Aug 1890, Hudson Coll. (1).

South I. NN. Cable Bay, peninsula off Maori Pt road, 20 Aug 1965, Walker & Townsend, moss (3). Farewell Spit, 2 Apr 1967, Watt, *Muehlenbeckia complexa* on sand (1). Nelson, 3 Oct 1943, Gourlay (1). Tahuna[nui Beach]: Fairburn (1); 31 Mar 1937 and 25 Nov 1951, Gourlay (2); 28 Oct 1970, Watt (2). Takaka, Pohara Beach, 19 Jan 1973, Kuschel (2). Waimea West, Eves Vly, Palmer's Beach, 20 Oct 1971, Ramsay, litter (8). West Haven Inlet, 22 and 28 Oct 1968, J. I. Townsend, litter (16). **MB.** Dashwood Pass, B.M. May, beating *Cassinia* sp. (5). **MC.** Christchurch, 13 May 1952, straw packing around earthenware from England (1).

Material examined. Type series, plus 13 non-type examples (AMNZ).

Three Kings Is / ND, AK, CL, BP, TO, TK, WN / NN, MB, MC.

Collected throughout the year.

Recorded primarily at or near sea level.

Found primarily at seashore areas and in coastal scrub, with a few specimens collected several kilometres inland. Individuals have been found beneath stones, litter, cow dung, wrack, etc. in these areas, and were particularly common on the ground under *Gahnia setifolia* and *Acacia meurnsii* in beach scrub at Lynfield (AK) (Kuschel 1990: 34, 66, as "*Anthicus* species 1").

Remarks. *S. aucklandensis* is readily recognised by the nearly impunctate head and pronotum, the contrasting orange apical antennomere, and the largely orange colour pattern. The name is taken from the manuscript name of Maurice Pic for this species.

Sapintus deitzi new species

Fig. 17, 34; Map 11

Length 2.96–3.08 mm. Body orange; elytra with base, median band, and apex brown.

Head and pronotum with setae decumbent. Head with base broadly subtruncate; basal margins briefly parallel to broadly rounded temporal angles; distinct, smooth punctures on disc approx. 0.02 mm apart, grading to fine posteriorly, with a smooth medial line on frons barely indicated. Eyes large and prominent; setae between facets as long as 0.02 mm.

Pronotum widest at distal third; lateral antebasal constriction feebly indicated; disc coarsely punctate and lightly microreticulate, with punctures approx. 0.03 mm apart; antebasal sulcus distinct, covered by setae in area of lateral foveae.

Elytra subparallel; humeri prominent; omoplates weak; postbasal impression indistinct; punctures well defined in proximal half, approx. 0.05 mm apart, weaker posteriorly; tactile setae 0.14 mm long, nearly perpendicular; setae slightly curved, raised at about 35°, 0.11 mm long; undersetae approx. 0.04 mm long, decumbent and very inconspicuous, directed obliquely laterally to laterally. Mesosternum with lateral margins slightly bowed outwards. Wings fully developed.

Males with distal half of hind tibiae shallowly excavated on inner surface, with dense, long, erect pubescence in excavation; tergum 8 with a short, flat pubescent zone at apex; sternum 8 short, with apex slightly emarginate. Genitalia: tegmen with sparse, small, randomly distributed setae on lateral margins not forming a discrete row; internal sac lacking spines.

Type data. Holotype: male, [AK] 6 km north of Parakai, 8 July 1976, L.L. Deitz (NZAC).

Paratypes (2 females; NZAC, UNHC). North I. AK. Same data as holotype (1); same data except 4 km north of Parakai, 4 Jul 1976 (1).

Material examined. Type series only.

AK / —.

Collected sweeping in July.

Recorded from near sea level.

Remarks. *S. deitzi* is distinct in its broad head, coarsely punctate and microreticulate pronotum, and generally orange coloration. It has long wings, and since it has been collected only in the Auckland area we suspect that it is an introduced species. In punctuation, setation, and general form it is much closer to a number of Australian and Oriental species than to the other three New Zealand

species of *Sapintus*. Named for Lewis L. Deitz, collector of the type series.

Sapintus obscuricornis (Broun) new combination

Fig. 18, 35; Map 12

obscuricornis Broun, 1880: 411 (*Anthicus*). Hutton 1904: 189. Pic 1911b: 64. Hudson 1923: 385.

anthracinus Broun, 1893: 1168 (*Anthicus*). Hutton 1904: 190. Pic 1911b: 33. Hudson 1923: 385. New synonymy.

Length 3.72–4.20 mm. Body dark brown, without elytral markings; pronotum sometimes paler posterior to antebasal sulcus; legs and antennae pale brown.

Head and pronotum with setae decumbent; tactile setae sparse and erect; punctures fine. Head with lateral margins posterior to eyes briefly parallel to broadly rounded temporal angles; base broadly subtruncate; punctures on disc 0.04 mm apart; tactile setae 0.12 mm long; setae 0.10 mm long. Eyes large; curved ocular setae visible on posterior half of eyes, 0.04 mm long.

Pronotum widest at distal third; punctures difficult to see except near base; antebasal sulcus sharply defined, obscured by setae near lateral foveae.

Elytra elongate, subparallel; humeral angles prominent; omoplates not evident; postbasal impression faint; punctures large and distinct on proximal two-thirds, 0.08 mm apart, grading to faint apically; tactile setae as long as setae and at same angle, difficult to separate, 0.16 mm long; setae raised to about 40°, 0.16 mm long; undersetae subdecumbent, directly laterally on disc, 0.06 mm long. Mesosternum with lateral margins distinctly bowed outwardly. Wings fully developed.

Both sexes with 1st hind tarsomere bearing a dense brush of laterally directed setae on posterior margin. Males with sternite 8 broadly rounded to barely subtruncate. Genitalia: tegmen with a dense row of setae on lateral margins in distal third.

Type data. *Anthicus obscuricornis*: lectotype male labelled "725/ [CL] Tairua" (Broun Coll., BMNH); single paralectotype with same labels plus "*Anthicus obscuricornis*" (Broun Coll., BMNH), here designated by FGW.

Anthicus anthracinus: lectotype (sex undetermined) labelled "2073/ [BR] Boatmans Reef/ *Anthicus anthracinus*" (Broun Coll., BMNH), and paralectotype with same first 2 labels (Broun Coll., BMNH), here designated by FGW.

Material examined. Type specimens, plus 132 non-type examples (AMNZ, LUNZ, NMNZ, NZAC, UAIC, UNHC).

ND, AK, WO, BP, WI, WN, WA / SD, NN, BR, NC, WD, OL, FD, SL.

Collected throughout the year.

Recorded from sea level to higher elevations.

Most commonly collected at night on *Blechnum* and other plants; during the day found under bark and stones.

Remarks. *S. obscuricornis* is distinct in its dark colour, broadly subtruncate head base, and laterally directed clytral undersetae. G. Kuschel (in litt.) indicates that this species is associated with vegetation of monocot species, as is *S. pellucidipes*, but the two apparently do not occur together.

Sapintus pellucidipes (Broun) new combination

Fig. 19, 23, 36; Map 13

pellucidipes Broun, 1880: 412 (*Anthicus*). Hutton 1904: 189. Pic 1911b: 66. Hudson 1923: 385.

Length 3.15–3.68 mm. Body elongate, shining; head and pronotum orange to brown; elytra orange to pale brown, with a brown median band and a poorly defined basal band; basal band connected to median band along sides and occasionally along suture; median band sometimes widely interrupted at suture, and with a circular to oval orange spot in distal fourth of elytra; darker specimens with apical band translucent brown may have paler areas barely apparent; legs yellowish to orange, with tibiae and tarsi dusky in dark individuals; antennae orange.

Head and pronotum with setae decumbent and tactile setae sparse, erect. Head with base semicircular, lacking temporal angles; disc with fine, scattered punctures 0.05 mm apart, but narrowly absent at midline; tactile setae 0.16 mm long; setae 0.10 mm long. Eyes moderately prominent, with posteriorly curved setae 0.03 mm long at juncture of facets in posterior half.

Pronotum with disc widest at distal third; sides almost evenly convex from collar to antebasal constriction; punctures weakly defined in distal half, more distinct towards base; antebasal sulcus distinct, obscured by setae near lateral foveae; pronotal collar with a lateral line of setae along base.

Elytra with humeral angles distinct; omoplates faint; postbasal transverse impression absent; punctures large and distinct in proximal two-thirds, grading to indistinct apically, 0.06 mm apart near base; tactile setae sparse, 0.18 mm long; setae raised to about 45°, 0.18 mm long; undersetae subdecumbent, 0.05 mm long, directed obliquely laterally near suture. Mesosternum with lateral margins slightly bowed outwards. Wings fully developed.

Both sexes with 1st hind tarsomere bearing a short brush of setae on posterior margin. Male with sternum 8 broadly

truncate at apex. Genitalia: lateral margins of tegmen with long rows of setae in distal third; internal sac with short, broad spines in distal half.

Type data. Lectotype female the anterior specimen and paralectotype female the posterior specimen on a double card mount labelled "726/ [AK] Howick" (Broun Coll., BMNH), here designated by FGW.

Material examined. Type specimens, plus 182 non-type examples (AMNZ, ANIC, CMNC, LUNZ, MCZC, NMNZ, NZAC, UAIC, UNHC).

ND, AK, CL, WO, BP, GB, TK, WA, WN / SD, DN.

Collected throughout the year.

Recorded from sea level to 610 m.

Found primarily in leaf litter or on fallen dead tree ferns (*Cyathea medullaris*) during the day, and at night commonly collected on foliage of various plants, including *Blechnum procerum*. At Lynfield (AK) more or less always encountered on monocots such as *Freyinetia baueriana*, *Gahnia setifolia*, *G. lacera*, *Carex* species, and *Uncinia* species, and sometimes particularly abundant on the South American *Cortaderia jubata* growing in the bush (Kuschel 1990: 34, 66).

Remarks. *S. pellucidipes* is distinct in its semicircular head base, colour pattern, and long, erect tactile setae on the elytra.

Subfamily LAGRIODINAE

Genus *Lagrioida* Fairmaire & Germain

Lagrioida Fairmaire & Germain, 1860: 3. Blair 1928a: 29.

Type species not designated.

Lagrioida of authors (misspelling). Pascoe 1876: 58. Hutton 1904: 188. Hudson 1923: 384.

Head slightly constricted just posterior to eyes, lacking a distinct neck; frons flattened; antennal bases exposed; antennomeres 1–8 narrow and elongate, the apical 3 enlarged, the penultimate transverse; frontoclypeal sulcus absent. Eyes large, with short setae between facets. Maxillary palps with 2nd segment elongate, 3rd short and triangular, 4th large and obliquely securiform.

Pronotum widest at anterior fourth, curving abruptly to apex; margins slightly convergent to base, with a faint lateral constriction near base; disc shallowly curved; sulcus originating at lateral margins of base, briefly angled antero-ventrally; lacking any other ventrolateral sulci; lacking pit or dimple dorsal to procoxae; lacking tergosternal sulcus. Procoxal cavities open externally, closed internally.

Elytra with scattered punctures; tactile setae short; undersetae absent. Mesoscutellum narrowly rounded at apex. Mesosternum triangular, with straight lateral margins; a median projection separating mesocoxae, bluntly meeting truncate extension of metasternum. Mesepisterna with lateral margins straight. Mesepimera large. Penultimate tarsomeres elongately bilobed. Abdomen with first 2 visible sternites fused, the remainder free. Genitalia: 9th sternite Y-shaped, with apical arms not articulated; tegmen and phallobase distinct.

Remarks. Members of *Lagrioida* occur in Australia, New Zealand, and temperate South America, where they are associated with coastal sand dunes.

Lagrioida brouni Pascoe

Fig. 6, 37; Map 14

Brouni Pascoe, 1876: 58 (*Lagrioida*) [sic]. Hutton 1904: 188. Hudson 1923: 384. Blair 1928a: 29.

Length 4.00–5.58 mm. Body orange with head reddish, or head and pronotum brown with elytra mottled yellow and brown; darkest specimens brown with elytral base paler; legs and antennae yellow to orange; antennal club sometimes darker. Punctures distinct over dorsum and venter. Tactile setae sparse, short, erect; setae white, appressed to decumbent over body.

Punctures on head and pronotum 0.04 mm apart. Eyes with setae between facets 0.01 mm long. Elytral punctures 0.07 mm apart near base; tactile setae on elytra 0.05–0.10 mm long; setae 0.08–0.14 mm long.

Type data. Lectotype and paralectotype labelled "N.Z. [CL] Tairua", Pascoe Collection (BMNH), here designated by FGW. Description based on five specimens from "sea beaches at Tairua," of which these two are yellow, with the elytra brownish on the sides in the distal half; one specimen has an indication of pale spotting in the brownish area. No other specimens have been seen with this particular colour pattern.

Material examined. Type specimens, plus 163 non-type examples (LUNZ, MCZC, NZAC, UNHC, UAIC).

ND, AK, CL, WO, BP, GB, TK, WI/NN, BR, MC, SL, SI / Chatham Is.

Collected October–May.

Recorded only from near sea level.

Strongly associated with coastal sand dunes on beaches. Commonly found beneath debris on the beach or in sand dune areas.

Remarks. All New Zealand *Lagrioida* are placed under *L. brouni*, though there is considerable variation in the width, length, and angle of the elytral tactile setae and in body size.

All specimens from Northland are entirely yellow. Specimens from near Auckland include a few pale individuals, but many are brown, very often with paler spots around the tiny punctures that bear the tactile setae on the elytra. These pale spots can be interconnected to the extent that most of the surface is pale or only the suture is brownish. In the south of the North Island and the Nelson area all are brown, with the pale spots on the elytra of smaller diameter and rather dull. Two examples from the Buller area are very dark, with only a feeble indication of the pale spots.

Tactile setae are very long in Northland, long throughout most of the rest of the range, but short in the Buller examples. The elytral setae are at their greatest angle in Northland, nearly appressed over the rest of the North Island and in the Buller area, but intermediate in Nelson.

Specimens from Norfolk Island also appear to be this species.

Subfamily LEMODINAE

Genus *Cotes* Sharp

Cotes Sharp, 1877: 9. Type-species *Cotes vestita* Sharp, by original monotypy.

Head with base short, broadly subtruncate to immediately rounded posterior to eyes; frontoclypeal sulcus broad; disc laterally with a shallow longitudinal impression extending from middle of eye to near antennal base. Eyes large, prominent, usually with visible setae originating between facets. Antennae long, relatively stout. Maxillary palps with segments 2 and 3 bearing 2–4 long setae, segment 3 angulate ventrally, and segment 4 narrowly securiform.

Prothorax with a thin, raised rim at apex, lacking a distinct collar; antebasal constriction deep laterally, often continued shallowly across disc; a large pit at ventral margin of constriction dorsal to procoxae; tergosternal sulcus present only dorsal to procoxae; disc smoothly convex; procoxal cavities closed internally, open externally.

Elytra with punctures subserial to serial in proximal half, with undersetae in addition to tactile setae and setae; fine lines along elytral suture distinct in distal half. Scutellum elongate, broadly rounded to subtruncate at apex. Mesosternum with lateral margins slightly curved laterally. Mesepisterna narrowly meeting medially anterior to mesosternum. Mesepimera elongate, parallel-sided, reaching middle coxal cavities; posterior margin with a fringe of short setae. Mesocoxae separated by mesosternum, which

narrowly meets median point of metasternum. Sternites free.

Male genitalia: 9th sternite Y-shaped, with apical arms not articulated; phallobase absent; penis extremely long and thin, 2–4× as long as tegmen; tegmen with lateral rows of setae near apex.

Remarks. This precinctive New Zealand genus is very close to the Australian genus *Trichananca*. Members of *Cotes* usually have the lateral constriction of the pronotum continued as an impression across the dorsum near the base, the mesoscutellar apex broadly rounded to subtruncate, and the pronotal disc convex. Species are generally quite distinct and easy to recognise, but the three species forming the *vestita*-group—*proba*, *gourlayi*, and *vestita*—are much more similar in appearance, and difficult to separate.

The various species of *Cotes* are invariably associated with vegetation native to New Zealand, and are found in leaf litter or on fallen dead trees in the bush.

Cotes bullata Broun

Fig. 7, 38; Map 15

bullata Broun, 1923: 690 (*Cotes*). Hudson 1923: 385.

Length 3.20–3.60 mm. Body orange to red-brown, shining; head and pronotum sometimes darker; legs orange; elytra of most specimens with a smooth, raised, yellow mound near lateral margins of postbasal impression.

Head and pronotum with disc polished; setae subdecumbent on head, decumbent on pronotum; tactile setae sparse; punctures fine and sparse. Head with base shortly and broadly rounded; discal impressions between eyes faint, oval. Eyes with setae between facets 0.03 mm long.

Pronotum widest at distal third; margins curved to a deep, smooth lateral constriction at proximal third, this continuing across disc to a depth of 0.04 mm; base slightly narrower than greatest width across disc; tergosternal sulcus faint; pit at ventral margin of constriction outlined by setae.

Elytra with humeral angles distinct; omoplates well defined; transverse postbasal impression weak; a series of deep punctures in proximal third 0.09 mm apart, grading to fine posteriorly, absent or sparse on omoplates and on raised lateral mounds in postbasal impression; tactile setae erect, 0.18 mm long; setae bushy, suberect at about 40°, 0.14 mm long; undersetae 0.07 mm long, directed obliquely near suture from base to postbasal impression, otherwise directed posteriorly. Wings straplike, shorter than elytra.

Males with last sternite broadly rounded apically, with a slight truncation at middle. Genitalia: tegmen with a short

row of 3 setae laterally near narrowly pointed apex. Females with last sternite broadly rounded.

Type data. Described from "[ND] Pakarau, North Auckland." The holotype could not be found in the Broun Collection (BMNH), but the Broun Collection in NZAC contains one male without a label, which is probably the holotype, and another specimen labelled "[WO] Ohaupo / 545 / *Cotes* n. sp."

Material examined. Probable holotype and 9 non-type examples (AMNZ, NZAC, UNHC).

ND, AK, CL, WO / —.

Collected January, February, and May–July.

Recorded from sea level to 100 m.

Found in leaf litter of forest sedges such as *Carex*, *Uncinia*, and *Schoenus* in bush areas at Lynfield, AK (Kuschel 1990: 34, 66).

Remarks. *C. bullata* is closest to *C. crispata* in its deep pronotal constriction that continues dorsally across the disc, small size, and relatively long, suberect elytral pubescence. It is distinguished by the distinct humeral angles of the elytra, elytral setae raised to about 40°, and lack of dark elytral bands.

Cotes crispata (Broun)

Fig. 3, 39; Map 16

crispata Broun, 1880: 412 (*Anthicus*); —1893: 1165 (*Cotes*).

Hutton 1904: 189. Pic 1911b: 23. Hudson 1923: 385.

punctata Broun, 1893: 1165 (*Cotes*). Hutton 1904: 189. Pic 1911b: 23. Hudson 1923: 385. New synonymy.

Length 3.40–4.20 mm. Head and pronotum orange to red-brown; elytra orange, with base and median band brown; distal third obscurely darker in some specimens; legs orange.

Head and pronotum with disc polished; punctures fine, sparse; setae subdecumbent on head, decumbent on pronotum; tactile setae long. Head with base briefly and broadly semicircular posterior to eyes; punctures on disc 0.04 mm apart; lateral discal impressions between eyes faint, oval. Eyes with setae between facets 0.02 mm long.

Pronotum widest at distal fourth; margins curved to deep constriction at proximal third; punctures dense and coarse in constriction, which extends across disc as a saddle to 0.04 mm depth on dorsum; base narrower than maximum width across pronotal disc; tergosternal sulcus faint; pit at ventral margin of constriction glabrous.

Elytra narrow; humeri obsolete; omoplates and postbasal impression faint; large serial punctures distinct in proximal

third, grading to indistinct posteriorly; tactile setae erect, 0.18 mm long; dense setae suberect at about 30°, 0.14 mm long; undersetae subdecumbent, 0.10 mm long, slightly swirled laterally in postbasal impression. Wings strap-like, shorter than elytra.

Males and females with last sternite broadly subtruncate at apex. Genitalia: tegmen with lateral rows of about 6 setae near apex, which tapers to a blunt point.

Type data. *Anthicus crispus*: holotype (sex undetermined) labelled "727/ [ND] Parua/ Cotes crispus" (Broun Coll., BMNH).

Cotes punctata: lectotype female labelled "2068/ [AK] Howick/ Cotes punctata" (Broun Coll., BMNH), here designated by FGW.

Material examined. Type specimens, plus 64 non-type examples (AMNZ, ANIC, LUNZ, NMNZ, NZAC, UAIC, UNHC).

ND, AK, WO, BP, RI, WI, WA, WN / —.

Collected throughout the year.

Recorded from sea level to 335 m.

Commonly found in coarse leaf and branch litter on the forest floor, and collected in large numbers from unbaited pitfall traps. At Lynfield (AK) found in leaf litter beneath *Phormium tenax*, *Astelia banksii*, and *Gahnia setifolia* (Kuschel 1990: 34, 66).

Remarks. *C. crispus* is separated from *C. bullata* by its obsolete elytral humeri, elytral setae at about 30°, and elytra with a brown base and median band. Broun indicated in his original description that this species was named for the collector, Mr T.A. Crisp.

Cotes gourlayi new species

Fig. 8, 40; Map 17

Length 4.16–7.52 mm. Body yellow to brown, occasionally with head and pronotum darker than elytra.

Head and pronotum with dense, subdecumbent to decumbent undersetae and decumbent to suberect setae, together often forming swirled patterns; tactile setae distinct, erect. Head with base short, broadly subtruncate; disc with minute, obscure punctures; vertex bulging posterior to eyes; interantennal impressions distinct. Eyes with setae at junction of facets 0.02 mm long.

Pronotum with disc strongly convex, distinctly exceeding plane of elytral disc; disc widest at distal two-thirds; punctures not apparent; lateral constriction continued strongly across disc, 0.06 mm deep on dorsum; pit at ventral margin of constriction obscured by setae.

Elytra with humeral angles distinct but small; oronotum and postbasal impression faint; disc flattened at middle; punctures serial and distinct in proximal third, sparse and indistinct apically; tactile setae erect and suberect in alternating rows laterally from elytral suture, 0.18 mm long; setae decumbent at 20–30°, 0.07 mm long; undersetae appressed, 0.07 mm long. Wings slightly reduced near apex. Abdominal sternites with distinct lateral patches of raised setae.

Males with last sternite broadly subtruncate to shallowly emarginate. Genitalia: tegmen with lateral preapical lobes fringed with setae. Females with last sternite broadly rounded.

Type data. Holotype: male, [NN] Takaka Hill, 2500' [750 m], 5 February 1957, E. S. Gourlay (NZAC).

Paratypes (21; NZAC, UAIC, UNHC). **South I. NN.** Canaan, 17–26 Jan 1949, Brookes (1). Mt Arthur: 3000' [900 m], 6 Mar 1935, Gourlay (1); 3000–3500' [900–1050 m], 13–16 Dec 1961, Townsend & Woods (4). Takaka Hill: 14 Nov 1949, O'Connor (1); 2500' [750 m], 5 Feb and 7 May 1957, Gourlay (10); 19 Feb 1957, Gourlay (3). **BR.** Greymouth, 19–21 Jan 1957, Gourlay (1). Lewis Pass, 3500' [1050 m], 8–12 Dec 1957, Gourlay (2).

Material examined. Type series, plus 3 non-type examples (NZAC, UAIC, UNHC).

— / NN, BR.

Collected November–May.

Recorded from sea level to 1100 m; most specimens at 750–1100 m.

The only substrate information is a record from "*Nothofagus* spp." at Nelson Lakes National Park (UAIC), probably from leaf litter.

Remarks. *C. gourlayi* is most similar to *C. proba* (see Remarks under *proba*). It is readily recognised by the decidedly convex pronotal disc, broadly subtruncate head base, and the distinct, erect to suberect tactile setae on the elytral disc that are twice as long as the decumbent setae. Named for E.S. Gourlay, who collected much of the type series.

Cotes halliana Broun

Not illustrated; Map 18

halliana Broun, 1923: 690 (*Cotes*). Hudson 1923: 385.

Length 5.12–5.16 mm. Body orange; legs paler.

Head dull in appearance; setae dense, suberect; tactile setae short, erect; lateral margins of base linearly converging to broadly rounded median angulation; punctures on

disc sparse, shallow, about 0.06 mm apart; lateral discal impressions between eyes elongate, extending anteriorly to between antennal bases. Eyes with setae between facets 0.04 mm long.

Pronotum widest at distal third; disc distinctly microreticulate; punctures near base crateriform, approx. 0.04 mm apart, larger and denser than on head; lateral margins rounded to a deep lateral constriction near base, this continuing across disc as a barely perceptible groove approx. 0.02 mm deep, its lateral portions coarsely punctate; pit at ventral margin of constriction obscured by a fringe of setae.

Elytra faintly microreticulate, subparallel posterior to obsolete humeri; disc gently convex, with no indication of postbasal transverse impression or omoplates; punctures distinct nearly to apex, strongest and in series in proximal half, 0.09 mm apart near base; tactile setae erect, 0.14 mm long; setae decumbent at about 35°, 0.14 mm long; undersetae appressed, 0.08 mm long; setae and undersetae directed posteriorly, nearly uniform over entire surface. Wings reduced to straps shorter than elytra.

Males unknown. Females with last sternite broadly subtruncate at apex.

Type data. Holotype labelled "[WN] Trentham, 5.11.1916/ *Cotes halliana*" (Broun Coll., BMNH), lacking left antenna beyond 5th segment.

Material examined. Holotype, plus 1 non-type example (NZAC).

WN / SD.

Collected in November.

The non-type specimen was collected from leaf litter.

Remarks. *C. halliana* is quite distinct by the dense crateriform punctures on the pronotum, indistinct continuation of the antebasal constriction across the disc, elytral setae at 35°, and undersetae all directed posteriorly.

Cotes optima Broun

Fig. 41; Map 19

optima Broun, 1893: 1165 (*Cotes*). Hutton 1904: 189. Pic 1911b: 22. Hudson 1923: 385.

proxima Broun, 1893: 1167 (*Cotes*). Hutton 1904: 189. Pic 1911b: 23. Hudson 1923: 385. New synonymy.

Length 6.03–7.20 mm. Head and prothorax reddish brown; elytra brown shading to reddish brown near apex; legs orange.

Head and pronotum with setae dense, decumbent; tactile setae distinct, erect. Head with base shallowly and evenly

curved posterior to eyes; front smooth; disc with scattered punctures small and distinct, 0.06 mm apart, denser in an area just posterior to base of antennae delineated medially by an oblique, shallow depression; neck with punctures much larger, crateriform. Eyes large; setae between facets 0.01 mm long.

Pronotum with dense, fine punctures, widest at distal fourth; base slightly narrower than maximum width across disc; lateral constriction very deep, just posterior to middle; disc in lateral profile gently convex from widest part to constriction, then flattened posteriorly to base; glabrous pit above procoxae with a surrounding fringe of setae.

Elytra swollen to middle, lacking distinct humeri, and without a postbasal impression or omoplates; lateral margins evenly convex; punctures larger than on pronotum but distinct only in proximal fourth, where subserial and 0.09 mm apart near base; tactile setae erect, 0.22 mm long; setae decumbent at 25°, 0.20 mm long, intermixed with undersetae; undersetae 0.12 mm long, slightly more depressed than setae; pubescence slightly swirled obliquely in proximal fourth and distal half (pattern best seen by moving lighting). Wings reduced to straps with 2 longitudinal veins and an expanded postcubital patch.

Males with last sternite narrowly subtruncate at apex. Genitalia: tegmen elongate, smoothly narrowed to blunt apex, with lateral rows of about 12 setae near apex. Females with last sternite similar to male but narrowly rounded at apex.

Type data. *Cotes optima*; described from "[AK] Howick." The holotype should be in BMNH. However, the Broun Collection (BMNH) contains only one male, labelled "2067/ [BP] Paparoa/ *Cotes optima*." Since the locality does not correspond with the one published in the original description, FGW did not mark this specimen as holotype.

Cotes proxima: holotype male labelled "2071/ [CL] Mokohinau/ *Cotes proxima*" (Broun Coll., BMNH).

Material examined. Holotype of *Cotes proxima*, plus 21 non-type examples (LUNZ, NMNZ, NZAC, UNHC).

ND, AK, CL, BP, WI, WN / —.

Collected in all months except August.

Recorded from near sea level.

Associated with dead and hollowed-out trees. Found in hollow *Metrosideros excelsa* (Kuschel 1990: 34, 66), on dead *Agathis australis*, on fallen tree trunks and rotten stumps, and under logs (Broun 1893: 1165).

Remarks. *C. optima* is distinct in its large size, lack of a transverse groove dorsal to the lateral constriction on the pronotal disc, and the dense, fine punctures on the pronotum.

Cotes proba Broun

Fig. 42; Map 20

proba Broun, 1881: 691 (*Cotes*). Hutton 1904: 189. Pic 1911b: 22. Hudson 1923: 385.

dorsale Broun, 1893: 1166 (*Cotes*). Hutton 1904: 189. Pic 1911b: 22. Hudson 1923: 385. New synonymy.

Length 5.84–6.72 mm. Body tan to orange, with lateral margins of pronotum and occasionally entire base brown; elytra with a vague oblong, brown spot at middle on disc, and lateral margins darker near base and lateral to discal mark; legs yellow.

Head and pronotum with dense undersetae appressed to narrowly subdecumbent, and setae dense and subdecumbent, these together producing a swirled pattern in most specimens; tactile setae sparse, erect. Head dull in appearance, faintly microreticulate on disc, lacking distinct punctures; base shallowly and evenly curved; interantennal impressions curved, distinct; vertex bulging posterior to eyes; setae between eye facets 0.02 mm long.

Pronotum with disc nearly flat, on same plane as elytral disc, widest at anterior fourth; lateral constriction continued across disc as a distinct impression, 0.05 mm deep on dorsum; microreticulation distinct on disc; punctures shallowly and poorly defined, 0.04 mm apart; pit at ventral margin of constriction obscured by setae.

Elytra with omoplates faint; postbasal transverse impression weak; humeral angles short but distinct; disc flattened; punctures weak, strongest in proximal third, faint to imperceptible in distal half; tactile setae nearly erect, 0.15 mm long; setae suberect at 30°, 0.18 mm long; dense undersetae appressed to subdecumbent, 0.07 mm long, directed laterally near base, obliquely laterally in distal two-thirds of length. Wings fully developed, or nearly so. Abdominal sternites with a circular patch of raised setae near lateral margins.

Males with apical margin of last sternite broadly truncate. Genitalia: tegmen with lateral setose lobes near apex. Females with last sternite broadly rounded.

Type data. *Cotes proba*: lectotype male labelled "1215/ [WN] Wellington/ *Cotes proba*" (Broun Coll., BMNH), here designated by FGW.

Cotes dorsale: lectotype male labelled "[AK] Clevedon/ 2069/ *Cotes dorsale*" (Broun Coll., BMNH), here designated by FGW.

Material examined. Type specimens, plus 21 non-type examples (ANIC, LUNZ, NMNZ, NZAC, UNHC).

ND, AK, BP, TO, RI, WN / NN.

Collected November–May.

Recorded from sea level to 750 m.

Common on foliage of *Astelia banksii*, and on vegetation during the night at Lynfield (AK) (Kuschel 1990: 34, 66, as *C. dorsalis*). Also collected from podocarp-broadleaf forest litter, leaf litter, and on a *Pinus* sp.

Remarks. *C. proba* is difficult to separate from two other species, which together are here designated as the *vestita*-group. It shares with *C. goulayi* the retention of the humeral angles of the elytra, and the male tegmen with preapical setose lateral lobes. *C. proba* has the pronotal disc flattened and in the same plane as the elytral disc, the head base shallowly and evenly curved between the eyes, and the elytral setae and tactile setae similar in length, with the tactile setae usually inconspicuous on the disc. Often it has a central brown spot on the elytra, and the pronotal base darker than the elytra.

Cotes rufa Broun

Fig. 9, 43; Map 21

rufa Broun, 1893: 1167 (*Cotes*). Hutton 1904: 189. Pic 1911b: 23. Hudson 1923: 385.

insignis Broun, 1912: 438 (*Cotes*). Hudson 1923: 385. New synonymy.

Length 5.66–5.86 mm. Body brown; elytra with a broad yellow to orange band in postbasal impression; elytral setae brown at base, yellow in band, and brown in distal half, with a narrow transverse band of white pubescence at distal third.

Head and pronotum with punctures not apparent; tactile setae long, erect. Head base subtruncate, with broadly rounded vertexal angles; disc with distinct lateral longitudinal impressions medial to eye and antennal base; eyes with setae between facets about 0.01 mm long; neck coarsely punctate.

Pronotum with disc widest at distal fourth, slightly narrower than base; margins rounded to deep antebasal constriction; shallow constriction distinct across disc, 0.03 mm deep on dorsum; pit above procoxae concealed by setae; setae lateral on disc directed towards middle of anterior lobe, at middle directed posteriorly.

Elytra with lateral margins parallel; humeri prominent; omoplates and postbasal transverse impression distinct; punctures shallow and serial basally, indistinct in distal half, 0.08 mm apart near base; tactile setae variably angled at about 45°, 0.13 mm long; setae dense, appressed to slightly raised, 0.12 mm long; undersetae appressed, 0.09 mm long; pubescence on humeri directed laterally; median band with setae on disc directed laterally to middle of elytra, and from there to lateral margin with setae directed mesally, the 2 blocks of setae meeting to form a posteriorly

oriented line; white pubescence in distal third directed obliquely at middle of disc. Wings fully developed.

Both sexes with last sternite broadly rounded. Genitalia: tegmen abruptly constricted near apex to form an elongate point, with lateral rows of about 12 setae near apex.

Type data. *Cotes rufa*: described from "most likely near [WN] Wellington." The Broun Collection (BMNH) contains a single female labelled "2072/ [CL] Mokohinau/ *Cotes rufa*." This specimen has 7 and 8 antennal segments, a pinhole in the right elytron, and is very rubbed. The Mokohinau label appears identical with the one on the holotype of *C. proxima* Broun (1893), which also came from Mr Sandager, who sent the specimen to Broun. This specimen is probably the holotype, but was not so labelled by FGW.

Cotes insignis: holotype female labelled "3256/ [WN] Kaitoke, Wellington/ *Cotes insignis*" (Broun Coll., BMNH).

Material examined. Type specimens, plus 7 non-type examples (NMNZ, NZAC).

CL, RI, WA, WN / BR.

Collected in November and June.

Recorded from near sea level.

No habitat information on labels.

Remarks. *C. rufa* is not obviously close to any other species. It is distinct in its combination of dense setae and undersetae, the colour pattern formed by these setae, and the mesally directed setae of the lateral portion of the postbasal impression.

Cotes vestita Sharp

Fig. 44; Map 22

vestita Sharp, 1877: 9 (*Cotes*). Broun 1880: 411. Hutton 1904: 189. Pic 1911b: 23. Hudson, 1923: 385.

distincta Broun, 1893: 1166 (*Cotes*). Hutton 1904: 189. Pic 1911b: 22. Hudson 1923: 385. New synonymy.

Length 4.72–6.00 mm. Body tan to red-brown, often with head and pronotum brown.

Head and pronotum with dense, appressed undersetae and decumbent to subdecumbent setae; tactile setae sparse, erect, quite distinct on some specimens, depressed and inconspicuous on others. Head with base broadly and shallowly curved; disc with minute, obscure punctures; vertex bulging posterior to eyes; interantennal impressions sometimes indistinct; setae between eye facets 0.02 mm long.

Pronotum widest at anterior fourth; lateral constriction continued strongly across disc, its impression 0.04 mm

deep on dorsum; disc moderately rounded, exceeding plane of elytral disc; punctures shallow, poorly defined, about 0.04 mm apart; pit at ventral margin of constriction obscured by setae.

Elytra lacking humeral angles, omoplates, and postbasal impression; disc shallowly convex; punctures small, serial, disappearing in distal third; tactile setae erect, generally sparse on disc, 0.16 mm long; setae suberect at 20–30°, 0.18 mm long; dense, decumbent undersetae in faint, random swirls through middle portion of each elytron, 0.08 mm long. Abdominal sternites with lateral circular patches of raised setae indistinct.

Males with apex of last sternite broadly subtruncate. Genitalia: tegmen with preapical margins straight, bearing short lateral preapical rows of setae. Females with last sternite broadly rounded.

Type data. *Cotes vestita*: holotype (sex undetermined) labelled "*Cotes vestita* Type D.S., [MC] Riccarton Nov. 73" on the card with the specimen (BMNH).

Cotes distincta: type locality not given. The single female(?) specimen in the Broun Coll. (BMNH), labelled "2070/ [WN] Wellington/ *Cotes distincta*," is probably the holotype.

Material examined. Type specimens, plus 39 non-type examples (AMNZ, LUNZ, NZAC, NMNZ, UNHC).

ND, TO, HB, RI, WI, WN / SD, NN, MC, SC.

Collected November–May, with 1 record in August.

Recorded primarily from near sea level, but found up to 600 m.

Habitat information sparse: *Nothofagus* forest, and from moss; one specimen collected by light trap in November.

Remarks. *C. vestita* is the most commonly collected species of the *vestita*-group, and overlaps in range with *C. proba* in the southern half of the North Island and with *C. gouldayi* in the northern South Island. It is separable from these two species by its lack of elytral humeri and the straight preapical margins of the male tegmen.

Genus *Trichananca* Blackburn

Trichananca Blackburn, 1891: 341. Type-species *Trichananca victoriensis* Blackburn, by original monotypy.

Head with vertex short posterior to eyes, abruptly constricted to a broad neck; frontoclypeal suture weak or not apparent; clypeofrontal area convex, with an elongate oblique lateral impression mesal to eyes and posterior to antennal bases. Eyes large, with curved setae distinct in

posterior half. Maxillary palps with segment 3 angulate ventrally; last segment large, securiform. Antennae relatively stout.

Prothorax with an obscure, thin, upraised rim at apex, lacking a collar, and lacking a transverse ante-basal sulcus; procoxal cavities open externally, closed internally; tergo-sternal sulcus distinct dorsal to procoxae, extending to near prothoracic base in some species, clearly extending to pronotal apex; ante-basal constriction deep laterally and extending to a large pit above procoxae, not continuing across dorsum; disc broadly flattened to slightly longitudinally impressed.

Elytra with punctures serial or nearly so except in distal third, with undersetae in addition to setae and tactile setae; a fine line along suture distinct in distal half. Wings fully developed. Scutellum broadly truncate to emarginate. Mesosternum narrowly dividing mesocoxae, briefly forked at apex, meeting median point of metasternum; lateral margins of mesosternum straight. Mesepimera elongate, broadly and shallowly emarginate on posterior margin, with a short fringe of setae. Sternites free. Genitalia: 9th sternite Y-shaped, with apical arms not articulated; phallobase absent; penis elongate, extending anteriorly beyond tegmen base but typically to no more than half length of tegmen.

Remarks. *Trichananca* is a large genus found primarily in Australia. At least two species from Chile appear to belong to this group, differing only by the mesocoxae being largely contiguous, with the anterior third of their length separated by the mesosternum. The single species found in New Zealand appears to be an introduction from New South Wales, where it has not been described. *Trichananca* is separated from *Cotex* by the short, apically truncate to emarginate mesoscutellum, the pronotal disc with a vague longitudinal impression, and the lateral constriction of the pronotum not continuing across the dorsum.

Many species in Australia are found in leaf litter.

Trichananca fulgida new species

Fig. 4, 45; Map 23

Length 3.30–3.56 mm. Body shining; head, pronotum, and sometimes mesoscutellum brown; elytra and underbody orange; femora whitish; tibiae brown. Tactile setae erect over body.

Head and pronotum with setae subdecumbent; punctures umbilicate. Head with vertex broadly subtruncate in middle half, short posterior to eyes; disc with impressions near inner margin of eyes flanked laterally by a weak ridge, this extending from inner eye margin to weak frontoclypeal

sulcus; punctures on disc approx. 0.04 mm apart; setae at juncture of eye facets erect, approx. 0.04 mm long.

Pronotum with ante-basal constriction deep laterally, ending ventrally in a pit obscured by setae above a smooth, puncture-free apron; disc with a weak median longitudinal depression; punctures approx. 0.04 mm apart.

Elytra with margins nearly parallel, vaguely narrower in post-basal area; humeri prominent; disc gently convex; omoplates feebly indicated; punctures large and serial on elytral disc, weaker but distinct towards apex, 0.08 mm apart near base; tactile setae bristling, 0.16 mm long; setae suberect at about 30°, 0.12 mm long; undersetae subdecumbent, 0.06 mm long. Wings fully developed.

Males with last sternite broadly rounded; fore tarsi slightly expanded, the 1st tarsomere with anterior apical angle produced. Genitalia: tegmen broadly and narrowly bilobed at apex, with a row of 3 or 4 setae on lateral margins near apex; penis strongly curving ventrally anterior to tegmen base. Females with last sternite broadly angulate at apex; anterior tarsi with 1st tarsomere narrower, its anterior apical angle quadrate.

Type data. Holotype: male, [AK] Lynfield, Tropicana Drive, 20 December 1975, G. Kuschel (NZAC).

Paratypes (41; NZAC, UAIC, UNHC). **North I. ND.** Trounson Park, 19 Jan 1943, G.W. Ramsay, litter (1). **AK.** Auckland: Cox's Creek, 4 Jan 1927, E. Fairburn (1); 3 Feb 1943, D. Spiller (1); 9 Nov 1969, J.D. Atkinson, house (1). Lynfield, Tropicana Dr., Kuschel: 8 Mar 1974 (2); 2 Nov 1974 (1); 4 Dec 1974 (1); 7 Dec 1974 (1); 14 Nov 1974, *Leptospermum scoparium* (1); 15 Jan 1975 (2); 20 Dec 1975 (1); 13 Mar 1976, at light in bush (1); 13 Mar 1979, on *Salix fragilis* (1). Noises Is, Otata I.: 1–2 Nov 1977, L.L. Deitz, pit trap (1), and near cottage, malaise trap in bush (1); 11–16 Dec 1977, Watt, pit trap (1); Aug–Oct 1978, pit trap (2); 7–10 Dec 1978, pit trap (1); Dec–Feb 1979, pit trap (2). Noises Is, Motuhoropapa I.: Dec 1977–Jan 1978, Watt & Deitz, pit trap (3); Feb–Apr 1978, B.M. May, pit trap (5). Owairaka: 26 Mar 1943, D. Spiller, [c]x sticky plates (5); 7 Apr 1943, P. Evans (1).

South I. NN. Nelson, Ruby Bay, 17 Aug 1943, A.K. Walker, moss on stones, ground (1). **FD.** L. Te Anau, 19 Feb 1965, A.K. Walker, litter (1).

Material examined. Type series, plus 10 non-type examples from Australia (ANIC, UNHC).

ND, AK / NN, FD.

Collected throughout the year.

Recorded primarily from sea level.

Associated with city garden conditions (G. Kuschel, in litt.), and very rare in the canopy in bush areas at Lynfield (AK), with one specimen found on *Leptospermum scop-*

arium at the bush margin and another on *Salix fragilis* at the mouth of Wattle Bay stream (Kuschel 1990: 34, 66). Mostly collected in pit traps. The earliest collection records are in 1943 from the Auckland area.

Remarks. Several specimens from warm temperate rainforests in Monga State Forest (southeastern New South Wales) and Styx River State Forest (northeastern New South Wales) appear to be members of this hitherto undescribed species. Apparently introduced into New Zealand from Australia. The glistening appearance of the body suggested its name.

Zealanthicus new genus

Type species *Zealanthicus sulcatus* n.sp., here designated.

Head short posterior to eyes, with a broad, distinct neck; vertex broadly subtruncate; frontoclypeal suture distinct; antennal bases exposed; a shallow, inflected depression between each eye and antennal base, lined laterally by a carina. Eyes large, round, lacking obvious setae between facets. Maxillary palps with 2nd segment bluntly and 3rd segment acutely angulate ventrally, bearing 2 or 3 tactile setae on angles, and 4th segment broadly securiform.

Pronotum with an obscure, narrow apical rim and with a deep lateral constriction just posterior to middle, this angled posterodorsally and continued straight across disc near base as a narrow sulcus, ending ventrally in a deep pit above procoxae; tergo-sternal sulcus briefly and weakly defined above procoxae.

Mesoscutellum quadrate, its apex shallowly emarginate. Elytra with undersetae; punctures subserial to serial, confused apically; a narrow groove adjacent to suture in distal two-thirds. Mesosternum with lateral margins straight, prolonged posteriorly to two-thirds length of mesocoxae. Mesepisternum quadrate, with a fringe of short setae on posterior margin. Metasternum slightly sinuate posterior to mesocoxae, meeting mesosternal projection below surface to separate coxae. Sternites free. Male genitalia: 9th sternite Y-shaped, with apical arms not detached; phallobase absent; penis extending anteriorly beyond base of tegmen.

Remarks. *Zealanthicus* is closest to *Trichanancea* and *Cotes* in its narrow pronotal rim, short head with lateral oblique interantennal impressions medial to the eyes and antennal bases, and elongate penis. The emarginate mesoscutellum is shared with *Trichanancea*, but *Zealanthicus* is readily recognised by the narrow basal transverse sulcus of the pronotum and the convex pronotal disc.

The name reflects the restricted distribution of this New Zealand genus; gender masculine.

Zealanthicus sulcatus new species

Fig. 10, 46; Map 24

Length 4.08–4.72 mm. Body and antennae brown; epipleural fold of elytra yellow to pale brown; coxae and legs yellow to tan, usually with apex of femora and most of tibiae brown.

Head and pronotum nearly impunctate, with polished disc; tactile setae erect; setae suberect. Head short posterior to eyes; margins smoothly rounded to broadly subtruncate base; a shallow longitudinal impression medial to each eye and antennal base, defined laterally by weak carinae; neck at constriction coarsely punctate.

Pronotal disc smooth, with sparse, fine punctures 0.04 mm apart.

Elytra lacking postbasal transverse impression; humeri prominent; omoplates distinct; coarse punctures arranged serially at base, confused near apex; tactile setae erect, raised at 70°, 0.10 mm long; setae suberect, directed obliquely laterally, 0.07 mm long; undersetae subdecumbent to suberect, 0.07 mm long, if raised then difficult to separate from setae. Wings fully developed.

Males with last sternite briefly subtruncate at apex. Females similar, but with sternite apex more rounded.

Type data. Holotype: female, [WN, Wainuiomata], Gollans Valley, 14 December 1921, Hudson Collection 1251 a,b (NMNZ).

Paratypes (4 females; ANIC, LUNZ, NMNZ, NZAC). **North I. ND.** Waipoua Kauri Forest, 11/12 Dec 1983, L. Masner, [screen] [sweeping] (1). **TK.** Stratford, T. Broun Coll. (1). **WN.** Wellington, Wiltons Bush, 21 Dec 1945, Hudson Coll. 1584 a (1).

South I. SD. Pelorus Bridge Scen. Res., 30 m, 24 Dec 1981, J.W. Early, sweeping ferns in beech / podocarp / broadleaf forest (1).

Material examined. Type series, plus portions of 1 topotypic male (an abdomen and male genitalia) (NMNZ).

ND, TK, WN / SD.

Collected in December.

Recorded from near sea level.

Two specimens were collected by sweeping, one from ferns in a beech/podocarp/broadleaf forest.

Remarks. Originally a male specimen of *Z. sulcatus* was associated with the holotype female, but unfortunately all that could be found when DSC finished this review were the male genitalia and associated abdomen. This taxon is unique in the Lemninae in having the sharply defined antebasal sulcus of the pronotum that is found in many other anthicid groups; this is reflected in the specific name.

Subfamily MACRATRIINAE

Genus *Macratría* Newman

Macratría Newman, 1838: 377. Type species *Macratría linearis* Newman, by original monotypy.

Macrarthrius LaFerté-Sénéctère, 1846: 1. Unnecessary replacement name for *Macratría*.

Head base sharply constricted to form a slender neck; frontoclypeal suture not visible; frons elevated over antennal bases as a carinate shelf. Eyes large, bulging, with setae originating between facets. Antennae elongate, with segments 2–8 at least twice as long as wide and of even width, and segments 9–11 noticeably wider. Maxillary palps with 2nd and 3rd segments bearing strong mesal lobes, that on 3rd segment longer than wide; 4th segment large, securiform.

Prothorax elongate; disc convex, with rounded lateral margins slightly constricted near base; apex with a distinct narrow collar; base with a thin, antebasal transverse sulcus extending anteroventrally at lateral margins to a pit just dorsal of procoxae, the pit obscured by setae. Procoxae contiguous, prominent; cavities open externally, closed internally, lacking a tergosternal sulcus.

Elytra lacking omoplates or transverse impression; lateral margins straight, slightly converging to apex; a thin longitudinal sulcus arising posterior to humeri and extending posteriorly to near elytral apex; punctures usually serial; undersetae absent. Mesoscutellum truncate. Mesosternum and mesepisterna fused, the line of fusion indicated at most by a vaguely defined smooth ridge, both coarsely punctate in New Zealand species. Mesepisterna extending laterally to elytra and posteriorly to metepisterna, bordered with pubescence laterally. Mesepimera recessed, barely visible as a narrow margin posterior to mesepisterna. Mesosternum narrowly separating mesocoxae, meeting metasternum as a blunt point. Sternites free; 1st visible sternum with a narrow, shallow groove just posterior to each metacoxa concealed by a dense line of setae, each groove with 2 separate foveae projecting inwards. Legs with 1st tarsomeres enlarged, densely setose ventrally. Genitalia: 9th sternite Y-shaped, with stem short and apical arms long, expanded at tip; phallobase and parameres distinct; penis tripartite at apex.

Remarks. *Macratría* is a large, cosmopolitan genus whose relationships have never been thoroughly evaluated. Members of the Macratriinae were described primarily by Maurice Pic through a multitude of short descriptive papers over many years. The New Zealand species differ from those of North America, which include the type species *linearis* Newman, in the rounded lateral margins of the

pronotum, the prolonged vertex, and the setose groove and foveae of the first visible abdominal sternite. North American species have a shallowly convex pronotal disc with angular to carinate lateral margins, the head base broadly subtruncate, and the first abdominal sternite lacking sulci or foveae.

These anthicids may be quite common on riparian vegetation, and are active during the day.

Macratría aotearoa new species

Fig. 47; Map 25

exilis Pascoe (misidentification: Kuschel 1990).

Length 3.08–4.36 mm. Body dark brown; antennomeres and femora yellow basally, to brown in distal half; tactile setae erect over body.

Head and pronotum with setae subdecumbent. Head base elongate, bluntly triangular to narrowly subtruncate behind eyes; punctures sharply defined and densest between eyes, 0.03 mm from centre to centre, becoming scattered and smaller towards base; setae originating between ocular facets 0.03 mm long.

Pronotum elongate, with deeper punctures than on head, 0.03 mm apart.

Elytra with punctures larger, nearly as distinct as those on pronotum, dense and subserial near base, serial over most of disc; tactile setae erect, 0.14 mm long; setae suberect at about 30–40°, 0.09 mm long, angled obliquely laterally over disc, angled posteriorly or obliquely dorsally along flanks. Wings fully developed.

Males with 8th sternite narrowly notched at apex, sinuate laterally. Genitalia: penis with middle part broadly rounded, narrowly notched at middle.

Type data. **Holotype:** male, [AK] Huia, 23 January 1975, B.M. May, beaten *Phyllocladus glaucus* (NZAC).

Paratypes (33; CMNC, LUNZ, NZAC, UNHC). **North I. ND.** Kaihu Bush, 1500–1600' [450–480 m], 30 Feb and 30 Dec 1944, B. Given (4). Kaingaroa, 18 Nov 1917 (2). Little Mangamuka Gorge, 10 Nov 1948, Brookes (1); Mangamuka Gorge, 2 Dec 1951, Brookes (1). Waipoua State Forest: Te Mata Ngahore, 4 Feb 1975, Walker, sweeping (1); Forest Sanctuary, 11–12 Dec 1983, sweeping in kauri forest (1); 11–12 Dec 1983, L. Masner, screen sweep (1). Whangarei Heads, 7 Dec 1977, Kuschel (1). **AK.** Same data as holotype (1). Lynfield, Tropicana Drive, Kuschel: 12 Nov 1976 (1); 4 Dec 1976, dead *Dysoxylum* (1); 15 Feb 1977, moss on track (1). Oratia, 15 Feb 1958, B.M. May, under bark of rotten log (1). Titirangi: 26 Dec 1914 (2); 29 Dec 1942, M.W. Carter (1); 2 Dec 1972, P.A. Maddison, in flight at dusk (1). Waitakere Range, Jun

1951, Spiller (1). CL. Great Barrier I.: Kaitoke, 25 Nov 1957, J.C. Watt, *Leptospermum* [*Kunzea*] *ericoides* forest (1); Rangihakaea Bay, 30 Dec 1957, Watt (3). Tapu-Coroglen Rd, 25 Mar 1977, L.L. Deitz, sweeping (1). TK. Mt Messenger (below), 15 Dec 1983, L. Masner, screen sweep (1). Pukerewa Scen. Res., 14 Dec 1983, J.W. Early (1). RI. Ohakune, Main Trunk [railway], 3 Apr 1924, T.R. Harris (1). WI. Feilding, Kitchener Park, 12 Apr 1936, R.M. Bull (1).

South I. NN. Cawthron Park (Gibbs), 23 Nov 1925, Gourlay (1).

Material examined. Type series, plus 34 non-type examples (AMNZ, BMNH, NZAC).

ND, AK, WO, CL, TK, RI, WI / NN.

Collected November–June.

Recorded from sea level to 450 m.

Diurnally active on vegetation near streams in bush areas at Lynfield, AK (as *Macratia exilis*, Kuschel 1990: 34, 66), and apparently associated with sedges (*Carex*, *Scirpus*, *Cyperus*); especially common in swampy flats with sedges. Also collected sweeping *Phyllocladus glaucus* and *Kunzea ericoides*.

Remarks. *M. aotearoa* is separated from *M. exilis* by the suberect elytral setae and the more distinct punctuation of the head and elytra. The specific epithet is the Maori name for New Zealand.

Macratia exilis Pascoe

Fig. 5, 48; Map 26

exilis Pascoe, 1877: 147 (*Macratia*). Broun 1880: 409. Pic 1911a: 19. Hudson 1923: 385. Not Kuschel 1990: 34, 66 (misidentification).

verticalis Sharp, 1877: 9 (*Macratia*). Broun 1880: 409. Pic 1911a: 19 (as synonym of *exilis*). Hudson 1923: 385.

flavipes Broun, 1893: 1162 (*Macratia*). Pic 1911a: 19. New synonymy.

Length 3.04–3.80 mm. Body dark brown; antennomeres and femora yellow basally to brown in distal half; tactile setae erect over body.

Head and pronotum with setae subdecumbent to nearly appressed. Head elongate, with base semicircularly rounded to narrowly subtruncate; punctures vague on frons, progressively denser to sharply defined though small between eyes, then sparser but still distinct to near head base, about 0.02 mm apart on disc between eyes; setae originating between ocular facets 0.02 mm long.

Pronotum with punctures larger and deeper than on head, dense and sharply defined, about 0.03 mm apart.

Elytra with punctures the same size as those on pronotum but less distinct, dense and subserial at base, serial over rest of disc; tactile setae 0.10 mm long; setae subdecumbent at about 20°, 0.08 mm long, angled obliquely laterally over disc, obliquely dorsally along flanks. Wings fully developed.

Males with 8th sternite prolonged; margins gradually convergent to deeply notched apex. Genitalia: penis with middle portion narrowly rounded at apex.

Type data. *Macratia exilis*: lectotype male and one paralectotype labelled "N.Z. [CL] Tairua" from the Pascoe Collection (BMNH), the left and right specimens on a double mount, here designated by DSC.

Macratia verticalis: lectotype male labelled "[AK] Auckland, N.Z." from the Sharp Collection (BMNH), and 4 paralectotypes with identical locality labels, here designated by DSC.

Macratia flavipes: holotype female labelled "[ND] Parua" in the Broun Collection (BMNH). This specimen was actually labelled "*Macratia exilis*," but is the only specimen in the Broun Collection with the correct locality data, and fits the description perfectly. It has been labelled as the holotype by DSC.

Material examined. Type specimens, plus 39 non-type examples (CMNC, LUNZ, NMNZ, NZAC, UNHC).

ND, AK, CL, TK, TO, WI, WN /—.

Collected October–January, and in June.

Recorded from near sea level.

Collected primarily by sweeping vegetation in riparian or wet areas; recorded from *Blechnum* and *Carex* species.

Remarks. *M. exilis* is separated from *M. aotearoa* by the subdecumbent setae on the elytra, the less distinct punctuation on the head and elytra, particularly between the eyes, and the more broadly rounded to subtruncate head base. Pascoe's description of *exilis* was published in February 1877; Sharp's description of *verticalis* was published in June 1877.

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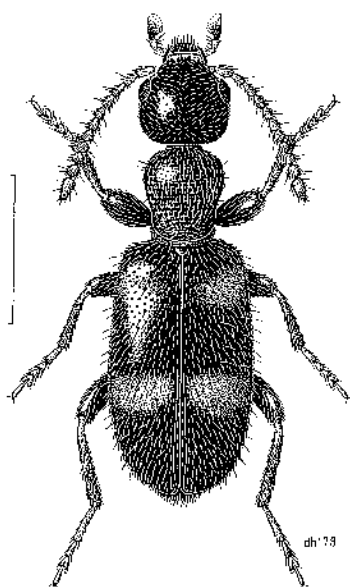
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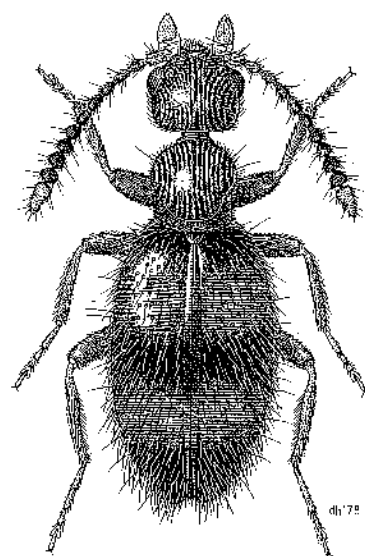
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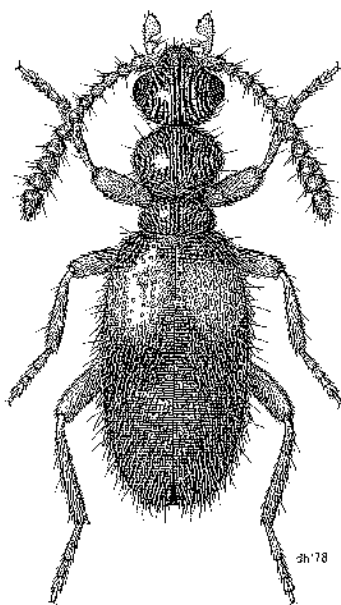
ILLUSTRATIONS



(1) *Anthicus hesperi*

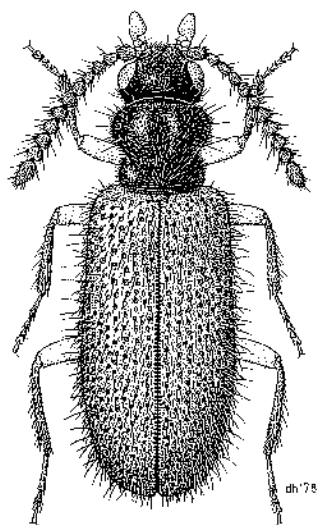


(2) *Sapintus aucklandensis*

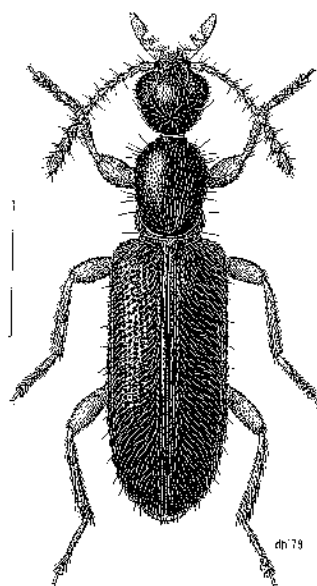


(3) *Cotes crispi*

Scale lines 1 mm

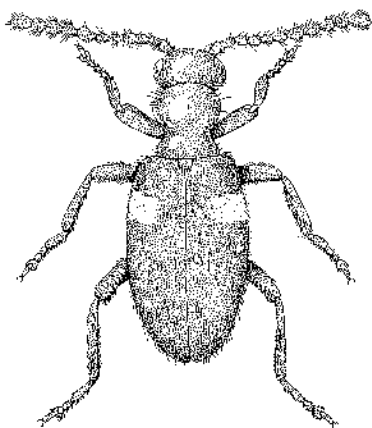


(4) *Trichananca fulgida*

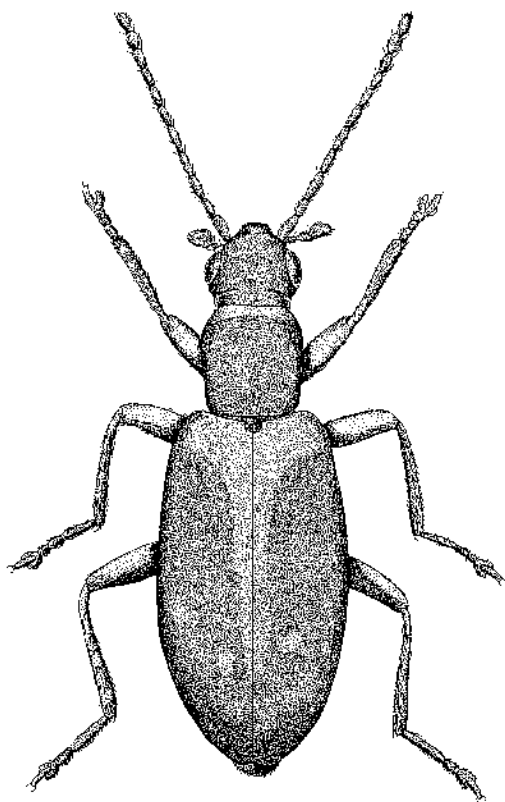


(5) *Macratia exilis*

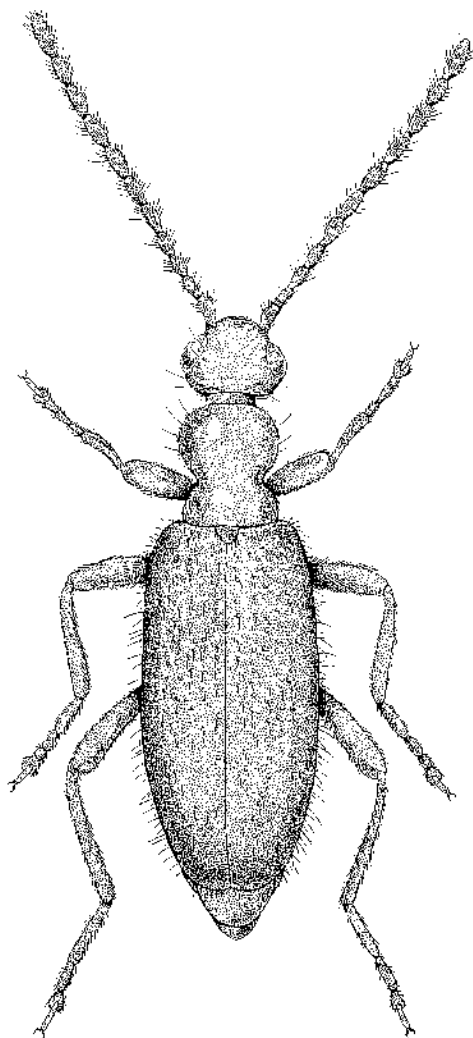
Fig. 1-5 Habitus, dorsal view, of some representative Anthicidae from New Zealand (Illustrator: D.W. Helmore).



(7) *Cotes bullata*



(6) *Lagrioida brouni*



(8) *Cotes gourlayi*


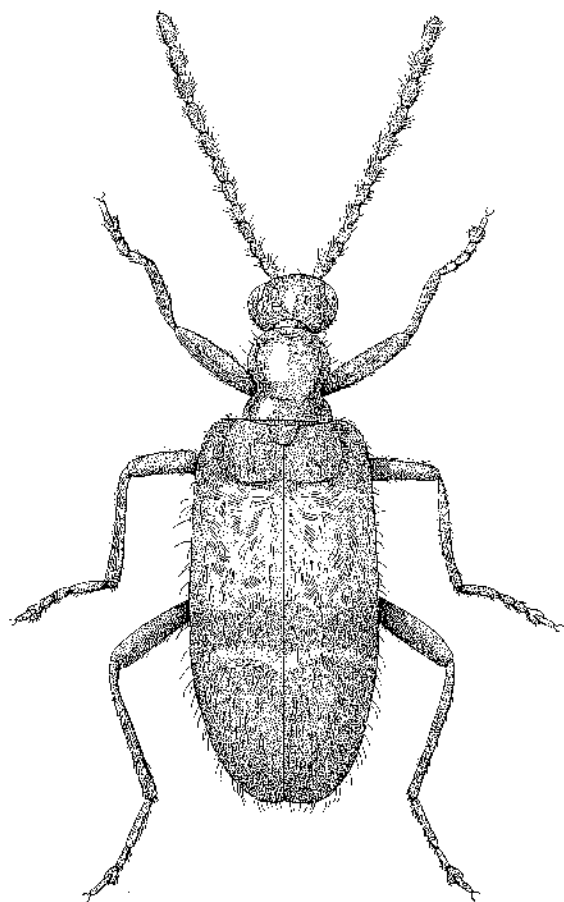
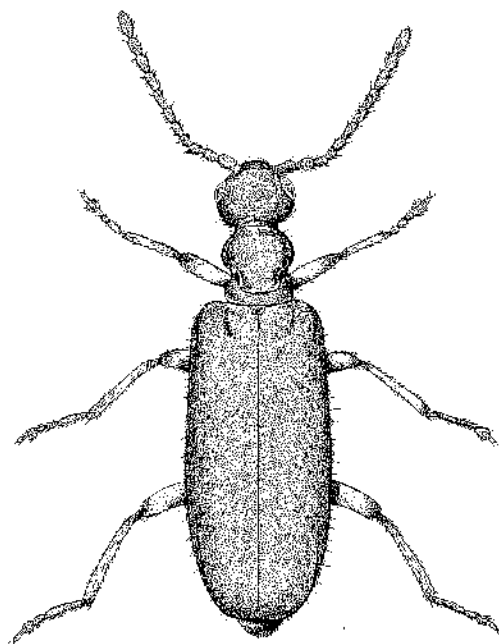
1 mm


Fig. 6-10 Habitus, dorsal view, of some representative Anthicidae from New Zealand (Illustrator: Gene Hall).



(9) *Cotes rufa*



(10) *Zealanthicus sulcatus*

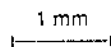
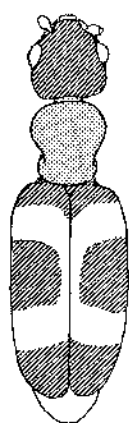


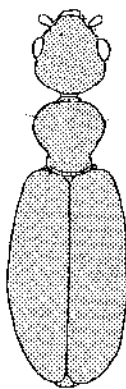
Fig. 11-15 Colour pattern, dorsal view, of some New Zealand Anthicidae: (11) *Anthicus kreusleri*; (12) *A. troilus*; (13) *A. glaber*; (14) *A. minor*; (15) *A. otagensis*.



(11)



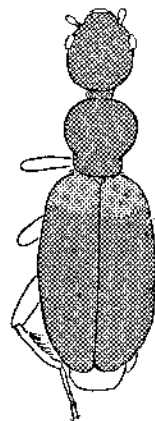
(12)



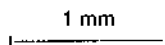
(13)

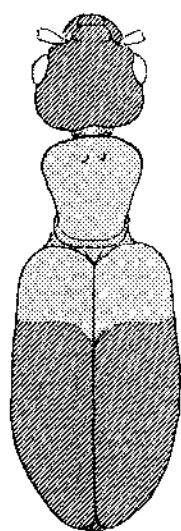


(14)



(15)





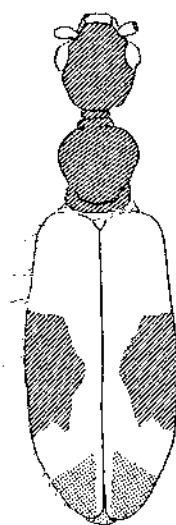
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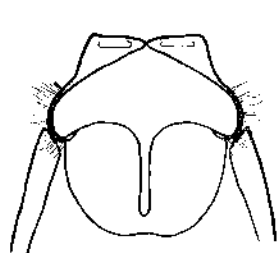


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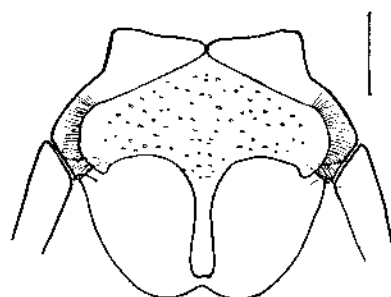
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Fig. 16–19 Colour pattern, dorsal view, of some New Zealand Anthicidae: (16) *Anthicus (Omonadus) floralis*; (17) *Sapintus deitzi*; (18) *S. obscuricornis*; (19) *S. pellucidipes*.

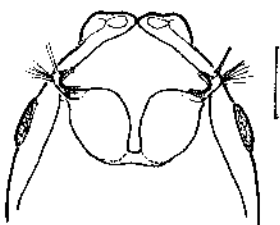
Fig. 20–23 Mesosternal area, ventral view: (20) *Anthicus troilus*; (21) *A. minor*; (22) *A. (Omonadus) floralis*; (23) *Sapintus pellucidipes*. Scale lines 0.2 mm.



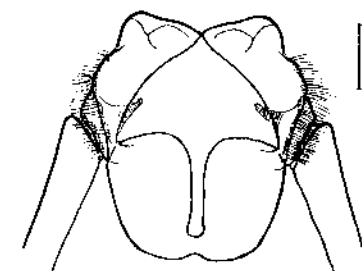
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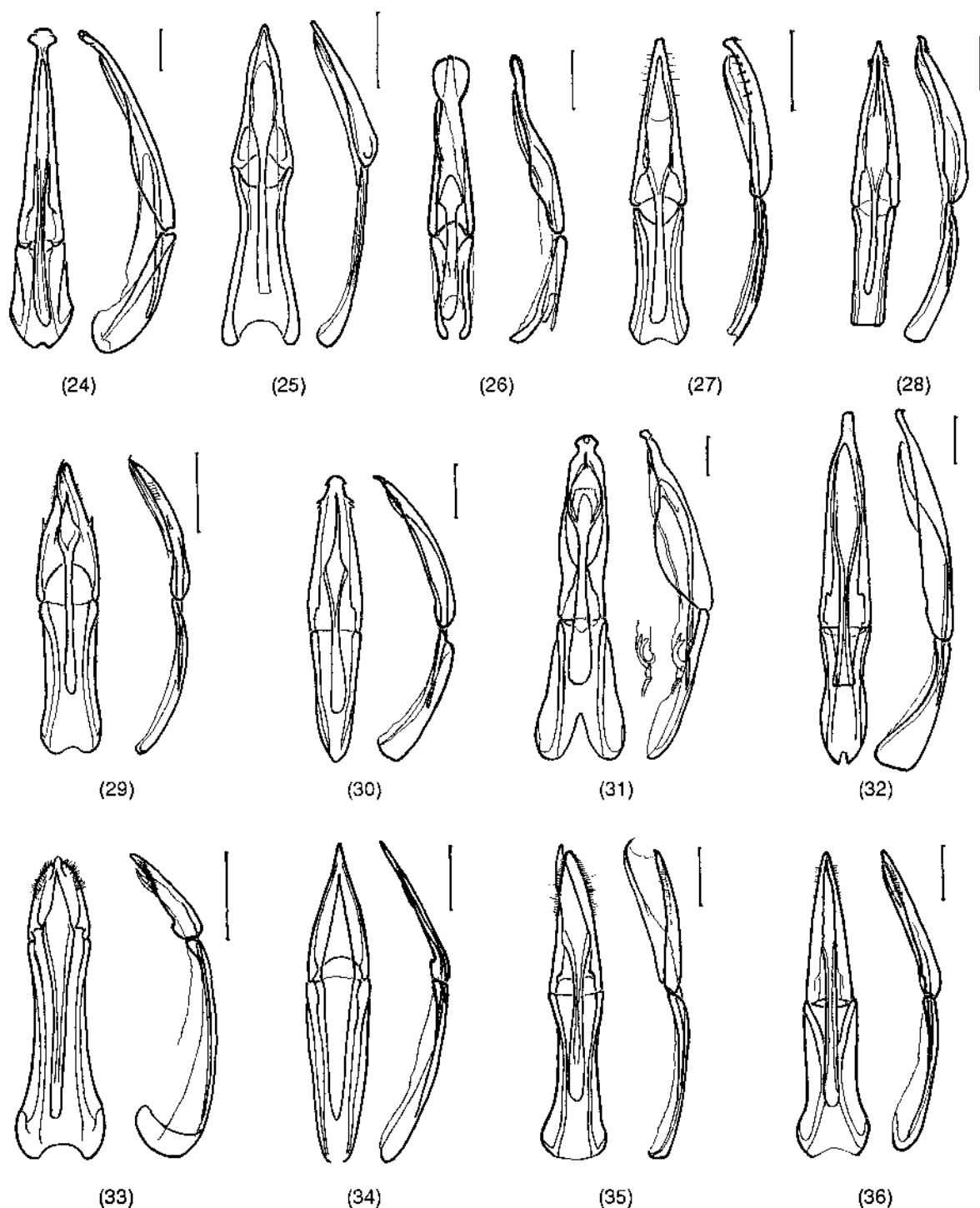


Fig. 24-36 Male genitalia, ventral and left lateral views: (24) *Anthicus hesperi*; (25) *A. kreusleri*; (26) *A. gushi*; (27) *A. troilus*; (28) *A. glaber*; (29) *A. minor*; (30) *A. otagensis*; (31) *A. (Omonadus) floralis* (with internal sac armature near primary gonopore, ventrolateral); (32) *A. (O.) formicarius*; (33) *Sapintus aucklandensis*; (34) *S. deitzi*; (35) *S. obscuricornis*; (36) *S. pellucidipes*.

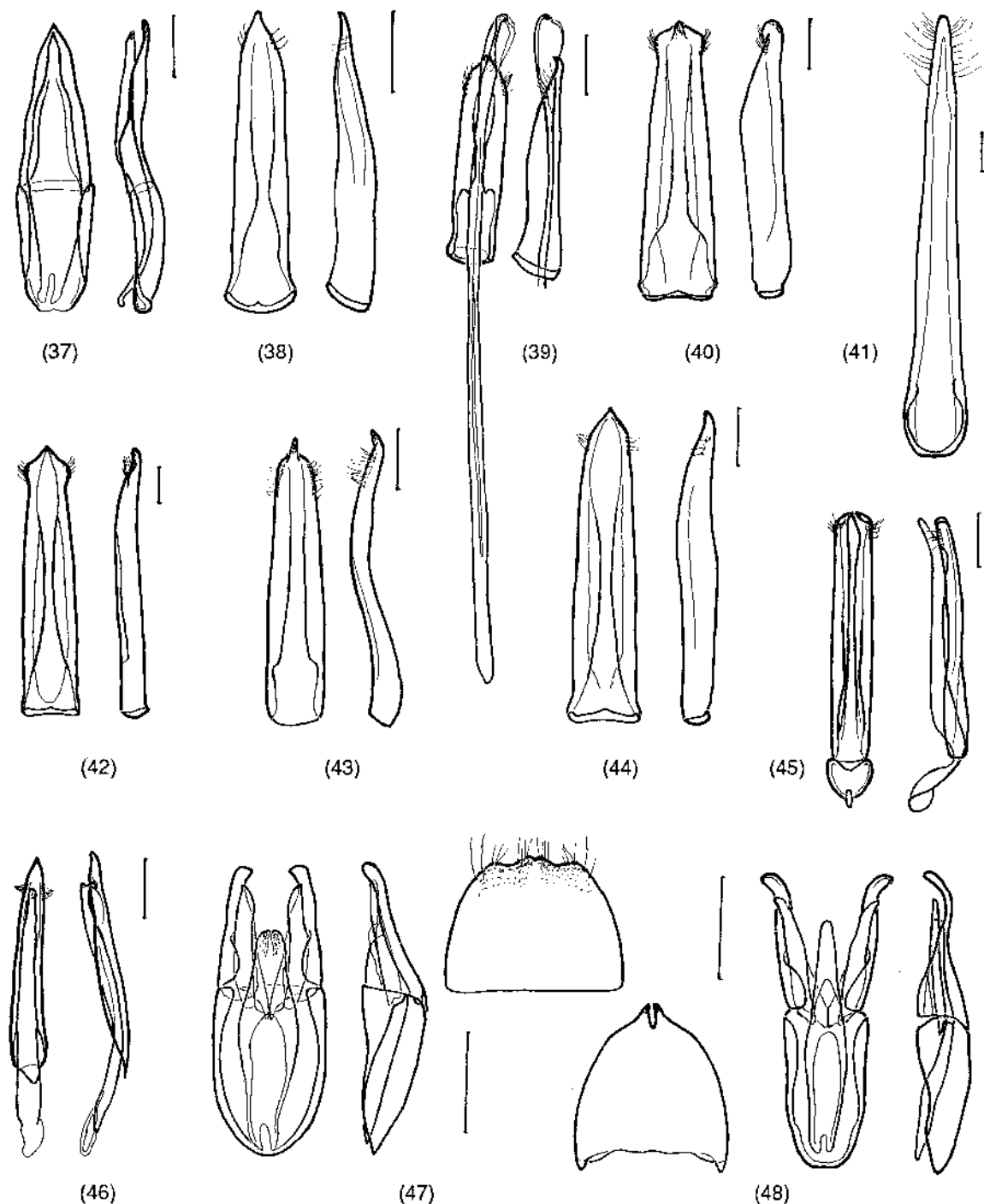
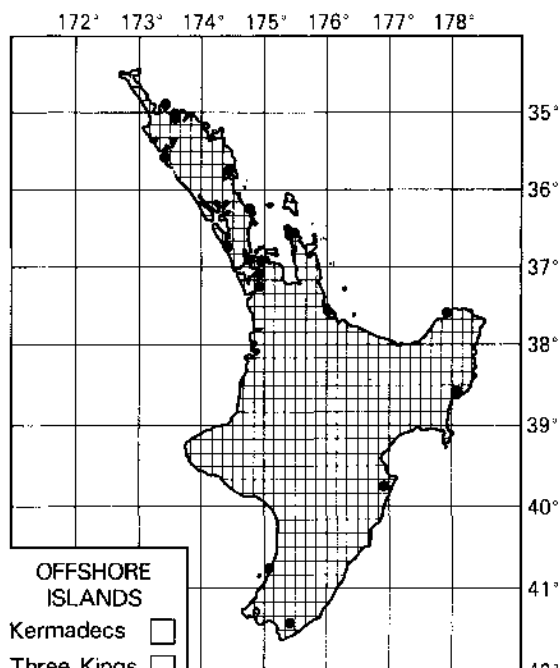


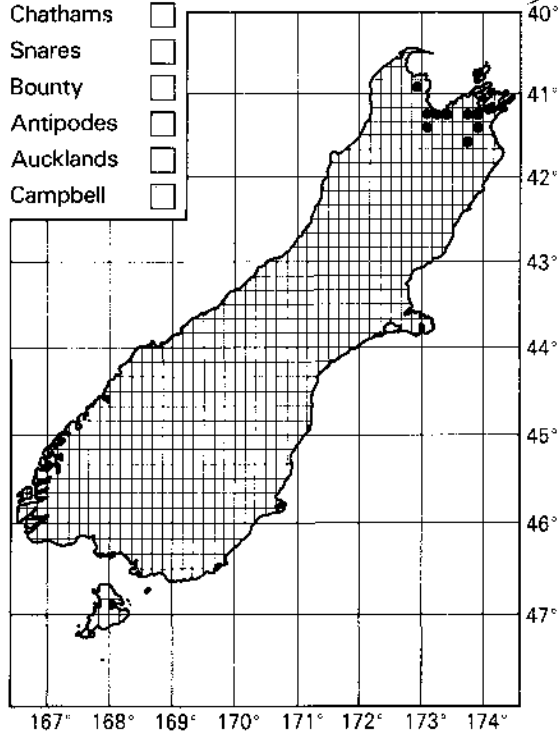
Fig. 37–48 Male genitalia, ventral and left lateral views: (37) *Lagrioida brouni*; (38) *Cotes bullata*; (39) *C. crispus* (ventral, including penis); (40) *C. gourlayi*; (41) *C. optima* (ventral only); (42) *C. proba*; (43) *C. rufa*; (44) *C. vestita*; (45) *Trichananca fulgida*; (46) *Zealanthicus sulcatus*; (47) *Macratia aotearoa* (with 8th sternite, ventral); (48) *M. exilis* (with 8th sternite, ventral).

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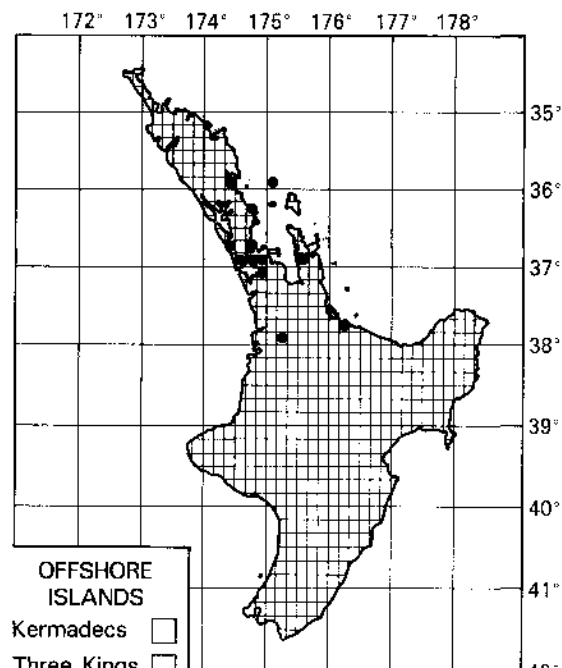


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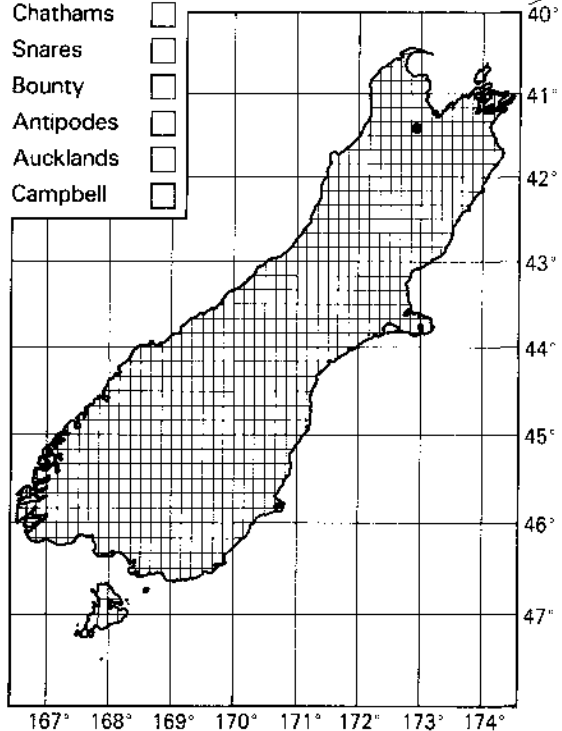


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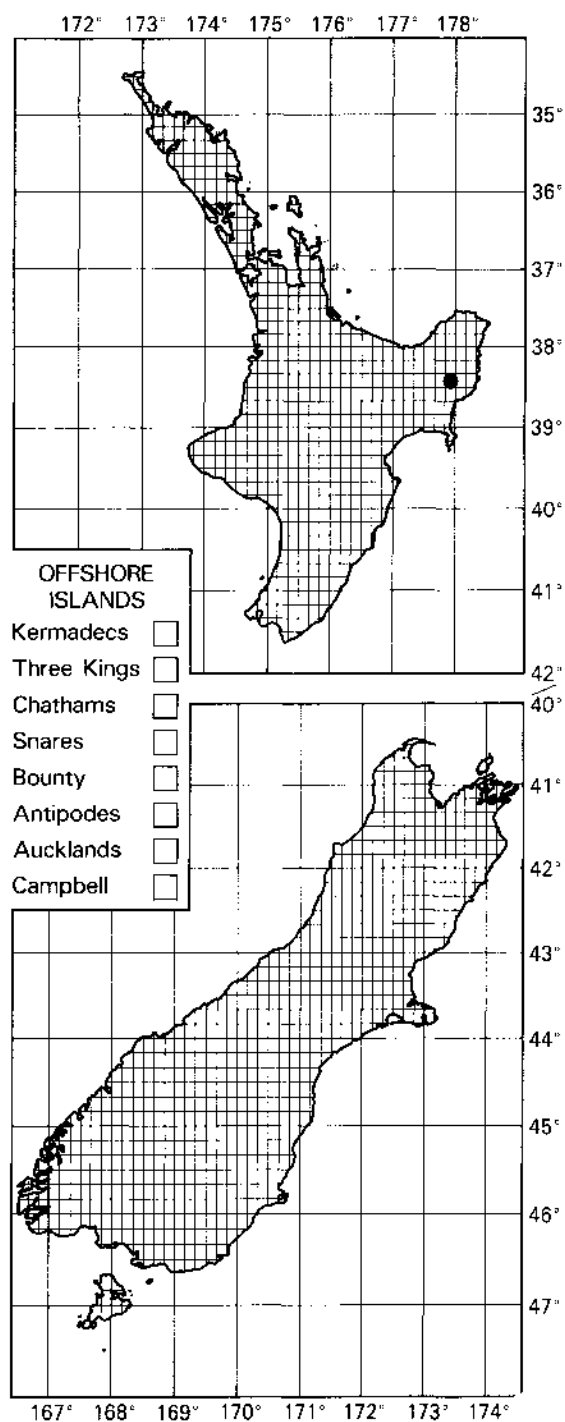


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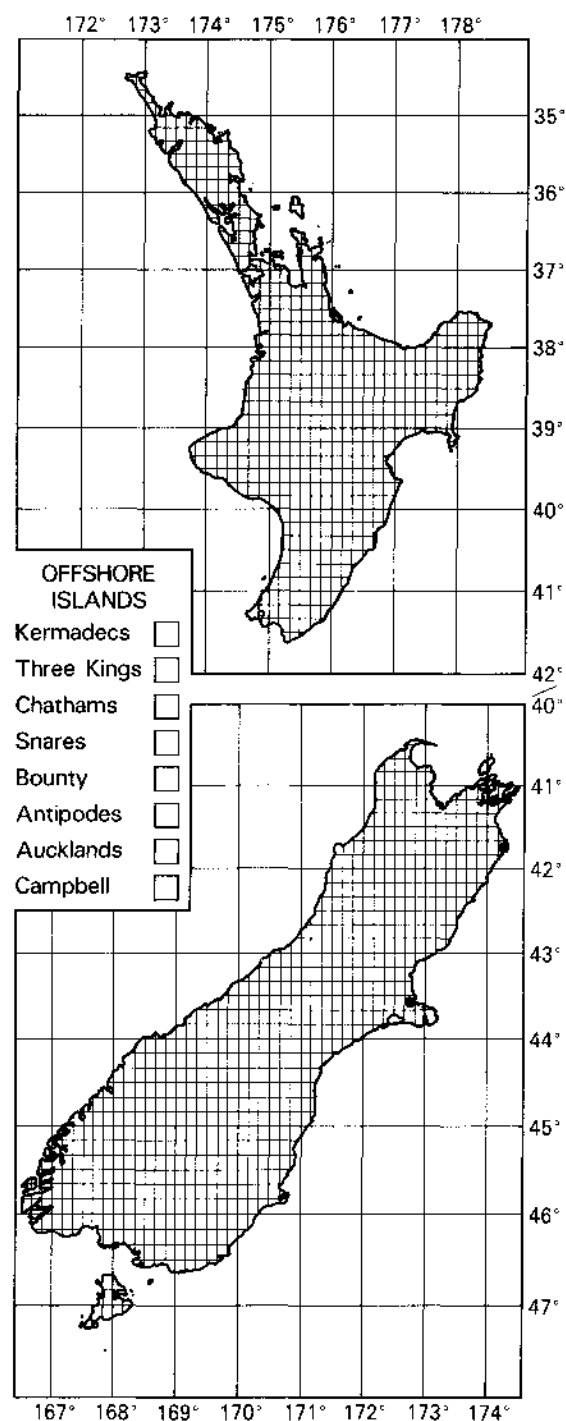
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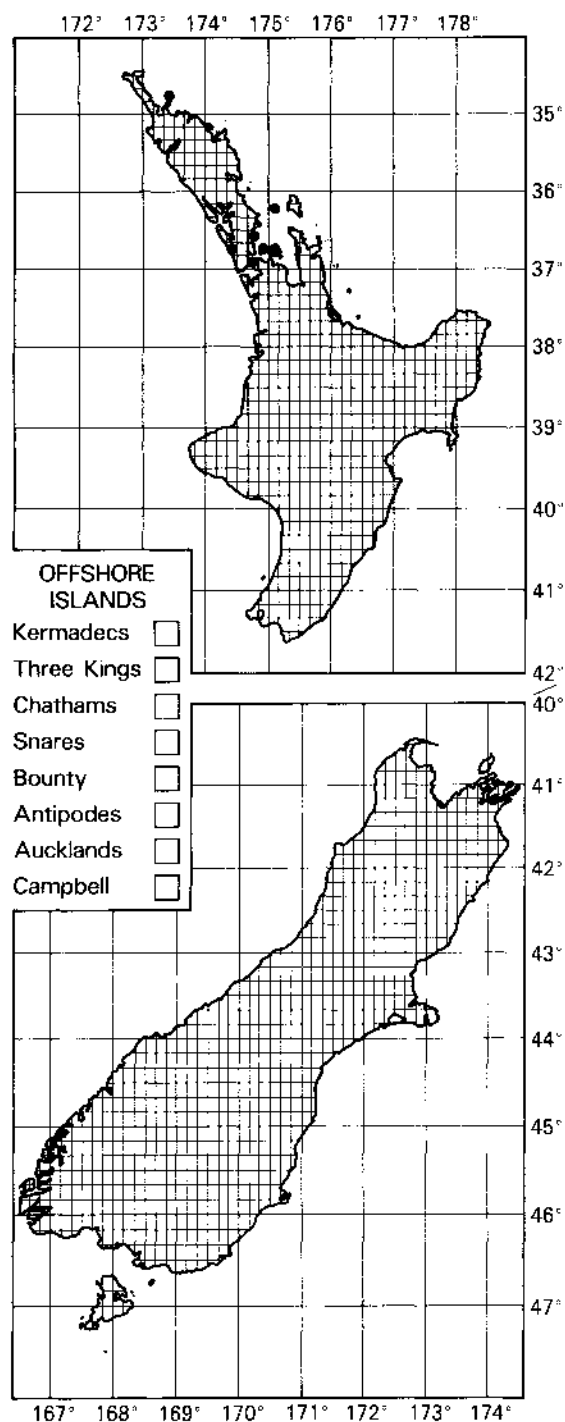
• Map 2 Collection localities, *Anthicus kreusleri* •



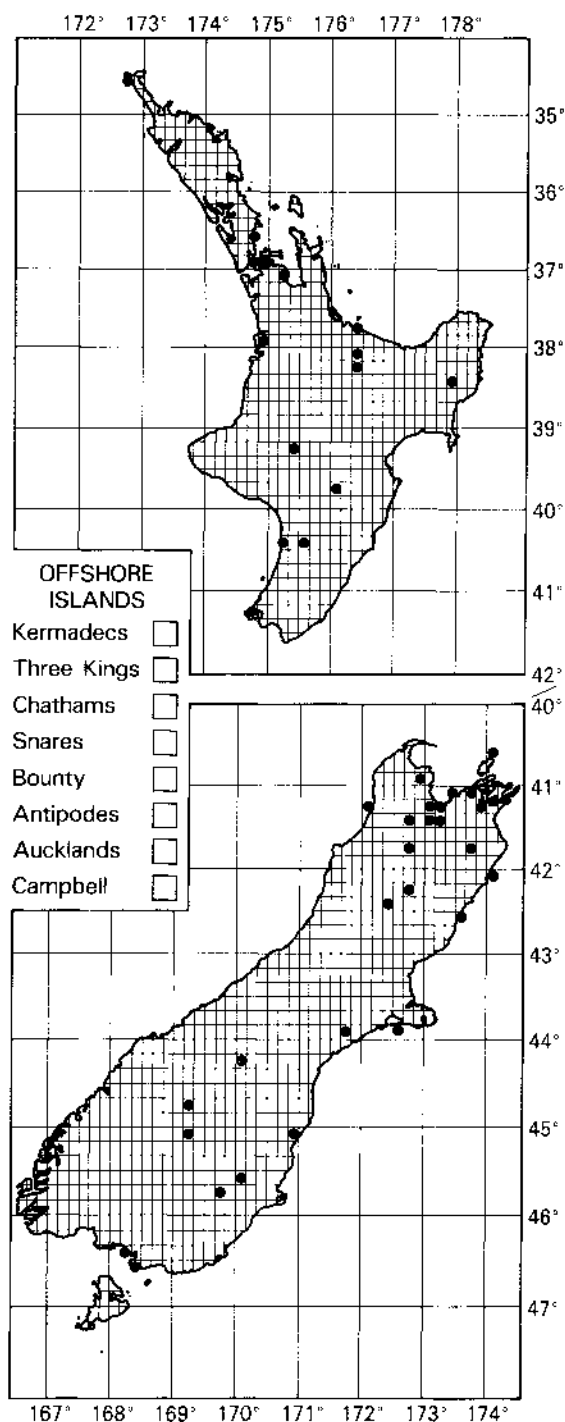
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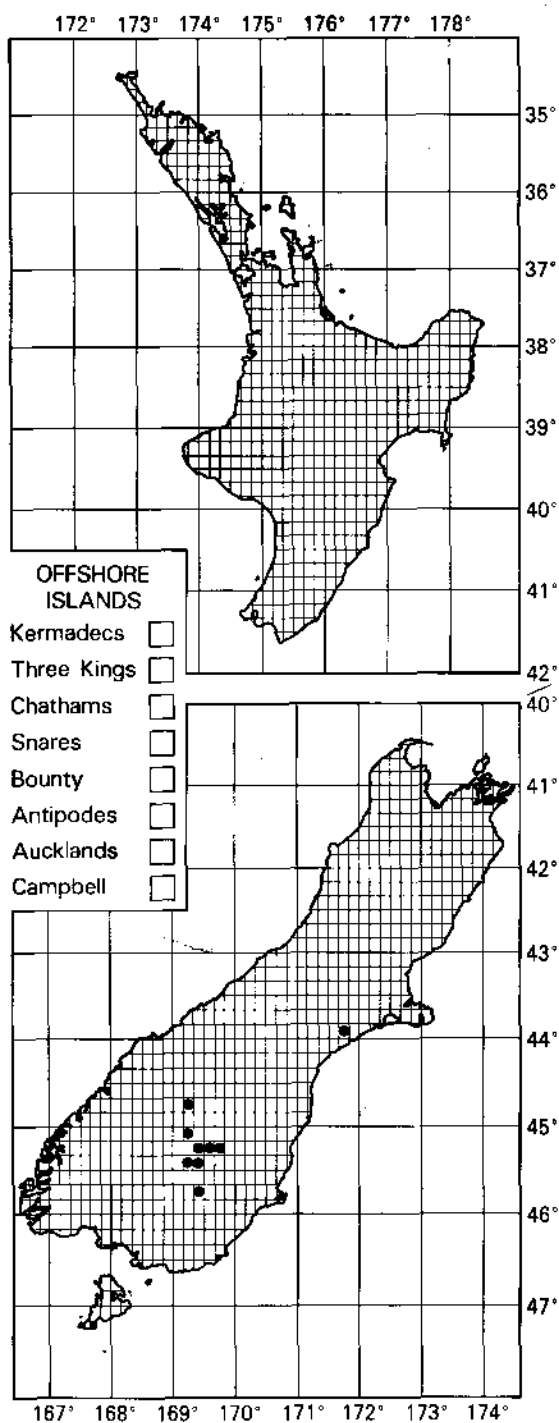
• Map 4 Collection localities, *Anthicus troilus* •



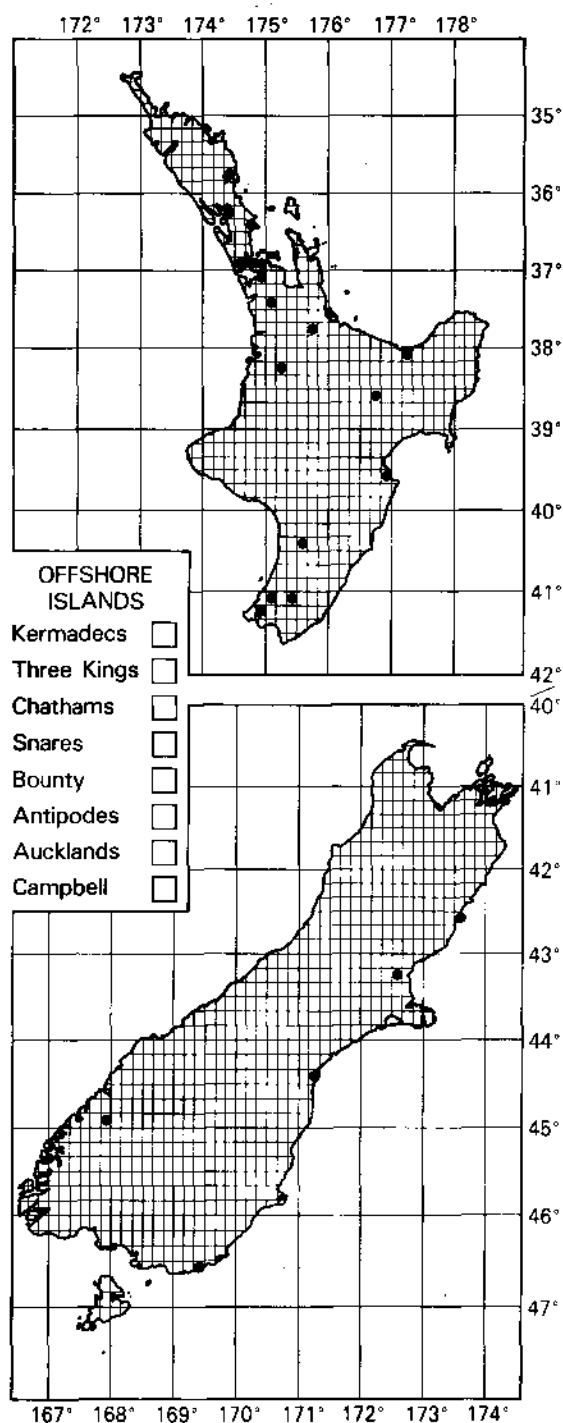
• Map 5 Collection localities, *Anthicus glaber* •



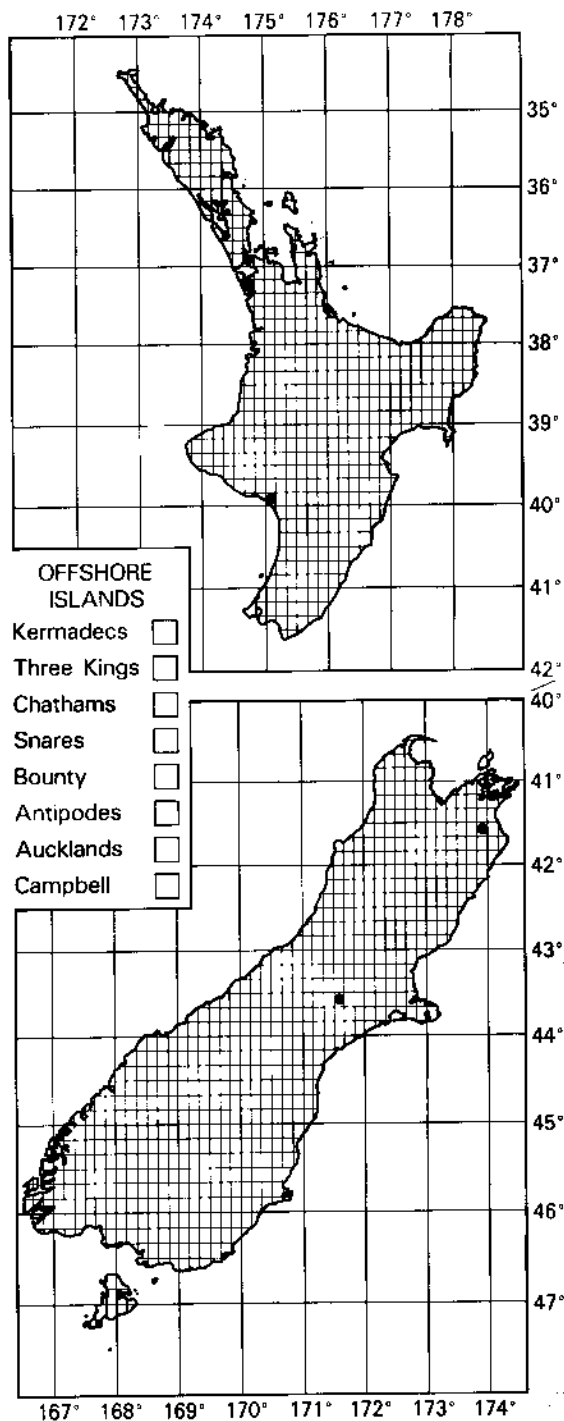
• Map 6 Collection localities, *Anthicus minor* •



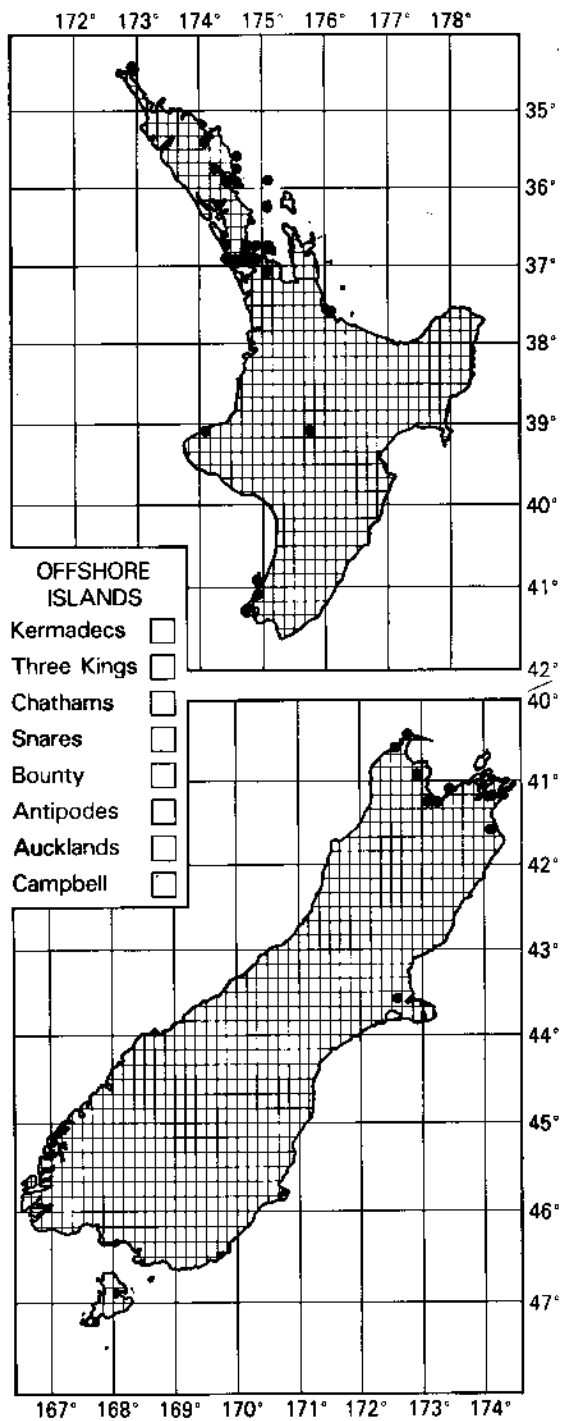
• Map 7 Collection localities, *Anthicus otagensis* •



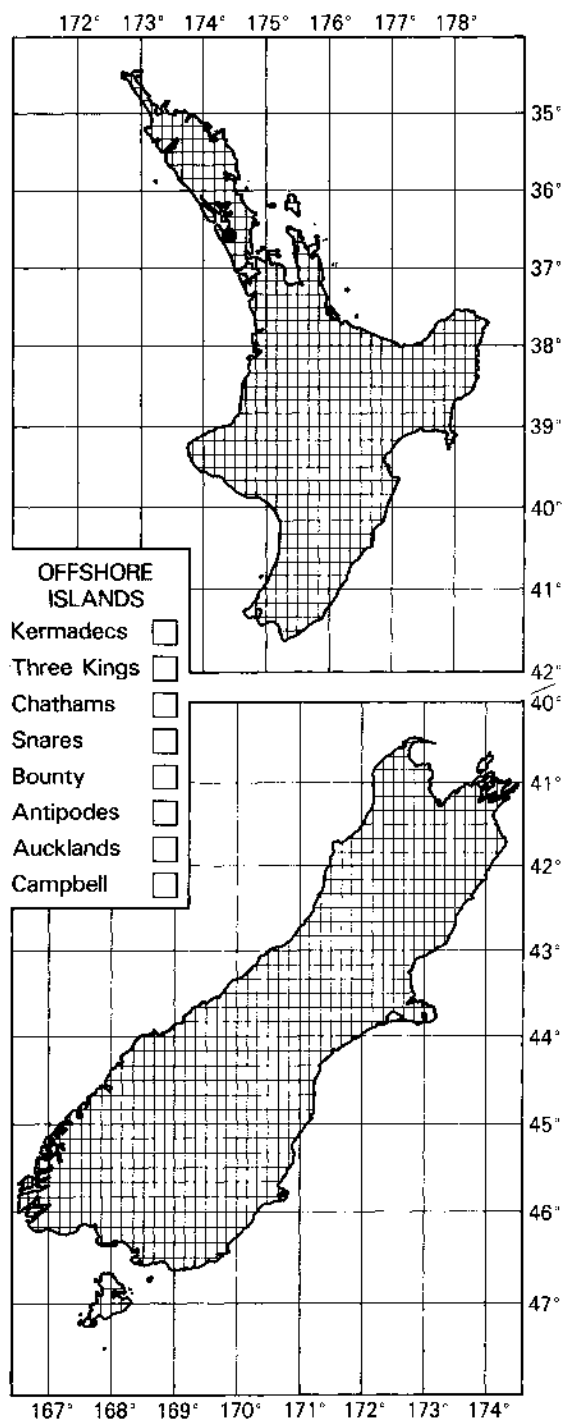
• Map 8 Collection localities, *Anthicus (O.) floralis* •



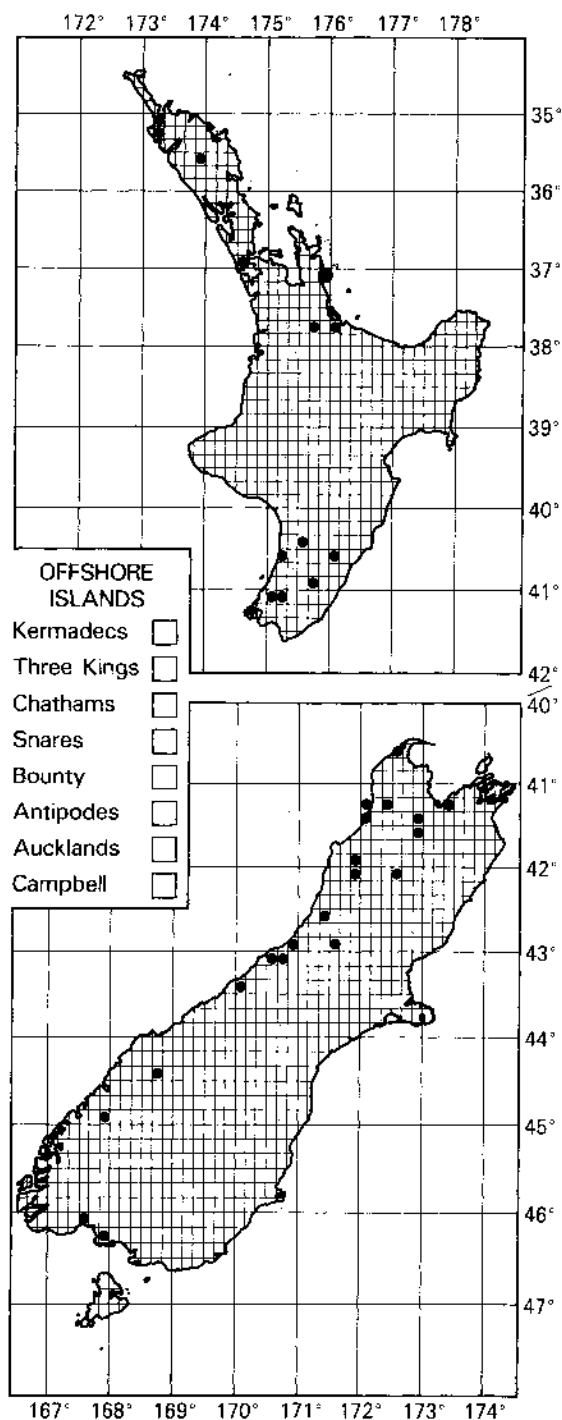
• Map 9 Collection localities, *Anthicus (O.) formicarius* •



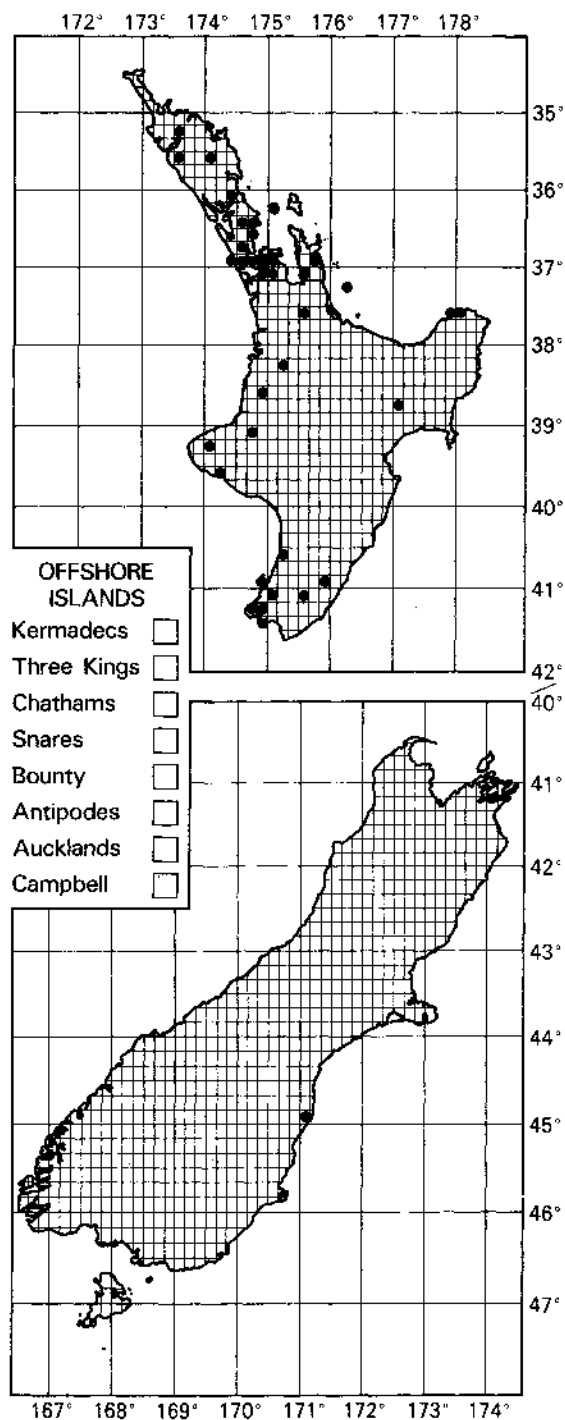
• Map 10 Collection localities, *Sapintus aucklandensis* •



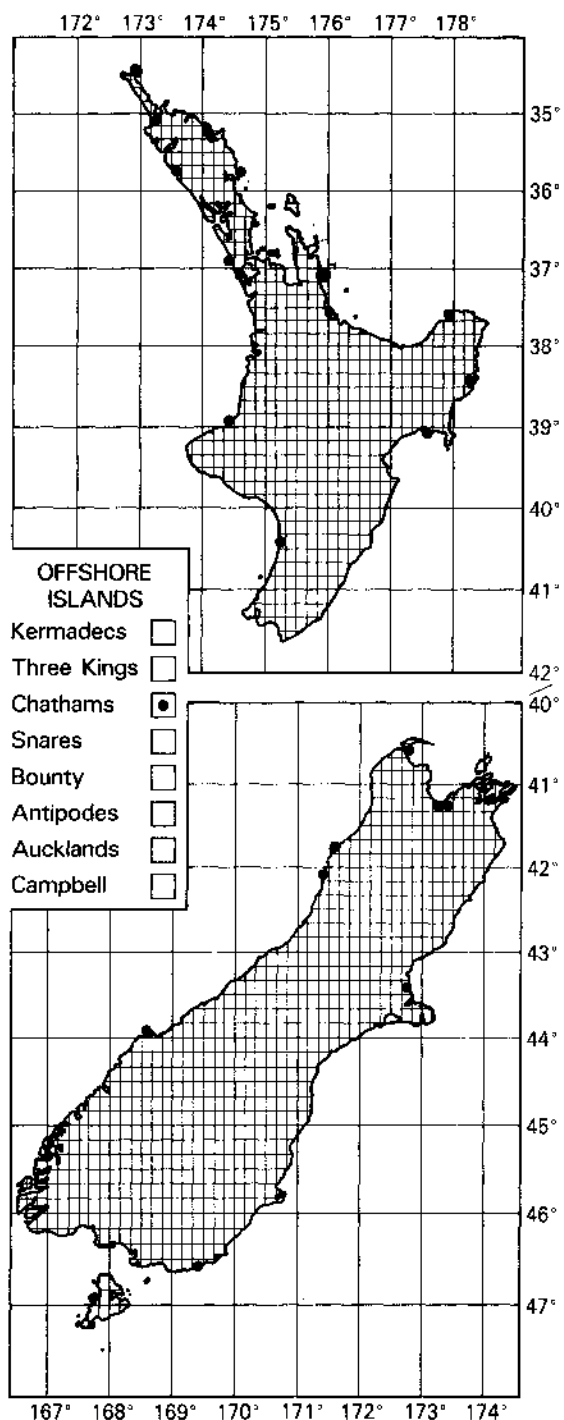
• Map 11 Collection localities, *Sapintus deitzi* •



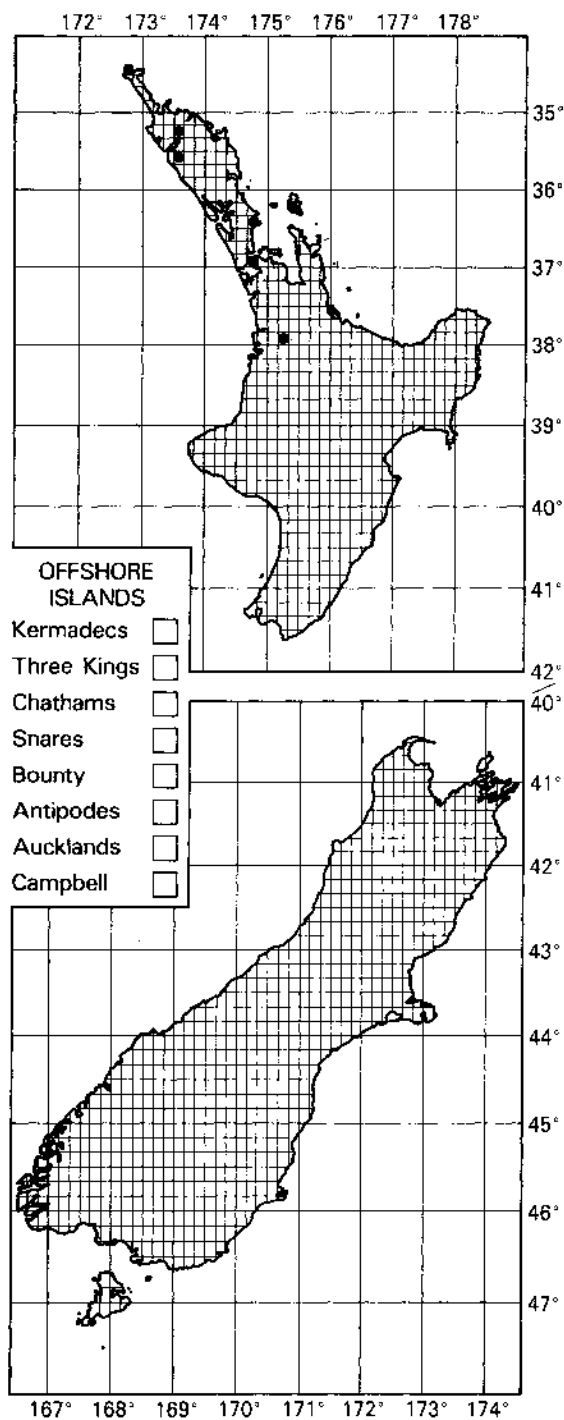
• Map 12 Collection localities, *Sapintus obscuricornis* •



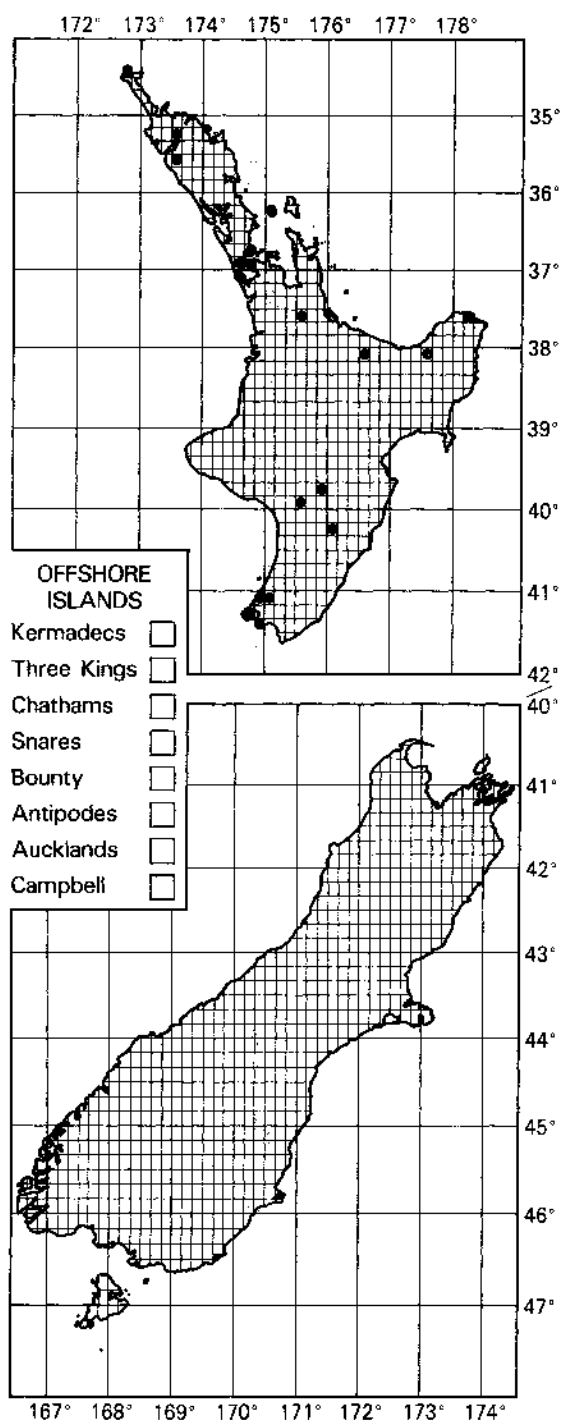
• Map 13 Collection localities, *Sapintus pellucidipes* •



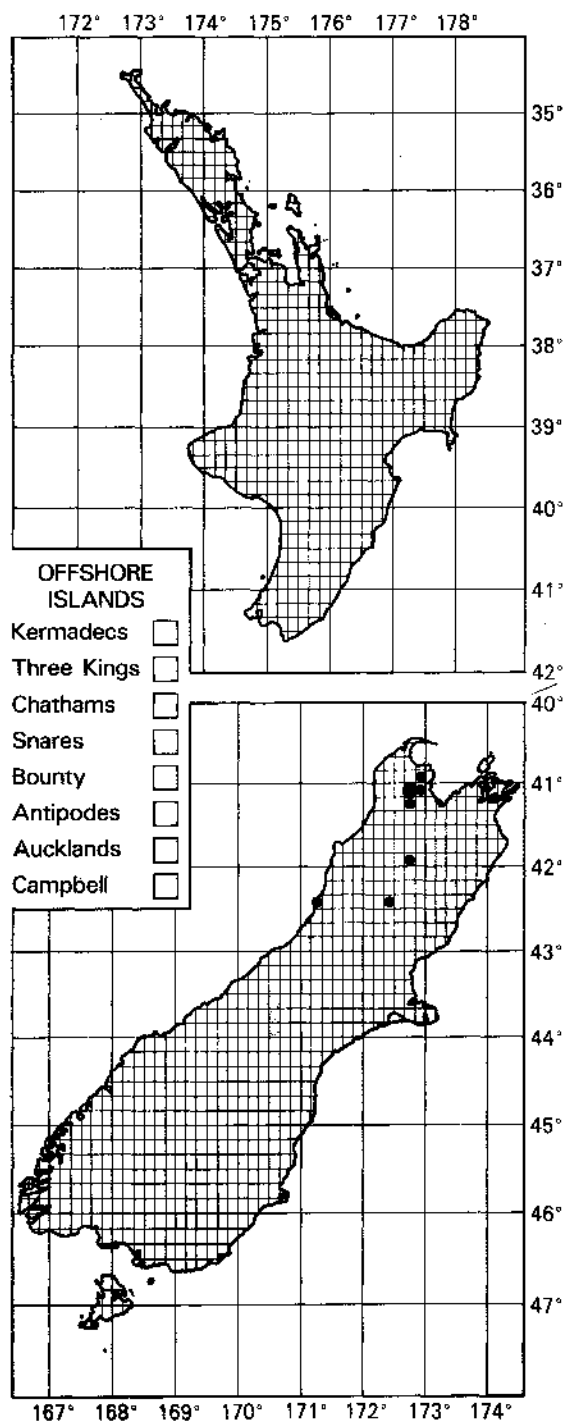
• Map 14 Collection localities, *Lagrioida browni* •



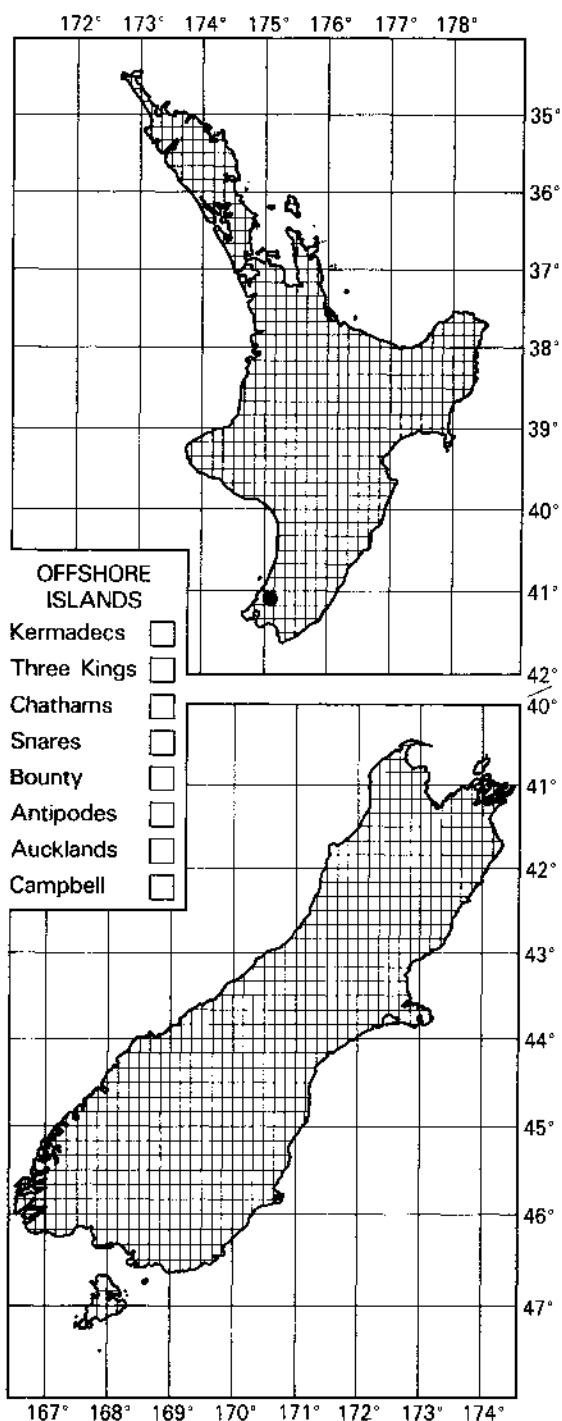
• Map 15 Collection localities, *Cotes bullata* •



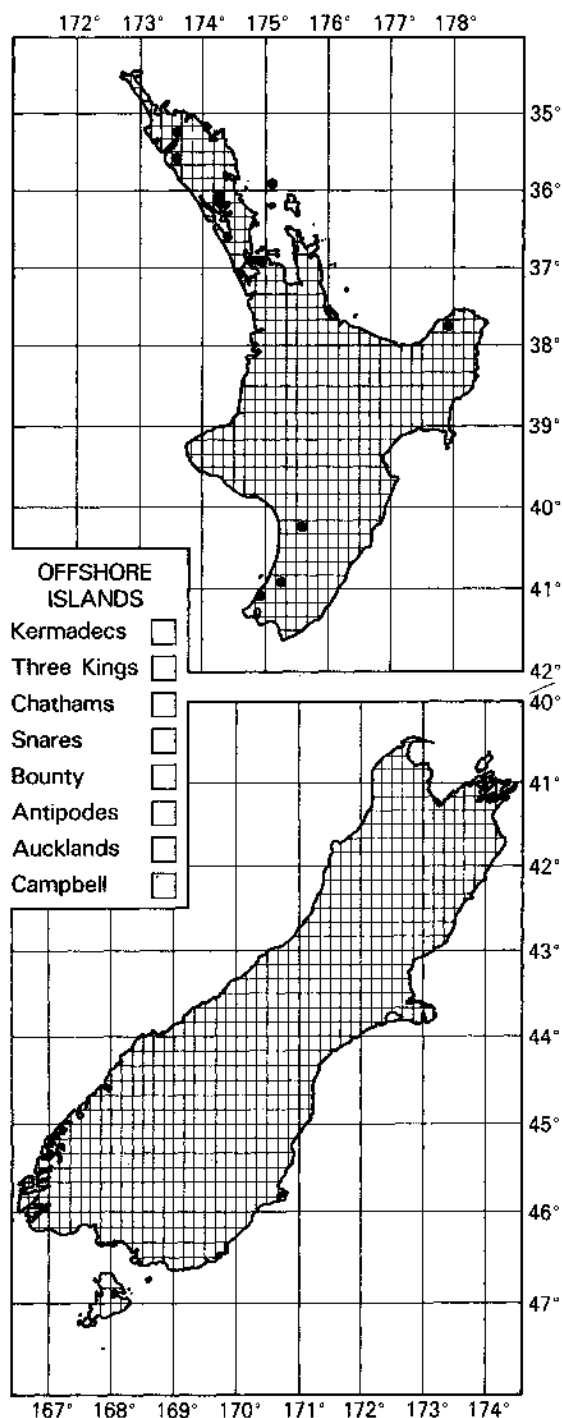
• Map 16 Collection localities, *Cotes crispi* •



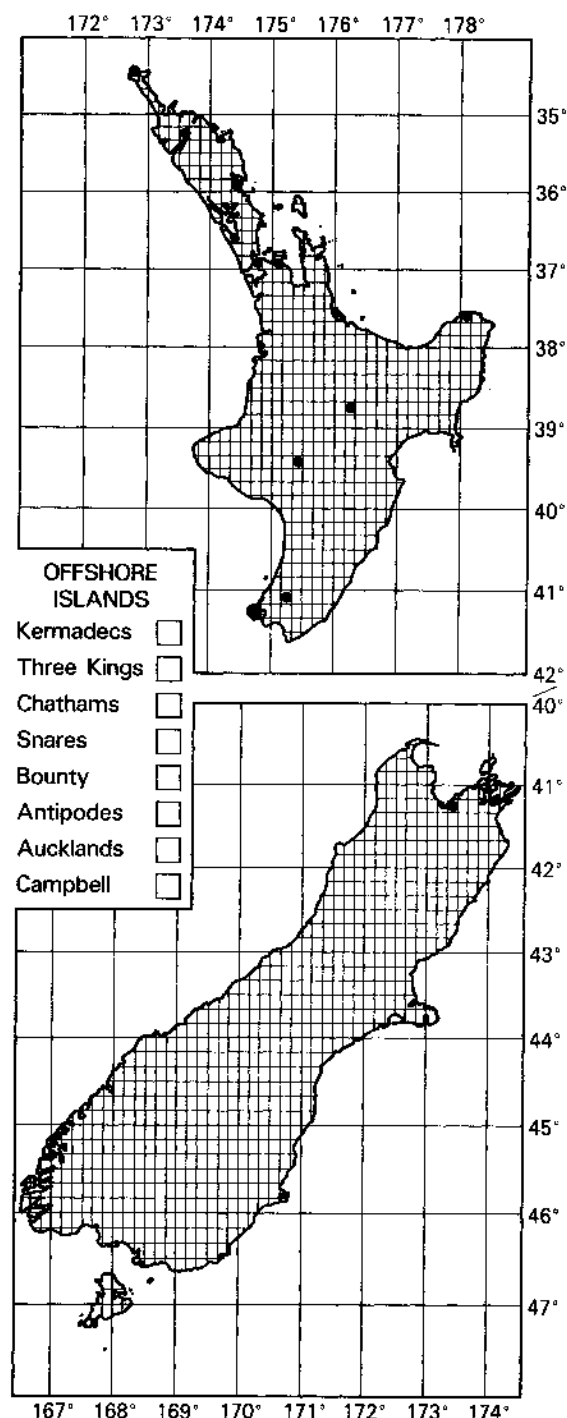
• Map 17 Collection localities, *Cotes gourlayi* •



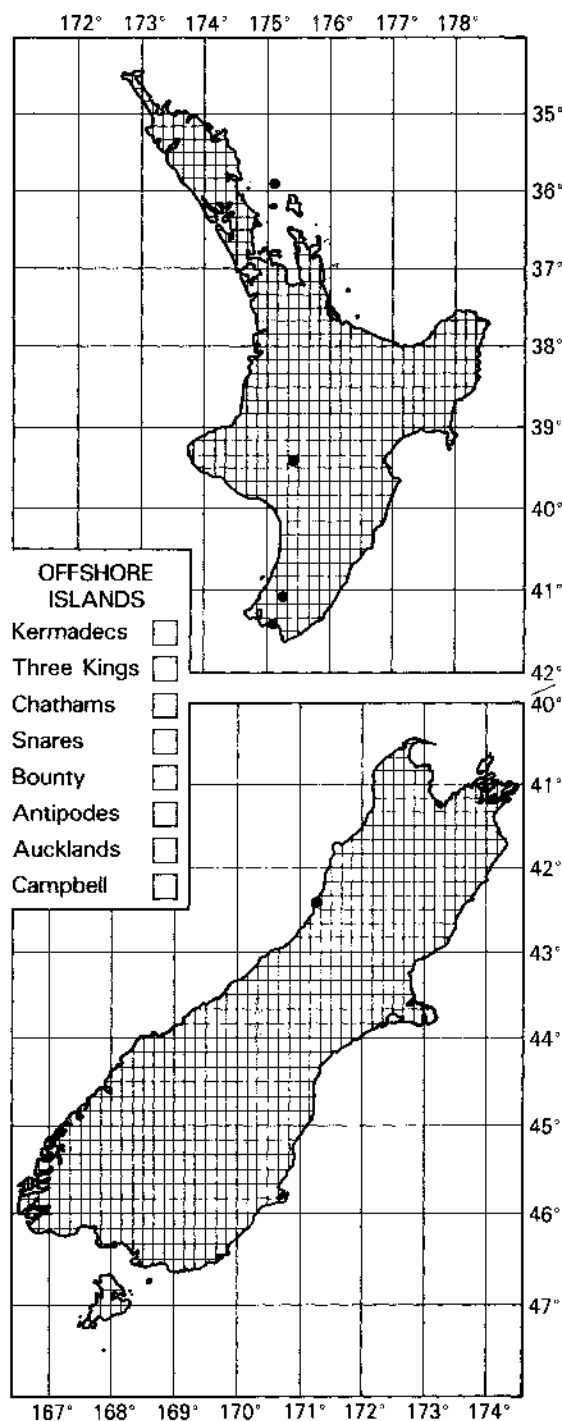
• Map 18 Collection localities, *Cotes halliana* •



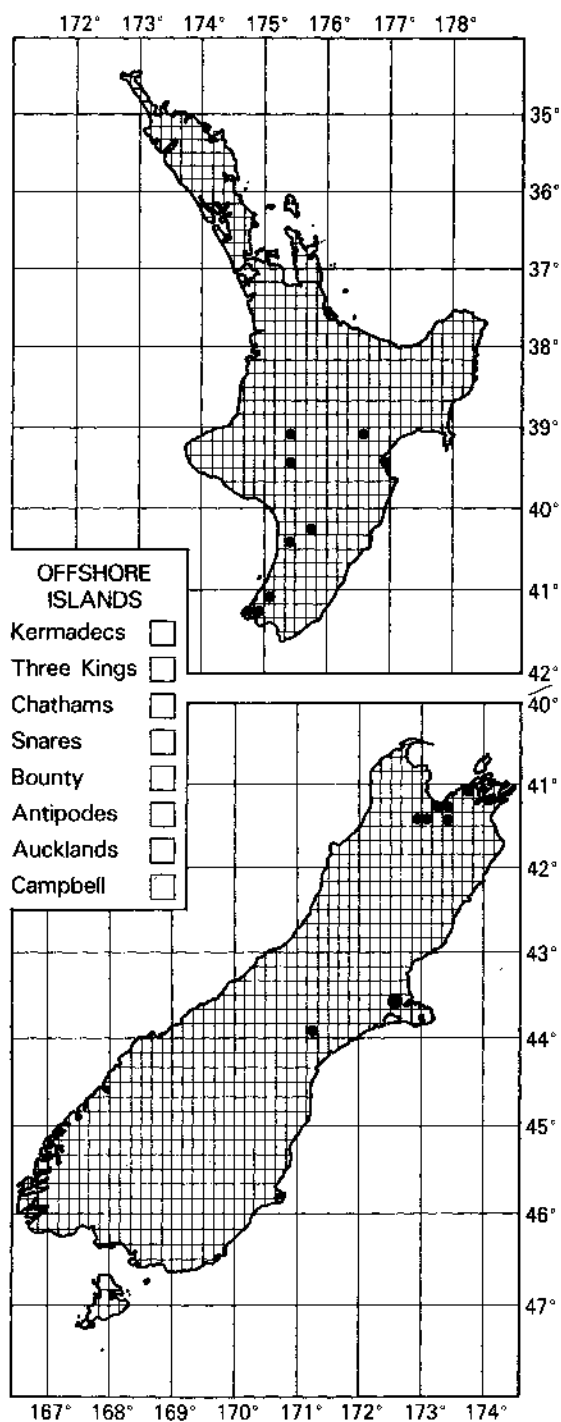
• Map 19 Collection localities, *Cotes optima* •



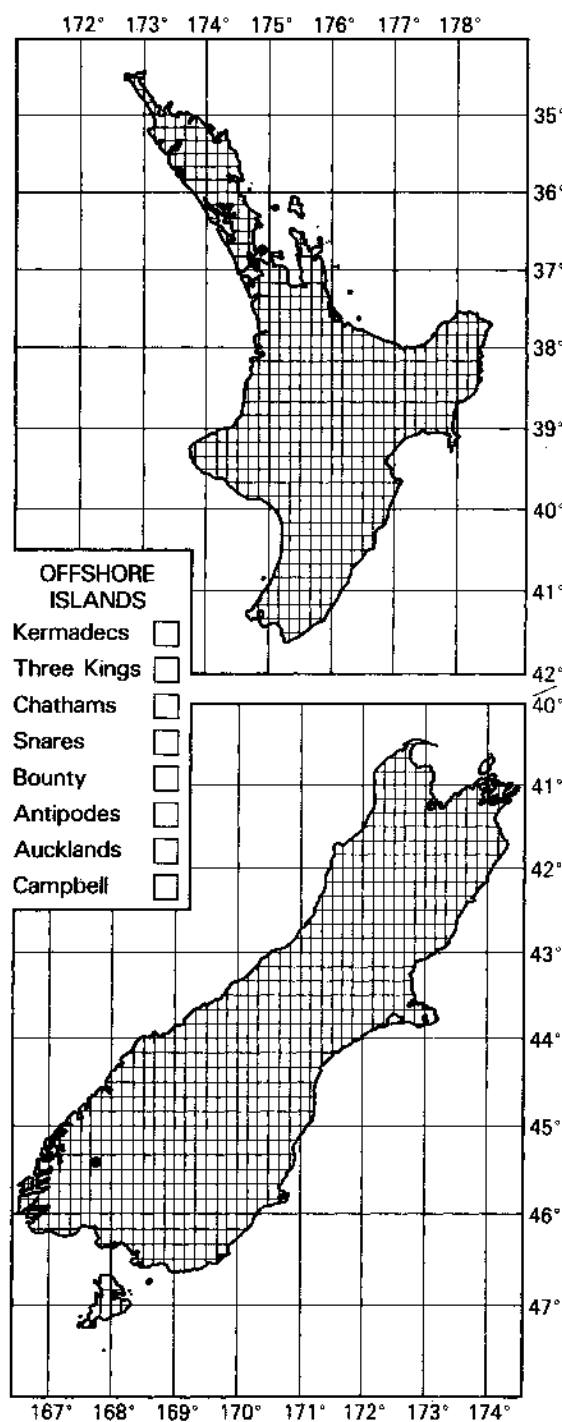
• Map 20 Collection localities, *Cotes proba* •



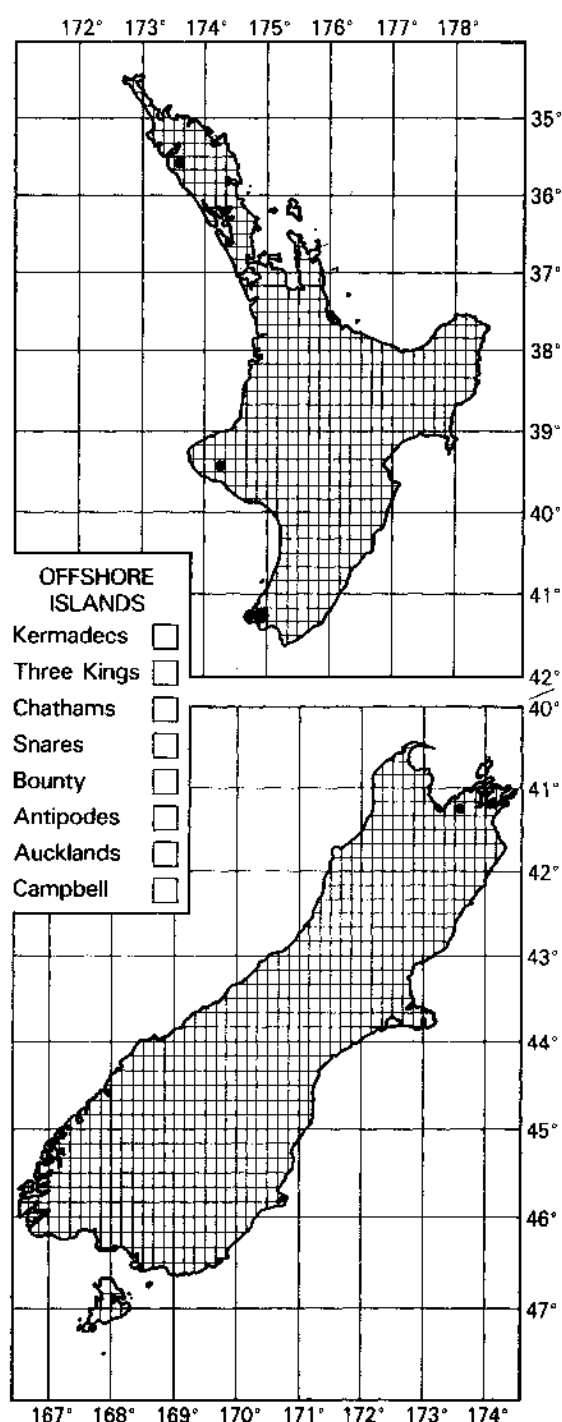
• Map 21 Collection localities, *Cotes rufa* •



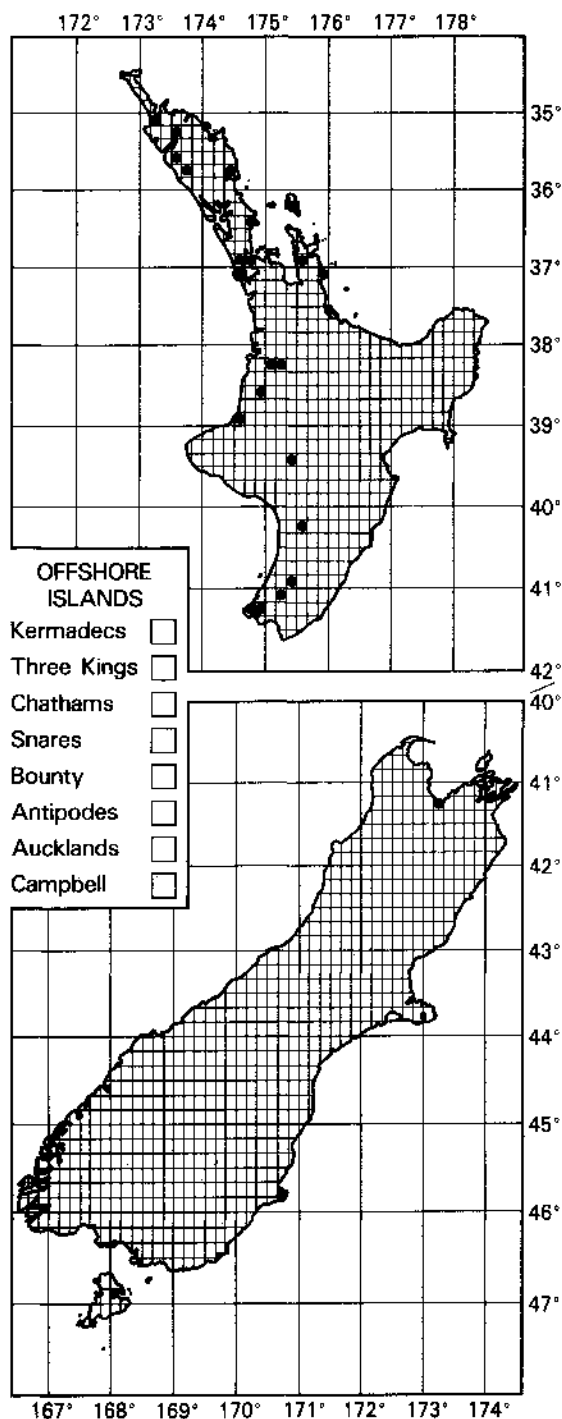
• Map 22 Collection localities, *Cotes vestita* •



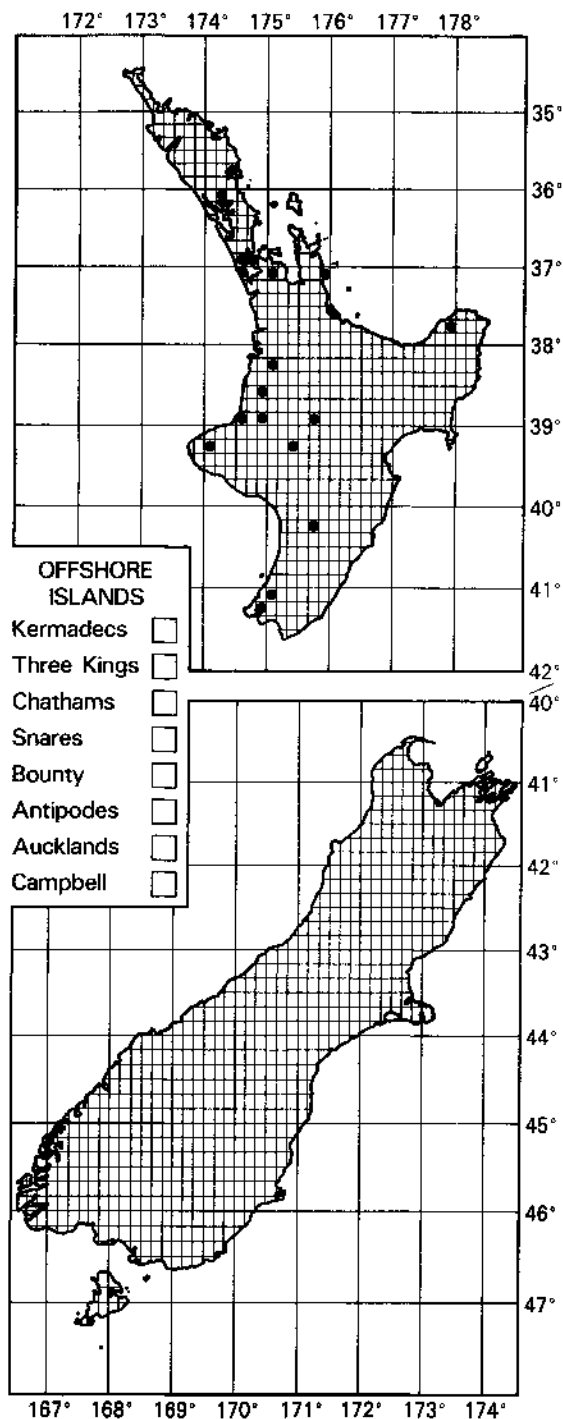
• Map 23 Collection localities, *Trichananca fulgida* •



• Map 24 Collection localities, *Zealanthicus sulcatus* •



• Map 25 Collection localities, *Macratria aotearoa* •



• Map 26 Collection localities, *Macratria exilis* •

TAXONOMIC INDEX

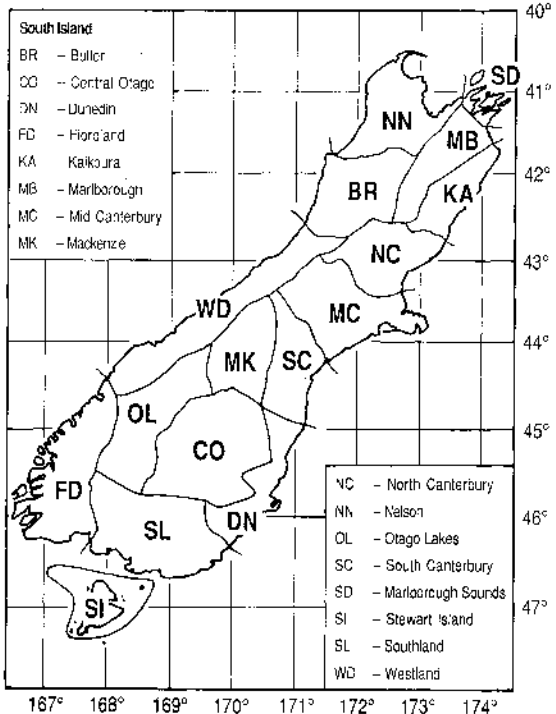
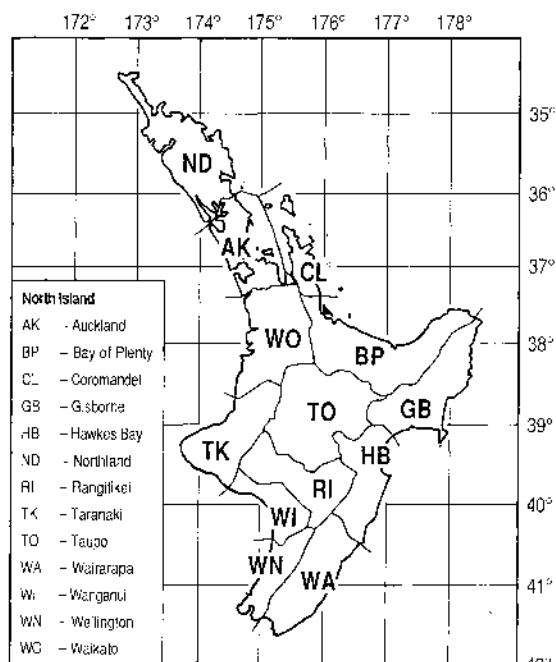
This index covers the nominal taxa mentioned in the text, regardless of their current status in taxonomy. Page numbers in bold type denote a description, and in italic type illustrations. A suffixed letter 'k' indicates a key, and 'm' a map.

Acacia mearnsii 23
Acanthinus 10, 11
Afreminae 8, 12
Afremus 12
Agathis australis 29
Agnathinae 12
Agnathus 12
Anisotria 12
Anthicinae 9, 10, 12, 13, 14k, 16
Anthicini 9, 10, 12, 13
antherinus, *Meloe* 16
Anthicus 8-12, 14k, 16
A. 'species 1' 23
anthracinus, *Anthicus* 24
aotearoa, *Macratia* 14k, 34, 35, 44, 57m
Astelia banksii 28, 30
aucklandensis, '*Anthicus*' 22
Sapintus 14k, 22, 39, 43, 49m
australis, *Anthicus* 16, 18, 19
australis-group 14k, 18
Blechnum procerum 25
Brachymyrmex 11
brouni, *Lagrioda* 8, 13k, 26, 40, 44, 51m
Brounii, *Lagrioda* [sic] 26
bullata, *Cotes* 15k, 27, 28, 40, 44, 52m
Carex 25, 27, 35
Cassinia 23
cinctus, *Malporus* 10
Cononotidae 13
Cononotinae 12
Cononotus 12
continuus, *Acanthinus* 11
Copobaeninae 10, 12, 13
Copobaenus 12
Cordylina 20

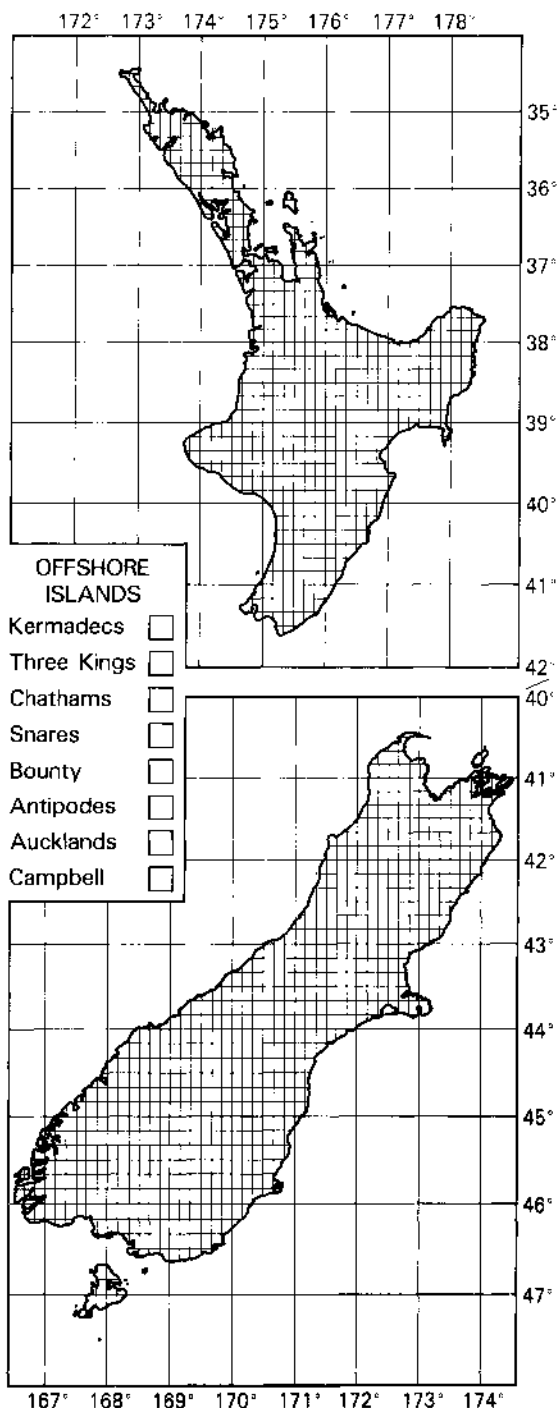
Cortaderia 19
C. jubata 25
Corydalidae 10
Cotes 8, 10, 11, 15k, 26, 32, 33
Crematogaster 11
crispi, *Anthicus* 27
Cotes 15k, 27, 39, 44, 52m
Cyathea medullaris 25
Cyperus 35
deitzi, *Sapintus* 8, 14k, 24, 42, 43, 50m
Diptera 10
Disphyma australe 20
distincta, *Cotes* 31
dorsale, *Cotes* 30
dorsalis, *Cotes* 30
Dysoxylum 34
elegans, *Anthicus* 18
Formicomus 18
Erinaceus europaeus 18
Eurygeniinae 9, 10, 12, 13
exilis, *Macratia* 14k, 34, 35, 39, 44, 57m
fallax, *Anthicus* 8, 21
flavipes, *Macratia* 35
flavitaris, *Anthicus* 19
floralis, *Anthicus* (*Omonadus*) 8, 14k, 16, 21, 22, 42, 43, 48m
Meloe 21
Forelius 11
formicarius, *Anthicus* (*Omonadus*) 8, 14k, 16, 21, 43, 49m
Meloe 21
Formicomus 9, 10
Freyinetia baueriana 25
fulgida, *Trichanarica* 8, 15k, 32, 39, 44, 56m
Gahnia lacera 25
G. setifolia 23, 25, 28
glaber, *Anthicus* 8, 15k, 16, 19, 41, 43, 47m
gourlayi, *Cotes* 15k, 27, 28, 30, 31, 40, 44, 53m
gushi, *Anthicus* 8, 15k, 16, 18, 43, 46m

halliana, *Cotes* 15k, 28, 53m
heroicus, *Anthicus* 10
hesperi, *Anthicus* 8, 14k, 16, 17, 39, 43, 45m
insignis, *Cotes* 30
Ischaliinae 8, 12
Ischyropalpus 10
kreusleri, *Anthicus* 8, 14k, 16, 17, 41, 43, 45m
Kunzea ericoides 35
Lagriidae 13
Lagrioda 8-11, 13, 25
Lagrioda [sic] 25
Lagrioidinae 8, 10, 13k, 25
Lagriomorpha 9
Larus dominicanus 17
Lemodes 9
Lemodinae 9-12, 13, 14k, 26
Leptospermum ericoides 35
L. scoparium 32
linearis, *Macratia* 34
Macratia 8-12, 14k, 34
Macratrinae 9-12, 13, 14k, 34
Macrathrus 34
mastersii, *Anthicus* 16
Mecynotarsus 12
Melandryidae 13
Meloidae 11
Metrosideros excelsa 29
Microhoria 10
minor, *Anthicus* 15k, 16, 19, 41-43, 47m
monodon, *Notoxus* 10
Muehlenbeckia 20, 23
M. complexa 23
Nothofagus 28, 31
Notoxini 9, 10, 12, 13
Notoxus 12
obscuricornis, *Anthicus* 24
Sapintus 14k, 24, 42, 43, 50m
Oedemeridae 13
Omonadus 9, 14k, 16, 21
optima, *Cotes* 15k, 29, 44, 54m

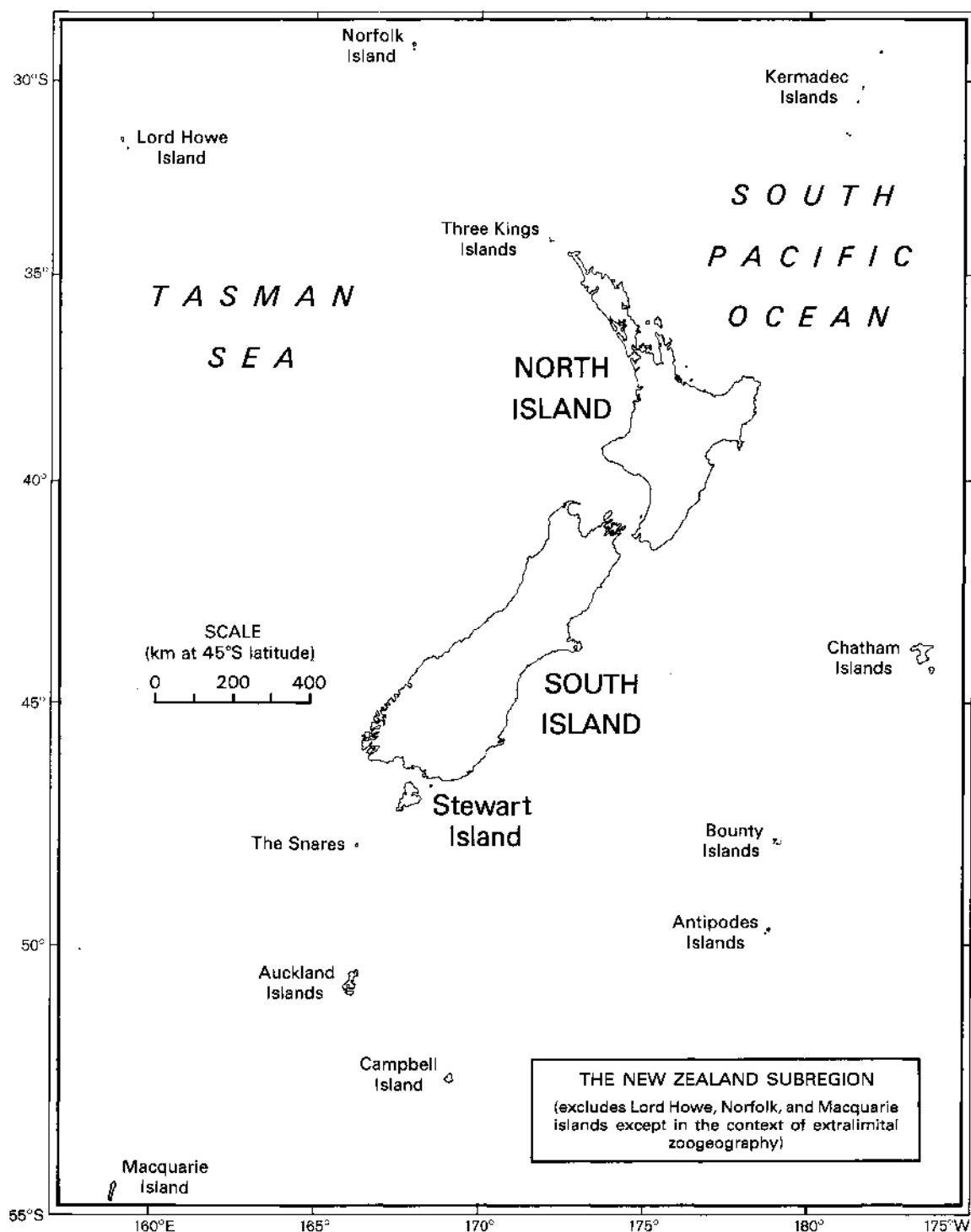
<i>ornatus</i> , <i>Acanthinus</i> 11	<i>pubescens</i> , <i>Anthicus</i> 22	<i>Tanarthrus</i> 10
<i>otagensis</i> , <i>Anthicus</i> 15k, 16, 20, 43, 48m	<i>punctata</i> , <i>Cotes</i> 27	<i>Techmessinae</i> 12
	<i>Pyrochroidae</i> 11, 12	<i>Tomoderinae</i> 10, 12
<i>Pedilidae</i> 12	<i>Raoulia australis</i> 20, 21	<i>Tomoderus</i> 12
<i>Pedilinae</i> 12	<i>rufa</i> , <i>Cotes</i> 15k, 30, 41, 44, 55m	<i>Trichananca</i> 8, 27, 31, 33
<i>Pedilus</i> 12		<i>troilus</i> , <i>Anthicus</i> 8, 14k, 16, 18, 41, 42, 43, 46m
<i>pellucidipes</i> , <i>Anthicus</i> 25	<i>Santalum album</i> 10	<i>Turdus philomelos</i> 17
<i>Sapintus</i> 14k, 25, 42, 43, 51m	<i>Sapintus</i> 8-11, 14k, 22	
<i>Pennisetum</i> 19	<i>Salix fragilis</i> 32, 33	<i>Uncinia</i> 25, 27
<i>Phormium cookianum</i> 17	<i>Schoenus</i> 27	
<i>P. tenax</i> 28	<i>Scirpus</i> 35	<i>verticalis</i> , <i>Macratria</i> 35
<i>Phyllocladus glaucus</i> 34, 35	<i>similis</i> , <i>Anthicus</i> 16	<i>vestita</i> , <i>Cotes</i> 15k, 26, 27, 31, 44, 55m
<i>Pilipalpinae</i> 12	<i>Steropes</i> 13	
<i>Pinus radiata</i> 10, 19	<i>Steropinae</i> 9, 10, 12, 13	<i>vestita</i> -group 11, 27, 31
<i>Podocarpus spicatus</i> 23	<i>strictus</i> , <i>Anthicus</i> 16, 20	<i>victoriensis</i> , <i>Trichananca</i> 31
<i>proba</i> , <i>Cotes</i> 15k, 27, 28, 30, 31, 44, 54m	<i>strictus</i> -group 8, 10, 14k, 19	
<i>proxima</i> , <i>Cotes</i> 29, 31	<i>Sturnus vulgaris</i> 17	<i>Zealanthicus</i> 8, 11, 33
<i>Pseudotomoderus</i> 10, 12	<i>sulcatus</i> , <i>Zealanthicus</i> 15k, 33, 41, 44, 56m	



Area codes and boundaries used to categorise specimen locality data (after Crosby *et al.* 1976)



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E toe ana nga pukapuka o mua. Mehemea e hiahia ana koe ki te katoa o nga pukapuka, toona mai kia heke iho te utu. E rua pai heneti te heke iho o te utu ki nga toa hoko pukapuka.

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Ko te Aitanga Pepeke o Aotearoa

Number 34



Anthicidae

(Insecta : Coleoptera)

F. G. Werner &
D. S. Chandler



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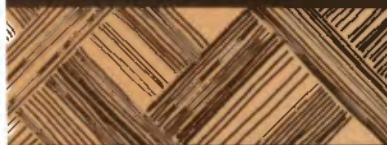
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