

# Fauna of New Zealand

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Fauna of New Zealand

Number 10

Tubulifera

(Insecta: Thysanoptera)

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## ABSTRACT

Sixty-eight species of Tubulifera in 29 genera are recorded from New Zealand, including the following new taxa: *Cryptothrips okiwiensis*; *Heptathrips cottieri*, *H. cumberi*, *H. kuscheli*, *H. tillyardi*; *Nesothrips alexandrae*, *N. pintadus*; *Ozothrips tubulatus*, *O. vagus*; *Apterygothrips collyerae*, *A. kohai*, *A. sparsus*, *A. viretum*; *Azaleothrips neatus*; *Deplorothrips bassus*; *Haplothrips salicorniae*; *Hoplandrothrips choritus*, *H. ingenuus*, *H. vernus*; *Hoplothrips anobii*, *H. kea*, *H. oudeus*; *Lissothrips dentatus*, *L. dugdalei*, *L. gersoni*; *Podothrips orarius*, *P. turangi*; *Psalidothrips moeone*, *P. tane*, *P. taylori*; *Yarnkothrips kolourus*. Seventeen species have been introduced to New Zealand from Australia, but only 8 species appear to have been introduced from other parts of the world. Two New Zealand species are now widespread elsewhere, *Nesothrips propinquus* and *Hoplothrips semicaecus*. Thus, 43 of the 68 species of Tubulifera appear to be endemic to New Zealand — a higher proportion than in the Terebrantia. Two subfamilies are recognised, the Idolothripinae and Phlaeothripinae; the available tribal classification of the second group is discussed and rejected. The text includes notes on distribution and biology, and discusses life histories, phylogeny, morphology, and technical methods. A key to taxa is given, and the descriptive notes are supported by some 300 illustrations.

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## INTRODUCTION

Until recently the Thysanoptera fauna of New Zealand was considered to be largely introduced, and to include only a small endemic element. The most recent checklist (Wise 1977) recorded 34 species (22 Terebrantia, 12 Tubulifera), of which only 10 were native (4 Terebrantia, 6 Tubulifera). In contrast, with the publication of this contribution, 59 species are recognised as having been introduced, but a further 60 species are either clearly endemic to New Zealand or at least not known from elsewhere. This endemic fauna has proved to contain a number of taxa that are interesting from the zoogeographic and phylogenetic points of view. Moreover, variation in structure between populations of endemics, particularly in the Phlaeothripidae discussed here, has posed exceptionally complex and interesting taxonomic problems.

The first volume in the *Fauna* series (Mound & Walker 1982c) provided an introduction to the order Thysanoptera, together with keys to the 51 species of the suborder Terebrantia known from New Zealand. The present volume, based on a study

of over 6000 specimens from the New Zealand subregion, deals with the other suborder, the Tubulifera, and includes keys to the 68 known species in 29 genera. Most of these feed on fungi and live on dead twigs and branches or in leaf litter. Only a few species are commonly noticed, including some of economic importance. Most are cryptic in their habits, and must be searched for carefully or extracted from plant debris with a Tullgren funnel. However, some fungus-feeding species are occasionally abundant, and several exhibit interesting patterns of allometric growth and sexual dimorphism which are probably related to inter-sexual display and male/male combat (Crespi 1986a, b).

## DISTRIBUTION AND FAUNAL RELATIONSHIPS

Most of the 68 species of Phlaeothripidae recorded from New Zealand are known only from a few specimens from scattered populations, and this makes it difficult to deduce their real distributions. Only *Nesothrips alexandrae* appears to be localised within New Zealand, and this seems to be a Central Otago form of the common and widespread species *N. propinquus*.

Although Phlaeothripidae have been collected over a wide range of altitudes, only *Teuchothrips annulosus* appears to live normally as high as the tree-line, where it is associated with the shrub *Cassinia vauvilliersii*. Another distribution pattern for which there is more evidence is the contrast between *Nothofagus* and *Podocarpus* forests; remarkably few thrips are found in the latter. Similarly, differences can be observed between forest with a complete canopy, in which *Ozothrips priscus* is often common, and forest with a disrupted canopy, in which *O. eurytis* is more typical. Habitats dominated by adventive plants do not usually harbour native thrips, although *Anaglyptothrips dugdalei* has been collected only under such conditions.

Faunal relationships of the New Zealand Phlaeothripidae have proved even more difficult to assess than those of the Terebrantia (Mound & Walker 1982c). The endemic species cannot be distinguished satisfactorily from the introduced fauna, primarily because this family is both large and poorly studied in surrounding geographical areas. Of the 68 species of Phlaeothripidae recorded here from New Zealand, 27 are known also from elsewhere, 17 of them only from Australia (including Tasmania). In addition, *Nesothrips propinquus* is clearly a member of the New Zealand fauna, but is now widespread in Australia and along the old shipping route to Europe (Mound 1983). Moreover, *Hoplothrips semicaecus* (including its synonym *H. fieldsi*), which has previously been

regarded as Holarctic, is here considered to be a New Zealand species introduced to the Northern Hemisphere. Thus, only eight Phlaeothripidae are considered to have been introduced to New Zealand from outside Australia. Three of them are widespread in the Northern Hemisphere (on lily bulbs, clover, and orchard trees), and the other five live on fungi on dead wood (three are European, two Oriental). This apparent lack of immigrant Tubulifera species is remarkable, particularly in view of the number of immigrant Terebrantia (Mound & Walker 1982c) and the number of tramp species known from the Pacific islands (Mound & Walker 1986).

Several of the species shared with Australia are evidently immigrants from that country. These include *Idolothrips spectrum*, which is abundant in Australia but is known from only one specimen in New Zealand; *Teuchothrips disjunctus*, the host plant of which is an introduced garden shrub from Australia; and *Baenothrips moundi*, *Emprosthiotrips bogong*, and *Sophiothrips greenladei*, which have relatives in Australia but not in New Zealand. Natural transfer of such small insects on winds across the Tasman Sea is evidently not uncommon (Mound 1983), and successive invasions possibly account for some of the taxonomic problems referred to below in the leaf litter species of the genera *Psalidothrips* and *Deplorothrips*. Other species may have been transported inadvertently by man in the opposite direction. For example, *Heptathrips cumberi* has no close relatives in Australia but is a member of a New Zealand species group. This may also be true of *Apterygothrips australis*, *Hoplothrips poultoni*, *Carientothrips loisthus*, and *C. badius*, although these are difficult to place with certainty in either fauna.

The 43 species of Tubulifera endemic to New Zealand represent a markedly higher proportion of the fauna than the 19 endemic Terebrantia (Mound & Walker 1982c). Amongst the Idolothripinae the genera *Cleistothrips* and *Ozothrips*, and most species of *Heptathrips*, are endemic to New Zealand, and it is interesting to note that these genera are regarded as being among the most primitive members of the subfamily (Mound & Palmer 1983). In addition, the species of *Nesothrips* dealt with here are all endemic to New Zealand, although this genus is widespread in the Pacific and Australia. Amongst the Phlaeothripinae, the species of *Apterygothrips*, *Hoplandrothrips*, *Hoplothrips*, *Lissothrips*, and *Sophiothrips* dealt with here are mainly endemic, although these genera are all found in other parts of the world. Despite this endemism, some species known so far only from New Zealand — including *Anaglyptothrips dugdalei*, *Azaleothrips neatus*, *Haplothrips salicorniae*, and possibly *Yarnkothrips*

*kolourus* — may eventually prove to be introduced. Moreover, the species of *Psalidothrips* in leaf litter may all be natural immigrants from Australia, although *Deplorothrips* appears to be endemic, judging from the structural variation within and between its populations.

### LIFE HISTORY AND HOST RELATIONSHIPS

The eggs of Phlaeothripidae are deposited on the available substrate, whether this is the leaf or flower of a host plant in phytophagous species, or a dead leaf or the bark of a tree in fungus-feeding species. The pattern in which eggs are deposited varies between species, depending to some extent on whether social behaviour has been developed to any degree. Thus, fungus-feeding species which live in groups and exhibit male polymorphism can be expected to deposit their eggs in communal batches (Crespi 1986a, b). These eggs will usually be laid horizontally, but Ananthakrishnan *et al.* (1984) note that the eggs of some species stand vertically. The egg surface often shows a hexagonal pattern, and at hatching the egg ruptures along the lines of this pattern, there being no operculum (cf. at least some species of Terebrantia; Kirk 1985). Some Idolothripinae, particularly large species such as *Idolothrips spectrum*, are probably ovoviviparous. Conclusive observations have not been made on New Zealand species, but one female of *Carienthrips badius* collected in January 1979 from Rocklands (CO) had a well developed larva in its abdomen.

The only detailed study of the life history of any Phlaeothripidae in New Zealand has been on *Haplothrips niger* (Doull 1949, Yates 1952). However, probably all species have two active, feeding larval instars succeeded by three almost inactive, and probably non-feeding, pupal instars. These stages can be distinguished from each other by the form of the antennae and (when present) wing buds (Figures 5 and 6). Each first-instar larva is probably enclosed in its embryonic cuticle as it begins to emerge from the egg, but this is soon ruptured and shed (Kirk 1985). Many first-instar larvae of Phlaeothripidae — and more particularly second-instar larvae — are brightly coloured, usually with red transverse bands or spots on a white background, and sometimes with the cuticle around the setal bases dark. These colour patterns may be species-specific, but no attempt has been made here to study these larvae as they have been collected too infrequently. Their detailed structure seems to be even more uniform than that of adults. The propupa and the first and second pupae are less distinctively coloured, although the second pupae

increasingly show the colours of the pharate adult through their cuticle. Adults and immature stages usually occur together in overlapping generations, except where the habitat is short-lived, as in the few flower-living species.

Behavioural studies on thrips are rare, but social behaviour has been demonstrated in one unusual species from Panama (Kiestler & Strates 1983). Moreover, Crespi (1986a, b), working with *Hoplothrips karnyi* and *Elaphrothrips tuberculatus* in Michigan, and with *Hoplothrips pedicularius* in Britain, has observed combat between males in order to secure access to a mate, and egg-guarding by both sexes. Similar behaviour could probably be observed among those fungus-feeding species on dead wood in New Zealand which show sexual dimorphism and size polymorphism in males.

Of the 68 species from New Zealand, 25 are known to feed by ingesting fungal spores, and a further 26 are assumed to feed on fungal hyphae or the external digestion products of fungal decay. Most of them live in concealed habitats, such as under bark or in leaf litter, and are rarely seen unless searched for. Two species are known to be predators of mites: the introduced *Haplothrips kurdjumovi*, which is known only from orchards; and the native *Apterygothrips collyerae*, which is found in a wide range of open habitats. Three other species (*Yarnkothrips kolourus*, *Podothrips orarius*, and *P. turangi*) may also be predatory, all on scale insects, but this requires confirmation. The three *Lissothrips* species feed on mosses or possibly lichens. This leaves nine species which probably feed on higher plants: four *Apterygothrips* species found in association with grasses and sedges, and assumed to be phytophagous; *Liothrips vaneeckeii*, a minor pest of lily bulbs; two *Teuchothrips* species, one specific to *Callistemon* and one to *Cassinia*; *Haplothrips niger*, a pest of clover flowers; and *H. salicorniae*, which has been collected only from *Salicornia* on salt marshes.

### DIAGNOSIS, PHYLOGENY, AND SYSTEMATICS

The suborder Tubulifera includes rather more described species (2700) than the Terebrantia (2000) (Mound *et al.* 1980). Moreover, since the Tubulifera exhibit a wider range of biologies, and frequently occupy relatively concealed ecological niches, this difference is likely to increase rather than decrease with expanding knowledge.

Adult Tubulifera can be distinguished from Terebrantia by the following characteristics.

(1) Forewings (Figure 150), when present, without veins although sometimes with a longitudinal dark line; usually only three setae present, near base;

membrane never bearing microtrichia; marginal cilia straight, arising directly from membrane, never independently socketed.

(2) Abdominal segment X (Figures 277–286) tubular, but varying in shape from short and conical to long and slender; terminal setae not arising from surface of tube, but arranged in a circle around the anus; base of tube emarginate ventrally in male.

(3) Female with an eversible ovipositor emerging at base of tube; eggs deposited on surface of substrate.

(4) Maxillary stylets usually elongate, extending deeply into head, often reaching almost as far as compound eyes (Figure 43), rarely restricted to mouth cone (Figures 71–74).

(5) Development from egg to adult involves two larval and three pupal instars (Figures 2–6).

The phylogenetic relationships of the Tubulifera are still unresolved. Only a single family, the Phlaeothripidae, is recognised in this group. Mound *et al.* (1980) suggested two possible evolutionary scenarios: either the Terebrantia as a whole is the sister-group of the Phlaeothripidae, in which case this family is ancient, or the sister-group lies within the thripid subfamily Panchaethripinae of the Terebrantia, in which case the family is relatively recent in origin. Although the first possibility is generally accepted, as indicated by the recognition of two suborders, there is no good evidence to support it. However, the second possibility is difficult to accept on morphological grounds. No thrips has ever been discovered which could possibly be considered as a 'primitive' member of the Phlaeothripidae, and whereas Terebrantia are common as fossils in amber, with several extinct taxa represented (Zur Strassen 1973), the few fossil Tubulifera found have all been very similar in structure to existing species. For the present, the classification into two suborders is accepted for practical reasons, despite the possibility mentioned above that the Phlaeothripidae arose from panchaethripine ancestors, presumably by neoteny in a subcortical habitat.

Within the Phlaeothripidae two subfamilies are recognised, the Phlaeothripinae and the Idolothripinae. The latter is much the smaller, with only 600 species world-wide, all feeding on fungal spores. A revised generic and suprageneric classification of these species (Mound & Palmer 1983) recognises only two tribes, Pygothripini and Idolothripini, and nine subtribes. With the exception of the Australian immigrant *Idolothrips spectrum*, the New Zealand spore-feeding thrips are all Pygothripini.

The subfamily Phlaeothripinae includes more than 2000 species, and their generic and suprageneric classification is particularly difficult. Priesner (1961) recognised 10 tribes (Plectrothripini,

Haplothripini, Phlaeothripini, Hoplothripini, Glyptothripini, Hydiiothripini, Leeuweniini, Emprosthiothripini, Terthrothripini, and Rhopalothripini), and an additional subfamily, Urothripinae. Moreover, he recognised 5 subtribes in the Phlaeothripini and 13 in the Hoplothripini. Most of these groups, other than the monobasic ones, were poorly characterised. Subsequent authors have found the classification largely unworkable, although it continues to be accepted in part and without any reappraisal (Ananthakrishnan 1969b, Schliephake & Klimt 1979).

Priesner's classification was published largely in reply to a well argued scheme of relationships propounded by Stannard (1957), although this author had not proposed any formal suprageneric classification. Stannard recognised a series of nine phyletic "lines", most of which are reflected in Priesner's formally named tribes. Thus, Stannard's *Haplothrips*, *Glyptothrips*, *Plectrothrips*, and *Hydiiothrips* lines correspond to the four tribes listed above bearing these names. Moreover, his *Amphibolothrips* line corresponds to the Urothripinae, his *Gigantothrips* line corresponds to the Hoplothripini with the exclusion of *Hoplothrips* itself, and his *Neurothrips* line corresponds to the Phlaeothripini with the addition of *Hoplothrips*. Finally, Stannard's *Docessissophothrips* line is now recognised as a tribe (Mound & Palmer 1983). This leaves only his *Williamsiella* line, including *Sophiothrips* and *Lissothrips*, in dispute.

Of the ten tribes recognised by Priesner, Emprosthiothripini was transferred to Idolothripinae and synonymised with the Pygothripina by Mound & Palmer (1983), and *Terthrothrips*, the only genus in the Terthrothripini, is now placed in Glyptothripini, a group of mainly Neotropical leaf litter species (Mound 1977a). Moreover, Urothripinae is now treated as a tribe (Mound 1972a), and the two genera placed in Rhopalothripini seem to be more closely related to the genus *Hoplothrips*. The only additions to the tribal classification in recent years have been two groups transferred from the Idolothripinae by Mound & Palmer (1983), the Ape-launothripini and the Docessissophothripini.

Thus, 10 tribes might still be recognised in the Phlaeothripinae, of which five are represented in New Zealand (Haplothripini, Hoplothripini, Phlaeothripini, Plectrothripini, and Urothripini). However, because of problems in differentiating the Hoplothripini and the Phlaeothripini, which together include most species and genera of the Phlaeothripinae world-wide, no attempt is made here to use the tribal classification. Haplothripini is discussed under *Haplothrips*, Plectrothripini under *Plectrothrips*, Urothripini under *Baenothrips*, and Hoplothripini and Phlaeothripini under

*Hoplothrips*. The five remaining tribes (Apelaunothripini, Docessissophothripini, Glyptothripini, Hydiiothripini, and Leeuweniini) all seem to be represented in Australia.

## MORPHOLOGICAL AND DIAGNOSTIC CHARACTERS

Heming (1970a, b, 1971, 1972, 1975, 1978, 1980) has discussed many aspects of thrips morphology and functional anatomy, and Priesner (1965) produced an extended introductory account of this subject. The following notes are intended simply as a guide to those structural features of Phlaeothripidae which are referred to in the descriptions and keys given below.

Morphological features of the adult are illustrated and labelled in Figure 1; the immature stages are illustrated in Figures 2–6.

### Head

Although typically compressed dorsoventrally, the head in Tubulifera is sometimes considerably deeper than in Terebrantia. This can result in considerable changes in apparent shape due to cover-slip pressure on specimens mounted for study on microscope slides. The head varies from more than twice as long as wide to slightly wider than long. The anterior margin is sometimes prolonged in front of the compound eyes, and in a few species bears one or more pairs of stout setae. The compound eyes are usually rounded and well developed, but are sometimes reduced to a few facets, or prolonged ventrally, or even greatly enlarged, such that the head is holoptic. Most species have a single pair of major postocular setae, and a pair of major postocellar setae may also be present; further major setae may be developed laterally on the cheeks. Three dorsal ocelli are present in macropterae, but frequently these are reduced or absent in micropterae and apterae.

Ventrally the mouth cone varies from very long and pointed, reaching across the mesosternum, to short and rounded. Differences in the shape of the mouth cone in dorsal view are due in part to whether it is directed ventrally or posteriorly. The right mandible is not developed, although the left one is long and stout. The paired maxillary stylets have complex, coadapted apices and fit together to form a feeding tube, but this varies considerably in length and thickness. In Idolothripinae, which ingest whole fungal spores, the maxillary stylets are 5–10  $\mu\text{m}$  in diameter, whereas in Phlaeothripinae they are more slender, 2–3  $\mu\text{m}$ . In *Sophiothrips* the stylets are exceptionally short and restricted to the

mouth cone, whereas in many species the stylets extend deeply into the head, often as far as the compound eyes. In many Phlaeothripidae a pair of elongate, dark structures is visible lateral to the maxillary stylets; these are referred to as the maxillary guides, and in *Hoplothrips* are clearly joined anteriorly by a maxillary bridge.

The antennae usually have eight segments, but several unrelated species have the terminal segments VII and VIII fused to give a seven-segmented condition. Segments III–VIII usually have one or more emergent, pale trichomes as well as a number of setae.

### Thorax

In most Phlaeothripidae three sclerites are visible dorsally on the prothorax: the large pronotum, and two small epimeral sclerites posterolaterally. In a few species the epimeral sutures are not developed. Typically there are five pairs of major pronotal setae — anteromarginals (*am*), anteroangulars (*aa*), mid-laterals (*ml*), epimerals (*ep*), and posteroangulars (*pa*); in addition, some species have a pair of posteromarginals developed medially.

Ventrally on the prothorax there is usually a pair of weakly developed sclerites just behind the mouth cone, the praepectus (or praepectal plates), which should not be confused with the smaller cervical sclerites. Behind the praepectus are a pair of probasisternal sclerites and a small median sclerite, the spinasternum. Behind this is a transverse, often boat-shaped sclerite, the mesopraesternum, just in front of the mesoepisternal border. In many species there is a pair of longitudinal sutures laterally on the metasternum, the metathoracic sternopleural sutures, which extend posteriorly from the mesothoracic coxal cavities.

Dorsally the structure of the mesonotum and metanotum depends on the degree of wing development. Macropterae have the mesonotum rhomboid, often with a pair of major setae laterally, and the metanotum elongate with one or more pairs of median setae. In apterae both these sclerites may be reduced and transverse.

### Legs

The fore tarsi are always one-segmented. The inner margin is often more or less drawn out into a small or large tooth, particularly in males, and ventrally the apex of the segment is prolonged into a claw-like hook, or hamus. The fore femora are often swollen, particularly in large males, and on the inner margin near the base there appears to be in all species a small, trichobothrium-like sense organ. The middle and hind tarsi may be of one or two segments, and the hind tibiae are often elongate, with one or more long setae on the external margin.

## Wings

In Tubulifera the wings are completely different in structure from those of Terebrantia. The fringing wing-cilia, although similar in general appearance, are probably not homologous, because unlike the socketed, seta-like cilia of Terebrantia they are solid, microtrichia-like extensions of the wing membrane itself. On the posterior margin of the forewing, distally, a few of the cilia are frequently duplicated. No wing veins are developed (cf. Terebrantia), and the only setae are two to four sub-basal setae on the forewing. Moreover, when closed the wings lie flat over each other on the abdomen.

In fully winged individuals (macropterae) the wings extend to the apex of the abdomen. However, short-winged or wingless individuals (micropterae and apterae) are common in many species, and the wing morphs are often not completely distinct from each other. A few species have the wings progressively reduced, giving rise to hemimacropterae. More frequently wingless individuals may have a small wing bud present, and even bearing a seta, despite the absence of axillary sclerites. For these reasons the distinction between apterae and micropterae is sometimes arbitrary.

## Abdomen

When referring to tergal and sternal setae the median pair is designated  $B_1$ , the submedian pair  $B_2$ , the next pair  $B_3$ , etc.

The abdomen comprises nine visible segments plus the tube (segment X). The first segment is reduced to a small sclerite dorsally, the pelta, which is often more or less bell-shaped but is sometimes reduced and rarely transverse. Tergites II-VII frequently bear one or two pairs of curved or sigmoid wing-retaining setae. These vary in size and shape, and in a few species are broadly expanded rather than acute. Individuals with reduced wings may have the wing-retaining setae reduced or absent. Tergite VIII bears a pair of spiracles laterally, and tergite IX bears three pairs of elongate postero-marginal setae, of which  $B_2$  is often short and stout in male Phlaeothripinae.

Ventrally the sternites bear a variable number of small discal setae and usually three pairs of postero-marginal setae. In males, sternite VIII frequently has a glandular area medially which is variable in size and shape between species. A few species (e.g., of *Plectrothrips*, *Hoplothrips*) when viewed by phase-contrast microscopy have curiously iridescent reticulate areas on the median sternites; these too may be glandular in function.

The tube varies greatly in shape; it may be almost conical, or short and parallel-sided, or very long and tubular. Apically a series of setae arises in a circle around the anus, but only a few species have

any setae well developed laterally on the tube. Males have the base of the tube, ventrally, emarginate where the aedeagal complex is evaginated. The structure of the male genitalia is discussed by Heming (1970b), but few species other than those related to *Haplothrips* have the aedeagus developed into a distinctive, elongate structure which can be used to distinguish between species. The female ovipositor is an eversible, chute-like structure derived from the hind margin of sternite VIII (Heming 1970a).

## COLLECTING, PREPARATION, AND CURATION

These topics are dealt with in some detail in our contribution on Terebrantia (Mound & Walker 1982c). Here we will only repeat our warning that sound taxonomic work on thrips requires that numerous specimens be mounted on microscope slides according to a standard method. Attempts to avoid the tedium of this approach have led (and continue to lead) to erroneous descriptions and the erection of spurious taxa. Thus, we cannot emphasise too strongly the importance of standardisation and care in the collection, preparation, and preservation of specimens for microscopy (Mound & Pitkin 1972, Walker & Crosby 1979), if specimens are to be used for serious taxonomic work.

## TEXT CONVENTIONS

The authorship citation for this work is in alphabetical order, and is not intended to reflect either seniority or proportion of input.

The descriptive text is based on the formal style of data presentation widely accepted in taxonomic entomology. Illustrations relevant to each species are listed under the species heading in numbered sequence. They are not intended to illustrate each species fully, but rather to supplement the descriptive text in emphasising diagnostic characters. An asterisk indicates figures based on holotype specimens.

Genera and species are arranged in alphabetical order within the two subfamilies. The Checklist follows the same sequence, and since page numbers are given it serves also as a supplement to the Contents list. For each taxon from family to genus the text includes an indication of its composition, geographical range, biology, and diagnostic characters. Species descriptions supplement the generic definitions with details on colour and structure, together with notes on wing morphs and sexual differences. Descriptions are more extensive for new taxa than for those previously described, but all are intended

to be comparative and brief rather than comprehensive.

The type-species of each genus is indicated, and for each previously described species the synonymy citation includes the original combination together with information on the type series. Synonyms are given only when these have occurred in New Zealand literature; full synonymies are available in Jacot-Guillarmod (1970–78).

For each species, locality records are summarised using the area codes proposed by Crosby *et al.* (1976), as explained on the inside back cover. Distribution maps have not been included, as these are of questionable value considering the highly vagile nature of most thrips. Introduced species have their first recorded locality and date noted. Where possible, plants and other substrates from which material has been collected are summarised, as are the months in which adult specimens have been collected. Repositories are indicated in parentheses by the following codes (after Watt 1979).

AMNZ	Auckland Institute and Museum, Auckland, New Zealand
ANIC	Australian National Insect Collection, Division of Entomology, CSIRO, Canberra City, ACT 2601, Australia
BMNH	British Museum (Natural History), London SW7 5BD, England
CASC	California Academy of Sciences, San Francisco, Ca 94118, U.S.A.
FRNZ	Forest Research Institute, New Zealand Forest Service, Rotorua, New Zealand
NMNZ	National Museum of New Zealand, Wellington, New Zealand
NRSS	Naturhistoriska Riksmuseet, Frescati, 10405 Stockholm, Sweden
NZAC	New Zealand Arthropod Collection, Entomology Division, Department of Scientific and Industrial Research, Auckland, New Zealand
PANZ	Plant Health Diagnostic Station, Ministry of Agriculture and Fisheries, Auckland, New Zealand
PLNZ	Plant Health Diagnostic Station, Ministry of Agriculture and Fisheries, Levin, New Zealand (collection now housed largely at PANZ)
QMBA	Queensland Museum, Brisbane, Qld 4006, Australia
SMFG	Senckenberg Museum, Frankfurt, West Germany
SOCT	Shuji Okajima Collection, Tokyo University of Agriculture, Japan
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, U.S.A.

## KEY TO NEW ZEALAND TUBULIFERA

- 01 Maxillary stylets more than 5  $\mu\text{m}$  thick ... (IDOLOTHRIPINAE) ... 02  
 — Maxillary stylets less than 4  $\mu\text{m}$  thick ... (PHLAEOTHRIPINAE) ... 26
- Subfamily IDOLOTHRIPINAE**
- 02(01) Body about 10 mm long; tube twice as long as head; antennal segment III 10 $\times$  as long as its apical width  
     ... *Idolothrips spectrum*  
 — Body less than 6 mm long; tube less than 1.5 $\times$  as long as head; antennal segment III less than 5.0 $\times$  as long as its apical width ... 03
- 03(02) Tube longer than head, covered with numerous prominent setae (Figure 277) ... *Cleistothrips idolothropoides*  
 — Tube usually shorter than head, without numerous prominent setae laterally ... 04
- 04(03) Dark brown species with head strongly sculptured and produced in front of eyes (Figure 12); eyes large, prolonged ventrally; cheek margins parallel-sided ... *Emprosthiothrips bogong*  
 — Head not as above ... 05
- 05(04) Yellowish-brown species with head strongly sculptured (Figure 7); eyes small, protruding; maxillary stylets wide apart; pronotum with no elongate setae; antennae 8-segmented, segment IV with 3 sense cones  
     ... *Anaglyptothrips dugdalei*  
 — Not with this combination of characters; if yellow-brown and strongly sculptured, then stylets close together; at least pronotal epimeral setae elongate ... 06
- 06(05) Maxillary stylets close together, almost touching medially (Figure 16) ... 07  
 — Maxillary stylets at least one-third of head width apart, often 'V'-shaped and widely separated (Figure 24a) ... 12
- 07(06) Antennal segment VIII clearly distinct from segment VII; antennal segment IV with 3 major sense cones (Figure 87); females lacking a foretarsal tooth  
     ... *Cryptothrips okiwiensis*  
 — Antennal segment VIII fused to segment VII or at least broadly joined to it (Figures 89–93); antennal segment IV with 2 sense cones; both sexes with a foretarsal tooth ... 08

- 08(07) Head strongly sculptured (Figure 15); colour golden brown  
 ... *Heptathrips kuscheli*  
 — Head not strongly sculptured; colour mainly dark brown ... 09
- 09(08) Antennae with segments VII and VIII distinct but broadly joined, the suture clearly present, at least ventrally (Figures 89 and 90); usually apterous or micropterous ... 10  
 — Antennae 7-segmented, with no trace of a suture dividing segment VII (Figures 92 and 93); macropterous ... 11
- 10(09) Head more than 1.3× as long as tube; tube short, conical (Figure 279)  
 ... *Heptathrips cumberi*  
 — Head less than 1.1× as long as tube; tube long, almost parallel-sided, sharply constricted at apex (Figure 278)  
 ... *Heptathrips cottieri*
- 11(10) Forewings brown, pale at apex; pelta with median lobe rounded on anterior margin (Figure 182); tube exceptionally long, distinctly longer than head (Figure 280) ... *Heptathrips tillyardi*  
 — Forewings completely brown; pelta with median lobe pointed on anterior margin (Figure 183); tube about as long as head (Figure 281)  
 ... *Heptathrips tonnoiri*
- 12(06) Antennal segment III small, with or without a single small sense cone; segment VII fused to VIII and broadly joined to VI (Figure 104); exceptionally small species  
 ... *Priesneriella gnomus*  
 — Antennal segment III with more than one sense cone; segment VII narrowed at base, distinct from VI (Figure 101) ... 13
- 13(12) Antennae 7-segmented; no trace of a suture dividing segment VII (Figure 102) ... 14  
 — Antennae 8-segmented; segments VII and VIII usually separate, sometimes closely joined but with a distinct suture (Figure 101) ... 15
- 14(13) Tube dark brown, as long as head; compound eyes not prolonged ventrally; macropterous or micropterous  
 ... *Ozothrips priscus*  
 — Tube golden yellow, dark brown at apex, shorter than head; compound eyes greatly prolonged ventrally (Figure 28); small, apterous species  
 ... *Ozothrips janus*
- 15(13) Antennal segments VII and VIII closely joined but with a complete suture (Figure 101); tergite II eroded laterally (Figure 249) ... 16  
 — Antennal segment VIII narrower at base than apex of VII (Figure 84); tergite II not eroded laterally, setae  $B_4$  usually present ... 18
- 16(15) Tube largely golden yellow, darker at base and apex; forewing lobe of micropterae 60 μm long and frequently bearing 3 setae; male with 2 long setae laterally on tergite II (Figure 249) ... *Ozothrips tubulatus*  
 — Tube brown; wing lobe of micropterae 30 μm long or smaller, with 1 seta or none; tergite II of male with only 1 long, posterolateral seta (Figure 250) ... 17
- 17(16) Antennal segments II and III and legs mainly yellow; micropterous, the forewing lobe scarcely 20 μm long; tergite II of male with 3 pairs of long setae (Figure 250) ... *Ozothrips vagus*  
 — Antennal segments II and III and legs mainly brown; micropterous, the forewing lobe 30 μm long; tergite II of male with only 1 pair of long setae  
 ... *Ozothrips eurytis*
- 18(15) Head elongate, constricted behind eyes and basally (Figure 8); sternopleural sutures absent; pelta broadly rounded laterally (Figure 172); a large, brown species, often micropterous ... *Carientothrips badius*  
 — Head less strongly elongate, less constricted behind eyes (Figure 9); sternopleural sutures usually present; pelta not broadly rounded laterally (Figure 173) ... 19
- 19(18) Maxillary stylets subparallel, separated by about one-third to one-half of head width; head strongly produced in front of eyes, relatively elongate; compound eyes reduced (Figure 9); pterothorax often paler than head and abdomen ... *Carientothrips loisthus*  
 — Maxillary stylets 'V'-shaped, wide apart in head; head shape not as above; compound eyes relatively large ... 20

- 20(19) Head bicoloured, the posterior half brown, the anterior half yellow; ocellar setae arising far apart behind each posterior ocellus (Figure 22)  
 ... *Nesothrips pintadus*  
 — Head brown, not distinctly bicoloured; ocellar setae variable in position, between posterior ocelli (Figure 23) or posterior to a line joining hind margins of these ocelli (Figure 20) but never behind each ocellus ... 21
- 21(20) Eyes narrowed and prolonged on ventral surface of head (Figure 24a) ... 22  
 — Eyes almost equal in size and shape on dorsal and ventral surfaces ... 23
- 22(21) Legs and antennal segments I–IV yellow or with yellow markings, or at most pale brown; head usually wider than long ... *Nesothrips propinquus*  
 — Legs and antennal segments dark brown; fore tibiae and extreme base of antennal segment III paler; head at least 1.1× as long as wide  
 ... *Nesothrips eastopi*
- 23(21) Antennal segment III mainly yellow, its apex more or less brown; antennal segments IV and V yellow or pale brown at base ... *Nesothrips rangi*  
 — Antennal segment III mainly brown, yellow in proximal one-third or less; antennal segments IV and V dark brown ... 24
- 24(23) Head as wide as long or slightly wider ... *Nesothrips alexandrae*  
 — Head 1.1× as long as wide ... 25
- 25(24) Pelta with 1 or 2 small setae lateral to each median pore (Figure 185); female without a foretarsal tooth; macropterous ... *Nesothrips zondagi*  
 — Pelta with no small setae lateral to each median pore (Figure 191); female with a foretarsal tooth; micropterous ... *Nesothrips doulli*
- Subfamily PHLAEOTHRIPINAE**
- 26(01) Anterior margin of head bearing 3 pairs of long, pale setae with expanded apices extending beyond apex of antennal segment II (Figure 38); tube 1.5× as long as head, with terminal setae more than twice as long as tube (Figure 284); usually apterous, with head and pronotum dark but rest of body pale; in litter ... *Baenothrips moundi*  
 — Anterior margin of head without such setae; tube and terminal setae shorter ... 27
- 27(26) Maxillary stylets wide apart and restricted to mouth cone, not visible within head capsule anterior to occipital margin of head (Figures 71–74); small, usually apterous species with one pair of ocellar setae well developed; on dead twigs ... 28  
 — Maxillary stylets often deeply retracted into head, always visible in dorsal view anterior to occipital margin of head ... 30
- 28(27) Interocellar and postocular setae blunt (Figure 74); antennal segment II with a pair of blunt or expanded setae dorsally; antennal segment III with 1 sense cone; female without a foretarsal tooth... *Sophiothrips greensladei*  
 — Dorsal setae on head and antennal segment II acute; antennal segment III with 2 sense cones; female with a foretarsal tooth ... 29
- 29(28) Antennal segment III with sense cones reaching beyond midpoint of segment IV (Figure 136); pelta of apterae eroded on posterior margin (Figure 234) ... *Sophiothrips duvali*  
 — Antennal segment III with sense cones not extending to midpoint of segment IV (Figure 135); pelta of apterae not eroded on posterior margin (Figure 233)... *Sophiothrips aleurodisci*
- 30(27) Antennae 7-segmented (segments VII and VIII completely fused; Figures 109 and 138); epimeral setae less than 35 µm long, with apices broadly expanded (Figures 37 and 75) ... 31  
 — Antennae 8-segmented (segments VII and VIII sometimes closely joined, but with a complete suture; Figure 127); epimeral setae not as above, if expanded at apex then more than 50 µm long ... 32
- 31(30) Anterior margin of pronotum and posterior margin of median tergites with major setae expanded apically; on dead branches  
 ... *Strepterothrips tuberculatus*

- Major setae on head, pronotum, and median tergites small and acute (exception: epimeral setae) ... *Azaleothrips neatus*
- 32(31) Compound eyes almost touching medially behind ocelli; mouth cone extending across mesosternum (Figure 64); body colour brown, in life with eyes bright red and with chalky white longitudinal stripes laterally on head and pronotum; on dead branches ... *Macrophthalmothrips argus*
  - Compound eyes not surrounding ocellar region ... 33
- 33(32) Antennal segment II with a circular sensorium in basal half; antennal segment VIII slender (Figure 128); tergite II (Figure 224) and pronotum (Figure 65) eroded laterally, with pronotal setae reduced (exception: epimerals) ... *Plectrothrips orientalis*
  - Antennal segment II with a circular sensorium in apical half; antennal segment VIII usually not slender; tergite II and pronotum not as above ... 34
- 34(33) Antennal segment III with 3 sense cones ... 35
  - Antennal segment III with 2 sense cones, 1, or none ... 56
- 35(34) Maxillary stylets not retracted into head as far as postocular setae, at least one-third of head width apart (Figures 41 and 69) ... 36
  - Maxillary stylets retracted into head as far as postocular setae, close together medially ... 37
- 36(35) Pronotal epimeral setae almost 1.3× as long as posteroangular setae; anteroangular and midlateral setae subequal in length (Figure 41); cheeks with more than one pair of small, stout setae (Figure 41); female with a foretarsal tooth ... (part) *Deplorothrips bassus*
  - Pronotal epimeral setae shorter than posteroangular setae; midlateral setae longer than anteroangulars, which are usually no longer than discal setae (Figure 69); cheeks without stout setae; female without a foretarsal tooth ... (part) *Psalidothrips tane*
- 37(35) Tube with terminal setae less than half its own length; maxillary bridge well developed (Figure 78); pronotum with epimeral sutures incomplete, posteroangular setae arising close to epimeral setae (Figure 78); on lichen-covered twigs ... *Yarnkothrips kolourus*
  - Tube with terminal setae as long as tube; maxillary bridge not well developed; epimeral sutures complete... 38
- 38(37) Antennal segment IV with 3 sense cones; head with postoccipital ridge bearing 2 small projections (Figures 39 and 40); on dead *Leptospermum* twigs ... 39
  - Antennal segment IV with 4 sense cones (NOTE: *Hoplothrips semicaecus* rarely with only 3 major sense cones on IV, but then also with several additional small sense cones ventrally) ... 40
- 39(38) Mesoeusternum with anterior margin broadly rounded; mesopraesternal plates triangular with rounded corners, the distance between their bases about one-third of mesoeusternal margin (Figure 80); metanotum with faint reticulation between median setae, these setae as long as mesonotal lateral setae or longer (Figure 155); male sternite VIII with glandular area not extending to anterior or posterior margin of sclerite (Figure 261) ... *Cartomothrips manukae*
  - Mesoeusternum with anterior margin sharply angulate; mesopraesternal plates sharply triangular, the distance between their bases much less than one-third of mesoeusternal margin (Figure 81); metanotum strongly reticulate between median setae, these setae shorter than mesonotal lateral setae (Figure 156); male sternite VIII with glandular area occupying most of sclerite (Figure 262) ... *Cartomothrips neboissi*
- 40(38) Head relatively elongate, dorsally with extensive sculpture; eyes large; cheeks with several pairs of prominent setae (Figure 49); at least epimeral setae long, with apices expanded; large, dark species; on dead branches ... 41
  - Head usually little longer than wide, dorsally with little sculpture; eyes small and often reduced; cheeks

- rarely with more than 1 pair of stout setae (Figures 54 and 57); major setae usually acute; size and colour diverse; on dead branches ... 44
- 41(40) Pronotal epimeral setae with apices expanded (Figure 49), 3.5× as long as midlateral and postocular setae, which are less than 35 µm  
... *Hoplandrothrips vernus*  
— Pronotal epimeral setae less than 2.0× as long as midlateral and postocular setae ... 42
- 42(41) Metanotum faintly reticulate medially, with a median pair of setae on anterior half (Figure 158); tergite IX with  $B_1$  setae more than half as long as tube; large males with a pair of tubercles on inner apex of fore femora (Figure 46); on dead branches of introduced trees  
... *Hoplandrothrips bidens*  
— Metanotum with sculpture not faint medially, median setae arising in posterior half (Figures 159 and 160); tergite IX with  $B_1$  setae less than half as long as tube; males without apical tubercles on fore femora ... 43
- 43(42) Metanotal sculpture longitudinally striate (Figure 160); pronotum of female with anteromarginal setae well developed and expanded (Figure 48), and midlateral setae more than 100 µm long; male sternite VIII with no glandular area ... *Hoplandrothrips ingenuus*  
— Metanotal sculpture more broadly reticulate medially (Figure 159); pronotum of female with anteromarginal setae less than 25 µm long, and midlateral setae 100 µm long or shorter; male sternite VIII with a transverse glandular area (Figure 265)  
... *Hoplandrothrips choritus*
- 44(40) Forewings fully developed ... 45  
— Forewings reduced or absent ... 51
- 45(44) Forewing duplicated cilia absent; metanotal median setae expanded at apex ... (part) *Hoplothrips oudeus*  
— Forewing duplicated cilia present ... 46
- 46(45) Abdominal tergites III–V each with 2 pairs of sigmoid or curved wing-retaining setae ... 47  
— Abdominal tergites III–V each with anterior pair of wing-retaining setae straight or absent ... 50
- 47(46) Antennal segment IV enlarged, with 20 or more small sense cones ventrally (Figure 122b)  
... (part) *Hoplothrips semicaecus*  
— Antennal segment IV without small ventral sense cones ... 48
- 48(47) Metanotum with up to 5 pairs of short, stout setae medially (Figure 161) ... (part) *Hoplothrips anobii*  
— Metanotum with only 1 pair of median setae ... 49
- 49(48) Antennal segments V and VI with proximal half yellow; posterolateral margins of pelta very close to anterior margin of tergite II (Figure 213)  
... (part) *Hoplothrips corticis*  
— Antennal segments V and VI dark brown; posterolateral margins of pelta curving away from anterior margin of tergite II (Figure 215a, b)  
... (part) *Hoplothrips orientalis*
- 50(46) Tergite IX with  $B_1$  setae longer than tube ... *Hoplothrips poultoni*  
— Tergite IX with  $B_1$  setae scarcely two-thirds as long as tube  
... (part) *Hoplothrips kea*
- 51(44) Metanotal median setae 45 µm long, expanded at apex; all 5 pairs of major pronotal setae well developed, expanded at apex; antennal segment VIII broadly joined to segment VII (Figure 121); female without a foretarsal tooth ... (part) *Hoplothrips oudeus*  
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## DESCRIPTIONS

### Family PHLAETHRIPIDAE

#### Subfamily IDOLOTHRIPINAE

A revised generic and tribal classification of this subfamily (Mound & Palmer 1983) recognised 78 genera arranged into two tribes and nine subtribes. A world total of 600 species was listed, with a further 200 species-group names placed in synonymy. Idolothripines all feed by imbibing whole fungal spores, and although some species are found in temperate areas the group is predominantly tropical. Some genera and species groups — such as *Cleistothrips*, *Ozothrips*, *Heptathrips*, and part of *Nesothrips* — are endemic to New Zealand, but others are introduced. Twenty-five species in 10 genera of this group are now recorded from New Zealand. No detailed studies have yet been attempted on any aspect of their biology, including feeding, behaviour, or ecology. However, the larger species are likely to show subsocial behaviour, and may well be ovoviviparous.

#### Genus *Anaglyptothrips* Mound & Palmer

*Anaglyptothrips* Mound & Palmer, 1983: 34–35. Type-species *Anaglyptothrips dugdalei* Mound & Palmer, by monotypy.

This monobasic genus was considered by Mound & Palmer (1983) to be related to the Holarctic genus *Bolothrips*, in the subtribe Compsothripina of the Pygothripini, because of the presence of three sense cones on antennal segment IV. Although known only from New Zealand at present, it has probably been introduced from some other part of the world.

#### *Anaglyptothrips dugdalei* Mound & Palmer

Figures 7, \*83, 142, and \*171

*Anaglyptothrips dugdalei* Mound & Palmer, 1983: 35. **Holotype** female, NEW ZEALAND, AK, Auckland (NZAC) [examined].

**Colour (all morphs).** Body brownish-yellow, darkest on posterior segments; antennal segments IV and V pale brown, VI–VIII brown.

**Structure. Female aptera.** Head (Figure 7) longer than wide, protruding in front of eyes; cheeks rounded, sharply constricted at base, the posterior margin explanate; dorsal surface strongly reticulate; ocelli absent; compound eyes small, protruding; postocular setae small; maxillary stylets 'V'-shaped, retracted about halfway towards eyes. Antennae (Figure 83) 8-segmented; segments II–VI strongly sculptured; segment III with 2 long sense cones, segment IV with 3. Pronotum (Figure 7) finely sculptured; no setae elongate; praepectal plates small. Mesopraesternal posterior margin short; mesonotum transversely rectangular. Metanotum transverse, with explanate lateral margins; metathoracic sternopleural sutures long, curved. Foretarsal tooth absent. Abdomen: pelta (Figure 171) broadly oval, bearing a transverse sub-basal line; tergites strongly reticulate; tergite IX with posteromarginal setae long, pointed, less than half as long as tube; tube shorter than head, weakly sculptured; terminal setae relatively long and fine.

Dimensions (holotype;  $\mu\text{m}$ ). Body length (extended) 2640. Head length 285, median width 195. Pronotum length 195, median width 255. Tergite IX setae *B*, 60. Tube length 192. Antennal segments III–VIII length 67, 53, 52, 48, 45, and 30 respectively.

**Male aptera.** Similar to female, but postocular setae well developed, 45  $\mu\text{m}$  long; a recurved foretarsal tooth present (Figure 142), and large in large specimens; fore femora swollen.

**Material examined.** 12 female apterae, 2 male apterae (BMNH, NZAC).

AK / —.

From introduced grasses. One female was collected in the nest of a thrush, *Turdus philomelos*.

Collected in January, March, May, and August.

#### Genus *Carientothrips* Moulton

*Bolothrips* (*Carientothrips*) Moulton, 1944: 306. Type-species *Bolothrips* (*Carientothrips*) *fijiensis* Moulton, by monotypy.

This group was first recognised as a full genus by Mound (1974b), who provided a key to the 14 known species. These are usually found at the base of grasses or on dead twigs. Most come from the Pacific and Australian regions, although one is known only from the Falkland Islands and Argentina. *Carientothrips* is closely related to *Nesothrips*, in subtribe Diceratothripina of the Pygothripini

(Mound & Palmer 1983); the systematic relationships between these genera are further discussed below (p. 29). Unfortunately some species of *Carientothrips* are highly variable, even the pelta differing between macropterous and micropterous individuals (Mound 1947a, b). Moreover, *C. badius* differs considerably from other species in the genus in the shape of the head and pelta.

### *Carientothrips badius* (Hood)

Figures 8, 84, 172, and 242

*Cryptothrips badius* Hood, 1918: 143–144. **Holotype** female, AUSTRALIA (USNM) [examined].

**Colour (all morphs).** Body, legs, and antennae brown to dark brown, but with tarsi, base of antennal segment III, and distal third of tube pale; major setae not dark brown; forewings (when present) pale.

**Structure. Female microptera.** Head (Figure 8) elongate, projecting in front of eyes; cheeks constricted behind eyes and basally; dorsal surface finely sculptured laterally and posteriorly; ocelli reduced; compound eyes with about 30 facets, sometimes larger dorsally than ventrally; postocular setae acute, about as long as distance between eyes; postocellar setae about half this length; maxillary stylets wide apart, extending into head about halfway to compound eyes. Antennae (Figure 84) 8-segmented; segment IV with pedicel variable in length; segments VII and VIII not closely joined; segment III with 2 sense cones, segment IV with 4. Pronotum with faint lines of sculpture laterally and posteriorly; major setae acute; epimeral sutures complete; praepectal plates present. Mesonotum reticulate; mesopraesternum present. Metanotum faintly reticulate; metathoracic sternopleural sutures absent. Foretarsal tooth absent. Forewing lobe about 30  $\mu\text{m}$  long. Abdomen: pelta (Figure 172) broad; tergites III–VI with a pair each of almost straight wing-retaining setae (Figure 242); tergite IX posteromarginal setae acute, almost as long as tube; tube shorter than head, constricted at apex.

Dimensions (1 example;  $\mu\text{m}$ ). Body length (extended) 2610. Head length 348, median width 222; ocellar setae 20; postocular setae 64. Pronotum length 170, median width 268; major setae — *ep* 60, *pa* 60. Forewing length 40. Tergite IX setae *B*<sub>1</sub> 186. Tube length 204. Antennal segments III–VIII length 88, 78, 75, 60, 55, and 45 respectively.

**Female macroptera.** Similar to microptera, but ocelli well developed; compound eyes with about 50 facets; forewing (length 1200  $\mu\text{m}$ ) with 3 major sub-basal setae and 12–17 duplicated cilia; wing-retaining setae straight on tergites II and III, curved or sigmoid on IV–VI.

**Male microptera.** Similar to female, but foretarsal tooth well developed.

**Material examined.** 61 female micropterae, 13 female macropterae, 53 male micropterae (BMNH, NZAC).

ND, AK, CL, TO / SD, MB, KA, MK, CO.

Usually associated with the bases of tussocky grass. Also collected from grasses in mangrove swamps (Coromandel Peninsula, CL; Auckland Harbour, AK) and from *Leptocarpus australis* (Restionaceae; Coromandel Peninsula).

Collected in January, February, March, April, and October.

Taken most frequently in subalpine areas; highest recorded locality at 1200 m (Crown Range, CO).

**Remarks.** In Australia this species is widespread in rough grasses (Mound 1974), and it may be a wind-transported immigrant to New Zealand. Its systematic relationships are by no means clear. Mound (1974b) and Mound & Palmer (1983) regarded it as a member of the Pacific and Australian genus *Carientothrips*. However, *badius* has evidently undergone structural adaptation to its habitat at the base of grasses and sedges, and as a result is quite distinct from other members of the genus in the reduction of the compound eyes, lack of metathoracic sternopleural sutures, and broad, *Bolothrips*-like pelta. New Zealand populations vary considerably in the relative length of antennal segment IV and the form of the eyes. One remarkable specimen studied was micropterous on one side but hemimacropterous on the other. Another female contained a mature egg in which the larva was apparently fully developed.

### *Carientothrips loisthus* Mound

Figures 9, 85, 173, and 174

*Carientothrips loisthus* Mound, 1974a: 29–30. **Holotype** female, AUSTRALIA (ANIC) [examined].

**Colour (all morphs).** Body brown, sometimes paler on head and thorax; tube dark brown in proximal two-thirds, paler distally; femora usually brown, sometimes yellow; tibiae and tarsi yellow; antennae brown, but segments III–V yellow at base; major setae pale; forewings (when present) fuscous.

**Structure. Female aptera.** Head (Figure 9) elongate, projecting in front of eyes; cheeks slightly convex; dorsal surface sculptured laterally; ocelli sometimes reduced; postocular setae finely acute, longer than distance between compound eyes; post-

ocellar setae about two-thirds as long as post-oculars; maxillary stylets separated by about one-third to one-half of head width, retracted into head as far as postocular setae. Antennae (Figure 85) 8-segmented; segments VII and VIII not closely joined; segment III with 2 sense cones, segment IV with 4. Pronotum (Figure 9) weakly sculptured posteriorly; major setae long, fine, the epimeral and posteroangular pairs longest; epimeral sutures complete. Praepectal plates, mesopraesternum, and metathoracic sternopleural sutures present. Foretarsal tooth absent. Abdomen: pelta (Figure 173) with median lobe not pronounced but bearing broad lateral lobes; tergite IX setae acute, about as long as tube; tube with straight sides.

Dimensions (1 female;  $\mu\text{m}$ ). Body length (extended) 2700. Head length 310, median width 225; ocellar setae 90; postocular setae 135. Pronotum length 173, median width 286; major setae — *ep* 120, *pa* 142. Forewing length 28. Tergite IX setae *B*<sub>1</sub> 180. Tube length 200. Antennal segments III–VIII length 72, 75, 70, 55, 55, and 36 respectively.

**Female macroptera.** Similar to aptera, but ocelli well developed; eyes larger; metanotum with lines of sculpture laterally; forewing (length 1080  $\mu\text{m}$ ) with 3 major sub-basal setae and 7 or 8 duplicated cilia; tergites III–VI each with a pair of wing-retaining setae; abdomen with pelta (Figure 174) bearing a pronounced median lobe.

**Male aptera.** Similar to female, but smaller; foretarsal tooth present, variable in size.

**Material examined.** 71 female apterae, 1 female macroptera, 29 male apterae (BMNH, NZAC).

Three Kings Is / ND, AK, CL, BP, TO, TK, WN / SD, NN, BR, WD, MC, MK, CO, DN, SL, FD.

Associated with *Juncus*, grass, and tussock, but also beaten from dead branches and leaves and extracted from litter, liverworts, mosses, and birds' nests. Taken in both native and adventive-dominated habitats, but (unlike *badius*) mainly in lowland areas.

Collected in all months.

**Remarks.** *Cariantothrips loisthus* was described from near Adelaide, South Australia, on the basis of a single apterous female taken in grass. It is widespread and variable in New Zealand, but is possibly Australian in origin, although still known from that country only by the holotype.

Some specimens studied have the femora yellow and the head and thorax paler than the abdomen, unlike the holotype. Moreover, in some small specimens the pronotal midlateral and epimeral setae have bluntly rounded apices. However, in a series of 15 specimens from Te Aroha (WO–BP) the setae are finely acute in 13 individuals but

bluntly rounded in two. This variation, as well as that involving the colour of the femora, is apparently intraspecific (Mound 1974b).

### Genus *Cleistothrips* Bagnall

*Cleistothrips* Bagnall, 1932: 511. Type-species *Cleistothrips idolothripoides* Bagnall, by monotypy.

This monobasic genus, endemic to New Zealand, was referred to the subtribe Pygothripina by Mound & Palmer (1983). It is closely related to *Heptathrips*, the species of which have similar stout maxillary guides, but the tube is unlike any other in members of the tribe Pygothripini in bearing numerous distinct lateral setae (Figure 277).

### *Cleistothrips idolothripoides* Bagnall

Figures 10, 86, 143, 175, 277, and front cover

*Cleistothrips idolothripoides* Bagnall, 1932: 512–513.

**Holotype** female, NEW ZEALAND, WN, Wellington, York Bay (BMNH) [examined].

**Colour.** Body dark brown; foretarsi and distal two-thirds of tibiae yellow; antennae brown, with segment III yellow in distal third, IV and V with a band of yellow near base, and VI with pedicel yellow; major setae pale; forewings brown.

**Structure. Female macroptera.** Head (Figure 10) elongate, about 3 $\times$  as long as its median width, with 2 small projections on posterior margin; dorsal surface finely sculptured; ocelli well developed; compound eyes large, slightly smaller ventrally than dorsally; postocular setae exceptionally long; a second pair of long setae on vertex; smaller, paired postocellar and preocellar setae present; maxillary stylets retracted into head as far as eyes; maxillary guides stout. Antennae (Figure 86) 7-segmented; segment III very elongate, about 4 $\times$  its apical width; segments III and IV each with 2 long, curved sense cones. Pronotum (Figure 10) finely sculptured; setae short, except epimerals; epimeral sutures complete; praepectal plates absent. Mesonotum broad, with a pair of long, midlateral setae; mesopraesternum broadly boat-shaped. Metanotum elongate, striate laterally, faintly reticulate medially; sternopleural sutures present. Foretarsal tooth blunt, arising near apex of tarsus (Figure 143). Forewings parallel-sided, with 3 major sub-basal setae and 40–56 duplicated cilia; *B*<sub>1</sub> and *B*<sub>2</sub> subequal. Abdomen: pelta (Figure 175) with median lobe elongate, lateral lobes slender and transversely elongate; tergite II finely sculptured, with lateral margins eroded and posteroangular setae absent; wing-retaining setae

present on tergites II–VII; posteromarginal setae on tergite IX about half as long as tube; tube (Figure 277) exceptionally long, covered with small, sharply pointed setae except basally and near constricted apex; terminal setae short.

Dimensions (1 female;  $\mu\text{m}$ ). Body length (extended) 5670. Head length 680, median width 310; postocellar setae 60; postocular setae 240. Pronotum length 228, median width 510; major setae — *ep* 210, *pa* 52. Forewing length 1220. Tergite IX setae *B*, 480. Tube length 840. Antennal segments III–VII length 212, 180, 150, 120, and 135 respectively.

**Male macroptera.** Similar to female, but pronotal midlateral setae long; foretarsal tooth large, pointed.

**Material examined.** 10 female macropterae, 5 male macropterae (BMNH, FRNZ, NMNZ, NZAC).

ND, AK, BP, WI, WN / SD, NN, MC.

Taken from native and adventive-dominated habitats, including a decaying vine of *Ripogonum scandens*, leaf litter, and elm (*Ulmus* sp.).

Collected in February, May, and July–December.

**Remarks.** Nothing is known of the biology of *Cleistothrips idolothropoides*, but it probably breeds in dead, hollow twigs. Spiller (1956) noted it in his checklist.

### Genus *Cryptothrips* Uzel

*Cryptothrips* Uzel, 1895: 228–229. Type-species *Cryptothrips lata* Uzel, a synonym of *Phloeothrips nigripes* Reuter, by subsequent designation (Hood 1916).

This genus has been used traditionally as a wastebasket for a wide range of rather featureless, dark-coloured Phlaeothripidae. Jacot-Guillarmod (1978) listed 24 species under this name, but Mound & Palmer (1983) recognised that a considerable number of these were members of the subfamily Phlaeothripinae. They therefore reduced the list of nominal *Cryptothrips* species to eight, four of which have not been seen since their original, and inadequate, descriptions were published, and which are now unrecognisable. Of the other four, *nigripes* is widespread in Europe, and may be the same species as *rectangularis* from eastern North America, although *sordidatus* from California has never been adequately distinguished from either. Only *carbonarius* from eastern North America can be recognised as being congeneric with *nigripes* and at the same time distinguished as a distinct species (the head being longer and the postocellar setae well developed).

Three idolothropine species described in *Cryptothrips* from the Australian region were recently (Mound & Palmer 1983) transferred to the genus *Priesneriana*, although *amneius* Mound is here returned to *Cryptothrips*. These two genera appear to be closely related, but species of *Cryptothrips* have three major sense cones on antennal segment IV and the maxillary stylets close together, whereas the species of *Priesneriana* have four major sense cones on antennal segment IV and the stylets about one-third of the head width apart. Mound & Palmer (1983) suggested that *Cryptothrips* might be the Holarctic sister-group of *Priesneriana*, which is known from India and the Australian region. However, *Cryptothrips amneius* Mound, 1974 **comb. rev.** from New Guinea and Australia and the closely related new species described below from New Zealand are in most characters similar to *Cryptothrips nigripes*, although very much smaller. Although this new species has been collected in native forest, it is not possible on present evidence to know whether it is native to New Zealand or introduced from elsewhere.

Members of *Cryptothrips* share the following characters: antennae with 8 distinct segments, III with 2 sense cones, IV with 3; head with eyes reduced, cheeks almost parallel or constricted to base, and maxillary stylets exceptionally broad, deeply retracted, close together medially; pronotum with epimeral sutures complete, praepectal plates present; foretarsal tooth present in male, absent in female; mesopraesternum reduced; meta-thoracic sternopleural sutures present; forewings (when present) parallel-sided, with duplicated cilia; abdomen with pelta broad, tergites each with only 1 pair of wing-retaining setae, and tube shorter than head, its terminal setae long.

### *Cryptothrips okiwiensis* new species

Figures 11, 87, \*176, and 177

**Female macroptera.** **Colour.** Dark brown; base of antennal segment III yellow; tarsi and apex of tibiae brown to pale brown; forewings shaded with a dark, median longitudinal line; major setae brown.

**Structure.** Head longer than wide, faintly sculptured on posterior margin; compound eyes much smaller ventrally than dorsally, directed forwards; 1 pair of finely acute postocellar setae; postocular setae finely acute; maxillary stylets reaching to postocular setae; mouth cone rounded. Antennae (Figure 87) with segment VIII lacking a distinct pedicel. Pronotum (Figure 11) sculptured on posterior margin and often anterolaterally; major pronotal setae acute to bluntly acute, the antero-

marginal setae shortest. Mesopraesternum finely transverse. Forewings with 5–8 duplicated cilia; major sub-basal setae acute, subequal (not in a straight line in holotype). Abdomen: pelta (Figure 176) reticulate, with broad lateral lobes; tergites III–VI each with 1 pair of sigmoid wing-retaining setae, tergite II with a small, straight pair; tergite IX with posteromarginal setae acute,  $B_1$  about as long as tube,  $B_2$  longer than tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2500. Head length 290, median width 240; postocular setae 90. Pronotum length 150, median width 300; major setae —  $am$  40,  $aa$  50,  $ml$  65,  $ep$  80,  $pa$  80. Tergite IX setae —  $B_1$  95,  $B_2$  135,  $B_3$  170. Tube length 170; longest terminal setae 240. Forewing length 950, major sub-basal setae —  $B_1$  35,  $B_2$  45,  $B_3$  50. Antennal segments III–VIII length 75, 75, 70, 65, 45, and 40 respectively.

**Female aptera.** Similar in colour and structure to macroptera, but head as in Figure 11, with ocelli reduced or absent; mesopraesternum absent; mesonotum broad, with 2 pairs of small setae laterally; metanotum also broad, lacking sculpture; tergites II–VII each with 1 pair of small, straight wing-retaining setae.

**Male aptera.** Similar in colour and structure to female aptera, but foretarsal tooth present; fore femora swollen; pronotum elongate, with a longitudinal median apodeme; pelta (Figure 177) with median lobe less pronounced; sternite VIII lacking a glandular area.

Dimensions (1 large paratype male, AKW 376;  $\mu\text{m}$ ). Body length (extended) 2200. Head length 270, median width 200; postocular setae 100. Pronotum length 230, median width 300; major setae —  $am$  45,  $aa$  70,  $ml$  70,  $ep$  90,  $pa$  75. Tergite IX setae —  $B_1$  130,  $B_2$  140,  $B_3$  170. Tube length 165.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, SD, Okiwi Bay, Moncrieff Reserve, dead *Leptospermum* wood in open situation, 24 December 1983, A.K. Walker 376 (NZAC). **Paratypes** (1 female macroptera, 6 female apterae, 6 male apterae). ND – female aptera, Cape Reinga, Tapotupotu Bay, in curled leaves of *Acacia longifolia*, 30 Jan 1982, AKW 156. SD – female macroptera, female aptera, 6 male apterae, same data as holotype. BR – female aptera, L. Rotoiti, 600 m, 5 Feb 1979, LAM 1407; female aptera, same data except dead leafy branch, 8 Feb 1979, LAM 1428; female aptera, 16 km N of Reefton, dead twigs, 6 Feb 1979, LAM 1408. CO – female aptera, Alexandra, Mitchell's Cottage, on dead *Sequoia* wood, 3 Nov 1982, AKW 255 (BMNH, NZAC).

**Material examined.** Type series only.

ND / SD, BR, CO.

Taken from dead twigs and wood, leafy branches, and in curled leaves of *Acacia longifolia*.

Collected in January, February, November, and December.

**Remarks.** *Cryptothrips okiwiensis* differs from *C. nigripes* in having the postocular setae arising behind the midpoint of each compound eye, rather than behind the inner margin, and the antennal segments are much more slender. It is very closely related to *C. amneius*, but that species has the third antennal segment brownish-yellow in the proximal half, and the forewing bears only two duplicated cilia.

### Genus *Emprosthiothrips* Moulton

*Emprosthiothrips* Moulton, 1942: 12. Type-species *Emprosthiothrips niger* Moulton, by monotypy.

This genus comprises six black, apterous species from south-eastern Australia (Mound 1974a), all of which live in leaf litter or at the base of grasses. It was placed in the subtribe Pygothripina by Mound & Palmer (1983), although it is not closely related to the New Zealand *Heptathrips* group.

### *Emprosthiothrips bogong* Mound

Figures 12, 88, and 178

*Emprosthiothrips bogong* Mound, 1969: 185. **Holotype** female, AUSTRALIA (ANIC) [examined].

**Colour (all morphs).** Body black; antennal segment I and base of segment III, all tarsi, and apex of tube paler.

**Structure. Female and male apterae.** Body surface, including legs and antennal segment II, reticulate. Head (Figure 12) constricted at base, projecting in front of eyes; cheek margins parallel-sided; ocelli absent; compound eyes prolonged ventrally; no setae elongate; maxillary stylets wide apart, retracted about halfway into head (Figure 12). Antennae (Figure 88) 8-segmented; segment II sharply angled; segments IV–VI each with a distinct pedicel; segments VII and VIII closely joined; sense cones reduced, apparently 1 on segment III and 2 on segment IV. Pronotum (Figure 12) with no elongate setae; epimeral sutures not developed; praepectal plates well developed. Mesopraesternum not developed. Foretarsal tooth absent in both sexes. Abdomen: pelta (Figure 178) broad; lateral

abdominal setae very short; tergite IX postero-marginal setae less than 30  $\mu\text{m}$  long; tube about twice as long as wide, its terminal setae short.

Dimensions (1 female;  $\mu\text{m}$ ). Body length (extended) 2640. Head length 370, median width 255. Pronotum length 192, median width 300. Tergite IX setae  $B_1$  15. Tube length 200. Antennal segments III–VIII length 72, 58, 51, 48, 48, and 30 respectively.

**Material examined.** 87 female apterae, 53 male apterae (BMNH, NZAC).

— / NN, MB, KA, BR, MK, CO.

Taken mostly from high-country tussock grassland, at elevations up to 1640 m (Coronet Peak, CO); recorded from relatively low altitudes only at Cape Campbell (KA) and Taylors Pass (MB). Not yet recorded from the North Island.

Collected in all months except June, August, and December.

**Remarks.** *Emprosthiotrips bogong* was described from the Australian alps just south of Canberra.

### Genus *Heptathrips* Moulton

*Heptathrips* Moulton, 1942: 3. Type-species *Heptathrips tonnoiri* Moulton, by monotypy.

Mound & Palmer (1983) included *Ascania* as a synonym of *Heptathrips* because of similarities between the four new species described below and two South African species, although the latter have the pre-ocellar setae stouter, the metathoracic sternopleural sutures weaker, and the tergal wing-retaining setae straighter than in the five New Zealand species. The genus *Capnothrips*, with one species from Saudi Arabia, was also placed in synonymy; this species differs from all the other members of *Heptathrips* in having the setae on tergite IX longer than the tube. *Heptathrips* is closely related to *Cleistothrips*, although the single species in the latter genus has pronounced lateral setae on the tube. *Ozothrips* is also related, but has the maxillary stylets wide apart in the head. All three genera were placed in the subtribe Pygothripina by Mound & Palmer (1983).

The species of *Heptathrips* feed on fungal spores, as is evident from the gut contents. Specimens have been collected from dead branches, under bark, in hollow twigs, and from leaf litter.

Species of *Heptathrips* share the following characters. Head longer than wide, elevated in midline; stylets close together, deeply retracted; maxillary guides long, stout; compound eyes usually smaller ventrally than dorsally; pre-ocellar setae sometimes

longer than one side of ocellar triangle; postocellar setae not elongate. Antennae 7-segmented or, if 8-segmented, segment VII always broadly joined to segment VIII; segments III and IV each with 2 sense cones. Pronotum with epimeral sutures complete; praepectal plates absent. Metathoracic sternopleural sutures present. Foretarsus of female with a forward-directed tooth arising near inner apical margin. Median tergites each with 1 pair of wing-retaining setae, though these sometimes reduced. Tube variable in shape, more or less constricted at apex.

### *Heptathrips cottieri* new species

Figures \*13, \*89, \*179, \*243, and \*278

**Female microptera.** **Colour.** Body mainly brown, with tube darkest and fore tarsi and apex of fore tibiae slightly paler; antennal segment III pale at extreme base; major setae pale brown.

**Structure.** Head (Figure 13) about as long as tube, longer than wide, faintly sculptured; ocelli small; postocular setae long, finely acute; 1 pair of small postocellar setae; 1 pair of longer, curved pre-ocellar setae. Antennae (Figure 89) 8-segmented; segments VII and VIII closely joined. Pronotum finely sculptured on anterior and posterior margins; major setae (except anteromarginals) long, finely pointed. Mesonotum transverse; mesopraesternum heavily eroded. Metanotum broad, with a weak reticulate pattern; 1 or 2 setae laterally on anterior margin. Foretarsal tooth small, projecting forward. Wing lobe small, about as wide as long, bearing 1 long seta. Abdomen: pelta (Figure 179) bearing a large median lobe and elongate lateral lobes; tergite II with lateral margins eroded and posteroangular setae absent, but with 1 pair of long posteromarginal setae (Figure 243); tergal setae long, finely pointed; tergites II–VII each with 1 pair of curved wing-retaining setae; tergite IX posteromarginal setae nearly as long as tube; tube with sides slightly concave in basal third, sharply constricted at apex (Figure 278).

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 3060. Head length 340, median width 244; postocellar setae 22; postocular setae 125. Pronotum length 206, median width 354; major setae — *am* 22, *aa* 90, *ml* 108, *ep* 195, *pa* 132. Wing bud length 50; seta 25. Tergite IX setae —  $B_1$  240,  $B_2$  292. Tube length 310, basal width 120; longest terminal setae 210. Antennal segments III–VIII length 112, 92, 87, 64, 55, and 35 respectively.

**Female macroptera.** Similar to microptera, but wings shaded brown; ocelli well developed; meta-

notum not as broad, lacking setae laterally on anterior margin; forewings with 24 or 25 duplicated cilia and 2 major, bluntly pointed sub-basal setae.

**Type data.** **Holotype** female microptera, NEW ZEALAND, NN, Nelson, dead twigs and leaves, 28 January 1979, L.A. Mound 1367 (NZAC). **Paratypes** (1 female microptera, 1 female macroptera). **BR** – microptera, Lake Rotoiti, forest stream-side, 4–9 Feb 1978, Malaise trap, 1–14 Apr 1976, A.C. Harris (BMNH, NZAC).

**Material examined.** Type series only.  
— / NN, BR, DN.

**Remarks.** This species can be distinguished from its New Zealand congeners by the dark, relatively heavy tube. The South African species *magnifica* (Faure) differs from *cottieri* in having the tube golden-brown and the preocellar setae stout.

### *Heptathrips cumberi* new species

Figures \*14, \*90, \*180, \*244, and 279

**Female aptera.** **Colour.** Body brown; fore tarsi, apices of fore femora, apex of antennal segment II, and base of segment III paler; tube variable from brown to golden brown; major setae brown.

**Structure.** Head (Figure 14) longer than tube, longer than wide, weakly sculptured near posterior margin; ocelli reduced or almost absent; postocular setae long, fine; 1 pair of long, relatively straight preocellar setae about half as long as postoculars. Antennae (Figure 90) 8-segmented; segments VII and VIII broadly joined but with a complete suture; segments IV–VI each with a distinct pedicel. Pronotum with faint lines of sculpture on lateral margins; setae long, finely acute. Mesonotum broadly transverse; mesopraesternum almost absent. Metanotum broadly transverse, weakly striate on anterior margin, with 1 pair of long anteroangular setae, 1 pair of small anteromarginals, and 1 pair of long median setae; metathoracic sternopleural sutures broadly expanded. Foretarsal tooth small. Abdomen: pelta (Figure 180) with elongate lateral lobes; tergite II eroded laterally, without posteroangular setae (Figure 244); tergites II–VI with curved wing-retaining setae; tergite IX posteroangular setae stout; tube short, conical, its surface distinctly sculptured, slightly constricted at apex (Figure 279).

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2400. Head length 270, median width 234; ocellar setae 60; postocular setae 128. Pronotum length 168, median width 320; major setae

— *am* 53, *aa* 90, *ml* 97, *ep* 126, *pa* 126. Tergite IX setae — *B*<sub>1</sub> 100, *B*<sub>2</sub> 45, *B*<sub>3</sub> —. Tube length 185, basal width 112; longest terminal setae —. Antennal segments III–VI and VII + VIII length 84, 72, 66, 66, and 66 respectively.

**Female macroptera.** Similar to aptera, but wings pale in basal third, slightly shaded distally, and with a brown area around sub-basal setae; legs uniformly brown; head with ocelli; mesonotum broad, with a pair of long midlateral setae; mesopraesternum almost absent; metanotum with 3 or 4 pairs of anteroangular setae; metathoracic sternopleural sutures not heavily eroded; forewings with 2 major sub-basal setae, subequal in length but arising one behind the other, and 18–20 duplicated cilia.

Dimensions (1 paratype female, Tokaanu, TO;  $\mu\text{m}$ ). Body length (extended) 2550. Head length 290, median width 267; ocellar setae 66; postocular setae 135. Pronotum length 168, median width 330; major setae — *am* 53, *aa* 75, *ml* 85, *ep* 98, *pa* 120. Tergite IX setae — *B*<sub>1</sub> 93, *B*<sub>2</sub> 85, *B*<sub>3</sub> 150. Tube length 195, basal width 120; longest terminal setae 140. Forewing length 1170, distal width 115; sub-basal setae 94 (all others broken). Antennal segments III–VI and VII + VIII length 87, 72, 68, 68, and 75 respectively.

**Male aptera.** Similar in colour and structure to female, but foretarsal tooth large; sternites V and VI with sculptured areas laterally.

**Type data.** **Holotype** female aptera, NEW ZEALAND, NN, Farewell Spit, sweeping under manuka trees, 4 December 1980, A.K. Walker 134 (NZAC). **Paratypes** (12 female apterae, 2 female macropterae, 8 male apterae). NEW ZEALAND. **ND** – female aptera, Unuwahao, Pakoku Hill, beating manuka and kanuka, 3 Dec 1977, G.W. Ramsay; female aptera, 2 male apterae, Waipoua Kauri Forest, beating *Leptospermum*, 11 Dec 1983, AKW 349. **AK** – female aptera, Huia, Malaise trap in bush, Aug 1980, B.M. May; male aptera, Trig area, Otata I., The Noises, beaten from shrubs, 3 Nov 1977, J.C. Watt; female aptera, same data except beaten, 8 Dec 1979. **CL** – female aptera, Ruamahuanui I., The Aldermen, *Pittosporum*, *Geniostoma*, *Hebe*, and *Leptospermum*, 13–16 Nov 1972, G.W. Ramsay; female aptera, same data except *Muehlenbeckia*, 14 Nov. **TO** – female macroptera, L. Taupo, Tokaanu, beaten from manuka, 14 Mar 1945. **SD** – female macroptera, female aptera, male aptera, Okiwi Bay, recently dead *Leptospermum* wood, 27 Feb 1983, AKW 283; male aptera, same data except Malaise trap in second-growth bush, Mar 1984, G.B. Simpson. **NN** – female aptera, Lee Valley, beating *Leptospermum* foliage, 22 Mar

1977, A.K. Walker. MK – male aptera, Mt Cook, Kea Point track, dead *Phyllocladus* wood, 2 Feb 1983, AKW 276. CO – 2 female apterae, male aptera, Old Man Range, 450 m, dead *Sequoia* wood, 29 Apr 1982, LAM 1678; female aptera, same data except AKW 221; male aptera, same data except 1700 m, *Chionochloa*, LAM 1684; male aptera, Alexandra, 29 Apr 1979, LAM 1679. AUSTRALIA. Female aptera, Tasmania, near Mt Anne (42°57'S, 146°21'E), *Leptospermum nitida*, 2 May 1982, LAM 1695 (BMNH, NZAC).

**Material examined.** Type series only.

ND, AK, CL, TO / SD, NN, MK, CO.

**Remarks.** The South African species *africanus* (Moulton) differs from *cumberi* in having the tube clear yellow with a dark brown apex and the setae on tergite IX almost as long as the tube. However, both species have long postocular setae.

*H. cumberi* has not been taken in closed-canopy forest. It appears to be associated with the open canopy of manuka scrubland, having been collected several times from *Leptospermum*.

### ***Heptathrips kuscheli* new species**

Figures 15, \*91, and 181

**Female aptera.** **Colour.** Body golden brown; tarsi pale; tibiae and apices of femora with pale markings; head pale between eyes; antennal segments I and II yellow, III and IV with dark patches in proximal third, V–VII with pedicel yellow, and VIII brown.

**Structure.** Head longer than tube, strongly sculptured, the sculpture resembling overlapping scales; anterior ocellus apparently lying in a small depression, posterior ocelli small; compound eyes small; postocular setae short. Antennae 7-segmented (Figure 91); segments IV–VI each with a distinct pedicel. Pronotum weakly sculptured; major setae short, the epimerals longest. Mesonotum slender, transverse, without wing lobes; mesopraesternum transverse, entire. Metanotum broad, finely reticulate, with a pair of small median setae but with no setae on anterior margins. Foretarsus with a small tooth. Abdomen: pelta (Figure 181) with lateral lobes very reduced or even fused to tergite II, median lobe reticulate, almost rectangular; tergite II (Figure 181) reticulate, not eroded laterally; tergites II–VII distinctly sculptured, each with 1 pair of reduced wing-retaining setae; tergite IX postero-marginal setae about half as long as tube; tube short, weakly sculptured, parallel-sided, with a slight constriction at apex, its terminal setae short.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2190. Head length 300, median width 252; postocular setae 33. Pronotum length 165, median width 340; major setae — *am* 30, *aa* 18, *ml* 24, *ep* 45, *pa* 30. Tergite IX setae — *B*<sub>1</sub> 99, *B*<sub>2</sub> 95, *B*<sub>3</sub> 105. Tube length 188, basal width 90; longest terminal setae 60. Antennal segments III–VII length 72, 56, 60, 56, and 75 respectively.

**Male aptera.** Similar to female, but head (Figure 15) pale, with brown on lateral margins; antennal segments III–VII brown; middle and hind tibiae entirely brown; pronotum more elongate; fore femora swollen; foretarsal tooth large.

Dimensions (1 paratype male, LAM 1345;  $\mu\text{m}$ ). Body length (extended) 2100. Head length 285, median width 210; postocular setae 30. Pronotum length 206, median width 330; major setae — *am* 30, *aa* 23, *ml* 15, *ep* 42, *pa* 18. Tergite IX setae — *B*<sub>1</sub> 102, *B*<sub>2</sub> 90, *B*<sub>3</sub> 96. Tube length 176, basal width 94; longest terminal setae 55. Antennal segments III–VII length 75, 59, 62, 53, and 78 respectively.

**Type data.** **Holotype** female aptera, NEW ZEALAND, AK, Lynfield, stream bank, 2 April 1977, G. Kuschel (NZAC). **Paratypes** (10 female apterae, 5 male apterae). AK – female aptera, same data as holotype; female aptera, type locality, old *Sophora*, 3 Jul 1976, G. Kuschel; male aptera, type locality, 20 Dec 1975, G. Kuschel; female aptera, Huia, Malaise trap in bush, 1980, B.M. May; 2 female apterae, same data but Aug and Sep 1980; male aptera, Sharp's Bush, Waitakere Range, dead wood, 21 Jan 1979, LAM 1345; female aptera, Lynfield, Subritzky's Bush, ex *Melicytus*, 1 Mar 1981, G. Kuschel; female aptera, trig area, Otata I., The Noises, litter 79/153, 10 Dec 1979, J.C. Watt. TO – 3 female apterae, male aptera, Pikiariki Ecological Area, Pureora Forest Park, rotten log at *Podocarpus* forest margin, 3 Apr 1985, J.G. Green. SD – male aptera, Shakespeare Bay, litter 69/147, 11 Aug 1969, G. Kuschel; male aptera, Middle Trio Island, leafmould, 3 Dec 1953, B.A. Holloway (BMNH, NZAC).

**Material examined.** Type series only.

AK, TO / SD.

**Remarks.** This small but distinctive species appears to have a relatively northern distribution. Although it has many characters in common with the other members of *Heptathrips*, the sculpture of the head and abdominal tergites and the form of the pelta make it easy to distinguish. It appears to be typical of low or broken-canopy bush rather than closed-canopy forest.

### *Heptathrips tillyardi* new species

Figures \*16, \*92, \*182, 245, and \*280

**Female macroptera.** **Colour.** Dark brown, darkest on head and tube; fore tarsi, apices of fore tibiae, and major setae pale brown; terminal setae on tube darker; wings brown, pale at apex.

**Structure.** Head (Figure 16) longer than wide, shorter than tube, with 2 small projections on posterior margin; dorsal surface finely sculptured; ocelli well developed; compound eyes slightly smaller ventrally than dorsally; postocular setae long, fine, arising posteromesad of compound eyes, behind posterior ocelli; 1 pair of postocellar setae; 1 pair of curved preocellar setae longer than one side of ocellar triangle. Antennae (Figure 92) 7-segmented; segment VI with a distinct pedicel. Pronotum finely sculptured; setae pointed, variable in length, but posterior pairs longer than anterior pairs. Mesonotum broad; mesopraesternum broadly boat-shaped. Metanotum elongate, finely reticulate. Foretarsal tooth bluntly pointed. Forewings parallel-sided, with 3 major sub-basal setae,  $B_3$  the longest, and 30–33 duplicated wing cilia. Abdomen: pelta (Figure 182) with anterior margin of median lobe rounded, lateral lobes slender, transversely elongate; tergite II eroded laterally, without posteroangular setae, strongly sculptured in median area (Figure 245); tergites II–VII each with sigmoid wing-retaining setae; tergite IX posteromarginal setae finely pointed, slightly shorter than tube; tube (Figure 280) exceptionally long, constricted at apex.

Dimensions (holotype and, in parentheses, largest and smallest female paratypes;  $\mu\text{m}$ ). Body length (extended) 3820 (4930, 3600). Head length 445 (570, 420), median width 275; postocellar setae 38; postocular setae 180. Pronotum length 198, median width 400 (540, 380); major setae — *am* 50, *aa* 28, *ml* 64, *ep* 183 (275, 165), *pa* 135 (150, 94). Tergite IX setae —  $B_1$  440,  $B_2$  420,  $B_3$  480. Tube length 570 (600, 480), basal width 120; longest terminal setae 255. Forewing length 1460 (1560, 1200), distal width 135; major sub-basal setae —  $B_1$  55,  $B_2$  90,  $B_3$  150. Antennal segments III–VII length 138 (186, 138), 115, 108, 87, and 113 respectively.

**Male macroptera.** Similar in colour to female. Similar in structure, but fore femora swollen; foretarsal tooth large; major pronotal setae very long and fine, except anteromarginals.

Dimensions (1 paratype male, LAM 1468;  $\mu\text{m}$ ). Body length (extended) 3600. Head length 420, median width 248; postocellar setae 34; postocular setae 180. Pronotum length 274, median width 450; major setae — *am* 34, *aa* 160, *ml* 225, *ep* 180, *pa* 168. Tergite IX setae —  $B_1$  310,  $B_2$  360,  $B_3$  330. Tube length 435, basal width 110; longest terminal

setae 225. Forewing length 1320, distal width 150; major sub-basal setae —  $B_1$  60,  $B_2$  120,  $B_3$  165. Antennal segments III–VII length 132, 108, 102, 78, and 102 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, BP, Lake Rotorua near Rotorua, *Hebe stricta?* hollow stems, 16 February 1979, L.A. Mound 1468 (NZAC). **Paratypes** (18 female macropterae, 5 male macropterae). BP – female macroptera, 2 male macropterae, same data as holotype; female macroptera, “Waiotapu, Ex Radiata”, Feb 1931, L.J. Dumbleton. TO – 2 female macropterae, Taupo, *Hebe stricta?* hollow stems, 17 Feb 1979, LAM 1469; 2 female macropterae, male macroptera, 32 km S of Turangi, 750–900 m, dead *Nothofagus*, 19 Feb 1979, LAM 1478; female macroptera, Kaimanawa Forest 32 km SE of Taupo, *Nothofagus menziesii*, 20 Feb 1979, LAM 1487. SD – female macroptera, Durville I., Kapowai, 17 Feb 1971, G. Kuschel. NN – female macroptera, male macroptera, Harwood’s Hole track, Canaan, dead *Nothofagus menziesii* branches, 22 Dec 1983, AKW 371; female macroptera, Nelson, dead twigs and leaves, 28 Jan 1979, LAM 1367; female macroptera, Wakapuaka, dead elm wood, 7 Jul 1966, emerged 22 Jul 1966, J.B. Waller & J.I. Townsend. BR – female macroptera, L. Rotoiti, 600 m, 5 Feb 1979, LAM 1407. SC – female macroptera, near Cave, under *Cytisus* bark, 9 Jul 1969, R. Zondag. CO – female macroptera, Glenorchy State Forest, Dart River, sweeping beech and totara forest, 21 Jan 1981, E.W. Valentine & J.S. Noyes. Chatham Islands – male macroptera, South East I., general beating, 3 Nov 1970, J.I. Townsend; female macroptera, Pitt I., Tupuangi, 28 Feb 1967, G. Kuschel; female macroptera, Chatham I., Limestone Quarry, beating, 11 Feb 1967, G. Kuschel; female macroptera, Chatham I., beating *Muehlenbeckia australis*, 10 Feb 1967, G.W. Ramsay; female macroptera, Chatham I., Makara, *Haloragis*, 25 Feb 1967, G.W. Ramsay (BMNH, NZAC).

**Material examined.** Type series only.

BP, TO / SD, NN, BR, SC, CO / Chatham Is.  
Collected in January, February, July, and November.

**Remarks.** *Heptathrips tillyardi* is closely related to the type-species of the genus, *H. tonnoiri*, but has the tube distinctly longer and the forewings differently coloured. Though not common it is widespread, having been taken on the North and South islands and the Chatham Islands. Nothing is known of its biology, but it probably lives in dead, hollow stems throughout the year. Both this species and *tonnoiri* are interesting in that no changes in body

form accompany the considerable individual size variation.

### *Heptathrips tonnoiri* Moulton

Figures 17, 93, 183, 246, and 281

*Heptathrips tonnoiri* Moulton, 1942: 3–4. **Holotype** female, NEW ZEALAND, NN, Nelson (CASC) [examined].

**Female macroptera. Colour.** Body dark brown; fore tarsi and apices of fore femora paler; antennal segment III yellow at extreme base; wings pale brown, but darker around sub-basal setae.

**Structure.** Head (Figure 17) elongate, as long as tube, finely sculptured; ocelli well developed; compound eyes slightly smaller ventrally than dorsally; 1 pair of postocellar setae; 1 pair of longer pre-ocellar setae; postocular setae wide apart. Antennae (Figure 93) 7-segmented. Pronotum finely sculptured on lateral margins; posteroangular and epimeral setae long, fine. Mesonotum broadly transverse, with a pair of mid-lateral setae; mesopraesternum broad. Metanotum elongate, striate laterally, reticulate in median area. Foretarsal tooth present. Forewings parallel-sided, with 3 major sub-basal setae and 29–38 duplicated cilia. Abdomen: pelta (Figure 183) with median lobe almost pointed on anterior margin, lateral lobes elongate; tergite II (Figure 246) eroded laterally, without posteroangular setae, sculptured in median area; tergites II–VII with sigmoid wing-retaining setae; tergite IX posteromarginal setae more than half as long as tube; tube (Figure 281) long, constricted at apex, its terminal setae about half as long as tube.

Dimensions (largest and smallest females;  $\mu\text{m}$ ). Body length (extended) 4140, 3470. Head length 420, 410, median width 300, 244; postocellar setae 36, 18; postocular setae 135, 90. Pronotum length 220, 180; median width 450, 370; major setae — *ep* 135, 120, *pa* 150, 90. Forewing length 1560, 1200. Tergite IX setae — *B*<sub>1</sub> 360, 300. Tube length 390, 360. Antennal segment III length 138, 123.

**Male macroptera.** Similar to female, variable in size; fore femora and foretarsal tooth large in large individuals.

**Material examined.** 7 female macropterae, 8 male macropterae (BMNH, NZAC).

ND / SD, SL.

Taken from dead twigs and leaves in native forest.

Collected in January and December.

**Remarks.** Variation in body size is discussed under *H. tillyardi*. This species was recorded by Spiller (1956).

### Genus *Idolothrips* Haliday

*Idolothrips* Haliday in Walker, 1852: 1096. Type-species *Idolothrips marginatus* Haliday, a synonym of *Idolothrips spectrum*, by subsequent designation (Bagnall 1908).

There are two species in this genus, both Australian. Mound & Palmer (1983) indicate that the Old World tropical genera *Meiothrips* and *Bactrothrips* are indistinguishable from *Idolothrips*, in the female. Individuals belonging to these genera are amongst the largest thrips in the world. Males of the *Idolothrips* species have long lateral tubercles on the abdominal segments, and are differentiated by Mound (1974).

### *Idolothrips spectrum* Haliday

Figures 18 and 247

*Idolothrips spectrum* Haliday in Walker, 1852: 1097. ?**Syntype** males, NEW HOLLAND (?lost).

**Female macroptera. Colour.** Body brown with small, yellow markings laterally on abdominal segments II–VII; hind femora yellow at base, tibiae variable; antennal segments III–VI with long, yellow pedicels; major setae pale; forewings shaded, with a dark median line.

**Structure.** Head (Figure 18) long, projecting in front of eyes, and with cheeks constricted behind eyes. Antennae more than twice as long as head. Pronotum (Figure 18) sculptured; epimeral sutures complete; praepectal plates present. Mesopraesternum broadly boat-shaped. Metathoracic sternopleural sutures absent; metanotum reticulate, its median setae small. Foretarsal tooth absent. Forewing broad, with duplicated cilia. Abdomen: pelta broadly trilobed; tergites each with more than 2 pairs of sigmoid wing-retaining setae; tube longer than head.

**Male macroptera.** Similar to female, but tergites II–VIII each with a pair of long lateral tubercles terminating in either a short, stout seta or a long, slender seta (varying with body size) (Figure 247); dorsal pair of setae on tergite IX very short and stout.

Dimensions ( $\mu\text{m}$ ). Body length (extended) 10 500. Head length 1000. Forewing length 4000; number of duplicated cilia 97. Tergite VIII length 600; lateral tubercle 200; terminal setae 70. Tube 1900. Antennal segments III–VIII length 800, 600, 450, 300, 130, and 100 respectively.

**Material examined.** 1 male macroptera (NZAC). AK / —.

Collected in April from a Malaise trap in a domestic garden.

**Remarks.** *Idolothrips spectrum* is common and widespread in Australia, feeding on fungal spores on the surface of dead *Eucalyptus* leaves, particularly when these are hanging in bunches from branches. It is very active in bright sunlight, and flies readily; one female has been studied which was collected in a net attached to an aeroplane near Adelaide. It is almost certainly able to cross the Tasman Sea in the air, but is here recorded from New Zealand on the basis of only a single specimen. If it were already established in New Zealand, entomologists would almost certainly have commented on its existence because it is one of the largest thrips in the world. However, with extensive planting of *Eucalyptus* trees in New Zealand its establishment becomes increasingly likely.

### Genus *Nesothrips* Kirkaldy

*Nesothrips* Kirkaldy, 1907: 103. Type-species *Nesothrips oahuensis* Kirkaldy, by monotypy.

This genus was redefined by Mound (1974), who gave a key to the 14 species then recognised. Mound & Palmer (1983) synonymised *Rhaebothrips* with *Nesothrips* and included 22 species under this name. These species are found at the base of grasses and on dead leaves, twigs, and branches. Most come from the Pacific Region, including Australia and New Zealand. Of the six species here included in *Nesothrips* from New Zealand, three were described originally in *Rhaebothrips*. The most closely related genus is *Cariantothrips*, which can be distinguished only with difficulty. *Nesothrips* species usually have the head shorter, the ocellar setae longer, and the maxillary stylets wider apart than *Cariantothrips* species. Further collecting around the Pacific is likely to demonstrate that only one, rather large genus is worth recognising.

Species of *Nesothrips* share the following characters. Small to moderately large, usually dark species of dichaeothripine Pygothripini. Head variable, wider than long or longer than wide; eyes sometimes prolonged ventrally; 1 pair of postocular setae; 1 pair of ocellar setae arising between or behind posterior ocelli; maxillary stylets broad, wide apart, usually extending about halfway into head; mouth cone broadly rounded. Antennae 8-segmented; segment VIII narrower at base than segment VII at apex but without a distinct pedicel; segment III with 2 sense cones, segment IV with 4. Pronotum transverse, enlarged in large (oedymorous) males; epimeral sutures complete; all major

setae well developed; praepectal plates present; probasisternum large; mesopraesternum usually boat-shaped; metathoracic sternopleural sutures usually present. Foretarsal tooth present in male, normally absent in female. Macropterous to micropterous; duplicated cilia usually present. Pelta with lateral lobes. Tube with sides straight.

### *Nesothrips alexandrae* new species

Figures \*19, \*94, and \*184

**Female macroptera.** **Colour.** Body brown; antennal segment III paler, its base yellow; wings shaded with darker longitudinal lines in proximal two-thirds.

**Structure.** Head (Figure 19) almost as wide as long, with lines of sculpture on posterior half; compound eyes as large dorsally as ventrally; ocellar setae about half as long as acute postocular setae; maxillary stylets reaching about halfway to compound eyes. Antennal segments IV–VI with distinct pedicels (Figure 94). Pronotum (Figure 19) with anteromarginal, anteroangular, midlateral, and posteroangular setae acute; epimeral setae slightly longer, stouter, and bluntly acute; a short, longitudinal median apodeme present. Mesopraesternum transverse, sometimes eroded. Metanotum with a few longitudinal lines of sculpture; median setae acute. Metathoracic sternopleural sutures short. Forewings with 0–11 (usually about 9) duplicated cilia; major sub-basal setae acute, subequal. Abdomen: pelta, Figure 184; tergites II–VII each with a pair of sigmoid wing-retaining setae; tergite IX posteromarginal setae  $B_1$  bluntly acute, more than half as long as tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2100. Head length 210, median width 220; postocular setae 85. Pronotum length 125, median width 260; major setae —  $am$  30,  $aa$  35,  $ml$  50,  $ep$  80,  $pa$  60. Tergite IX setae —  $B_1$  105,  $B_2$  105,  $B_3$  180. Tube length 170; longest terminal setae 150. Forewing length 900; major sub-basal setae —  $B_1$  45,  $B_2$  60,  $B_3$  70. Antennal segments III–VIII length 70, 75, 65, 60, 45, and 35 respectively.

**Female microptera.** Similar to macroptera, but mesonotum and metanotum more transverse; wing lobe 90  $\mu\text{m}$  long, bearing 1 or 2 acute setae; tergites II–VII each with 1 pair of short, curved wing-retaining setae. Body length varying from 1800 to 2400  $\mu\text{m}$ .

**Male microptera.** Similar to female, but pronotum more elongate, with anteromarginal and anteroangular setae shorter; foretarsal tooth pres-

ent; wing lobe usually bearing only 1 seta; pelta more transverse; tergites II–VII with posteromarginal  $B_2$  setae long, acute; large males with fore tarsi, fore tibiae, and apex of fore femora yellow; foretarsal tooth larger, fore femora swollen, pronotal setae longer, and median longitudinal apodeme longer.

Dimensions (1 large paratype male, AKW 222;  $\mu\text{m}$ ). Body length (extended) 1750. Head length 195, median width 195; postocular setae 100. Pronotum length 165, median width 270; major setae — *am* 20, *aa* 50, *ml* 80, *ep* 80, *pa* 90. Forewing lobe length 65. Tergite IX setae —  $B_1$  85,  $B_2$  80,  $B_3$  150. Tube length 160. Antennal segments III–VIII length 65, 65, 60, 55, 43, and 30 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, CO, Alexandra, Goodall's Orchard, dead apricot wood, 29 April 1982, A.K. Walker 222 (NZAC). **Paratypes** (4 female macropterae, 17 female micropterae, 7 male micropterae), same data as holotype (BMNH, NZAC).

**Material examined.** Type series, plus 117 non-type specimens (27 female macropterae, 65 female micropterae, 25 male micropterae) (BMNH, NZAC).

— / NC, MK, CO.

On dead wood, particularly of introduced trees including apricot, peach, pear, willow, and pine. Four macropterae were taken in a suction trap and five in a light trap at Earnsclough (CO).

Collected in January, April, and October–December.

**Remarks.** *N. alexandrae* has been found quite commonly in Central Otago between Alexandra and Lindis Pass, and may prove to be endemic to that area. A single male has been collected further north, near Lewis Pass (NC). This species is closely related to *N. propinquus*, but has the eyes equal in size dorsally and ventrally, and despite its variation in size and morph is remarkably constant in colour and structure, both within and between populations.

### ***Nesothrips doulli* (Mound)**

Figures 20, 95, 152, and 185

*Rhaebothrips doulli* Mound, 1974b: 171–173. **Holotype** female, NEW ZEALAND, MC, Christchurch (BMNH) [examined].

**Colour (all morphs).** Body brown; antennal segment III yellow at extreme base; forewings weakly shaded, darker at base.

**Structure.** **Female macropterae/micropterae** (N.B. wing morphs intergrading — wing length in four known specimens 950, 465, 270, 220). Head (Figure 20) longer than tube; compound eyes as large dorsally as ventrally; postocular setae as long as distance between their bases; ocellar setae as long as distance between posterior ocelli, arising between or slightly behind them; maxillary stylets reaching more than halfway into head. Antennae, Figure 95; segment III slightly longer than IV. Metanotum broad, with faint lines of sculpture laterally and a pair of setae medially (Figure 152). Foretarsal tooth small. Forewings with 3 major sub-basal setae,  $B_3$  the longest; 5 duplicated cilia on fully developed wing. Abdomen: pelta (Figure 185) with broad lateral lobes, lacking small setae laterally on median lobe; tergites III–VI with curved wing-retaining setae; tergite IX posteromarginal setae about half as long as tube, with  $B_1$  and  $B_2$  subequal in length; terminal setae nearly as long as tube.

Dimensions (holotype female microptera;  $\mu\text{m}$ ). Body length (extended) 2950. Head length 315, median width 261; interocellar setae 94; postocular setae 146. Pronotum length 180, width 352; major setae — *ep* 119, *pa* 114. Wing length 465. Tergite IX setae  $B_1$  135. Tube length 260. Antennal segments III–VIII length 105, 100, 85, 72, 57, and 42 respectively.

**Male microptera.** Similar to female, but sometimes smaller. Foretarsal tooth large.

**Material examined.** 3 micropterous to macropterous females, 1 female macroptera, 6 male micropterae (BMNH, FRNZ, NZAC).

BP / SD, MC.

Taken on three occasions in MC, from a dead walnut twig, under *Cytisus* bark, and in a Malaise trap at edge of native bush. The records from Stephens Island (SD) and Waitapu (BP) are of single male specimens.

Collected in January, February, September, and October.

### ***Nesothrips eastopi* (Mound)**

Figures 21, \*96, and 126

*Rhaebothrips eastopi* Mound, 1974b: 173–174. **Holotype** female, NEW ZEALAND, BR, Moana / Kotuku (BMNH) [examined].

**Colour (all morphs).** Body brown; antennal segment III yellow at extreme base; forewings brown.

**Structure.** **Female macropterae/micropterae** (N.B. wing morphs intergrading — wing length 1140–135  $\mu\text{m}$ ). Head (Figure 21) longer than tube; compound

eyes about 1.4× as long ventrally as dorsally; post-ocular setae shorter than distance between their bases; ocellar setae arising between posterior ocelli or slightly behind, as long as distance between their bases; maxillary stylets reaching less than halfway into head. Antennae, Figure 96; segment IV as long as III or longer. Metanotum broad, reticulate, with a pair of long median setae. Foretarsal tooth absent. Forewings with 2 major sub-basal setae, these equal in length; 4–9 duplicated wing cilia on fully developed wing. Abdomen: pelta (Figure 186) with broad lateral lobes, and with 1 or 2 pairs of small setae laterally on median lobe; tergites II–VII with curved wing-retaining setae; tergite IX posteromarginal setae almost half as long as tube, with  $B_1$  and  $B_2$  subequal in length; terminal setae more than half as long as tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2820. Head length 318, width 248; interocellar setae 67; postocular setae 135. Pronotum length 195, width 315; major setae —  $ep$  109,  $pa$  90. Wing length 960. Tergite IX setae  $B_1$ , 135. Tube length 232. Antennal segments III–VIII length 97, 105, 96, 75, 58, and 43 respectively.

**Male microptera.** Similar to female, but sometimes smaller. Foretarsal tooth present.

**Material examined.** 4 micropterous to macropterous females, 3 female macropterae, 16 male micropterae (BMNH, NZAC).

BP, TO / SD, BR, SC.

Holotype (originally unique) described from *Juncus*; examples taken subsequently from base of *Cortaderia splendens*.

Collected in January, February, August, and September.

**Remarks.** Prolongation of the eyes ventrally is not uncommon in other spore-feeding species associated with Gramineae.

### ***Nesothrips pintadus* new species**

Figures 22, 97, 144, and 187

**Female macroptera. Colour.** Body dark brown with contrasting yellow markings, as follows. Thorax, abdomen, posterior half of head, and median area of vertex dark brown; anterior half of head yellow, but with interantennal projection pale brown. Legs brown; femora sharply yellow in distal half, particularly on inner surface. Antennae brown except for segments I and II and pedicels of III–VI, which are yellow. Major setae brown. Forewings deeply shaded, with a longitudinal darker line medially.

**Structure.** Head almost as wide as long, projecting in front of eyes, narrower at base, weakly sculptured at posterior margin; eyes large, but reduced on ventral surface; ocelli well developed; post-ocular setae long, finely acute; postocellar setae each arising just behind an ocellus; maxillary stylets almost parallel, about half of head width apart, retracted to compound eyes. Antennae (Figure 97) 8-segmented; segments V–VII each with a distinct pedicel; segment VIII not sharply constricted to VII; segment III with 2 long, slender sense cones, segment IV with 4. Pronotum transverse, weakly sculptured on posterior margin; major setae pointed; anteromarginal setae reduced; epimeral sutures complete; praepectal plates present. Mesopraesternum broadly boat-shaped. Metanotum elongate, with a reticulate pattern laterally, a pair of small setae medially, and 3 pairs of smaller setae on anterolateral margin; metathoracic sternopleural sutures reaching halfway between middle and hind coxae. Foretarsal tooth absent. Forewing almost parallel-sided, scarcely constricted medially; no duplicated wing cilia; 3 major sub-basal setae,  $B_2$  arising posterior to  $B_1$  and  $B_3$ . Abdomen: pelta (Figure 187) entire, with broad lateral lobes and a square median lobe that is weakly reticulate medially; tergites III–VII with sigmoid wing-retaining setae, and tergite II with a slightly curved pair; lateral abdominal setae finely acute; tergite IX with a transverse area of reticulation near anterior margin, and posteromarginal setae much shorter than tube; tube shorter than head, slender, with fine terminal setae shorter than the tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2375. Head length 244, median width 232; postocellar setae 26; postocular setae 92. Pronotum length 130, median width 270; major setae —  $am$  15,  $aa$  17,  $ml$  45,  $ep$  60,  $pa$  72. Forewing length 1075, distal width 105; sub-basal setae —  $B_1$ , 60,  $B_2$ , 64,  $B_3$ , 84. Tergite IX setae —  $B_1$ , 72,  $B_2$ , 65,  $B_3$ , 64. Tube length 156, basal width 78; longest terminal setae 90. Antennal segments III–VIII length 69, 78, 78, 64, 56, and 30 respectively.

**Female microptera.** Similar to macroptera, but median area of vertex and interantennal projection usually yellow, and wing lobe brown; head (Figure 22) with ocelli smaller, and with stylets apparently retracted only as far as postocular setae (?distorted); pronotal anteroangular setae longer; metanotum transverse, faintly reticulate medially; metathoracic sternopleural sutures reaching almost to hind coxae; forewing lobe scarcely longer than wide, usually bearing 1 long seta; abdomen with pelta lobes smaller; wing-retaining setae reduced.

Dimensions (1 paratype female, LAM 1463;  $\mu\text{m}$ ). Body length (extended) 2580. Head length 267,

median width 243; postocellar setae 35; postocular setae 97. Pronotum length 182, median width 340; major setae — *am* 22, *aa* 39, *ml* 60, *ep* 83, *pa* 78. Wing bud length 25, distal width 25; wing bud setae 45. Tergite IX setae — *B*<sub>1</sub> 62, *B*<sub>2</sub> 64, *B*<sub>3</sub> 70. Tube length 154, basal width 90; longest terminal setae 75. Antennal segments III–VIII length 75, 86, 87, 68, 55, and 27 respectively.

**Male microptera.** Similar to female. Foretarsal tooth large in large examples; fore femora swollen, and fore tibiae bent at a slight angle (Figure 144).

Dimensions (1 paratype male, LAM 1463;  $\mu\text{m}$ ). Body length (extended) 1975. Head length 225, median width 195; postocellar setae 30; postocular setae 105. Pronotum length 180, median width 270; major setae — *am* 20, *aa* 30, *ml* 90, *ep* 97, *pa* 120. Wing bud length 24, distal width 19; wing bud setae 30. Tergite IX setae — *B*<sub>1</sub> 75, *B*<sub>2</sub> 82, *B*<sub>3</sub> 67. Tube length 132, basal width 79; longest terminal setae 75. Antennal segments III–VIII 62, 64, 72, 57, 53, and 26 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, BP, 26 km NE of Rotorua, dead twigs, 16 February 1979, L.A. Mound 1463 (NZAC). **Paratypes** (2 female macropterae, 11 female micropterae, 5 male micropterae). BP – 8 female micropterae, male microptera, same data as holotype; female microptera, 2 male micropterae, Rotorua, mossy branch, 15 Feb 1979, LAM 1459. TK – 2 female macropterae, 2 female micropterae, 2 male micropterae, 10 km N of Ohura, beating dead twigs and leaves of *Nothofagus fusca*, 14 Dec 1983, AKW 354 (BMNH, NZAC).

**Material examined.** Type series, plus 6 non-type female micropterae, NN, Kaihoka Lakes, 16 km W of Collingwood, dead frond of *Rhopalostylis sapida*, 1 Feb 1979, LAM 1392 (BMNH, NZAC). BP, TK / NN.

**Remarks.** The females from Kaihoka Lakes that have been omitted from the type series are more extensively yellow on the anterior half of the head and fore femora, and the tibiae, tarsi, and antennal segments III and IV are brownish-yellow. The colour pattern of this species, with the anterior half of the head yellow but the posterior half brown, is unique. The origin of the postocellar setae, wide apart and behind each ocellus, is also unusual in this genus. Unlike many *Nesothrips* species, *pintadus* appears not to be associated with grasses. There is little variation in body size, although the species has been collected from widely separate localities.

### *Nesothrips propinquus* (Bagnall)

Figures 23, 24a,b, 98, 145a,b, 188, 189a–e, and 282a,b

*Oedemothrips propinquus* Bagnall, 1916: 408–409. **Holotype** female, AUSTRALIA (BMNH) [examined].  
*Oedemothrips propinquus* var. *breviceps* Bagnall, 1924: 634–635. **Syntype** females, NEW ZEALAND, NN, Nelson (BMNH) [examined].

The description below encompasses the males and females and all morphs of this highly variable species.

**Colour.** Variable; usually with abdomen dark brown and head and thorax paler, but sometimes body uniformly brown. Antennal segments VII and VIII brown; typical form with segments I–VI yellow, but varying as follows (usually between populations, but sometimes within them): (a) segments I–IV yellow at base and dark at apex, VI–VIII brown; (b) segments I and II yellow, III yellow in basal half but dark at apex, IV–VIII brown. Legs of typical form yellow, but varying as follows: femora and tibiae pale brown with darker shading, or all brown, or with fore tibiae paler at apex.

**Structure.** Head (Figures 23 and 24) wider than long, narrowed to base but often parallel-sided under coverslip pressure (Figure 24b), sometimes with faint lines of sculpture laterally and posteriorly; ocelli present in macropterae (Figure 23), present or absent in apterae; sometimes only 1 ocellus developed; eyes typically almost twice as long ventrally as dorsally; ocellar setae two-thirds as long as postocular setae, arising between posterior ocelli (arising behind ocelli in 1 male microptera from Chatham Island); postocular setae about as long as dorsal width of eye; both pairs of setae long and fine in some specimens from ND, AK, SD, BR, MK, CO, and SL; maxillary stylets 'V'-shaped in configuration, wide apart, extending about halfway to posterodorsal margin of compound eyes. Antennae (Figure 98) 8-segmented; segment VIII slightly constricted at base, clearly separated from segment VII; segment III varying in length; segment III with 2 sense cones, segment IV with 4. Pronotum (Figure 24a) with epimeral sutures complete; setae long and fine in some specimens from areas listed above; praepectal plates present. Mesopraesternum broadly boat-shaped in most females, frequently eroded in males. Metanotum with 1 pair of major setae medially, and a second pair of smaller discal setae varying in position; metathoracic sternopleural sutures variable — present, absent, or partial. Foretarsal tooth absent in females, small to large in males; large males with fore femora swollen (compare Figures 145a and b).

Forewings usually absent; males apterous except for 1 micropterous example from Chatham Island, females usually apterous; when present, forewings parallel-sided, about 880  $\mu\text{m}$  long, with 3 major sub-basal setae and usually without duplicated cilia. Abdomen: pelta (Figures 188 and 189a–e) variable, typically with small lateral lobes separated from a larger median lobe (Figure 189e), but often with one lateral lobe or both joined medially (Figure 189b); some populations with pelta consistently entire and with small, slender lateral lobes (Figure 189a); macropterae usually with median lobe rounded (Figure 188); pelta sometimes heavily eroded (Figure 189c); tergites II–VII of macropterae each with 1 pair of sigmoid wing-retaining setae (not developed in apterae); median tergites of apterae slightly shorter in midline than sternites; tergite IX posteromarginal setae variable in length, particularly between populations, the *B*<sub>1</sub> setae usually relatively stout but sometimes finely acute when elongate (2 females from Waituruku (ND) with *B*<sub>1</sub> setae 130  $\mu\text{m}$  long); tube usually short and broadly conical, but sometimes longer and tapering (compare Figures 282a and b).

Dimensions (apterae — large female, small female, and large male from Nelson, LAM 1358;  $\mu\text{m}$ ). Body length (extended) 1925, 1660, 1500. Head length 168, 168, 155, median width 225, 210, 203; interocular setae 37, 33, 27; postocular setae 58, 54, 60. Pronotum length 157, 132, 117, width 248, 232, 218; major setae — *ep* 53, 45, 45, *pa* 58, 53, 48. Tergite IX setae *B*<sub>1</sub> 72, 68, 48. Tube length 135, 108, 122. Antennal segments III–VIII length 66, 60, 60; 60, 57, 60; 60, 53, 55; 55, 48, 48; 42, 36, 40; and 33, 27, 27 respectively.

**Material examined.** 45 female macropterae, 468 female apterae, 152 male apterae, 1 male microptera (BMNH, NZAC).

ND, AK, CL, WO, BP, GB, TO, TK, HB, WI, WN / SD, NN, MB, KA, BR, WD, MC, SC, CO, MK, DN, SL / Chatham Is.

Associated particularly with the bases of grasses, sedges, and tussock, but also collected on twigs and leaves, various crops, citrus, birds' nests, and a variety of native plants as well as in leaf litter, moss, and lichen.

Taken from sea level up to 800 m (Rocklands Station, CO).

Collected in all months.

**Remarks.** This species has been described under at least five different names from South Africa and Australia, having been distributed widely along Old World sea-trading routes (Mound 1974). The 'typical form', which has been so widely dispersed, is not particularly variable despite the number of

names applied to it. The body is usually dark with the head and thorax paler, the legs yellow, and the antennae yellow to brown; moreover, the eyes are prolonged ventrally, the metathoracic sternopleural sutures are absent, the forewings (when present) lack duplicated cilia, the pelta has the lateral lobes separated, and the *B*<sub>1</sub> setae on tergite IX as well as the tube are relatively short. Although this 'typical form' of *propinquus* is so widespread in the Old World, and is also common throughout New Zealand in ruderal habitats and rough pasture, the species exhibits a bewildering range of variation in many native habitats in New Zealand. The colour of the antennae is particularly variable, ranging from largely yellow, except for the terminal segments, to largely brown, except for the base of segment III. The head and thorax are frequently almost as dark as the abdomen, and the middle and hind legs are often brown. The compound eyes are always prolonged ventrally, although this prolongation varies in extent. The metathoracic sternopleural sutures are often developed, but only one female macroptera with duplicated wing cilia has been seen (Crown Peak, CO). The lateral lobes of the pelta are often fused to the median lobe, and in a few specimens the tube and/or the setae on tergite IX are unusually long.

Despite this range of variation it has not proved possible to define any morphological segregates within the *propinquus* complex that might represent valid species, with the exception of the Central Otago form described above as *alexandrae*. A single female macroptera from the Waitakere Range (AK) also has the eyes not prolonged ventrally, and moreover has the tergites and metanotum exceptionally sculptured; this may represent a further distinct species. Almost certainly there are genetic differences between populations, but the patterns of overlapping variation suggest that considerable gene flow exists between these populations. Apterous specimens are often found in situations where they are unlikely to have developed, such as on crops or the leaves of plants, suggesting that these apterae are readily distributed by wind as well as by birds and man on straw and twigs. However, only the 'typical form' seems able to adapt to disturbed habitats, and this is widespread along roadsides and in other ruderal situations.

Spiller recorded this species in his checklists of 1951 and 1956.

### *Nesothrips rangi* Mound & Palmer

Figures 25, 99, 153, and 190

*Nesothrips rangi* Mound & Palmer, 1983: 48–49. **Holotype** female, NEW ZEALAND, MB, Taylor's Pass (NZAC) [examined].

**Colour (all morphs).** Body dark brown, darkest on head and tube; legs dark; extreme apices of femora and bases of tibiae yellow; fore tibiae yellowish-brown; all tarsi paler. Antennae variable in colour; segments I and VI–VIII dark brown; II variably yellow at apex; III yellow, with apex more or less brown; IV yellow in proximal half, sometimes pale brown; V with pedicel yellow or uniformly brown. Major setae dark brown. Forewings dark at base, weakly shaded distally.

**Structure. Female macroptera and microptera.** Head (Figure 25) almost as wide as long, longer than tube; compound eyes as large dorsally as ventrally; postocular setae shorter than distance between their bases; ocellar setae as long as distance between posterior ocelli, arising between them; maxillary stylets retracted halfway into head. Antennae, Figure 99; segments III and IV subequal in length. Pronotum with epimeral setae longer than pronotal setae. Metanotum broad, with a reticulate pattern, and with 1 pair of setae medially (Figure 153). Foretarsal tooth absent. Forewings with 3 major sub-basal setae,  $B_2$  and  $B_3$  equal in length, and with 5–11 duplicated wing cilia; micropterae with wing buds varying in length (150–375  $\mu\text{m}$ ), bearing 2 long setae. Abdomen: pelta (Figure 190) broad, without small setae laterally on median lobe; tergites II–VII with curved or sigmoid wing-retaining setae; tergite IX posteromarginal setae more than half as long as tube; tube margins weakly convex in distal third.

Dimensions (holotype female macroptera;  $\mu\text{m}$ ). Body length (extended) 2600. Head length 270, width 260; interocellar setae 60; postocular setae 90. Pronotum length 170, width 320; major setae — *ep* 110, *pa* 60. Wing length 1000. Tergite IX setae  $B_1$  120. Tube length 220. Antennal segments III–VIII length 93, 90, 82, 68, 50, and 35 respectively.

**Male microptera.** Similar to female, but usually smaller. Foretarsal tooth present.

**Material examined.** 32 female micropterae, 10 female macropterae, 7 male micropterae (BMNH, NZAC).

AK, BP / NN, MB, BR, CO, SL.

Taken mainly on *Juncus*. Apparently associated with seepage areas in grassland.

Collected in January, March, September, October, and December.

**Remarks.** *N. rangi* is intermediate in structure between the 'typical *Nesothrips*' and the 'typical *Rhaebothrips*' species, in that the head is relatively broad but the ocellar setae arise between the posterior ocelli.

### *Nesothrips zondagi* (Mound)

Figures 26, 100, 154, and 191

*Rhaebothrips zondagi* Mound, 1974b: 176–177. **Holotype** female, NEW ZEALAND, BR, Hochstetter State Forest (NZAC) [examined].

**Colour (all morphs).** Body brown; antennal segment III yellow at extreme base; major setae brown; forewings uniformly brown, with a median longitudinal line.

**Structure. Female macroptera.** Head (Figure 26) about as long as tube; compound eyes as large dorsally as ventrally; postocular setae as long as distance between their bases; ocellar setae about as long as distance between posterior ocelli, arising between or slightly behind them; maxillary stylets reaching about halfway into head. Antennae, Figure 100; segment III longer than segment IV. Pronotum, Figure 26. Metanotum with median setae long, weakly sculptured laterally, and with a faint reticulate pattern posteriorly (Figure 154). Foretarsal tooth absent. Forewings with 3 major sub-basal setae,  $B_3$  the longest, and with 8–13 duplicated wing cilia. Abdomen: pelta (Figure 191) with short lateral lobes, and bearing 1 or 2 pairs of small setae laterally on median lobe; tergites II–VII with sigmoid wing-retaining setae; tergite IX posteromarginal setae almost half as long as tube, with  $B_1$  shorter than  $B_2$ ; terminal setae shorter than tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2500. Head length 270, width 222; interocellar setae 68; postocular setae 97. Pronotum length 152, width 272; major setae — *ep* 85, *pa* 90. Wing length 1077. Tergite IX setae  $B_1$  120. Tube length 280. Antennal segments III–VIII length 90, 82, 70, 63, 48, and 36 respectively.

**Male macroptera.** Similar to female. Foretarsal tooth present.

**Material examined.** 28 female macropterae, 9 male macropterae (BMNH, FRNZ, NZAC).

AK, BP, TO / NN, BR.

Associated with dead branches and twigs rather than grass, unlike most members of the genus. Apparently associated with podocarp forest, in contrast to most New Zealand thrips.

Collected January–April, September, and December.

**Remarks.** Several micropterae have been studied (nine females, six males) from widely separated localities (TO, NN, SC) which may represent this species, although the two morphs have never been collected together. These micropterae do not have small setae laterally on the pelta.

## Genus *Ozothrips* Mound & Palmer

*Ozothrips* Mound & Palmer, 1983: 24. Type-species *Ozothrips priscus* Mound & Palmer, by original designation.

This genus was erected for three species endemic to New Zealand, and a further two species are described below. Unlike the species of *Heptathrips* and *Cleistothrips*, with which *Ozothrips* probably shares a common ancestor, these five species have the maxillary stylets wide apart and 'V'-shaped in the head. Mound & Palmer (1983) interpret this condition as an apomorphy which has arisen independently in this New Zealand group, despite the fact that widely spaced stylets are found in all the more advanced groups of spore-feeding thrips. The degree of parallel evolution is such that *Ozothrips eurytis* would probably have been placed in the pantropical genus *Neosmerinthothrips* had the New Zealand species to which it is related been unknown. In *Ozothrips* one species, *priscus*, has antennae similar to those of *Heptathrips* and *Cleistothrips*. The other four species have four sense cones on antennal segment IV, but whereas *janus* has retained the plesiomorphic condition of seven antennal segments, *eurytis* and the two new species have eight. Moreover, these four species have the praepectal plates developed, albeit weakly, and lack a foretarsal tooth in the female, unlike *priscus*.

The species of *Ozothrips* share the following characters. Colour dark brown. Head slightly longer than wide; stylets broad, separated by about one-third of head width; maxillary guides stout. Antennae 7-segmented, or with segments VII and VIII closely joined; segment III with 2 sense cones. Pronotal epimeral sutures complete; metathoracic sternopleural sutures developed; anapleural sutures complete. Fore tarsi with a tooth in male. Forewing parallel-sided, with duplicated cilia. Abdomen with pelta broad; tergite II eroded laterally; tergites II-VII each with a pair of curved wing-retaining setae; sternites with reticulate sculpture anterior to discal setae more evident in males than in females.

### *Ozothrips eurytis* Mound & Palmer

Figures \*27, \*101, 192, and \*283

*Ozothrips eurytis* Mound & Palmer, 1983: 25-26. **Holotype** female, NEW ZEALAND, AK, Auckland (NZAC) [examined].

**Colour (all morphs).** Body brown, darkest on tube; inner apices of femora and base and external margin of antennal segment III yellowish; major setae dark; forewing uniformly shaded.

**Structure. Female macroptera.** Head (Figure 27) nearly as wide as long; dorsal surface with faint lines of sculpture; compound eyes not large; post-ocular setae finely acute, wide apart, arising close to eyes; maxillary stylets retracted into head as far as postocular setae. Antennae (Figure 101) 8-segmented; segments VII and VIII broadly joined, the suture usually complete; segments VI and VII each with a distinct pedicel; segment III with 2 sense cones, segment IV with 4. Pronotum with faint lines of sculpture on posterior margin; praepectal and probasisternal plates weakly sclerotised. Mesopraesternum eroded medially. Metanotum elongate, finely sculptured. Foretarsal tooth absent. Forewings curved in distal third, with 3 major sub-basal setae and 2-8 duplicated wing cilia. Abdomen: pelta faintly reticulate, with broad lateral lobes; tergite IX posteromarginal setae about half as long as tube; tube (Figure 283) slightly constricted apically and in basal third.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 1860. Head length 198, width 195; post-ocular setae 75. Pronotum length 117, width 234; major setae — *ep* 75, *pa* 57. Forewing length 660. Tergite IX setae *B*, 64. Tube length 123. Antennal segments III-VII+VIII length 64, 60, 57, 55, and 57 respectively.

**Female microptera.** Similar to macroptera, but ocelli reduced; metanotum broad; forewing lobe small (25  $\mu\text{m}$ ), round, bearing 2 small setae; pelta with short lateral lobes (Figure 192).

**Male microptera.** Similar to female, but slightly smaller; forewing lobe less than 20  $\mu\text{m}$  long; tergite II with 1 pair of long setae laterally. Large specimens have swollen femora, a large foretarsal tooth, and sternites IV-VII reticulate anterior to discal setae. One small male has a small foretarsal tooth and no reticulation on sternites.

**Material examined.** 40 female micropterae, 7 female macropterae, 20 male micropterae (BMNH, NZAC).

ND, AK, CL, TK / SD, NN, BR, WD, CO, SL / Chatham Is.

Taken mostly in disturbed native forest areas, also in birds' nests.

Collected in January-April and August-December.

**Remarks.** Possibly *eurytis* avoids darker areas with a closed canopy, in which *priscus* is dominant on dead branches. As is to be expected in a species which is widespread but exists in small populations, *eurytis* is variable in colour and structure. One apterous female collected with the holotype at Wattle Bay, Auckland (AK), bore about ten specimens of a mite species belonging to the genus *Adactylidium* (Pyemotidae).

### *Ozothrips janus* Mound & Palmer

Figures \*28, \*102, \*193, and \*248

*Ozothrips janus* Mound & Palmer, 1983: 26. **Holotype** female, NEW ZEALAND, AK, The Noises, Otata Island (NZAC) [examined].

**Female aptera.** **Colour.** Body brown; fore tarsi yellow; extreme apices of fore femora, median area of fore tibiae, extreme base of antennal segment III, and apex of II yellowish; tube golden-yellow with a dark brown apex; major setae weakly shaded.

**Structure.** Head (Figure 28) about as wide as long, not sculptured; ocelli absent; compound eyes greatly prolonged ventrally, with 2 rows of large ommatidia; 1 pair of long, fine postocular setae and a second pair medially; 1 pair of ocellar setae shorter than postoculars; maxillary stylets retracted about halfway into head, possibly 'V'-shaped (disarranged in available specimens). Antennae (Figure 102) 7-segmented; segments III–VII pedicellate; segment II with a distinctive pattern around pore; segment III with 2 sense cones, segment IV with 4. Pronotum (Figure 28) without sculpturing; setae long, finely acute; praepectus weak. Mesopraesternum heavily eroded; mesonotum and metanotum small, transverse. Fore tarsus with inner margin slightly thickened; tooth absent. Abdomen: pelta (Figure 193) broad, slender, with faint lines of sculpture; tergal wing-retaining setae short, but median tergal setae on VII exceptionally long; tergite II eroded on lateral margin (Figure 248); posteromarginal tergal setae long, finely acute; tergite IX setae longer than tube; tube shorter than head, constricted apically.

Dimensions (holotype;  $\mu\text{m}$ ). Body length (extended) 1500. Head length 150, median width 172; interocellar setae 60; postocular setae 105. Pronotum length 114, median width 237; major setae — *ep* 135, *pa* 120. Tergite IX setae *B*<sub>1</sub> 135. Tube length 105. Antennal segments III–VII length 38, 45, 45, 43, and 57 respectively.

**Male aptera.** Similar to female, but smaller; foretarsal tooth present; sternites without reticulate areas. Tergite II chaetotaxy similar to that in *eurytis*.

**Material examined.** 5 female apterae, 2 male apterae (BMNH, NZAC).

AK / —.

On *Gahnia* (Cyperaceae).

Collected in March, April, August, October, and December.

**Remarks.** Many idiothripine species that live on grasses have the compound eyes prolonged on the ventral surface of the head (Mound & Palmer 1983). In view of this, the association of *O. janus* with

*Gahnia* may well be natural. Unlike the other species of *Ozothrips*, the seven specimens of *janus* are completely apterous, with no trace of a forewing lobe.

### *Ozothrips priscus* Mound & Palmer

Figures \*29, \*103, 146, and \*194

*Ozothrips priscus* Mound & Palmer, 1983: 26–27. **Holotype** female, NEW ZEALAND, NN, Nelson (NZAC) [examined].

**Colour (all morphs).** Body dark brown, darkest on head and tube; antennal segments III–V with pedicels yellow to pale brown; tarsi pale brown; major setae brown, with terminal setae of tube darkest; forewings strongly shaded.

**Structure. Female macroptera.** Head (Figure 29) longer than wide, finely sculptured; ocelli present; compound eyes slightly smaller ventrally than dorsally; 1 pair of finely acute postocular setae; maxillary stylets retracted more than halfway towards eye. Antennae (Figure 103) 7-segmented; segments VII and VIII completely fused; segments III and IV each with 2 long sense cones. Pronotum weakly sculptured near margins; setae finely acute, with epimerals longer than posteroangulars; praepectus absent; probasisternum large. Mesonotal midlateral setae moderately developed; mesopraesternum broadly boat-shaped. Metanotum reticulate medially; median setae about as long as mesonotal midlaterals. Fore femora slender; foretarsal tooth small, curved, at inner apical margin (Figure 146). Forewings with 3 major sub-basal setae, *B*<sub>3</sub> the longest. Abdomen: pelta (Figure 194) broadly rounded medially; tergite II slightly eroded laterally, the posteroangular setae not developed; tergites II–VII with sigmoid wing-retaining setae; tergite IX posteromarginal setae slightly more than half as long as tube, with *B*<sub>1</sub> shorter than *B*<sub>2</sub>; tube as long as head, slightly constricted apically; terminal setae less than half as long as tube.

Dimensions (holotype;  $\mu\text{m}$ ). Body length (extended) 3780. Head length 370, median width 300; postocular setae 118. Pronotum length 205, median width 410; major setae — *am* 45, *aa* 42, *ml* 75, *ep* 120, *pa* 75, *pm* 28. Forewing length 1500. Tergite IX setae *B*<sub>1</sub> 240. Tube length 386. Antennal segments III–VII length 129, 108, 98, 85, and 98 respectively.

**Male macroptera.** Similar to female, but large examples with a small tubercle ventrally on frons (approximately underlying posterior ocelli); pronotal midlateral setae elongate; fore femora swollen; and foretarsal tooth greatly enlarged. Small

examples lack these characters, and have the foretarsal tooth relatively small.

**Material examined.** 98 female macropterae, 48 male macropterae (BMNH, NZAC).

TO / SD, NN, BR.

Common and abundant on dead, leafy branches of *Nothofagus* in mature forest with a closed canopy.

Collected in January, February, May, and December.

**Remarks.** Both sexes of *O. priscus* vary considerably in size, males in particular showing patterns of allometric growth in the pronotum, forelegs, and ventral tubercle on the head.

### *Ozothrips tubulatus* new species

Figures 150, \*195, and 249

**Colour (all morphs).** Body brown; antennal segment II yellow with brown markings; antennal segment III pale brown, with base of pedicel yellow; inner apices of femora yellow; major setae dark; tube golden yellow, with base and apex brown; forewing shaded, slightly paler distally.

**Structure. Female macroptera.** Head nearly as wide as long; dorsal surface with faint lines of sculpture; compound eyes not large; ocelli present; 1 pair of postocular setae long and fine; maxillary stylets retracted about halfway into head. Antennae 7-segmented; segments VII+VIII with a complete suture; segments V–VII with distinct pedicels; segment III with 2 sense cones, segment IV with 4. Pronotum with faint lines of sculpture on posterior margin, and with setae long and finely acute; praepectal plates present; mesopraesternum and anterior margin of eusternum eroded medially. Sternopleural sutures present. Mesonotum reticulate in anterior half; midlateral setae short. Metanotum with longitudinal lines of sculpture in posterior half. Foretarsal tooth absent. Forewings parallel-sided, with 3 sub-basal setae, subequal in length, and with 4–6 duplicated cilia. Abdomen: pelta (Figure 195) reticulate, with broad lateral lobes; tergites II–VII each with 1 pair of sigmoid wing-retaining setae; tergite IX setae bluntly pointed, about half as long as tube; tube shorter than head, constricted at apex.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2000. Head length 210, median width 210; postocular setae 80. Pronotum length 140, median width 280; major setae — *am* 35, *aa* 45, *ml* 55, *ep* 110, *pa* 75. Forewing length 800. Tergite

IX setae — *B*<sub>1</sub> 70, *B*<sub>2</sub> 90, *B*<sub>3</sub> 105. Tube length 150; longest terminal setae 120. Antennal segments III–VII+VIII length 70, 65, 60, 55, and 65 respectively.

**Female microptera.** Similar to macropterae, but ocelli almost absent; metanotum broad; forewing lobe well developed (60  $\mu\text{m}$ ), oval, and bearing 3 variable setae (Figure 150); tergites II–VII without sigmoid wing-retaining setae; tergite II with 1 pair of curved wing-retaining setae.

Dimensions (1 paratype female, AKW 379; mm). Body length (extended) 2000. Head length 210, median width 210. Tergite IX setae — *B*<sub>1</sub> 65, *B*<sub>2</sub> 70, *B*<sub>3</sub> 100. Tube length 150. Antennal segments III–VII+VIII length 70, 63, 60, 57, and 60 respectively.

**Male microptera.** Similar to female, but usually smaller; fore femora swollen; foretarsal tooth large; tergite II with 2 pairs of long setae laterally (Figure 249); sternites IV–VI with lateral reticulations anterior to discal setae.

Dimensions (1 paratype male, AKW 269;  $\mu\text{m}$ ). Body length (extended) 1500. Head length 195, median width 170; postocular setae 100. Pronotum length 155, median width 240; major setae — *am* 30, *aa* 110, *ml* 105, *ep* 140, *pa* 120. Tergite IX setae — *B*<sub>1</sub> 60, *B*<sub>2</sub> 57, *B*<sub>3</sub> 45. Tube length 110. Antennal segments III–VII+VIII 55, 50, 50, 50, and 60 respectively.

**Type data. Holotype** female macroptera, NEW ZEALAND, AK, Mt Albert Research Centre, dead twigs of *Boehmeria dealbata*, 27 January 1983, A.K. Walker 269 (NZAC). **Paratypes** (3 female macropterae, 22 female micropterae, 12 male micropterae). AK – 13 female micropterae, 5 male micropterae, same data as holotype; 2 female micropterae, Wattle Bay, sweeping *Carex*, 11 Jan 1984, AKW 379; male microptera, same data except sweeping *Carex* and *Scirpus* in swampy area, 1 Apr 1977, A.K. Walker & L.L. Deitz; 2 female micropterae, 2 male micropterae, same data except sweeping undergrowth, 29 Aug 1983, A.K. Walker; female microptera, same data except sweeping *Tradescantia fluminensis*, 13 Oct 1983, AKW 291; female macroptera, female microptera, 2 male micropterae, same data except sweeping *Carex*, 25 Nov 1983, AKW 344; female microptera, Lynfield, Malaise trap, 2 Apr 1980, G. Kuschel; female microptera, The Noises, Motuhoropapa I., beating *Cyathodes*, 22 Aug 1978, G.W. Ramsay; female microptera, same data except Scott I., beating, 20 Aug 1978, G.W. Ramsay. BP – female macroptera, Rotorua, suction trap, 23–31 Dec 1970, R. Zondag. WI–WN – female macroptera, 2 male micropterae, Paiaaka, *Phormium*, 23 Nov 1949, R.A. Cumber (BMNH, NZAC).

**Material examined.** Type series only.

AK, BP, WI-WN / —.

Collected in January, April, August, and October–December.

**Remarks.** Mound & Palmer (1983) indicated that they had studied six specimens of *Ozothrips* which resembled *eurytis* but had the tube a clear yellow colour medially. These specimens are here included in the type series of *tubulatus*.

### *Ozothrips vagus* new species

Figures 30 and 250

**Colour. Female microptera.** Head, antennal segments IV–VII, and tube dark brown; body, antennal segment I, and base of femora, tarsi, and tibiae paler; tergites II–IX varying in colour from pale to dark brown; antennal segment II and apical half of femora yellow; antennal segment III yellow with brown markings.

**Structure. Female microptera.** Similar to *tubulatus* microptera, but head longer than wide; ocelli absent; 1 pair of ocellar setae almost as long as postocular setae; pronotal setae shorter, bluntly acute; mesopraesternum almost completely eroded; forewing lobe small (20 µm), bearing 2 pairs of setae, the posterior setae longest; abdomen with pelta eroded on posterior margin and bearing shorter lateral lobes; tergites II–VII with median pair of setae longer.

Dimensions (holotype female; µm). Body length (extended) 2200. Head length 235, median width 210; postocular setae 75. Pronotum length 170, median width 290; major setae — *am* 25, *aa* 30, *ml* 35, *ep* 65, *pa* 50. Tergite IX setae — *B*<sub>1</sub> 75, *B*<sub>2</sub> 75, *B*<sub>3</sub> 90. Tube length 140; longest terminal setae 120. Antennal segments III–VII+VIII length 70, 65, 60, 55, and 60 respectively.

**Male microptera.** Similar to female, but legs and pronotum more yellow; head (Figure 30) more slender, with ocellar setae and median setae on vertex longer; pronotal setae longer, finely acute; epimera with 2 long setae; foretarsal tooth present; abdominal tergites with longer posteromarginal setae; tergite II with 2 pairs of major setae on posterior margin, the inner pair shorter, and 1 pair of long setae posterolateral to discal pores (Figure 250).

Dimensions (1 paratype male; µm). Body length (extended) 1900. Head length 240, median width 180; postocular setae 120. Pronotum length 240, median width 300; major setae — *am* 90, *aa* 120, *ml* 180, *ep* 150, *pa* 170. Tergite IX setae — *B*<sub>1</sub> 90, *B*<sub>2</sub> 60, *B*<sub>3</sub> 75. Tube length 150.

**Type data.** Holotype female microptera, NEW ZEALAND, NN, Kaihoka Lakes, 16 km W of Collingwood, dead from *Rhopalostylis sapida*, 1 February 1979, L.A. Mound 1392 (NZAC). Paratypes (2 female micropterae, 4 male micropterae), same data as holotype.

**Material examined.** Type series only.

— / NN.

**Remarks.** This material was considered to represent *eurytis* by Mound & Palmer (1983), although excluded from the type series of that species. However, the chaetotaxy of the second abdominal tergite in the males is so distinctive that the sample is here interpreted as representing a distinct species. A macropterous female collected at the same time cannot be distinguished from the widespread species *eurytis*.

### Genus *Priesneriella* Hood

*Priesneriella* Hood, 1927: 198–199. Type-species *Priesneriella citricauda* Hood, by monotypy.

Mound & Palmer (1983) treated *Pygidiotrips* Hood, *Parallothrips* Hood, and *Embothrips* Dyadechko as synonyms of *Priesneriella*, thereby recognising this genus as an holophyletic group of eight species. Individuals of these species are exceptionally small. Four species come from southern Europe and the Mediterranean area, and three from the southern U.S.A. The eighth species, *gnomus*, is known from a single female collected in New Zealand, but this may have been introduced from elsewhere. Nothing is known of the biology of the species, but the genus is placed in the subtribe Allothripina, in which the species have the terminal sensorium on the maxillary palps considerably enlarged. *Priesneriella* species are distinguished by the close union or (occasional) fusion of antennal segment VI to the fused segments VII and VIII.

### *Priesneriella gnomus* Mound & Palmer

Figures \*31, \*104, and 196

*Priesneriella gnomus* Mound & Palmer, 1983: 33. Holotype female, NEW ZEALAND, MC, Kowai Bush (NZAC) [examined].

**Female aptera. Colour.** Body brown, paler on inner margins of fore femora and apex of antennal segment II; tube yellow in proximal two-thirds.

**Structure.** Head (Figure 31) scarcely longer than wide; ocelli absent; compound eyes with only about

5 ommatidia ventrally; postocular setae long, fine; ocellar setae small; maxillary stylets wide apart, reaching as far as postoculars; maxillary palp with a long sense cone at apex. Antennae 7-segmented (Figure 104); segments VI and VII closely joined; segment III with or without 1 sense cone, segment IV with 2 sense cones. Pronotum (Figure 31) transverse; anteromarginal setae reduced; epimeral sutures incomplete; praepectus and probasisternum absent. Mesonotum and metanotum transverse; metathoracic sternopleural sutures broad. Wing lobe absent. Abdomen: pelta (Figure 196) represented by a thin line close to tergite II; sternites II–IV without discal setae; tergites without sculpture; major setae long, slender; tergite IX posteromarginal setae longer than tube; tube shorter than head, scarcely constricted at apex.

Dimensions (holotype;  $\mu\text{m}$ ). Body length (extended) 1500. Head length 150, median width 150; postocular setae 80. Pronotum length 110, median width 220; major setae — *ep* 120, *pa* 120. Tergite IX setae *B*, 150. Tube length 110. Antennal segments III–VII length 36, 40, 42, 45, and 50 respectively.

**Material examined.** Holotype female aptera only (NZAC).

— / MC.

On dead branch of *Griselinia littoralis*.

Collected in September.



### SUBFAMILY PHLAETHRIPINAE

This subfamily includes more than 2000 species, but the species taxonomy is often poor and the generic and suprageneric classification inadequate and confusing. A wide range of biologies is evident: a few species are predatory, and many are phytophagous, even forming galls on leaves, but the majority feed on fungal hyphae in dead wood or in leaf litter. The problems of species taxonomy are rooted in structural variation, which is common both within and between populations. The classificatory problems arise because few workers have examined taxa from different parts of the world, and usually approach classification within an essentially typological framework (Mound 1985). A conservative approach has been adopted here, at both species and genus level. Future studies on the biology of New Zealand thrips may require more than the present 43 species and 19 genera of Phlaeothripinae to be recognised.

### Genus *Apterygothrips* Priesner

*Apterygothrips* Priesner, 1933: 1. Type-species *Apterygothrips haloxyli* Priesner, by monotypy.

The genus was revised by Zur Strassen (1966), who included a key to the eight known species, a generic definition, and comparisons with other genera. A further seven species have since been referred to *Apterygothrips*, all 15 members of which are from the Old World. Zur Strassen indicated that *Karonyothrips* species are larger and more robust, with longer fore femora, the anal setae about twice as long as the tube, and forewing duplicated cilia present in macropterae. Moreover, males of some *Karonyothrips* species have a glandular area on the eighth sternite. Thus, the contrasting characteristics of *Apterygothrips* species are all reductions or losses, and the evidence for this being an holophyletic group is therefore weak.

Ten of the 15 species have been studied during this investigation, and all except *remotus* (Bianchi) from New Caledonia were found to lack metathoracic sternopleural sutures. These sutures are also retained in *viretum*, one of four new species described below. Together *remotus* and *viretum* form a closely inter-related group with *australis* and the new species *kohai* and *sparsus*. Of these five species, only *viretum* has two sense cones on antennal segment III and only *sparsus* and a few specimens of *viretum* have three sense cones on antennal segment IV. The mesopraesternum of *sparsus* and *viretum* is transverse and complete, whereas in the other three species it is reduced to a pair of small lateral triangles. Zoogeographically the diversity and intergrading of this species-group from New Zealand and New Caledonia is interesting, because in Australia *Apterygothrips* is represented by the single very widespread species *australis*, which is not variable in structure.

The other new species, *collyerae*, is distinguished from the *australis* species-group by its relatively short head and antennae. Whereas the species related to *australis* are all associated with grasses, reeds, or sedges, *collyerae* appears to be a predator of mites, particularly on dead branches.

Members of *Apterygothrips* differ from *Haplothrips* species in having only two or three sense cones on the fourth antennal segment, instead of four. Moreover the forewing, when present, lacks duplicated cilia and is scarcely constricted medially. The third antennal segment bears one or two sense cones. Three of the New Zealand species — *australis*, *kohai*, and *sparsus* — have only one sense cone on the third segment, as have six members of the genus from other parts of the world. The New Zealand species can be distinguished from these as follows: *pellucidus* is yellow; *pini* is brown with a

bicoloured tube; and *flavus*, *haloxyli*, *piceatus*, and *remotus* all have the tergite IX  $B_1$  setae finely acute and longer than the tube. The seventh species, *australis*, is here recorded from New Zealand and distinguished in the key.

The other two *Apterygothrips* species described here from New Zealand have two sense cones on the third antennal segment, and that character is found in a further seven members of the genus from other parts of the world. However, the New Zealand species can apparently be distinguished by the presence of metathoracic sternopleural sutures (*viretum*), or by the short, pale third antennal segment (*collyerae*).

### *Apterygothrips australis* Pitkin

Figure 32

*Apterygothrips australis* Pitkin, 1973: 328–329. **Holotype** female, AUSTRALIA (ANIC) [examined].

**Female microptera.** **Colour.** Similar to *A. kohai*, but slightly darker, with antennal segment III pale at base, and usually with apex of segment III and segments IV–VIII brown (3 specimens from MB and KA have antennal colour similar to *kohai*); tarsi and distal half of tibiae yellow. Major setae pale brown, terminal setae browner.

**Structure.** Similar to *kohai*, but with the following major setae expanded — postoculars, pronotals (Figure 32), tergite VIII posteroangulars and posteromarginals, and tergite IX  $B_1$  posteromarginals; foretarsal tooth slightly larger; antennae, Figure 32. Australian specimens have the head constricted behind the eyes (Figure 32), but the few New Zealand specimens available for study are too compressed for this feature to be discerned.

Dimensions (1 female microptera;  $\mu\text{m}$ ). Body length (extended) 1810. Head length 180, median width 138; postocular setae 30. Pronotum median length 133, median width 187; major setae — *am* –, *aa* 15, *ml* 18, *ep* 37, *pa* 27. Forewing length 35. Tergite IX setae  $B_1$ , 60. Tube length 102. Antennal segments III–VIII length 45, 45, 45, 42, 37, and 26 respectively.

**Male microptera.** Similar to female, but smaller; foretarsal tooth larger.

Dimensions (1 male microptera;  $\mu\text{m}$ ). Body length (extended) 1293. Head length 167. Pronotum median length 118. Tube length 94.

**Material examined.** 6 female micropterae, 3 male micropterae (BMNH, NZAC).

TO / MB, KA.

Associated with sedges and tussock, but also collected from litter and moss.

Collected in February, March, and July.

**Remarks.** Pitkin (1973) refers to two macropterous females of *australis* from New South Wales. In Australia the species is common and widespread, but in New Zealand it has been collected only infrequently.

### *Apterygothrips collyerae* new species

Figures \*33, \*105, and \*197

**Female macroptera.** **Colour.** Pale brown; tarsi and antennal segment III pale; tibiae pale on inner margin and base; major setae brown, terminal setae darker. Forewings brown in distal two-thirds.

**Structure.** Head (Figure 33) longer than wide, faintly sculptured near base; cheeks rounded, constricted at base; ocelli small; compound eyes larger dorsally than ventrally; postocular setae about half as long as eye, blunt or slightly expanded at apex; maxillary stylets wide apart, reaching almost to postocular setae; maxillary bridge present. Antennae 8-segmented (Figure 105); segment III with 2 sense cones, segment IV with 2 (often plus an extra smaller one). Pronotum (Figure 33) elongate, with bluntly pointed setae, the epimeral and posteroangular setae longest. Mesopraesternum boat-shaped, not eroded. Metathoracic sternopleural sutures absent. Forelegs reaching beyond head; foretarsal tooth small. Forewing wider at base, with 3 bluntly pointed major sub-basal setae,  $B_3$  the longest, but lacking duplicated cilia. Abdomen: pelta (Figure 197) 'D'-shaped, sculptured; tergites III–VII each with 2 pairs of sigmoid wing-retaining setae; tergite VIII with posteroangular setae finely pointed, posteromarginal setae blunt; tergite IX posteromarginal setae  $B_1$  and  $B_2$  subequal, finely pointed, nearly as long as tube; tube shorter than head.

Dimensions (holotype female macroptera;  $\mu\text{m}$ ). Body length (extended) 1740. Head length 180, median width 147; postocular setae 30. Pronotum median length 122, median width 202; major setae — *am* 5, *aa* 5, *ml* 5, *ep* 34, *pa* 22. Forewing length 650;  $B_3$  setae length 34. Tergite IX setae  $B_1$ , 90. Tube length 112; longest terminal setae 123. Antennal segments III–VIII length 37, 37, 37, 37, 37, and 28 respectively.

**Female microptera.** Wing bud variable, from 34 to 202  $\mu\text{m}$  long, often bearing 3 bluntly pointed sub-basal setae. Tergites IV–VI each with 2 pairs of sigmoid wing-retaining setae, these rarely present on VII.

Dimensions (paratype female microptera (holotype data);  $\mu\text{m}$ ). Body length (extended) 1680. Head length 168. Pronotum median length 124, median width 192. Forewing length 75.

**Male microptera.** Similar to female, but smaller, with wing-retaining setae sometimes not sigmoid or even absent.

Dimensions (1 paratype male microptera, LAM 1506;  $\mu\text{m}$ ). Body length (extended) 1180. Head length 153. Pronotum median length 94. Tergite IX setae —  $B_1$  75,  $B_2$  30,  $B_3$  102. Tube length 87.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, 16 km N of Reefton, dead *Sarothamnus*, 6 February 1979, L.A. Mound 1410 (NZAC).

**Paratypes** (35 female macropterae, 62 female micropterae, 62 male micropterae). NEW ZEALAND. ND – female microptera, Waipoua State Forest, ex *Pinus radiata*, May 1979, D. Prest. AK – 6 female micropterae, 9 male micropterae, 6 km S of Wellsford, *Leptospermum* fruits, 21 Aug 1968, LAM 806; female macroptera, Auckland Domain, *Turdus philomelos* nest 76/78, 9 Oct 1976, R. Healey; male microptera, Whatipu, West Coast beach 32 km W of Auckland, yellow lichen, 25 Feb 1978, LAM 1501; female macroptera, 8 female micropterae, 10 male micropterae, same locality, on *Ulex europaeus* foliage, 24 Feb 1979, AKW 61; male microptera, same locality and date, in marram grass, sand dunes, AKW 65, LAM 1497; female macroptera, same locality and date, in kikuyu grass, AKW 70; female microptera, same data except LAM 1505; female microptera, same locality and date, marram grass, LAM 1497; female macroptera, 5 female micropterae, 8 male micropterae, same locality, dead leafy gorse, 26 Feb 1979, LAM 1506; female microptera, male microptera, Huia, nr Auckland, *Leptospermum scoparium*, 24 Jan 1979, LAM 1351; female microptera, male microptera, Titirangi golf course, ex *Cryptomeria japonica*, 14 Nov 1978, C.D. Scott; male microptera, Pukekohe, ex dead stems of *Solanum aviculare*, 12 Jul 1981, N.A. Martin. BP – 3 female micropterae, Te Puke, Tustain, *Actinidia chinensis*, 25 Apr 1977, M.K. Moloney; 2 male micropterae, Mangorewa Gorge, sedges and grasses, 25 Sep 1972, V.F. Eastop 13542; female macroptera, 7 female micropterae, 12 male micropterae, Matakana I., *Pinus radiata* regeneration, 13 Apr 1972, R. Lawrence; female microptera, male microptera, Temati State Forest 18, 25 Sep 1972, V.F. Eastop 13544. TO – female macroptera, female microptera, 32 km S of Turangi, 750–900 m, dead *Nothofagus*, 19 Feb 1979, LAM 1478; female macroptera, Kaimanawa Forest, 32 km SE of Taupo, *Nothofagus menziesii*, 20 Feb 1979, LAM 1487; female macroptera, Tarawera,

?*Carex*, 23 Sep 1972, V.F. Eastop 13533. WI – female macroptera, Palmerston North, potato foliage, Feb 1930, W. Cottier. SD – female microptera, Tennyson Inlet, *Coprosma* sp., 28 Jan 1979, LAM 1369. NN – female microptera, Appleby, on Sturmer, eating red spider mite summer eggs, 11 Mar 1965, E. Collyer; 2 female macropterae, 4 female micropterae, 4 male micropterae, Nelson, apple leaves and twigs, 1968, E. Collyer; female macroptera, Eve's Valley, *Juncus*, 16 Sep 1972, V.F. Eastop 13490; female macroptera, Lee Valley, beating hawthorn foliage, 22 Mar 1977, AKW; 3 female macropterae, male microptera, Third House, Dun Mountain, on recently dead *Nothofagus fusca* still with fresh leaves, 29 Jan 1979, AKW 10; 2 female micropterae, same date and locality, beating *Ulex europaeus*, AKW 12; female microptera, same locality and date, *Leptospermum scoparium*, LAM 1376; female microptera, Wairoa Gorge, *Ulex europaeus*, 16 Sep 1972, V.F. Eastop 13489; 2 female micropterae, Atawhai, sweeping broom, 13 Apr 1966, A.C. Eyles; female microptera, same locality and date, sweeping browntop; female macroptera, summit ridge, Iron Hill, L. Sylvester, litter 72/193, 18 Nov 1972, J.S. Dugdale; female macroptera, track to L. Sylvester, beating dead branches, 31 Jan 1979, AKW 19; female macroptera, female microptera, sparrow's nest, 7 Aug 1967; male microptera, Nelson, from 2 thrushes' nests 68/229, 6–8 Dec 1967, E.S. Gourlay; female macroptera, Whangamoia Saddle, *Coprosma*, 27 Jan 1979, LAM 1364; male microptera, same locality, sweeping *Nothofagus*, 13 Dec 1980, AKW 147. KA – male microptera, Cape Campbell, base of tussock and sedges, 7 Feb 1979, AKW 58. BR – 3 female macropterae, 2 female micropterae, same data as holotype; 8 female macropterae, similar data except *Juncus*, LAM 1409; female macroptera, 3 km N of Reefton, dead leafy branch, 6 Feb 1979, LAM 1411; male microptera, Tawhai State Forest, 7.3 km S of Reefton, litter 72/75, 28 Jan 1972, J. McBurney; female microptera, 3 km N of Greymouth, *Juncus* and grasses, 12 Sep 1972, V.F. Eastop 13455; female microptera, Moana / Kotuku, *Veinia* and ?*Juncus*, 12 Sep 1972, V.F. Eastop 13454; male microptera, Caplestone, litter 72/112, 8 Mar 1972, J.C. Watt; female microptera, Maruia Saddle, 450 m, on *Cassinia nummularifolia*, 6 Feb 1979, AKW 51; female macroptera, Tawhai State Forest, litter and moss 72/77, 28 Jan 1972, J. McBurney; female macroptera, Mt Robert, 900 m, dead twigs, LAM 1401; female macroptera, male microptera, L. Rotoiti, Nelson Lakes National Park, 600 m, on dead branches in *Nothofagus* forest, 4 Feb 1979, AKW 38. MK – 2 male micropterae, Te Kohai I., L. Pukaki, mixed litter 76/33, 28 Jan 1976, C.M. Smith. CO – female microptera, 4 km N of Lindis

Crossing (Queensberry Dam site), Malaise trap, 26–30 Oct 1979, J.C. Watt; female macroptera, Crown Peak, 1200 m, sweeping tussock grass, 24 Jan 1981, E.W. Valentine & J.S. Noyes. SL – 2 female micropterae, Queen's Park, Invercargill, in *Banksia integrifolia* seedheads, 14 Mar 1979, AKW; female macroptera, 2 female micropterae, male microptera, Invercargill, in seeding *Ulex europaeus*, 15 Mar 1979, AKW; male microptera, same data but beating *Juncus* in paddock. AUSTRALIA. Female microptera, Tasmania, Hobart, Lenah Valley, dead branch, 3 May 1982; female microptera, same data except on bracken, LAM 1700 (BMNH, NZAC).

**Material examined.** Type series, plus 71 non-type specimens (11 female macropterae, 37 female micropterae, 1 male macroptera, 22 male micropterae) (BMNH, NZAC).

ND, AK, WO, BP, TO, WI / SD, NN, KA, BR, WD, MK, CO, SL.

Recorded from as far north as Waipoua State Forest (ND) to Invercargill (SL) in the south, and from sea level to around 900 m a.s.l.

Adults have been taken in a variety of habitats, including grass, birds' nests, *Ulex europaeus*, *Pinus radiata*, *Leptospermum* species, and *Nothofagus* forest.

**Remarks.** This new species was first mentioned by Collyer (1976) under the name *Xylaplothrips* nr. *fuliginosus*, and noted as a predator on the eggs of European red mite (*Panonychus ulmi*). Both adults and larvae showed a preference for feeding on the summer eggs of this mite, and it was found from February to April — occasionally as late as June — on wood together with *P. ulmi* eggs. Elsie Collyer (pers. comm.) has observed this thrips in a restricted part of DSIR's Appleby Research Orchard (NN) since 1965, and noted that all stages occur, but never in great numbers. Since it has been widely collected from both living and dead plant material, it is probably predatory on a wide range of mites (or other small arthropods).

Despite the widespread distribution of *collyerae* in New Zealand, the recent collection of two specimens in Tasmania suggests that it might be an immigrant. A predatory species such as this would probably have less difficulty in establishing a population than a phytophagous species after crossing the Tasman Sea (Mound & Walker 1982). Equally, *collyerae* might have been transported from some other part of the world during the last century on nursery stock (Mound 1983).

### *Apterygothrips kohai* new species

Figures \*34, \*106, and \*198

**Colour (all morphs).** Pale brown; tube darker medially; antennal segments III–VI grading from yellow to yellowish brown; tarsi and apices of tibiae yellow. Major setae brown. Forewings (when present) clear.

**Structure. Female microptera.** Variable in size. Head (Figure 34) slender, elongate, slightly constricted at base but not behind eyes, with faint lines of sculpture near posterior margin; ocelli reduced, sometimes absent; compound eyes larger dorsally than ventrally; postocular setae bluntly acute, wide apart; maxillary stylets about one-third of head width apart, reaching about halfway towards postocular setae; maxillary bridge stout. Antennae (Figure 106) 8-segmented; segment IV broader than III, segments V–VII elongate; segment III with 1 sense cone, segment IV with 2. Pronotum (Figure 34) elongate, with weak median thickening; apices of major epimeral and posteroangular setae variably blunt to acute, remaining major setae short; epimeral sutures complete; praepectal plates about as long as wide. Mesopraesternum eroded, usually incomplete medially. Metanotum scarcely sculptured; sternopleural sutures absent. Forelegs (Figure 34) short, reaching as far as head; foretarsal tooth small. Wing buds small, sometimes bearing 1 or 2 small setae. Abdomen: pelta (Figure 198) 'D'-shaped, with sculpture faint or absent; tergites II–VII each with 2 pairs of wing-retaining setae, these usually very small, but sometimes posterior pair sigmoid; tergite VIII posteroangular and posteromarginal setae acute; tergite IX posteromarginal setae usually acute but sometimes blunt, about half as long as tube; tube short, about half as long as head.

Dimensions (holotype female microptera and, in parentheses, large paratype female microptera (data as holotype);  $\mu\text{m}$ ). Body length (extended) 1730 (2080). Head length 188 (208); median width 127 (138); postocular setae 30 (28). Pronotum median length 132 (142), median width 180 (188); major setae — *am* 13, *aa* 18, *ml* 15, *ep* 28, *pa* 25, *pm* 7. Forewing length 28. Tergite IX setae *B*<sub>1</sub> 60 (64). Tube length 102 (115); longest terminal setae 120. Antennal segments III–VIII length 42 (45), 48 (48), 45 (48), 45 (45), 42 (42), and 30 (28) respectively.

**Female macroptera.** Forewing parallel-sided, with 3 sub-basal setae, *B*<sub>3</sub> the longest, but without duplicated cilia (? 1 present).

Dimensions (1 paratype female macroptera, Glenorchy State Forest, CO;  $\mu\text{m}$ ). Body length (extended) 2100. Head length 205. Pronotum

median length 150, median width 210. Forewing length 720; sub-basal setae  $B_3$  52.

**Male microptera.** Smaller than female, and variable in size. Large foretarsal tooth present.

Dimensions (1 large paratype male microptera (data as holotype);  $\mu\text{m}$ ). Body length (extended) 1420. Head length 170. Pronotum median length 124. Tergite IX setae —  $B_1$  60,  $B_2$  28,  $B_3$  90. Tube length 85.

**Type data.** **Holotype** female microptera, NEW ZEALAND, MK, Te Kohai Island, Lake Pukaki, tussock litter 76/32, 28 January 1976, C.M. Smith (NZAC). **Paratypes** (100 female micropterae, 3 female macropterae, 1 male macroptera, 48 male micropterae). MB — female macroptera, male macroptera, Awatere Valley, Hodder Hut, 1410 m, base of snow grass, 15 Feb 1982, AKW 159. MK — 77 female micropterae, female macroptera, 30 male micropterae, same data as holotype; 3 female micropterae, same data except mixed litter 76/33. CO — 4 female micropterae, male microptera, centre of Cromwell beetle reserve, litter 75/136, 14 Mar 1975, J.C. Watt; 2 female micropterae, male microptera, same data except litter and dead leaves of *Poa colensoi* 75/132; female microptera, Alexandra, at base of tussock, 22 Oct 1980, AKW; male microptera, Kawarau Gorge, Roaring Meg, Upper Power House, moss 75/100, 17 Mar 1975, J.C. Watt; female microptera, The Remarkables, Nevis Burn, 975 m, plant debris 79/129, 27 Oct 1979, J.C. Watt; 10 female micropterae, 7 male micropterae, Carrick Range, 1400 m, Watt's Rock, litter 79/39, 11 Mar 1979, J.C. Watt; 5 male micropterae, Lindis Pass, 762 m, litter 71/10, 11 Jan 1971, J.S. Dugdale; female microptera, 2 male micropterae, Lindis Pass, 971 m, litter 71/9, 11 Jan 1971, J.S. Dugdale; female microptera, female macroptera, Glenorchy State Forest, Dart R., sweeping beech / totara forest, 21 Jan 1981, E.W. Valentine & J.S. Noyes (BMNH, NZAC).

**Material examined.** Type series, plus 80 non-type specimens (1 female macroptera, 49 female micropterae, 30 male micropterae) (BMNH, NZAC).

— / MB, MK, CO.

Apparently associated mainly with high-country tussock grassland.

Recorded up to 1400 m (Carrick Range, CO).

Collected in January, March, and October.

**Remarks.** The type locality has subsequently been flooded in the course of hydro-electric power development.

### *Apterygothrips sparsus* new species

Figures \*35, \*107, and \*199

**Female microptera.** **Colour.** Body brown; antennal segment III yellowish; tibiae either entirely yellow or at least apical half yellow; tarsi yellow. Major setae pale brown, terminal setae browner.

**Structure.** Head (Figure 35) similar to that of *kohai* but lacking sculpture; ocelli developed; post-ocular setae with expanded apices. Antennae (Figure 107) 8-segmented; segments V–VII not elongate; segment VIII relatively broad at base; segment III with 1 sense cone, segment IV with 3. Pronotum (Figure 35) elongate; anteromarginal setae very short; other major setae elongate, with expanded apices; discal setae absent; praepectal plates large. Mesopraesternum complete. Metathoracic sternopleural sutures absent. Foretarsal tooth very small. Wing buds bearing 1–3 small setae with expanded apices. Abdomen: pelta (Figure 199) rounded at apex; tergites II–VII each with 2 pairs of wing-retaining setae, sigmoid from III to VI; tergite VIII posteroangular setae expanded at apex, postero-marginal setae blunt; tergite IX posteromarginal setae  $B_1$  nearly as long as tube, with expanded apices, shorter than the finely pointed  $B_2$ ; setae  $B_2$  and  $B_3$  long, finely acute; tube shorter than head.

Dimensions (holotype female microptera;  $\mu\text{m}$ ). Body length (extended) 1900. Head length 203, median width 127; postocular setae 35. Pronotum median length 115, median width 168; major setae — *am* 7, *aa* 30, *ml* 23, *ep* 45, *pa* 32, *pm* 5. Tergite IX setae  $B_1$  88. Tube length 103; longest terminal setae 135. Antennal segments III–VIII length 43, 45, 45, 43, 32, and 18 respectively.

**Female macroptera.** Similar in colour and structure to microptera; forewings clear, slightly constricted medially, bearing 3 subequal major sub-basal setae with expanded apices, and with 1–4 duplicated cilia.

**Type data.** **Holotype** female microptera, NEW ZEALAND, MB, Wairau Valley, 16 km W of Blenheim, sedges, 7 February 1979, L.A. Mound 1426 (NZAC). **Paratypes** (3 female macropterae, 62 female micropterae). ND — female microptera, Mangamuka summit, 400 m, litter 76/101, 13 Dec 1976, V.A. May. AK — female microptera, The Noises, Motuhorapapa I., beating, 23 Oct 1976, D.W. Helmore; female macroptera, female microptera, same data except litter 79/28, 26 Feb 1979, J.M. Clearly; female microptera, same data except litter 77/188, 15 Dec 1977, J.C. Watt; female microptera, Whangaparaoa Peninsula, Shakespeare Farm Park, *Gerygone igata* nest 79/138, 10 Nov

1979, M.F. Tocker; 7 female micropterae, Mangere sewage pond island, *Larus dominicanus* nest 76/111, 10 Dec 1976, S.M. Reed; 2 female macropterae, 45 female micropterae, same data except 76/87, 29 Oct 1976. HB – female microptera, Napier, estuary, sweeping grasses, 16 Mar 1980, C.F. Butcher. MB – 2 female micropterae, same data as holotype. CO – female microptera, Cromwell, Kawarau Gorge, Roaring Meg, Upper Power House, litter 77/166, 17 Nov 1977, J.C. Watt (BMNH, NZAC).

**Material examined.** Type series only.

ND, AK, HB / MB, CO.

Taken mainly in grassy habitats, and in birds' nests.

Collected in February, March, and October–December.

**Remarks.** Males are unknown.

### *Apterygothrips viretum* new species

Figures \*36, \*108, and \*200

**Female macroptera. Colour.** Body brown; tarsi slightly paler; fore tibiae sometimes pale; tube darker at base. Antennal segment III pale at extreme base, sometimes entirely pale. Forewings pale, darker around sub-basal setae.

**Structure.** Head (Figure 36) slender, elongate, slightly constricted behind eyes and at base, with faint lines of sculpture near base; ocelli well developed; compound eyes larger dorsally than ventrally; postocular setae pointed but not finely acute; maxillary stylets about one-third of head width apart, reaching nearly to postocular setae; maxillary bridge stout. Antennae (Figure 108) 8-segmented; segment III with 2 sense cones, segment IV usually with 2, rarely 3. Pronotum (Figure 36) with major setae acute to bluntly acute, anteromarginal and anteroangular setae short; praepectal plates present. Mesopraesternum broadly boat-shaped, never eroded. Metanotum faintly sculptured anterolaterally; metathoracic sternopleural sutures reaching almost halfway to hind coxae. Forelegs (Figure 36) reaching beyond head; foretarsal tooth present, arising near apex. Forewings parallel-sided, bearing 3 major sub-basal setae,  $B_1$  shortest, but with no duplicated wing cilia. Abdomen: pelta (Figure 200) faintly sculptured on anterior margin; tergites II–VII each with 1 or 2 pairs of wing-retaining setae, the anterior pair smaller or often absent; tergite VIII with posteroangular and posteromarginal setae acute; tergite IX posteromarginal setae acute, nearly as long as tube.

Dimensions (holotype female macroptera;  $\mu\text{m}$ ). Body length (extended) 2295. Head length 244, median width 145; postocular setae 53. Pronotum median length 150, median width 206; major setae —  $am$  –,  $aa$  8,  $ml$  8,  $ep$  38,  $pa$  33. Forewing length 780; major sub-basal setae  $B_3$  30. Tergite IX setae  $B_1$  97. Tube length 138; longest terminal setae 120. Antennal segments III–VIII length 58, 52, 52, 50, 50, and 33 respectively.

**Female microptera.** Similar to macroptera, but ocelli small; wing bud bearing 1 or 2 small setae; wing-retaining setae slightly shorter, straight.

Dimensions (1 paratype female microptera (holotype data);  $\mu\text{m}$ ). Body length (extended) 2070. Head length 234. Pronotum median length 135, median width 192. Forewing length 75. Tube length 124.

**Male microptera.** Similar to female, but tergite IX posteromarginal setae  $B_2$  short, stout.

Dimensions (1 paratype male microptera (holotype data);  $\mu\text{m}$ ). Body length (extended) 1500. Head length 193. Pronotum median length 112, median width 157. Tergite IX setae —  $B_1$ , 86,  $B_2$  36,  $B_3$  88. Tube length 103.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, MB, Taylor's Pass, 225 m, 24 km S of Blenheim, *Juncus*, 7 February 1979, L.A. Mound 1422 (NZAC). **Paratypes** (5 female macropterae, 45 female micropterae, 22 male micropterae). AK – female microptera, Sharp's Bush, Waitakere Range, dead *Leptospermum scoparium*, 21 Jan 1979, LAM 1344. NN – female microptera, Nelson side of Rai Saddle, ?*Bromus*, 17 Sep 1972, V.F. Eastop 13497; female microptera, Nelson, Boulder Bank, base of grass, 27 Jan 1979, LAM & AKW; 4 female micropterae, male microptera, same data but grass and sedges on salt marsh, LAM 1365; 15 female micropterae, female macroptera, 6 male micropterae, Farewell Spit, 16 km W of Collingwood, 1 Feb 1979, LAM 1393. SD – female macroptera, Tennyson Inlet, Tuna Bay, sweeping grasses and rushes in grazed area, 2 Feb 1978, AKW. MB – 4 female micropterae, 2 male micropterae, same data as holotype; 3 female micropterae, female macroptera, 5 male micropterae, same data but base of *Juncus*, LAM 1422, AKW 52; female microptera, male microptera, Molesworth, 900 m, moss 68/87, 21 Mar 1968, J.C. Watt; 2 female micropterae, male microptera, lower Awatere Valley, base of *Juncus*, 7 Feb 1979, LAM & AKW 56. KA – 2 female micropterae, 3 male micropterae, Cape Campbell, 32 km SE of Blenheim, base of grass, 7 Feb 1979, LAM 1423; 4 female micropterae, male microptera, same data

but base of tussock in very dry pasture, AKW 57. BR – female macroptera, St Arnaud, 600 m, sweeping swampy grassland, 9 Dec 1980, AKW 142; 2 female microptera, same locality, 12 Dec 1980, AKW 145; 3 female microptera, female macroptera, L. Rotoroa, 11 Dec 1980, AKW 144; female microptera, Mt Robert, 900 m, 10 Dec 1980, sweeping grass and tussock, 10 Dec 1980, AKW 143. MC – female microptera, Brooklands Lagoon, grass and sedge tuft, 9 Sep 1972, V.F. Eastop 13440. MK – 2 male microptera, Te Kohai I., L. Pukaki, mixed litter 76/33, 28 Jan 1976, C.M. Smith (BMNH, NZAC).

**Material examined.** Type series, plus 11 non-type specimens (5 female microptera, 6 male microptera) (BMNH, FRNZ, NZAC).

AK, TK / NN, SD, MB, KA, BR, MC, MK, CO, SL.

Commonly associated with wet, grassy habitats up to about 900 m a.s.l., particularly in the South Island.

Collected in January–March, September, and December.

**Remarks.** A macropterous female from Rocklands (CO) has been studied which may also represent *viretum* but differs from the above description in having four sense cones on antennal segment IV.

### Genus *Azaleothrips* Ananthakrishnan

*Azaleothrips* Ananthakrishnan, 1964: 220–221. Type-species *Azaleothrips amabilis* Ananthakrishnan, by monotypy.

Five species have been described in this genus (Okajima 1978, Chen 1980). All are from the Oriental Region (India, Thailand, Indonesia, Taiwan, Japan), and all are associated with dead leaves and twigs. They are very similar to *Streptoerhrips* species (pp. 78–79) in the form of the setae and body sculpture. *Azaleothrips* species have antennal segment VIII present but closely joined to segment VII, the praepectal plates present, and the  $B_1$  and  $B_2$  setae on tergite IX of equal length, with expanded apices. In contrast, *Streptoerhrips* species have antennal segments VII and VIII fused, the praepectal plates absent, and the  $B_2$  setae on tergite IX long and acute (Okajima 1976). The new species described below is intermediate between these two genera: antennal segments VII and VIII are fused (except on the right antenna of one of the five available specimens, in which a partial suture is developed), the praepectal plates are apparently absent, and the  $B_2$  setae on tergite IX are expanded

and similar to the  $B_1$  setae. The first two of these characters are 'loss characters', and in view of the general reduction in sculpture and setation of *neatus*, greater weight is placed on the condition of the tergite IX setae in allocating this species to a genus. It is therefore described in genus *Azaleothrips*. However, it differs from all other species of *Azaleothrips* — as well as *Streptoerhrips* — in having the major setae on the head, median tergites, and pronotum (except the epimerals) short and acute.

### *Azaleothrips neatus* new species

Figures 37, \*109, and 251

**Female microptera.** **Colour** (bleached after 10 years of storage in ethyl alcohol). Pale; antennal segments VI and VII and tube darker.

**Structure.** Head (Figure 37) reticulate, with scattered small, acute setae; postocular setae short; compound eyes directed forwards, prolonged ventrally; maxillary stylets close together, extending to compound eyes; mouth cone rounded. Antennae (Figure 109) 7-segmented; segments III–VII with distinct pedicels; segments III and IV each with 2 sense cones. Pronotum (Figure 37) faintly sculptured on anterior and posterior margins; major setae short, scarcely twice as long as discal setae; epimeral setae greatly expanded, the remainder acute. Praepectal plates apparently absent; metathoracic sternopleural sutures absent. Metanotum broad, bearing up to 7 pairs of subequal discal setae. Foretarsal tooth absent. Forewing lobe variable in size, bearing up to 4 acute setae. Abdomen: pelta faintly sculptured; tergites II–VII transversely sculptured, each with 2 pairs of acute posteromarginal setae, the lateral pair stouter than the median pair and about twice as long (Figure 251); tergite IX posteromarginal setae  $B_1$  and  $B_2$  subequal, expanded at apex, about half as long as tube; sternites II–VII with a row of up to 6 pairs of discal setae, and with lateral marginal setae short.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 1400. Head length 170, median width 170; postocular setae 6. Pronotum length 110, median width 210; major setae — *am* 10, *aa* 15, *ml* 10, *ep* 12, *pa* 10. Tergite IX setae —  $B_1$  45,  $B_2$  48,  $B_3$  75. Tube length 110; longest terminal setae 140. Wing lobe length 60. Antennal segments III–VII length 45, 35, 40, 40, and 55 respectively.

**Type data.** **Holotype** female microptera, NEW ZEALAND, CO, Dunstan Range, 1585 m, swards 72/3, 13 January 1971, J.S. Dugdale (NZAC). **Paratypes** (4 female micropterae): same data as holotype (BMNH, NZAC).

**Material examined.** Type series only.  
— / CO.

**Remarks.** Known only from the type series.

### Genus *Baenothrips* Crawford

*Baenothrips* Crawford, 1948: 39. Type-species *Baenothrips guatemalensis* Crawford, by monotypy.

Mound (1972a) treated four other genera as synonyms of *Baenothrips*, and referred a total of nine species to the genus. Two of these species are from Australia, and one of them also occurs in New Zealand; the others are found in various parts of the tropics. This genus is a member of the tribe Urothripini, the species of which have the tube and anal setae exceptionally long. Most individuals are wingless, and are usually found in leaf litter. This group was treated as a separate family by earlier workers, and even as a distinct suborder, the Poly-stigmata — the latter name derived from a faulty interpretation of the abdominal dorsoventral muscles as “abdominal spiracles”.

### *Baenothrips moundsi* (Stannard)

Figures 38, 110, and 284

*Transithrips moundsi* Stannard, 1970: 121–122. **Holotype** female, AUSTRALIA (ANIC) [examined].

**Colour (all morphs).** Head, pronotum, and mesonotum dark brown. Abdomen pale, with brown markings on lateral and median areas. Legs usually pale, with brown markings; fore femora sometimes entirely brown or entirely pale; fore tibiae pale in males. Antennal segments I and VI–VIII brown, II–IV pale, V either pale or brown. Tergite IX with dark margins; tube darker at apex. Major setae pale; epimeral and terminal setae brown. Forewings (when present) pale. Body pigment often red.

**Structure. Female aptera.** Head (Figure 38) longer than wide; dorsal surface tuberculate; anterior margin overlying bases of antennae, bearing 3 pairs of long, expanded setae, of which the median pair is longest and the 2 lateral pairs arise close together; compound eyes small, usually with 5 or 6 facets dorsally and 3 ventrally; no ocelli nor postocular setae; maxillary stylets about one-third of head width apart, reaching to compound eyes; maxillary bridge present. Antennae (Figure 110) 8-segmented; segment III with a distinct pedicel, segments VII and VIII closely joined; segment III without sense cones, segment IV with 2 long sense cones. Pronotum (Figure 38) strongly sculptured,

with 1 pair of short, stout epimeral setae; praepectal plates small, lateral. Mesonotum striate anteriorly. Metanotum with scattered small setae, unsculptured; metathoracic sternopleural sutures absent; metathoracic epimeral setae similar to prothoracic epimerals. Abdomen: tergite I broad, not reduced to a pelta; tergites faintly sculptured medially, with a transverse row of discal setae; tergite IX (Figure 284) about twice as long as VIII; tube exceptionally long and slender; terminal setae long, fine, the dorsal pair only half as long as the lateral 2 pairs.

**Female macroptera.** Similar to aptera, but tergites II–VII with wing-retaining setae; forewings narrow, broader in proximal third, with no major sub-basal setae; wing cilia widely spaced, without duplicated cilia.

Dimensions (1 female aptera;  $\mu\text{m}$ ). Body length (extended) 1651. Head length 185, median width 165; median seta 64; lateral seta 45. Pronotum length 115, median width 195; major setae *ep* 30. Tube length 284; longest terminal seta 660. Antennal segments III–VIII length 33, 27, 27, 30, 27, and 18 respectively.

**Male aptera.** Similar to female, but smaller; head with only 1 pair of lateral setae on anterior margin; no sternal glandular areas.

Dimensions (male aptera;  $\mu\text{m}$ ). Body length (extended) 1200. Head length 142. Pronotum median length 90. Tube length 210.

**Material examined.** 264 female apterae, 1 female macroptera, 61 male apterae (AMNZ, BMNH, NMNZ, NZAC).

Three Kings Is / ND, AK, CL, WO, TK, TO, BP, HB, WN / SD, MB, KA, NN, BR, MC, CO, DN, FD / Chatham Is.

Collected throughout the year.

**Remarks.** *B. moundsi* is found usually at the base of grasses, although it also occurs in smaller numbers on dead twigs and branches. Mound (1972a) suggests that the habit of climbing up twigs enables even the apterae to be distributed by winds. Populations may sometimes be very large. On Motu-horopapa Island (AK) an area of second-growth coastal forest was regularly sampled by collecting leaf litter and twigs on a two-monthly basis from 1977 to 1979. On five occasions the one site produced high numbers of specimens: December 1977 – 597 adults, 220 larvae; February 1978 – 787 adults, 206 larvae; April 1978 – 1975 adults, 141 larvae; April 1979 – 813 adults, 69 larvae; October 1979 – 659 adults, 558 larvae.

This species is probably native to Australia, where it is widespread between Adelaide, Brisbane, and Perth.

## Genus *Cartomothrips* Stannard

*Cartomothrips* Stannard, 1962: 38. Type-species *Cartomothrips browni* Stannard, by original designation.

This genus was erected for two species, *browni* from Australia and *manukae* from New Zealand. The latter species is very common in this country, but Mound & Walker (1982a), in describing two further members of the genus — *laughlini* from Australia and *neboissi* from both Australia and New Zealand — suggested that *manukae* should be looked for in Tasmania. Subsequently Mound (1983) discovered *manukae* near Hobart, living on its typical host plant *Leptospermum scoparium*, which is also native to Tasmania. It thus appears that two species of *Cartomothrips* have crossed the Tasman Sea, possibly on wind currents, and established themselves in New Zealand. In contrast, Arnaud (1983) has recently collected a few specimens of this genus in California. These may represent a further undescribed species, presumably introduced on nursery stock from Australia.

The species of *Cartomothrips* appear to be fungus-feeders rather than phytophages; they are usually found on the twigs of their host plant in association with a black fungus. The genus was compared originally to *Teuchothrips*, but that genus, in common with its relative *Liothrips*, comprises purely leaf-feeding species. Moreover, unlike *Liothrips* and *Teuchothrips*, the species of *Cartomothrips* have three sense cones on the third antennal segment instead of only one, and these genera may therefore be only distantly related.

*Cartomothrips* species are always macropterous, and share the following characters. Body brown; base of antennal segment III pale. Antennae 8-segmented; segment IV rather truncate at apex; segments III and IV each bearing 3 sense cones. Head with large eyes; cheeks more or less constricted at base, sometimes with 1 or more pairs of short, stout setae; postoccipital ridge with a pair of small projections; dorsal surface moderately sculptured; postocular setae relatively distant from eyes; ocelli well developed; maxillary stylets retracted almost to eyes, about one-fifth of head width apart; maxillary guides well developed; maxillary bridge sometimes present; mouth cone short and broadly rounded. Pronotum exceptionally short and transverse in females; epimeral sutures complete; epimeral setae longest; anteromarginal setae always short; praepectal plates absent, but sometimes faintly indicated; probasisternal plates large. Mesonotum transverse; lateral setae moderately long; mesopraesternum comprising 2 lateral, triangular sclerites and a poorly defined median sclerite just posterior to spinasternum (Figure 80). Metanotum reticulate, with 1 pair of slender median

setae; anapleural sutures complete; metathoracic sternopleural sutures long, curved (Figure 155). Fore tarsi with tooth well developed in both sexes; fore femora enlarged in large males, with posterior margin of femora angulate where it contacts ridged inner surface of fore coxae. Forewings broad, parallel-sided but narrowed at apex, bearing 3 major sub-basal setae; numerous duplicated cilia. Abdomen: pelta reticulate, roughly triangular; anterior tergites with posteroangular setae absent or small, and arising from pleurotergites; tergites II–VII each with 2 pairs of wing-retaining setae; females with tergite IX setae  $B_1$  slightly shorter than  $B_2$ . Tube length varying with gender and body size; terminal setae long. Sternites with 1 row of discal setae; sternite VIII of male with a large glandular area.

## *Cartomothrips manukae* Stannard

Manuka thrips

Figures 39, 80, 111, 155, 201, and 261

*Cartomothrips manukae* Stannard, 1962: 40. **Holotype** female, NEW ZEALAND, SL, Dusky Forest (repository unknown; paratype female in BMNH).

**Female macroptera. Colour.** Body brown, tube darker; base of antennal segment III and sometimes fore tarsi paler. Major setae pale brown; terminal setae of tube dark. Wings pale brown, darker at base; fringe cilia darker.

**Structure.** Variable in size. Head (Figure 39) about as long as tube, slightly constricted at base; cheeks with a few prominent setae, particularly in larger specimens; posterior margin with a pair of postoccipital projections; postocular setae bluntly pointed, arising well behind eyes; maxillary stylets close together, retracted about halfway into head; maxillary bridge faintly visible. Antennae (Figure 111) 8-segmented; segments III and IV each with 3 pairs of short sense cones. Pronotum (Figure 39) transverse, its median length short, particularly in small females; major setae bluntly pointed, the epimeral setae longest; praepectal plates absent. Mesonotum transverse, with a pair of bluntly pointed setae laterally; mesopraesternum (Figure 80) divided into 2 triangular plates with rounded angles, the median distance between their bases about one-third of mesoeusternum margin; mesoeusternum usually broadly rounded on anterior margin. Metanotum (Figure 155) strongly reticulate but faintly so between median setae, which are as long as mesonotal lateral setae or longer; forewings with 3 subequal major sub-basal setae and 25–43 duplicated cilia. Abdomen: pelta (Figure 201) triangular; tergites strongly sculptured; tergite II with no posteroangular setae, tergites III–VII with

posteroangular setae on pleurotergites; tergite IX posteromarginal setae pointed, nearly as long as tube,  $B_2$  longer than  $B_1$ ; tube long, its sides straight but slightly constricted at apex; terminal setae as long as tube, finely pointed.

Dimensions (1 large and, in parentheses, 1 small female macroptera;  $\mu\text{m}$ ). Body length (extended) 3460 (2400). Head length 350 (280), median width 272 (233); postocular setae 75 (45). Pronotum median length 171 (110), median width 420 (300); major setae — *am* 7 (7), *aa* 45 (15), *ml* 35 (27), *ep* 105 (45), *pa* 55 (30), *pm* 18 (18). Metanotum median setae 68 (33). Forewing length 1490 (1080); sub-basal setae  $B_3$  68 (52). Tergite IX setae  $B_1$  340 (240). Tube length 360 (260); longest terminal setae 390 (315). Antennal segments III–VIII length 118 (90), 105 (75), 90 (73), 82 (62), 75 (60), and 48 (45) respectively.

**Male macroptera.** Similar to female, but pronotum more elongate medially, and tube relatively longer; tergite IX posteromarginal setae  $B_2$  about as long as  $B_1$ ; sternite VIII (Figure 261) with a large, transverse glandular area not reaching to anterior or posterior margin. Large males with foretarsal tooth and fore femora swollen.

Dimensions (1 large and, in parentheses, 1 small male macroptera;  $\mu\text{m}$ ). Body length (extended) 3600 (2400). Head length 360 (285). Pronotum median length 245 (124). Tergite IX setae —  $B_1$  330 (270),  $B_2$  330 (172),  $B_3$  330 (240). Tube length 450 (300).

**Material examined.** 125 female macropterae, 63 male macropterae (BMNH, FRNZ, NMNZ, NZAC).

Three Kings Is / ND, AK, CL, BP, TO, TK, WN / SD, NN, BR, KA, MC, SC, MK, CO, DN, SL / SI.

Adults and larvae beaten in large numbers from dead branches, twigs, and fruit capsules of *Leptospermum ericoides*, *L. scoparium*, and *Metrosideros perforata*, which are usually blackened by a fungus.

Collected throughout the year.

**Remarks.** Fungal spores have not been observed in any of the specimens studied, so presumably *manukae* feeds on fungal hyphae or the liquid breakdown products of hyphal digestion.

The earliest available specimen was collected in 1941, and Mound & Walker (1982a) noted how remarkable it was that such a conspicuous and abundant insect was not collected earlier by entomologists in New Zealand. Helson (1952) found this species in 1951 in manuka seed capsules in the Tararua Range. He illustrated a specimen under the name "*Eugynothrips* species", and claimed that he had previously seen it infesting strawberry beds

around Christchurch in 1934. The species was not formally named until Stannard (1962) described it along with the Australian species, *browni*. Mound (1983) recorded the species from Hobart, Tasmania on *Leptospermum scoparium*, and suggested that both the insect and the plant were probably natural introductions to New Zealand across the Tasman Sea.

### *Cartomothrips neboissi* Mound & Walker

Figures 40, 81, 156, and 262

*Cartomothrips neboissi* Mound & Walker, 1982: 311–312.

**Holotype** female, AUSTRALIA (ANIC) [examined].

**Female macroptera. Colour.** Body dark brown; tarsi and base of antennal segment III paler; wings with extreme bases brown.

**Structure.** Similar to *manukae*, but cheek setae less prominent, and postoccipital projections weakly developed (Figure 40); anterior margin of mesoepisternum sharply angulate, and mesopraesternal plates sharply triangular, the median distance between their bases much less than one-third of mesoepisternal margin (Figure 81); metanotum (Figure 156) with strong reticulation between median setae, which are shorter than mesonotal lateral setae; forewing major sub-basal setae  $B_3$  longer than  $B_1$  and  $B_2$ ; tergite IX posteromarginal setae  $B_1$  just over half as long as tube.

Dimensions (holotype female macroptera;  $\mu\text{m}$ ). Body length (extended) 3260. Head length 360, median width 264; postocular setae 75. Pronotum median length 172, median width 375; major setae — *am* 15, *aa* 52, *ml* 50, *ep* 90, *pa* 60, *pm* 15. Forewing length 1220; sub-basal setae  $B_3$  126. Tergite IX setae  $B_1$  159. Tube length 274; longest terminal setae 270. Antennal segments III–VIII length 94, 88, 78, 72, 58, and 48 respectively.

**Male macroptera.** Similar to *manukae*, but sternite VIII glandular area almost reaching to anterior and posterior margins (Figure 262); tergite IX posteromarginal setae  $B_2$  exceptionally short and fine.

Dimensions (1 large and, in parentheses, 1 small paratype male;  $\mu\text{m}$ ). Body length (extended) 3090 (2300). Head length 345 (284). Pronotum median length 214 (142). Tergite IX setae —  $B_1$  183 (128),  $B_2$  52 (34),  $B_3$  240 (195).

**Material examined.** 31 female macropterae, 12 male macropterae (ANIC, BMNH, NZAC).

ND, AK, CL, GB / —.

Recorded on a wider variety of plants than *manukae*, including *Dacus carota*, *Solanum mauritianum*, *Muehlenbeckia*, and *Leptospermum*.

Collected in all months except March.

**Remarks.** *C. nevoissi* was described from Victoria and New South Wales, Australia, as well as from New Zealand. In Victoria it was collected from *Leptospermum ericoides*. Mound & Walker (1982a) suggested that, as it is collected only infrequently, and only in the north of the North Island, it may be introduced sporadically from Australia on the wind, and is unable to maintain large populations.

### *Deplorothrips* new genus

Type-species *Deplorothrips bassus* new species.

Small phlaeothripine species with 8-segmented antennae; segment VIII broad basally; segments III and IV each with 2 or 3 sense cones. Head almost parallel-sided, bearing a few stouter cheek setae; postocular setae long; maxillary stylets wide apart, low in head; mouth cone rounded. Pronotum with anteromarginal setae reduced; epimeral sutures complete; praepectus absent. Mesopraesternum divided into 2 lateral triangles. Foretarsal tooth present in both sexes. Metathoracic sternopleural sutures present. Forewings (when present) with duplicated cilia, weakly constricted medially. Pelta small, variable; tergites with 2 pairs of wing-retaining setae; tergite IX *B*, setae shorter than tube; sternites with a row of discal setae. Male: *B*, setae on tergite IX short, stout; sternite VIII with a glandular area; sternites III–VII with specialised reticulate areas laterally.

Most of the characters listed above are shared with *Hoplothrips*, but *Deplorothrips* differs in having the stylets low in the head and the terminal antennal segments not constricted from each other. Only one species with maxillary stylets not deeply retracted into the head is currently placed in *Hoplothrips* — *smithi* Hood, from North America. That, however, has antennal segment VIII lanceolate, and moreover the pronotal anteromarginal setae are well developed. *Psolidothrips* includes a further group of *Hoplothrips*-like species, but these are usually pale in colour, with the head compressed dorsoventrally and without stout cheek setae.

*Deplorothrips* is erected for a species or species-group apparently endemic to New Zealand, which is widespread on dead wood in native habitats and probably associated with a *Stereum*-like white fungus. Unfortunately it is not possible at present to decide whether the available material represents one highly variable species or a series of intergrading species, each of which is itself variable. The type-species, *bassus*, is restricted to a single sample con-

taining macropterae and micropterae of both sexes, but showing little further variation, and it is to this sample alone that the formal description below applies. More than 200 additional specimens have been studied, including several series of 10–25 individuals, but these are all excluded from the type series. These specimens are all similar to *bassus* in most characters, but there is considerable variation (see Table 1) both between and within populations, such that we do not feel justified in recognising further new species. Genetic differences almost certainly exist between these structurally disparate samples, but further field work would be required to determine their biological and taxonomic significance. Mound (1972a) refers to a similar problem with interpopulation variation in Australian leaf-litter thrips of the genus *Biconothrips*.

### *Deplorothrips bassus* new species

Figures 41, \*112, \*157, \*202, and 263a–h

**Female macroptera.** **Colour.** Brown; extreme base of antennal segment III, tarsi, distal half of fore tibiae, and apex of middle and hind tibiae yellow; forewings shaded, pale at apex; major setae pale brown.

**Structure.** Head (Figure 41) faintly sculptured, with up to 3 stout cheek setae on lateral margins; compound eyes larger dorsally than ventrally; ocellar area slightly raised; postocular setae wide apart, blunt to expanded at apex. Antennae (Figure 112) with segment VIII lacking a distinct pedicel and closely joined to segment VII; segments III and IV each bearing 3 sense cones. Pronotum (Figure 41) sculptured on posterior margin; apices of major anteroangular and epimeral setae expanded; mid-lateral setae blunt to expanded; posteroangular setae acute; anteromarginal setae acute, almost as short as scattered discal setae. Metanotum (Figure 157) with lateral lines of sculpture, faintly reticulate medially and basally; median pair of setae acute, wide apart, almost on raised submarginal area; metathoracic sternopleural sutures short. Forewings with 10 or 11 duplicated cilia; major sub-basal setae subequal, *B*<sub>1</sub> and *B*<sub>2</sub> blunt, *B*<sub>3</sub> acute. Abdomen: pelta (Figure 202) reticulate, with small lateral lobes; tergites II–VIII each with 2 pairs of wing-retaining setae, these curved on II, sigmoid on III–VII; tergite IX posteromarginal setae *B*<sub>1</sub> bluntly expanded.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2100. Head length 230, median width 180; postocular setae 75. Pronotum length 135, median width 240; major setae — *am* 15, *aa* 35, *ml* 35, *ep* 80, *pa* 60. Tergite IX setae — *B*<sub>1</sub> 90, *B*<sub>2</sub>

**Table 1** Variation in populations of *Deplorothrips*  
(condition of setal apices: a, acute; b, blunt; e, expanded; ex, greatly expanded; (s), spatulate in male)

Sample number:	1455	1657	1668/214	271	1368	1407	1375	1459	1435	1434	1447(pt)	1447(pt)
Macropterous ♀	9	—	—	1	1	2	3	1	2	1	—	1
Macropterous ♂	2	—	—	—	—	1	—	1	—	1	—	—
Micropterous ♀	6	1	11	—	1	2	—	5	2	—	—	—
Micropterous ♂	9	1	18	—	—	—	2	1	1	—	—	—
Apterous ♀	—	9	—	2	11	—	—	3	1	9	5	4
Apterous ♂	—	5	—	1	4	—	—	—	—	8	3	5
Forewing dupl. cilia	10 or 11	—	—	2-4	3-6	5-7	9	8 or 9	8	5 or 6	—	5
Antennal sense cones:												
on segment III	3	2 or 3	2 or 3	2 or 3	2 or 3	2 or 3	2 or 3	2 or 3	2 or 3	2	2 or 3	2 or 3
on segment IV	3	3	2 or 3	3	2 or 3	2 or 3	3	2 or 3	2 or 3	2	2 or 3	2 or 3
Setae:												
postocular	b/e(s)	a/b/e(s)	a/b/e	b	a/b/e	a/b/e	e	b/e	b/e	b/e(s)	a/b/e	ex
pronotal <i>aa</i>	b/e(s)	a/b/e	a	a/b	a/b/e	b	a/b/e	b/e	b/e	b/e(s)	a/b/e	ex
pronotal <i>ml</i>	a/b/e	a	a	a	a	a	a/b/e	a/b	a/b/e	a/b/e	a	ex
pronotal <i>ep</i>	e	e	b/e	b	b/e	b/e	b/e	b/e	e	b/e	a/b	ex
tergite IX <i>B</i> , Sternal gland of ♂ (Figure 263a-h)	b/e	a/b/e	b	a/b	a/b/e	a/b	a/b/e	b/e	b/e	a/b/e	a/b	ex
	(a, b)	(c)	(c)	(e)	(c, d)	(g)	(c, e)	(b)	(b)	(e, f)	(g)	(h)

120,  $B_3$  110. Tube length 150; longest terminal setae 170. Forewing length 900. Antennal segments III–VIII length 63, 60, 60, 50, 50, and 30 respectively.

**Female microptera.** Similar in colour and structure to female macroptera, but sense cones shorter; ocelli smaller; mesonotum and metanotum broader; forewing lobe 80  $\mu\text{m}$  long, bearing 1 or 2 weakly developed setae; tergites II–VIII wing-retaining setae smaller, curved, not sigmoid.

Dimensions (1 paratype female, LAM 1455;  $\mu\text{m}$ ). Body length (extended) 2200. Head length 240, median width 195; postocular setae 85. Pronotum length 160, median width 280; major setae — *am* 15, *aa* 40, *ml* 45, *ep* 85, *pa* 60. Tergite IX setae —  $B_1$  100,  $B_2$  120,  $B_3$  120. Tube length 150. Antennal segments III–VIII length 65, 60, 60, 50, 50, and 35 respectively.

**Male macroptera** (large). Similar to female macroptera, but postocular setae and major pronotal setae with spatulate apices; foretarsal tooth larger; fore femora swollen; pronotal setae longer; pronotum with a longitudinal median apodeme; tergite VIII posteromarginal setae  $B_1$  shorter; tergite IX posteromarginal setae  $B_2$  shorter, stout, acute; sternites III–VII with paired areas of specialised reticulation laterally; sternite VIII with a thin, transverse glandular area broadening laterally.

Dimensions (1 paratype male, LAM 1455;  $\mu\text{m}$ ). Body length (extended) 2100. Head length 235, median width 180; postocular setae 90. Pronotum length 160, median width 250; major setae — *am* 5, *aa* 60, *ml* 45, *ep* 100, *pa* 60. Tergite IX setae —  $B_1$  90,  $B_2$  45,  $B_3$  105.

**Male microptera.** Similar in colour and structure to female microptera, but foretarsal tooth larger; tergite VIII posteromarginal setae  $B_1$  shorter; tergite IX posteromarginal setae  $B_2$  shorter, stout, acute; sternite VIII with a constricted, sometimes interrupted transverse glandular area broadening laterally (Figure 263a,b). Large specimens: postocular setae longer; foreleg with femora, tibiae, and tarsi enlarged; pronotum with a longitudinal median apodeme; median metanotal area usually more strongly reticulate; sternites III–VII with paired areas of specialised reticulation laterally.

Dimensions (1 paratype male, LAM 1455;  $\mu\text{m}$ ). Body length (extended) 2200. Head length 200, median width 180; postocular setae 90. Pronotum length 230, median width 300; major setae — *am* 10, *aa* 65, *ml* 30, *ep* 100, *pa* 45.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, WO–BP, Te Aroha, beetle galleries, rotten tree trunk, 14 February 1979, L.A. Mound

1455 (NZAC). **Paratypes** (8 female macroptera, 6 female microptera, 2 male macroptera, 9 male microptera): same data as holotype (BMNH, NZAC).

**Material examined.** Type series, plus 208 non-type specimens (123 females, 85 males; see also Table 1). ND – female, 2 males, Poor Knights, Tawhiti Rahi I., sifted litter 80/132, 4 Dec 1980, G. Kuschel; 2 females, Waipoua State Forest, rotten stumps/trees, 20 Sep 1977, D.W. Helmore; male, Waipoua Kauri Forest, beating dead wood, 11 Dec 1983, AKW 347. AK – male, Waitakere Range, Sharp's Bush, dead *Leptospermum scoparium*, 21 Jan 1979, LAM 1344; female, Waitakere Range, sweeping, Dec 1980, J.S. Noyes; male, Waitakere Range, Kauri Knob, dead wood, 22 Jan 1979, LAM 1347; male, Rangitoto I., litter 76/39, 14 Mar 1976, J.C. Watt. CL – 5 females, male, Kirikiri Saddle, 13 km S of Thames, dead branches, 12 Feb 1979, LAM 1435; 10 females, 9 males, same data except dead branches and white fungus, LAM 1434; 4 females, male, Mt Moehau, Ward's Bush, 574 m, moss 79/135, 1 Nov 1977, B.M. May. WO–BP – 2 females, 3 males, Te Aroha, 750 m, dead branches, 14 Feb 1979, LAM 1452; 10 females, 8 males, Te Aroha, 900 m, dead twigs, 14 Feb 1979, LAM 1447. BP – female, 40 km NE of Rotorua, *Cortaria sarmentosa* leaves, 16 Feb 1979, LAM 1466; 9 females, 2 males, Rotorua, mossy branch, 15 Feb 1979, LAM 1459. TO – female, Waituhi Saddle, 24 km E of Turangi, *Weinmannia racemosa*, 20 Feb 1979, LAM 1496; female, 32 km S of Turangi, 750–900 m, dead *Nothofagus*, 19 Feb 1979, LAM 1478; male, 32 km SE of Taupo, Kaimanawa Forest, dead twigs in grass, 20 Feb 1979, LAM 1488. TK – 2 females, Mt Messenger, 530 m, dead twigs and leaves, 15 Dec 1983, AKW 360. SD – male, Ship Cove, 365 m, litter 72/273, 30 Nov 1972, J.S. Dugdale; 13 females, 4 males, Tennyson Inlet, 48 km N of Nelson, dead branch and *Vararia protrusa* fungus, 28 Jan 1979, LAM 1368; male, Okiwi Bay, Malaise trap in second-growth bush, Apr 1984, R.E. Jones. MB – male, Pelorus Bridge, ex *Aristotelia serrata*, 25 Jul 1967, emerged 17 Aug 1967, W 67/62, J.C. Watt. NN – 3 females, 2 males, Dun Mtn, 750 m, 29 Jan 1979, LAM 1375; male, same data but beating foliage, A.K. Walker; female, track to L. Sylvester, Cobb Valley, beating dead branches, 31 Jan 1979, AKW 19. BR – 4 females, male, L. Rotoiti, 600 m, 5 Feb 1979, LAM 1407; 3 females, same locality, dead leafy branch, 8 Feb 1979, LAM 1428; 4 females, male, same locality, on white/pink coral-like fungus on dead *Nothofagus* branch, 4 Jan 1979, AKW 39; female, same locality, beating dead branches, 5 Feb 1979, AKW 45; female, same locality, beating coral-like fungus

on dead *Nothofagus* wood, 25 Sep 1979, A.K. Walker; 2 males, same locality, dead *Nothofagus* wood, 22 Oct 1983, AKW 295; male, same locality, dead *Nothofagus* branches, 20 Dec 1983, AKW 368; male, Fletcher's Creek, litter 72/106, 7 Mar 1972, J.S. Dugdale; male, Capleston Biological Reserve, litter 73/9, 12 Jan 1983, J.C. Watt. WD – female, Mt Hercules, Harihari, cut branches, 25 Apr 1982, LAM 1655; female, Ross, dead *Leptospermum*, 26 Apr 1982, LAM 1652; 2 females, 8 males, 16 km E of Haast, twigs with lichen, 28 Apr 1982, LAM 1668; 9 females, 10 males, same data but AKW 214; 12 females, 4 males, Franz Josef, dead *Coprosma* twigs, 27 Apr 1982, LAM 1657; female, Jackson's Bay, litter, moss, and dead wood 79/89, 23 Sep 1979, A.K. Walker. NC-WD – male, Klondyke Corner, Arthur's Pass, moss, 13 Oct 1970, D.S. Horning. MK – 3 females, male, Mt Cook village, 750 m, dead *Dacrydium* wood, 2 Feb 1983, AKW 271. OL – female, 8 km E of Haast Pass, on dead *Coprosma*, 28 Apr 1982, AKW 217. DN – female, Outram, Malaise trap, 1–14 Apr 1976, A.C. Harris (BMNH, NZAC).

ND, AK, CL, WO, BP, TO, TK / SD, NN, BR, WD, MC, MK, OL, DN.

Collected in January, February, April, September, October, and December.

**Remarks.** The considerable variation within and between the samples excluded from the type series is summarised in Table 1. Some character states are often bilaterally asymmetrical; for example, the number of antennal sense cones, the apices of some setae, and the number of forewing duplicated cilia. The forewings are unusual in that the distal half is broken off in 17 of the 26 available macropterae; in the type series only the holotype has complete wings. It is also unusual for a species to have more than two wing morphs, but three samples included macropterae, micropterae, and apterae. Most of the observed variation is not morph-related. However, setae with spatulate apices have been observed only in larger males; the antennal sense cones of macropterae are longer than those of other morphs, and antennal segment VIII is more constricted basally; and in apterae the antennal segments are usually shorter. The dorsal ocelli are well developed in the type micropterae, but are often reduced or absent in the other micropterae as well as the apterae. The pelta is variable both within and between samples (Figures 202–204). Colour is relatively constant within samples, but some individuals have the tibiae almost all yellow, and antennal segment IV is largely yellow in those specimens of sample LAM 1447 which have the major setae expanded apically. These specimens are particularly distinctive, and would certainly have

been considered a separate species had they not been collected with several more 'typical' individuals.

### Genus *Haplothrips* Amyot & Serville

*Haplothrips* Amyot & Serville, 1843: 640. Type-species *Phloeothrips albipennis* Burmeister, a synonym of *Thrips aculeata* Fabricius, by monotypy.

This genus includes more than 300 species, with representatives in all parts of the world, and many of these show a high degree of host or habitat specificity (Mound *et al.* 1976). Eleven species are recorded from Australia (Pitkin 1973), and it seems probable that not one of the three species recorded here from New Zealand is native to this country. The most abundant species — *niger*, the red clover thrips — is almost certainly Holarctic. *H. kurdjumovi* is a predator in orchards, presumably introduced from Europe or North America. The new species, *salicorniae*, is probably a recent immigrant or introduction from Australia.

*Haplothrips* species are usually macropterous, and the forewings are distinctly constricted medially. The maxillary bridge is always well developed, the fourth antennal segment bears four sense cones but the third only one or two, and the males never have a glandular area on sternite VIII. Moreover, less than 10 of the 100 or so species examined were found to possess metathoracic sternopleural sutures. *Trybomiella* has been used for a group of species with broad wings but lacking duplicated cilia; however, following Pitkin (1976), this group is here treated as a subgenus.

The tribe Haplothripini includes about 30 generic names (Priesner 1961), but many of these represent small groups of species which cannot easily be distinguished from *Haplothrips*. One of them, *Apterygothrips*, is currently retained for a series of species which are often wingless; they seem to represent degenerate species of *Haplothrips*, and the group may not be holophyletic as it can be defined only by "loss apomorphies" (Gauld & Mound 1982). *Podothrips* is a more discrete entity, although reservations are expressed below about the relationships of the New Zealand species. Other genera of Haplothripini which might be expected in New Zealand are *Antillothrips* — grass-living species in which the maxillary stylets are very short; *Karnyothrips* — predators of scale insects with long anal setae; and *Priesneria*, in which the third antennal segment has a ring-like swelling at the base (Pitkin 1973).

### *Haplothrips kurdjumovi* Karny

Figures 42, \*113, and \*205

*Haplothrips aculeatus* subsp. *kurdjumovi* Karny, 1913: 8–9. **Syntypes**, U.S.S.R. (repository not known).

**Female macroptera.** **Colour.** Body brown. Tarsi, apical half of fore tibiae, antennal segments III–V, and proximal half of VI yellow. Major setae brown. Forewings pale, dark at extreme base; fringe cilia dark.

**Structure.** Head (Figure 42) about as wide as long, with weak lines of sculpture near posterior margin; ocelli well developed; compound eyes as large dorsally as ventrally; postocular setae blunt; maxillary stylets reaching to postocular setae, about one-third to one-half of head width apart; maxillary bridge wide. Antennae (Figure 113) 8-segmented; segment III with 1 sense cone, segment IV with 4. Pronotum (Figure 42) faintly sculptured near posterior margin; anteromarginal setae small, finely acute; remaining major setae broadly blunt or weakly expanded; epimeral sutures complete; praepectal plates present. Mesopraesternum broadly boat-shaped. Metathoracic sternopleural sutures absent. Foretarsal tooth very small (Figure 42). Forewings constricted medially; fringe cilia with surface smooth; 7–10 duplicated cilia; 3 major sub-basal setae,  $B_3$  pointed,  $B_1$  and  $B_2$  shorter, blunt. Abdomen: pelta (Figure 205) bearing small lateral lobes; tergites II–VII each with 2 pairs of sigmoid wing-retaining setae; tergite IX posteromarginal setae acute; tube shorter than head.

Dimensions (1 female macroptera;  $\mu\text{m}$ ). Body length (extended) 2220. Head length 230, median width 183; postocular setae 58. Pronotum median length 132, median width 235; major setae — *am* 13, *aa* 15, *ml* 23, *ep* 60, *pa* 55. Forewing length 980; sub-basal setae  $B_3$  78. Tergite IX setae  $B_1$  94. Tube length 124; longest terminal setae 124. Antennal segments III–VIII length 53, 58, 52, 45, 37, and 27 respectively.

**Material examined.** 81 female macropterae.

AK, WO, GB, HB / CO.

Most frequently collected in orchards; in one orchard associated with the two-spotted mite, *Tetranychus urticae*.

Collected in all months except May and August.

**Remarks.** *H. kurdjumovi* is well known as a predator of mites and moth eggs in North American orchards, either under the synonym *H. faurei* Hood (MacPhee 1953, Putman 1965) or misidentified as *H. subtilissimus* Haliday (Putman 1942, Stannard 1968). This synonymy has been treated formally by Nakahara (1985), to whom we are grateful for

advice. The species has also been recorded feeding on scale insects in the laboratory (Palmer & Mound 1986). Males have been found only in central Europe, and this is probably its native area. It is closely related to *subtilissimus*, which is common on *Quercus* branches in western Europe, and apparently predatory on mites. The two species can be distinguished by the absence of a foretarsal tooth in females of *subtilissimus*, but the male genitalia have yet to be compared satisfactorily.

### *Haplothrips niger* (Osborn)

Red clover thrips

Figures 1, 43, 114, 151, and 206

*Phloeothrips nigra* Osborn, 1883: 154. **Syntype** females, U.S.A., Iowa (?lost).

**Female macroptera.** **Colour.** Dark brown with red pigment; fore tarsi, apices of fore tibiae, and antennal segment III yellowish. Major setae brown; lateral abdominal setae paler. Forewings weakly shaded, dark at base; fringe cilia dark.

**Structure.** General morphology, Figure 1. Head (Figure 43) about as wide as long, slightly constricted at base; dorsal surface faintly sculptured; ocelli well developed; compound eyes larger dorsally than ventrally; postocular setae small, acute, scarcely longer than postocellar setae; maxillary stylets about one-third of head width apart, retracted to postocular setae; maxillary bridge well developed. Antennae (Figure 114) 8-segmented; segment III with 2 sense cones, segment IV with 4 rather short, stout sense cones. Pronotum (Figure 43) transverse, faintly sculptured near posterior margin; usually only epimeral and posteroangular setae long and bluntly acute; praepectal plates well developed. Mesonotum with mid-lateral setae as long as pronotal epimeral setae; mesopraesternum comprising 2 lateral triangles often joined by a thin median line. Metanotum faintly reticulate; median setae small, fine; metathoracic sternopleural sutures absent. Foretarsal tooth small (Figure 43). Forewing (Figure 151) constricted medially, with 3 major sub-basal setae,  $B_3$  the longest, and 5–11 duplicated cilia. Abdomen: pelta (Figure 206) triangular but expanded at base; tergites II–VII each with 2 pairs of sigmoid wing-retaining setae; tergite VII posteroangular setae acute; tergite IX  $B_1$  setae bluntly acute,  $B_2$  finely acute, less than half as long as tube; tube shorter than head; terminal setae nearly as long as tube.

Dimensions (1 large and, in parentheses, 1 small female macroptera;  $\mu\text{m}$ ). Body length (extended) 2370 (1700). Head length 220 (185), median width

185 (162); postocular setae 15 (15). Pronotum median length 145 (102), median width 260 (205); major setae — *am* 10 (8), *aa* 20 (8), *ml* 15 (10), *ep* 20 (18), *pa* 42 (27). Forewing length 960 (660); sub-basal setae *B*<sub>1</sub> 45 (34). Tergite IX setae *B*<sub>1</sub> 67 (55). Tube length 168 (128); longest terminal setae 64 (55). Antennal segments III–VIII length 55 (45), 55 (50), 55 (45), 50 (42), 45 (43), and 30 (30) respectively.

**Material examined.** 365 female macropterae (BMNH, NMNZ, NZAC, PANZ).

ND, AK, WO, BP, TO, HB, WI, WA, WN / NN, BR, MB, KA, MC, MK, CO, SL.

Common on clover; also taken in flowers of *Chrysanthemum leucanthemum* (ox-eye daisy), and occasionally in native habitats as high as 1640 m a.s.l. (Coronet Peak, CO).

Collected January–April and August–December.

**Remarks.** The first available specimens of *H. niger* were taken in February 1930 at Palmerston North (WI) and Blenheim (MB). Muggeridge (1932, 1933) was first to record the species from New Zealand, and reported it to be “well distributed” and “a serious menace to the production of clover seed”. Spiller (1956) listed *H. niger* in his checklist, and Cumber (1959) recorded it as being widely distributed throughout both islands. Small numbers were taken by Cumber & Eyles (1961) in their fodder crop survey of the North Island, and Martin (1983) listed it in his pasture survey.

Periodic outbreaks occur in the flowers of red and white clover (Doull 1949, Yates 1952). The species was listed as a pest of lucerne by Pottinger & Macfarlane (1967), on the basis of Yates (1952), but in a later survey Macfarlane & Pottinger (1976) failed to confirm this host relationship (under the name *Haplothrips leucanthemi*), as no specimens were collected. Yates (1952), Doull (1949, 1956), and Chapman (1984) give accounts of its life history in New Zealand, but the males described by Yates and Doull are here interpreted as females squashed on microscope slides. No Doull collections have subsequently been examined, but males have not been found in Yates’s voucher specimens, and none were found in 1000 specimens examined from the mid-Canterbury area in November 1981. *H. niger* appears to constitute a parthenogenetic strain of the bisexual species *H. leucanthemi* (Shrank), which is abundant in flowers of *Chrysanthemum leucanthemum* in Europe. Females of these two nominal species cannot be distinguished satisfactorily. However, *H. niger* is usually confined to clover flowers, on which it is regarded as a pest in North America (Loan & Holdaway 1955) and periodically in New Zealand.

### *Haplothrips (Trybomiella) salicorniae* new species

Figures \*44, \*115, and \*207

**Female macroptera. Colour.** Body brown; head darker; antennal segment III paler. Tarsi and apices of fore tibiae yellow. Wing-retaining setae dark brown. Forewings pale except at extreme base; fringe cilia and sub-basal setae dark.

**Structure.** Head (Figure 44) longer than wide, faintly sculptured; ocelli well developed; compound eyes larger dorsally than ventrally; postocular setae blunt, arising wide apart; maxillary stylets reaching to compound eyes, close together; maxillary bridge short, stout. Antennae (Figure 115) 8-segmented; segment III with 2 sense cones, segment IV with 4. Pronotum (Figure 44) transverse; epimeral and posteroangular setae stout, blunt; anteromarginal and anteroangular setae smaller, pointed; midlateral setae scarcely longer than discal setae; epimeral sutures complete; praepectal plates present. Mesopraesternum reduced to 2 lateral triangles. Metanotum faintly reticulate; meta-thoracic sternopleural sutures absent. Forelegs not reaching beyond head (Figure 44); tarsal tooth very small, sometimes obscured. Forewings strongly constricted medially, without duplicated cilia but with 3 blunt major sub-basal setae arising close together. Abdomen: pelta (Figure 207) triangular, faintly reticulate; tergites II–VII with sigmoid wing-retaining setae; tergite IX posteromarginal setae *B*<sub>1</sub> and *B*<sub>2</sub> blunt; tube shorter than head.

Dimensions (holotype female macroptera;  $\mu\text{m}$ ). Body length (extended) 1920. Head length 214, median width 165; postocular setae 29. Pronotum median length 108, median width 228; major setae — *am* 24, *aa* –, *ml* 7, *ep* 30, *pa* 30, *pm* 7. Forewing length 740; setae *B*<sub>1</sub> 30. Tergite IX setae *B*<sub>1</sub> 73. Tube length 118; longest terminal setae 123. Antennal segments III–VIII length 42, 45, 45, 42, 38, and 30 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, KA, Cape Campbell, Grassmere, on *Salicornia*, 7 February 1979, L.A. Mound 1425 (NZAC). **Paratypes** (23 female macropterae). NN – 1, Nelson, Boulder Bank mud flats, on *Salicornia*, 8 Feb 1979, LAM 1429. KA – 22, same data as holotype (BMNH, NZAC).

**Material examined.** Type series only.

— / NN, KA.

Collected only in February.

**Remarks.** Males of *H. (T.) salicorniae* are unknown. The forewings of this species, which are

broad and lack duplicated cilia, are typical of the subgenus *Trybomiella*. Indeed, the specimens were at first assumed to be *Haplothrips (Trybomiella) nigricornis* Bagnall, which is common on the coasts of South Australia in the flowers of fleshy Aizoaceae (Pitkin 1973). However, *salicorniae* is unlike any other member of this group in the deeply retracted, closely approximated maxillary stylets with a narrow bridge (Figure 44). It is probably not native to New Zealand, but should be looked for in Australia in similar halophytic habitats, both coastal and inland.

### Genus *Hoplandrothrips* Hood

*Phloeothrips* subgenus *Hoplandrothrips* Hood, 1912: 145.

Type-species *Phloeothrips (Hoplandrothrips) xanthopus* Hood, a synonym of *Phloeothrips jennei* Jones (Stannard 1968, p. 447), by original designation.

Members of *Hoplandrothrips* share the following characteristics. Antennae 8-segmented, with 3 sense cones on segment III and 4 on segment IV. Maxillary stylets long, slender, lying close together medially in head; mouth cone long, pointed, extending across prosternum. Foretarsal tooth present in both sexes; major males usually with 2 pointed tubercles near inner apex of fore femora. Pronotal epimeral sutures complete; praepectal plates absent. Mesopraesternum usually divided into 2 lateral plates; mesonotal lateral setae well developed. Metanotum sculptured; median pair of setae arising on anterior half; metathoracic sternopleural sutures well developed. Forewings usually constricted medially, with a series of duplicated cilia. Males usually with a glandular area on sternite VIII, and the  $B_2$  setae on tergite IX short, stout.

About 70 species names are currently valid and available in this genus, mostly from the New World, but no revision of the species has been published. Stannard (1957) listed 31 species from North America, and later (1968) provided a key to eight species from Illinois. Schliephake & Klimt (1979) keyed the six or more species known from Europe, but placed them with the European species of *Phlaeothrips*, although this generic placement has not been followed by other authors. True *Hoplandrothrips* species are fungus-feeders associated with hyphae on dead twigs and dead leaves, but most of the Afrotropical species placed in this genus feed on green leaves, and one is a minor pest of coffee.

The three new species described below seem to constitute a New Zealand species-group. They differ from most other members of *Hoplandrothrips* in the following characters: antennal segments dark (not bicoloured); segment III with a straight (not

excavate) inner margin; mesopraesternum entire (not divided); metanotum with 2 or more pairs of minor setae in anterior half of sclerite, and median major setae arising well behind them; fore femora lacking apical tubercles in male; forewing scarcely constricted medially, and lacking a median 'pocket'.

This suite of characters is also found in *chapmani* Hood and *picticornis* Crawford from eastern North America, but these two species are unusual in having antennal segments VII and VIII broadly joined. All four New Zealand species also have in common the following characters: pale major setae; head constricted behind eyes and at base, sculptured on dorsal surface and bearing stout marginal setae, with ocellar area raised; metathoracic sternopleural sutures reaching only halfway towards hind coxae; always macropterous, with tergites II–VII each bearing 2 pairs of sigmoid wing-retaining setae.

### *Hoplandrothrips bidens* (Bagnall)

Figures 45, 46, 116, 158, 208, and 264

*Acanthothrips bidens* Bagnall, 1910: 374–375. **Holotype** male, HUNGARY (BMNH) [examined].

**Female macroptera.** **Colour.** Brown; tarsi, fore tibiae, and apices of middle and hind tibiae paler. Antennal segments III–VII bicoloured, with proximal half of III and IV, proximal third of V and VI, and extreme base of VII yellow. Forewings faintly shaded medially. Major setae pale.

**Structure.** Head (Figure 45) bearing up to 6 pairs of small, stout marginal setae; maxillary stylets reaching to compound eyes; compound eyes slightly larger dorsally than ventrally; postocular setae wide apart, expanded at apex. Antennae (Figure 116) with segment III excavate on inner margin. Pronotum (Figure 45) sculptured on margins, with small, scattered discal setae; major setae expanded at apex. Mesopraesternum divided into 2 lateral triangles. Metanotum (Figure 158) with median area faintly reticulate; median pair of setae acute, wide apart, in anterior half of sclerite. Forewings constricted medially, with a distinct 'pocket', and with 10–14 duplicated cilia; sub-basal setae subequal and expanded at apex. Abdomen: pelta (Figure 208) reticulate, elongate, with lateral lobes; tergite IX posteromarginal setae slightly expanded at apex and more than half as long as tube.

Dimensions (1 large female macroptera;  $\mu\text{m}$ ). Body length (extended) 3100. Head length 330, median width 230; postocular setae 75. Pronotum length 180, median width 330; major setae — *am* 45, *aa* 70, *ml* 65, *ep* 100, *pa* 85. Tergite IX setae  $B_1$  135. Tube length 200.

**Male macroptera.** Similar to female, but head (Figure 46) with postocular setae longer, marginal setae stouter; sternite VIII (Figure 264) with a small, circular glandular area; large male specimens with a pair of tubercles on inner apex of fore femora and a smaller tubercle on inner margin of fore tibiae (Figure 46); major pronotal setae longer, except anteromarginals, which are small and acute.

Dimensions (1 large male macroptera;  $\mu\text{m}$ ). Body length (extended) 3000. Head length 330, median width 230; postocular setae 110. Pronotum length 210, median width 330; major setae — *am* 20, *aa* 140, *ml* 110, *ep* 90, *pa* 110. Tergite IX setae — *B*<sub>1</sub> 150, *B*<sub>2</sub> 60. Tube length 190.

**Material examined.** 19 female macropterae, 18 male macropterae (BMNH, NZAC).

AK / MB, BR, MK, CO.

On dead branches of introduced trees.

Collected in February, April, October, and November.

**Remarks.** This European species is quite distinct from the New Zealand species-group comprising *choritus*, *ingenuus*, and *vernus*, in having bicoloured antennae with segment III excavate on the inner margin, the mesopraesternum divided into two lateral plates, and the metanotal median setae on the anterior half of this sclerite. In Europe *bidens* is widespread from Scandinavia and Britain to the Mediterranean, and exhibits considerable variation both within and between populations. This variation leads to problems of species definition which are not yet fully resolved.

#### *Hoplandrothrips choritus* new species

Figures 47, 117, 147, 159, \*209, and 265

**Female macroptera. Colour.** Body brown. Tarsi yellow; fore tibiae variable, the base darker than the yellow apex. Antennal segment II yellow at extreme base. Major setae pale. Forewings shaded, particularly medially.

**Structure.** Head (Figure 47) longer than wide, bearing up to 7 stout marginal setae, the basal setae stouter; compound eyes similar in size dorsally and ventrally; postocular setae expanded at apex; maxillary stylets close together medially, reaching to postocular setae. Antennae, Figure 117. Pronotum (Figure 47) sculptured on posterior and lateral margins, with small, scattered discal setae; anteroangular, midlateral, and epimeral setae long, expanded at apex; epimerals longest; posteromarginal setae shorter, bluntly acute. Mesopraesternum boat-shaped; mesonotum sculptured on anterior margin, its lateral setae well developed. Metanotum (Figure

159) with elongate lines of sculpture laterally, reticulate medially; median setae usually expanded; 2 or 3 pairs of small setae anterior to these. Foretarsal tooth well developed (Figure 147), variable in size. Forewing very weakly constricted medially; major sub-basal setae *B*<sub>1</sub> and *B*<sub>2</sub> expanded at apex, *B*<sub>3</sub> longer, acute. Abdomen: pelta (Figure 209) reticulate, elongate, with small lateral lobes; tergite IX posteromarginal setae blunt, less than half as long as tube; tube slender.

Dimensions (holotype and, in parentheses, largest and smallest female paratypes;  $\mu\text{m}$ ). Body length (extended) 2700 (3300, 2200). Head length 320 (345, 285), median width 240 (265, 210); postocular setae 75 (85, 50). Pronotum length 155 (185, 105), median width 330 (380, ?240); major setae — *am* 20 (20, 15), *aa* 70 (95, 40), *ml* 80 (100, 55), *ep* 100 (120, 80), *pa* 45 (50, 45). Tergite IX setae — *B*<sub>1</sub> 100 (105, 80), *B*<sub>2</sub> 110 (105, 80), *B*<sub>3</sub> 180 (170, 120). Tube length 230 (270, 195); longest terminal setae 160 (200, 110). Forewing length 1100 (1250, 850); duplicated cilia 12 (14, 7); major sub-basal setae — *B*<sub>1</sub> 65 (75, 45), *B*<sub>2</sub> 70 (80, 45), *B*<sub>3</sub> 115 (150, 105). Antennal segments III–VIII length 95 (110, 75), 95 (115, 80), 85 (105, 75), 70 (80, 60), 55 (60, 50), and 35 (40, 35) respectively.

**Male macroptera.** Similar in colour and structure to female, but head with postocular setae longer, marginal setae stouter; pronotum with anteroangular setae longer; median metanotal area raised, with median setae usually acute, and 3–5 pairs of smaller setae on anterior half; forewing with sub-basal setae *B*<sub>3</sub> usually shorter; tergite IX posteromarginal setae *B*<sub>2</sub> short, stout; sternite VIII (Figure 265) with a transverse glandular area; large specimens with pronotum more elongate, less sculptured, bearing a stout median longitudinal apodeme, and with anteroangular and epimeral setae longer; fore femora swollen; fore coxae bearing stout setae.

Dimensions (1 paratype male, LAM 1381;  $\mu\text{m}$ ). Body length (extended) 2450. Head length 300, median width 210; postocular setae 95. Pronotum length 150, median width 290; major setae — *am* 10, *aa* 110, *ml* 80, *ep* 95, *pa* 35. Tergite IX setae — *B*<sub>1</sub> 110, *B*<sub>2</sub> 60, *B*<sub>3</sub> 140. Tube length 210; longest terminal setae 150. Forewing length 1050; major sub-basal setae — *B*<sub>1</sub> 55, *B*<sub>2</sub> 60, *B*<sub>3</sub> 120. Antennal segments III–VIII length 90, 95, 90, 70, 50, and 40 respectively.

**Type data. Holotype** female macroptera, NEW ZEALAND, NN, Cobb Reservoir, 900 m, Nelson, dead branch of *Nothofagus*, 31 January 1979, L.A. Mound 1381 (NZAC). **Paratypes** (17 female macropterae, 4 male macropterae): same data as holotype (BMNH, NZAC).

**Material examined.** Type series, plus 259 non-type specimens (164 female macropterae, 95 male macropterae) (BMNH, NZAC).

TO, TK / NN, BR, WD, OL, SL / SI.

Apparently associated with *Nothofagus* forest; found on dead twigs and branches, probably feeding on fungal hyphae. A few specimens taken on dead *Salix* branches.

Collected in January, February, October, and December.

**Remarks.** *H. chorit* is the most commonly collected and widespread *Hoplandrothrips* species in New Zealand.

### *Hoplandrothrips ingenuus* new species

Figures \*48 and \*160

**Female macroptera.** **Colour.** Body brown; similar to *chorit*, but fore tibiae and fore tarsi a little paler, and forewings more extensively shaded.

**Structure.** Similar to *chorit*, but head (Figure 48) with postocular setae slightly closer together, and maxillary stylets reaching to eyes; pronotum (Figure 48) entirely sculptured, with pronotal anteromarginal setae well developed and midlateral, epimeral, and posteroangular setae longer and all expanded; metanotum (Figure 160) with striate sculpturing, finer on raised medial area, median setae usually pointed, and up to 4 pairs of smaller scattered setae anterior to these; forewings with 11–17 duplicated cilia, and sub-basal setae  $B_3$  expanded; foretarsal tooth slightly longer, more acute.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length 3000. Head length 330, median width 260; postocular setae 85. Pronotum length 180, median width 390; major setae — *am* 90, *aa* 50, *ml* 170, *ep* 155, *pa* 125. Tergite IX setae —  $B_1$  100,  $B_2$  100,  $B_3$  180. Tube length 225; longest terminal setae 200. Forewing length 1200; major sub-basal setae —  $B_1$  85,  $B_2$  85,  $B_3$  155. Antennal segments III–VIII length 110, 115, 100, 90, 65, and 50 respectively.

**Male macroptera.** Similar to female, but postocular setae often shorter, sometimes bluntly pointed; pronotal setae shorter, less expanded at apex, and anteromarginal setae reduced; forewing with sub-basal setae  $B_3$  shorter, acute; sternite VIII without a glandular area.

Dimensions (1 paratype male, AKW 371;  $\mu\text{m}$ ). Body length (extended) 2400. Head length 300, median width 240; postocular setae 60. Pronotum length 150, median width 330; major setae — *am* 25, *aa* 60, *ml* 110, *ep* 115, *pa* 60. Tergite IX setae —  $B_1$  115,  $B_2$  60,  $B_3$  180. Tube length 195, longest terminal setae 180. Forewing length 1000; major

sub-basal setae —  $B_1$  45,  $B_2$  50,  $B_3$  65. Antennal segments III–VIII length 95, 100, 90, 80, 65, and 35 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, NN, Canaan, Harwood's Hole track, dead *Nothofagus menziesii* branches, 22 December 1983, A.K. Walker 371 (NZAC). **Paratypes** (12 female macropterae, 12 male macropterae). NN – 12 female macropterae, 11 male macropterae, same data as holotype. BR – male macroptera, L. Rotiti, Mt Robert, 960 m, dead twigs, 4 Feb 1979, LAM 1403 (BMNH, NZAC).

**Material examined.** Type series only.

— / NN, BR.

Collected in February and December.

**Remarks.** *H. ingenuus* is very similar to *chorit*, but has the metanotal sculpture more striate.

### *Hoplandrothrips vernus* new species

Figures \*49, \*210, and 266

**Female macroptera.** **Colour.** Body brown. Tarsi, fore tibiae (except base), and apex of middle and hind tibiae yellow. Forewing shaded medially. Major setae pale.

**Structure.** Head (Figure 49) bearing up to 7 pairs of small, stout marginal setae; maxillary stylets close together, reaching to compound eyes; 2 pairs of postocellar setae; postocular setae closer together than in *chorit*, short, acute. Pronotum sculptured (Figure 49), with scattered discal setae. Major setae expanded at apex; epimeral setae long, pale, their apices expanded; other major setae reduced. Metanotum with sculpture striate medially but more open near posterior and anterior margins; median metanotal setae wide apart, acute; at least 4 pairs of small, scattered setae anterior to these. Foretarsal tooth variable in size. Forewings with 9–17 duplicated cilia; sub-basal setae  $B_1$  and  $B_2$  expanded at apex,  $B_3$  longer, acute. Abdomen: pelta (Figure 210) variable, with transverse lateral lobes; tergite IX posteromarginal setae blunt, less than half as long as tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 3100. Head length 350, median width 270; postocular setae 30. Pronotum length 180, median width 360; major setae — *am* 20, *aa* 35, *ml* 30, *ep* 115, *pa* 30. Tergite IX setae —  $B_1$  105,  $B_2$  100,  $B_3$  150. Tube length 240; longest terminal setae 170. Forewing length 1100; major sub-basal setae —  $B_1$  35,  $B_2$  40,  $B_3$  200. Antennal segments III–VIII length 100, 100, 90, 75, 60, and 40 respectively.

**Male macroptera.** Similar to female, but head with marginal setae stouter; pronotum with less sculpturing, and anteroangular, mid-lateral, and posteroangular setae bluntly acute; metanotum with up to 6 pairs of scattered discal setae; forewing with sub-basal setae  $B_3$  often shorter; sternite VIII (Figure 266) with a glandular area medially. Large specimens with pronotum elongate, not sculptured, and bearing a stout, median longitudinal apodeme, and with metanotum reticulate on a raised area.

Dimensions (1 paratype male, AKW 347;  $\mu\text{m}$ ). Body length (extended) 2600. Head length 300, median width 230; postocular setae 25. Pronotum length 160, median width 330; major setae — *am* 20, *aa* 45, *ml* 25, *ep* 120, *pa* 30. Tergite IX setae —  $B_1$  120,  $B_2$  55,  $B_3$  150. Tube length 195; longest terminal setae 150. Forewing length 1100; major sub-basal setae —  $B_1$  40,  $B_2$  45,  $B_3$  110. Antennal segments III–VIII length 90, 97, 95, 75, 55, and 40 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, ND, Waipoua Kauri Forest, beating dead wood, 11 December 1983, A.K. Walker 347 (NZAC). **Paratypes** (11 female macropterae, 11 male macropterae). ND – 10 females, 11 males, same data as holotype; female, Waipoua State Forest, among roots of *Freyinetia* on trunks, 25 Nov 1980, G. Kuschel (BMNH, NZAC).

**Material examined.** Type series, plus 140 non-type specimens (93 females, 47 males) (BMNH, NZAC).

ND, AK, CL, BP, TK / SD, NN.

Many taken by beating dead wood, mainly in native forest.

Collected in January, February, May, and August–December.

**Remarks.** *H. vernus* is remarkably similar in structure to the eastern North American species *chapmani* Hood, although that has a broad pelta and antennal segments VII and VIII broadly joined.

### Genus *Hoplothrips* Amyot & Serville

*Hoplothrips* Amyot & Serville, 1843: 640. Type-species *Trips corticis* De Geer, by subsequent designation (Karny 1912).

Members of *Hoplothrips* are very diverse in structure, and many exhibit sexual dimorphism and patterns of allometry which make the genus difficult to define and the species difficult to characterise. However, they all share the following characters. Antennae 8-segmented; terminal segment almost always constricted at base and distinct from segment VII; usually 3 sense cones on seg-

ment III and 4 on IV. Head sometimes with stout cheek setae; maxillary stylets usually deeply retracted and close together in middle of head. Foretarsal tooth usually present, but tibiae and femora lacking any tubercles. Forewings parallel-sided, almost always with duplicated cilia; sub-basal setae often irregular. Abdomen: pelta usually broader than in *Hoplandrothrips*; tergites normally each bearing 2 pairs of wing-retaining setae; tergite IX with long terminal setae. Males with  $B_2$  setae on tergite IX short, stout; a glandular area present on sternite VIII, and in many species additional paired areas of distinctive reticulation laterally on each sternite, possibly representing a different type of gland.

At least 130 species are currently placed in this genus, but many are known only from single samples or even single specimens. No world revision has ever been attempted, and therefore no estimate can be made either of the number of nominal species which should be regarded as synonyms or of the number which really belong in *Hoplothrips*. Stannard (1957) listed 48 species from North America, and subsequently (1968) gave a key to 11 species from Illinois. Mound *et al.* (1976) gave a key to eight species from Britain, and Priesner (1964) gave a key to 18 species from Europe.

All *Hoplothrips* species are fungus-feeders associated with hyphae on dead branches, twigs, or leaf litter. Several are polymorphic, with macropterae and micropterae, sometimes of both sexes, and males which vary greatly in size and exhibit various patterns of allometric growth. Species recognition, even using good samples, is therefore often complicated; the more so in that some species are widespread, and vary considerably between populations. For example, *fungi* Zetterstedt is possibly part of a 'ring-species' involving *karnyi* in North America, *japonicus* in the eastern Oriental region, and *orientalis* in southern India. One part of this 'ring-species' seems to be represented by *ulmi* Fabricius, which was distinguished morphometrically by Mound *et al.* (1976) but was placed without comment as a synonym of *fungi* by Schliephake & Klimt (1979).

Seven species of *Hoplothrips* are here recorded from New Zealand, of which *corticis* and *orientalis* seem to be introduced. In contrast *semicaecus*, *anobii*, *kea*, and probably *oudeus* are considered to be native to New Zealand, although *semicaecus* is now widespread in eastern North America and Europe.

As indicated in the Introduction, the two largest tribes of the Phlaeothripinae (Hoplothripini and Phlaeothripini) are very poorly defined. *Hoplothrips* is closely related to *Psalidothrips* and *Deplorothrips* in the New Zealand fauna, also to

*Sophiothrips* and possibly *Yarnkothrips*. In contrast *Hoplandrothrips* appears to be closer to *Phlaeothrips*, *Cartomothrips*, *Macrophthalmothrips*, and *Poecilothrips*. Stannard's view (1957) that *Hoplothrips* probably represents one of several evolutionary lineages derived from *Hoplandrothrips* / *Phlaeothrips* stock seems more likely than the implication in Priesner's classification (1961) that there are just two fundamentally distinct lineages. The large number of phytophagous Phlaeothripinae found in other parts of the world, including *Liothrips* and *Teuchothrips*, may well represent an holophyletic group. But this is probably not close to, nor even derived from, *Hoplothrips* any more than is *Lissothrips*. In the present state of knowledge, use of the name Hoplothripini does not seem to serve any useful purpose, and is almost certainly obscuring real relationships.

### *Hoplothrips anobii* new species

Figures \*50, 51, \*161, \*211, 212, 255, and 267

**Female macroptera.** Colour. Body dark brown; tarsi paler. Base of antennal segment III yellow. Wings shaded, darker distally. Major setae pale.

**Structure.** Head (Figure 50) slightly constricted behind eyes and at base, sculptured; compound eyes as large dorsally as ventrally; postocular setae acute; 1 pair of stout median setae on vertex; maxillary stylets reaching to postocular setae. Antennal segments elongate, each with a distinct pedicel. Pronotum (Figure 50) sculptured on anterior and posterior margins; major pronotal setae blunt, the midlaterals and epimerals longest. Mesonotal lateral setae not elongate; mesopraesternum transverse. Metanotum (Figure 161) with striate lines of sculpture laterally, reticulate to faintly reticulate medially; 1 pair of median acute setae and up to 5 pairs of sterner, stout setae anterior to these; meta-thoracic sternopleural sutures short. Foretarsal tooth present. Forewings with 12–15 duplicated cilia; major sub-basal setae acute,  $B_3$  usually the longest,  $B_1$  often missing. Abdomen: pelta (Figure 211) rounded, without lateral lobes, reticulate, lying on concave anterior margin of tergite II; tergites II–VII each with 2 pairs of sigmoid wing-retaining setae, the posterior pair stouter on tergites III–VII; tergite IX posteromarginal setae  $B_1$  acute, about half as long as tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 3400. Head length 330, median width 290; postocular setae 130. Pronotum length 200, median width 390; major setae —  $am$  25,  $aa$  80,  $ml$  130,  $ep$  160,  $pa$  90. Tergite IX setae —  $B_1$  160,  $B_2$  200,  $B_3$  210. Tube length 260. Forewing length

1300; sub-basal setae —  $B_1$  30,  $B_2$  35,  $B_3$  150. Antennal segments III–VIII length 120, 120, 105, 90, 75, and 60 respectively.

**Female microptera.** Similar to macroptera, but eyes smaller ventrally than dorsally; mesonotum and metanotum transverse; forewing lobe 60–90  $\mu\text{m}$  long, bearing 1 major seta; pelta usually more square (cf. Figures 211 and 212); tergites II–VII each with 2 pairs of curved wing-retaining setae.

**Male microptera.** Similar to female microptera, but head (Figure 51) with a ventral tubercle anterior to major pair of interocular setae, stout marginal setae, and postocular setae longer, with spatulate apices; pronotum (Figure 51) elongate, with major setae longer, spatulate; probasisternal plates longer than wide (Figure 51); foretarsal tooth enlarged; fore femora swollen; tergite IX posteromarginal setae  $B_1$  shorter, blunt,  $B_2$  stout; sternite VIII with a transverse gland (Figure 267); sternites II–VII with striate to reticulate lines of sculpture laterally (Figure 255). Large specimens with tarsal tooth, femora, pronotum, and major setae greatly enlarged (Figure 51).

Dimensions (1 large paratype male, Rangiora, NC;  $\mu\text{m}$ ). Body length (extended) 2600. Head length 280, median width 230; postocular setae 120. Pronotum length 300, median width 500; major setae —  $am$  20,  $aa$  200,  $ml$  200,  $ep$  140,  $pa$  100. Tergite IX setae —  $B_1$  90,  $B_2$  55,  $B_3$  140. Tube length 210. Antennal segments III–VIII length 115, 110, 95, 75, 60, and 55 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, NC, Rangiora, ex *Anobium* galleries in walnut wood, 1 December 1941, D. Spiller (USNM at present). **Paratypes** (5 female macropterae, 10 female micropterae, 7 male micropterae). NC – 5 female macropterae, female microptera, 2 male micropterae, same data as holotype. CO – 9 female micropterae, 5 male micropterae, Kawarau Gorge, Roaring Meg, 480 m, dead branches of *Olearia avicennifolia*, in tunnels of *Anobium* sp., 17 Mar 1975, B.M. May (BMNH, NZAC, USNM).

**Material examined.** Type series only.  
— / NC, CO.

Collected in March and December.

**Remarks.** *H. anobii* has been collected twice in tunnels of *Anobium* species, at an interval of 34 years. It is presumed to be endemic because the following three characters are not known in *Hoplothrips* species from any other part of the world: (a) metanotum with numerous stout setae; (b) large males with a stout, horn-like tubercle on

head ventrally, in front of interocular setae; (c) antennal segment III elongate and dark, with only base of pedicel yellow. A horn-like tubercle is also sometimes present in large males of *orientalis*, but it arises in a different position, and these two species are probably not closely related.

### *Hoplothrips corticis* (De Geer)

Figures 52, 53, 118, 162, 213, 256, and 268

*Trips corticis* De Geer, 1773: 11–17. **Syntype** males and females, ?SWEDEN (repository not known).

**Female macroptera.** **Colour.** Body brown. Apex of antennal segment II, segment III, basal half of IV–VI, tarsi, and tibiae yellow. Forewings shaded, mottled in distal half. Major setae pale.

**Structure.** Head (Figure 52) expanded behind compound eyes, with lines of sculpture on posterior margin; cheeks with at least 1 pair of small, stout setae; compound eyes similar in size dorsally and ventrally; postocular setae long, acute; maxillary stylets close together, reaching compound eyes. Antennal segment III with transverse lines of sculpture in basal third; sense cones short, numbering 3 (rarely 2) on segment III and 4 on segment IV; segment VIII constricted at base. Pronotum (Figure 52) with major setae long, acute, the anteromarginal setae shortest. Mesopraesternum divided into 3 sclerites, 2 lateral and 1 median. Metathoracic sternopleural sutures present; metanotum (Figure 162) with lateral longitudinal lines of sculpture, 1 pair of median setae in anterior half, and 2 smaller pairs near anterior margin. Foretarsal tooth present (Figure 53). Forewings with 7–14 duplicated cilia; major sub-basal setae finely pointed,  $B_1$  and  $B_2$  the longest. Abdomen: pelta irregularly 'D'-shaped (Figure 213), faintly reticulate anteriorly; posterior margin lying very close to concave anterior margin of tergite II; tergites II–VII each with 2 pairs of wing-retaining setae, these curved on II but otherwise sigmoid; tergite IX posteromarginal setae  $B_1$  almost as long as tube, acute.

Dimensions (1 female macroptera;  $\mu\text{m}$ ). Body length (extended) 3500. Head length 300, median width 290; postocular setae 170. Pronotum length 220, median width 400; major setae — *am* 30, *aa* 75, *ml* 200, *ep* 180, *pa* 180. Tergite IX posteromarginal setae  $B_1$  240. Tube length 270. Forewing length 1300; sub-basal setae —  $B_1$  110,  $B_2$  110,  $B_3$  30. Antennal segments III–VIII length 100, 100, 85, 75, 68, and 63 respectively.

**Female microptera.** Similar to macroptera, but compound eyes and ocelli smaller (Figure 53); antennal segment III usually with 2 sense cones;

mesonotum and metanotum transverse; forewing lobe (120  $\mu\text{m}$  long) bearing 2 pairs of acute setae; tergites III–VII with anterior pair of wing-retaining setae curved, not sigmoid.

**Male microptera.** Similar to female microptera, but smaller; sternite VIII (Figure 268) with a broad, transverse glandular area not extending to lateral margins; sternites III–VII with a pair of specialised sculptured areas laterally (Figure 256). Large specimens with foretarsal tooth enlarged, fore femora swollen.

**Material examined.** 4 female macropterae, 55 female micropterae, 9 male micropterae (BMNH, NZAC).

— / SD, NN, BR.

Apart from seven female micropterae labelled "Stephens Is" and one female macroptera from Lake Rotoiti, the specimens were taken at Nelson on *Pinus radiata*, May 1930 and July 1931 (referred to by Clark 1932, p. 239) or on apple bark, June 1964.

Collected in January and March–July.

**Remarks.** *H. corticis* is widespread in Europe and eastern North America. Moreover, two of the species described by Moulton (1928) from Hawaii (*flavitibia* and *mauiensis*) may also represent *corticis*, although further specimens must be studied to confirm this. *H. corticis* seems to be related to the *fungi* species-group, including *orientalis*, but differs in the form of the pelta and of the glandular area on sternite VIII in males. Also, the number of sense cones on antennal segment III is usually reduced to two in micropterae.

### *Hoplothrips kea* new species

Figures \*54, \*119, \*214, 257, and 269

**Female macroptera.** **Colour.** Body brown; apex of antennal segment II and base of III paler. Tarsi yellow; tibiae mainly yellow, but outer margins darker. Forewings and major setae pale.

**Structure.** Head (Figure 54) expanded behind eyes, strongly constricted laterally halfway towards base, faintly sculptured on lateral margins and at base; compound eyes bulbous, the same size dorsally as ventrally; postocular setae wide apart, finely acute; maxillary stylets close together, reaching compound eyes. Antennae (Figure 119) with short, fat sense cones, 3 on segment III, 4 on segment IV; segments IV–VII with distinct pedicels; segment VIII narrowed at base. Pronotum elongate, with a median longitudinal apodeme; posteroangular and

epimeral setae long, finely acute, the epimerals longest. Mesopraesternum and anterior border of mesoepisternum eroded. Metathoracic sternopleural sutures reaching halfway to coxae; metanotum sculptured laterally, with a median pair of acute setae. Foretarsal tooth present. Forewings with 16–18 duplicated cilia; major sub-basal setae acute, subequal. Abdomen: pelta (Figure 214) faintly sculptured, with small lateral lobes; tergite II eroded on lateral margins; tergites II–VII each with 1 pair of curved wing-retaining setae; tergite IX posteromarginal setae finely acute, about two-thirds as long as tube.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 3100. Head length 270, maximum width 265; postocular setae 140. Pronotum length 225, median width 300; major setae — *am* 15, *aa* 15, *ml* 20, *ep* 165, *pa* 65. Tergite IX setae —  $B_1$  150,  $B_2$  150,  $B_3$  160. Tube length 260; longest terminal setae 150. Forewing length 1200; sub-basal setae 45. Antennal segments III–VIII length 85, 75, 70, 55, 50, and 50 respectively.

**Female microptera.** Similar to macroptera, but mesonotum and metanotum transverse, and forewing lobe (160  $\mu\text{m}$  long) bearing at least 1 small seta.

**Male microptera.** Similar to female microptera, but body length of small male only 2300  $\mu\text{m}$ ; sternite VIII with a small, reticulate, median glandular area (Figure 269); tergite IX posteromarginal setae  $B_2$  shorter. Large specimens with foretarsal tooth larger, fore femora swollen, and sternites V–VII with lateral reticulations (Figure 257).

Dimensions (1 large paratype male, Mt Cook National Park, MK;  $\mu\text{m}$ ). Body length (extended) 3100. Head length 270, maximum width 255; postocular setae 130. Pronotum length 240, median width 360; major setae — *am* 5, *aa* 15, *ml* 30, *ep* 180, *pa* 70. Tergite IX setae —  $B_1$  140,  $B_2$  75,  $B_3$  250. Tube length 30. Forewing lobe 140. Antennal segments III–VIII length 80, 70, 70, 50, 50, and 50 respectively.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, MK, Mt Cook National Park, Kea Point track, dead *Phyllocladus* wood, 2 February 1983, A.K. Walker 276 (NZAC). **Paratypes** (3 female macropterae, 5 female micropterae, 2 male micropterae). BR – female macroptera, L. Rotoiti, 600 m, dead *Nothofagus* leaves, 1 May 1982, AKW 231. MK – 2 female macropterae, 5 female micropterae, 2 male micropterae, same data as holotype (BMNH, NZAC).

**Material examined.** Type series only.

— / BR, MK.

Collected in February and May.

**Remarks.** *H. kea* is very probably native to New Zealand. It is remarkable because of the shape of the head, the short antennal sense cones, and the curiously reticulate glandular area on sternite VIII of the males.

### *Hoplothrips orientalis* (Ananthakrishnan)

Figures 55, 120, 215a,b, 258, and 270

*Carathrips orientalis* Ananthakrishnan, 1969a: 179–181.

**Syntype** males and females, INDIA (BMNH) [examined].

**Female macroptera. Colour.** Body dark brown. Tarsi and proximal half of antennal segment III yellow. Base of middle hind tibiae yellowish brown. Wings shaded with dark longitudinal lines in proximal half; forewings darker in apical half, with scale dark. Major setae pale.

**Structure.** Head (Figure 55) slightly constricted at base, sculptured dorsally; compound eyes larger ventrally than dorsally; postocular setae long, acute; maxillary stylets reaching to compound eyes. Antennae (Figure 120): segments III–VII each with a distinct pedicel; segment VIII with pedicel variable, sometimes less distinct; sense cones on segment III long, acute, the inner one curved. Pronotum (Figure 55) often faintly sculptured near anterior and posterior margins, and with a longitudinal median apodeme; major setae long, acute, but anteroangular setae shorter. Mesopraesternum transverse, often eroded medially. Metathoracic sternopleural sutures present; metanotum with longitudinal lateral lines in anterior half, a pair of median acute setae, and 1 or 2 pairs of shorter setae anterior to these. Foretarsal tooth present. Forewings with 7–13 duplicated cilia; major sub-basal seta acute,  $B_1$  and  $B_2$  variable but longer than  $B_3$ ; often a small sub-basal seta or pore proximal to  $B_1$ . Abdomen: pelta (Figures 215a, b) variable in shape but usually bell-shaped, with median area usually lacking sculpture, and with at least median third of posterior margin lying on concave anterior margin of tergite II, but extreme lateral margins curving away from it; tergites II–VII each with 2 pairs of wing-retaining setae; tergite IX posteromarginal setae bluntly acute, more than half as long as tube.

Dimensions (1 female macroptera, LAM 1442, CL;  $\mu\text{m}$ ). Body length (extended) 3500. Head length 315, median width 240; postocular setae 150. Pronotum length 180, median width 330; major setae — *am* 25, *aa* 35, *ml* 140, *ep* 140, *pa* 165. Tergite IX setae —  $B_1$  160,  $B_2$  165,  $B_3$  140. Tube length

240. Forewing length 1400; major sub-basal setae length —  $B_1$  105,  $B_2$  105,  $B_3$  30. Antennal segments III–VIII length 95, 105, 95, 80, 60, and 50 respectively.

**Female microptera.** Similar to macroptera, but antennal sense cones smaller, less acute, and inner sense cone on III not curved; mesonotum and metanotum more transverse; metanotum with less longitudinal sculpture; wing lobe (100  $\mu$ m long) bearing 1 or 2 pairs of acute setae; tergites II–VII each with 2 pairs of curved wing-retaining setae.

**Male microptera.** Similar to female microptera, but sternite VIII with a transverse glandular area extending posterolaterally of spiracles (Figure 270); sternites III–VII with striate lines of sculpture laterally (Figure 258); tergite IX posteromarginal setae  $B_2$  short, stout. Forewing lobe 120  $\mu$ m long. Large specimens with foretarsal tooth larger; apex of fore tibia thickened; fore femora swollen; and pronotum elongate, with major setae longer and median apodeme more developed. A ventral, horn-like tubercle lying between interocular setae present in a few major males (4 from Coromandel Peninsula (CL), 1 from Taumatamaire (BP)).

Dimensions (1 large male microptera, LAM 1442, CL;  $\mu$ m). Body length (extended) 2700. Head length 280, median width 215; postocular setae 170. Pronotum length 310, median width 420; major setae — *am* 10, *aa* 210, *ml* 230, *ep* 210, *pa* 200. Tergite IX setae —  $B_1$  130,  $B_2$  90,  $B_3$  150. Tube length 200. Forewing lobe 220. Antennal segments III–VIII length 80, 90, 85, 75, 60, and 55 respectively.

**Male macroptera.** Similar to female macroptera, but pronotal setae longer; sternite VIII with a transverse glandular area extending posterolaterally of spiracles; and tergite IX posteromarginal setae  $B_2$  shorter.

**Material examined.** 12 syntypes (India), plus 230 non-type specimens (121 female macropterae, 54 female micropterae, 8 male macropterae, 47 male micropterae) (BMNH, NZAC).

AK, CL, BP, TO / NN, BR, WD.

Apparently associated with dead wood. Large numbers taken together in samples from Maungaiti Forest (TO) under *Eucalyptus obliqua* bark, and from Mapua (NN) in cracks of dry, dead plum wood.

Collected in February–April, July, November, and December.

**Remarks.** The name *orientalis*, proposed originally for a series of specimens collected at 2400 m in the Nilgiri Hills, southern India, is used here

with some hesitation. The specimens from New Zealand have been compared with 12 syntypes of *orientalis*, and very little difference can be observed between the specimens from these two countries. The problem arises with the status of *orientalis* in relation to the European species *fungi* Zetterstedt, the north American *karnyi* Hood, and the Oriental species *japonicus* Karny. These all belong to one species complex, within which *orientalis* is scarcely distinguishable except by the almost uniformly brown colour (instead of distinctly yellow/brown bicolour) of antennal segments IV and V. *H. poultoni* (Bagnall) from eastern Australia is also similar to *orientalis*, but has the setae on tergite IX about as long as the tube.

The *H. fungi* complex is probably worldwide in distribution, and judging from the patterns of variation in material available at the BMNH at least part of this distribution may well be natural, leading to structural differences between populations. However, the species has almost certainly been introduced into New Zealand, and differences between the samples suggest that these introductions may have been effected from different parts of the world. Specimens in the series from Mapua have antennal segment IV paler basally than in most of the other New Zealand specimens, and the mesopraesternum tends to be more heavily eroded submedially. There are also differences in the length of the pedicel of antennal segment VIII, and the hind tibiae are not constant in colour. The lateral lobes of the pelta are not always distinct from the median lobe, the concave lateral margins frequently being in-filled to produce an almost triangular outline (Figure 215b).

Six large males (AK, CL) have a small, horn-like tubercle on the ventral surface of the head, arising between the major pair of interocular setae. Small males collected with them, and quite large males from other New Zealand series, do not have this tubercle developed. No previously described species of *Hoplothrips* has such a structure, nor has it been seen in males of *orientalis* from India. A similar tubercle is present on *H. anobii*, described above, but that arises anterior to the ventral interocular seta.

### *Hoplothrips oudeus* new species

Figures 56, \*121, and 216

**Female microptera.** **Colour.** Body pale brown to yellow with darker markings medially on tergites; distal antennal segments darker. Tube yellow basally, dark brown in distal three-quarters. Major setae pale.

**Structure.** Head (Figure 56) about as long as wide; eyes reduced, directed forwards; maxillary stylets close together medially, retracted almost to eyes; mouth cone rounded; postocular setae long, their apices expanded. Antennae (Figure 121) 8-segmented; 2 sense cones on segment III, 3 on segment IV; segments VII and VIII broadly joined. Pronotum (Figure 56) lacking sculpture; epimeral suture complete; all 5 pairs of major setae well developed, with apices expanded; praepectal plates absent. Foretarsal tooth not developed, but inner margin of fore tarsi slightly expanded (Figure 56). Mesopraesternum very slender medially, with a pair of small, triangular sclerites laterally. Mesonotal lateral setae well developed, their apices expanded. Forewing lobe about 45  $\mu\text{m}$  long, bearing 2 similar setae. Metanotum without sculpture; median setae long, expanded at apex; metathoracic sternopleural sutures complete. Abdomen: pelta (Figure 216) transverse, bearing 2 large pores; tergites II–VII each with 2 pairs of reduced wing-retaining setae scarcely 20  $\mu\text{m}$  long; tergal major setae expanded at apex, except for  $B_2$  on VIII and IX; tube shorter than head; sternal discal setae small.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (slightly contracted) 1700. Head length 180, median width 185; postocular setae 65. Pronotum length 140, median width 260; major setae — *am* 55, *aa* 65, *ml* 60, *ep* 75, *pa* 65. Metanotal median setae 50. Tergite IX setae —  $B_1$  80,  $B_2$  80,  $B_3$  120. Tube length 160; longest terminal setae ?150. Antennal segments III–VIII length 45, 42, 45, 40, 25, and 20 respectively.

**Male microptera.** Similar to female, but fore tarsus with a stout tooth; tergite IX with setae  $B_2$  similar to  $B_3$ ; sternite VIII fully occupied by glandular area, and with discal setae scattered; median sternites without specialised reticulate areas.

**Female macroptera** (from Australia; not paratype). Similar to microptera, but ocelli present, and compound eyes slightly larger; metanotal median setae arising wide apart on posterior half of tergite; forewing parallel-sided, without duplicated cilia, but with 3 apically expanded sub-basal setae arising in a straight line; pelta slightly more elongate; tergites III–VII with posterior pair of wing-retaining setae well developed, sigmoid.

**Type data.** **Holotype** female microptera, NEW ZEALAND, TO, Ngatokatako R., west Taupo, ex moss and lichen, 3 November 1953, R.K. Dell (NZAC). **Paratypes** (30 female micropterae, 15 male micropterae). ND – 6 female micropterae, 4 male micropterae, North Cape, Kerr Point, clifftops, low shrubs, 6 Dec 1967, K.A.J. Wise; female microptera,

male microptera, Waipoua State Forest, Pawakatutu, 359 m, moss 66/176, 11 Jun 1966, J.I. Townsend; female microptera, Waipoua State Forest, moss 66/184, 13 Jun 1966, J.I. Townsend; female microptera, Omahuta State Forest, beating *Gahnia*, 21 Sep 1976, G. Kuschel. TO – 21 female micropterae, 10 male micropterae, same data as holotype (AMNZ, BMNH, NZAC).

**Material examined.** Type series, plus 3 non-type specimens (female macroptera, female microptera, male microptera), AUSTRALIA, Queensland, Cooloola, Warrawonga, litter, 29 Mar 1977, P. Greenslade (ANIC).

ND, TO / —.

Apparently confined to leaf litter (as indicated by the specific epithet), whereas most other *Hoplothrips* species are typically found on dead twigs and branches.

**Remarks.** *H. oudeus* can be distinguished from other members of *Hoplothrips* by the broadly based eighth antennal segment, the five pairs of equally long pronotal major setae, all with the apices broadly expanded, and the pair of large metanotal median setae with expanded apices. It is moreover unusual in lacking a foretarsal tooth in the female, in lacking forewing duplicated cilia, in having sternite VIII of the male almost completely occupied by the glandular area, and in having setae  $B_2$  on tergite IX of the male as long as  $B_1$ , with the apices similarly expanded.

### *Hoplothrips poultoni* (Bagnall & Kelly)

Figure 57

*Trichothrips poultoni* Bagnall & Kelly, 1929: 90–91. **Holotype** female, AUSTRALIA (BMNH) [examined].

**Female macroptera.** **Colour.** Body brown. Antennal segments IV and V pale brown; apex of antennal segment II, basal third of III, and tarsi yellow. Tibiae yellow washed with brown. Forewing similar to that of *H. corticis*, shaded and mottled in distal half. Tube variable, but paler than body and usually orange/brown.

**Structure.** Head (Figure 57) with eyes slightly larger than in *corticis*, and cheeks less broadly expanded. Antennae relatively slender. Rest of body very similar to *corticis*, but with pelta slightly more elongate, anterior pair of wing-retaining setae on tergites II–VII small and straight, and tergite IX posteromarginal setae  $B_1$  longer than tube.

Dimensions (1 female macroptera;  $\mu\text{m}$ ). Body length (extended) 3500. Head length 290, median width 240; postocular setae 120. Tergite IX setae  $B_1$ , 260. Tube length 225.

**Material examined.** 3 female macropterae (BMNH, NZAC).

— / CO.

Collected from an orchard at Earnscliffe, 2 specimens from a suction trap in January 1980, and 1 in December 1979 from a light trap.

**Remarks.** *H. poultoni* is similar to *corticis* in structure, but the setae on tergite IX are exceptionally long, and the anterior pair of tergal wing-retaining setae are reduced. Until now *poultoni* was known only from the holotype female macroptera, collected on a newspaper near Melbourne, Australia. Two further macropterae have now been identified from Adelaide, Australia, and a series of micropterae from Canberra may represent the same species.

### *Hoplothrips semicaecus* (Uzel)

Figures 58, 59, 122a–c, 163, 164, 217, 218, 259, and 271

*Trichothrips semicaeca* Uzel, 1895: 249–250. **Syntype** males and females, BOHEMIA (repository not known).

*Hoplothrips (Trichothrips) fieldsi* Crawford, 1939: 77–79. **Holotype** female, NEW YORK, U.S.A. (USNM) [not examined]. **New synonymy.**

This description is based on specimens from England; comparisons are then made with specimens from other localities.

**Female macroptera. Colour.** Body pale brown. Distal half of antennal segment II, most of segment III, tarsi, and tibiae yellow; tube darker medially. Forewings and major setae pale.

**Structure.** Head (Figure 58) wider than long, expanded behind eyes, slightly constricted at base, with faint lines of sculpture basally; postocular setae blunt, wide apart; maxillary stylets about one-fifth of head width apart medially, reaching to postocular setae. Antennae, Figure 122a–c; segment III with pedicel bearing transverse lines of sculpture; segments IV–VII each with a distinct pedicel; segment III with 2 sense cones, segment IV with 2, 3, or 4 (i.e., 2 large ones or 4 small ones); segment IV enlarged, on distal half of ventral surface bearing up to 25 small sense cones (Figure 122b); segments V and VI with similar but fewer ventral sense cones; segment VIII scarcely constricted at base. Pronotum (Figure 58) with very little sculpture; anteromarginal setae minute, remaining major setae blunt or weakly expanded. Mesopraesternum boat-shaped; mesonotal lateral setae moderately developed. Metathoracic sternopleural sutures

short; metanotum (Figure 163) with striate sculpture laterally, a median pair of acute setae, and up to 2 smaller pairs anterior to these. Foretarsal tooth small. Forewings with 8–10 duplicated cilia; major sub-basal setae blunt to acute,  $B_1$  and  $B_2$  the longest. Abdomen: pelta (Figure 217) faintly sculptured; tergites II–VII each with 2 pairs of curved wing-retaining setae; tergite IX posteromarginal setae  $B_1$  blunt to expanded, about half as long as tube.

Dimensions (1 British female macroptera;  $\mu\text{m}$ ). Body length (extended) 2600. Head length 225, maximum width 235; postocular setae 65. Pronotum length 170, median width 300; major setae — *am* 5, *aa* 45, *ml* 60, *ep* 80, *pa* 80. Tergite IX setae —  $B_1$  90,  $B_2$  110,  $B_3$  160. Tube length 200; longest terminal setae 210. Forewing length 1100; sub-basal setae —  $B_1$  35,  $B_2$  40,  $B_3$  15. Antennal segments III–VIII length 60, 75, 65, 60, 55, and 55 respectively.

**Female aptera.** Similar to macroptera, but slightly paler; compound eyes smaller; ocelli absent (Figure 59); stylets closer together; antennal segment IV scarcely enlarged, its ventral surface bearing less than 4 small sense cones (Figure 122c); mesonotum and metanotum transverse (Figure 164); pelta broader (Figure 218); tergites II–VII each with 2 pairs of small, straight wing-retaining setae.

**Male aptera.** Largely brownish yellow, with tube, pronotum, and distal antennal segments darkest. Similar in structure to female aptera, but mesopraesternum scarcely developed; sternite VIII with an irregular glandular area (Figure 271) not reaching to lateral margins; sternites IV–VII with lateral reticulate areas (Figure 259); tergite IX posteromarginal setae  $B_2$  shorter. Large specimens with foretarsal tooth enlarged, fore femora swollen, and pronotum elongate, with a median longitudinal apodeme.

Dimensions (1 large British male aptera;  $\mu\text{m}$ ). Body length (extended) 2300. Head length 200, maximum width 220; postocular setae 80. Pronotum length 230, median width 330; major setae — *am* 10, *aa* 65, *ml* 90, *ep* 80, *pa* 80. Tergite IX setae —  $B_1$  105,  $B_2$  55,  $B_3$  140. Tube length 165. Antennal segments III–VIII length 65, 60, 55, 55, 50, and 40 respectively.

American specimens similar to British specimens, but macropterae with antennal segment III frequently more angulate apically, and IV larger; postocular and pronotal setae almost acute; tube shorter.

Dimensions (1 female macroptera, Washington, D.C.;  $\mu\text{m}$ ). Body length (extended) 2900. Head length 240, maximum width 245; postocular setae

60. Pronotum length 195, median width 300; major setae — *am* 10, *aa* 45, *ml* 45, *ep* 65, *pa* 75. Tergite IX setae — *B*<sub>1</sub> 70, *B*<sub>2</sub> 100, *B*<sub>3</sub> 130. Tube length 165. Antennal segments III–VIII length 65, 90, 70, 60, 50, and 45 respectively.

New Zealand mainland specimens similar to British specimens, but macropterae with antennal segment III sometimes stout; postocular setae longer, more acute; tergite IX setae acute; apterae with major setae longer, acute (1 male and 1 female aptera from Rakaia Island (MC) have pronotal midlateral and anteroangular setae exceptionally short).

Dimensions (1 female macroptera, Earnsclough, CO;  $\mu\text{m}$ ). Body length (extended) 2400. Head length 230, maximum width 225; postocular setae 90. Pronotum length 165, median width 280; major setae — *am* 10, *aa* 60, *ml* 75, *ep* 100, *pa* 100. Tergite IX setae — *B*<sub>1</sub> 105, *B*<sub>2</sub> 120, *B*<sub>3</sub> 150. Tube length 165. Antennal segments III–VIII length 55, 75, 65, 60, 50, and 40 respectively.

Dimensions (1 male aptera, Upper Hutt, WN;  $\mu\text{m}$ ). Body length (extended) 2300. Head length 200, maximum width 210; postocular setae 120. Pronotum length 200, median width 300; major setae — *am* 10, *aa* 80, *ml* 110, *ep* 120, *pa* 140. Tergite IX setae — *B*<sub>1</sub> 120, *B*<sub>2</sub> 45, *B*<sub>3</sub> 150. Tube length 165. Antennal segments III–VIII length 60, 60, 60, 55, 50, and 35 respectively.

New Zealand southern offshore island specimens: 3 female macropterae from The Snares islands are similar to English specimens but have the *B*<sub>1</sub> setae on tergite IX long and acute, and the postocular setae relatively long and almost acute; 4 females from southern Stewart Island (2 macropterae, 2 apterae) are similar to English specimens but have the pronotal anteroangular setae and particularly the midlateral setae short, although the *B*<sub>1</sub> setae on tergite IX are long.

**Material examined** (excluding Europe and North America). 8 female macropterae, 11 female apterae, 7 male apterae (BMNH, NZAC).

AK, WO, CL, WN / WD, MC, CO / SI / The Snares.

Collected in February, April, May, August, September, and December.

**Remarks.** Although *H. semicaecus* was described originally from "Bohemia", and was subsequently recorded from Poland, Germany, Austria, Denmark, England, and north-eastern America (Priesner 1928), it is here interpreted as a New Zealand native species. The basis for this is the relative lack

of variation among large numbers of specimens examined from Europe (particularly England) and eastern U.S.A. (New Jersey, Illinois, Pennsylvania, Maryland, District of Columbia, Virginia), in contrast to the considerable variation in the New Zealand material. The American specimens, including paratypes of *fieldsi*, cannot be distinguished satisfactorily from European examples of *semicaecus*, and so *fieldsi* is here treated as a synonym. The possibility that individuals of these relatively stable forms were introduced to New Zealand, and there gave rise to a new range of variation, has been considered and rejected. *H. semicaecus* has no obvious relatives in the Holarctic region. Therefore, a more likely explanation of these observations is that the species is native to the southern offshore islands of New Zealand, and the pattern of variation there is natural and comparable to the interpopulation variation of *Nesothrips propinquus*, described above. *H. semicaecus*, a fungus-feeding species, was probably introduced to the Northern Hemisphere from the subantarctic islands in the mid nineteenth century, either on dead wood used in ships' galleys by the extensive whaling trade, or in the containers used by plant collectors.

Most specimens of this species are apterous, although previous authors have referred to them as brachypterous. A small wing lobe is commonly present, about 15  $\mu\text{m}$  in diameter and often bearing a seta, but axillary sclerites have been observed only in a few New Zealand specimens. The variation in the number of major sense cones on antennal segments III and IV evidently results from fusion, two small sense cones combining as one large one. The variation in number of the smaller ventral sensoria on antennal segment IV is related in part to the size of this segment and the size of the individual.

### **Genus *Liothrips* Uzel**

*Liothrips* Uzel, 1895: 261. Type-species *Phloeothrips setinodis* Reuter, by subsequent designation (Hood 1918).

This is a large genus, containing about 240 species worldwide; it is moreover at the centre of a complex of related smaller genera. Most species feed on the leaves of green plants, some of them causing leaf deformation or even galls, and many are probably monophagous or oligophagous (Ananthakrishnan 1978). The species taxonomy within *Liothrips* is unsettled, and much of the published literature may be unreliable. Furthermore, systematic relationships with surrounding genera are ill defined, and the available classifications are difficult to use. *Liothrips* and *Teuchothrips* species all have only a

single sense cone on antennal segment III. There are no native *Liothrips* species in New Zealand, but one immigrant species has been taken in greenhouses.

### *Liothrips vaneecke* Priesner

Lily thrips

Figures 60, 123, and 219

*Liothrips vaneecke* Priesner, 1920: 211. **Syntype** male and female, NETHERLANDS (SMFG) [not examined].

**Female macroptera.** **Colour.** Mainly dark brown, but yellow on tarsi, fore tibiae, distal half of middle and hind tibiae, and extreme apex of femora. Antennal segments I, II, VII, and VIII brown, III yellow, and IV–VI yellow with apices more or less brown. Major setae brown, paler on tergite IX. Forewings weakly shaded, particularly along margins and around sub-basal setae.

**Structure.** Head (Figure 60) longer than wide, with transverse sculpture; ocelli present; compound eyes large; postocular setae bluntly acute, nearly as long as distance between their bases; 1 pair of small postocellar setae; maxillary stylets reaching to postocular setae, less than one-third of head width apart. Antennae 8-segmented (Figure 123); 1 sense cone on segment III, and 3 on segment IV. Pronotum (Figure 60) transverse, weakly sculptured; major setae long, bluntly acute, with anteromarginal setae shortest; epimeral sutures complete; praepectal plates absent. Metanotum longitudinally reticulate/striate; metathoracic sternopleural sutures short. Forewing parallel-sided, with 3 long major sub-basal setae about as long as postoculars, and 7–12 duplicated cilia. Abdomen: pelta (Figure 219) triangle-shaped, weakly sculptured; tergites II–VII with sigmoid wing-retaining setae; tergite IX postermarginal setae as long as tube; tube shorter than head, wider at base than at apex; terminal setae as long as tube.

Dimensions (1 female macroptera;  $\mu\text{m}$ ). Body length (extended) 2740. Head length 285, median width 240; postocular seta 105. Pronotum length 142, median width 330; major setae — *am* 57, *aa* 60, *ml* 135, *ep* 165, *pa* 150. Forewing length 1140. Tergite IX setae *B*, 240. Tube length 248. Antennal segments III–VIII length 87, 75, 75, 75, 64, and 45 respectively.

**Male macroptera.** Similar to female, with an entire glandular area on sternite VIII.

Dimensions (1 male macroptera;  $\mu\text{m}$ ). Body length (extended) 2340. Head length 274. Pronotum median length 145. Tube length 225.

**Material examined.** 32 female macropterae, 3 male macropterae (BMNH, NZAC, PANZ, PLNZ). WO, WI, (TK) / NC.

Only these 35 specimens have so far been taken, all from lily bulbs.

Collected in March, May, June, and December.

**Remarks.** The first available specimens of *L. vaneecke* were collected from Stratford (TK) in May 1940, between the scales of *Lilium thunbergianum* bulbs, and this record was published by Spiller (1951, 1956). Harrison (1955) recorded it from New Plymouth (TK) and noted that previously it had been known from collections taken from imported bulbs.

This species is unusual in the genus *Liothrips* in that it feeds on lily bulbs rather than green leaves. An account of the life history is given by Hodson (1935), and the host range and geographical distribution are summarised by Bailey (1939). Modern fumigation methods appear to have largely eliminated this thrips from lily bulbs.

### Genus *Lissothrips* Hood

*Lissothrips* Hood, 1908: 365. Type-species *Lissothrips muscorum* Hood, by monotypy.

Fifteen species have been described in this genus, all from the New World apart from one collected in Fiji. Almost all of these species have now been re-examined, and a revision of the genus is in preparation, but descriptions of three new species from New Zealand — *dentatus*, *dugdalei*, and *gersoni* — are included here. Most species of *Lissothrips* have been collected in association with mosses, and *gersoni* has actually been reared on such a host. However, *dentatus* has been taken in large numbers from twigs covered in lichen, and is also unusual in having a well developed foretarsal tooth. In *dugdalei*, the only other member of the genus with a foretarsal tooth, this structure is very small. In *Lissothrips* the maxillary stylets are rather less slender than in most species of Phlaeothripinae. The members of this genus exhibit a wide range of states in several characters, and as a result the genus is difficult to define. It appears to be related to *Williamsiella* from the Neotropics, and most species have antennal segment III smaller than either II or IV. The origin of the three New Zealand species is far from clear; the genus may be ancient, or perhaps the species were introduced by man in mosses.

### *Lissothrips dentatus* new species

Figures 61, 124, 165, 220, and 272

**Female aptera.** **Colour.** Body brown; base of antennal segment III, tarsi, and apex of tibiae paler. Forewings shaded. Major setae pale.

**Structure.** Head (Figure 61) with faint lines of sculpture at base; postocular setae acute; a small median pair of setae on vertex; ocelli absent; maxillary stylets about one-third of head width apart, reaching to postocular setae. Antennae, Figure 124; segment III slightly smaller than II or IV; segment VIII scarcely constricted at base; segment III with 1 sense cone, segment IV with 2. Pronotum (Figure 61) lacking sculpture; epimeral sutures complete, sometimes fainter posteriorly; anteromarginal setae minute, other major setae blunt or acute. Mesopraesternum reduced to 2 lateral triangles; mesonotum (Figure 165) bearing 1 minute seta laterally. Metanotum (Figure 165) without sculpture, bearing 1 pair of acute median setae; metathoracic sternopleural sutures short, sometimes reduced or absent. Foretarsal tooth (Figure 61) minute. Abdomen: pelta (Figure 220) faintly sculptured on anterior margin; tergites II–VII each with 1 pair of curved wing-retaining setae, sometimes 2 pairs on VI and VII tergite IX posteromarginal setae  $B_1$  longer than tube, finely acute.

Dimensions (holotype female aptera;  $\mu\text{m}$ ). Body length (extended) 1500. Head length 165, median width 160; postocular setae 85. Pronotum length 110, median width 230; major setae —  $am$  10,  $aa$  50,  $ml$  70,  $ep$  70,  $pa$  70. Tergite IX setae —  $B_1$  140,  $B_2$  130,  $B_3$  100. Tube length 110; longest terminal setae 150. Antennal segments I–VIII length 43, 43, 48, 45, 43, and 30 respectively.

**Female macroptera.** Similar to aptera, but ocelli present; metanotum with a few striate lines of sculpture laterally, and 1 pair of median acute setae; forewings without duplicated cilia; major sub-basal setae  $B_1$  blunt,  $B_2$  and  $B_3$  usually shorter; tergites II–VII each with 2 pairs of wing-retaining setae, the posterior pair sigmoid on III–VII, the remainder usually curved.

Dimensions (1 paratype female macroptera, LAM 1505;  $\mu\text{m}$ ). Body length (extended) 1300. Head length 165. Forewing length 600; major sub-basal setae —  $B_1$  40,  $B_2$  45,  $B_3$  15.

**Male aptera.** Similar to female aptera, but foretarsal tooth larger; sternite VIII (Figure 272) with a transverse gland not reaching to lateral margins; tergite IX posteromarginal setae  $B_2$  shorter, stout.

Dimensions (1 paratype male aptera, LAM 1505;  $\mu\text{m}$ ). Body length (extended) 1200. Head length 165, median width 140; postocular setae 65. Tergite IX setae —  $B_1$  110,  $B_2$  30,  $B_3$  110. Tube length 85.

**Type data.** **Holotype** female aptera, NEW ZEALAND, AK, Whatipu, 32 km W of Auckland, yellow lichen, 25 February 1979, L.A. Mound 1505 (NZAC). **Paratypes** (4 female macropterae, 159 female apterae, 63 male apterae). AK – female macroptera, 45 female apterae, 29 male apterae, same data as holotype; 2 female macropterae, 85 female apterae, 18 male apterae, same data but AKW 72; female macroptera, 3 female apterae, male aptera, same data but LAM 1501; female aptera, 3 male apterae, same data but 26 May 1979, AKW 81; 8 male apterae, same data but 21 Jan 1982; 2 female apterae, male aptera, Mt Albert, associated with yellow lichen on walnut tree branch, 20 Dec 1975, A.K. Walker. WO – 2 female apterae, Te Kuiti, ex white pine (*Podocarpus dacrydioides*), 9 Aug 1978, MAF 6840. SD – 4 female apterae, male aptera, Stephens I., on lichen, rocks above landing, 2 Dec 1953, B.A. Holloway. BR – 4 female apterae, L. Rotoiti, 600 m, 5 Feb 1979, LAM 1407. WD – female aptera, male aptera, Haast Pass, twigs with lichen, 28 Apr 1982, LAM 1668; 3 female apterae, 16 km N of Haast, dead wood covered in lichen and moss, 28 Apr 1982, AKW 214 (BMNH, NZAC).

**Material examined.** Type series only.

AK, WO / SD, BR, WD.

Collected in January, February, April, May, August, and December.

**Remarks.** *L. dentatus* resembles other members of *Lissothrips* in the rather stout maxillary stylets and the long setae on tergite IX. However, antennal segment III is not particularly small, the praepectal plates are not developed, the pronotal epimeral sutures are complete although weak, and the foretarsus bears a small tooth. Moreover, both adults and larvae are apparently associated with lichen on twigs, rather than with mosses. Despite these differences, *dentatus* is placed in *Lissothrips* because of the variation in each of these characters between other species of the genus.

### *Lissothrips dugdalei* new species

Figures \*62, 125, \*148, \*166, and \*221

**Female aptera.** **Colour.** Body pale brown. Antennal segments I and II yellow, III–V darker, VI–VIII brown. Tarsi, tibiae, and middle and hind femora yellow; fore femora darker basally. Tube paler at apex. Major setae brown.

**Structure.** Head, Figure 62; compound eyes enclosed dorsolaterally by head, larger and more prolonged ventrally than dorsally; ocelli absent;

postocular setae long, acute; 1 pair of small setae on vertex; maxillary stylets about one-seventh of head width apart and reaching to postocular setae. Antennae, Figure 125; segment III noticeably smaller than II or IV; segments VII and VIII closely joined but with a complete suture; segment III with 1 sense cone, segment IV with 2. Pronotum transverse, lacking sculpture; epimeral sutures incomplete; major setae blunt to acute. Mesopraesternum almost totally eroded; mesonotum transverse, lacking lateral setae (Figure 166). Metanotum transverse, lacking sculpture, with a pair of small pores medially which usually lack setae (Figure 166); metathoracic sternopleural sutures absent. Foretarsal tooth hooked-shaped, minute, arising distally (Figure 148). Abdomen: pelta (Figure 221) reduced to an irregular subcircular sclerite; sternites without a continuous line of discal setae; tergites V–VIII each bearing a median pair of exceptionally long, finely acute setae posterolaterally to median pores; tergites II–VII each with 1 pair of minute wing-retaining setae; tergite IX posteromarginal setae  $B_1$  longer than tube, finely acute.

Dimensions (holotype female aptera;  $\mu\text{m}$ ). Body length (extended) 1450. Head length 150, median width 165; postocular setae 80. Pronotum length 90, median width 210; major setae —  $am$  60,  $aa$  65,  $ml$  75,  $ep$  100,  $pa$  85. Tergite IX setae —  $B_1$  120,  $B_2$  120,  $B_3$  120. Tube length 110; longest terminal setae 90. Antennal segments III–VIII length 35, 42, 42, 45, 35, and 30 respectively.

**Male aptera.** Similar to female; sternite VIII with no glandular area; tergite IX posteromarginal setae  $B_2$  as long as  $B_1$ .

**Type data.** **Holotype** female aptera, NEW ZEALAND, FD, Secretary Island nr The Hub, litter 81/182a, 25 November 1981, G.T. Bayless (NZAC). **Paratypes** (8 female apterae, 1 male aptera). BR – female aptera, Mawhera State Forest, Tutty's Plateau, moss 72/178, 20 Sep 1972, J.S. Dugdale; 7 female apterae, male aptera, Fletcher's Creek Biological Reserve, moss 71/131, 9 Nov 1971, J.S. Dugdale (BMNH, NZAC).

**Material examined.** Type series only.

— / BR, FD.

Collected in September and November.

**Remarks.** *L. dugdalei* is one of the most completely apterous species in *Lissothrips*. The pterothorax is exceptionally reduced, as is the pelta, the terminal pair of antennal segments are closely joined, and the praepectal plates and mesopraesternum are almost completely lost. Some of the tergites bear a pair of long setae medially, and the

foretarsus bears a minute recurved tooth distally, just proximal to the pretarsus.

### *Lissothrips gersoni* new species

Figures \*63, 126, \*167, and \*222

**Female aptera.** **Colour.** Body brown; antennal segments II and III, tarsi, apex of tibiae, and apex of tube paler.

**Structure.** Head (Figure 63) with faint lines of sculpture basally; compound eyes enclosed dorso-laterally by head, narrowed ventrally to about 8 facets; ocelli absent; postocular setae finely acute, wide apart; maxillary stylets close together, reaching to compound eyes. Antennae, Figure 126; segment III noticeably smaller than either II or IV; segment VIII with a small but distinct pedicel; segment III lacking sense cones, segment IV with 2 long, slim ones. Pronotum (Figure 63) lacking sculpture; epimeral sutures incomplete; anteroangular setae minute; anteromarginal setae often short, other major setae longer and finely acute; antero-marginals the shortest; praepectal plates small, concealed by mouth cone. Mesopraesternum reduced to 2 lateral triangles; mesonotum (Figure 167) transverse, with minute setae laterally. Metanotum transverse, lacking sculpture, with a pair of median acute setae; metathoracic sternopleural sutures absent. Foretarsal tooth absent. Abdomen: pelta (Figure 22) broad, with a faint line of sculpture anteriorly; tergites II–VII each with 1 pair of minute, straight wing-retaining setae; sternites with few (1–4) or no discal setae; tergite IX posteromarginal setae  $B_1$  finely acute, longer than tube.

Dimensions (holotype female aptera;  $\mu\text{m}$ ). Body length (extended) 1500. Head length 150, median width 170; postocular setae 90. Pronotum length 100, median width 240; major setae —  $am$  35,  $aa$  10,  $ml$  50,  $ep$  120,  $pa$  60. Tergite IX setae —  $B_1$  140,  $B_2$  120,  $B_3$  120. Tube length 120; longest terminal setae 90. Antennal segments III–VIII length 33, 40, 40, 50, 40, and 40 respectively.

**Male aptera.** Similar to female, but pronotal anteromarginal setae shorter; tergite IX posteromarginal setae  $B_2$  shorter, stout; sternite VIII lacking a glandular area.

Dimensions (1 paratype male aptera, Horokaka, ND;  $\mu\text{m}$ ). Body length (extended) 1200. Head length 140; postocular setae 75. Pronotum length 85, median width 200; major setae —  $am$  20,  $aa$  5,  $ml$  40,  $ep$  80,  $pa$  60. Tergite IX setae —  $B_1$  120,  $B_2$  45,  $B_3$  115. Tube length 105.

**Type data.** **Holotype** female aptera, NEW ZEALAND, ND, Kawakawa, reared, on *Thuidium*

moss, 5 September 1982, U. Gerson (NZAC). **Paratypes** (24 female apterae, 4 male apterae). ND – female aptera, same data as holotype; 2 female apterae, Whakapara, moss 67/257, 3 Nov 1967, J.I. Townsend; 5 female apterae, Waipoua State Forest, moss on nikau 67/248, 19 Oct 1967, J.S. Dugdale; 2 female apterae, male aptera, Oparau, Kauri Ridge, moss on tree, 6 Jun 1966, M. Luxton; 4 female apterae, 2 male apterae, Tangihua Range, Mt Horokaka, moss 77/95, 16 Aug 1977, G. Kuschel; female aptera, same data except litter 77/97, J.S. Dugdale; female aptera, Maungaturata, moss 64/115, 12 Nov 1964, G.S. Grandison. AK – female aptera, Rangitoto I., moss 72/160, 4 Jun 1972, J.C. Watt; female aptera, Lynfield, litter 75/66, 29 Mar 1975, G. Kuschel. BP – female aptera, Raukumara Range, Matu Road, litter 79/36, 27 Feb 1979, B.M. May. TK – female aptera, Arawhata Road, moss on bank, 20 May 1966, M.S. Luxton. WN – female aptera, Orongorongo Valley, Wootton's Creek, 90 m, moss 69/136, 22 May 1969, J.S. Dugdale. SD – 3 female apterae, Mt Cullen, 800 m, moss 68/206, 11 Dec 1968, J.I. Townsend. MC – female aptera, Banks Peninsula, Sugarloaf, Mitchell's Track, 360 m, grass and liverwort sward, 14 Sep 1982, J.S. Dugdale (BMNH, NZAC).

**Material examined.** Type series only.

ND, AK, BP, TK, WN / SD, MC.

Collected in March, May, June, and August–December.

Holotype collected as an immature on *Thuidium* moss, maintained alive on it to adulthood 2 weeks later; adult kept alive on this moss until 21 December 1982.

**Remarks.** Apart from its reduced praepectal plates, *L. gersoni* appears to be a typical member of *Lissothrips*, with antennal segment III very small and VIII slender. Difficulties arise, however, with similar specimens from outside New Zealand. A series of nine females collected about 60 km south of Sydney, New South Wales, cannot be distinguished from New Zealand material, although eight males collected with them each have a transverse glandular area on sternite VIII. Moreover, a single female specimen has been studied from Fiji which is very similar to the New Zealand specimens, but has the anteroangular setae about 20  $\mu\text{m}$  long (instead of 10  $\mu\text{m}$  or less) and the *B*<sub>1</sub> setae on tergite IX scarcely as long as the tube. The type series of *gersoni* is interesting in that the length of the pronotal anteromarginal setae is highly variable, from 5  $\mu\text{m}$  to 35  $\mu\text{m}$ . Moreover, this variation occurs between specimens within more than one series, and several individuals have been studied in which the left and right setae differ drastically in length.

## Genus *Macrophthalthrips* Karny

*Macrophthalthrips* Karny, 1922: 34. Replacement name for *Ophthalmothrips* Karny, 1920, not *Ophthalmothrips* Hood, 1919a. Type-species *Ophthalmothrips argus* Karny, by monotypy.

Members of this genus are remarkable for their greatly enlarged eyes, which meet both in front of and behind the ocellar triangle. The mouth too is exceptionally long. In life, despite their small size, the individuals are coloured in a remarkable mixture of red, brown, yellow, and chalky white which, if found in a larger insect, would be considered to be aposematic.

Mound (1972b) recognised 13 species in this genus, each with a restricted distribution in some part of the tropics, apart from *argus*, which is now known from Hawaii, Australia, New Zealand, and Tanzania. The species are presumed to be fungus-feeders, in that they are always associated with dead twigs and branches. They are most satisfactorily distinguished from each other on details of sculpture and the form of the pelta. Colour patterns and lengths of antennal segments are known to be variable or subject to allometry.

### *Macrophthalthrips argus* (Karny)

Figures 64, 127, 168, and 223

*Ophthalmothrips argus* Karny, 1920: 38. **Holotype** female, AUSTRALIA (NRSS) [examined].

**Female macroptera.** **Colour.** Body brown. Head with lateral marginal third pale brown. Pronotum with lateral marginal half very pale, white in life. Tibiae, apical third and extreme base of tarsi, distal two-thirds of antennal segment II, and all of segment III yellow. Forewings shaded, with a dark median line. Major setae pale.

**Structure.** Head (Figure 64) holoptic, longer than tube, strongly constricted behind eyes; posterior margin with a pair of postoccipital projections; dorsal surface with lines of sculpture; compound eyes very large, projecting over antennal segment I and part of II and surrounding a rounded projection which bears the ocelli, 3 pairs of curved preocellar setae, and 2 pairs of straight postocellar setae; no long postocular setae present; maxillary stylets close together, reaching to compound eyes; mouth cone exceptionally long, pointed, reaching to mesosternum. Antennae (Figure 127) 8-segmented; segment III exceptionally elongate; segments VII and VIII closely joined; segment III with 2 sense cones, segment IV with 4. Pronotum (Figure 64) with lines of sculpture medially; major setae relatively short, with expanded apices; epimeral sutures incomplete; praepectal plates absent.

Mesonotum and metanotum (Figure 168) reticulate, with internal markings; metathoracic sternopleural sutures present. Forewings sharply angled on anterior margin near base, with 10–12 duplicated cilia; sub-basal setae subequal, with expanded apices. Abdomen: pelta (Figure 223) reticulate; tergites II–VII each with 2 pairs of sigmoid wing-retaining setae; tergite IX posteromarginal setae  $B_1$  with expanded apices, shorter than  $B_2$ ; tube shorter than head, its dorsal surface with a transverse groove in proximal third.

Dimensions (1 female macroptera, Australia;  $\mu\text{m}$ ). Body length (extended) 2400. Head length 310, median width 194. Pronotum median length 142, median width 270. Forewing length 840; sub-basal setae  $B_1$ , 45. Tergite IX setae  $B_1$ , 97. Tube length 128. Antennal segments III–VIII length 98, 90, 63, 60, 43, and 36 respectively.

**Male macroptera.** Similar to female, but with fore tarsi entirely pale; antennal segments more slender, with only 3 sense cones on segment IV; fore femora swollen, with a large tubercle on inner margin; sternite VIII without a glandular area.

Dimensions (1 male macroptera;  $\mu\text{m}$ ). Body length (extended) 2220. Head length 300. Pronotum median length 195. Tube length 135. Antennal segments III–VIII length 112, 97, 75, 75, 46, and 30 respectively.

**Material examined.** 6 female macropterae (BMNH, FRNZ, NZAC).

AK, TO / —.

First collected near Taupo in December 1962, reared from *Pinus radiata* logs. Two females beaten from dead apple wood in an Auckland domestic garden in 1982, and another caught in 1981 in a Malaise trap.

**Remarks.** *M. argus* is probably more common than the above records suggest.

### Genus *Plectrothrips* Hood

*Plectrothrips* Hood, 1908: 370. Type-species *Plectrothrips antennatus* Hood, by monotypy.

This genus comprises 29 species, 18 from the Old World and 11 from the New World (Okajima 1981). They are probably fungus-feeders, as they are found on dead branches and under bark. They share a number of unusual characters: antennal segment II with a campaniform sensillum in basal half; antennal segment VIII long, slender; posterior ocelli close to compound eyes; pronotum reduced to a median shield; tergite II eroded laterally; median sternites

often with paired, reticulate glandular areas. Many of the species have a well developed maxillary bridge, as in the Haplothripini; however, the forewings are broad and parallel-sided, not constricted medially. Six specimens belonging to this genus have been collected individually in New Zealand. Four of them can be identified as a species described from Singapore and Kuala Lumpur, but the other two probably represent an undescribed species (see Remarks under *orientalis*, below). The tribe Plectrothripini is a fairly well defined group which includes a further 9 genera and 18 species (Okajima 1981).

### *Plectrothrips orientalis* Okajima

Figures 65, 128, 224, and 260

*Plectrothrips orientalis* Okajima, 1981: 327–329. **Holotype** female, SINGAPORE (SOCT) [examined].

**Female macroptera. Colour.** Body brown. Tarsi, fore tibiae, and extreme base of antennal segment III yellow. Forewings shaded, darker in basal half. Major setae pale.

**Structure.** Head (Figure 65) longer than wide, sculptured near base; cheeks rounded, constricted at base; posterior pair of ocelli close to margin of compound eyes, which are larger dorsally than ventrally; postocular setae acute, low on head, almost halfway between base and compound eyes; maxillary stylets about one-fifth of head width apart, reaching to postocular setae; maxillary bridge faintly indicated. Antennae (Figure 128) 8-segmented; segment VIII elongate; segments IV–VII each with a distinct pedicel; segment II with a campaniform sensillum in proximal half; segment III with 2 long, stout sense cones, segment IV with 3. Pronotum shield-like, with a median line; epimeral setae long, pointed, the remaining setae short; epimeral sutures complete; praepectal plates absent. Mesonotum sculptured on anterior half; mesopraesternum reduced to 2 small lateral plates. Metanotum with striate reticulations, a pair of pores, and a pair of setae medially; metathoracic sternites heavily eroded almost halfway to hind coxae. Foretarsal tooth large; middle tibiae each with an apical spur-like seta; hind tibiae with 1 large and 1 small spur-like seta. Forewing parallel-sided, with 3–7 duplicated cilia, 1 long major sub-basal seta, and a smaller seta posteriorly. Abdomen: pelta (Figure 224) bearing 2 large lateral lobes; tergite II heavily eroded laterally (Figure 224); sternite VI with a characteristic worm-like glandular area (Figure 260), this area reduced on sternites V and VII; tergite IX posteromarginal setae acute; tube stout, shorter than head, constricted at apex.

Dimensions (1 female macroptera;  $\mu\text{m}$ ). Body length (extended) 2370. Head length 243, median width 185; postocular setae 72. Pronotum median length 162, median width 222; major setae — *ep* 94, *pa* 15. Forewing length 870; sub-basal setae *B*<sub>3</sub> 90. Tergite IX posteromarginal setae — *B*<sub>1</sub> 88. Tube length 157. Antennal segments III–VIII length 64, 64, 58, 55, 48, and 60 respectively.

**Material examined.** 4 female macropterae (BMNH, NZAC).

AK / SD, NN.

Collected in February and August.

**Remarks.** *P. orientalis* was described from Kuala Lumpur and Singapore, and Dr Okajima has since collected it in the Philippine Islands. The specimens studied from New Zealand (Tennyson Inlet, Canaan, and near Auckland) are smaller than the smallest available paratype of *orientalis*, with shorter antennal sense cones and less clearly defined reticulate areas on the median sternites. However, they cannot be distinguished from a small female of *orientalis* collected recently in Singapore.

Two further females of a *Plectrothrips* species have been studied from New Zealand (AK: Lynfield, November 1980, and The Noises islands, December 1979). These apparently represent a new species closely related to *orientalis* but with yellow tibiae and the *B*<sub>1</sub> setae on tergite IX longer (0.75 $\times$  as long as the tube). These specimens are particularly confusing because the middle tibiae each have an apical spur-like seta together with a second seta which could be interpreted either as a weak spur or a stout seta. The species appears to be distinct from any treated by Okajima (1981), but the available material does not warrant a formal description.

### Genus *Podothrips* Hood

*Podothrips* Hood, 1913: 67–70. Type-species *Podothrips semiflavus* Hood, by monotypy.

This genus was revised and redefined with a key to 19 species by Ritchie (1974). Its species are found throughout the tropics and subtropics in association with various grasses and bamboos, upon which they appear to be predators of scale insects. They are typical haplothripines, with a maxillary bridge, constricted forewings, and no glandular area on sternite VIII of the males. The antennae have one or two sense cones on segment III and two or three on segment IV, but the elongate praepectal plates are distinctive for the genus. All species have a broadly based foretarsal tooth, unlike the distal tooth of *Apterygothrips* and *Karnyothrips* species,

and most have a seta-bearing tubercle or tooth near the apex of the fore tibiae. Metathoracic sternopleural sutures are present in about half of the species.

The two new species described below, *orarius* and *turangi*, are referred to *Podothrips* with considerable hesitation because the praepectal plates are scarcely longer than wide and the foretibial tubercle is small. Moreover, both species are known only from micropterae, whereas most *Podothrips* are macropterous. They are similar to the Australian species *P. orion*, although that lacks the metathoracic sternopleural sutures which are present in both New Zealand species. An alternative interpretation of these two species could be that they are derived from the *Apterygothrips australis* species-group, and the similarities to *Podothrips* are due to convergence.

### *Podothrips orarius* new species

Figures \*66, \*129, and \*225

**Female microptera.** **Colour.** Body brown. Tarsi, distal half of middle and hind tibiae, and fore tibiae excluding base and external margin yellow. Antennal segments III–VIII increasingly brown. Major setae pale brown, terminal setae of tube darkest.

**Structure.** Head (Figure 66) longer than wide but not elongate, weakly constricted at base but not behind eyes, lacking sculpture; ocelli usually absent, but sometimes fore ocellus weakly developed; compound eyes larger dorsally than ventrally; postocular setae acute; maxillary stylets reaching to postoculars; maxillary bridge about one-third of head width apart. Antennae (Figure 129) 8-segmented; segment VII elongate; segments III and IV each with 2 sense cones. Pronotum (Figure 66) elongate; setae acute, the epimeral and posteroangular setae longest; discal setae present; praepectal plates longer than wide. Mesonotum with lateral setae small; mesopraesternum broadly boat-shaped. Metanotum almost devoid of sculpture; metathoracic sternopleural sutures present. Fore tibiae (Figure 66) with a small, seta-bearing tubercle near inner apex. Forewing bud bearing a small seta. Abdomen: pelta (Figure 225) rounded at apex, faintly sculptured; tergites II–VII each with 2 pairs of short, straight wing-retaining setae; tergite VIII posteroangular and posteromarginal setae acute; tergite VII with an extra pair of submedian, submarginal setae; tergite VIII posteromarginal setae acute, shorter than tube; tube shorter than head; terminal setae longer than tube.

Dimensions (holotype female microptera;  $\mu\text{m}$ ). Body length (extended) 1950. Head length 207,

median width 147; postocular setae 48. Pronotum median length 172, median width 188; major setae — *am* —, *aa* 22, *ml* —, *ep* 48, *pa* 45, *pm* 7. Forewing length 72. Tergite IX setae  $B_1$  60. Tube length 94; longest terminal setae 132. Antennal segments III–VIII length 38, 38, 38, 34, 48, and 30 respectively.

**Male microptera.** Similar to female, but slightly smaller; foretarsal tooth slightly larger.

Dimensions (1 paratype male microptera (data as holotype);  $\mu\text{m}$ ). Body length (extended) 1860. Head length 198. Pronotum median length 172. Tergite IX setae —  $B_1$  72,  $B_2$  45,  $B_3$  75. Tube length 111.

**Type data.** **Holotype** female microptera, NEW ZEALAND, AK, Whatipu, West Coast beach 32 km W of Auckland, marram grass, 25 February 1979, L.A. Mound 1497 (NZAC). **Paratypes** (7 female micropterae, 17 male micropterae): same data as holotype (BMNH, NZAC).

**Material examined.** Type series only.  
AK / —.

**Remarks.** *P. orarius* is similar to *P. orion* from Australia, but that species is macropterous and lacks metathoracic sternopleural sutures. The most closely related species, *turangi*, is contrasted in the key.

### *Podothrips turangi* new species

Figures \*130 and 226

**Female microptera.** **Colour.** Similar to *orarius*.

**Structure.** Similar to *orarius*, but ocelli developed; antennal segment IV with 2 large sense cones and 1 small one (Figure 130); wing bud longer, bearing 3 sub-basal setae; pelta (Figure 226) subquadrate; tergite VII with no long submedian, submarginal setae; tergite VIII posteroangular setae blunt; foretibial tubercle apparently smaller.

Dimensions (holotype female microptera;  $\mu\text{m}$ ). Body length (extended) 2050. Head length 222, median width 150; postocular setae 45. Pronotum median length 165, median width 184; major setae — *am* —, *aa* 14, *ml* —, *ep* 43, *pa* 45, *pm* 7. Forewing 120. Tergite IX setae  $B_1$  60. Tube length 115; longest terminal setae 128. Antennal segments III–VIII length 43, 43, 43, 38, 45, and 27 respectively.

**Male microptera.** Similar to female, but slightly smaller; foretarsal tooth larger.

Dimensions (1 paratype male microptera;  $\mu\text{m}$ ). Body length (extended) 1670. Head length 205.

Pronotum median length 142. Tergite IX setae —  $B_1$  49,  $B_2$  38,  $B_3$  90. Tube length 105.

**Type data.** **Holotype** female microptera, NEW ZEALAND, TO, 24 km S of Turangi, 900 m, *Poa* and *Chionochloa* tussock, 19 February 1979, L.A. Mound 1476 (NZAC). **Paratypes** (1 female microptera, 3 male micropterae): same data as holotype (BMNH, NZAC).

**Material examined.** Type series only.  
TO / —.

**Remarks.** *P. turangi* is contrasted with its closely related congener *orarius* in the key.

### Genus *Poecilothrips* Uzel

*Poecilothrips* Uzel, 1895: 264. Type-species *Poecilothrips albopicta* Uzel, by monotypy.

The two species which should be placed in this genus, *albopictus* and *nubilus* Faure, share a curious apomorphy in the arched form of the mesopraesternum and the cleft-like eroded area of the mesoeusternum (Kishan 1972). The country of origin of Uzel's *albopicta* cannot be ascertained, but *nubilus*, which is very similar, is from South Africa. They appear to be related to *Hoplothrips* and *Hoplandrothrips* in having elongate maxillary stylets, but the mouth cone is exceptionally long.

### *Poecilothrips albopictus* Uzel

Figures 67, 82, 131, 169, and 227

*Poecilothrips albopicta* Uzel, 1895: 264–265. **Holotype** female, BOHEMIA (repository not known).

**Female macroptera.** **Colour.** Body brown; proximal half of antennal segment III, base of segments IV–VI, tarsi, apex and sometimes base of tibiae, and apex of tube paler. Pronotum pale laterally (chalky white in life), dark in median third. Forewings shaded medially. Major setae pale brown.

**Structure.** Head longer than wide, weakly expanded behind eyes, with no major setae but with reticulate sculpture on dorsal surface; ocellar area raised; compound eyes larger dorsally than ventrally; maxillary stylets close together in head, reaching to compound eyes; mouth cone long, pointed, reaching to mesoeusternum. Antennae (Figure 131) 8-segmented; segments III–V each with a distinct pedicel; segment III with 2 short, stout sense cones, segment IV with 4. Pronotum (Figure 67) with reticulate sculpture medially; major setae

short, expanded at apex; epimeral sutures complete; praepectal plates absent. Mesopraesternum entire, curving away from mesoeusternum medially (Figure 82); mesoeusternum with an eroded median cleft anteriorly (Figure 82). Metanotum (Figure 169) with median setae acute, reticulations longitudinally elongate and with internal markings; metathoracic sternopleural sutures either absent or less than one-third of metathoracic length. Foretarsal tooth absent. Forewing parallel-sided, with 8–13 duplicated cilia; major sub-basal setae subequal, expanded at apex. Abdomen: pelta (Figure 227) reticulate, with short lateral lobes; tergites II–VII with lateral reticulations bearing microtrichia, each with 2 pairs of wing-retaining setae, these sigmoid except for anterior pair on tergites II–V, which are curved; major posteroangular setae expanded at apex; tergite IX posteromarginal setae  $B_1$  and  $B_2$  expanded at apex,  $B_3$  acute; sternites with a row of 15 or more discal setae.

Dimensions (1 female macroptera;  $\mu\text{m}$ ). Body length (extended) 2300. Head length 310, median width 240. Pronotum length 165, median width 300; major setae — *am* 30, *aa* 35, *ml* 40, *ep* 55, *pa* 45. Tergite IX setae —  $B_1$  75,  $B_2$  85,  $B_3$  130. Tube length 180; longest terminal setae 200. Forewing length 900; sub-basal setae —  $B_1$  35,  $B_2$  45,  $B_3$  55. Antennal segments III–VIII length 70, 65, 55, 55, 45, and 40 respectively.

**Female microptera.** Similar to macroptera, but sometimes smaller; head and pronotum, Figure 67; ocelli reduced; forewing lobe bearing 1 or 2 expanded, stout setae (usually 40–60  $\mu\text{m}$  long; in 1 specimen 120  $\mu\text{m}$  long); mesonotum and metanotum broader; metathoracic sternopleural sutures usually absent; tergites II–VII bearing curved or weakly sigmoid wing-retaining setae, the anterior pair more reduced than the posterior pair.

**Material examined.** 38 female macropterae, 50 female micropterae (BMNH, NZAC).

— / CO.

Taken in orchards, the macropterae by suction trap, light trap, and sticky trap. Macropterae, micropterae, and larvae were found on dead wood of apricot, pine, and walnut.

Collected in January, April, and October–December.

**Remarks.** *P. aibopictus* is known from various parts of Europe and from eastern and western North America (Kishan 1972). This is the first record from New Zealand, and the species has not yet been recorded from Australia. Males have not been recorded from New Zealand, Britain, or North America. The only known male, described by Peli-

kan (1950), was taken in Czechoslovakia among collections totalling more than 250 females.

### Genus *Psalidothrips* Priesner

*Psalidothrips* Priesner, 1932: 61–62. Type-species *Psalidothrips amens* Priesner, by monotypy.

Small, pale phlaeothripines usually in leaf litter. Head about as wide as long but compressed dorsoventrally; cheeks without strong setae, frequently incut behind eyes, with a small tooth; compound eyes rounded or angulate, reduced in apterae; maxillary stylets usually wide apart in head, retracted scarcely halfway to postocular setae; maxillary bridge sometimes present but weak; maxillary palps exceptionally small; mouth cone short, rounded. Antennae 8-segmented; segment III with 1–3 sense cones, segment IV with 2–4. Pronotal anteromarginal and (usually) anteroangular setae minute; epimeral setae shorter than posteroangular setae; epimeral sutures complete; praepectal plates absent. Mesonotal lateral setae small; mesopraesternum boat-shaped, sometimes reduced or absent. Metathoracic sternopleural sutures present. Foretarsal tooth usually absent in female, present in male. Forewing usually without duplicated cilia, weakly constricted medially or parallel-sided and narrowed in distal half, sometimes absent; sub-basal setae small. Abdomen with pelta small, variable; tergal wing-retaining setae usually rounded, not sigmoid, often reduced; sternites with few discal setae; male sternite VIII with a transverse glandular area.

This genus appears to be related to *Hoplothrips*, and two species have been studied (one from Trinidad and one from Australia) in which the maxillary stylets are only about one-fifth of the head width apart and retracted almost to the postocular setae. Moreover, *P. taylori* — which is described below from Australia and New Zealand — has the pronotal anteroangular setae elongate in some specimens, and the postocellar setae unusually long. The genus is common in leaf litter in Australia, but all the species are as yet undescribed. They usually differ from *Psalidothrips* species from other parts of the world in having only one sense cone on antennal segment III and two on segment IV, the anterior pair of wing-retaining setae reduced on each tergite, and the mesopraesternum reduced. Apterae are common in Australia but scarcely known from other parts of the world.

Okajima (1983) has given a key to the 17 known species of *Psalidothrips*, comprising eight from the Neotropics south of Trinidad and Colombia, and nine from the Oriental region between India, Japan, and Kalimantan. The Australian species that have

been studied appear to form a relatively distinct group, from which the New Zealand species are presumably derived. Unfortunately, species definition in the group has proved difficult owing to considerable variation in structure between samples. New Zealand populations may be derived from relatively frequent migrations across the Tasman Sea, and extensive studies of the litter fauna would be needed to establish the biological significance of the structural variation observed so far. We have limited ourselves to describing three species only, although these represent scarcely half of the available (but often poorly preserved) *Psalidothrips* specimens collected in New Zealand. One of these species is common in Australia, but the other two are not at present known from that country. In contrast, the unidentified New Zealand material contains many individuals which are very similar to various specimens collected in eastern Australia.

### *Psalidothrips moeone* new species

Figures \*68, \*132, \*228, 229, and 273

**Female macroptera.** Colour (all available specimens very bleached, having been stored in ethyl alcohol for 6–20 years). Body pale brown. Tarsi, tibiae, tergite IX, and tube yellow. Forewings weakly shaded. Major setae pale.

**Structure.** Head (Figure 68) strongly constricted into an apodeme behind eyes; cheeks round, weakly sculptured at base; ocelli present; postocular setae finely acute, about as long as distance between their bases; maxillary stylets about one-third of head width apart, reaching to about halfway to postocular setae, 'V'-shaped, with a weak maxillary bridge. Antennae, Figure 132; segment III bearing 1 sense cone (plus 1 small inner cone), segment IV with 2. Pronotum (Figure 68) lacking sculpture; setae finely acute. Metanotum weakly sculptured laterally, lacking sculpture medially, bearing a pair of median setae no longer than mesonotal median setae. Foretarsal tooth absent. Forewings lacking duplicated cilia; sub-basal setae acute, subequal. Abdomen: pelta (Figure 228) faintly sculptured, without lateral lobes; tergites II–VII each with 1 pair of wing-retaining setae, those on II almost as small as median setae, those on III–VII weakly sigmoid; tergite IX posteromarginal setae  $B_1$  finely acute, more than half as long as tube; sternites with a row of up to 4 pairs of discal setae.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2000. Head length 190, median width 175; postocular setae 90. Pronotum length 135, median width 240; major setae — *am* 5, *aa* 5, *ml*

75, *ep* 70, *pa* 100. Tergite IX setae —  $B_1$ , 120,  $B_2$ , 120,  $B_3$ , 110. Tube length 160. Forewing length 850.

**Female aptera.** Similar to macroptera, but antennal segment III often lacking the small inner sense cone; pronotal midlateral setae blunt to finely acute; mesopraesternum eroded; mesonotum and metanotum broader; metanotum lacking sculpture; pelta (Figure 229) occasionally bearing small lateral lobes, often eroded on posterior margin; tergites II–VII each with 1 pair of smaller, curved wing-retaining setae.

**Male aptera.** Similar to female aptera, but lacking ocelli; inner sense cone on segment III rarely present; foretarsal tooth present; tergite IX posteromarginal setae  $B_2$  shorter, stout; sternite VIII (Figure 273) glandular area transverse, with faint reticulations.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, BR, Caplestone (Central Valley) 4.5 km SE of Cronadun, litter 72/74, 28 January 1972, J.C. Watt (NZAC). **Paratypes** (40 female apterae, 12 male apterae). AK – 2 female apterae, male aptera, Maraetai Hills, under *Nothofagus truncata*, 8 Aug 1978, B.M. May. BP – female aptera, Kaimai Range, 600 m, litter 77/83, 9 Jun 1977, V.A. May. GB – female aptera, L. Waikaremoana, litter 72/57, 17 Jan 1972, G.W. Ramsay. HB – female aptera, Kaweka Range, Mokahu Spur, 1036 m, moss 71/23, 24 Feb 1971, J.I. Townsend. SD – 3 female apterae, Shakespeare Bay, litter 73/30, 21 Feb 1973, J. McBurney. BR – 2 female apterae, Murchison, Kawatiri, litter 64/82, 25 Aug 1964, J.I. Townsend; 3 female apterae, Boatman's Creek, litter 71/117, 4 Oct 1971, G. Kuschel; female aptera, W. Inangahua, Coal Creek, moss 72/184, 19 Sep 1972, J.S. Dugdale; 2 female apterae, Mawhera State Forest, 15 km SE of Ngahere, litter 71/147, 11 Nov 1971, J.C. Watt; male aptera, Caplestone, Italian Creek, moss 73/11, 12 Jan 1973, J.C. Watt; 2 female apterae, Fletcher's Creek, 6 km SW of Rotokohu, litter 71/138, 9 Nov 1971, J.S. Dugdale; 9 female apterae, 6 male apterae, Fletcher's Creek, litter 72/106, 7 Mar 1972, J.S. Dugdale; male aptera, Fletcher's Creek, 305 m, litter 72/108, 7 Mar 1972, J.S. Dugdale; male aptera, Stoney Creek, S side of Fletcher's Creek, litter 72/101, 28 Jan 1982, J.S. Dugdale; female aptera, Tawhai State Forest, litter 71/186, 9 Nov 1971, J. McBurney; female aptera, same locality but litter 72/146, 17 Apr 1972, J.S. Dugdale; 3 female apterae, male aptera, same locality but litter 72/75, 28 Jan 1972, J. McBurney; male aptera, same locality but litter 72/121, 6 Mar 1972, J.S. Dugdale; female aptera, same data except litter 72/127; female aptera, same data as holotype except

7/134, 8 Nov 1971; 5 female apterae, Capleston Biological Reserve, Main Ridge, litter 73/9, 12 Jan 1979, J.C. Watt. WD – female aptera, Franz Josef, dead *Coprosma* twigs, 27 Apr 1982, LAM 1657 (BMNH, NZAC).

**Material examined.** Type series only.

AK, BP, GB, HB / SD, BR, WD.

In litter and moss; one specimen on dead *Coprosma* twigs.

Collected in January–April, June, and August–November.

**Remarks.** The strong apodeme in the head, visible laterally behind the compound eyes, is distinctive in *P. moeone*.

### *Psalidothrips tane* new species

Figures \*69 \*133, \*230, and 274

**Female macroptera.** **Colour.** Body brown; tarsi paler; tibiae variable, from entirely pale with dark margins to only base paler. Antennae pale brown; proximal half of segments III–V and basal third of VI yellow. Forewings shaded. Major setae brown.

**Structure.** Head (Figure 69) strongly constricted behind eyes and slightly at base, faintly sculptured; 1 pair of finely acute postocellar setae, usually shorter than distance between their bases; postocular setae blunt to finely acute, shorter than distance between their bases; maxillary stylets about one-third of head width apart, reaching about halfway to postocular setae, often 'V'-shaped; maxillary bridge faint. Antennae, Figure 133; segments III–V each with an elongate pedicel, segments VI and VII with pedicel shorter; segment III with 3 sense cones, segment IV with 4. Pronotum (Figure 69) lacking sculpture; posteromarginal setae longest, finely acute; midlateral and epimeral setae shorter, blunt to acute; anteroangular and anteromarginal setae no longer than discal setae. Mesonotum with striate sculpture laterally, unsculptured medially, bearing a pair of acute setae; mesonotal lateral setae minute; mesopraesternum broadly boat-shaped. Metathoracic sternopleural sutures present. Fore tarsus occasionally with inner margin expanded, but tooth not developed (Figure 69). Forewing broader at base than at apex, with 3–9 duplicated cilia; major sub-basal setae acute,  $B_2$  and  $B_3$  the longest. Abdomen: pelta (Figure 230) elongate, with narrow lateral lobes; tergites II–VII each with 2 pairs of wing-retaining setae, these curved on segment II, the remainder sigmoid; tergite IX posteromarginal setae  $B_1$  blunt, occasionally acute, about half as long as tube; sternites II–VII each bearing a row of 4–9 discal setae.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2400. Head length 220, median width 200; postocular setae 100. Pronotum length 135, median width 270; major setae —  $am$  10,  $aa$  5,  $ml$  75,  $ep$  90,  $pa$  120. Tergite IX setae —  $B_1$  120,  $B_2$  100,  $B_3$  130. Tube length 210; longest terminal setae 170. Forewing length 1050; sub-basal setae —  $B_1$  15,  $B_2$  20,  $B_3$  45. Antennal segments III–VIII length 75, 65, 65, 62, 48, and 55 respectively.

**Female aptera and microptera.** Similar to macroptera, but mesonotum and metanotum broader; pelta less elongate; forewing lobe (when present) variable from 30  $\mu\text{m}$  to 550  $\mu\text{m}$  in length.

**Male aptera.** Similar to female aptera, but smaller; antennal sense cones variable on segments III and IV, often between left and right of the same individual; segment III with 2 or 3 sense cones, segment IV with 2 or 3 but never 4; ocelli often absent; postocular setae longer; occasionally a pair of long, acute setae at mid-vertex; foretarsal tooth present; pronotum elongate, with a longitudinal median apodeme; mesopraesternum almost entirely eroded; pelta variable in size and shape; tergites II–VII each bearing 2 pairs of short, curved wing-retaining setae; tergite IX setae  $B_2$  short, stout; sternite VIII (Figure 274) with a transverse gland, constricted medially.

Dimensions (1 paratype male, AKW 354;  $\mu\text{m}$ ). Body length (extended) 1750. Head length 190, median width 170; postocular setae 90. Pronotum length 170, median width 240; major setae —  $am$  5,  $aa$  5,  $ml$  70,  $ep$  65,  $pa$  100. Tergite IX setae —  $B_1$  140,  $B_2$  75. Tube length 150.

**Type data.** **Holotype** female macroptera, NEW ZEALAND, TK, 10 km N of Ohura, beating dead twigs and leaves of *Nothofagus fusca*, 14 December 1983, A.K. Walker 354 (NZAC). **Paratypes** (15 female macropterae, 2 female micropterae, 2 female apterae, 10 male apterae). ND – 5 female macropterae, 2 male apterae, Waipoua State Forest, dead wood of *Beilschmiedia tawa*, 29 Jan 1982, AKW 153. AK – female microptera, Ponga Bush, 300 m, litter 73/4, 4 Jan 1983, B.M. May. TK – 6 female macropterae, 2 male apterae, same data as holotype; male aptera, same data except AKW 353; 2 female macropterae, 2 female micropterae, 2 female apterae, 5 male apterae, Mt Messenger, 530 m, dead twigs and leaves, 15 Dec 1983, AKW 360; female macroptera, base of Mt Messenger, dead leaves, 15 Dec 1983, AKW 361. SD – female macroptera, Okiwi Bay, Malaise trap in second-growth bush, Apr 1984, R.E. Jones (BMNH, NZAC).

**Material examined.** Type series only.

ND, AK, TK / SD.

From dead wood, twigs, and leaves in native lowland forest; 1 specimen (Okivi Bay, SD) taken in a Malaise trap.

Collected in January, April, and December.

**Remarks.** *P. tane* seems to differ from the other members of *Psalidothrips* in New Zealand in living on dead twigs rather than in leaf litter.

### *Psalidothrips taylori* new species

Figures \*70, \*134, \*231, and 275a,b

**Female macroptera.** **Colour.** Head, thorax, and antennal segment I pale brown; rest of body paler. Legs, distal half of tube, and antennal segments II, VII, and VIII yellow. Forewings weakly shaded. Major setae pale.

**Structure.** Head (Figure 70) wider than long, constricted behind eyes, weakly sculptured on posterior third; fore ocellus slightly raised; postocellar setae longer than distance between their bases; postocular setae wide apart, finely acute; 1 pair of interocular setae shorter than postocular setae; maxillary stylets wide apart, reaching about halfway to postocular setae; mouth cone rounded. Antennae (Figure 134) 8-segmented; segment III vasiform; sense cones short, stout, numbering 1 (+1) on segment III and 2 on segment IV. Pronotum (Figure 70) broad, unsculptured; major setae bluntly acute; anteromarginal and anteroangular setae shorter. Mesopraesternum eroded, either absent or represented by a few irregular small sclerites. Metanotum not sculptured medially, bearing 1 pair of acute median setae. Foretarsal tooth absent (Figure 70). Forewings without duplicated cilia, with 2 major sub-basal setae, these subequal, bluntly pointed. Abdomen: pelta (Figure 231) sculptured on anterior half; tergites II–VI each with 1 pair of small, straight wing-retaining setae; tergites VI and VII median setae posterior to pores, elongate, more than half as long as lateral setae; tergite IX posteromarginal setae  $B_1$  acute, longer than tube; tube with faint, scalloped sculpture in basal half.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2000. Head length 155; width (? slightly crushed) 180; postocellar setae 40; postocular setae 100; vertex setae 20. Pronotum length 120, median width 250; major setae —  $am$  30,  $aa$  45,  $ml$  85,  $ep$  120,  $pa$  110. Forewing length 800, distal width 65; sub-basal setae 60, 74. Tergite VI median setae 30. Tergite VII median setae 70. Tergite IX setae —  $B_1$  175,  $B_2$  165,  $B_3$  165. Tube length 135; terminal setae 150. Antennal segments III–VIII length 42, 42, 42, 40, 40, and 45 respectively; maximum width 33, 36, 33, 33, 24, and 18 respectively.

**Female aptera.** Similar to macroptera, but paler, with compound eyes reduced to 3 or 4 facets; ocelli absent; postocellar setae more than half as long as postocular setae; mesonotum and metanotum broad, with median pairs of setae larger; pelta variable; tergite II slightly eroded laterally; tergal median setae variable in length on tergites V and VI, sometimes as short as on III but sometimes as long as on VII.

Dimensions (2 paratype females collected with holotype;  $\mu\text{m}$ ). Body length (extended) 1800, 1800. Head length 140, 150; postocellar setae 55, 58; postocular setae 90, 90; vertex setae 30, 36. Pronotum length 135, 142; major setae —  $am$  40, 34,  $aa$  40, 38,  $ml$  95, 95,  $ep$  115, 107,  $pa$  115, 105. Median setae on tergites V–VII 48, 80, 100 and 30, 30, 102; tergite IX setae —  $B_1$  152, 150,  $B_2$  150, 120. Tube length 125, 115. Antennal segments III–VIII length 32, 36, 40, 40, 36, 42 and 36, 42, 42, 42, 40, 42; segments III and IV maximum width 32, 36 and 32, 36.

**Male aptera.** Similar to female aptera, but smaller and lacking a foretarsal tooth; sternite VIII (Figures 275a and b) with a transverse, slender but variable glandular area; tergite IX posteromarginal setae  $B_2$  shorter and stouter than  $B_1$ .

Dimensions (1 paratype male collected with holotype;  $\mu\text{m}$ ). Body length (extended) 1350. Head length 120; postocellar setae 45; postocular setae 75; vertex setae 24. Tergite IX setae —  $B_1$  120,  $B_2$  72,  $B_3$  120. Tube length 95. Antennal segments III–VIII length 30, 32, 32, 32, 30, and 32 respectively.

**Type data.** **Holotype** female macroptera, AUSTRALIA, A.C.T., Black Mountain, 2400' [720 m], leaf litter, 29 November 1967, C.G. Brooks (ANIC). **Paratypes** (1 female macroptera, 9 female apterae, 9 male apterae): female macroptera, 7 female apterae, 7 male apterae, same data as holotype; 2 female apterae, male aptera, same data except near summit, 9 Jan 1968; male aptera, same data except 2200' [660 m], 29 Dec 1966, R.W. Taylor (ANIC, BMNH, NZAC).

**Material examined.** Type series (from Australia), plus 51 non-type specimens from New Zealand (2 female macropterae, 32 female apterae, 17 male apterae). ND – 2 female apterae, 4 male apterae, Cape Reinga, Taputaputa Reserve, fern litter, 30 Apr 1968, K.A.J. Wise; 2 female apterae, male aptera, same data except tree-fern leaf litter, 7 Dec 1967; 4 female apterae, North Cape, Whareana, pohutukawa and kowhai leaf litter, 6 Dec 1967, K.A.J. Wise; female aptera, above Hihii, scrubland, 6 Jan 1969, K.A.J. Wise; male aptera, Spirits Bay, Waipuna Stream, moss 67/274, 9 Nov 1967, J.I.

Townsend & J. McBurney; female aptera, Okaihau, moss beneath totara tree in mixed scrub, 30 Jun 1965, M. Luxton; male aptera, Waipoua State Forest, Waikohatu Bridge, 290 m, litter 80/53, 14 Apr 1980, J.C. Watt. AK – 9 female apterae, 4 male apterae, Riverhead Forest Reserve, litter 82/71, 30 Aug 1982, P.A. Maddison; female aptera, Maraetai Hills, under *Nothofagus truncata*, 8 Aug 1978, B.M. May; male aptera, Lynfield, litter 74/44, 27 Jul 1974, G. Kuschel; male aptera, Rangitoto I., moss 72/160, 4 Jun 1972, J.C. Watt. CL – female macroptera, Cuvier I., Whau Saddle, litter 82/42, 1 Mar 1982, G. Hall; 2 female apterae, same data except Shooter's Ridge, litter 82/43, 2 Mar 1982. GB – female aptera, L. Waikaremoana, litter 72/57, 17 Jan 1972, G.W. Ramsay. WA – female aptera, Mt Pongaroa, litter 80/159, 31 Dec 1980, J.C. Watt. WN – 2 female apterae, Stokes Valley, ex beech leaf mould, 10 Aug 1952, B.A. Holloway. SD – female aptera, Endeavour Inlet, leaf mould in mixed tawa rain forest, 29 Jan 1960, G.M. Buckler. NN – 2 female apterae, Dart Valley, Wangapeka, litter 67/194, 20 Apr 1967, F. Alack. BR – female aptera, Boatman's Creek, litter 71/140, Nov 1971, J. McBurney; female aptera, Fletcher's Creek, litter 71/141, Nov 1971, J. McBurney; male aptera, Ahaura, litter 71/99, 21 Apr 1971, J.S. Dugdale; 2 male apterae, Grey Valley, Waipuna, litter 71/97, 21 Apr 1971, J.S. Dugdale; female aptera, Fletcher's Creek, litter 72/80, 26 Jan 1972, J.S. Dugdale; female aptera, Redman's Creek, moss 73/6, 10 Jan 1973, J.C. Watt. OL – female macroptera, male aptera, Hawea, Kidd's Bush, litter 73/29, 28 Jan 1973, J.C. Watt (BMNH, NMNZ, NZAC).

ND, AK, CL, GB, WN / SD, NN, BR, OL.

Found only in leaf litter and moss in lowland native forest habitats.

Collected in January, March, April, June–August, November, and December.

**Remarks.** The type series of *P. taylori* is restricted to 20 specimens collected in Australia near Canberra. However, this is apparently a widespread and common species in both Australia and New Zealand. It is readily distinguished by the pair of long ocellar setae, but is remarkable for the variation in length of the tergal median setae.

### Genus *Sophiothrips* Hood

*Sophiothrips* Hood, 1933: 425–426. Type-species *Sophiothrips squamosus* Hood, by original designation.

This genus is represented on all the major land masses of the world, although each of the six species-groups to which the 21 described species are

allocated (Mound & Walker 1982b) has a more restricted geographic distribution. Three species are known from New Zealand; two are endemic to this country and constitute the *duvali*-group, but the third also occurs in Australia and belongs to the Old World *breviceps*-group. These are all fungus-feeding species, and it seems possible that they are associated with the pink coral spot fungi of the genus *Aleurodiscus* which grow on dead twigs. One of the New Zealand species has been collected several times with such a fungus, and recently one of us (LAM) collected a species of *Sophiothrips* in Costa Rica from a similar fungus.

*Sophiothrips* is currently placed in the subtribe Williamsiellina, together with several other phlaeothripids with exceptionally short maxillary stylets (Mound 1977b). More recent studies, however, suggest that this group is possibly not holophyletic, and *Sophiothrips* may be an independent derivative of *Hoplothrips*. The species of these two genera feed on fungi and share similar complex patterns of allometric growth associated with dimorphism in sex and wing length. In contrast, several other members of the Williamsiellina are structurally less variable, and apparently feed on mosses or lichens.

The members of *Sophiothrips* are all very small, and share the following characters: maxillary stylets 'V'-shaped, exceptionally low in head, not retracted as far as posterior margin of head; compound eyes smaller ventrally than dorsally; 1 pair of ocellar setae well developed; antennae 8-segmented; epimeral sutures complete; metathoracic sternopleural sutures present; forewings without duplicated cilia.

### *Sophiothrips aleurodisci* Mound & Walker

Figures \*71, 72, \*135, \*232, 233, and 285

*Sophiothrips aleurodisci* Mound and Walker, 1982b: 349–352. **Holotype** female, NEW ZEALAND, NN, Dun Mountain (NZAC) [examined].

**Female macroptera.** **Colour.** Body brown. Head pale between eyes and sometimes behind; antennal segment I, proximal half of II–V, base of VI, tube, base of tibiae, and distal third and base of femora yellow. Major setae brown. Forewings (when present) shaded, darker in proximal third.

**Structure.** Head (Figure 71) wider than long, produced in front of eyes; cheeks rounded, constricted behind eyes and at base, sculptured; ocelli well developed; ocellar setae long, acute; 2 pairs of acute major postocular setae, the median pair lying well behind eyes, the lateral pair almost on cheek margin. Antennae, Figure 135; segments VII and VIII closely joined, the suture slender; segments III and

IV each with 2 long, slender sense cones. Pronotum (Figure 71) sculptured near posterior margin; major setae acute; anteroangular setae shorter; praepectal plates small. Mesonotum transverse, its lateral setae small; mesopraesternum slender but transverse and entire. Metanotum elongate, reticulate medially, with a pair of finely pointed median setae. Foretarsal tooth small. Forewing major sub-basal setae acute,  $B_3$  longest,  $B_2$  lying posterior to  $B_1$ . Abdomen: pelta (Figure 232) bell-shaped, sculptured; tergite II pores sometimes absent; tergites III–VII each with 1 pair of sigmoid wing-retaining setae; tergite IX posteromarginal setae pointed,  $B_1$  longer than  $B_2$ ; tube faintly reticulate, shorter than head, constricted at apex; terminal setae short; sternites with about 8 discal setae.

Dimensions (holotype female macroptera;  $\mu\text{m}$ ). Body length (extended) 1730. Head length 172, median width 188; ocellar setae 33; median post-ocular setae 24. Pronotum median length 154, median width 260; major setae —  $am$  –,  $aa$  15,  $ml$  30,  $ep$  64,  $pa$  45. Tergite IX setae —  $B_1$  78,  $B_2$  58,  $B_3$  75. Tube length 130; longest terminal setae 58. Antennal segments III–VIII length 64, 60, 62, 60, 33, and 30 respectively.

**Female aptera.** Similar to macroptera, but variable in size; sense cones slightly shorter; ocelli absent (Figure 72); praepectal plates very small or absent; mesonotum broadly transverse, with a lateral tubercle bearing a stout seta; mesopraesternum represented by a thin, broken line; metanotum transverse, partly fused to mesonotum, at least laterally; pelta (Figure 233) rectangular, weakly sculptured, sometimes with margins weakly eroded, bearing 2 small lateral lobes; abdominal segments II–IV with tergites much shorter than sternites; tergites III–VII each with 1 pair of very small, straight wing-retaining setae.

Dimensions (1 large and, in parentheses, 1 small paratype female aptera;  $\mu\text{m}$ ). Body length (extended) 1690 (1220). Head length 165 (135), median width 180 (160); ocellar setae 30 (30); median post-ocular setae 15 (15). Pronotum median length 185 (142), median width 285 (234); major setae —  $ml$  52 (36),  $ep$  33 (42),  $pa$  50 (37). Mesonotal lateral setae 19 (19). Tergite IX setae —  $B_1$  75 (63),  $B_2$  38 (48),  $B_3$  75 (52). Tube length 120 (92); longest terminal setae 52 (48). Antennal segments III–VIII length 63 (58), 58 (48), 58 (52), 64 (58), 37 (33), and 30 (30) respectively.

**Male aptera.** Similar to female aptera, but tergite IX setae  $B_2$  scarcely half as long as  $B_1$ ; foretarsal tooth larger, recurved. Large specimens with a greatly enlarged foretarsal tooth and swollen fore femora; head longer than wide, often with a ventral

tubercle between eyes; setae on head and pronotum long, slender; pronotum enlarged; tergite IX often with a small, blunt tubercle (Figure 285) between posteromarginal setae.

Dimensions (1 large and, in parentheses, 1 small paratype male aptera;  $\mu\text{m}$ ). Body length (extended) 1710 (1200). Head length 183 (115). Pronotum length 315 (132), median width 328 (215); major setae —  $aa$  82 (15),  $ml$  135 (52),  $ep$  90 (60),  $pa$  112 (42). Tergite IX setae —  $B_1$  105 (62),  $B_2$  37 (30),  $B_3$  127 (90). Tube length 132 (90).

**Material examined.** Type series (3 female macropterae, 105 female apterae, 23 male apterae), plus 1 non-type female aptera (ANIC, BMNH, NZAC). AK, CL / NN, BR.

Widespread in native forest, suggesting that it is endemic rather than introduced (Mound & Walker 1982b). Taken at several sites in association with a pink coral-spot fungus, identified as *Aleurodiscus* sp. by E.H.C. McKenzie (DSIR, Auckland). Only three macropterae have been recorded out of 115 adults studied. However, apterae have been collected in Malaise traps, which suggests that even wingless individuals can disperse actively.

Collected in all months except March and June.

**Remarks.** *S. aleurodisci* differs from the related species *duvali* in the form of the pelta, the shorter antennal sense cones, and the smaller tubercle on tergite IX of large males.

### *Sophiothrips duvali* Mound & Walker

Figures \*73, \*136, \*234, and 286

*Sophiothrips duvali* Mound & Walker, 1982b: 352. **Holotype** female, NEW ZEALAND, TO, 32 km S of Turangi (NZAC) [examined].

**Female aptera. Colour.** Body brown. Antennal segments I and II, proximal two-thirds of III, proximal half of IV–VI, and extreme base of VII yellow. Distal half of middle and hind femora and distal two-thirds of fore femora also yellow. Tube yellow in proximal two-thirds. Major setae brown.

**Structure.** Similar to *aleurodisci* but known only from apterae; head (Figure 73) with cheeks less rounded and with faint lines of sculpture near posterior margin; ocelli absent; antennae (Figure 136) with sense cones on segments III and IV exceptionally long and thin; pronotum (Figure 73) without strong lines of sculpture near posterior margin; mesonotum broadly transverse, usually lacking setae on lateral tubercles; pelta (Figure 234) rounded anteriorly, faintly sculptured, bearing 2 small lateral lobes, eroded on posterior margin; tergite II II

pores wide apart; tergites II–VII each with 1 pair of small, straight wing-retaining setae; tergite IX setae  $B_3$  longer than tube, finely pointed; tube almost as long as head; sternites with about 6 discal setae.

Dimensions (holotype female aptera;  $\mu\text{m}$ ). Body length (extended) 1620. Head length 154, median width 165; ocellar setae 42; median postocular setae 18. Pronotum median length 180, median width 270; major setae —  $am$  –,  $aa$  –,  $ml$  43,  $ep$  50,  $pa$  45. Tergite IX setae —  $B_1$  68,  $B_2$  63,  $B_3$  150. Tube length 150; longest terminal setae 90. Antennal segments III–VIII length 64, 60, 64, 64, 45, and 28 respectively.

**Male aptera.** Similar to female, but large specimens with a large foretarsal tooth and swollen fore femora; pronotum enlarged, with midlateral setae longer; head with a ventral tubercle between eyes; tergite IX with a large, pointed tubercle between posteromarginal setae (Figure 286).

Dimensions (1 large paratype male;  $\mu\text{m}$ ). Body length (extended) 1440. Head length 152. Pronotum median length 210, median width 255; major setae —  $ml$  76,  $ep$  52,  $pa$  52. Tergite IX setae —  $B_1$  60,  $B_2$  35,  $B_3$  123; tergite IX median tubercle length 25. Tube length 135.

**Material examined.** Type series only (3 female apterae, 1 male aptera; BMNH, NZAC).

CL, TO / —.

Apterae taken at only 2 sites, in native forest, so species presumably endemic. Macropterae unknown.

Collected in February.

**Remarks.** The erosion of the posterior margin of the pelta in *S. duvali* resembles the condition in the three North American species of the *peculiaris*-group. However, *duvali* has two sense cones on antennal segment III instead of only one, and these are considerably longer than in the related species *aleurodisci* (cf. Figures 135 and 136).

### *Sophiothrips greensladei* Mound & Walker

Figures \*74, \*137, 170, \*235, and 236

*Sophiothrips greensladei* Mound & Walker, 1982b: 352–355. **Holotype** female, AUSTRALIA (ANIC) [examined].

**Female macroptera.** **Colour.** Pale yellow, with brown markings on tibiae and tarsi; distal half of antennal segment III and all of segments IV–VIII pale brown. Forewings shaded.

**Structure.** Exceptionally small. Head (Figure 74) wider than long, with dorsal surface sculptured,

bearing 2 pairs of small setae; cheeks rounded, slightly constricted at base; ocelli present; ocellar setae short, slightly expanded at apex; cheek margins with a pair of short setae lying behind eyes, these slightly expanded at apex. Antennae, Figure 137; segment II dorsal setae stout, truncate; segment III with a long pedicel and a small basal ring; segment VII slender, closely joined to VIII; segment III with 1 sense cone, segment IV with 2 cones. Pronotum (Figure 74) with anteroangular and epimeral setae slightly expanded at apex; no long posteroangular setae; praepectal plates present. Mesonotum with a weak reticulate pattern; mesopraesternum transverse, entire. Metanotum with no sculpture medially; metathoracic sternopleural sutures very small. Forelegs with faint lines of sculpture on femora; tarsal tooth absent. Forewings with 1 pair of very small, peg-like sub-basal setae. Abdomen: pelta (Figure 235) weakly sculptured, its lateral lobes reaching almost to tergite II lateral margins; tergite II (Figure 235) not strongly sculptured, its median pores close together; tergites II–VII each with 1 pair of wing-retaining setae (short on tergite II, broken on III and IV, sigmoid on V–VII). Tergite IX posteromarginal setae  $B_2$  longer than  $B_1$  or  $B_3$ ,  $B_1$  pointed,  $B_2$  blunt,  $B_3$  rounded; tube longer than head, its terminal setae short; sternites with about 10 discal setae.

Dimensions (holotype female macroptera;  $\mu\text{m}$ ). Body length (extended) 1150. Head length 88, median width 135; ocellar setae 15; cheek setae 22. Pronotum median length 112, median width 192; major setae —  $am$  –,  $aa$  15,  $ml$  –,  $ep$  26,  $pa$  –. Forewing length 500. Tergite IX setae —  $B_1$  65,  $B_2$  75,  $B_3$  52. Tube length 110; longest terminal setae 38. Antennal segments III–VIII length 38, 33, 33, 45, 33, and 22 respectively.

**Female aptera.** Similar to macroptera, but entirely pale; ocelli and ocellar setae absent; mesonotum broadly transverse (Figure 170); metanotum broad, reticulate, with scattered discal setae (Figure 170); pelta oval (Figure 236), close to tergite II, which is sculptured; tergites II–VII with reduced wing-retaining setae; tergite IX posteromarginal setae  $B_1$  shorter.

Dimensions (1 paratype female aptera;  $\mu\text{m}$ ). Body length (extended) 1080. Head length 85, median width 127; cheek setae 8. Pronotum median length 115, median width 182. Tergite IX setae —  $B_1$  35,  $B_2$  42,  $B_3$  30. Tube length 102.

**Male aptera.** Similar to female aptera, but tergite IX setae  $B_3$  longer than  $B_1$  or  $B_2$ ; ventral tubercle between eyes absent; tubercle on tergite IX absent.

Dimensions (1 male aptera;  $\mu\text{m}$ ). Body length (extended) 860. Head length 82, median width 120.

Pronotum median length 94, median width 165. Tergite IX setae —  $B_1$  42,  $B_2$  30,  $B_3$  54. Tube length 85.

**Material examined.** Type series from Australia and New Zealand (1 female macroptera, 2 female apterae), plus 8 non-type specimens from New Zealand (6 female apterae, 2 male apterae) (ANIC, BMNH, NZAC).

AK, CL, WN / —.

Collected in March, June, and August–December.

**Remarks.** *S. greensladei*, *S. vorticosus* from Florida, and *S. makaronesicus* from the Azores and Canary Islands are unlike all other *Sophiothrips* species in lacking a foretarsal tooth in females. Mound & Walker (1982b) refer to differences in structure between the eight specimens from Australia and New Zealand on which the species is based.

### Genus *Strepterothrips* Hood

*Strepterothrips* Hood, 1933: 431. Type-species *Strepterothrips conradi* Hood, by monotypy.

A full definition of this genus, with a key to six species, is given by Mound & Ward (1971). These species are found in many parts of the tropics and subtropics, and Okajima (1976) has described a seventh, collected in New South Wales. All of them are small, dark brown, and strongly sculptured, with seven-segmented antennae. The males lack sternal glandular areas, and have the ventral hamus of the fore tarsi enlarged and similar to a foretarsal tooth in appearance. The pelta of macropterae is quite unlike that of micropterae (cf. Figures 237 and 238). Only one species is known from New Zealand, and this is widespread in eastern Australia. Mound & Ward (1971) suggest that the members of this genus may be transported by migrating birds, but wind dispersal is now considered equally possible (Mound 1983).

### *Strepterothrips tuberculatus* (Girault)

Figures 75, 138, 149, 237, 238, 252, and 253

*Rhopalothrips tuberculatus* Girault, 1929: 2. **Holotype** female aptera. AUSTRALIA (QMBA) [examined].

**Colour (all morphs).** Body dark brown with red hypodermal pigment; posterior margin of metanotum in life chalky white. Head sometimes pale behind eyes; antennal segment III variably pale. Major setae expanded. Forewings (when present) brown.

**Structure. Female aptera.** Variable in size. Head (Figure 75) slightly longer than wide, with a tuberculate, reticulate pattern; ocelli absent; compound eyes directed forwards, larger dorsally than ventrally; postocular setae short; maxillary stylets close together, reaching to compound eyes. Antenna (Figure 138) 7-segmented; segments IV–VII each with a distinct pedicel; segment III with 1 small sense cone, segment IV with 2 large ones. Pronotum (Figure 75) strongly sculptured; major setae small, with widely expanded apices; epimeral sutures incomplete; praepectal plates absent. Mesonotum and metanotum broad, with tuberculate sculpture; metanotum with numerous scattered, blunt setae; metathoracic sternopleural sutures small. Abdomen: pelta (Figure 237) broad; tergites sculptured, with numerous discal setae (Figure 252); tergite IX posteromarginal setae  $B_1$  broadly expanded at apex, shorter than the finely acute  $B_2$  setae; tube shorter than head, broader at base than at apex; terminal setae shorter than tube.

Dimensions (1 large and, in parentheses, 1 small female aptera;  $\mu\text{m}$ ). Body length (extended) 1770 (1350). Head length 225 (192), median width 195 (165). Pronotum length 150 (115), median width 285 (218); major setae — *ep* 32 (27), *pa* 23 (18). Tergite IX setae  $B_1$  48 (34). Tube length 155 (130). Antennal segments III–VII length 52 (42), 48 (32), 42 (30), 42 (32), and 64 (55) respectively.

**Female macroptera.** Similar to aptera, but ocelli present; eyes larger; metanotum narrower; pelta (Figure 238) irregular but usually narrower at base than at apex, with thin, irregular lateral lobes; tergites II–VII each with 2 pairs of sigmoid wing-retaining setae, the posterior pair broad, flattened (Figure 253); forewing swollen basally, angled in proximal third, then parallel-sided, with 3 major sub-basal setae that are subequal in length, but without duplicated cilia.

Dimensions (1 female macroptera;  $\mu\text{m}$ ). Body length (extended) 1680. Head length 225. Pronotum length 132, median width 252. Forewing length 660. Tube length 157.

**Male aptera.** Variable in size. Large specimens with hamus (ventral claw) (Figure 149) on fore tarsi greatly enlarged; fore tibiae bearing an apical tubercle on inner margin; pronotum elongate; tergite IX  $B_2$  setae short, acute; sternite VIII without a glandular area.

Dimensions (1 male aptera;  $\mu\text{m}$ ). Body length (extended) 1380. Head length 207. Pronotum length 142.

**Material examined.** 106 female apterae, 9 female macropterae, 38 male apterae (BMNH, NZAC, PLNZ).

ND, AK, CL, BP, TK, WN / SD, NN.

Found mainly on dead twigs and branches, but also in grass, litter, lichen, fungus, *Leptospermum*, *Carmichaelia*, and *Pinus radiata* in relatively open habitats; none were taken in dense forest.

Collected in January–May, July, August, and October–December.

**Remarks.** *S. tuberculatus* was first collected at Kaiteriteri (NN) in 1959, and then Levin (WN) in 1961 (Mound & Ward 1971). Martin (1983) records it from his pasture faunal survey. It is presumably introduced from Australia, either by birds or on the wind across the Tasman Sea.

### Genus *Teuchothrips* Hood

*Teuchothrips* Hood, 1919b: 86. Type-species *Teuchothrips simplicipennis* Hood, by original designation.

This is an ill defined genus used for a series of ten to twenty *Liothrips*-like species mainly from Australia, but one of them from California. It was distinguished from *Liothrips* on account of the shorter antennal segment VIII and the less stout major setae. However, the group and its generic relationships are in need of further study, and it is possible that *Teuchothrips* may then be restricted to those Australian species which lack duplicated cilia on the forewings. Most of the species at present referred to this genus are poorly known, but they probably all feed on the leaves of shrubs or small trees, causing simple leaf-roll galls, and most of them are likely to be monophagous or oligophagous. Two species are found in New Zealand. One has probably been introduced from Australia with its host plant the bottlebrush, but the other may be a natural immigrant from Australia, because its host is a widespread subalpine plant.

### *Teuchothrips annulosus* (Priesner) new combination

Figures 76, 139, and 239

*Rhynchothrips annulosus* Priesner, 1928: 645–646. **Lectotype** female here designated, AUSTRALIA (SMFG) [examined].

**Female macroptera and microptera** (N.B. wing length intergrading from 990 to 165  $\mu\text{m}$ , and no consistent differences apparent between morphs). **Colour.** Body dark brown; tarsi and apex of fore femora paler. Proximal half of antennal segments III–V and base of VI yellow. Major setae pale brown. Forewings shaded, particularly posteriorly in proximal half and at extreme base.

**Structure.** Head (Figure 76) longer than wide; dorsal surface with faint lines of sculpture; ocelli

present; compound eyes larger dorsally than ventrally; postocular setae not differentiated from minor setae; cheeks with a pair of well developed thorn-like setae in proximal third; maxillary stylets close together, reaching to compound eyes; maxillary guides stout, with a narrow bridge. Antennae (Figure 139) 8-segmented; segments IV–VI each with a distinct pedicel; segment VIII not strongly narrowed at base; segment III with 1 sense cone, segment IV with 3 sense cones. Pronotum (Figure 76) sculptured near posterior margin; major anteroangular, epimeral, and posteroangular setae weakly expanded at apex, usually rounded, the epimerals longest; epimeral sutures complete; praepectal plates absent. Mesonotum strongly sculptured, with lateral setae about as long as pronotal anteroangular setae; mesopraesternum divided into 2 lateral plates, these sometimes faintly joined. Metanotum strongly reticulate; metathoracic sternopleural sutures reaching about halfway to hind coxae. Foretarsal tooth absent. Forewings, when fully developed, with 1–12 duplicated cilia; sub-basal setae  $B_1$  and  $B_2$  long, weakly expanded,  $B_3$  shorter, finely acute. Abdomen: pelta (Figure 239) triangular, strongly reticulate; all 3 lateral abdominal setae on tergite IX with apices variable, acute to bluntly rounded; tergites II–VI each with 2 pairs of sigmoid wing-retaining setae, the anterior pair often short, straight, scarcely distinguishable from the lateral tergal setae, and both pairs sometimes straight on tergite VII; tube shorter than head.

Dimensions (lectotype female macroptera;  $\mu\text{m}$ ). Body length (not extended) 2040. Head length 274, median width 210. Pronotum median length 158, median width 330; major setae — *am* –, *aa* 63, *ml* –, *ep* 90, *pa* 55, *pm* 13. Forewing length 960; sub-basal setae  $B_2$  62. Tergite IX setae —  $B_1$  138,  $B_2$  135,  $B_3$  150. Tube length 188; longest terminal setae – (broken). Antennal segments III–VIII length 64, 64, 64, 60, 64, and 30 respectively.

**Males.** Smaller than females; wing morphs variable in size, but never fully macropterous; foretarsal tooth present; tergite IX setae  $B_2$  about half as long as  $B_1$ ; sternite VIII with no glandular area. Large specimens with a large foretarsal tooth and swollen fore femora.

Dimensions (1 large and, in parentheses, 1 small male microptera;  $\mu\text{m}$ ). Body length (extended) 2250 (1830). Head length 270 (217). Pronotum median length 202 (142), median width 330 (292). Tergite IX setae —  $B_1$  (117),  $B_2$  64 (75),  $B_3$  120 (120). Tube length 168 (110).

**Material examined.** 22 female macropterae, 28 female micropterae, 30 male micropterae (BMNH, NZAC, SMFG).

TO / MB, NN, MC, CO.

Associated with the native shrub *Cassinia vauvilliersii* in alpine habitats; taken at up to 1400 m (Black Birch Range, MB).

Collected in January, February, and November.

**Remarks.** *T. annulosus* differs from *disjunctus* in having longer maxillary stylets which are closer together medially, and in the stout pair of cheek setae on the posterior third of the head. The two species are probably not closely related, and both are referred to *Teuchothrips* only provisionally, until such time as the Australian fauna is better understood. New Zealand specimens of *annulosus* have the  $B_3$  setae on tergite IX only as long as the  $B_1$  and  $B_2$  setae, whereas they are longer in the type series from Australia. Moreover, the New Zealand specimens are very variable in wing length, although the short-winged individuals do not have the ocelli or pterothorax reduced as is usual in this morph in many species.

*T. annulosus* is probably widespread in the New Zealand alpine area, where it is likely to be a wind-transported natural immigrant. It was described from Australia on the basis of a series of syntype females, and a specimen labelled by Priesner as "Type" is here designated as **lectotype** "AUSTRALIA, Victoria, Warburton, galls of *Cassinia aculeata*, 24 IV 1926 (R. Kelly)" (SMFG). One paralectotype female (in SMFG) has also been studied, together with one female bearing identical data in Kelly's writing (BMNH).

### *Teuchothrips disjunctus* (Hood)

Bottlebrush thrips

Figures 2-6, 77, 140, and 240

*Liothrips disjunctus* Hood, 1918: 134. **Holotype** female, AUSTRALIA (USNM) [examined].

**Female macroptera.** **Colour.** Body dark brown to black; tarsi, apices of middle and hind tibiae, and distal two-thirds of fore tibiae paler. Antennal segments I, VII, and VIII brown, apex of II and proximal half of III-VI pale. Major setae pale brown. Forewing frequently shaded medially and at base.

**Structure.** Variable in size. Head (Figure 77) longer than wide, strongly sculptured; ocelli well developed; compound eyes smaller ventrally than dorsally; postocular setae expanded at apex, arising laterally; postocellar setae fine; maxillary stylets retracted about halfway to postocular setae, one-third of head width apart. Antennae (Figure 140) 8-segmented; segments VII and VIII closely joined; segment III with 1 long sense cone, segment IV with 3 long sense cones. Pronotum sculptured near margins; major setae long, with expanded apices,

the epimerals longest; epimeral sutures complete; praepectal plates absent. Mesonotum strongly sculptured; mesopraesternum comprising 2 lateral triangles. Metanotum elongate, with a reticulate pattern; metathoracic sternopleural sutures present. Foretarsal tooth present. Forewing parallel-sided, with 2-9 duplicated cilia and with 3 major sub-basal setae, these subequal in length and expanded at apex. Abdomen: pelta (Figure 240) irregularly triangular; tergites sculptured; tergites II-VII each with 2 pairs of sigmoid wing-retaining setae; tergite IX posteromarginal setae with expanded apices,  $B_1$  shorter than  $B_2$ ,  $B_3$  longer, finely acute; tube slightly constricted in proximal third and at apex; terminal setae long, finely pointed.

Dimensions (1 large and, in parentheses, 1 small female macroptera;  $\mu\text{m}$ ). Body length (extended) 2420 (1800). Head length 264 (214), median width 195 (165); postocular setae 45 (30). Pronotum length 185 (117), median width 300 (210); major setae — *ep* 92 (6), *pa* 63 (45). Forewing length 960 (600). Tergite IX setae  $B_1$  150 (117). Tube length 222 (163). Antennal segments III-VIII length 60 (57), 64 (51), 68 (48), 64 (48), 60 (38), and 35 (27) respectively.

**Male macroptera.** Variable in size. Fore tibiae often entirely pale. Large specimens with swollen femora and enlarged foretarsal tooth. Sternite VIII with a large, transverse glandular area; tergite IX setae  $B_2$  shorter than  $B_1$ , with apices expanded,  $B_3$  long, finely acute.

Dimensions (1 large and, in parentheses, 1 small male macroptera;  $\mu\text{m}$ ). Body length (extended) 2400 (1680). Head length 270 (192). Pronotum median length 212 (123), median width 330 (245). Tergite IX setae —  $B_1$  174 (118),  $B_2$  83 (52),  $B_3$  240 (193). Tube length 240 (165).

**Material examined.** 100 female macropterae, 66 male macropterae (ANIC, BMNH, FRNZ, NZAC, NMNZ, PANZ, PLNZ).

ND, AK, WO, BP, TO, WI / NN, MC.

**Remarks.** *T. disjunctus* was described initially from a single female collected on Thursday Island, in the Torres Straits off northern Australia. No further Australian specimens were known until June 1981, when a substantial population was found in the Botanic Gardens at Canberra on *Callistemon citrinus* and *C. teritifolius*. With this new material it has proved possible to identify as *disjunctus* the widespread and abundant thrips in New Zealand which is a pest of the introduced Australian bottlebrush, *Callistemon citrinus*. The holotype is paler than the more recently collected specimens, but this is probably due to storage in alcohol before it was mounted on to a microscope slide.

*T. disjunctus* was probably brought into New Zealand from Australia on early cuttings of *C. citrinus*, used for propagation by New Zealand nurserymen in the fifties (J.M. Dingley, pers. comm.). The first available New Zealand specimen was taken at Auckland (AK) on "Callistemon" in October 1953. Although known for many years as a pest of *C. citrinus*, particularly var. *splendens*, it had not been recorded in the literature until mentioned by Sommerfield (1984) and by Walker in Miller (1984).

Adults and immature stages (Figures 2–6) of *T. disjunctus* are found throughout the year on the young leaves of bottlebrush, and their feeding activity causes the leaf margins to roll. Eggs are deposited inside these simple leaf-roll galls, and the subsequent feeding by larvae causes these leaves to distort further and turn red. The samples from two species of *Callistemon* at Canberra mentioned above were found to contain two predators of the thrips — an anthocorid bug, *Anthocoris austropiceus* Gross, and larvae of a chloropid dipteran, *Lioscinella sabroskyi* Cogan & Smith (1982), which were observed feeding on adult thrips.

### *Yarnkothrips* new genus

Type-species *Yarnkothrips kolourus* new species.

(*Yarnkothrips* is an anagram of *Karnyothrips*, and the specific epithet refers to the exceptionally short terminal setae on the abdomen.)

Medium-sized, brown, macropterous phlaeothripines with short terminal setae. Head longer than wide; eyes large; postocular setae short; maxillary stylets retracted to eyes; maxillary bridge wide; mouth cone short, rounded. Antennae (Figure 141) 8-segmented; 3 sense cones on segment III, 4 on segment IV; segment VIII broad at base. Pronotum with epimeral sutures incomplete; posteroangular setae arising close to epimeral setae; praepectal plates small; mesopraesternum complete but slender; metathoracic sternopleural sutures wide; mesonotal lateral setae and metanotal median setae moderately developed. Forewings parallel-sided, with duplicated cilia; sub-basal setae arising in a triangle. Foretarsal tooth small, curved, arising near apex (Figure 78); hind femora slightly swollen. Abdomen: pelta (Figure 241) elongate; tergites II–VII each with 1 pair of very long, sigmoid wing-retaining setae (Figure 254); tergal lateral setae and setae on tergite IX elongate; tube shorter than head, its terminal setae less than half as long as tube; sternites III–VI with marginal setae short, no longer than discal setae. Male with  $B_2$  setae on tergite IX elongate; sternite VIII with a broad, transverse glandular area; genitalia with aedeagus not elongate, endotheca with surface tuberculate.

The type species, described below, has the head, forelegs, and hind femora remarkably similar to those of the widespread scale insect predators in the genus *Karnyothrips*, though the terminal setae on the tube are exceptionally short. Despite the well developed maxillary bridge, *Yarnkothrips* is not a member of the Haplothripini, to which *Karnyothrips* belongs, in view of the small praepectal plates, broad metathoracic sternopleural sutures, short tube setae, long  $B_2$  setae on tergite IX in the male, and the form of the male genitalia.

### *Yarnkothrips kolourus* new species

Figures \*78, 79, 141, \*241, \*254, and 276

**Female macroptera.** Colour. Body dark brown. Antennal segments I and II, tarsi, and fore tibiae pale brown. Proximal third of antennal segment III, base of segments IV–VI, distal half of fore and hind femora, and apex of middle femora yellow. Forewings shaded; sub-basal setal area and wing scale darker. Major setae brown.

**Structure.** Head, Figure 78; postocular setae bluntly acute. Antennae, Figure 141. Pronotum (Figure 78) with a short, longitudinal median apodeme and with major setae bluntly acute; prosternum with a pair of small, ill defined discs posterior to praepectal plates. Mesopraesternum variably reduced, transversely slender, fused to mesoeusterium laterally (Figure 79). Metanotum with inner pair of anterolateral setae more than twice as long as outer pairs; metathoracic sternopleural sutures exceptionally wide at anterior, tapering towards posterior. Fore and hind femora larger than middle femora. Forewings with 7–11 duplicated cilia; major sub-basal setae subequal, finely acute. Abdomen: pelta (Figure 241) elongate, reticulate, its base lying on concave anterior margin of tergite II; tergite II eroded on lateral margins; tergite IV, Figure 254; tergite IX posteromarginal setae  $B_1$  acute, as long as tube,  $B_2$  longer; tube with terminal setae shorter than tergite IX posteromarginal setae.

Dimensions (holotype female;  $\mu\text{m}$ ). Body length (extended) 2100. Head length 200, median width 160; postocular setae 35. Pronotum length 140, median width 240; major setae — *am* 10, *aa* 40, *ml* 35, *ep* 80, *pa* 90. Tergite IX setae —  $B_1$  120,  $B_2$  150,  $B_3$  134. Tube length 140; longest terminal setae 50. Forewing length 850; sub-basal setae —  $B_1$  65,  $B_2$  70,  $B_3$  100. Antennal segments III–VIII length 63, 60, 50, 50, 45, and 30 respectively.

**Male macroptera.** Similar to female macroptera, but tergite IX posteromarginal seta  $B_1$  as long as  $B_2$ ; sternite VIII with a broad, transverse glandular area (Figure 276).

**Type data.** **Holotype** female macroptera, NEW ZEALAND, AK, Whatipu, West Coast beach 32 km W of Auckland, yellow lichen, 25 February 1979, L.A. Mound 1505 (NZAC). **Paratypes** (12 female macropterae, 5 male macropterae). AK – 2 female macropterae, 2 male macropterae, same data as holotype; 3 male macropterae, same data except LAM 1501; 4 female macropterae, same data except AKW 72; 3 female macropterae, same data except 21 Jan 1982, AKW 152. SD – female macroptera, Tennyson Inlet, 48 km NW of Nelson, dead branch and *Vararia protrusa* fungus, 28 Jan 1979, LAM 1368. SD-MB – female macroptera, Pelorus Bridge, ex *Aristotelia serrata* branch, 25 Jul 1967, emerged 4 Sep 1967, W67/62, J.C. Watt. CO – female macroptera, Earnsclough, suction trap, 28 Jan 1980, G.F. McLaren (BMNH, NZAC).

**Material examined.** Type series only.

AK / SD, MB, CO.

Collected in January, February, and July.

**Remarks.** In view of the structure of the forelegs, it is possible that *Y. kolourus* is a predator of Coccoidea, which were sometimes common on twigs under lichens and fungi where this thrips was collected.

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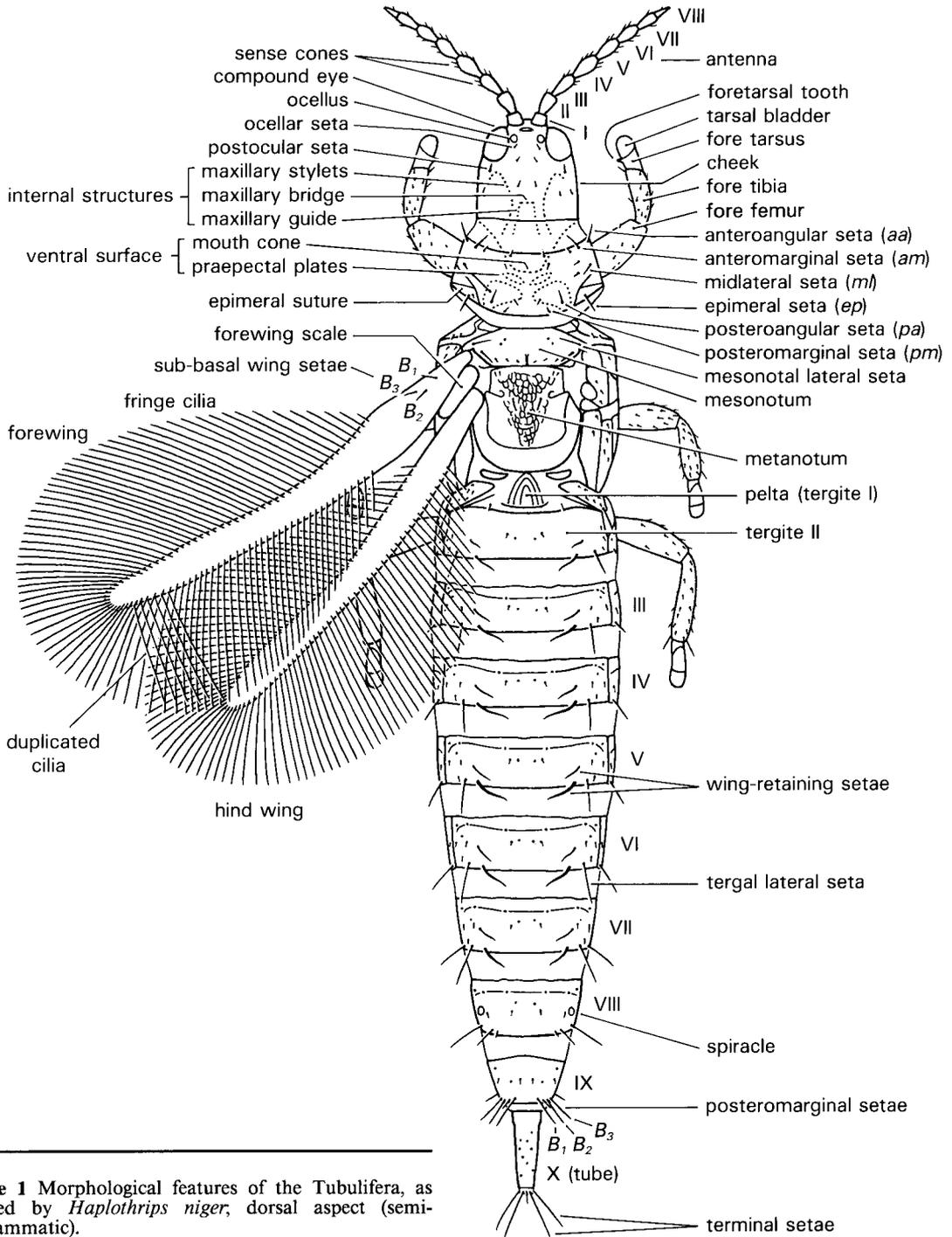
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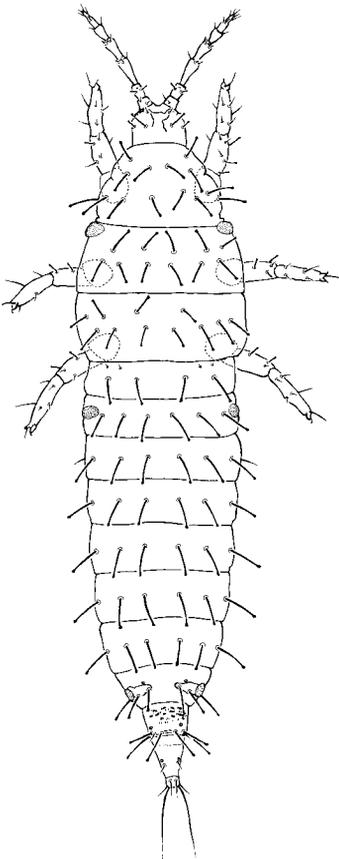
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ILLUSTRATIONS

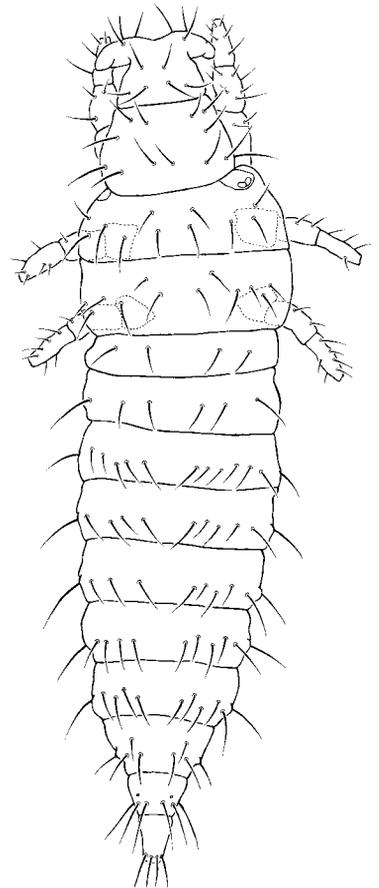


**Figure 1** Morphological features of the Tubulifera, as typified by *Haplothrips niger*, dorsal aspect (semi-diagrammatic).

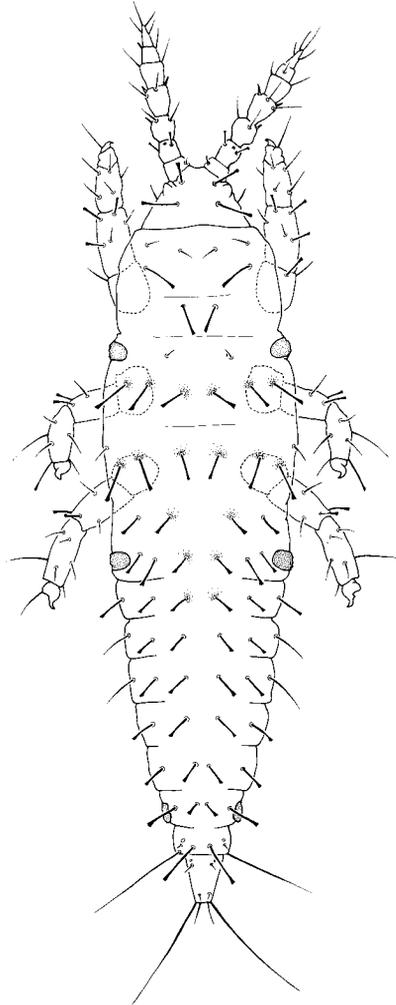
3. Instar II (larva II)



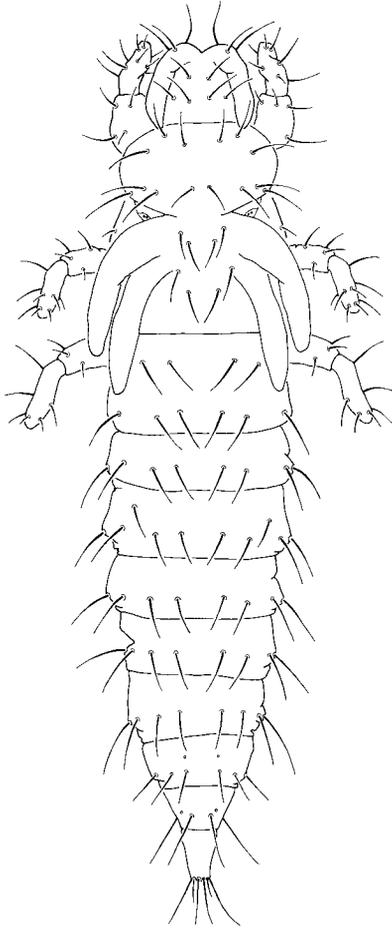
4. Instar III (prepupa)



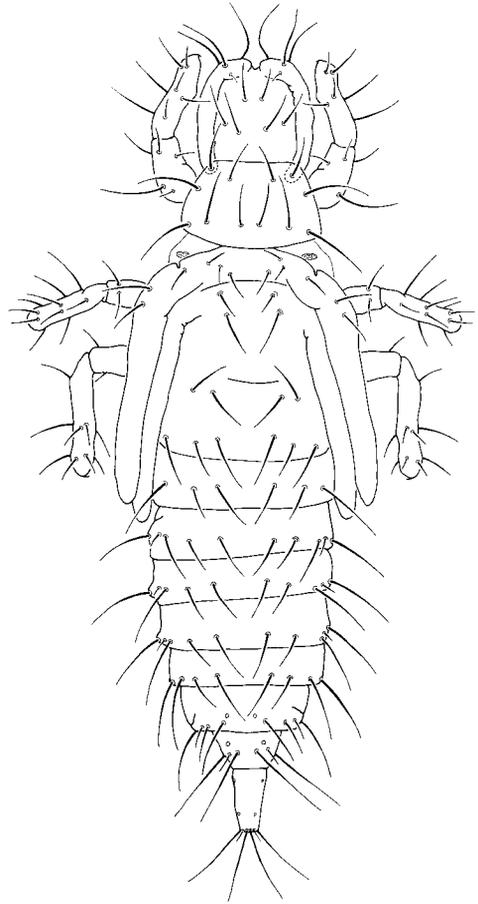
2. Instar I (larva I)



5. Instar IV (1st pupa)



6. Instar V (2nd pupa)

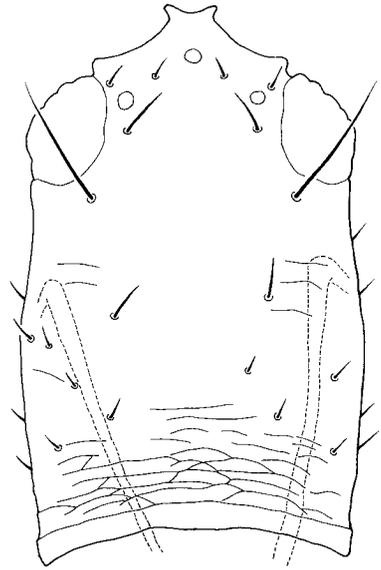
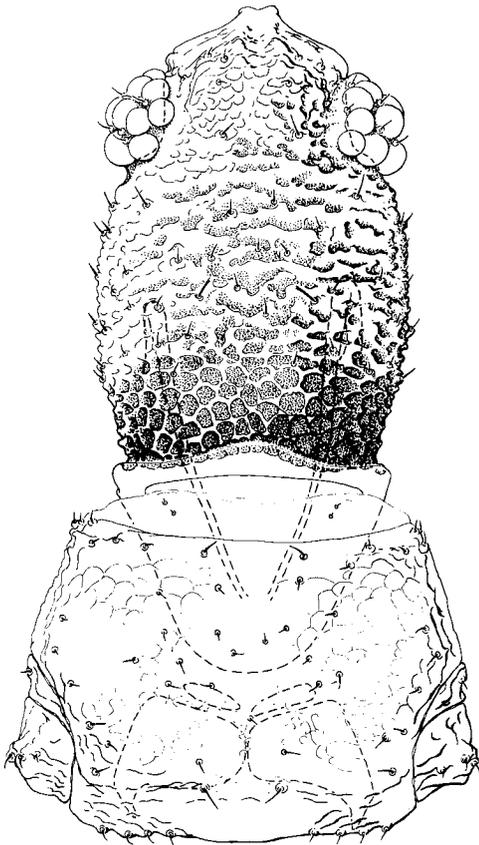


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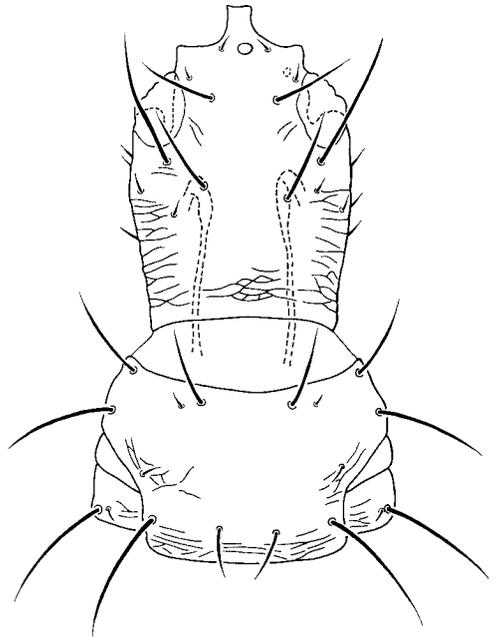
**Figures 2-6** Immature stages of the Tubulifera, as typified by *Teuchothrips disjunctus*. Instar I magnified  $\times 2$  relative to others.

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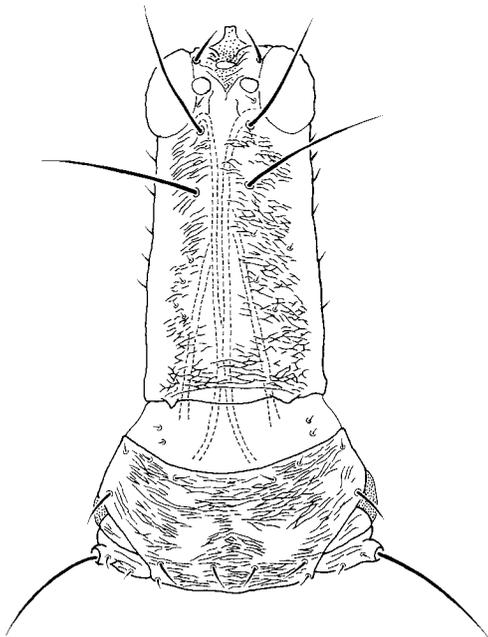
7. *Anaglyptothrips dugdalei*, apt.



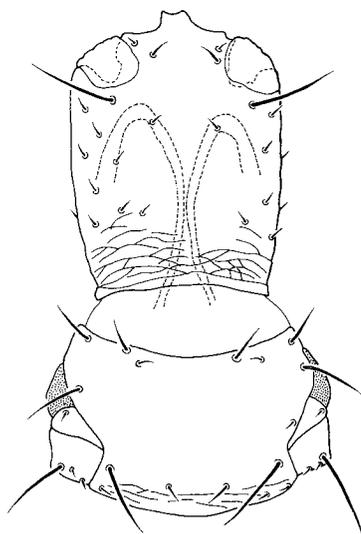
8. *Carientothrips badius*, mic.



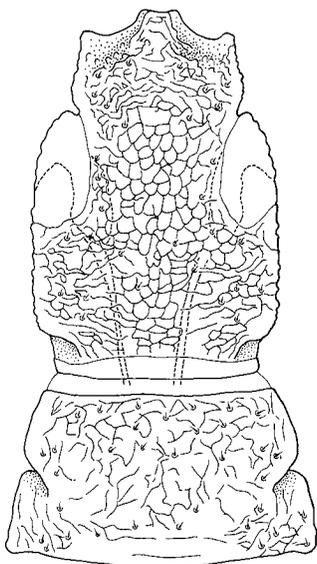
9. *Carientothrips loisthus*, apt.



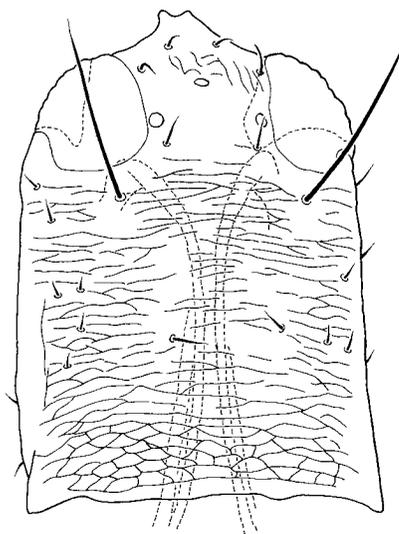
10. *Cleistothrips idolithripoides*, mic.



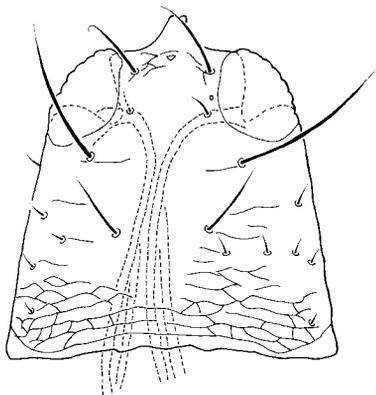
11. *Cryptothrips okiwiensis*, apt.



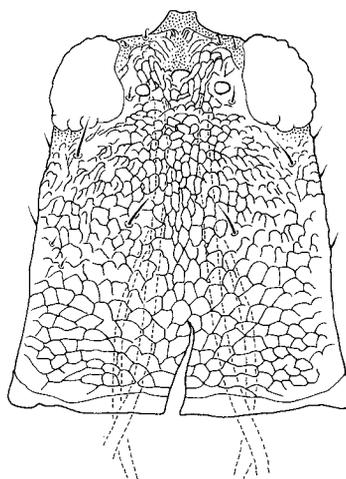
12. *Emprosthiothrips bogong*, apt.



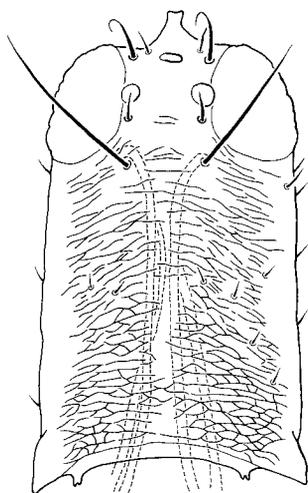
13. *Heptathrips cottieri*, mic.



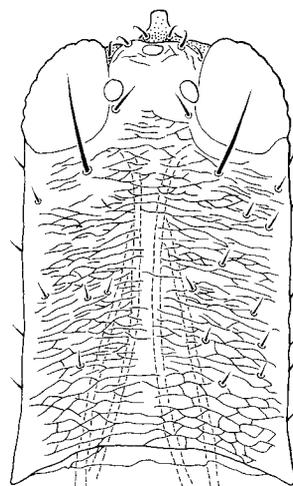
14. *Heptathrips cumberi*, apt.  
(slightly compressed)



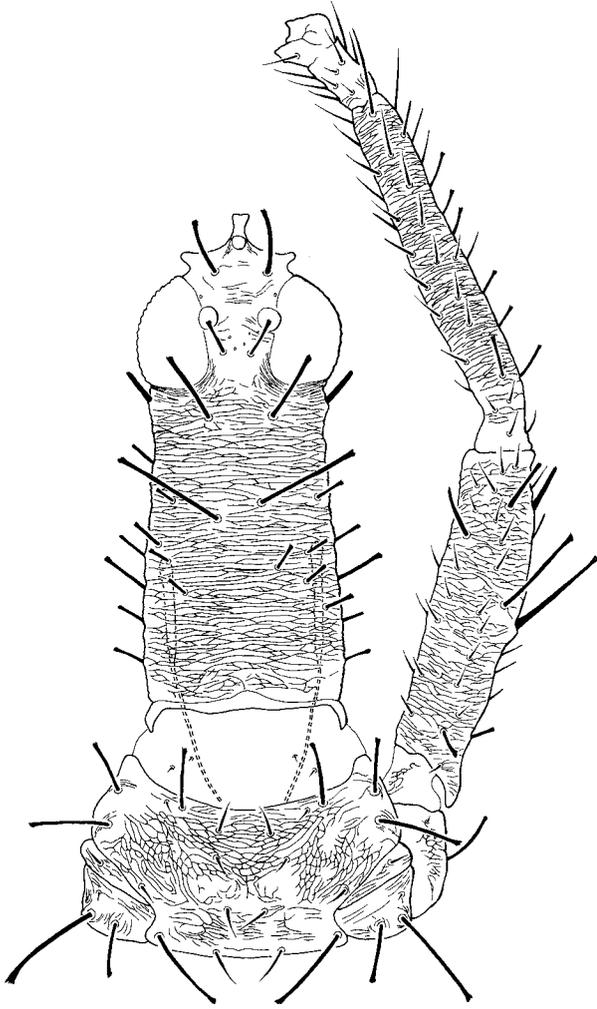
15. *Heptathrips kuscheli*, apt.



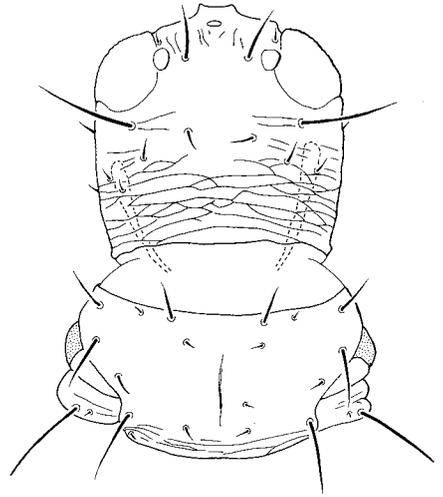
16. *Heptathrips tillyardi*, mac.



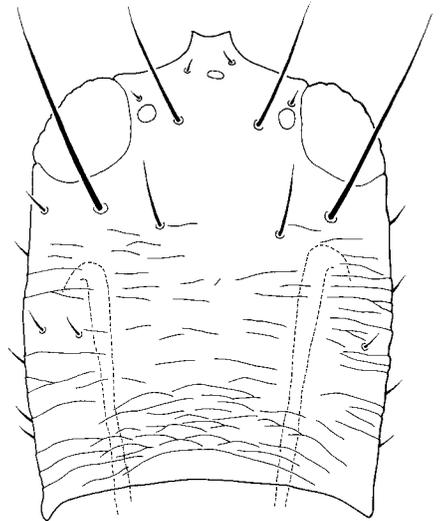
17. *Heptathrips tonnoiri*, mac.



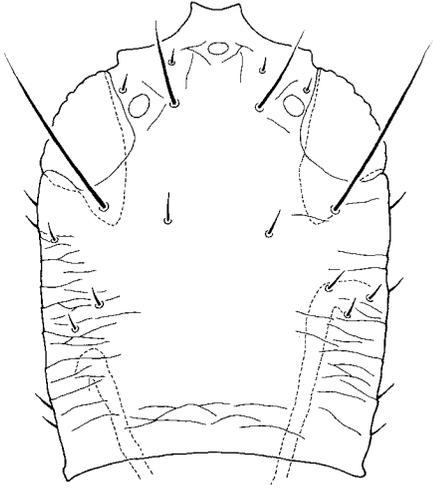
18. *Idolothrips spectrum*, mac.



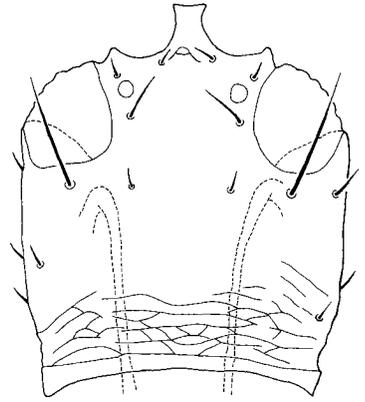
19. *Nesothrips alexandrae*, mac.



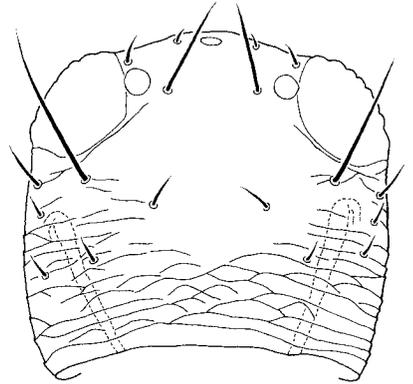
20. *Nesothrips doulli*, mac.



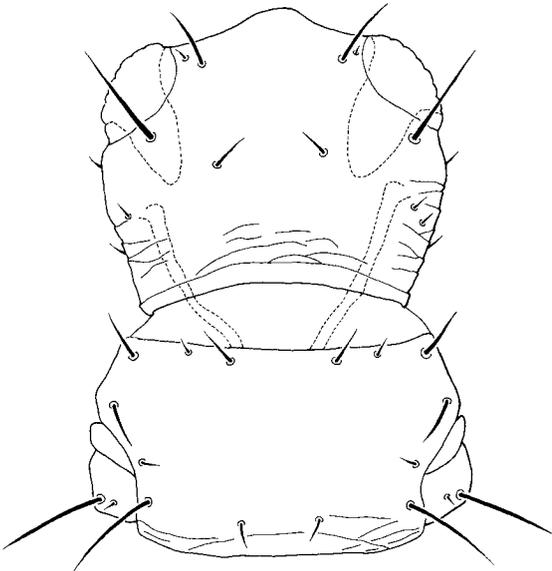
21. *Nesothrips eastopi*, mac.



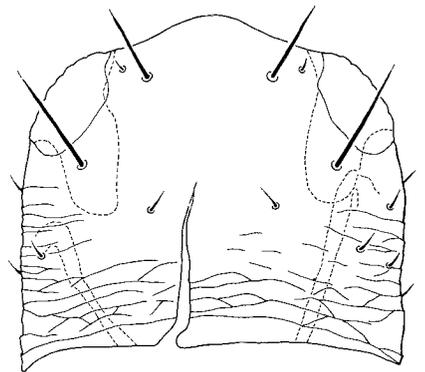
22. *Nesothrips pintadus*, mic.



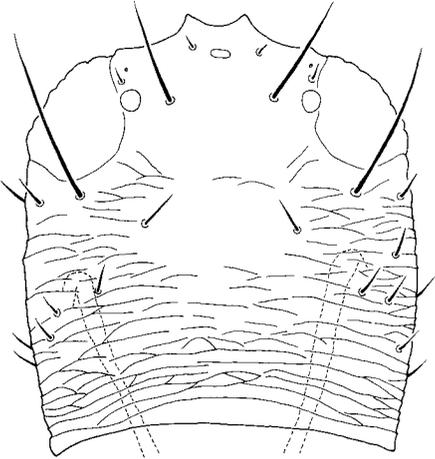
23. *Nesothrips propinquus*, mac.



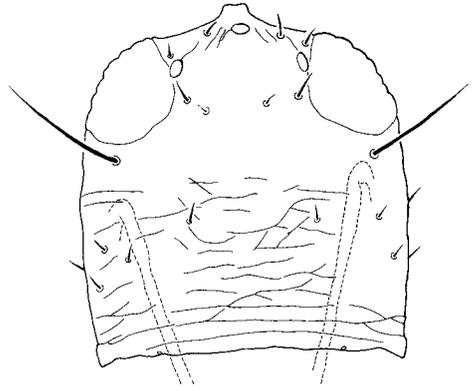
24a. *Nesothrips propinquus*, apt.



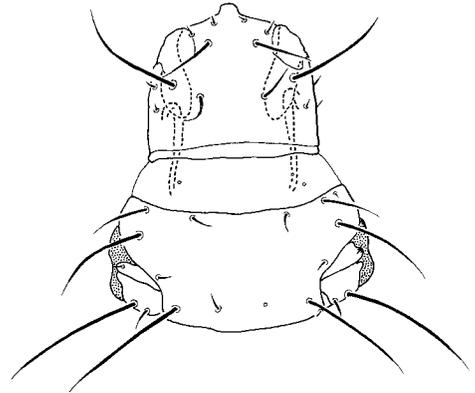
24b. Same, depressed.



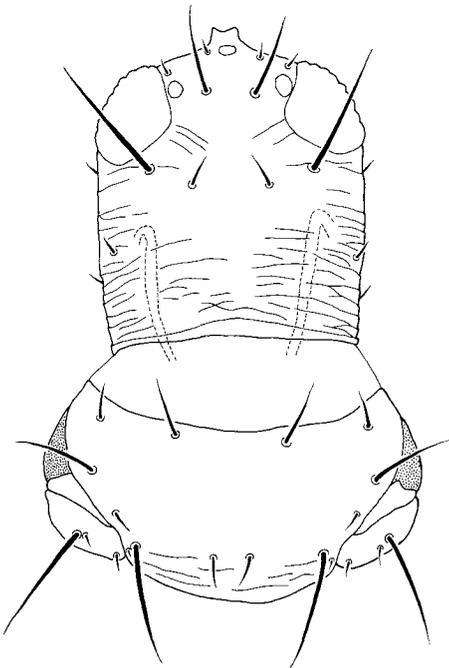
25. *Nesothrips rangi*, mic.



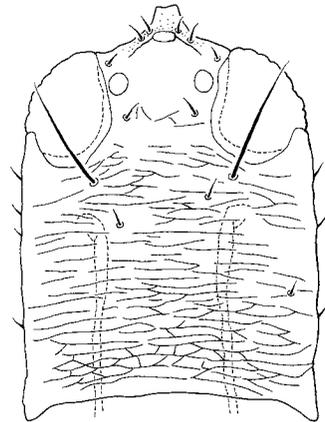
27. *Ozothrips eurytis*, mac.



28. *Ozothrips janus*, apt.

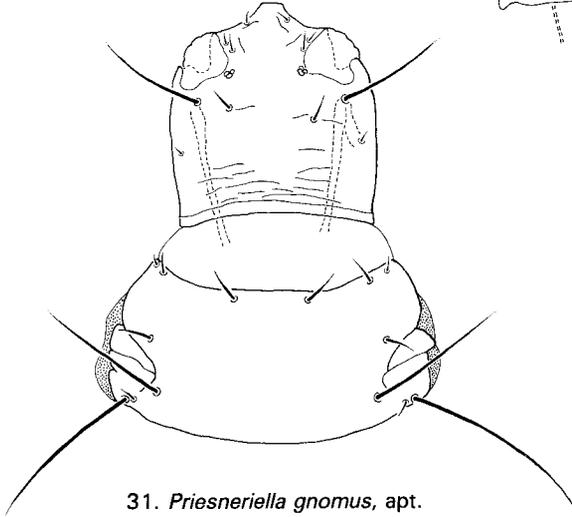
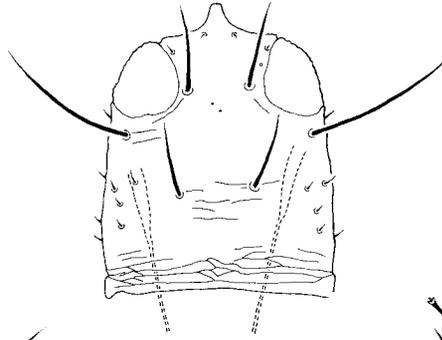


26. *Nesothrips zondagi*, mac.

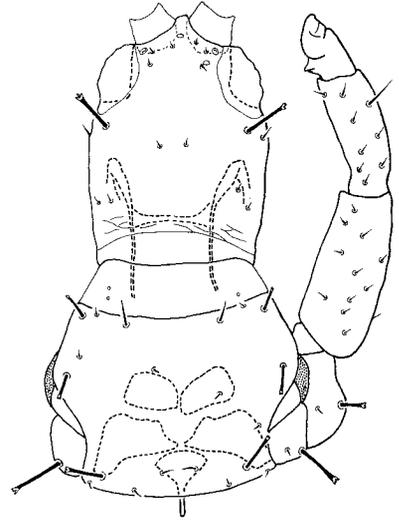


29. *Ozothrips priscus*, mac.

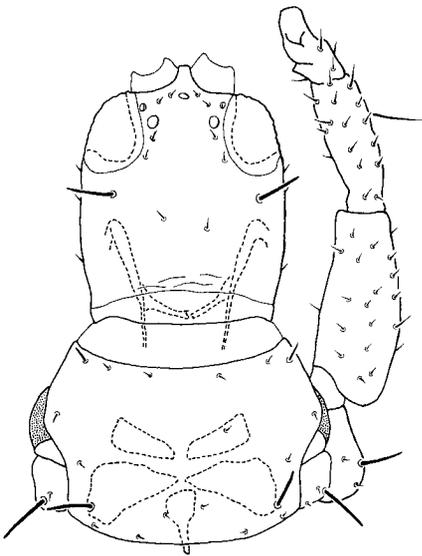
30. *Ozothrips vagus*, mic.



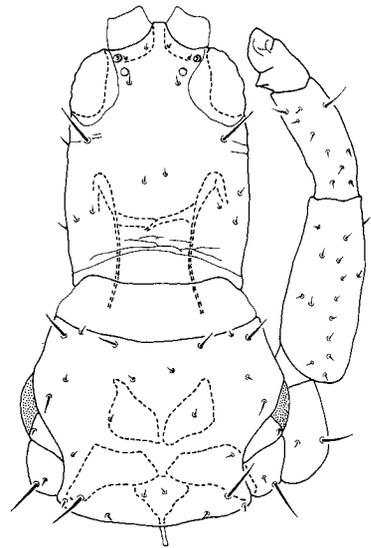
31. *Priesneriella gnomus*, apt.



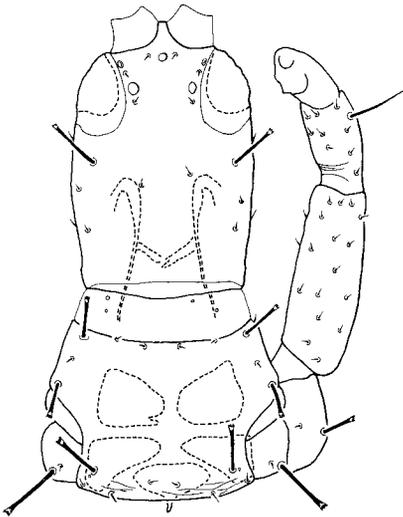
32. *Apterygothrips australis*, mic.  
(Australian specimen)



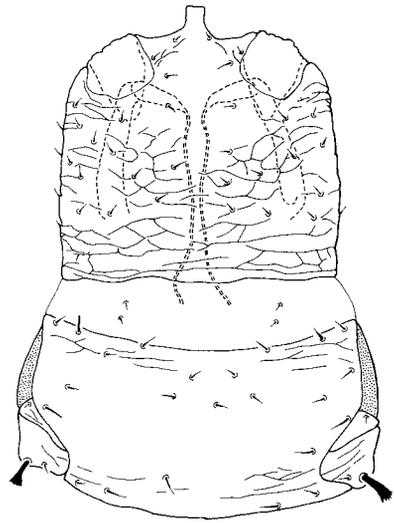
33. *Apterygothrips collyerae*, mac.



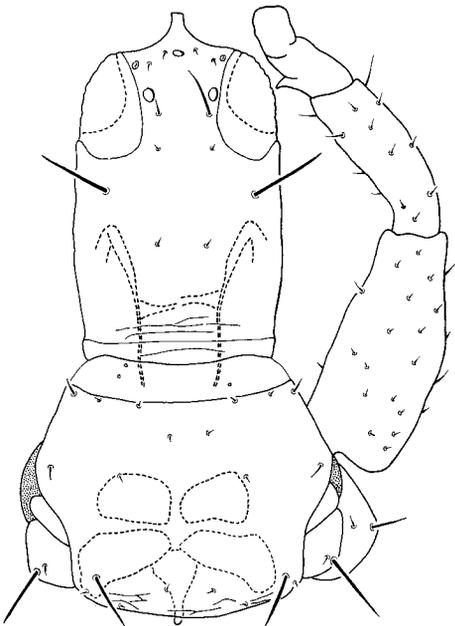
34. *Apterygothrips kohai*, mic.



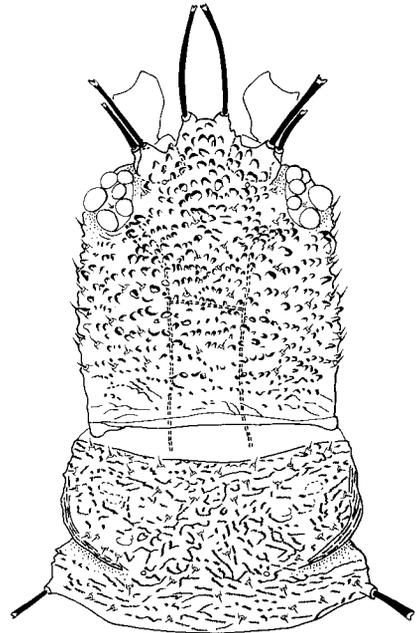
35. *Apterygothrips sparsus*, mic.



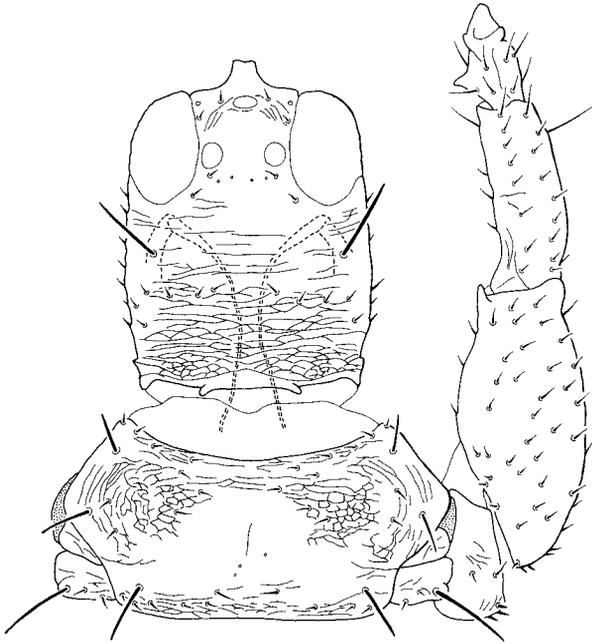
37. *Azaleothrips neatus*, mic.



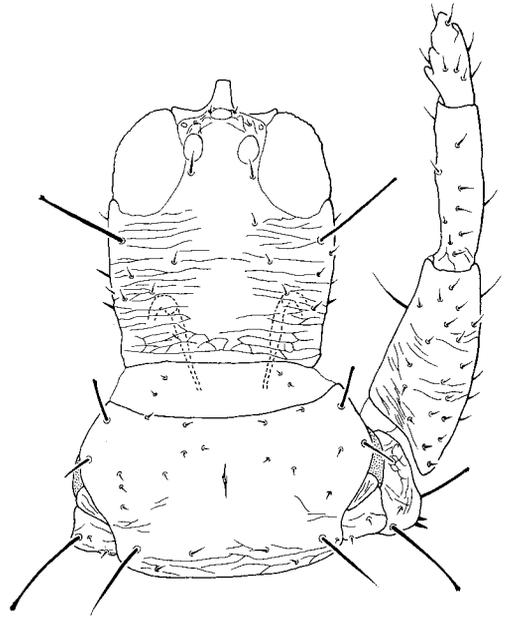
36. *Apterygothrips viretum*,  
mac.



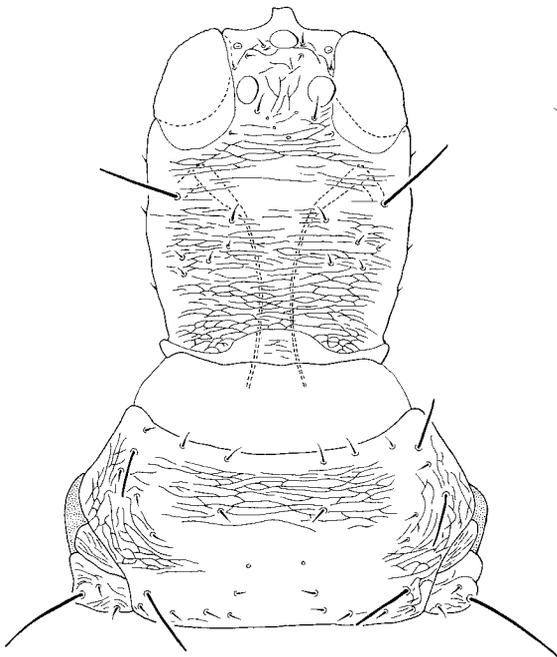
38. *Baenothrips moundi*, apt.



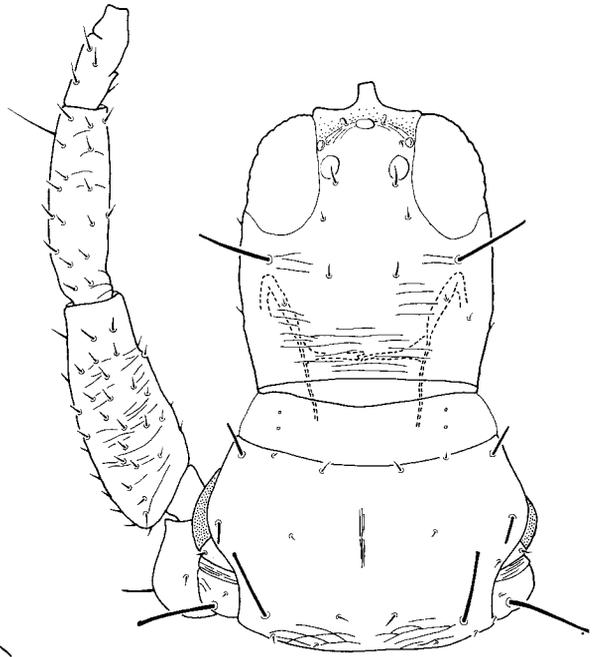
39. *Cartomothrips manukae*,  
mac.



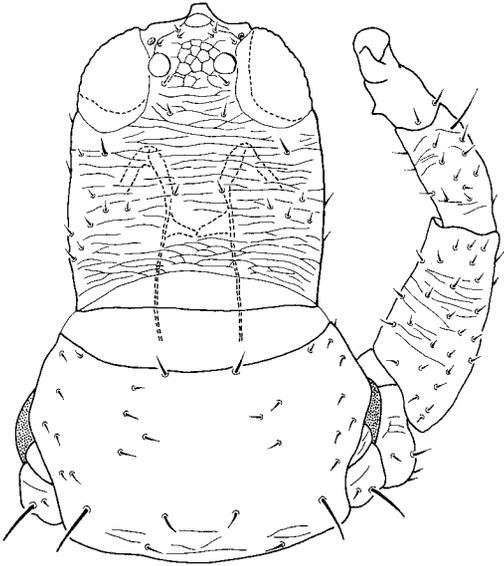
41. *Deplorothrips bassus*, mac.



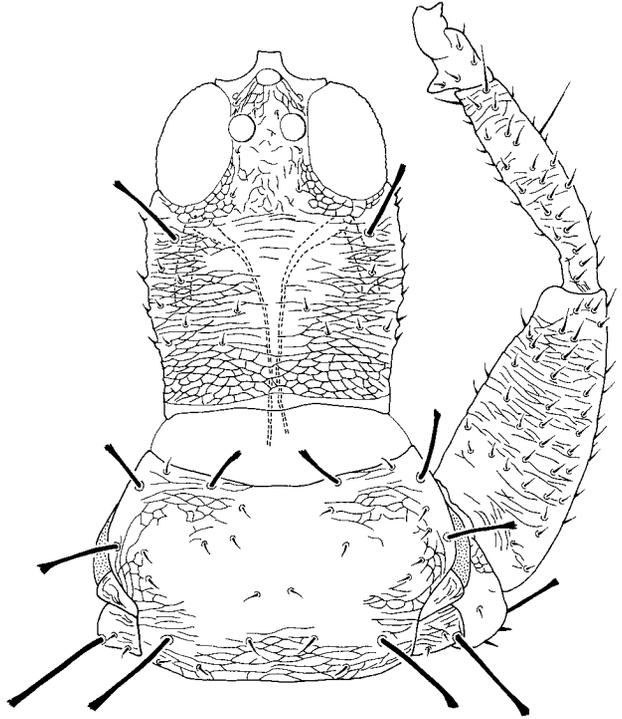
40. *Cartomothrips neboissi*,  
mac.



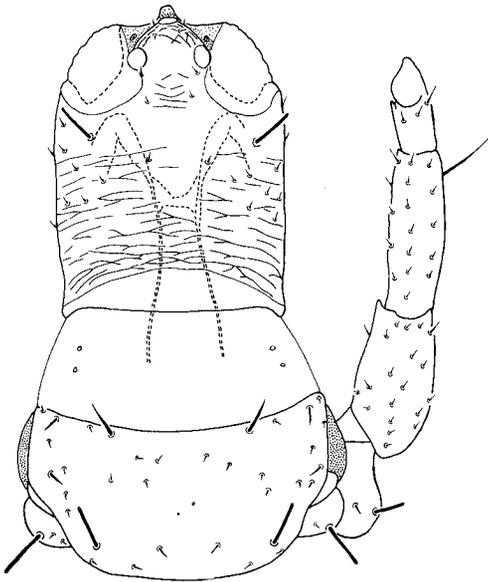
42. *Haplothrips kurdjumovi*,  
mac.



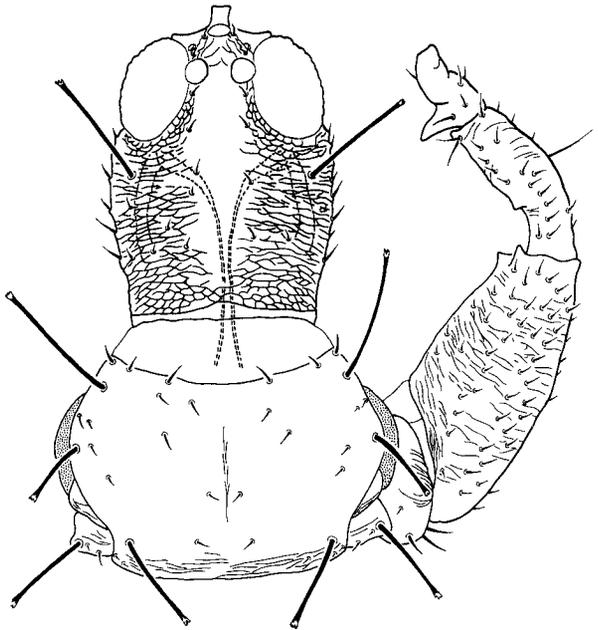
43. *Haplothrips niger*, mac.



45. *Hoplandrothrips bidens*, mac.

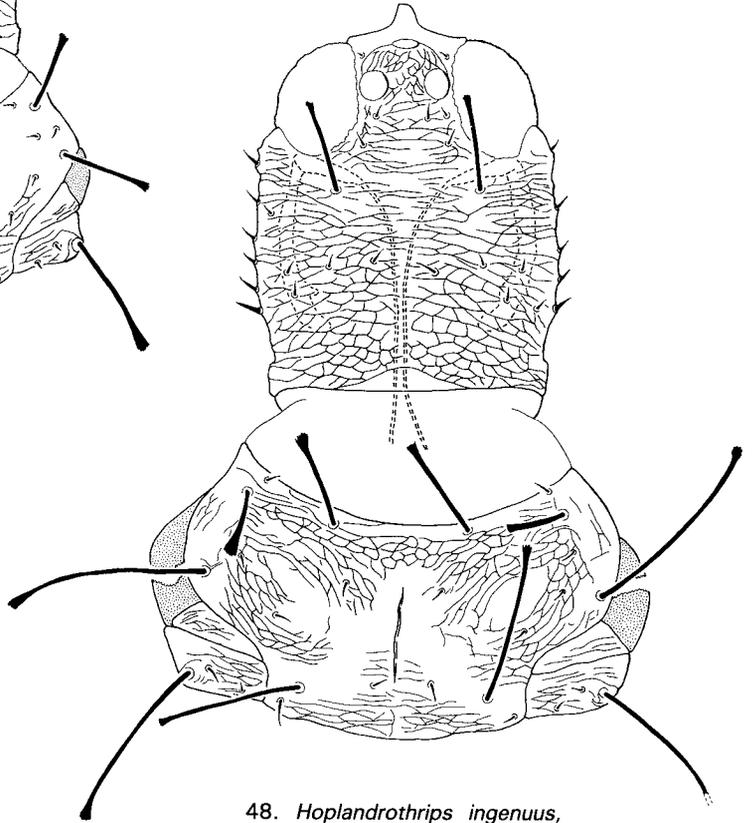
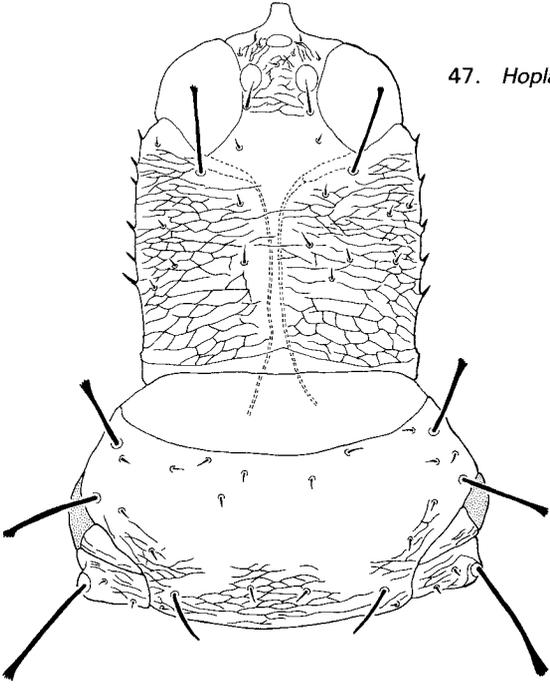


44. *Haplothrips salicorniae*, mac.

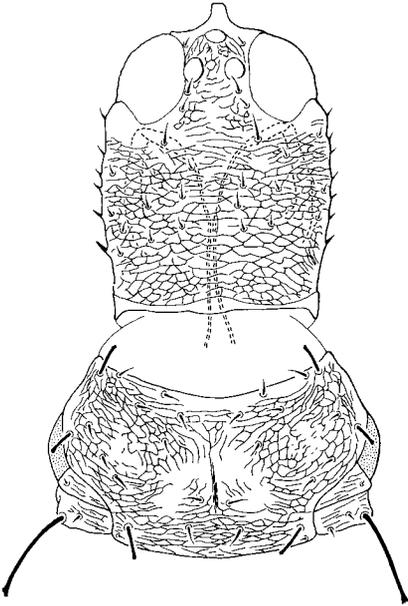


46. *Hoplandrothrips bidens*, large male mac.

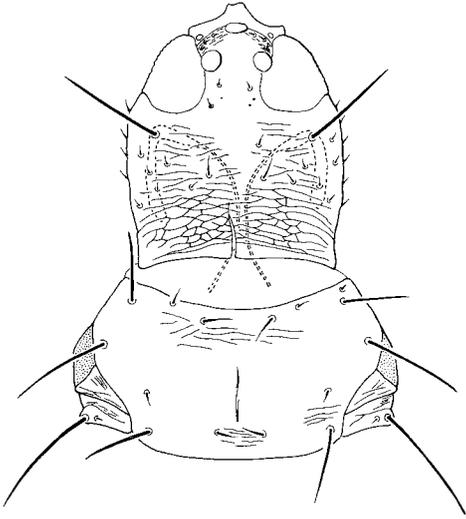
47. *Hoplandrothrips choritus*,  
mac.



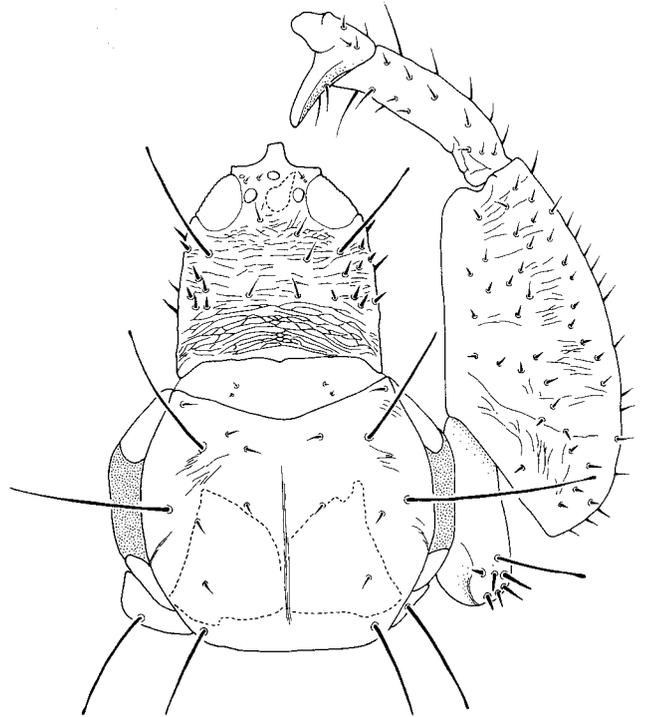
48. *Hoplandrothrips ingenuus*,  
mac.



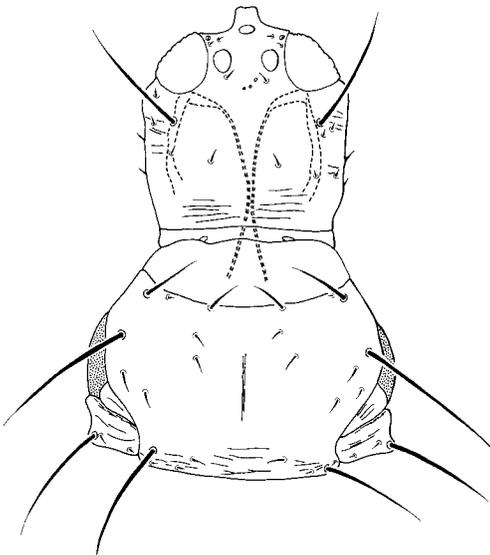
49. *Hoplandrothrips vernus*,  
mac.



50. *Hoplothrips anobii*, mac.



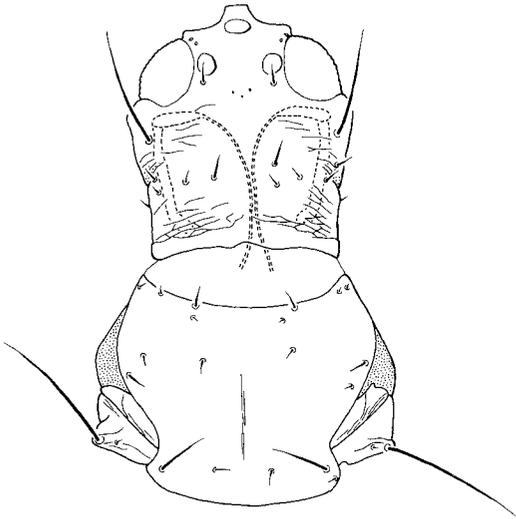
51. *Hoplothrips anobii*,  
large male mic.



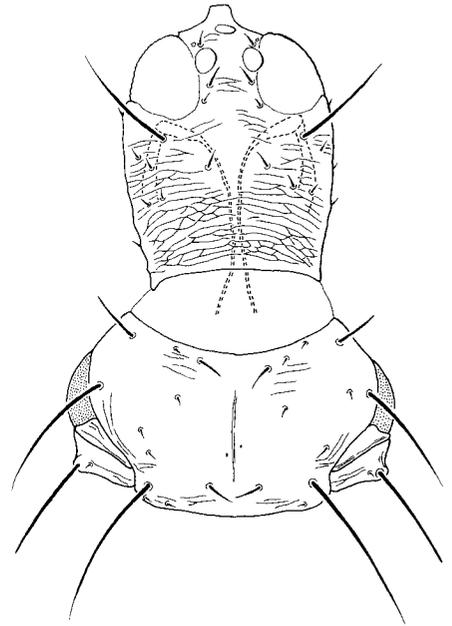
52. *Hoplothrips corticis*, mac.  
(English specimen)



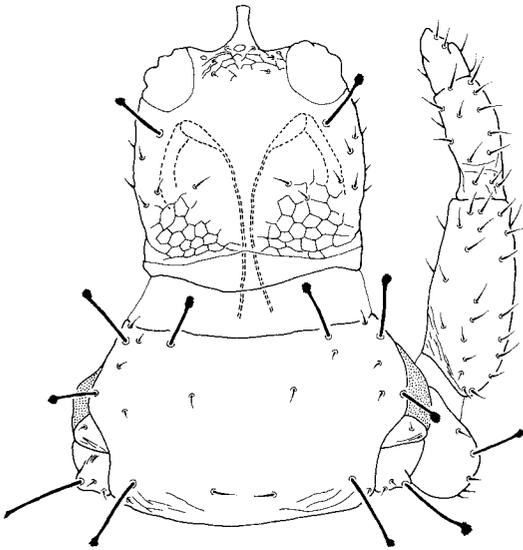
53. *Hoplothrips corticis*, mic.  
(English specimen)



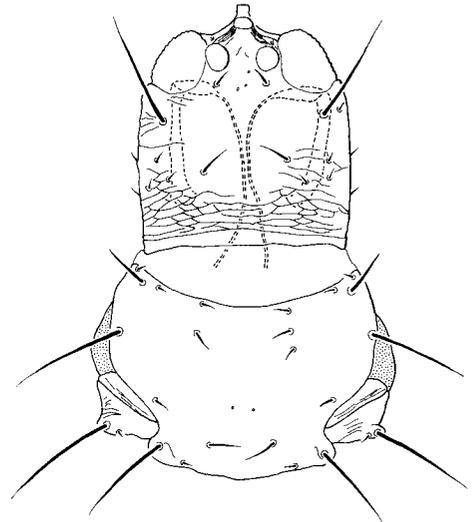
54. *Hoplothrips kea*, mac.



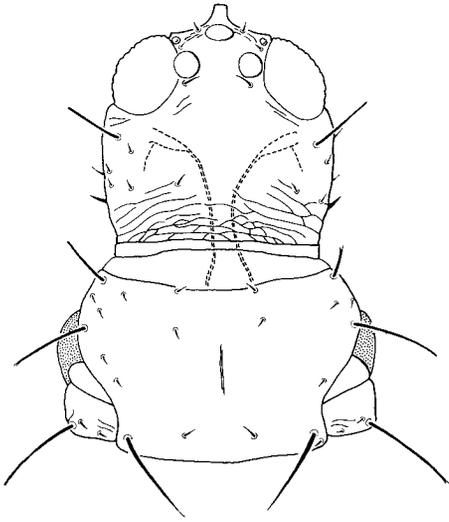
55. *Hoplothrips orientalis*, mac.



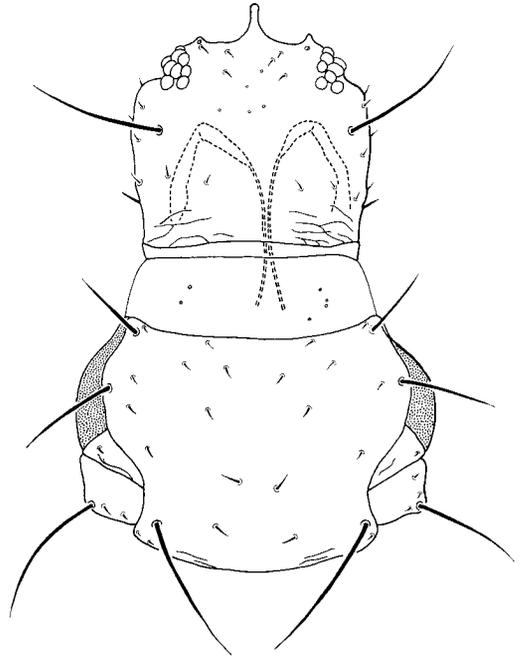
56. *Hoplothrips oudeus*, mic.



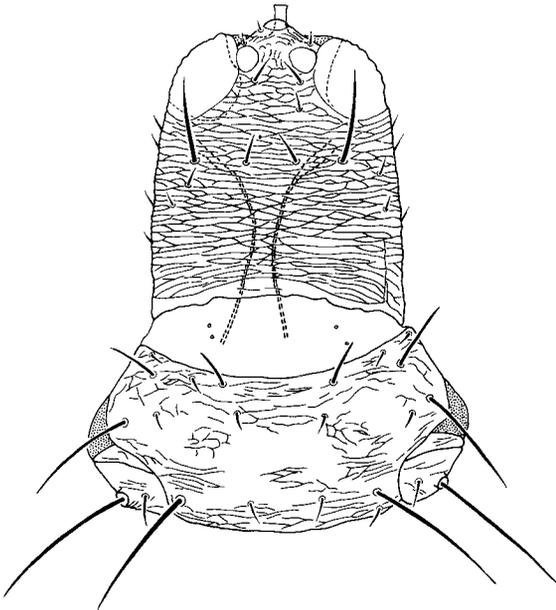
57. *Hoplothrips poultoni*, mac.



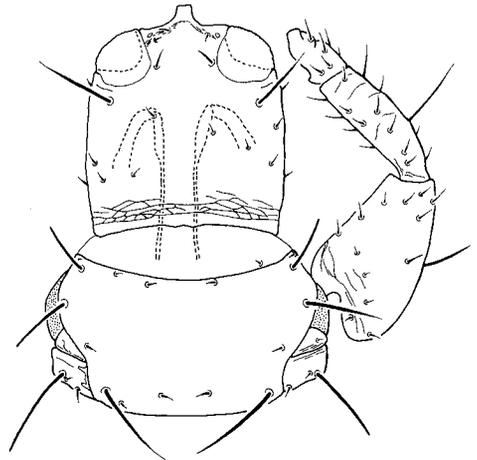
58. *Hoplothrips semicaecus*, mac.  
(English specimen)



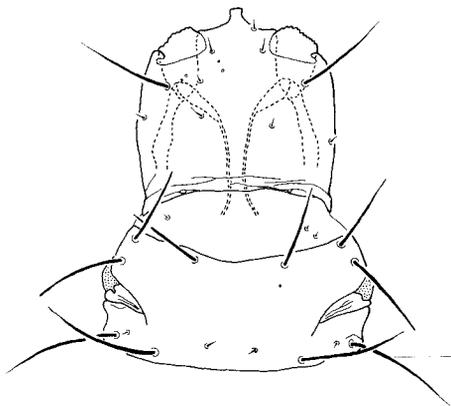
59. *Hoplothrips semicaecus*, apt.



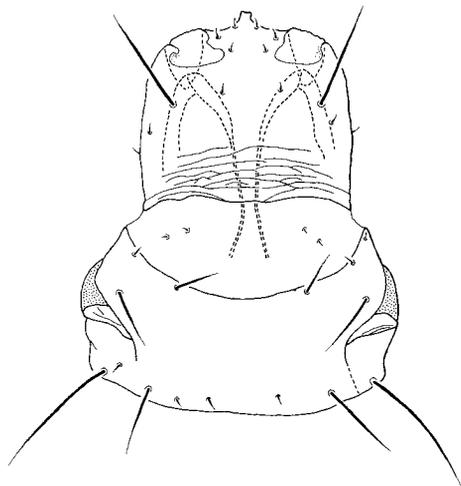
60. *Liothrips vaneeckeii*, mac.



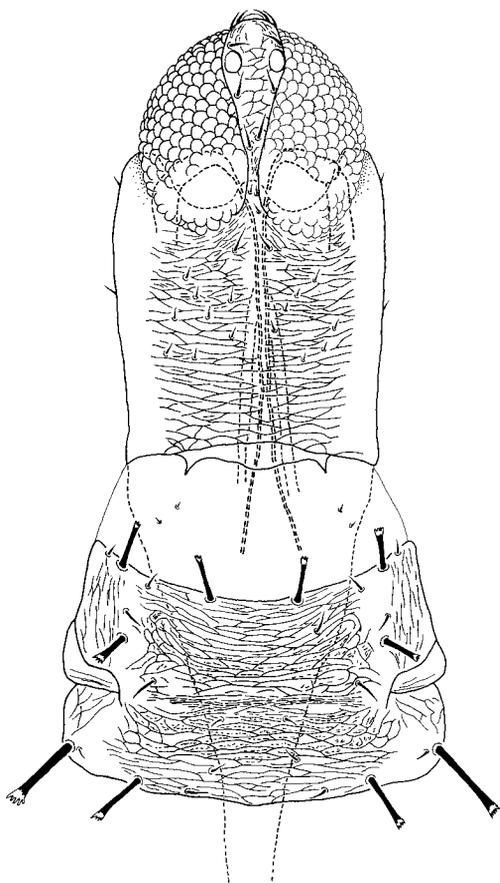
61. *Lissothrips dentatus*, apt.



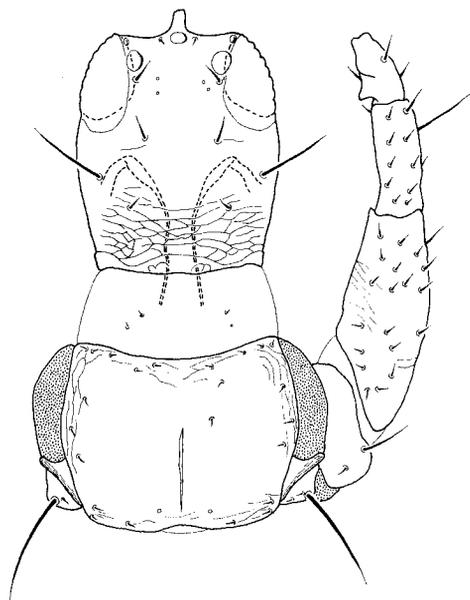
62. *Lissothrips dugdalei*, apt.



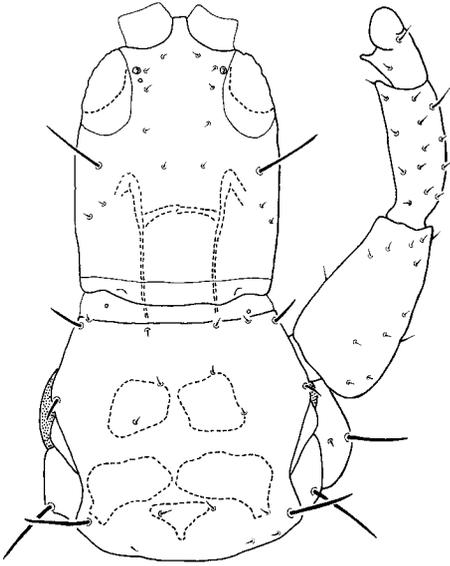
63. *Lissothrips gersoni*, apt.



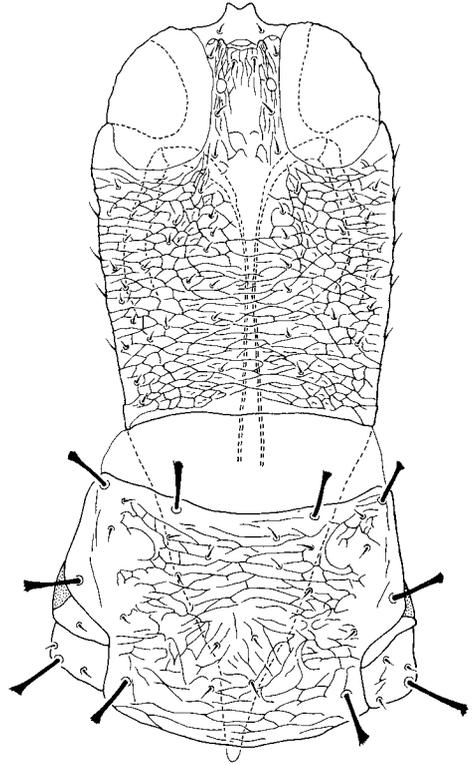
64. *Macrothrips argus*, mac.  
(Australian specimen)



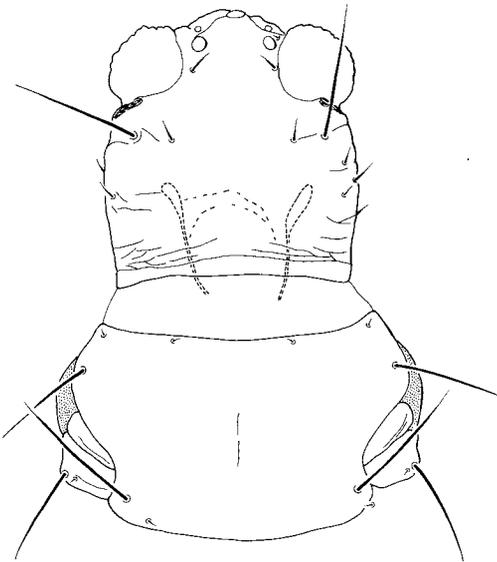
65. *Plectrothrips orientalis*, mac.



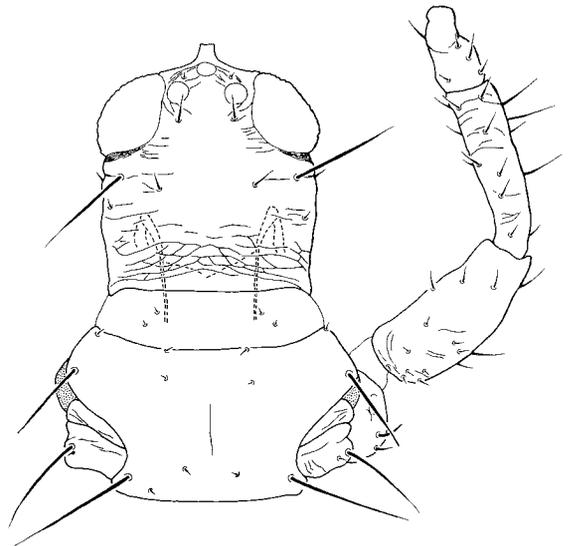
66. *Podothrips orarius*, mic.



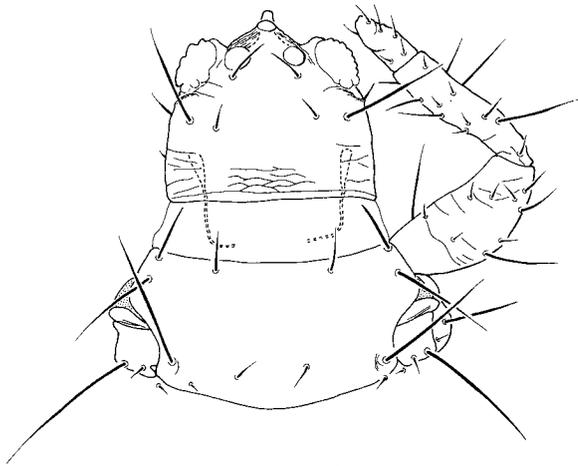
67. *Poecilothrips albopictus*, mic.



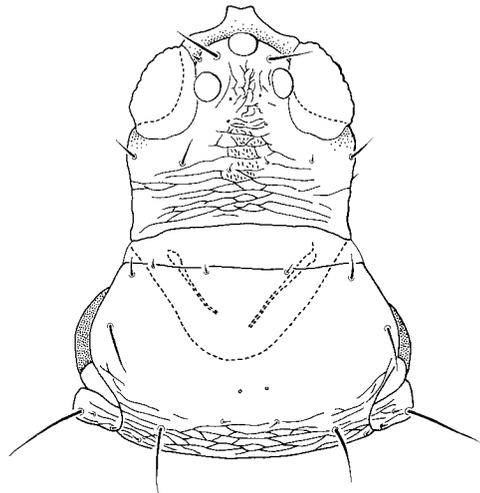
68. *Psalidothrips moeone*, mac.



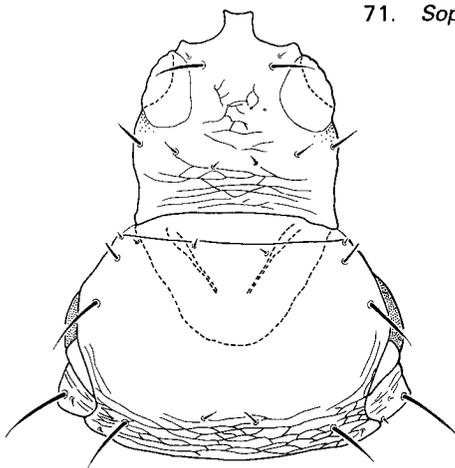
69. *Psalidothrips tane*, mac.



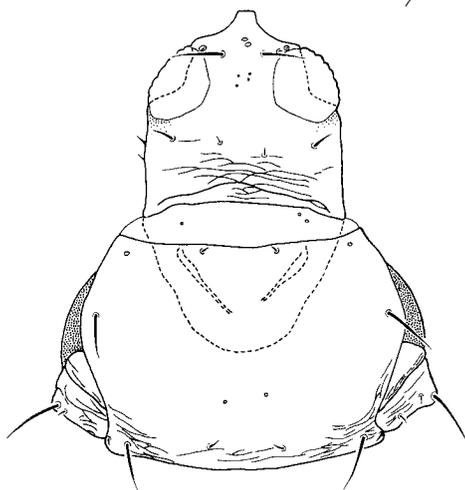
70. *Psalidothrips taylori*, mac.



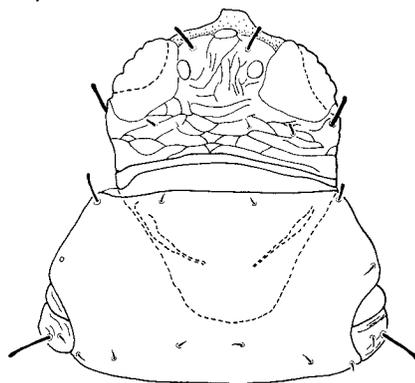
71. *Sophiothrips aleurodisci*,  
mac.



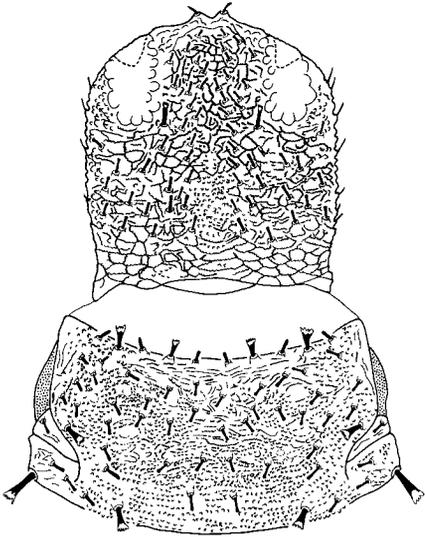
72. *Sophiothrips aleurodisci*, apt.



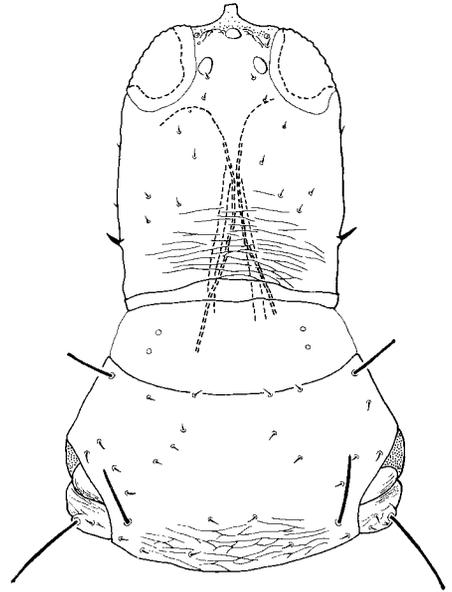
73. *Sophiothrips duvali*, apt.



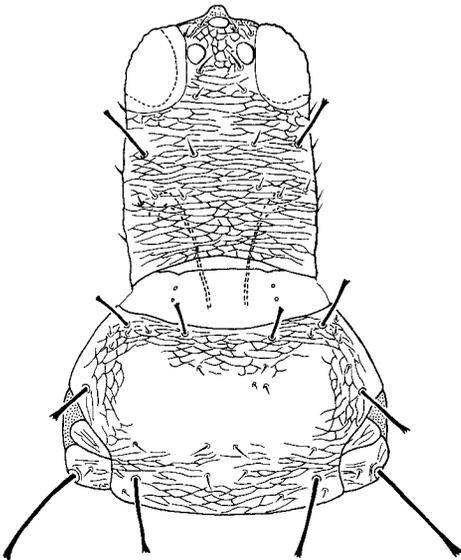
74. *Sophiothrips greensladei*,  
mac.



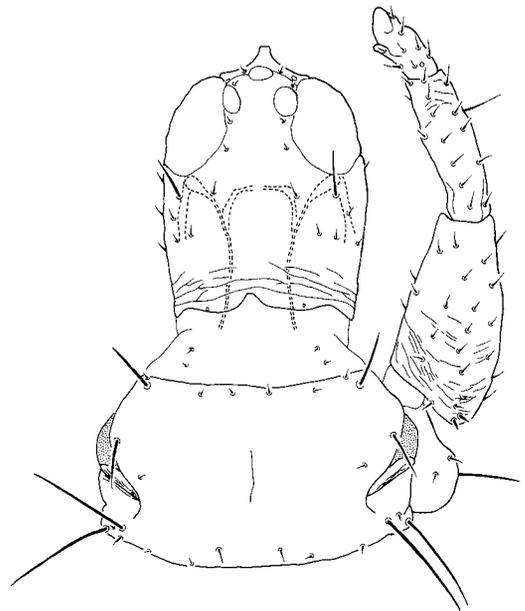
75. *Streptothrips tuberculatus*, apt.



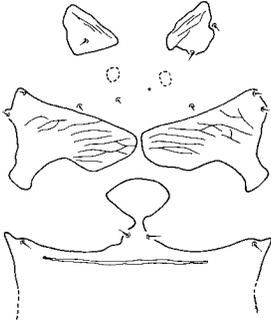
76. *Teuchothrips annulosus*,  
mac.



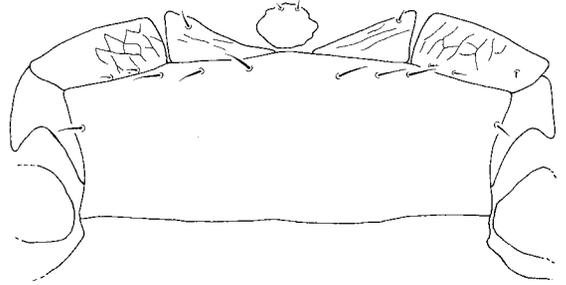
77. *Teuchothrips disjunctus*,  
mac



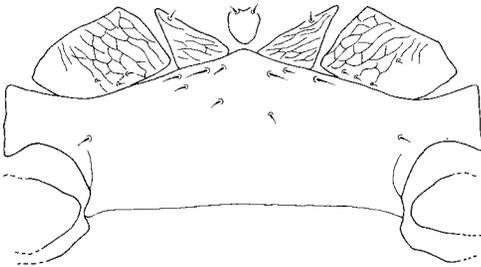
78. *Yarnkothrips kolourus*, mac.



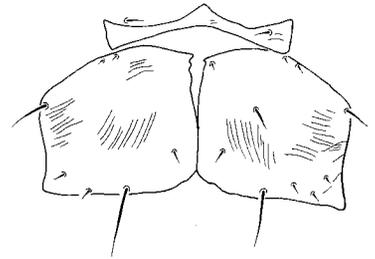
**Figure 79** Prothoracic and mesothoracic sclerites, *Yarnkothrips kolourus*, paratype female.



**80.** *Cartomothrips manukae*



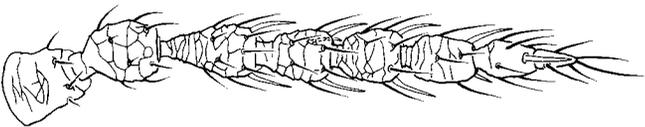
**81.** *Cartomothrips nevoissi*



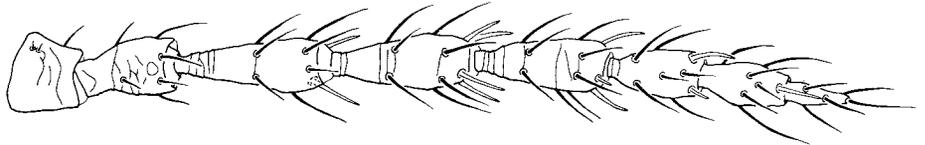
**82.** *Poecilothrips albopictus*

**Figures 80–82** Mesopraesternum and mesoepisternum.

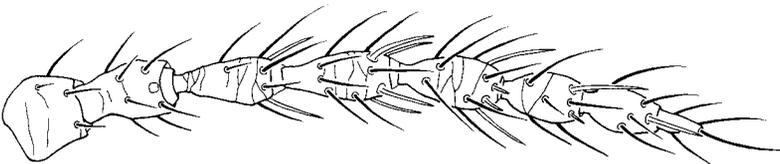
**Figures 83–141** Right antennae, dorsal aspect (exceptions as noted under each figure).



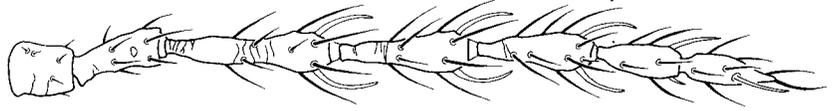
**83.** *Anaglyptothrips dugdalei*



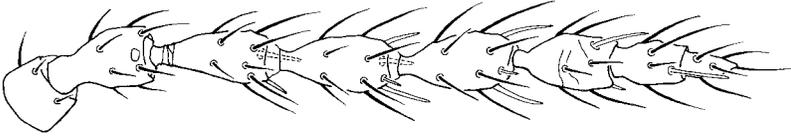
**84.** *Carientothrips badius*



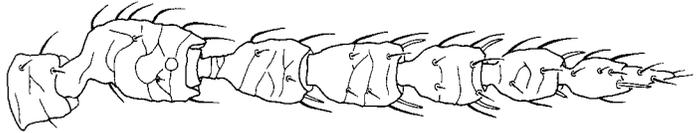
**85.** *Carientothrips loisthus*



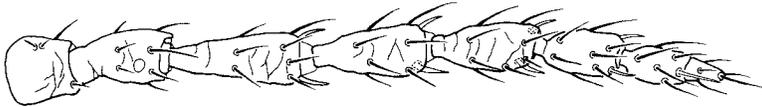
86. *Cleistothrips idolothripoides*



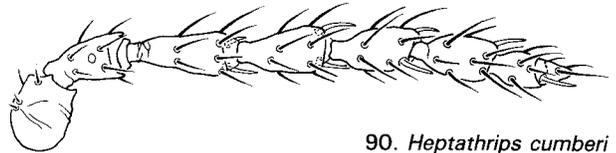
87. *Cryptothrips okiwiensis*



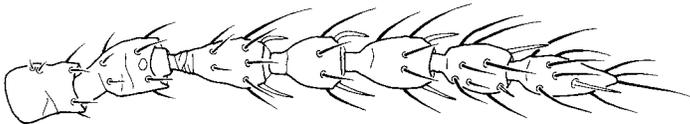
88. *Emprosthiothrips bogong*



89. *Heptathrips cottieri*

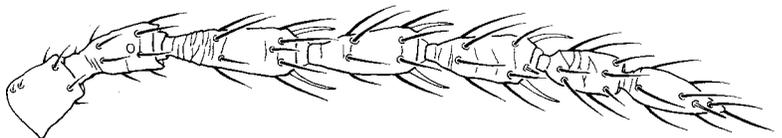


90. *Heptathrips cumberi*



91. *Heptathrips kuscheli*

92. *Heptathrips tillyardi*

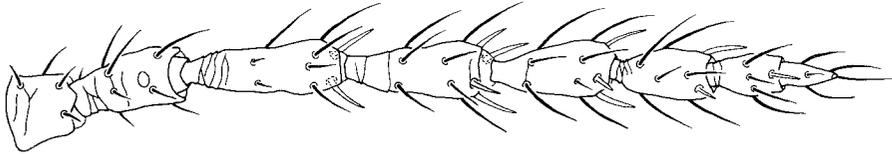




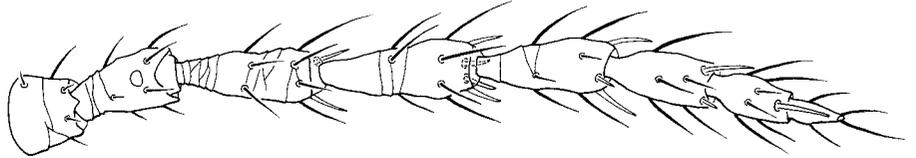
93. *Heptathrips tonnoiri*



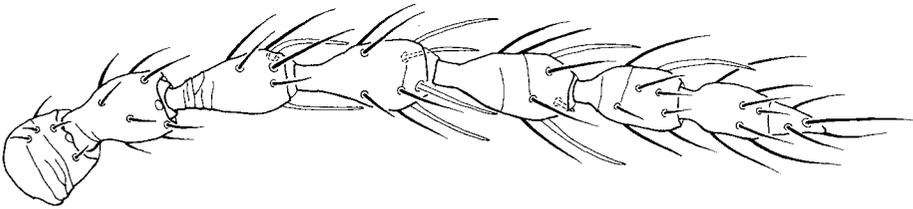
94. *Nesothrips alexandrae*



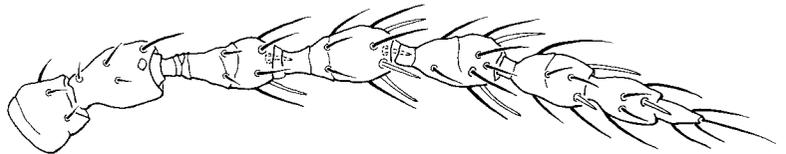
95. *Nesothrips doulli*



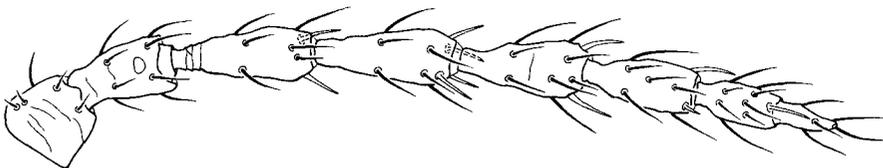
96. *Nesothrips eastopi*



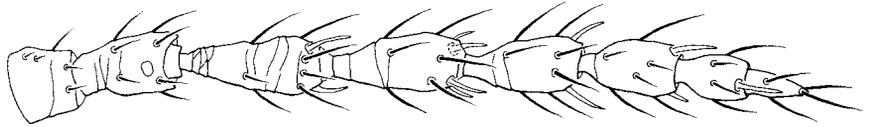
97. *Nesothrips pintadus*



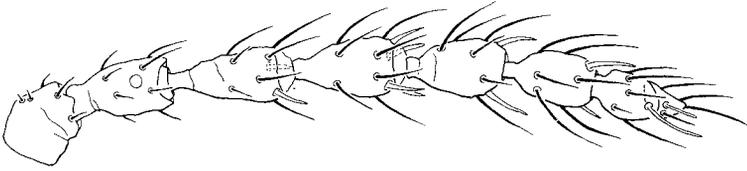
98. *Nesothrips propinquus*



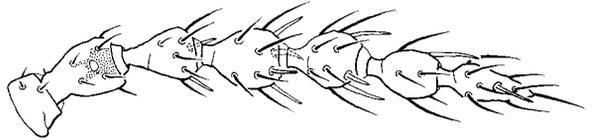
99. *Nesothrips rangi*



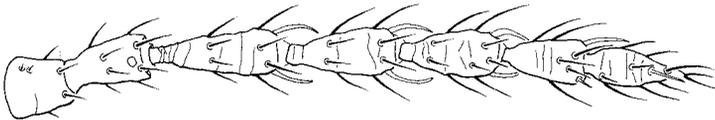
100. *Nesothrips zondagi*



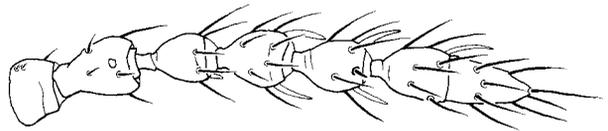
101. *Ozothrips eurytis*



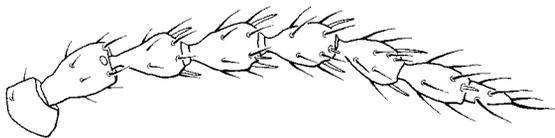
102. *Ozothrips janus*



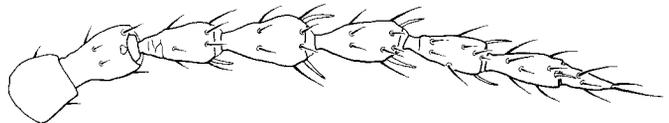
103. *Ozothrips priscus*



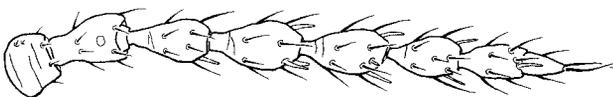
104. *Priesneriella gnomus*



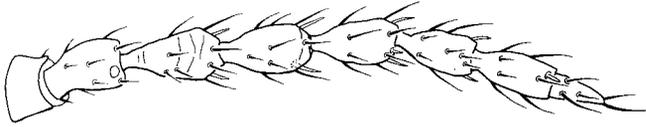
105. *Apterygothrips collyerae*



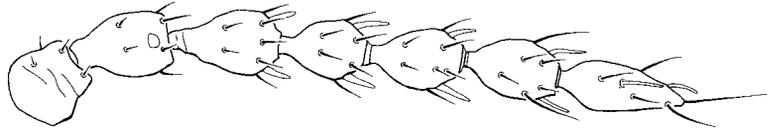
106. *Apterygothrips kohai*



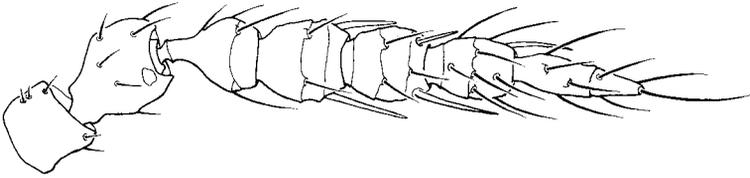
107. *Apterygothrips sparsus*



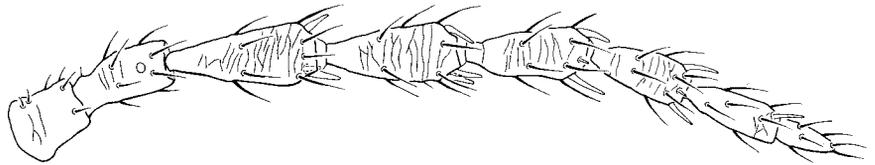
108. *Apterygothrips viretum*



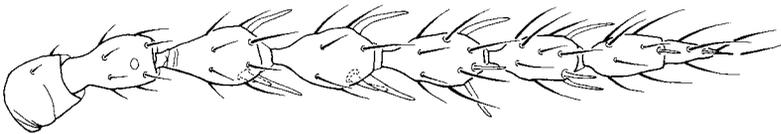
109. *Azaleothrips neatus*



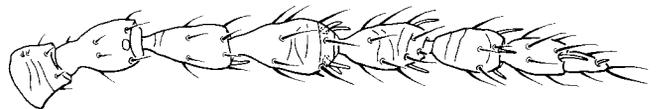
110. *Baenothrips moundi*



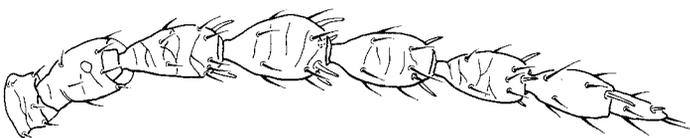
111. *Cartomothrips manukae*



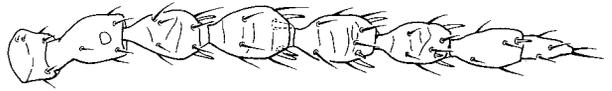
112. *Deplorothrips bassus*



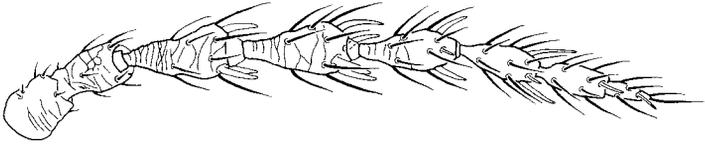
113. *Haplothrips kurdjumovi*



114. *Haplothrips niger*



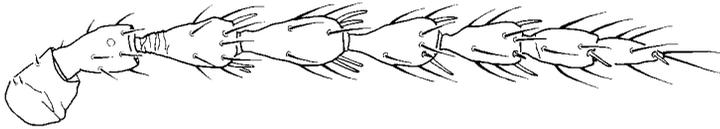
115. *Haplothrips salicorniae*



116. *Hoplandrothrips bidens*



117. *Hoplandrothrips choritus*



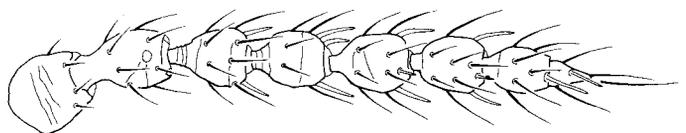
118. *Hoplothrips corticis*



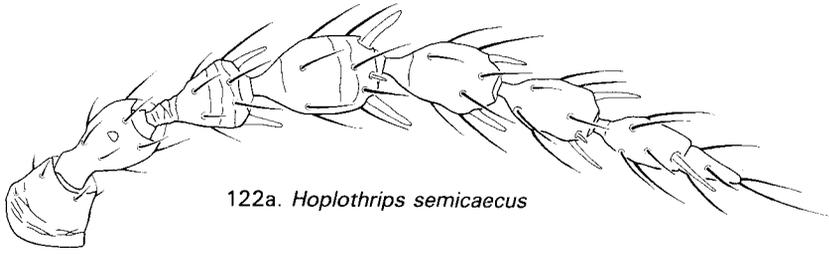
119. *Hoplothrips kea*



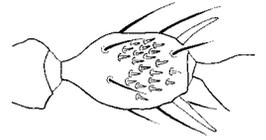
120. *Hoplothrips orientalis*



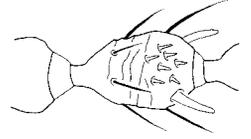
121. *Hoplothrips oudeus*



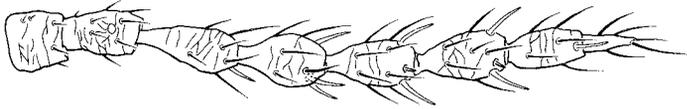
122a. *Hoplothrips semicaecus*



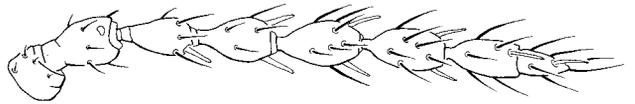
122b. segm. IV, ventral, mac.



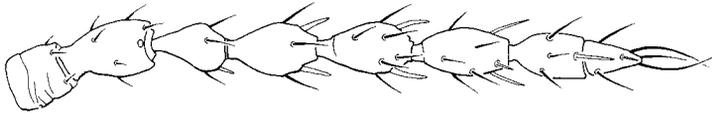
122c. same, apt.



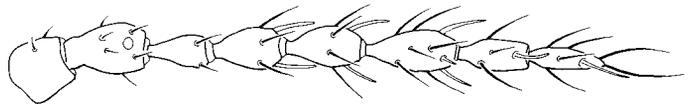
123. *Liothrips vaneeckei*



124. *Lissothrips dentatus*



125. *Lissothrips dugdalei*



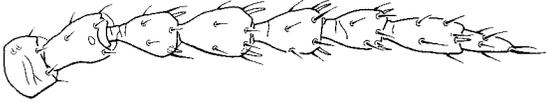
126. *Lissothrips gersoni*



127. *Macrophalthmothrips argus*



128. *Plectrothrips orientalis*



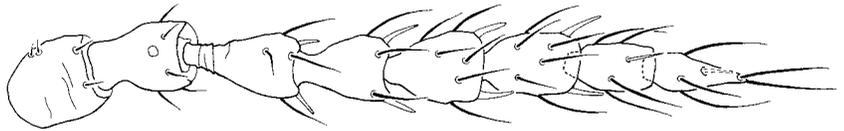
129. *Podothrips orarius*



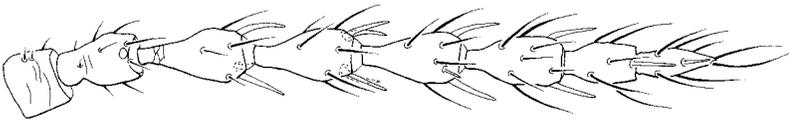
130. *Podothrips turangi*



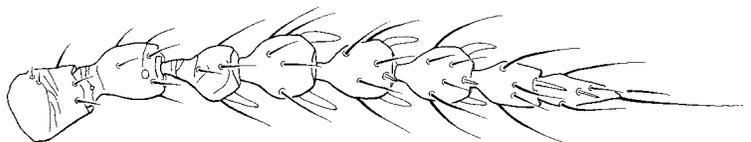
131. *Poecilothrips albopictus*



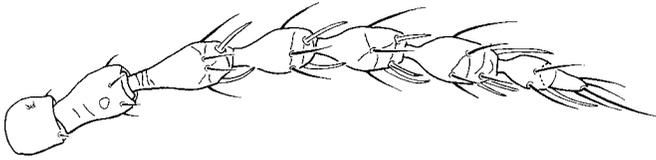
132. *Psalidothrips moeone*



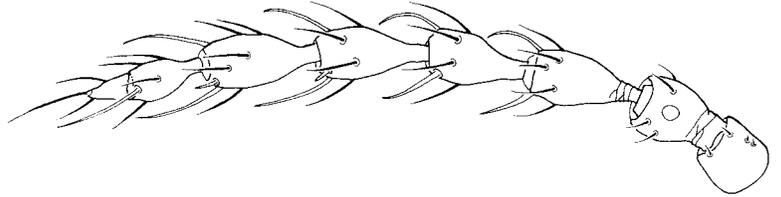
133. *Psalidothrips tane*



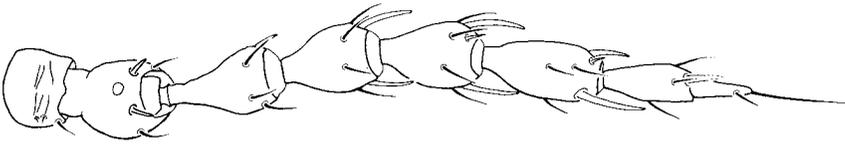
134. *Psalidothrips taylora*



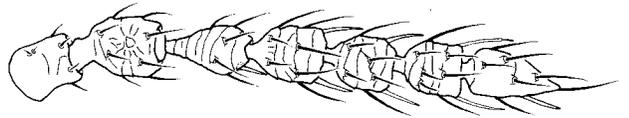
135. *Sophiothrips aleurodisci*



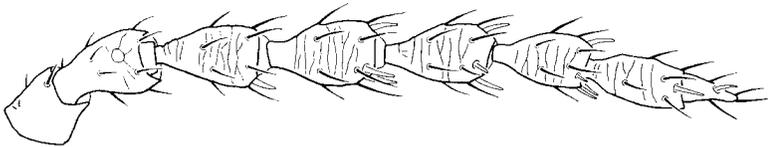
136. *Sophiothrips duvali* (left)



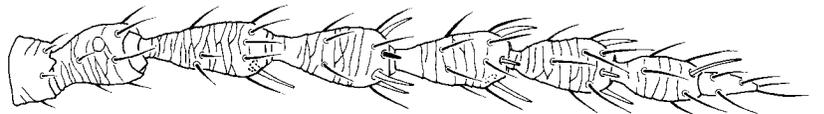
137. *Sophiothrips greensladei*  
(left)



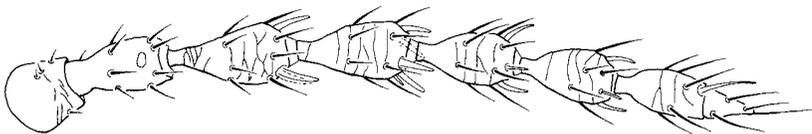
138. *Strepterothrips tuberculatus*



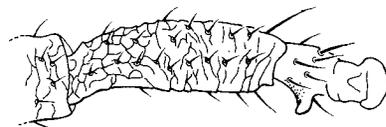
139. *Teuchothrips annulosus*



140. *Teuchothrips disjunctus*

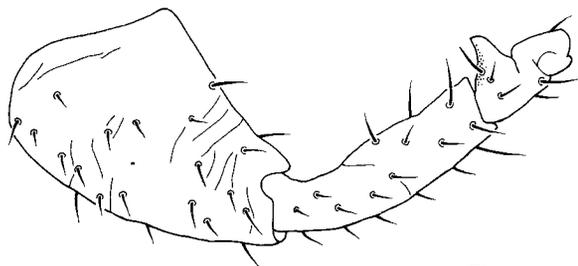


141. *Yarnkothrips kolourus*



142. *Anaglyptothrips dugdalei*, ♂

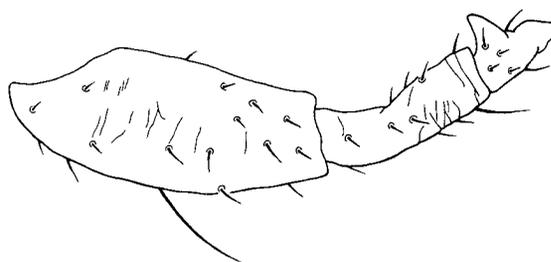
145a. *Nesothrips propinquus*, ♂,  
large



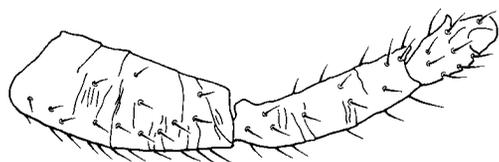
143. *Cleistothrips idolothropoides*, ♀



145b. same, small



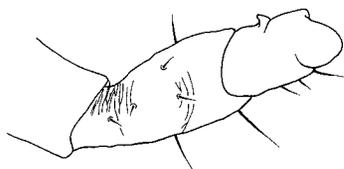
144. *Nesothrips pintadus*, ♂



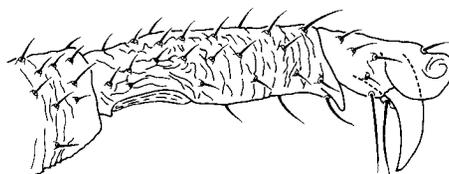
146. *Ozothrips priscus*, ♀



147. *Hoplandrothrips choritus*, ♀



148. *Lissothrips dugdalei*, ♀

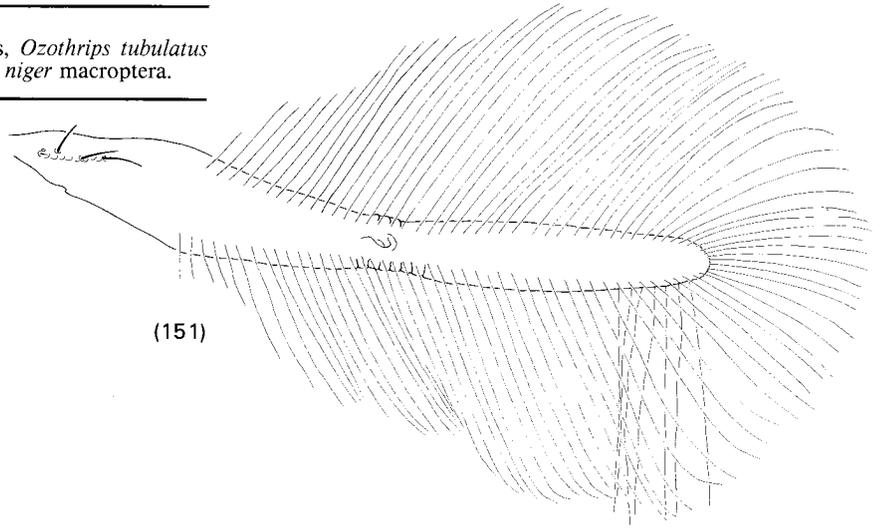
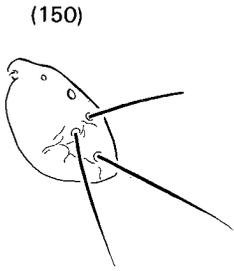


149. *Strepterothrips tuberculatus*, apt.  
♂

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**Figures 150 and 151 Wings, *Ozothrips tubulatus* microptera and *Haplothrips niger* macroptera.**

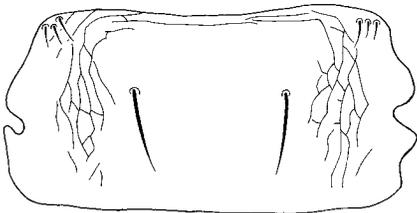
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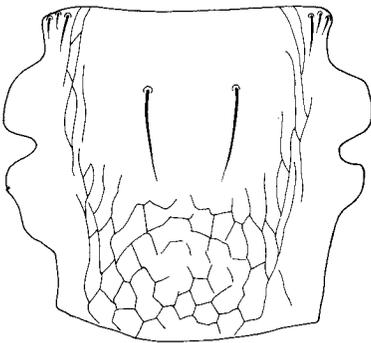
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**Figures 152–170 Metanota (164–167 and 170 with mesonota).**

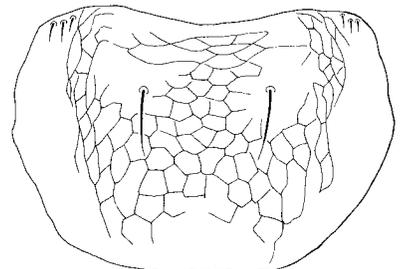
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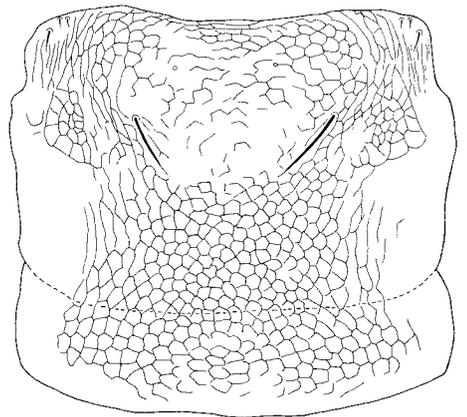
152. *Nesothrips doulli*, mac.



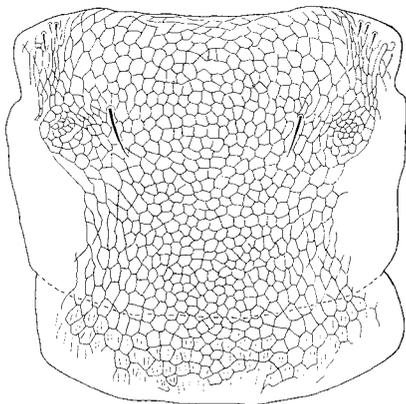
154. *Nesothrips zondagi*, mac.



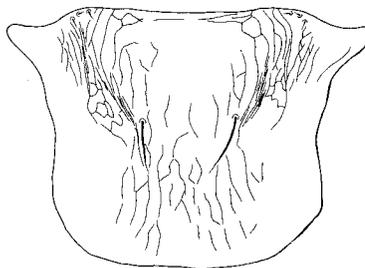
153. *Nesothrips rangi*, mic.



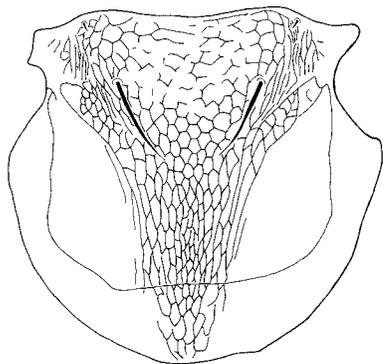
155. *Cartomothrips manukae*, mac.



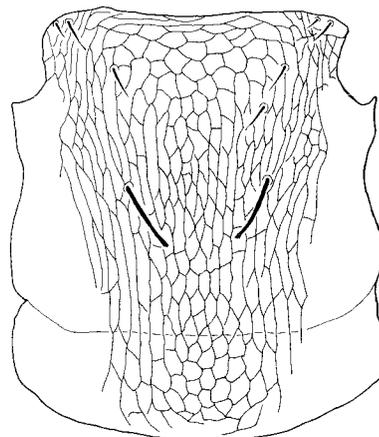
156. *Cartomothrips neboissi*,  
mac.



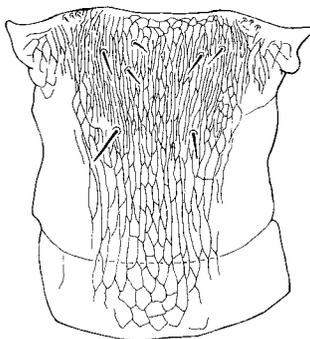
157. *Deplorothrips bassus*, mac.



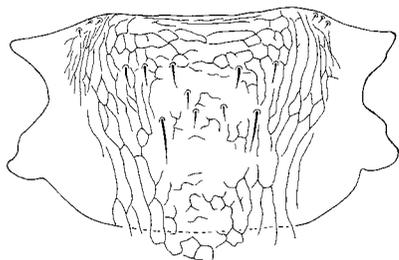
158. *Hoplandrothrips bidens*,  
mac.



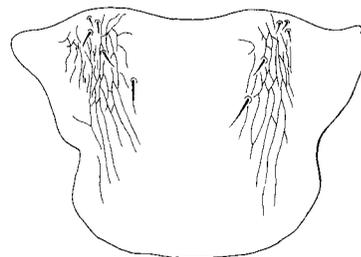
159. *Hoplandrothrips choritus*,  
mac.



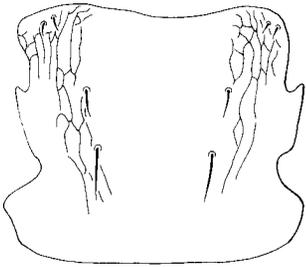
160. *Hoplandrothrips ingenuus*,  
mac.



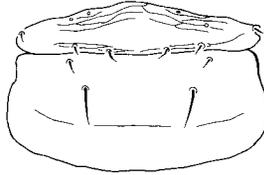
161. *Hoplothrips anobii*, mac.



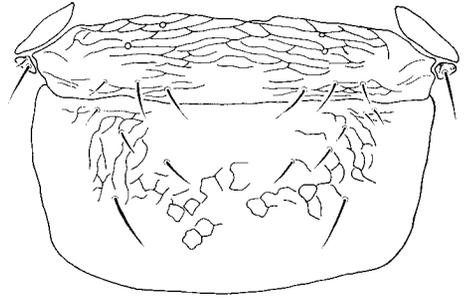
162. *Hoplothrips corticis*, mac.



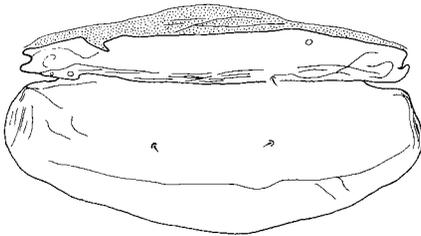
163. *Hoplothrips semicaecus*,  
mac.



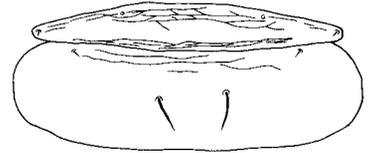
165. *Lissothrips dentatus*, apt.



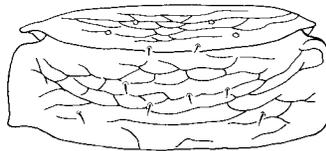
164. *Hoplothrips semicaecus*,  
apt.



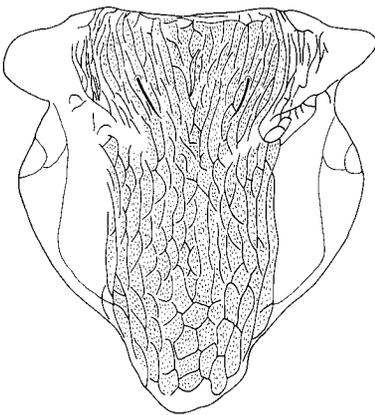
166. *Lissothrips dugdalei*, apt.



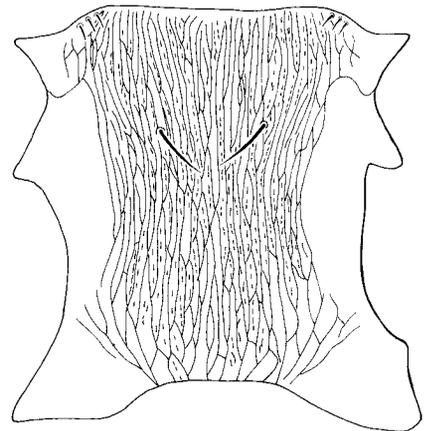
167. *Lissothrips gersoni*, apt.



170. *Sophiothrips greensladei*,  
apt.



168. *Macrophthalthothrips argus*, mac.



169. *Poecilothrips albopictus*,  
mac.

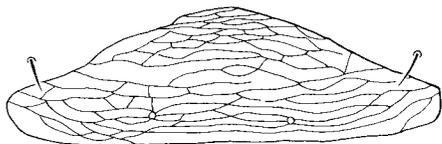
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Figures 171–241 Peltae (details as noted under each figure).

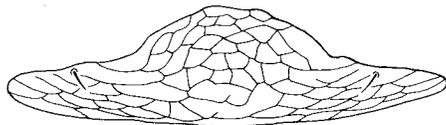
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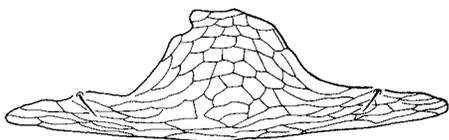
171. *Anaglyptothrips dugdalei*,  
apt.



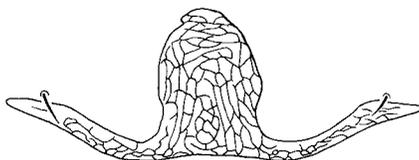
172. *Cartomothrips badius*, mic.



173. *Carientothrips loisthus*, apt.



174. *Carientothrips loisthus*,  
mac.



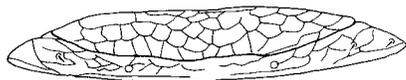
175. *Cleistothrips idolothripoides*, mac.



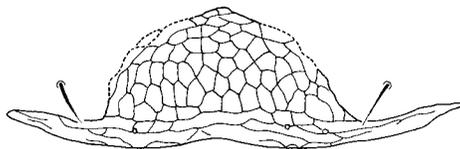
176. *Cryptothrips okiwiensis*,  
mac.



177. *Cryptothrips okiwiensis*,  
apt.



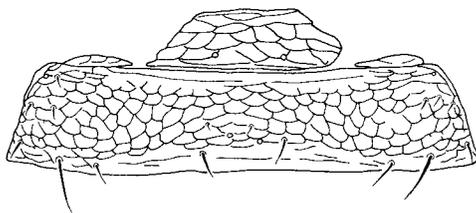
178. *Emprosthriothrips bogong*, apt.



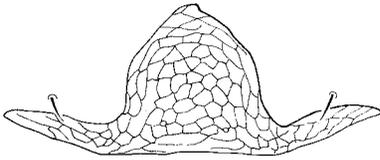
179. *Heptathrips cottieri*, mic.



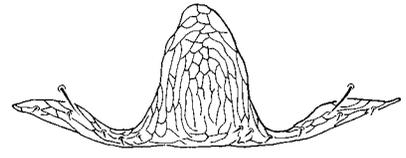
180. *Heptathrips cumberi*, apt.



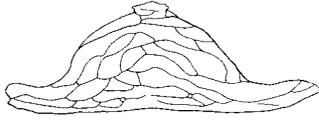
181. *Heptathrips kuscheli*, apt.



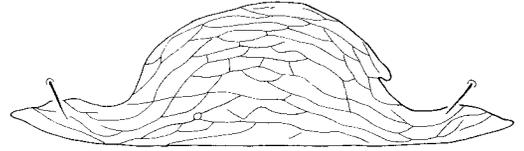
182. *Heptathrips tillyardi*, mac.



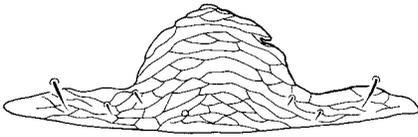
183. *Heptathrips tonnoiri*, mac.



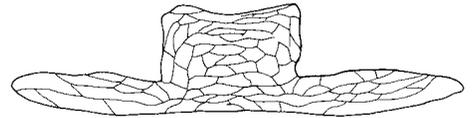
184. *Nesothrips alexandrae*,  
mac.



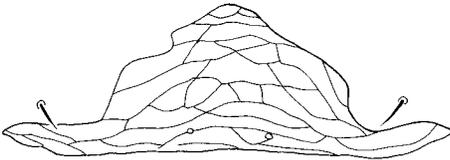
185. *Nesothrips doulli*, mic.



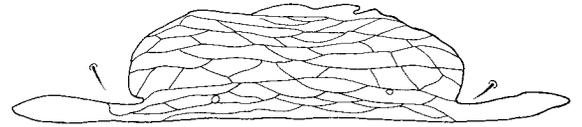
186. *Nesothrips eastopi*, mic.



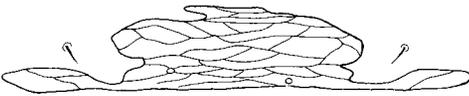
187. *Nesothrips pintadus*, mic.



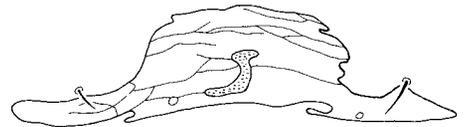
188. *Nesothrips propinquus*,  
mac.



(a)

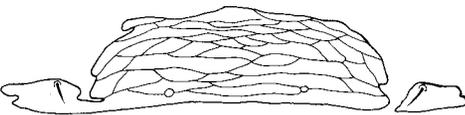


(b)

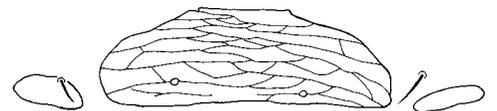


(c)

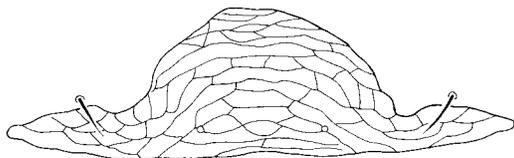
189a-e. *Nesothrips propinquus*,  
apt., variants



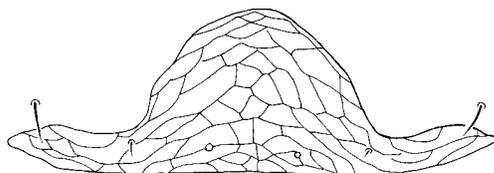
(d)



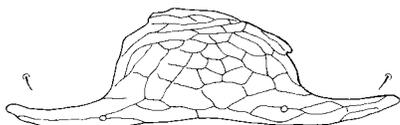
(e)



190. *Nesothrips rangi*, mic.



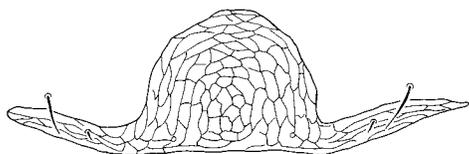
191. *Nesothrips zondagi*, mac.



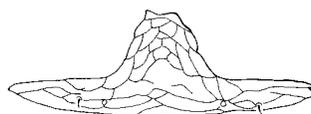
192. *Ozothrips eurytis*, mic.



193. *Ozothrips janus*, apt.



194. *Ozothrips priscus*, mac.



195. *Ozothrips tubulatus*, mac.



196. *Priesneriella gnomus*, apt.



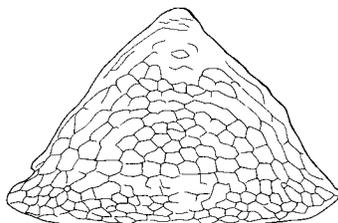
197. *Apterygothrips collyerae*,  
mac.



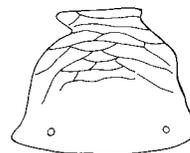
198. *Apterygothrips kohai*, mic.



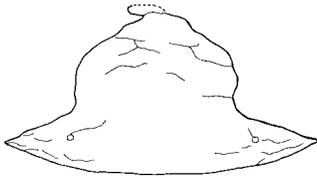
199. *Apterygothrips sparsus*,  
mic.



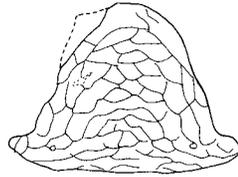
201. *Cartomothrips manukae*,  
mac.



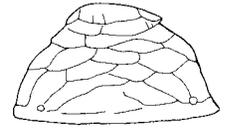
200. *Apterygothrips viretum*,  
mac.



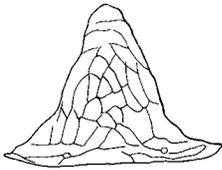
203. *Deplorothrips* sp. (MK),  
mac.



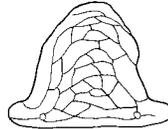
202. *Deplorothrips bassus*, mac.



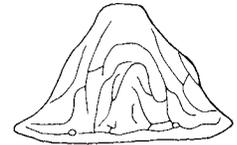
204. *Deplorothrips* sp., apt.



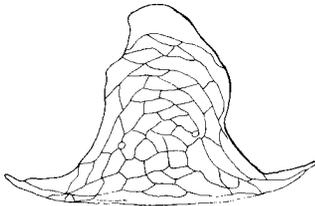
206. *Haplothrips niger*, mac.



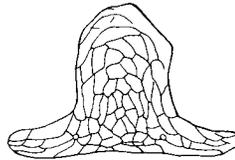
205. *Haplothrips kurdjumovi*,  
mac.



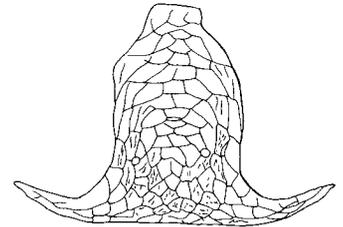
207. *Haplothrips salicorniae*,  
mac.



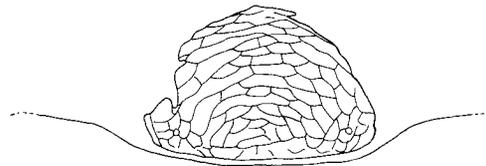
209. *Hoplandrothrips chortus*,  
mac.



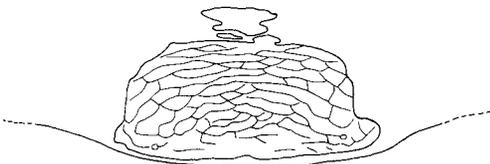
208. *Hoplandrothrips bidens*,  
mac.



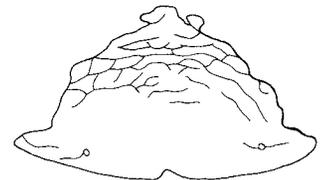
210. *Hoplandrothrips vernus*,  
mac.



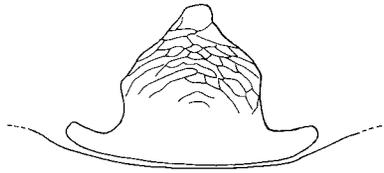
211. *Hoplothrips anobii*, mac.



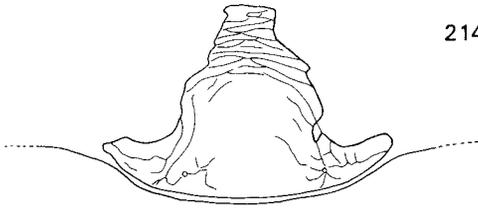
212. *Hoplothrips anobii*, mic.



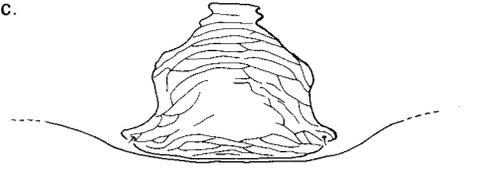
213. *Hoplothrips corticis*, mac.



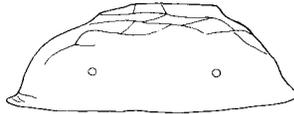
214. *Hoplothrips kea*, mac.



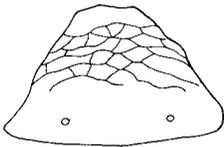
215a. *Hoplothrips orientalis*, mac.



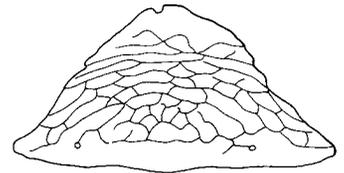
215b. same, variant



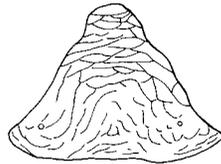
216. *Hoplothrips oudeus*, mic.



217. *Hoplothrips semicaecus*, mac.



218. *Hoplothrips semicaecus*, apt.



219. *Liothrips vaneeckei*, mac.



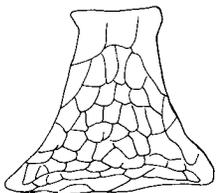
220. *Lissothrips dentatus*, apt.



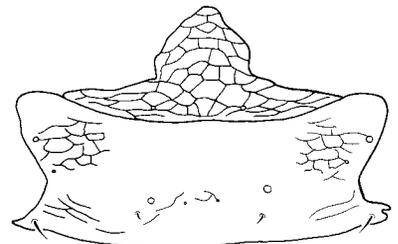
221. *Lissothrips dugdalei*, apt.



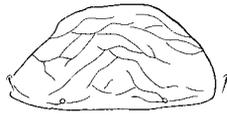
222. *Lissothrips gersoni*, apt



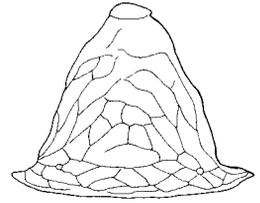
223. *Macrophthalmus argus*, mac.



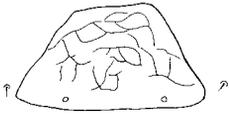
224. *Plectrothrips orientalis*, mac.



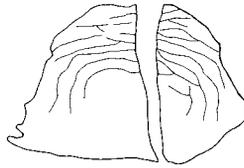
225. *Podothrips orarius*, mic.



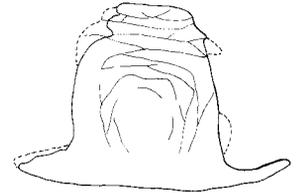
227. *Poecilothrips albopictus*, mac.



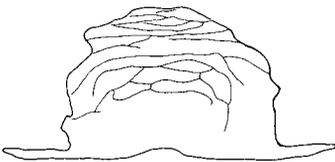
226. *Podothrips turangi*, mic.



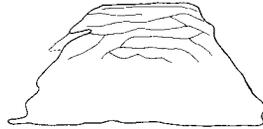
228. *Psalidothrips moeone*, mac.



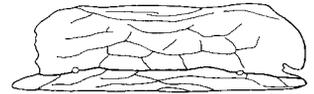
230. *Psalidothrips tane*, mac.



229. *Psalidothrips moeone*, apt.



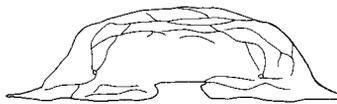
231. *Psalidothrips taylori*, mac.



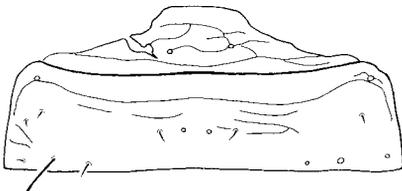
233. *Sophiothrips aleurodisci*, apt.



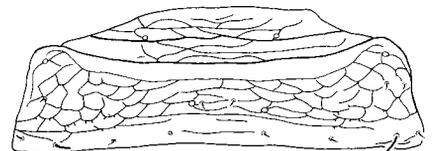
232. *Sophiothrips aleurodisci*, mac.



234. *Sophiothrips duvali*, apt.



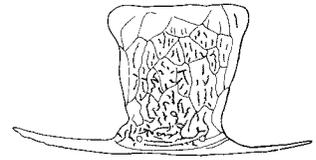
235. *Sophiothrips greensladei*, mac.



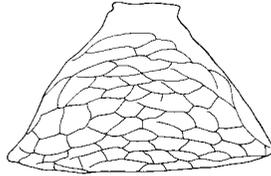
236. *Sophiothrips greensladei*, apt.



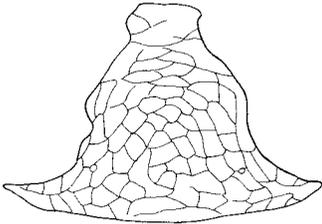
237. *Strepterothrips tuberculatus*, apt.



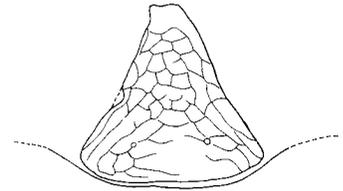
238. *Strepterothrips tuberculatus*, mac.



239. *Teuchothrips annulosus*, mac.



240. *Teuchothrips disjunctus*, mac.

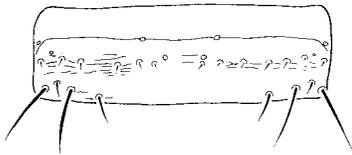


241. *Yarnkothrips kolourus*, mac.

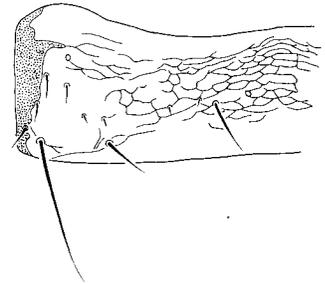
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Figures 242–254 Tergites (242, T VI; 247, 252–254, T IV; remainder, T II).

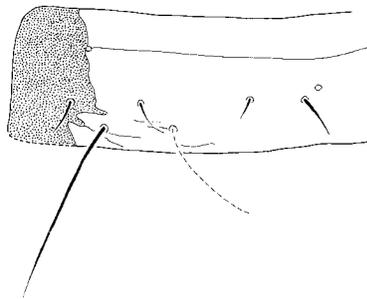
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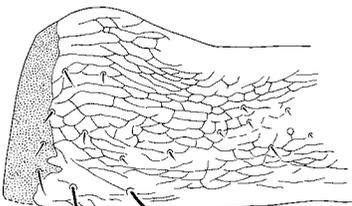
242. *Carientothrips badius*, ♀ mic.



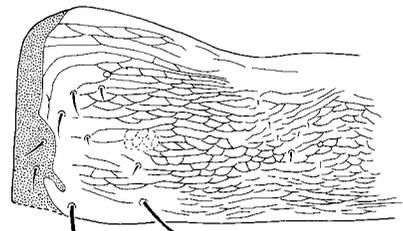
243. *Heptathrips cottieri*, ♀ mic.



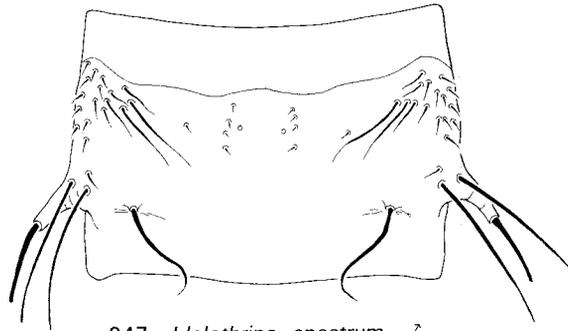
244. *Heptathrips cumberi*, ♀ apt.



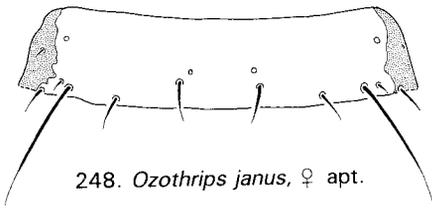
245. *Heptathrips tillyardi*, ♀ mac.



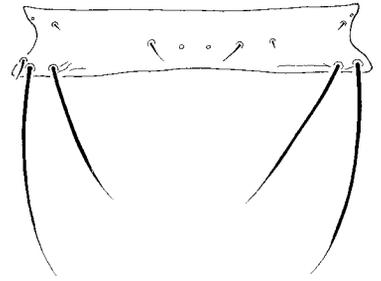
246. *Heptathrips tonnoiri*, ♀ mac.



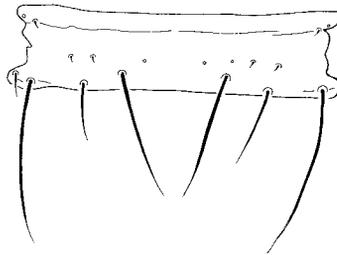
247. *Idolothrips spectrum*, ♂  
mac.



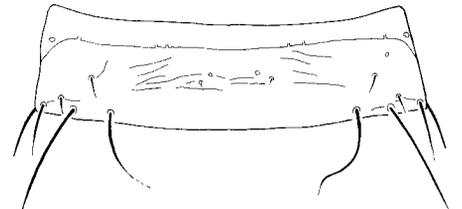
248. *Ozothrips janus*, ♀ apt.



249. *Ozothrips tubulatus*, ♂ mic.



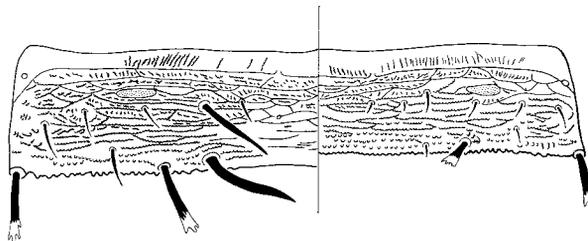
250. *Ozothrips vagus*, ♂ mic.



254. *Yarkothrips kolourus*, ♀  
mac.



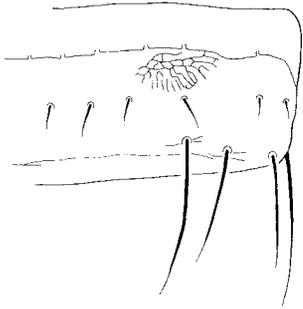
251. *Azaleothrips neatus*, ♀  
mic.



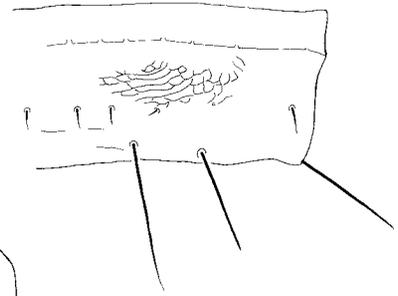
253. *Strepterothrips tuberculatus*, ♀  
mac.

252. *Strepterothrips tuberculatus*, ♀  
apt.

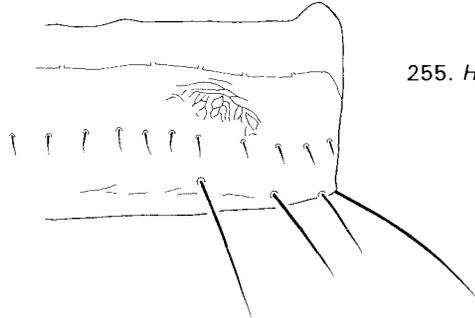
Figures 255–260 Sternites VII (exception: 260, S VI).



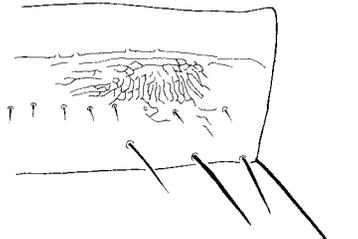
256. *Hoplothrips corticis*, ♂ mic.



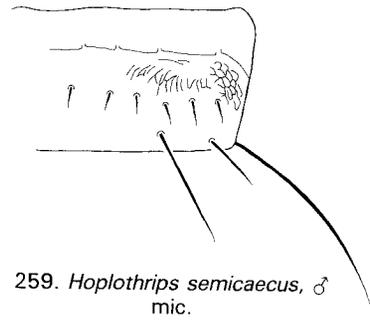
255. *Hoplothrips anobii*, ♂ mic.



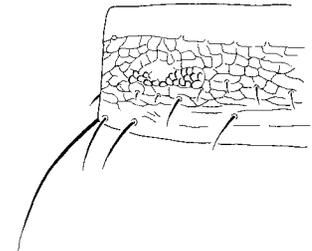
257. *Hoplothrips kea*, ♂ mic.



258. *Hoplothrips orientalis*, ♂ mic.

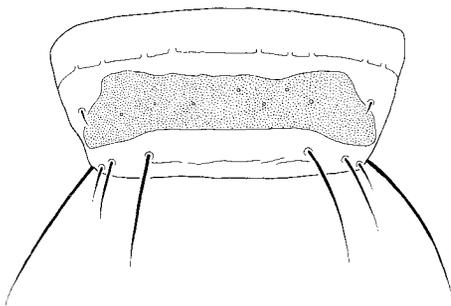


259. *Hoplothrips semicaecus*, ♂ mic.

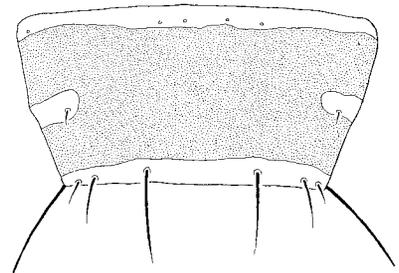


260. *Plectrothrips orientalis*, ♀ mac.

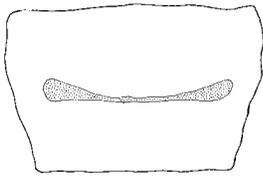
Figures 261–276 Male sternite VIII glands (263a–h, variants, with setae and sculpture omitted).



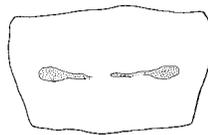
261. *Cartomothrips manukae*



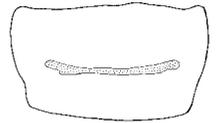
262. *Cartomothrips nevoissi*



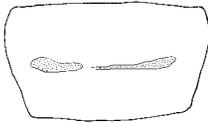
(a) paratype



(b) sample 1455

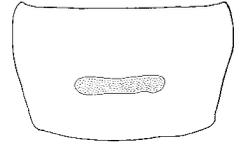


(c) sample 1368

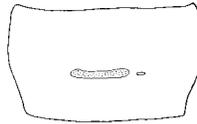


(d) sample 1368

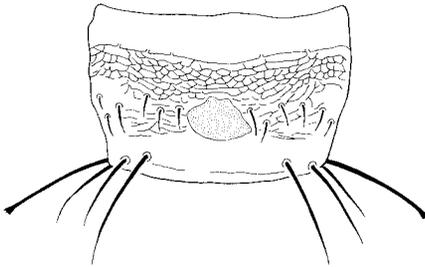
263a-h. *Deplorothrips bassus*, variants



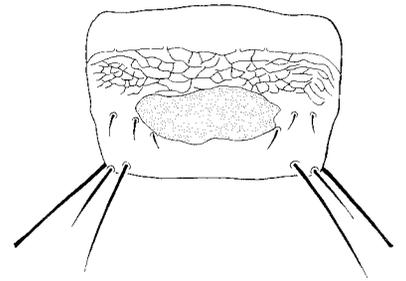
(e) sample 1434



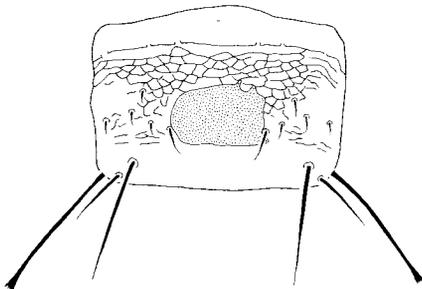
(f) sample 1434



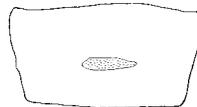
264. *Hoplandrothrips bidens*, ♂ mac.



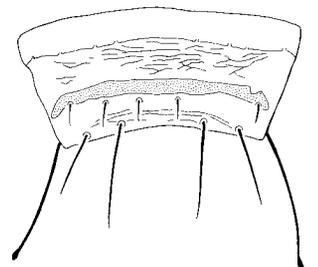
265. *Hoplandrothrips choritus*, ♂ mac.



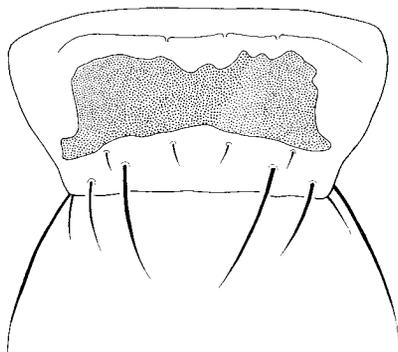
266. *Hoplandrothrips vernus*, ♂ mac.



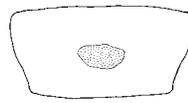
(g) sample 1447



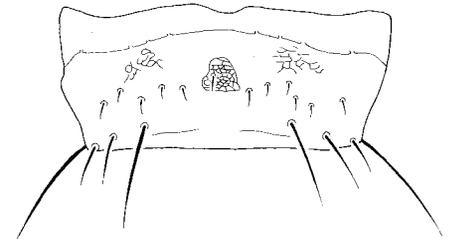
267. *Hoplothrips anobii*, ♂ mic.



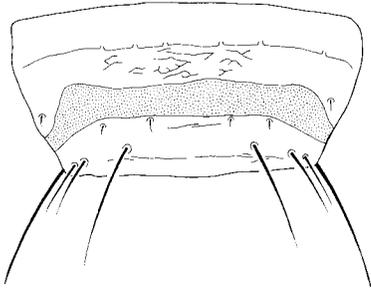
268. *Hoplothrips corticis*, ♂ mic.



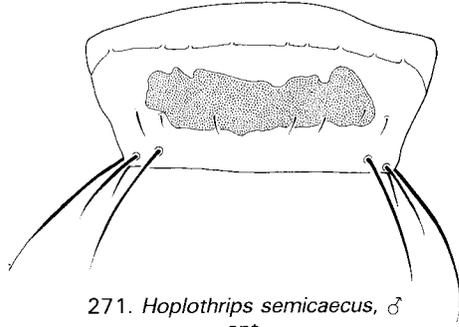
(h) sample 1447



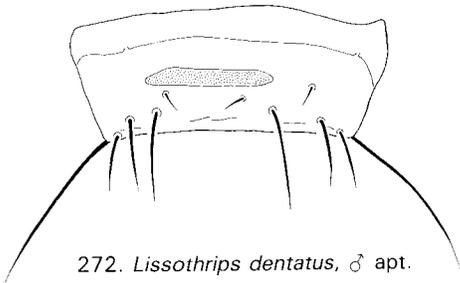
269. *Hoplothrips kea*, ♂ mic.



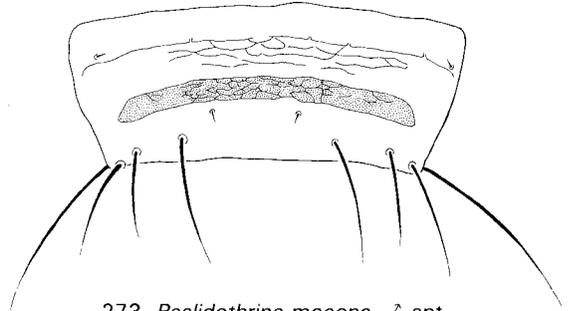
270. *Hoplothrips orientalis*, ♂ mic.



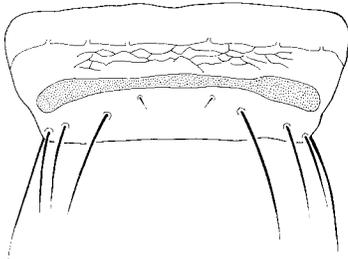
271. *Hoplothrips semicaecus*, ♂ apt.



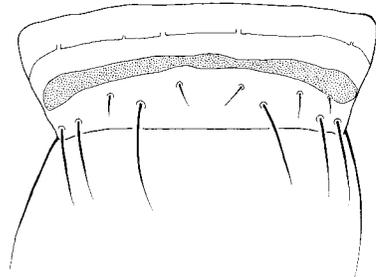
272. *Lissothrips dentatus*, ♂ apt.



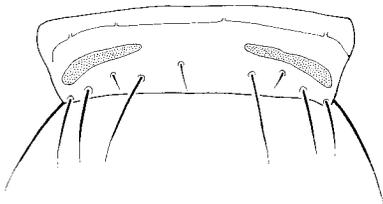
273. *Psalidothrips moeone*, ♂ apt.



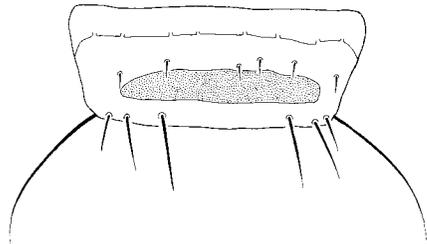
274. *Psalidothrips tane*, ♂ apt.



275a. *Psalidothrips taylori*, ♂ apt.

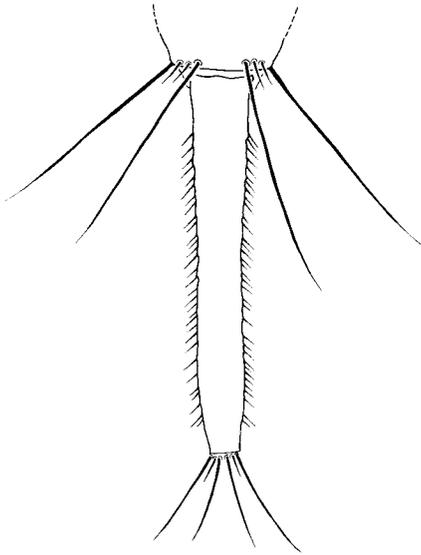


275b. same, variant

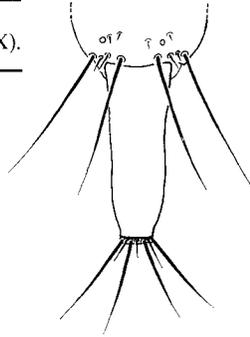


276. *Yarnkothrips kolourus*, ♂ mac.

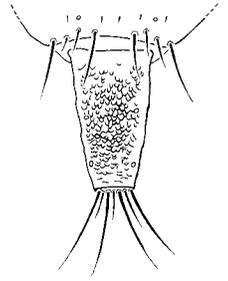
Figures 277–286 Tergite X, or tube (283 with T IX).



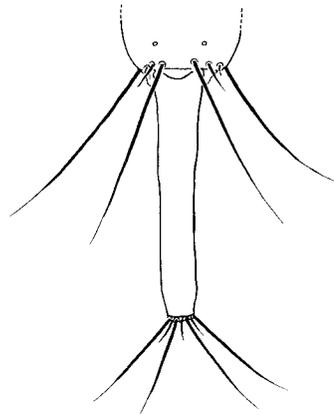
277. *Cleistothrips idolothripoides*, ♀



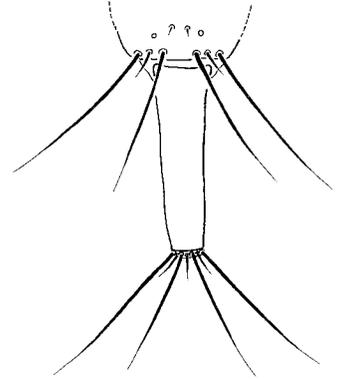
278. *Heptathrips cottieri*, ♀



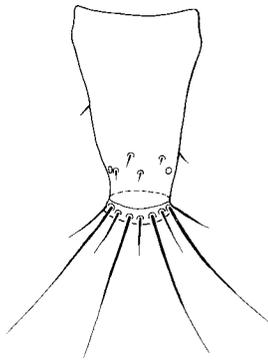
279. *Heptathrips cumberi*, ♀



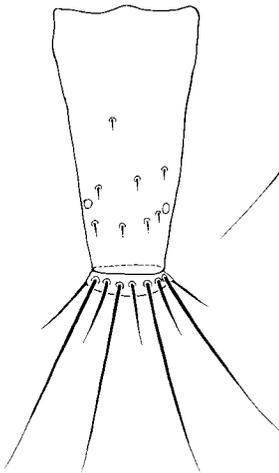
280. *Heptathrips tillyardi*, ♀



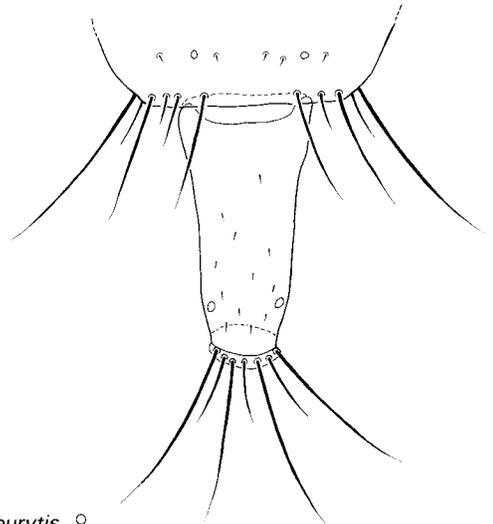
281. *Heptathrips tonnoiri*, ♀



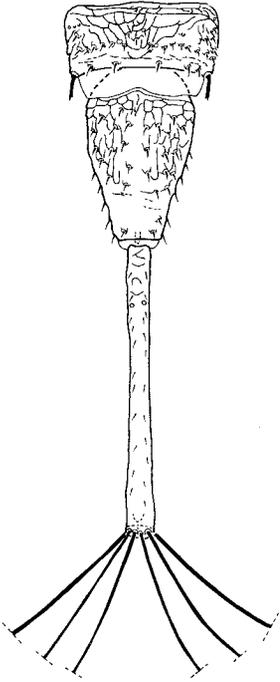
282a. *Nesothrips propinquus*, ♀



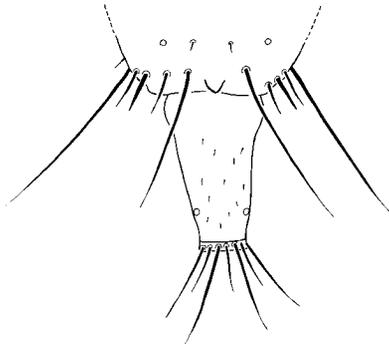
282b. same, variant



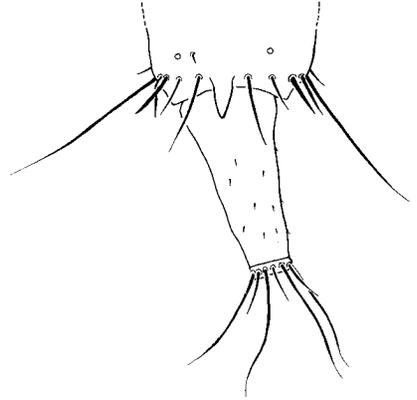
283. *Ozothrips eurytis*, ♀



284. *Baenothrips moundi*, ♀



285. *Sophiothrips aleurodisci*, ♂



286. *Sophiothrips duvali*, ♂

## TAXONOMIC INDEX

This is a composite index, covering both the Terebrantia (*Fauna of N.Z. no. 1*) and the Tubulifera (this contribution). For users' convenience, these two major groupings of thrips are listed separately, however.

All nominal taxa covered in the text are indexed, regardless of their current status in taxonomy. Page numbers with the suffix 'k' are those on which a taxon is keyed out. Page numbers in bold type indicate the start of major descriptive sections. Numbers in italic type are figure numbers.

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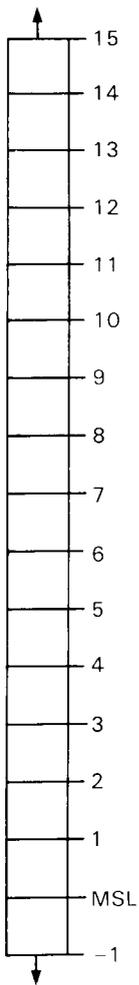
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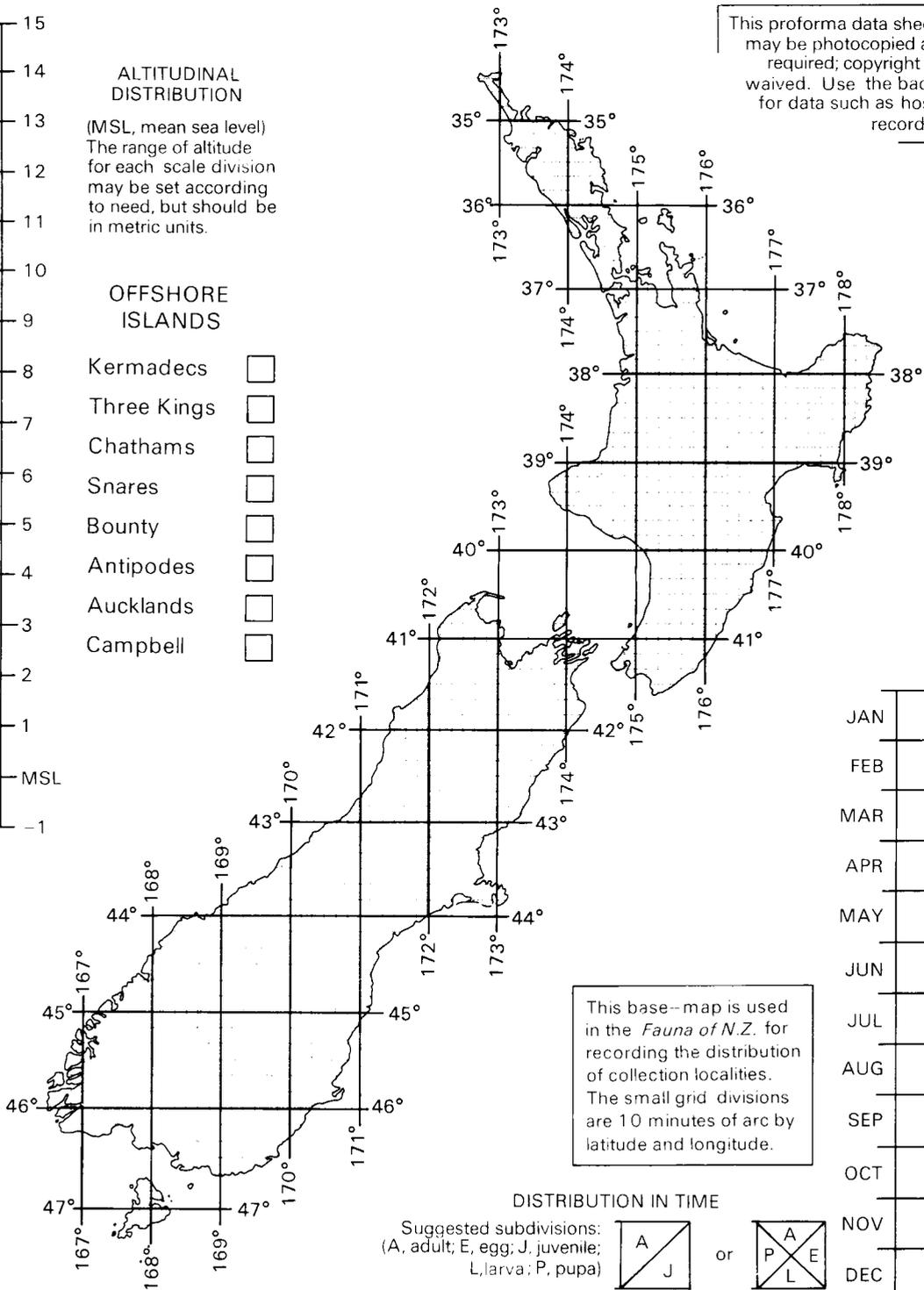
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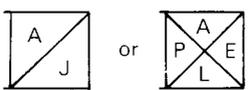


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# Fauna of New Zealand



Number 10

## Tubulifera (Insecta: Thysanoptera)

Laurence A. Mound  
& Annette K. Walker

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This series of refereed occasional publications has been established with two major objectives: to encourage those with expert knowledge of elements in the New Zealand fauna to publish concise yet comprehensive accounts; and to provide a means of identification accessible to the non-specialist. It will deal largely with non-marine invertebrates, since the vertebrates are well documented, and marine forms are covered by the series *Marine Fauna of New Zealand*.

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No. 1 Terebrantia (Insecta: Thysanoptera), by Laurence A. Mound & Annette K. Walker. ISBN 0-477-06687-9. Published 23 December 1982. Price NZ\$8.50 + 0.85 (OS 2.20).

No. 2 Osoriinae (Insecta: Coleoptera: Staphylinidae), by H. Pauline McColl. ISBN 0-477-06688-7. Published 23 December 1982. Second impression May 1983. Price NZ\$8.50 + 0.85 (OS 2.20).

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No. 10 Tubulifera (Insecta: Thysanoptera), by Laurence A. Mound & Annette K. Walker. ISBN 0-477-06784-0. Publication date and price to be announced.

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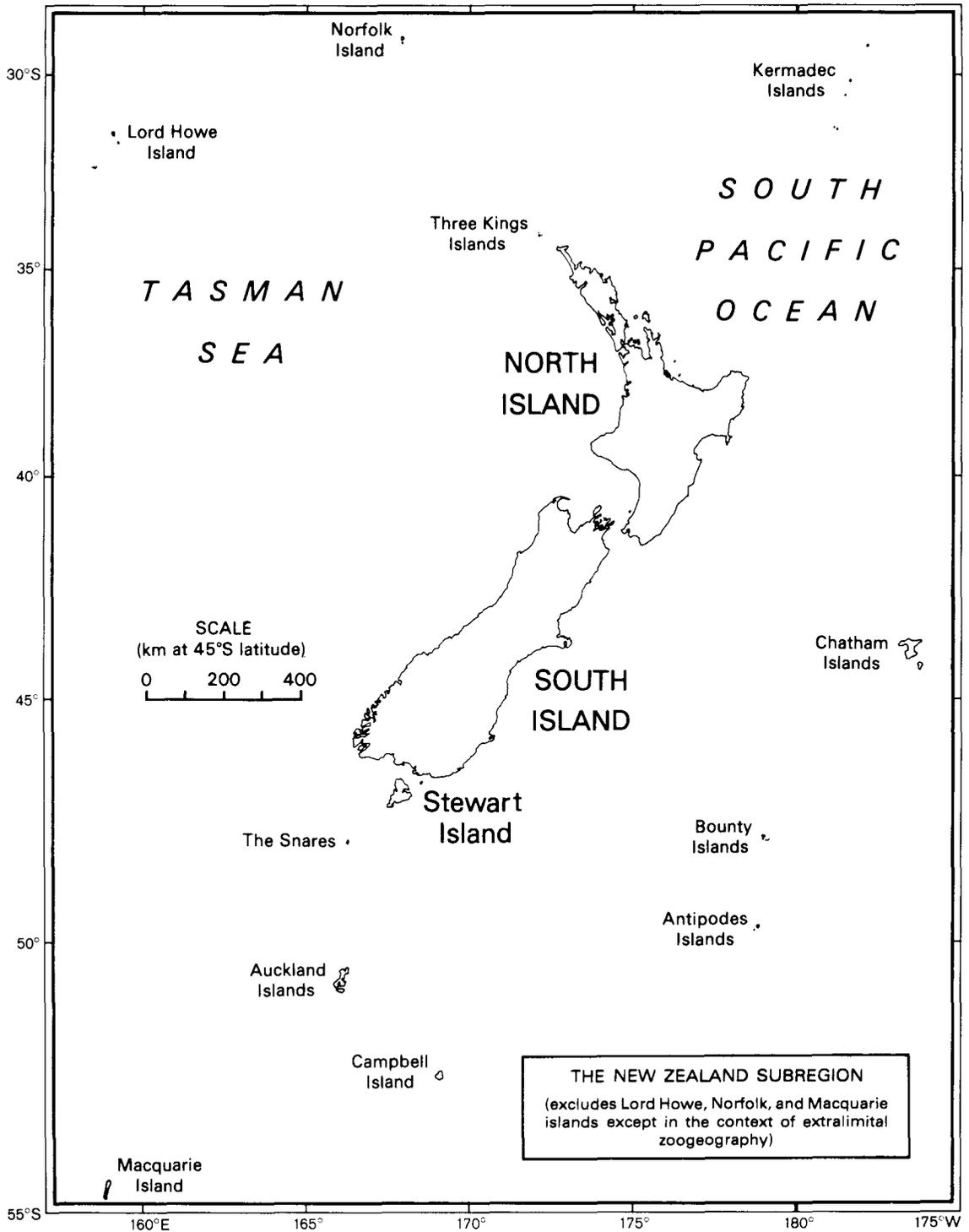
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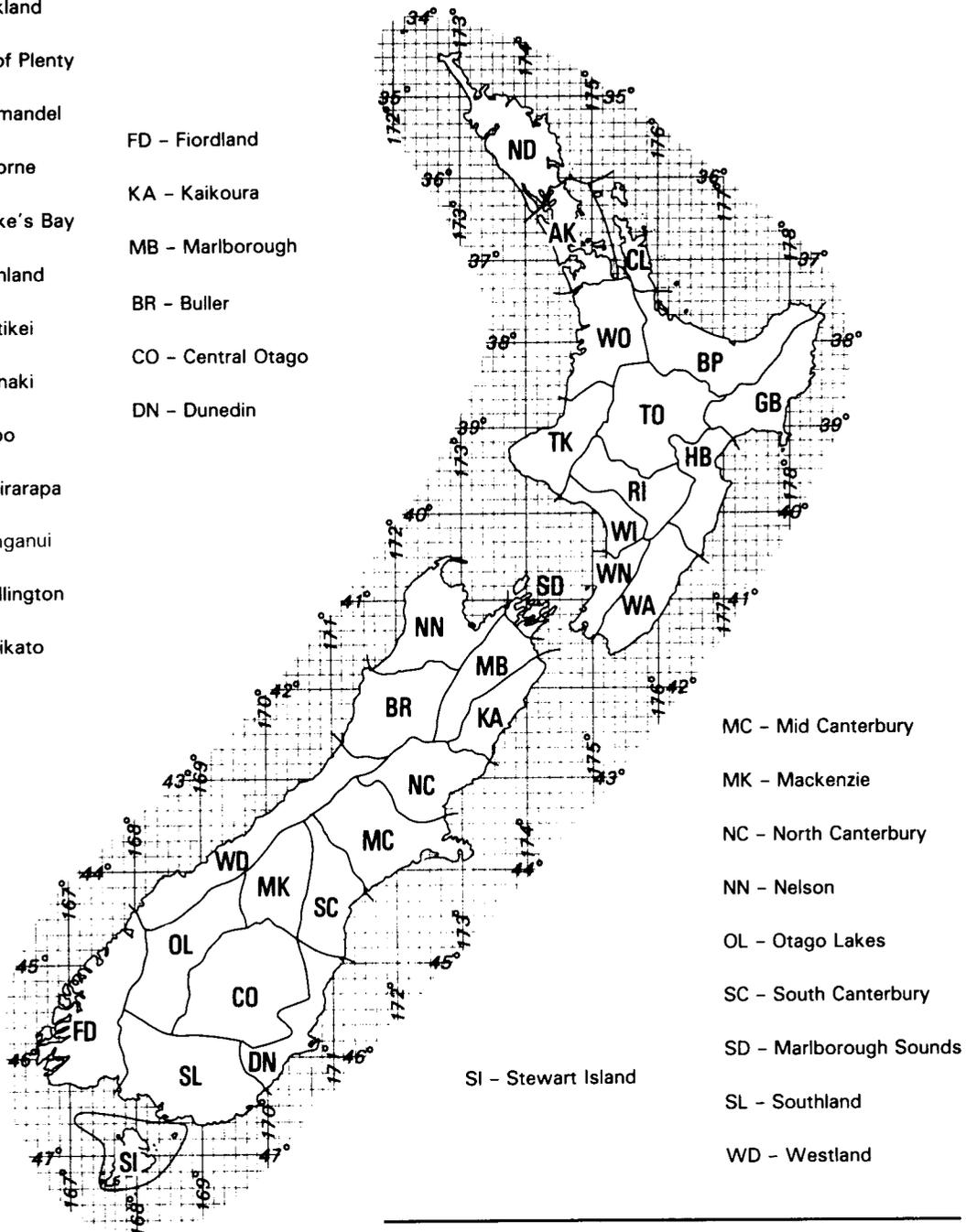
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