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Cryptostigmata
(Arachnida: Acari)
– a concise review

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Front cover: The mite depicted is *Ramsayellus grandis* (Hammer, 1967), recently recorded on kiwifruit

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ABSTRACT

Three hundred and sixty-six species of Cryptostigmata (= Oribatei or Oribatida) in 160 genera and 58 families are recorded from the New Zealand region. Four new families are proposed (Maorizetidae, Austrachipteriidae, Onychobatidae, Ramsayellidae), and six new genera are erected (*Baioppia*, *Campbelloppia*, *Nesoppia*, *Pra-voppia*, *Paraphysobates*, *Sicaxylobates*). Keys are provided to all species; these are supported by figures explaining morphology, habitus figures representing all genera, and notes on distribution, biogeography, morphology, and techniques.

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INTRODUCTION

The number of cryptostigmatid (= oribatid) species known from New Zealand has increased by more than 80% in the past 15–20 years, bringing the number to 366, distributed between 160 genera and 58 families. The list here presented (which includes records from Macquarie, Campbell, Auckland, and Chatham islands) is organised systematically, with keys to all species. The classification used is founded on that of Balogh (1972), with some alterations and additions. The higher classification follows that of Johnston (1982).

The first indigenous species to be described, *Crotonia obtecta*, was thought by its discoverer (Pickard-Cambridge 1875) to be a phalangid. Although the status of this species has been confirmed from the type specimen (Ramsay & Luxton 1967), no further records of it are known.

The next species to appear in the literature was '*Leiosoma longipilis*', described by Moniez (1894) from collections made in nests of an ant of the genus *Monomorium* by Smith (1895). This species was recorded in the lists of Lamb (1952) and Spain &

Luxton (1971) as *Liacarus longipilis*, because *Liacarus* is a senior synonym of *Leiosoma*. However, the species is quite impossible to identify adequately from Moniez's description, and it has accordingly been omitted from the present work. Hammer (1967), with some justification, suggested that it might be a species of *Pseudoceratoppia*, and in my view it is probably synonymous with *P. sexsetosa* Hammer. However, this cannot be confirmed unless Smith's specimens are located.

Michael (1908) described a few cryptostigmatid mites collected from New Zealand, but it was not until the second half of this century that study of the group in New Zealand began properly to develop. Several workers have been responsible (Dalenius, Luxton, Ramsay, Spain, Wallwork, Woolley), but Marie Hammer is truly the doyenne of the subject for New Zealand.

Cryptostigmatids are an ancient group of arachnids with an evolutionary history extending back at least to the lower Jurassic period (Hammer & Wallwork 1979, Wallwork 1979). It has been postulated that the cosmopolitan genera inhabited the supercontinent of Pangaea before its break-up. Those genera of the southern continents which are absent from the northern are thought to have evolved during the time when the southern continents were united as Gondwanaland (Hammer & Wallwork 1979, Wallwork 1979). The more localised cryptostigmatid distribution patterns are shown by those forms which have evolved since the land masses attained their present positions (Wallwork 1979), and especially in those locations which are geographically remote. This is clearly evident in New Zealand, where there is a high degree of generic and specific endemism (Hammer & Wallwork 1979). One-third of New Zealand's cryptostigmatid genera have not been reported from elsewhere (Hammer & Wallwork 1979), and 82% of the species are considered to be endemic (Hammer 1968).

The closest links appear to be with South America: 5.5% of the species are known only from these two regions, and 11% of their joint total cryptostigmatid faunas are held in common. Several of these genera have speciated in the subantarctic islands, which suggests the possibility of a previous faunal continuity between New Zealand and South America via Antarctica (Hammer 1968, Hammer & Wallwork 1979). New Zealand has few cryptostigmatid species in common with the islands of the Pacific or with Australia. This suggests that there has been little migration of cryptostigmatids to or from the nearer northern land masses through the agency of air currents or oceanic flotsam (Hammer 1982), or via a previous land connection. Some cryptostigmatids have undoubtedly been introduced to New Zealand through man's activities,

*See 'Checklist of taxa' and 'Taxonomic index' for page references to individual taxa.

although Hammer & Wallwork (1979) list only six possible introductions from Europe.

In New Zealand, mites are by far the most numerous arthropods in the soils of forests (McCull 1974, 1975) and grasslands (Manson 1959, McMillan 1969, Adams 1971, Luxton 1982b), and cryptostigmatids are usually the most abundant (McMillan 1969, Adams 1971, Luxton 1982b). Taxonomic difficulties have prevented the proper development of studies in cryptostigmatid community ecology, but pasture sites are reported to contain between 10 and 16 species (McMillan 1969, Adams 1971, Luxton 1982d, 1983b), and natural peat sites between 16 and 22 species (Luxton 1982c, 1983a). Study of cryptostigmatid mites in these grassland ecosystems should be an economic priority, since Ramsay (1966a) reported that 2–6% of the combined populations of two pasture species alone were infected with cysticercoids of the sheep tapeworm *Moniezia expansa*.

Cryptostigmatids also abound in the above-ground vegetation, the community in this zone largely differing from that of the soil layer. Spain & Harrison (1968) found 18 species associated with the foliage of *Olearia colensoi*, and Hammer (1967, 1968) recorded 10 species from tree foliage. Furthermore, although cryptostigmatids are air-breathing organisms they are not always strictly terrestrial. For example, in New Zealand 16 species have been recorded from a restiad peat substrate where the water table is always at or near the surface (Luxton 1982c), and 4 species have been described from the marine littoral zone living in algae and rock crevices, amongst barnacles, or in salt-marsh soil (Luxton 1967, 1984).

Cryptostigmata are the only group of mites in which diversity has been achieved in the absence of parasitism (Johnston 1982). Most species (panphytophages) feed on both microbes and the dead remains of higher plants, but some (macrophytophages) prefer to eat dead higher plant material alone, and others (microphytophages) subsist solely on a microbial diet. There have been only occasional reports of carnivory or herbivory.

Reproduction is frequently sexual, the females taking up stalked spermatophores placed by males on the substrate; but many species are parthenogenetic. There are 4 postembryonic developmental stages (1 larval, 3 nymphal) preceding the adult stage, and the juvenile stages are usually quite unlike the adult morphologically. Development times are modified by prevailing temperatures, but in the field are usually long (1 or more years from egg to adult). Each moult is prefaced by a pre-ecdysial resting stage during which the juvenile remains immobile for long periods; this may take up to one-third of

the total development time. Usually eggs are laid, but some cryptostigmatids are viviparous.

Cryptostigmatid mites are the most successful of all soil arthropods. They have achieved an astonishing diversity in New Zealand, and deserve to be more widely studied both for their own sake and for the importance of the role they play in soil formation and as vectors of parasites. This contribution is a first attempt at consolidating the literature, and I hope it may encourage further developments in the study of the marvellous mite fauna of this interesting region.

MORPHOLOGY

In dorsal view the body of a cryptostigmatid mite has two parts, the prodorsum and the notogaster. The prodorsum covers the propodosoma, and the notogaster covers the hysterosoma (Figure 1). The propodosoma may be folded on to the hysterosoma like the blade of a penknife, or articulated but not foldable, or immovably attached. The prodorsum and the notogaster are separated by the dorsosejugal suture, which sometimes is interrupted medially or is completely absent.

Dorsal surface (Figures 1, 4, and 6)

Prodorsum. This region bears 4 or 5 pairs of setae:

- (i) sensilli (*ss*)
- (ii) interlamellars (*in*)
- (iii) lamellars (*le*)
- (iv) rostrals (*ro*)
- (v) exobothridials (*ex*)

The sensilli are situated in an invagination, the bothridium (*bo*), which like the sensilli may sometimes be missing. The tip of the prodorsum is called the rostrum, and may bear teeth or incisions of taxonomic significance. Frequently, on each side of the prodorsum between the bothridium and the rostrum, there are thickened integumental extensions. If flat and raised above the prodorsum, or lamelliform and horizontally extended, they are known as lamellae (*la*) (Figures 8 and 9). If they are merely indistinct, rib-like ridges they are termed costulae. The lamellae are frequently connected by a translamella (*trs*), the costulae by a transcostula. The apex of a lamella is known as the cuspis (*cu*).

Notogaster (Figures 3, 5, and 7). In the higher cryptostigmatids the notogaster generally bears 10–14 pairs of setae, whereas in the more primitive forms it usually has 16 or more. Lee (1981, 1982) is in the process of homologising chaetotaxy, but currently 3 different notations are used, as follows.

(1) Primitive cryptostigmatids with approximately 16 pairs of setae (Figures 1 and 2). Setal notation is in the order of the transverse rows:

- row 1: *c1, c2, c3*
- row 2: *d1, d2, d3*
- row 3: *e1, e2*
- row 4: *f1, f2*
- row 5: *h1, h2, h3*
- row 6: *ps1, ps2, ps3*

(2) Higher cryptostigmatids with 14 or 15 pairs of setae (Figure 4). The homology of some of the setal rows is uncertain. The notation for rows 1, 5, and 6 is retained, but for the others letters indicating relative position are substituted (e.g., *d*, dorsal; *l*, lateral; *a*, anterior; *m*, median; *p*, posterior):

- row 1: *c1, c2, c3*
- anterior row: *da, la*
- median row: *dm, lm*
- posterior row: *dp, lp*
- row 5: *h1, h2, h3*
- row 6: *ps1, ps2, ps3*

(3) Higher cryptostigmatids with approximately 10 pairs of setae (Figure 6). The homology of the *ps* row is accepted, but other homologies are uncertain. Four setal groups are distinguished:

- group *t*: *ta, te, ti*
- group *ms*: *ms*
- group *r*: *r1, r2, r3*
- group *p*: *p1, p2, ps3*

In many cryptostigmatids there are other notogastral insertions which are important taxonomic features. Thus, the areae porosae are thinner sections of the notogastral integument which appear to be punctate. Where they are present, the following notation is used:

- areae porosae adalares: *Aa*
- areae porosae mesonoticae 1: *A1*
- 2: *A2*
- 3: *A3*

The dorsosejugal suture has a further pair of these structures, the areae porosae dorsosejugales (*Ad*). More rarely, there is a pair at the sides of the prodorsum (the areae porosae laterales: *Al*) and/or behind the anal plates (the areae porosae postanales: *App*).

The sacculi are small sacs below the cuticle with a minute opening to the surface. Their position and number correspond to those of the areae porosae, and their notation is *Sa, S1, S2, S3*. The pori are slit-like pores on the notogaster; their notation is prefaced by the letter 'i' (viz *ia, ip, ips, ih, im, iad* — Figures 1–3). The location of pori *iad* has taxonomic significance in some groups. If they are parallel with the edge of the anal plate they are said to be adanal in position, if obliquely inclined they are apoanal in position.

Sometimes the anterolateral edges of the notogaster are prolonged into a horizontal or ventrally

curved integumental lamella known as a pteromorph. This may be hinged and moveable, or fixed (or only partly hinged) and immoveable. In some species the anterior edge of the notogaster is also extended into a thin projection, like the eaves of a house, known as a tectum.

Chitinous teeth, ridges, or lines are sometimes to be found anterodorsally on the notogaster. These are collectively known as cristae.

Ventral surface (Figures 3, 5, and 7)

Epimeral region. Anteriorly, the infracapitulum and the camerostome contain the mouthparts. Posterolateral to these are the coxae of the legs, with the genital plates further posteromedially. The area delimited by the camerostome, the coxae, and the genital plates is known as the epimeral region, and is covered by 4 epimeral plates (= epimera): *ep1, ep2, ep3, ep4*. The epimeral plates are bordered by chitinous thickenings, the apodemata, of which there are 5: *apo1, apo2, aposj* (apodemata sejugales), *apo3, apo4*. Apodemata 3 are often absent as a consequence of the coalescing of *ep3* and *ep4*. Setae arising from the epimera are identified by numbers indicating the precise epimere, and by letters indicating location on the epimere. The epimeral setal formula frequently has important taxonomic value.

Projecting laterally from between the legs are appendages called tectopodia. These are described and located as follows:

- tutorium (*tu*): tectopodium 1, anterior to leg I
- pedotectum 1: tectopodium 2, posterior to leg I
- pedotectum 2: tectopodium 3, posterior to leg II
- discidium (*disc*): tectopodium 4, posterior to leg III

Genitoanal region. Posterior to the epimeral region is the genitoanal region. The genital and anal openings are usually protected by plates bearing setae, and may be closely adjacent or widely separated. Aggenital (*ag*) and adanal (*ad*) setae are frequently present.

TECHNIQUES

Collection. Many cryptostigmatids may be collected directly by using a fine, moistened artist's brush or a 'pooter'. Those inhabiting bark or rock crevices are readily gathered by this method, as are many of the larger forms in leaf litter. The technique is not adequate for the smaller mites or for those living cryptically in soil, litter, moss, or lichen. These must first be expelled from their habitat by exploiting their aversion to low humidity. The sample is placed on a sieve in a funnel, and an

USE OF THIS GUIDE

incandescent electric lamp is suspended above it as a source of heat. A collecting vessel containing, for instance, 50% ethyl alcohol is placed beneath the funnel opening to catch, kill, and temporarily preserve the animals as they emerge from their drying environment. Many modifications of this basic pattern of extractor have been devised, to allow for greater efficiency and/or for multiple sample extraction.

Preservation. Cryptostigmatids may be satisfactorily preserved in 70–80% ethanol. It is recommended that up to 5% of glycerol should be added as a safety measure so that the specimens do not dry out. Indeed, several workers have advocated the preservation of cryptostigmatids in pure glycerol or in ethylene glycol. Small glass vials with airtight caps are suitable for curation, and the smaller specimens may be contained in plugged Durham tubes inverted within the vials themselves. The most satisfactory plugs for the Durham tubes, where available, are small portions of botanical pith or dried bracket fungus (*Polyporus*) taken with a suitable cork borer.

Preparation for study. Cryptostigmatid mites are best studied in temporary preparations. The most suitable mounting and clearing medium is lactic acid used cold or warm and at 50–100% dilution, according to the degree of sclerotisation of the specimen. Individuals should ideally be transferred to a drop of lactic acid in a cavity slide, covered with a coverslip, and placed on a hotplate for gentle warming. Lactophenol is also a good clearing agent, especially for the more heavily sclerotised specimens.

Temporary preparations are not suitable for permanent storage. For this, several slide mounting media are available; the most widely used is de Faure's medium:

Distilled water	50 ml
Chloral hydrate	50 g
Glycerol	20 ml
Gum arabic or acacia	30 g

This medium is water-soluble, and the slide mount may be recovered by soaking in water. For permanent storage the coverslip should be ringed with Glyceel or with nail varnish. Cobb slides, in which the specimen is sandwiched between two coverslips held in an aluminium frame, are the most suitable for permanent mounts because the specimen may be viewed from two sides.

This review concerns adult cryptostigmatids only. Juvenile stages may readily be distinguished by the slit-like nature of their genital and anal openings, which have no true genital or anal plates. Furthermore, their cuticle is thin and unpigmented. Several of the primitive cryptostigmatids are also without pigment or anal or genital plates in the adult stage, but may be distinguished by their long, black setae, or by the presence of horizontal sutures on the notogaster.

Based as they are on adult stages, the keys are somewhat artificial, and are intended as an aid to identification rather than as an opinion on phylogeny. They represent a first attempt to bring order to the voluminous and scattered literature on the subject, and to stimulate further work on taxonomy and ecology of the New Zealand species. In the present fluid state of mite systematics it is inevitable that modifications will be made in the future. In particular, familial diagnoses are in need of revision (Johnston 1982), and this must be done on the basis of the world fauna. I have excluded diagnoses of nominal families for this very reason. Families, genera, and species should be readily identifiable by means of the keys provided, and for ease of rapid checking concise diagnoses of genera are given in the section 'Diagnoses, keys to species, and collection records'. Full diagnoses of species are not included in this review; the original literature must be consulted.

Collecting locations are recorded in the manner of Crosby *et al.* (1976).

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**KEYS TO THE CRYPTOSTIGMATA
KNOWN FROM NEW ZEALAND**

I. COHORTS*

- 01 Notogaster with 1-3 transverse sutures ... (p. 26) .. ENARTHRONOTA
— Notogaster without transverse sutures ... 2
- 02(01) Propodosoma able to close on hysterosoma like a penknife blade; body generally compressed laterally ... (p. 25) .. EUPTYCTIMA
— Not as above ... 3
- 03(02) Legs with 2 femora; notogaster not pigmented ... (p. 25) .. PALAEOSOMATA
— Legs with 1 femur; notogaster generally pigmented ... 4
- 04(03) Tibiae and genua of about uniform length and shape ... (p. 28) .. NOTHRONATA
— Genua reduced ... (p. 33) .. CIRCUMDEHISCENTIAE

II. SUPERFAMILIES, FAMILIES, AND GENERA†

A. PALAEOSOMATA

Represented by superfamily PALAEACAROIDEA:

- 01 No notogastral setae conspicuously more robust than others; prodorsal shield present ... (p. 25; Fig. 10) ..
ADELPHACARIDAE, *Aphelacarus*
— Some notogastral setae conspicuously more robust than others; prodorsal shield absent ... ACARONYCHIDAE .. 2
- 02(01) 'False lamella' absent from prodorsum; setae *c2* on separate paired sclerites ... (p. 25; Fig. 11) .. *Acaronychus*
— 'False lamella' present on prodorsum; setae *c1* and *c2* on a single median sclerite ... (p. 25; Fig. 12) .. *Stomacarus*

*The page numbers cited are for pick-up in the section 'Diagnoses, keys to species, and collection records', which follows the keys. The five cohorts are each keyed out to genus level below (IIA-E).

†New families and genera mentioned in these keys are indicated by a superscript dagger. They are formally proposed in the section 'Diagnoses, keys to species, and collection records', at the page indicated.

B. EUPTYCTIMA

- 01 Genital and anal plates wide; body not conspicuously compressed laterally ... PHTHRACAROIDEA, PHTHRACARIDAE ... 2
— Genital and anal plates narrow; body considerably compressed laterally ... EUPHTHRACAROIDEA ... 5
- 02(01) Anal plates with 7 pairs of setae ... (p. 26; Fig. 13) .. *Protophthiracarus*
— Anal plates with 5 pairs of setae ... 3
- 03(02) Three of the 5 pairs of setae on inner margins of anal plates ... (p. 26; Fig. 14) .. *Hoplophorella*
— Two pairs of setae on inner margins of anal plates ... 4
- 04(03) Interlamellar setae either minute or decumbent ... (p. 26; Fig. 15) .. *Phthiracarus*
— Interlamellar setae erect ... (p. 26; Fig. 16) .. *Notophthiracarus*
- 05(01) Anal and genital plates fused with ventral plate ... (p. 25; Fig. 17) ..
EUPHTHRACARIDAE, *Microtrititia*
— Anal and genital plates not fused with ventral plate ... ORIBOTRITHIDAE .. 6
- 06(05) Genital and ventral plates partly fused anteriorly ... (p. 25; Fig. 18) .. *Indotrititia*
— Genitoventral suture complete ... (p. 25; Fig. 19) .. *Mesotrititia*
- C. ENARTHRONOTA**
- 01 Notogaster with 3 sutures ... (p. 27; Fig. 20) .. COSMOCHTHONOIDEA, *Cosmochthonius*
— Notogaster with 2 sutures ... BRACHYCHTHONOIDEA, BRACHYCHTHONIIDAE ... 2
— Notogaster with 1 suture ... HYPOCHTHONOIDEA ... 3
- 02(01) Setae *d3* distant from notogastral margin; seta *p2* always lateral to *p1*; posterior part of hysterosoma without tubercles ... (p. 27; Fig. 21) .. *Liochthonius*
— Setae *d3* situated at notogastral margin; seta *p2* beneath *p1*; posterior part of hysterosoma with 2 tubercles ... (p. 26; Fig. 22) .. *Brachychochthonius*

- 03(01) An indistinct, medially interrupted groove between true suture and prodorsum ... (p. 27; Fig. 23) .. ENIOCHTHONIIDAE, *Hypochthoniella*
 — No such groove present ... (p. 27; Fig. 24) .. HYPOCHTHONIIDAE, *Hypochthonius*
- D. NOTHRONATA
- 01 Genital and anal plates separate; a semicircular, medially interrupted suture between genital and anal plates (diagastry) ... (p. 28; Fig. 25) .. NANHERMANNOIDEA, *Nanhermannia*
 — Genital and anal plates meeting or nearly meeting each other; diagastry absent ... 2
- 02(01) Genital and anal plates on separate ventral plate; hysterosoma rounded ... (p. 28; Fig. 26) .. HERMANNOIDEA, *Phyllhermannia*
 — Genital and anal plates occupying entire ventral side posterior to epimera; hysterosoma quadrangular or oval ... NOTHROIDEA ... 3
- 03(02) Aggenital setae numbering 2 pairs ... 4
 — Aggenital setae absent ... 5
- 04(03) Sensilli totally immersed in bothridia ... CROTONIIDAE ... 7
 — Sensilli not completely enclosed by bothridia ... CAMISHIDAE ... 9
- 05(03) Epimera neotrichous; only some of genital setae at inner margin of genital plate ... NOTHRIDAE ... 11
 — Epimera without neotrichy; genital setae conspicuously marginal ... 6
- 06(05) Bothridia present ... TRHYPOCHTHONIIDAE ... 12
 — Bothridia absent ... MALACONOTHRIDAE ... 13
- 07(04) Anal setae numbering 3 pairs; setae c2 absent ... (p. 29; Fig. 27) .. *Crotonia*
 — Anal setae numbering 2 pairs; setae c2 present ... 8
- 08(07) Epimera 3 and 4 divided by a longitudinal split ... (p. 29; Fig. 28) .. *Austronothrus*
 — Epimera 3 and 4 not divided longitudinally ... (p. 30; Fig. 29) .. *Holonothrus*
- 09(04) Anal setae numbering 3 pairs ... (p. 28; Fig. 30) .. *Camisia*
 — Anal setae numbering 2 pairs ... 10
- 10(09) Posteromarginal setae of notogaster arising from apophyses ... (p. 28; Fig. 31) .. *Heminothrus*
 — Posteromarginal setae not arising from apophyses ... (p. 29; Fig. 32) .. *Platynothrus*
- 11(05) Sensilli flagelliform; epimere 1 with 9 setae ... (p. 32; Fig. 33) .. *Novonothrus*
 — Sensilli filiform, setiform, or fusiform; epimere 1 with 5–7 setae ... (p. 32; Fig. 34) .. *Nothrus*
- 12(06) Anal setae numbering 1 pair ... (p. 33; Fig. 35) .. *Trhypochthonius*
 — Anal setae numbering 2 pairs ... (p. 33; Fig. 36) .. *Allonothrus*
- 13(06) Monodactylous ... 14
 — Tridactylous ... 15
- 14(13) Genital setae numbering 4–6 pairs; fewer than 2 pairs of anal setae ... (p. 31; Fig. 37) .. *Malaconothrus*
 — Genital setae numbering 18–20 pairs; anal setae 2 pairs ... (p. 33; Fig. 38) .. *Mucronothrus*
- 15(13) Notogastral setae numbering 13 pairs ... (p. 31; Fig. 1–3) .. *Trimalaconothrus*
 — Notogastral setae numbering 14 pairs ... 16
- 16(15) Genital setae numbering 5 or 6 pairs ... (p. 32; Fig. 39) .. *Zeanothrus*
 — Genital setae numbering 8 pairs ... (p. 31; Fig. 40) .. *Fossonothrus*
- E. CIRCUMDEHISCENTIAE
 This major cohort may readily be divided into two groups, as follows. Even these divisions are, however, so large as to require separate keys for the taxa at two hierarchical levels:
- 01 Notogaster without pteromorphae, areae porosae, or sacculi ... PYCNONOTICAE
 — Notogaster with pteromorphae, and/or areae porosae, and/or sacculi ... PORONOTICAE

SUPERFAMILIES OF PYCNONOTICAE

(key to families and genera, p. 19)

- 01 Prodorsum with true lamellae (lath-shaped, usually bearing lamellar seta on cusps) ... 2
 - Prodorsum without true lamellae (sometimes narrow costulae present, without a prominent cusps) ... 5
- 02(01) Notogaster smooth, rarely with fine reticulation, granulation, or foveolation, often dark but not thickened; tridactylous ... LIACAROIDEA
 - Notogaster with cerotegument and/or adherent debris, or with rough sculpturing (wrinkles, tubercles, reticulation); monodactylous or tridactylous ... 3
- 03(02) Notogaster below cerotegument and adhering debris smooth or punctate ... POLYPTEROZETOIDEA
 - Cerotegument and debris often slight or absent; notogaster with rough sculpturing (wrinkles, tubercles, reticulation) ... 4
- 04(03) Lamellae more or less convergent; notogaster circular, not longer than wide ... CEPHEOIDEA
 - Lamellae more or less parallel or hardly convergent; notogaster longer than wide ... CARABODOIDEA
- 05(01) Hysterosoma with a lateral tube ... HERMANNIELLOIDEA
 - Hysterosoma without a lateral tube ... 6
- 06(05) Genital setae numbering 3 pairs ... OTOCEPHEOIDEA
 - Genital setae exceeding 3 pairs ... 7
- 07(06) Legs long, with swollen, spherical joints; hysterosoma spherical, with notogastral setae in 2 longitudinal rows ... BELBOIDEA
 - Not as above ... 8
- 08(07) Genital plates with a transverse suture ... LIODOIDEA
 - Genital plates without a transverse suture ... 9
- 09(08) Sensilli reduced or absent ... 10
 - Sensilli normal ... 11
- 10(09) Notogastral setae numbering 16 pairs or more; monodactylous ... HYDROZETOIDEA
 - Notogastral setae numbering 15 pairs or fewer; usually tridactylous (*Fortuynia* is monodactyle) ... AMERONOTHROIDEA

- 11(09) Genital and anal plates relatively large, meeting or nearly meeting each other ... GYMNODAMAEOIDEA
 - Genital and anal plates widely separated ... 12
- 12(11) Ventral plate with 4 pairs of setae (1 pair aggenital, 3 pairs adanal); if more than 1 pair of aggenitals, then with only 4 pairs of genital setae (*Tripiloppia*) ... OPPIOIDEA
 - Ventral plate with more than 4 pairs of setae ... EREMULOIDEA

SUPERFAMILIES OF PORONOTICAE

(key to families and genera, p. 22)

- 01 Pteromorphae auriculate, extending both anteriorly and posteriorly ... GALUMNOIDEA
 - Pteromorphae not auriculate, or absent ... 2
- 02(01) Chelicerae thick basally, becoming attenuate apically, and bearing a small chela (peloptoid); interlamellar setae usually very large, leaf-shaped; body frequently covered with a thick cerotegument and with some fusiform dorsal setae ... PELOPOIDEA
 - Not as above ... 3
- 03(02) Minute species (less than 250 μm), with large lamellae; chelicerae with bacilliform appendages laterally ... MICROZETOIDEA
 - Larger than 250 μm ; no bacilliform appendages on chelicerae ... 4
- 04(03) Lamellae present or absent; if present, then notogaster with rough sculpture (wrinkles, tubercles, reticulation) ... PASSALOZETOIDEA
 - Lamellae present; integument without rough sculpture ... 5
- 05(04) Lamellae extremely wide, meeting or fusing medially and covering major portion of prodorsum ... ORIBATELLOIDEA
 - Lamellae either marginal strips or, if wider, not meeting medially but connected by a translamella ... 6
- 06(05) Lamellae narrowing anteriorly, almost always without a translamella or cusps; pteromorphae horizontal, hardly protruding from outline of hysterosoma, or absent ... ORIBATULOIDEA

- Lamellae usually not conspicuously narrowing anteriorly; cuspis almost always present, and translamella frequently so; pteromorphae well developed, directed downwards
... CERATOZETOIDEA

FAMILIES AND GENERA OF PYCNONOTICAE

(in alphabetical sequence of superfamilies)

AMERONOTHROIDEA

- 01 Monodactylous; with a complex system of tubes and canals (van der Hammen's organ) between bothridium and coxae ... (p. 34; Fig. 41) ..
... FORTUYNIIDAE, *Fortuynia*
- Tridactylous; van der Hammen's organ absent ... 2

- 02(01) Notogastral sculpturing a robust reticulation; sensilli with short stalks terminating in large globes ... CYBBAEREMAEIDAE ... 3
- Notogaster smooth or punctate; sensilli various, but stalk clearly emerging from bothridium ... PODACARIDAE ... 5

- 03(02) Interlamellar setae absent; notogastral setae somewhat thickened ... (p. 34; Fig. 42) .. *Scapheremaeus*
- Interlamellar setae present; notogastral setae small and thin ... 4

- 04(03) Notogastral setae numbering 15 pairs; genital setae numbering 5 pairs; dorsosejugal suture interrupted medially; no aggenital setae ... (p. 33; Fig. 43) .. *Capillibates*
- Notogastral setae numbering 12 pairs; genital setae numbering 6 pairs; dorsosejugal suture not interrupted medially; aggenital setae numbering 1 pair ... (p. 33; Fig. 44) .. *Bulleremaeus*

- 05(02) Dorsosejugal suture evenly curved anteriorly ... (p. 34; Fig. 45) .. *Alaskozetes*
- Dorsosejugal suture angulate anteriorly, or inconspicuous ... 6

- 06(05) Interlamellar setae minute or absent ... (p. 35; Fig. 46) .. *Podacarus*
- Interlamellar setae long ... (p. 34; Fig. 47) .. *Halozetes*

BELBOIDEA

Represented by the belbid genus *Metabelba* (p. 35; Fig. 48)

CARABODOIDEA

- 01 Genital setae numbering 4 pairs; lamellae not extending beyond rostrum; no translamella ... CARABODIDAE ... 2
- Genital setae numbering 6 pairs; lamellae extending beyond rostrum; translamella complete or incomplete ... (p. 36; Fig. 49) .. TECTOCEPHEIDAE, *Tectocephus*

- 02(01) Notogastral setae numbering 10 pairs ... (p. 36; Fig. 50) .. *Carabodes*
- Notogastral setae numbering 14 pairs ... (p. 36; Fig. 51) .. *Austrocarabodes*

CEPHEOIDEA

Represented by the tikizetid† genus *Tikizetes* (p. 37; Fig. 52)

EREMULOIDEA

- 01 Dorsosejugal suture straight; sensilli flagelliform ... (p. 37; Fig. 53) .. EREMULIDAE, *Eremulus*
- Dorsosejugal suture curved; sensilli swollen apically ... (p. 37; Fig. 54) .. DAMAEOLIDAE, *Fosseremus*

GYMNODAMAEOIDEA

Represented by family PLATEREMAEIDAE:

- 01 Lamellar setae originating marginally; notogaster foveolate ... (p. 38; Fig. 55) .. *Pedrocortesia*
- Lamellar setae originating dorsally; notogaster reticulate ... (p. 39; Fig. 56) .. *Pedrocortesella*

HERMANNIELLOIDEA

Represented by the hermanniellid genus *Hermaniella* (p. 38; Fig. 57)

HYDROZETOIDEA

Represented by the hydrozetid genus *Hydrozetes* (p. 39; Fig. 58)

LIACAROIDEA

- 01 Monodactylous; adanal setae numbering 2 pairs.. (p. 39; Fig. 59) .. ASTEGISTIDAE, *Cultroribula*
- Tridactylous; adanal setae numbering 3 pairs ... 2
- 02(01) Notogastral setae absent; genital and anal plates touching ... (p. 39; Fig. 60) .. MAORIZETIDAE†, *Maorizetes*
- Notogastral setae present; genital and anal plates separate ... 3

- 03(02) Notogastral setae numbering 12 pairs ... (p. 39; Fig. 61) .. ADHAESOZETIDAE, *Adhaesozetes*
 — Notogastral setae numbering 10 pairs or fewer ... METRIOPIIDAE .. 4
- 04(03) Translamella absent ... (p. 39; Fig. 62) .. *Pseudoceratoppia*
 — Translamella present ... (p. 39; Fig. 63) .. *Macquarioppia*
- LIODOIDEA
 Represented by the liodid genus *Liodes* (p. 40; Fig. 64)
- OPPIOIDEA
- 01 Chelicerae needle-like ... SUCTOBELBIDAE .. 4
 — Chelicerae robustly chelate ... 2
- 02(01) Tridactylous; prodorsum bearing large, paired spines ... (p. 52; Fig. 65) .. TUPAREZETIDAE, *Tuparezetes*
 — Monodactylous; prodorsum without large, paired spines ... 3
- 03(02) Costulae long; cristae well developed ... (p. 40; Fig. 66) .. AUTOGNETIDAE, *Austrogneta*
 — Costulae and cristae various, but rarely well developed together; if well developed together, then either the costulae (*Quadroppia*) or the cristae (*Belloppia*) connected anteriorly by a chitinous bridge ... OPPIIDAE .. 6
- 04(01) Dorsosejugal suture with an unpaired tubercle medially ... (p. 51; Fig. 67) .. *Suctobelbida*
 — Dorsosejugal suture with no medial tubercles, or with more than one ... 5
- 05(04) Distal joints of pedipalps drawn out into bifurcate threads; at most 1 pair of rostral teeth ... (p. 51; Fig. 68) .. *Zeasuctobelba*
 — Distal joints of pedipalps without bifurcate threads; more than 1 pair of rostral teeth ... (p. 51; Fig. 69) .. *Suctobelba*
- 06(03) Genital setae numbering 4 pairs ... 7
 — Genital setae numbering 5 pairs ... 16
 — Genital setae numbering 6 pairs ... 28
- 07(06) Prodorsum with costulae ... 8
 — Prodorsum without costulae ... 15
- 08(07) Setae *ta* present ... 9
 — Setae *ta* absent ... 13
- 09(08) Rostrum tripartite; aggenital setae numbering 3 pairs ... (p. 50; Fig. 70) .. *Tripiloppia*
 — Rostrum entire; aggenital setae numbering 1 pair ... 10
- 10(09) Sensilli bacilliform or setiform; all femora with broad laminae ... (p. 43; Fig. 71) .. *Laminoppia*
 — Sensilli lanceolate or fusiform; femora without laminae ... 11
- 11(10) Sensilli lanceolate; femora with a process bearing a solenidion ... (p. 49; Fig. 72) .. *Processoppia*
 — Sensilli fusiform; femora without a process ... 12
- 12(11) Sensilli ciliate; pori *iad* oblique, in apoanal position ... (p. 50; Fig. 73) .. *Solenoppia*
 — Sensilli smooth, membranous; pori *iad* anterolateral to anal field ... (p. 42; Fig. 74) .. *Campbelloppia*†
- 13(08) Bothridia closed with opercula ... (p. 40; Fig. 75) .. *Acutoppia*
 — Bothridia without opercula ... 14
- 14(13) Sensilli setiform, smooth ... (p. 49; Fig. 76) .. *Rhaphoppia*
 — Sensilli fusiform, unilaterally ciliate ... (p. 43; Fig. 77) .. *Gressittoppia*
- 15(07) Tibiae I each with a long process bearing a solenidion; bothridia without opercula ... (p. 48; Fig. 78) .. *Paroppia*
 — Tibiae I without long processes; bothridia with opercula ... (p. 47; Fig. 79) .. *Operculoppia*
- 16(06) Pori *iad* oblique, in apoanal position ... 17
 — Pori *iad* parallel with edge of anal plates, in adanal position ... 20
- 17(16) Notogaster with 12–13 pairs of setae ... (p. 48; Fig. 80) .. *Polyoppia*
 — Notogaster with fewer than 12 pairs of setae ... 18
- 18(17) Prodorsum elongate, with very short setae; epimera 3 and 4 extremely elongate ... (p. 50; Fig. 81) .. *Trizetes*
 — Not as above ... 19

- 19(18) Sensilli fusiform, ciliate
 ... (p. 48; Fig. 82) .. *Oxyoppia*
 — Sensilli pectinate or radiate
 ... (p. 42; Fig. 83) .. *Brachioppiella*
- 20(16) Epimeral setae extremely long,
 directed inwards
 ... (p. 46; Fig. 84) .. *Machuella*
- 21(20) Cristae strongly developed, extending
 posteriorly for one-third to two-thirds
 of notogastral length
 ... (p. 49; Fig. 85) .. *Quadroppia*
 — Cristae weakly developed, or absent ... 22
- 22(21) Interlamellar setae and setae *ta* much
 longer than other setae; lamellar setae
 absent ... (p. 47; Fig. 86) .. *Miropia*
 — Interlamellar setae and setae *ta* sub-
 equal to other dorsal setae or only
 slightly longer; lamellar setae present
 ... 23
- 23(22) Rostral setae geniculate
 ... (p. 49; Fig. 87) .. *Ramusella*
 — Rostral setae not geniculate ... 24
- 24(23) Sensilli setiform, long, with long cilia
 ... (p. 49; Fig. 88) .. *Ptiloppia*
 — Sensilli bacilliform, fusiform, or
 capitate ... 25
- 25(24) Prodorsum with costulae ... 26
 — Prodorsum without costulae ... 27
- 26(25) Sensilli capitate, smooth; dorsosejugal
 suture with a strongly developed,
 anteriorly projecting medial ridge
 ... (p. 42; Fig. 89) .. *Belloppia*
 — Sensilli otherwise; dorsosejugal suture
 without anteriorly projecting medial
 ridge ... (p. 48; Fig. 90) .. *Oppiella*
- 27(25) Setae *ta* absent; sensilli pectinate, or
 fusiform and unilaterally ciliate
 ... (p. 43; Fig. 91) .. *Insculptoppia*
 — Setae *ta* present; sensilli short,
 capitate ... (p. 47; Fig. 92) .. *Micropia*
- 28(06) Pori *iad* parallel with lateral edge of
 anal plates, in adanal position ... 29
 — Pori *iad* oblique, in apoanal position
 ... 31
- 29(28) Interlamellar setae absent
 ... (p. 41; Fig. 93) .. *Amerioppia*
 — Interlamellar setae present, or repre-
 sented by alveoli ... 30
- 30(29) Sensilli fusiform, unilaterally ciliate
 ... (p. 48; Fig. 94) .. *Pletzenoppia*
 — Sensilli radiate, with 2 or 3 distal
 branches ... (p. 41; Fig. 95) .. *Arcoppia*
- 31(28) Sensilli ciliate ... 32
 — Sensilli not ciliate, at most aciculate
 ... 33
- 32(31) Sensilli unilaterally ciliate
 ... (p. 41; Fig. 96) .. *Austroppia*
 — Sensilli bilaterally ciliate
 ... (p. 49; Fig. 97) .. *Setuloppia*
- 33(31) Sensilli capitate ... 34
 — Sensilli otherwise ... 37
- 34(33) Bothridia covered with a narrow rib-
 bon of membrane
 ... (p. 47; Fig. 98) .. *Membranoppia*
 — Bothridia without narrow ribbon of
 membrane ... 35
- 35(34) Costulae and transcostula absent or
 reduced ... (p. 43; Fig. 99) .. *Globoppia*
 — Costulae and transcostula distinct ... 36
- 36(35) Transcostula discontinuous; inter-
 lamellar region with transverse ridges
 ... (p. 48; Fig. 100) .. *Pravoppia*†
 — NOT as above
 ... (p. 47; Fig. 101) .. *Nesoppia*†
- 37(33) Costulae and transcostula both con-
 spicuous together
 ... (p. 41; Fig. 102) .. *Baioppia*†
 — Costulae and transcostula not con-
 spicuous together ... 38
- 38(37) Rostrum with 2 membranous lobes at
 tip ... (p. 46; Fig. 103) .. *Loboppia*
 — Rostrum without membranous lobes
 at tip ... 39
- 39(38) Costulae conspicuous, straight, con-
 verging, and with lamellar setae at
 tips ... (p. 42; Fig. 104) .. *Convergoppia*
 — Costulae not converging, or absent ... 40
- 40(39) Small, chitinous hook behind proxi-
 mal part of femora II
 ... (p. 43; Fig. 105) .. *Hamoppia*
 — No hook behind proximal part of
 femora II
 ... (p. 44; Fig. 106) .. *Lanceoppia*

OTOCEPHEOIDEA
 Represented by family OTOCEPHEIDAE:

- 01 Notogastral setae numbering 10 pairs ... 2
 — Notogastral setae numbering more than 10 pairs ... 3
- 02(01) Notogastral setae clavate ... (p. 52; Fig. 107) .. *Clavazetes*
 — Notogastral setae simple ... (p. 53; Fig. 108) .. *Pseudotocephus*
- 03(01) Notogastral setae numbering 14 pairs ... (p. 52; Fig. 109) .. *Plenotocephus*
 — Notogastral setae numbering 12 pairs ... (p. 52; Fig. 110) .. *Neotocephus*
- POLYPTEROZETOIDEA**
- 01 Sensilli with terminal villi more or less well developed; longitudinal ridges or lines at dorsosejugal region; adanal setae numbering 2 pairs ... **TUMEROZETIDAE** .. 2
 — Sensilli various; no longitudinal ridges or lines at dorsosejugal region; adanal setae numbering 3 pairs ... **EUTEGAEIDAE** .. 3
- 02(01) Genital setae numbering 6 pairs; notogastral setae numbering 10 pairs ... (p. 55; Fig. 111) .. *Tumerozetes*
 — Genital setae numbering 4 pairs; notogastral setae usually absent, but anyway fewer than 10 pairs ... (p. 55; Fig. 112) .. *Topalia*
- 03(01) Genital setae numbering 4 pairs ... (p. 55; Fig. 113) .. *Nodocephus*
 — Genital setae numbering 5 or 6 pairs ... 4
- 04(03) Humeral processes long, pointed, directed forwards in parallel with lamellae ... 5
 — Humeral processes short, blunt ... 7
- 05(04) Rostral and interlamellar setae absent ... (p. 55; Fig. 114) .. *Pterozetes*
 — Rostral and interlamellar setae present ... 6
- 06(05) Lamellar cuspis with 2 teeth ... (p. 54; Fig. 115) .. *Eutegaeus*
 — Lamellar cuspis with at most a single, long, incurved tooth ... (p. 54; Fig. 116) .. *Neseutegaeus*
- 07(04) Notogastral and interlamellar setae robust; chelicerae needle-like ... (p. 53; Fig. 117) .. *Bornebuschia*
- Notogastral and interlamellar setae short; chelicerae robustly chelate ... (p. 53; Fig. 118) .. *Compactozetes*
- N.B. *Pareutegaeus* was erroneously included in the New Zealand fauna by Spain & Luxton (1971).
- FAMILIES AND GENERA OF PORONOTICAE**
 (in alphabetical sequence of superfamilies)
- CERATOZETOIDEA**
- 01 Pteromorphae completely or partially hinged; always with a translamella ... 2
 — Pteromorphae not hinged; with or without a translamella ... 3
- 02(01) Notogaster without areae porosae or sacculi ... (p. 60; Fig. 119) .. **RAMSAYELLIDAE**†, *Ramsayellus*
 — Notogaster with areae porosae ... **MYCOBATIDAE** .. 6
- 03(01) Translamella absent ... (p. 58; Fig. 120) .. **CHAMOBATIDAE**, *Pedunculozetes*
 — Translamella developed to a greater or lesser degree ... 4
- 04(03) Lamellae large and covering much of prodorsum; teeth of cuspis more or less well developed ... (p. 56; Fig. 121) .. **AUSTRACHIPTERIIDAE**†, *Austrachipteria*
 — Not as above ... 5
- 05(04) Translamella represented by a chitinous scale; heterodactylous ... (p. 60; Fig. 122) .. **ONYCHOBATIDAE**†, *Onychobates*
 — Translamella partial or complete; tri-dactylous or monodactylous ... **CERATOZETIDAE** .. 11
- 06(02) Monodactylous ... 7
 — Tridactylous ... 8
- 07(06) Notogastral setae numbering 9 pairs; genital setae numbering 5 pairs ... (p. 59; Fig. 123) .. *Mycozetes*
 — Notogastral setae numbering 10 pairs; genital setae numbering 3 pairs ... (p. 59; Fig. 124) .. *Cryptobothria*
- 08(06) Notogaster with a well developed tectum on anterior border ... 9
 — Notogaster without tectum ... 10
- 09(08) Tectum strongly projecting anteriorly; pteromorphae not striate, completely hinged ... (p. 60; Fig. 8, 9, and 125) .. *Punctoribates*

- Tectum not projecting anteriorly; pteromorphae striate, incompletely hinged
... (p. 59; Fig. 126) .. *Neomycobates*
- 10(08) Translamella only intermittently present
... (p. 59; Fig. 127) .. *Baloghobates*
- Translamella continuous
... (p. 59; Fig. 128) .. *Antarctozetes*
- 11(05) Genital setae numbering 5 pairs
... (p. 57; Fig. 129) .. *Macrogena*
- Genital setae numbering 6 pairs ... 12
- 12(11) Tutoria extremely broad, covering sides of propodosoma
... (p. 58; Fig. 130) .. *Tutorozetes*
- Tutoria not as above ... 13
- 13(12) Rostrum tripartite
... (p. 58; Fig. 131) .. *Magellozetes*
- Rostrum rounded or truncate ... 14
- 14(13) Translamella a faint line; cuspis not prominent
... (p. 57; Fig. 132) .. *Edwardzetes*
- Translamella, or translamellar remnant, well defined; cuspis prominent
... 15
- 15(14) Sejugal apodemes forming a transverse ridge; no dark, curved ridge anterior to genital region
... (p. 57; Fig. 133) .. *Ceratozetes*
- Sejugal apodemes not forming a transverse ridge; a dark, curved ridge anterior to genital region
... (p. 58; Fig. 134) .. *Parafurcobates*

GALUMNOIDEA

- 01 Prodorsum with true, projecting lamellae ... PARAKALUMMIDAE .. 2
- Prodorsum lacking true, projecting lamellae, at most with chitinous lines on surface of prodorsum
... GALUMNIDAE .. 3
- 02(01) Notogaster with 4 pairs of well developed areae porosae
... (p. 62; Fig. 135) .. *Porokalumma*
- Notogaster with 4 pairs of sacculi
... (p. 61; Fig. 136) .. *Neoribates*
- 03(01) Prodorsum with 2 pairs of chitinous lines on surface ... 4
- Prodorsum with 1 pair of chitinous lines on surface ... 5

- 04(03) One lamellar seta situated between each pair of chitinous lines
... (p. 61; Fig. 137) .. *Galumna*
- Lamellar setae not situated between chitinous lines, but more medially on prodorsum
... (p. 61; Fig. 138) .. *Pergalumna*
- 05(03) Notogaster with 1 median pore
... (p. 61; Fig. 139) .. *Allogalumna*
- Notogaster without a median pore (females) or with several in a group (males)
... (p. 60; Fig. 140) .. *Acrogalumna*

MICROZETOIDEA

Represented by the microzetid genus *Cuspitiegula* (p. 62; Fig. 141)

ORIBATELLOIDEA

- 01 Lamellae entirely fused in middle, forming a single large scale almost wholly covering prodorsum
... (p. 62; Fig. 142) .. TEGORIBATIDAE, *Paraphysobates*†
- Lamellae meeting only in median line, or fusing only basally ... (p. 62; Fig. 143) .. ORIBATELLIDAE, *Lamellobates*

ORIBATULOIDEA

- 01 Pteromorphae curving ventrally to a greater or lesser extent
... HAPLOZETIDAE .. 4
- Pteromorphae represented by horizontal projections, or absent ... 2
- 02(01) Notogaster with sacculi
... SCHELORIBATIDAE .. 11
- Notogaster with areae porosae ... 3
- 03(02) Notogastral setae numbering more than 30 pairs ... (p. 64; Fig. 144) .. NEOTRICHOZETIDAE, *Neotrichozetes*
- Notogastral setae numbering fewer than 15 pairs ... ORIBATULIDAE .. 16
- 04(01) Genital setae numbering 3 pairs ... 5
- Genital setae numbering 4–6 pairs ... 6
- 05(04) All setae minute
... (p. 62; Fig. 145) .. *Angullozetes*
- All setae conspicuous
... (p. 63; Fig. 146) .. *Totobates*
- 06(04) Notogaster with 14 pairs of setae ... 7
- Notogaster with fewer than 14 pairs of setae ... 8

- 07(06) Genital setae numbering 5 pairs; tridactylous ... (p. 63; Fig. 147) .. *Peloribates*
 — Genital setae numbering 6 pairs; monodactylous ... (p. 63; Fig. 148) .. *Rostrozetes*
- 08(06) Notogaster with sacculi ... 9
 — Notogaster with areae porosae ... 10
- 09(08) Setae of prodorsum and notogaster frequently accompanied by a pore ... (p. 62; Fig. 149) .. *Lauritzenia*
 — Setae of prodorsum and notogaster lacking adjacent pore ... (p. 63; Fig. 150) .. *Magnobates*
- 10(08) Tridactylous; femora I and II and tarsi I–III bearing broad, branched setae ... (p. 63; Fig. 151) .. *Sicaxylobates*†
 — Monodactylous; without broad, branched setae on legs ... (p. 63; Fig. 152) .. *Xylobates*
- 11(02) Monodactylous; aggenital setae absent ... 12
 — Tridactylous; aggenital setae numbering 1 pair ... 13
- 12(11) Notogastral setae numbering 10 pairs; genital setae numbering 4 pairs; anal setae numbering 1 pair ... (p. 66; Fig. 153) .. *Campbellobates*
 — Notogastral setae numbering 9 pairs; genital setae numbering 3 pairs; anal setae numbering 2 pairs ... (p. 68; Fig. 154) .. *Zeaschelorbates*
- 13(11) Notogastral setae numbering 13 pairs ... (p. 68; Fig. 4 and 5) .. *Setobates*
 — Notogastral setae numbering 10 pairs ... 14
- 14(13) Pteromorphae long and narrow, extending posteriorly at least to level of setae *ms* ... (p. 67; Fig. 155) .. *Grandjeanobates*
 — Pteromorphae triangular, not extending to setae *ms*, at most to level of pore *im* ... 15
- 15(14) Hysterosoma narrow, elongate; sensilli with heads disc-shaped ... (p. 67; Fig. 156) .. *Incabates*
 — Hysterosoma broadly oval; sensilli fusiform or lanceolate ... (p. 67; Fig. 157) .. *Schelorbates*
- 16(03) Genital setae numbering 2 pairs ... (p. 65; Fig. 158) .. *Ingella*
 — Genital setae numbering 3 pairs ... (p. 65; Fig. 6 and 7) .. *Maculobates*
 — Genital setae numbering 4 pairs ... 17
 — Genital setae numbering 6 pairs ... 18
- 17(16) Monodactylous; notogastral setae numbering 10 pairs; translamella absent ... (p. 65; Fig. 159) .. *Liebstadia*
 — Tridactylous; notogastral setae numbering 13 pairs; translamella present ... (p. 66; Fig. 160) .. *Zygoribatula*
- 18(16) Notogaster with a single conical projection posteriorly ... (p. 66; Fig. 161) .. *Sellnickia*
 — Notogaster without a conical projection posteriorly ... (p. 65; Fig. 162) .. *Crassoribatula*
- PASSALOZETOIDEA
- 01 Genital setae numbering 6 pairs; lamellae with translamella ... (p. 69; Fig. 163) .. SCUTOVERTICIDAE, *Scutovertex*
 — Genital setae numbering 3 or 4 pairs; lamellae absent ... PASSALOZETIDAE ... 2
- 02(01) Genital setae numbering 3 pairs; costulae on prodorsum ... (p. 68; Fig. 164) .. *Paraphauloppia*
 — Genital setae numbering 4 pairs; no costulae on prodorsum ... (p. 68; Fig. 165) .. *Subphauloppia*
- PELOPOIDEA
 Represented by the pelopid genus *Nesopelops* (p. 69; Fig. 166)

—⑤—

DIAGNOSES, KEYS TO SPECIES,
AND COLLECTION RECORDS

Cohort PALAEOSOMATA
Superfamily PALAEACAROIDEA
Family ACARONYCHIDAE

Genus *Acaronychus* Grandjean, 1932: 421

Type-species *Acaronychus traegardhi* Grandjean, 1932.

Acaronychid mites lacking a prodorsal shield; setae *c2* on separate paired sclerites.

Recorded as genus only (Figure 11) from pasture on Taita hill soil, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).

WN / —.

Genus *Stomacarus* Grandjean, 1952: 360

Type-species *Stomacarus tristani* Grandjean, 1952.

Acaronychid mites with a conspicuous prodorsal shield bearing at least 1 seta; setae *c1* and *c2* on a single notogastral shield.

- 01 Sensilli expanded distally into fusiform heads ... 2
— Sensilli without expanded fusiform heads ... 3

- 02(01) Rostral setae longer than interlamellar setae; setae *e1* much longer than *e2* ... *watsoni*
— Rostral and interlamellar setae approximately equal in length; setae *e1* and *e2* approximately equal in length ... *campbellensis*

- 03(01) Rostral setae not barbed; interlamellar setae halfway up 'false lamella' ... (Fig. 12) .. *ligamentifer*
— Rostral setae barbed; interlamellar setae at base of 'false lamella' ... *cilius*

S. campbellensis (Wallwork, 1966) — moss, Beeman Hill, Campbell Island (Wallwork 1966).
— / — / Campbell I.

S. cilius Luxton, 1982 — fern peat soils, near Hamilton (Luxton 1982a, 1983a).
WO / —.

S. ligamentifer (Hammer, 1967) (Figure 12) — rather dry mosses under manuka, Waitakere Range; low plants under manuka in thermal area, Rotorua; thick moss and bone-dry lichens and *Lycopodium* in open manuka / *Nothofagus* forest, Lake Rotoiti; mosses and liverworts on dead branches and in dead leaves, Fox Glacier and Milford Sound; also at Waitomo and Lake Matheson (Hammer 1967).

AK, WO, BP / BR, WD, FD.

S. watsoni (Travé, 1964) — moss, wind-exposed rock above western beach, Wireless Hill, Macquarie Island (Travé 1964, Watson 1967).

— / — / Macquarie I.

REMARKS. I have accepted Lee's (1981) proposed synonymy of *Andacarus* with *Stomacarus*.

Family ADELPHACARIDAE

Genus *Aphelacarus* Grandjean, 1932: 412

Type-species *Parhypochthonius acarinus* Berlese, 1910.

Adelphacarid mites with short, arcuate, fusiform sensilli considerably shorter than prodorsum.

Recorded as (queried) genus only (Figure 10) from pastures on Taita hill soil and in Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).

WN / —.

Cohort EUPTYCTIMA

Superfamily EUPHTHIRACAROIDEA
Family EUPHTHIRACARIDAE

Genus *Microtritia* Märkel, 1964: 45

Type-species *Phthiracarus minimus* Berlese, 1904.

Euphthiracarid mites with both genital and anal plates fused with ventral plate; a single interlocking triangle between genital and anal plates; genital setae numbering 4 or 5 pairs; notogaster with 14 pairs of setae; trochanters III and IV each with 1 seta; monodactylous.

Recorded as genus only (Figure 17) from pasture on Akatarawa hill soil, Hutt Valley (Adams 1971).

WN / —.

Family ORIBOTRITIIDAE

Genus *Indotritia* Jacot, 1929: 213

Type-species *Tritia krakatauensis* Sellnick, 1923.

Oribotritiid mites with anal plates separated from ventral plate by a suture; genital plates partly fused with ventral plates anteriorly; notogaster with 14 pairs of setae; tridactylous.

I. aotearoana Ramsay, 1966 (Figure 18) — litter of halophytic scrub and mat plants, Little Brother Island, Cook Strait (Ramsay 1966b).

/ SD.

Genus *Mesotritia* Forsslund, 1963: 284

Type-species *Mesotritia testacea* Forsslund, 1963.

Oribotritiid mites with both anal and genital plates separated from ventral plate by suture; notogaster

with 14 pairs of setae; genital setae numbering 6 pairs; genua IV lacking solenidia; tridactylous.

Recorded as genus only (Figure 19) from pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).

WN / —.

Superfamily PHTHIRACAROIDEA

Family PHTHIRACARIDAE

Genus *Hoplophorella* Berlese, 1923: 260

Type-species *Hoplophora cucullatum* Ewing, 1909.

Phthiracarid mites with 5 pairs of setae on anal plates; anal setae (3 pairs) closely adjacent to each other on inner margins.

Recorded as genus only (Figure 14) from pohutukawa leaf litter near landing, *Histiopteris* leaf litter, rotten pohutukawa log, and wet pohutukawa leaf litter at top of forest, Ohauora, White Island (Wise 1970).

BP / —.

Genus *Notophthiracarus* Ramsay, 1966: 905

Type-species *Phthiracarus maculatus* Trägårdh, 1931.

Phthiracarid mites with erect interlamellar setae and 5 pairs of setae on anal plate, 2 pairs greatly reduced; notogaster with 15 pairs of setae; genital setae in a single row of 5 on each accessory plate and 4 on each genital plate (i.e., 9 in each file).

N. australis Ramsay, 1966 (Figure 16) — litter of halophytic scrub and mat plants, Little Brother Island, Cook Strait (Ramsay 1966b).

— / SD.

Genus *Phthiracarus* Perty, 1841: 874

Type-species *Hoplophora laevigata* Koch, 1841.

Phthiracarid mites with interlamellar setae minute or decumbent; anal plates each with 5 setae, 2 on inner margins.

P. pellucidus Ramsay, 1966 (Figure 15) — litter of halophytic scrub and mat plants, Little Brother Island, Cook Strait (Ramsay 1966b).

— / SD.

Genus *Protophthiracarus* Balogh, 1972: 43

Type-species *Notophthiracarus chilensis* Balogh & Mahunka, 1967.

Phthiracarid mites with erect interlamellar setae and 7 pairs of setae on anal plates, none reduced; notogaster with 21 pairs of setae; genital setae numbering 9 pairs, 7 on accessory plate and 2 on genital plate.

P. neutrichus (Wallwork, 1966) (Figure 13) — moss, Bee-man Hill, Campbell Island (Wallwork 1966).

— / — / Campbell I.

Cohort ENARTHRONOTA

Superfamily BRACHYCHTHONOIDEA

Family BRACHYCHTHONIIDAE

Genus *Brachychochthonius* Jacot, 1938: 130

Type-species *Brachychochthonius jugatus* Jacot, 1938.

Brachychthoniid mites with 3 free suprapleural plates; posterior edge of hysterosoma with 2 tubercles; seta *p*₂ posterior to seta *p*₁; aggenital plate present.

- 01 Sculptured areas of prodorsum not in a medially situated column between bothridia; interlamellar setae minute; laterally, on either side of posterior-most division of notogaster, a sculptured area containing 6 small pores on lateral edge
... (Figure 22) ... *novazealandicus*
— Five pairs of sculptured areas medially in a column between bothridia; interlamellar setae robust; posterolateral sculptured area without small pores on lateral edge ... *jugatus*

B. jugatus Jacot, 1938 — restiad and fern peat soils, and pasture soils on Kaipaki and Rukuhia peats, near Hamilton (Luxton 1982c,d, 1983a,b); lawn, Whakarewarewa, and luxuriant moss under manuka in thermal area, Rotorua (Hammer 1966); pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971); pasture soil, Nelson (Martin 1978).

WO, BP, WN / NN.

B. novazealandicus (Hammer, 1966) (Figure 22) — slightly moist moss on a slope with fern, Mirror Lake, Rotorua; dead leaves and thick moss in moist native forest, Fox Glacier (Hammer 1966).

BP / WD.

REMARKS. *B. jugatus* is recorded as the subspecies *suecica* Forsslund, 1942 by Hammer (1966), McMillan (1969), and Adams (1971). *B. novazealandicus* was originally described in the genus *Brachychthonius*.

Genus *Liochthonius* van der Hammen, 1959: 19

Type-species *Brachychthonius perpusillus* Berlese, 1910.

Brachychthoniid mites lacking suprapleural plates; hysterosoma not terminating in tubercles; seta *p*₂ lateral to *p*₁.

01 Prodorsum and notogaster lacking rounded patches of ornamentation (areoles) ... *saltaensis*
— Prodorsum and notogaster ornamented ... 2

02(01) All setae simple, none expanded ... *idem*
— Some or all prodorsal and notogastral setae expanded ... 3

03(02) Some setae simple; notogaster posterodorsally with a group of 8 areoles (4 large, 4 small) ... *altimonticola*
— All dorsal setae expanded ... 4

04(03) Notogastral setae expanded but with smooth edges; a group of areoles between setae *d*₁ ... *altus*
— Notogastral setae greatly expanded and with serrated edges; no areoles between setae *d*₁
... (Fig. 21) .. *fimbriatissimus*

L. altimonticola (Hammer, 1958) — dead leaves, Waitakere Range; moist *Selaginella* on tree trunk, New Plymouth; thick moss on rotten log, Lake Rotoiti; thin moss on vertical slope in shadow, Christchurch; thick, moist moss in *Nothofagus* forest, Milford Sound (Hammer 1966).
AK, TK / NN, MC, FD.

L. altus (Hammer, 1958) — thin layer of moist moss and small ferns under manuka in thermal area, Rotorua; moist moss on slope with ferns and tall trees, Mirror Lake, Rotorua; moist moss on a slope in *Nothofagus* forest, Upper Takaka; dead leaves in *Nothofagus* forest, Fox Glacier and Milford Sound (Hammer 1966).
BP / NN, WD, FD.

L. fimbriatissimus (Hammer, 1958) (Figure 21) — moist moss in *Nothofagus* forest, Lake Rotoiti (Hammer 1966).
— / BR.

L. idem Hammer, 1966 — thermal area, Rotorua (Hammer 1966).
BP / —.

L. saltaensis (Hammer, 1958) — lawn with thick moss, Forest Research Institute, Whakarewarewa; moist moss and small ferns on slope with tall trees, Mirror Lake, Rotorua (Hammer, 1966).
BP / —.

Superfamily COSMOCHTHONOIDEA

Family COSMOCHTHONIIDAE

Genus *Cosmochthonius* Berlese, 1910: 221

Type-species *Hypochthonius lanatus* Michael, 1887.

Cosmochthoniid mites with some notogastral setae long, stout, and ciliate; tarsi I bidactylous, tarsi II-IV bidactylous or tridactylous.

C. semiareolatus Hammer, 1966 (Figure 20) — moist to wet moss from a spring in *Nothofagus* forest, Lake Rotoiti (Hammer 1966).
— / BR.

Superfamily HYPOCHTHONOIDEA

Family ENIOCHTHONIIDAE

Genus *Hypochthoniella* Berlese, 1910: 218

Type-species *Hypochthonius minutissimus* Berlese, 1904.

Eniochthoniid mites with anterior of 2 transverse hysterosomal sutures interrupted medially.

H. minutissima (Berlese, 1904) (Figure 23) — dense, green, luxuriant carpet of low ferns and moss by brook in deep shadow, Kerikeri; liverwort and moss on dead tree trunk in native forest, Waitakere Range (Hammer 1966); fern peat soils, near Hamilton (Luxton 1983a); edge of spring in wet meadow grown with moss, grass, and watercress, etc., Pupu Springs (Hammer 1966).
ND, AK, WO / NN.

REMARKS. *H. minutissima* is recorded as *Eniochthonius minutissimus* (Berlese) by Hammer (1966).

Family HYPOCHTHONIIDAE

Genus *Hypochthonius* Koch, 1836: 3, 19

Type-species *Hypochthonius rufulus* Koch, 1836.

Hypochthoniid mites with a single, complete notogastral suture; notogaster yellowish or orange, somewhat flattened dorsoventrally; lateroabdominal gland absent.

H. luteus Oudemans, 1913 (Figure 24) — moist moss and grass under shrubs on outskirts of native forest, Waitakere Range (Hammer 1966); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971).
AK, WN / —.

Genus alone recorded from pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).
WN / —.

REMARKS. Hammer's (1966) record of *H. luteus* differs somewhat from the typical form in the patterning of the integument, the structure of the setae, and the sculpturing of the rostrum.

Cohort NOTHRONATA
Superfamily HERMANNOIDEA
Family HERMANNIIDAE

Genus *Phyllhermannia* Berlese, 1917: 65

Type-species *Hermannia phyllophora* Michael, 1908.

Hermanniid mites with expanded, flattened notogastral setae.

- 01 Leg setae flattened, leaf-like, delicately patterned
 ... (Fig. 26) .. *phyllophora*
 — Some leg setae perhaps somewhat expanded, but never leaf-like ... 2
- 02(01) Sensilli filiform, pointed at tip; lamellar setae foliate ... *rubra*
 — Sensilli expanded at tip; lamellar setae simple ... 3
- 03(02) Notogastral setae foliate and elongate ... *foliata*
 — Notogastral setae foliate and almost circular ... *mollis*

P. foliata Hammer, 1966 — moist grass, mosses, and lichens, Kerikeri; liverworts and mosses on dead tree trunk, and moist dead leaves, Waitakere Range; moist grass and dense mosses in native forest, New Plymouth (Hammer 1966).

ND, AK, TK / —.

P. mollis Hammer, 1966 — liverworts and mosses on dead tree trunk, native forest, Waitakere Range (Hammer 1966).

AK / —.

P. phyllophora (Michael, 1908) (Figure 26) — dead, wet kauri leaves, and mosses on the ground, Puketi; dead leaves and debris under trees, Kerikeri; dead leaves in deep shadow under trees, and thick moss in native forest, Waitomo; *Selaginella* and moss on tree trunk in native forest, New Plymouth (Hammer 1966); moss, Ruahine Range (Michael 1908).

ND, WO, TK, RI / —.

P. rubra Hammer, 1966 — luxuriant mosses on trunk of rimu tree, Puketi; dead, moist leaves under tree ferns, New Plymouth; dripping wet mosses, grass, and watercress at edge of spring, Pupu Springs; dead leaves, Lake Matheson (Hammer 1966).

ND, TK / NN, WD.

Superfamily NANHERMANNOIDEA
Family NANHERMANNIIDAE

Genus *Nanhermannia* Berlese, 1913: 100

Type-species *Nothrus nanus* Nicolet, 1855.

Nanhermanniid mites with long, simple notogastral setae; notogaster lacking apophyses; posteriorly prodorsum bearing a chitinous ridge with more or less well developed backward projections.

- 01 Sensilli with heads capitate, almost disc-shaped ... *tenuicoma*
 — Sensilli narrow, the heads not disc-shaped ... 2
- 02(01) Interlamellar setae longer than the distance separating them; rostrum not protruding ... *nana*
 — Interlamellar setae not longer than the distance separating them; rostrum protruding like a nose
 ... (Fig. 25) .. *acutisetosa*

N. acutisetosa Hammer, 1966 (Figure 25) — dead leaves and moist moss, Puketi and New Plymouth; dead leaves, Waitomo; moist moss and grass at foot of tree fern, Pauatahanui (Hammer 1966).

ND, WO, TK, WN / —.

N. nana (Nicolet, 1855) — restiad and fern peat soils, near Hamilton (Luxton 1982c, 1983a).

WO / —.

N. tenuicoma Hammer, 1966 — moist moss and grass in native forest, and moist moss beneath manuka, Waitakere Range; thick moss on log, Waitomo and Lake Rotoiti; moist moss beneath manuka, and moist moss, near Mirror Lake, Rotorua; edge of spring in meadow vegetation of moss, grass, watercress, etc., Pupu Springs; dense moss on small hillock in wet meadow, Lake Moke, Queenstown (Hammer 1966).

AK, WO, BP / NN, OL.

Superfamily NOTHROIDEA
Family CAMISIIDAE

Genus *Camisia* von Heyden, 1826: 612

Type-species *Notaspis segnis* Hermann, 1804.

Camisiid mites with margins of hysterosoma more or less parallel, posterior margin truncate; genital setae numbering 9 pairs, aggenital setae 2 pairs, anal setae 3 pairs, adanal setae 3 pairs.

C. segnis (Hermann, 1804) (Figure 30) — thermal area and dry moss, Rotorua, and leaves in understorey of redwood forest, Whakarewarewa (Hammer 1966).

BP / —.

REMARKS. The specimens recorded by Hammer (1966) are somewhat smaller than the typical form, and are described by Hammer as subspecies *nova*.

Genus *Heminothrus* Berlese, 1913: 98

Type-species *Nothrus targionii* Berlese, 1885.

Camisiid mites with median part of notogaster slightly concave; posteromarginal setae arising from apophyses; genital setae numbering 9–23 pairs, aggenital setae 2 pairs, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

- 01 Sensilli fusiform; notogastral setae long, *c1* extending to base of *d1* ... (Fig. 31) .. *microclava*
 — Sensilli rod-shaped, only slightly flattened at tip; notogastral setae short, *c1* not reaching *d1* ... *traversus*

H. microclava Hammer, 1966 (Figure 31) — soaked moss in a spring in *Nothofagus* forest, Lake Rotoiti (Hammer 1966).
 — / BR.

H. traversus Hammer, 1966 — moss and grass in native forest, Waitakere Range; dead leaves, Waitomo; moss and liverworts on slope, Lake Tarawera, Rotorua; moss and grass on lawn, and dead leaves on slope in native forest, New Plymouth; dead leaves in forest of (?) cypresses, and liverworts and moss in forest, Pauatahanui; low plants at roadside, Christchurch; oozing water on rock, Port Hills, Christchurch (Hammer 1966).
 AK, WO, BP, TK, WN / MC.

Genus *Platynothrus* Berlese, 1913: 99
 Type-species *Nothrus peltifer* Koch, 1839.

Camisiid mites with lateral margins of hysterosoma convex; posteromarginal setae never on apophyses; genital setae numbering 13–25 pairs, aggenital setae 2 pairs, anal setae 2 pairs, adanal setae 3 pairs.

- 01 Parallel ridges present between median rows of notogastral setae ... 2
 — No parallel ridges between medial rows of notogastral setae ... 3
- 02(01) Seta *d1* not reaching base of seta *d2*; length more than 1000 µm ... (Fig. 32) .. *major*
 — Seta *d1* reaching base of seta *d2*; length less than 1000 µm ... *peltifer*
- 03(01) Distance between *d1* setae subequal to distance between *c1* setae ... *tenuiclava*
 — Distance between *d1* setae appreciably less than distance between *c1* setae ... *skottsbergii*

P. major Hammer, 1966 (Fig. 32) — moss and dead leaves on slope in *Nothofagus* forest, Upper Takaka; moist moss and small ferns on rotten tree trunk in *Nothofagus* forest, Lake Rotoiti (Hammer 1966).
 — / NN, BR.

P. peltifer (Koch, 1839) — lawns, moist moss, stream and pond edges, and meadows at Kerikeri, Waitangi, Waitakere Range, Rotorua, New Plymouth, Pauatahanui, Christchurch, Fox Glacier, and Milford Sound (never found in forests) (Hammer 1966); Kaipaki and Rukuhia peat pastures, near Hamilton (Luxton 1982d, 1983b); pasture, Palmerston North (Manson 1959); pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971).

ND, AK, WO, BP, TK, WI, WN / MC, WD, FD, DN.

P. skottsbergii Trägårdh, 1931 — pasture on Akatarawa hill soil, Hutt Valley (Adams 1971).

WN / —.

P. tenuiclava Hammer, 1966 — wet moss on stone in brook, moss on ground, moss on tree trunk, moss and needles under fir, and moss at edge of swamp, Kerikeri; moss and grass in garden, Waitakere Range; liverworts and small plants in thermal area, and moss and grass on lawn, Rotorua; moss and grass on lawn, Nelson (Hammer 1966); *Coprosma* leaf litter, Ohauora, White Island (Wise 1970).

ND, AK, BP / NN.

Family CROTONIIDAE

Genus *Austronothrus* Hammer, 1966: 33

Type-species *Austronothrus curviseta* Hammer, 1966.

Crotoniid mites with propodosoma almost as long as hysterosoma; notogastral setae numbering 14 pairs; posterior edge of hysterosoma rounded and without apophyses; epimera 4 separated by a deep groove which also cuts midway between epimera 3.

A. curviseta Hammer, 1966 (Figure 28) — moss on ground in deep shadow near brook, Kerikeri; State Forest, Whakarewarewa; moss and grass on lawn in deep shadow, New Plymouth; on ground in forest, Palmerston North; 'Treelands', Himatangi (Hammer 1966).

ND, BP, TK, WI, WN / —.

Genus *Crotonia* Thorell, 1876: 454

Type-species *Westwoodia obtecta* Pickard-Cambridge, 1875.

Crotoniid mites bearing conspicuous, variously formed apophyses on posterior edge of hysterosoma; lamellar setae on long apophyses; notogaster with 10 pairs of setae; genital setae numbering 7–11 pairs, aggenital setae 2 pairs, anal setae 3 pairs, adanal setae 3 pairs; tridactylous.

- 01 Posterior apophyses arising from a conspicuous caudal extension ... 2
 — Posterior apophyses not arising from a conspicuous caudal extension ... 6

- 02(01) Posterior extension apparently double; dorsum of notogaster more or less demarcated from lateral field by a thinner strip of integument not extending posteriorly to seta *f*₂; setae *c*₁ and *c*₃ long, approximately equal in length; epimeral setal formula 3-1-4-2 ... *cervicornia*
 — Posterior extension single; dorsum of notogaster not demarcated from lateral field by a thinner strip of integument; setae *c*₁ longer than *c*₃; epimeral setal formula 3-1-4-3 or greater ... 3
- 03(02) Dorsum heavily tuberculate-punctate ... *tuberculata*
 — Dorsum not heavily tuberculate-punctate ... 4
- 04(03) Setae *h*₂ set in cup-shaped apophyses; apophyses of setae *f*₁ swollen ... *cupulata*
 — Not as above ... 5
- 05(04) Apophyses of setae *h*₂ elongate, swollen distally ... *longibulbula*
 — Apophyses of setae *h*₂ not elongate ... (Fig. 27) .. *caudalis*
- 06(01) Dorsal notogastral plate not demarcated from lateral field by a conspicuous plicature strip; setae *c*₁ longer than *c*₃ ... *obtecta*
 — Dorsal notogastral plate demarcated from lateral field by a conspicuous plicature strip; setae *c*₁ shorter than *c*₃, or as long ... 7
- 07(06) Dorsal notogastral plate narrow ... 8
 — Dorsal notogastral plate broad ... 9
- 08(07) Setae *c*₁ long, reaching bases of *d*₂ ... *unguifera*
 — Setae *c*₁ short, not reaching bases of *d*₂ ... *brevicornuta*
- 09(07) Dorsal region of notogaster heavily reticulate ... *reticulata*
 — Dorsal region of notogaster not reticulate ... *cophinaria*

C. brevicornuta (Wallwork, 1966) — moss, Beeman Hill, and mollymawk nests, Courrejolles Peninsula, Campbell Island (Wallwork 1966).
 — / — / Campbell I.

C. caudalis (Hammer, 1966) (Figure 27) — leaf litter and moss, throughout New Zealand (Hammer 1966, Luxton 1982e).
 Ubiquitous.

C. cervicornia Luxton, 1982 — leafmould in Unuwahao Bush, and road to Tom Bowling Bay, Spirits Bay; litter, Russell State Forest, Bay of Islands; dry, fibrous mat of moss from dry wall, Aorangi Island, Poor Knights; Mangamuka Gorge; litter, Parahaki Park, Whangarei (Luxton 1982e).
 ND / —.

C. cophinaria (Michael, 1908) — leaf litter and moss, throughout New Zealand (Michael 1908, Hammer 1966, Luxton 1982e).
 Ubiquitous.

C. cupulata Luxton, 1982 — moss at base of tanekaha tree, Kauri Ridge, near Oparau; thick mixed bush on steep slope, McKenzies Bush, near Oparau; moss on fallen log in mixed bush, near Oaonui; litter, Moor Park, Canaan Track, Abel Tasman National Park; wet moss under a bush on grassy bank near beach, Ruby Bay (Luxton 1982e).
 WO, TK / NN.

C. longibulbula Luxton, 1982 — under manuka, DSIR Soil Bureau Experimental Station, Lower Hutt; moss in forest, Upper Takaka; hard beech litter, Canaan Road, Takaka Hill; in moss and under hard beech, Buller Gorge; litter, Charleston, Meybelle Bay, and Lake Kaniere (Luxton 1982e).
 WN / NN, BR, WD.

C. oblecta (Pickard-Cambridge, 1875) — “Otago, New Zealand” (Pickard-Cambridge 1875).
 — / (?).

C. reticulata Luxton, 1982 — litter, Russell State Forest, Bay of Islands; dry, fibrous mat of moss from dry wall, Aorangi Island, Poor Knights; moss in tussock, Kirkliston Range, Middlemarch, Macraes Flat (Luxton 1982e).
 ND / MK-SC, CO.

C. tuberculata Luxton, 1982 — road to Tom Bowling Bay, and Unuwahao, Spirits Bay; under broadleaf forest, and at Kamo, near Whangarei; mixed litter, Aorangi Island, Poor Knights; forest litter, Waiorio Bush, Kawakawa; litter, Eastern Chicken Island, Hen and Chickens; Huia, Auckland; litter, Wharerata Hills, Hawke’s Bay (Luxton 1982e).
 ND, AK, HB / —.

C. unguifera (Michael, 1908) — “Feilding; Maunga Kareru” (Michael 1908).
 RI / —.

Genus alone recorded from individuals living arboreally in *Myrsine chathamica*, *Olearia traversii*, *Hymenanthera chathamica*, *Muehlenbeckia australis*, and *Neopanax* sp., Chatham Islands (Spain & Harrison 1968); and from *Pinus radiata* litter, Kaingaroa State Forest, Rotorua (Styles 1967).
 BP / — / Chatham Is.

Genus *Holonothrus* Wallwork, 1963: 722

Type-species *Holonothrus foliatus* Wallwork, 1963.

Crotoniid mites lacking apophyses on posterior margin of hysterosoma; lamellar setae on short apophyses; notogaster with 16 pairs of setae; genital setae numbering 8 pairs, aggenital setae 2 pairs, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

- 01 Interlamellar setae not on apophyses
 ... *concavus*
 — Interlamellar setae on apophyses ... 2
- 02(01) Notogastral setae not foliate, except
 for *h2* ... (Fig. 29) ... *pulcher*
 — Notogastral setae foliate, *h2* not
 conspicuously different from the rest
 ... *foliatus*

H. concavus Wallwork, 1966 — moss, Beeman Hill,
 Campbell Island (Wallwork 1966).
 — / — / Campbell I.

H. foliatus Wallwork, 1963 — *Stilbocarpa* litter, moss,
Azorella, lichens, and soil, at Nuggets Point, Plateau, and
 Mt Hamilton, Macquarie Island (Wallwork 1963, Watson
 1967).
 — / — / Macquarie I.

H. pulcher Hammer, 1966 (Figure 29) — thick moss on
 tree trunk, and dead kauri leaves and moist moss on
 ground, Puketii; liverworts and small ferns on log, Wait-
 akere Range (Hammer 1966).
 ND, AK / —.

Family MALACONOTHRIDAE

Genus *Fossonothrus* Hammer, 1962: 20

Type-species *Fossonothrus latus* Hammer, 1962.

Malaconothrid mites with epimera 4 posteriorly
 convex; notogaster with 14 pairs of setae; genital
 field beneath plates hexagonal in outline; genital
 setae numbering 8 pairs, aggenital setae absent, anal
 setae 1 pair, adanal setae 3 pairs; tridactylous.

F. novaezealandiae Hammer, 1966 (Figure 40) — wet moss
 on flat stone in a brook in deep shadow, Kerikeri (Ham-
 mer 1966).
 ND / —.

Genus *Malaconothrus* Berlese, 1904: 24

Type-species *Nothrus monodactylus* Michael, 1888.

Malaconothrid mites lacking bothridia and sensilli;
 genital setae numbering 4–6 pairs, aggenital setae
 absent, anal setae 1 pair or none, adanal setae 3
 pairs; monodactylous.

- 01 Rostral setae and all ventral setae
 pilose; interlamellar and exobothridial
 setae subequal in size
 ... (Fig. 37) ... *keriensis*
 — Rostral setae and all ventral setae
 smooth; interlamellar setae much
 larger than exobothridial setae ... 2
- 02(01) Small, angular projections laterally at
 dorsosejugal suture; region between
 interlamellar setae with a group of
 areoles ... *zealandicus*

- No angular projections at dorsoseju-
 gal suture; prodorsum without areoles
 ... *indifferens*

M. indifferens Hammer, 1966 — dead leaves, Waitomo;
 swampy area along sea, Pakawau; soaked moss on clay
 slope in forest, and wet moss and grass in swamp, Lake
 Moke, Queenstown (Hammer 1966).
 WO / NN, OL.

M. keriensis Hammer, 1966 (Figure 37) — Kerikeri Falls
 (Hammer 1966).
 ND / —.

M. zealandicus Hammer, 1966 — wet moss on stone in
 pond, Whakarewarewa; moist liverworts and moss in
 forest, Pauatahanui; wet moss at town reservoir, Nelson;
 wet moss on stone in brook, *Nothofagus* forest, Milford
 Sound (Hammer 1966).
 BP, WN / NN, FD.

Genus alone recorded from restiad and fern peat soils,
 near Hamilton (Luxton 1982c, 1983a).
 WO / —.

Genus *Trimalaconothrus* Berlese, 1916: 336

Type-species *Malaconothrus indusiatus* Berlese,
 1916.

Malaconothrid mites lacking bothridia and sensilli;
 genital setae numbering 4–12 pairs, aggenital setae
 absent, anal setae 1 pair, adanal setae 3 pairs;
 tridactylous.

- 01 Notogaster with irregular reticulation
 containing punctation ... 2
 — Notogaster lacking reticulation ... 4
- 02(01) Interlamellar setae shorter than dis-
 tance separating them from setae *cl*
 ... *platyrhinus*
 — Interlamellar setae longer, overlap-
 ping base of setae *cl* ... 3
- 03(02) Setae *cl* reaching base of *d1*; setae *d1*
 reaching base of *e1*; group of areoles
 between interlamellar setae in shape
 of inverted 'T' ... *opisthoseta*
 — Notogastral setae shorter; 3 pairs of
 areoles in a vertical patch between
 interlamellar setae ... *oxyrhinus*
- 04(01) Prodorsum lacking areolation ... 5
 — Prodorsum with at least some patches
 of areolation ... 7
- 05(04) Lamellar setae reaching base of ros-
 tral setae ... 6
 — Lamellar setae not reaching base of
 rostral setae ... *crispus*

06(05) Rostral setae projecting beyond tip of rostrum, which is coarsely punctate

- ... *novus*
— Rostral setae not projecting beyond tip of rostrum, which is at most finely punctate ... *longirostrum*

07(04) Genital setae numbering 4 pairs ... *angustirostrum*

- Genital setae numbering 5 pairs ... (Fig. 1-3) .. *tonkini*
— Genital setae numbering 6 pairs ... *sacculus*

T. angustirostrum Hammer, 1966 — thin liverworts on log in native forest, Waitakere Range (Hammer 1966).
AK / —.

T. crispus Hammer, 1962 — moist moss and liverworts on stone post, Kerikeri; thick moss on lawn under tall trees, New Plymouth (Hammer 1966).
ND, TK / —.

T. longirostrum Hammer, 1966 — luxuriant moss on trunk of rimu tree, Puketi (Hammer 1966).
ND / —.

T. novus (Sellnick, 1921) — soaked moss, grass, and low plants near a spring, Lake Moke, Queenstown (Hammer 1966).
— / OL.

T. opisthosea Hammer, 1966 — slightly moist moss under manuka, Waitakere Range; dead, moist leaves and moss in native forest, Fox Glacier; slightly moist moss and dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1966).
AK / WD, FD.

T. oxyrhinus Hammer, 1962 — moist, dead leaves in *Nothofagus* forest, Lake Matheson (Hammer 1966).
— / WD.

T. platyrhinus Hammer, 1962 — thick moss on log in native forest, Waitomo; moss and grass on lawn under trees, moss on tree trunk, dead leaves, debris, and ferns on swampy ground, New Plymouth; dead *Nothofagus* leaves, Milford Sound (Hammer 1966).
WO, TK / FD.

T. sacculus Hammer, 1966 — wet moss on flat stone in small stream under tall trees, Kerikeri; wet moss at town reservoir, Nelson; wet moss on stone in brook through *Nothofagus* forest, and mosses on bank of fiord, Milford Sound (Hammer 1966).
ND / NN, FD.

T. tonkini Luxton, 1982 (Figures 1-3) — restiad and fern peat soils, near Hamilton (Luxton 1982a, 1982c, 1983a).
WO / —.

Genus alone recorded from restiad peat soils, near Hamilton (Luxton 1982c).
WO / —.

Genus *Zeanothrus* Hammer, 1966: 20

Type-species *Zeanothrus elegans* Hammer, 1966.

Malaconothrid mites similar to *Trimalaconothrus* but with anterior border of hysterosoma distinctly arched, the arch continuing backwards behind lateroanterior border of hysterosoma; epimera 1 and 2 separated from the two sides by a narrow slit, epimera 3 not fully separated anteriorly, epimera 4 completely separated; genital setae numbering 5 or 6 pairs, aggenital setae absent, anal setae 1 pair, adanal setae 3 pairs; tridactylous.

Z. elegans Hammer, 1966 (Figure 39) — dry moss on ground under manuka in thermal area, and thick, moist moss under manuka, Rotorua (Hammer 1966).
BP / —.

Family NOTHRIDAE

Genus *Nothrus* Koch, 1836: 2, 17

Type-species *Nothrus palustris* Koch, 1839.

Nothrid mites lacking aggenital setae and with strong epimeral neotrichy; epimera 1 each with 5-7 setae; genital setae numbering 9 pairs, anal setae 2 pairs, adanal setae 3 pairs.

- 01 Sensilli expanded at tip; setae *h1* and *h2* much shorter than *h3* ... *biciliatus*
— Sensilli not expanded; setae *h1* and *h2* subequal to *h3* or longer ... (Fig. 34) .. *silvestris*

N. biciliatus Koch, 1841 — moss on lawn, Kerikeri; moss and liverworts on tree trunk, Waitakere Range; moss and lichens on tree trunk, and moss and liverworts on ground, Waitomo; moss and grass on lawn, Rotorua (Hammer 1966).
ND, AK, WO, BP / —.

N. silvestris Nicolet, 1855 (Figure 34) — thin moss and liverworts on ground, Kerikeri (Hammer 1966).
ND / —.

REMARKS. The *N. silvestris* recorded by Hammer (1966) is the subspecies *anauniensis* Canestrini & Fanzago, 1876.

Genus *Novonothrus* Hammer, 1966: 24

Type-species *Novonothrus flagellatus* Hammer, 1966.

Nothrid mites with a broad lateral protuberance to the propodosoma anterior to leg I; sensilli flagelliform; epimera fused medially, epimera 1 each with 9 setae; genital setae numbering 9 pairs, aggenital setae absent, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

- 01 Sensilli long, smooth; setae *h*₂ expanded ... *flagellatus*
 — Sensilli long, slightly setose, especially in distal third; setae *h*₂ long, flagelliform ... (Fig. 33) .. *pupuensis*

N. flagellatus Hammer, 1966 — dead leaves and moss on ground, Puketi; liverworts and moss on dead tree trunk, Waitakere Range; dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1966).
 ND, AK / FD.

N. pupuensis Hammer, 1966 (Figure 33) — fern peat soils, near Hamilton (Luxton 1983a); soaked moss, grass, and watercress on edge of spring under low manuka, Pupu Springs (Hammer 1966).
 WO / NN.

Family TRHYPOCHTHONIIDAE

Genus *Allonothrus* van der Hammen, 1953: 244

Type-species *Allonothrus schuilingi* van der Hammen, 1953.

Trhypochthoniid mites with 30 pairs of flabelliform notogastral setae; either 7 or 13 or 14 pairs of genital setae, aggenital setae absent, 2 pairs of anal setae, 3 pairs of adanal setae; monodactylous or tridactylous.

Recorded as genus only (Figure 36) from *Histiopteris* leaf litter, low plants and grass above gannetry, rotten pohutukawa log, and *Coprosma* leaf litter, Ohauora, White Island (Wise 1970).
 BP / —.

Genus *Mucronothrus* Trägårdh, 1931: 31

Type-species *Mucronothrus rostratus* Trägårdh, 1931.

Trhypochthoniid mites lacking bothridia and sensilli; genital setae numbering 18–20 pairs, aggenital setae absent, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

M. nasalis Willmann, 1933 (Figure 38) — moss in running water at town reservoir, Nelson; wet moss, grass, and watercress at edge of spring, Pupu Springs; dripping wet moss near oozing spring in *Nothofagus* forest, Lake Rotoiti; soaked moss from a spring, Lake Moke, Queenstown; soaked moss from mountainside with oozing water, and dripping wet moss taken from a stone in icy brook in *Nothofagus* forest, Milford Sound (Hammer 1966).
 — / NN, BR, OL, FD.

Genus *Trhypochthonius* Berlese, 1904: 27

Type-species *Hypochthonius tectorum* Berlese, 1896.

Trhypochthoniid mites with 10 pairs of genital setae, aggenital setae absent, anal setae 1 pair, adanal setae 3 pairs; sensilli present; tridactylous.

T. excavatus (Willmann, 1919) (Figure 35) — wet moss on stone in small stream, Kerikeri; wet moss and liverworts on edge of pond, Whakarewarewa; moist moss and liverworts on slope in forest, Pauatahanui; edge of spring in moist to wet moss, grass, watercress, etc., Pupu Springs; dripping wet moss in a spring, Lake Moke, Queenstown (Hammer 1966).

ND, BP, WN / NN, OL.

Genus alone recorded from pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).
 WN / —.

Cohort CIRCUMDEHISCENTIAE (Pycnonoticae)

Superfamily AMERONOTHROIDEA

Family CYMBAEREMAEIDAE

Genus *Bulleremaeus* Hammer, 1966: 87

Type-species *Bulleremaeus reticulatus* Hammer, 1966.

Cymbaeremaeid mites with 12 pairs of notogastral setae, 6 pairs of genital setae, 1 pair of aggenital setae, 2 pairs of anal setae, 3 pairs of adanal setae; tibiae of all legs with a distal solenidion swollen at the tip; tridactylous.

- 01 Dorsal surface of notogaster with a coarse, irregular reticulation ... *reticulatus*
 — Dorsal surface of notogaster with tubercles arranged in regular rows posteriorly ... (Fig. 44) .. *tuberculatus*

B. reticulatus Hammer, 1966 — thick moss and liverworts in native tree-fern forest, Pauatahanui; thick moss on dead tree trunk in *Nothofagus* forest, Lake Rotoiti (Hammer 1966).
 WN / BR.

B. tuberculatus Hammer, 1966 (Figure 44) — thick, moist moss, white clover, and grass at roadside, Milford Sound (Hammer 1966).
 — / FD.

Genus *Capillibates* Hammer, 1966: 89

Type-species *Capillibates stagaardi* Hammer, 1966.

Cymbaeremaeid mites bearing 14 or 15 pairs of setae on notogaster; genital setae numbering 5 pairs, aggenital setae absent, anal setae 2 pairs, adanal setae 3 pairs; tibiae III and IV each with a distal solenidion swollen at tip; tridactylous.

C. stagaardi Hammer, 1966 (Figure 43) — moist liverworts and moss on slope by Lake Tarawera, Rotorua; moist liverworts and moss in swamp grown with *Scirpus* in tree-fern forest, Pauatahanui; thick moss on log in *Nothofagus* forest, Lake Rotoiti; moss and grass at roadside between beach and glacier, Fox Glacier (Hammer 1966).

BP, WN / BR, WD.

Genus *Scapheremaeus* Berlese, 1910: 226

Type-species *Cymbaeremaeus patella* Berlese, 1910.

Cymbaeremaeid mites with an evident marginal zone on notogastral dorsum; notogaster with 13 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

01 Notogaster with indistinct marginal zone ... *emarginatus*
— Notogaster with distinct marginal zone ... 2

02(01) Notogastral setae of 2 different types; lamellar setae borne on strong apophyses ... (Fig. 42) ... *insularis*
— Notogastral setae all similar; lamellar setae not on apophyses ... *patella*

S. emarginatus Hammer, 1966 — moist moss under ferns and tall trees, Mirror Lake, Rotorua; thick, moist moss and dead branches in *Nothofagus* forest, Milford Sound (Hammer 1966).

BP / FD.

S. insularis Hammer, 1966 (Figure 42) — moist to wet luxuriant moss on ground, Kerikeri (Hammer 1966).

ND / —.

S. patella (Berlese, 1910) — thin layer of dry moss on ground under manuka in thermal area, Rotorua (Hammer 1966).

BP / —.

Genus alone recorded from foliage of *Olearia colensoi* (precise localities not known) (Spain & Harrison 1968) and from restiad and fern peat soils, near Hamilton (Luxton 1982c, 1983a).

WO / —.

REMARKS. Hammer (1966) expresses some doubt about the generic status of *S. emarginatus*. Furthermore, New Zealand *S. patella* is recorded as being smaller than typical examples of the species, with thicker body setae and no reticulation between the lamellae.

Family FORTUYNIIDAE

Genus *Fortuynia* van der Hammen, 1960: 2

Type-species *Fortuynia marina* van der Hammen, 1960.

Fortuyniid mites with a complex system of tubes and canals between bothridia and coxae; interlamellar setae absent; notogaster with 14 pairs of setae; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

F. elamellata Luxton, 1967 (Figure 41) — crevices on upper shore, South East Bay, Great Island, Three Kings; rock fissures on upper shore, Takatu Peninsula, near Matakana; crevices on upper shore, Russell, Bay of Islands (Luxton 1967).

Three Kings Is, ND / —.

Family PODACARIDAE

Genus *Alaskozetes* Hammer, 1955: 16

Type-species *Alaskozetes coriaceus* Hammer, 1955.

Podacarid mites with a distinct, evenly curved dorsosejugal suture; interlamellar setae present; notogastral setae variable in number (14 or 15 pairs); genital setae numbering 6 pairs (in 2 rows on each plate), aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

A. antarcticus (Michael, 1903) (Figure 45) — salt-marsh soil, near Dunedin (Luxton 1967); grass, on cliffs and on a freshwater pool, Macquarie Island (Dalenius & Wilson 1958, Dalenius 1965); moss, algae, and *Azorella*, *Cotula plumosa*, *Colobanthus muscoides*, under stones, soil, and mud in royal penguin rookery, cave rookery debris, *Poa hamiltoni*, cormorant and albatross nest material, *Puccinellia macquariensis*, coastal rocks, green algae and crevices on coastal rocks, under rocks, *Stilbocarpa* litter and feathers, and on spider egg case at North End, North Head, Aerial Cove, Garden Cove, Catch-me Point, Buckles Bay, Green Gorge, Hurd Point, Nuggets Point, Handspike Point, Gadget Gully, and Caroline Valley, Macquarie Island (Wallwork 1963, Watson 1967).

— / DN / Macquarie I.

REMARKS. The specimens from Macquarie Island represent the subspecies *grandjeani* Dalenius & Wilson, 1958.

Genus *Halozetes* Berlese, 1917: 64

Type-species *Notaspis marina* Lohmann, 1907.

Podacarid mites with or without a distinct dorsosejugal suture (when present it is angular); interlamellar setae conspicuous; notogastral setae variable in number (14 or 15 pairs); genital setae numbering 6 pairs (in 2 rows on each plate), aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

01 Setae *cl* absent ... *plumosus*
— Setae *cl* present ... 2

02(01) Setae *c3* present ... 3
— Setae *c3* absent ... 5

03(02) Notogastral setae smooth ... *bathamae*
— Notogastral setae not smooth ... 4

- 04(03) Notogastral setae conspicuously tufted
 ... *crozetensis*
 — Notogastral setae slightly barbed or
 roughened ... *belgicae*
- 05(02) Notogastral setae roughened
 ... (Fig. 47) .. *otagoensis*
 — Notogastral setae smooth ... 6
- 06(05) Interlamellar setae extending well
 beyond rostrum ... *marinus*
 — Interlamellar setae not extending
 much beyond rostrum ... 7
- 07(06) Setae *ps1* much longer than *ps2*;
 length of female more than 800 μ m
 ... *macquariensis*
 — Setae *ps1* not longer than *ps2*; length
 of female less than 800 μ m ... *intermedius*

H. bathamae Luxton, 1984 — from *Chaetomorpha* sp., extremely exposed rocky headland, Pipikeretu Beach, Otago Peninsula (Luxton 1984).
 — / DN.

H. belgicae (Michael, 1903) — algae, moss, herbs, litter, soil, sheep dung, cave scrapings, bird nests, penguin rookeries, and rock crevices at North Head, Aerial Cove, Camp Hill, Garden Cove, Wireless Hill, Brothers Point, Isthmus, Nuggets Point, Buckles Bay, Mt Hamilton, and Caroline Valley, Macquarie Island (Dalenius & Wilson 1958, Wallwork 1963, Dalenius 1965, Watson 1967).
 — / — / Macquarie I.

H. crozetensis (Richters, 1908) — algae, moss, herbs, under stones, and in bird nests, Courrejolles Peninsula, Campbell Island (Wallwork 1966); algae, lichens, moss, herbs, under stones, litter, soil, sheep dung, cave scrapings, bird nests, penguin rookeries, loose feathers, in rock crevices, and on a dead rabbit at Isthmus, Hasselborough Bay, Garden Cove, Aerial Cove, Buckles Bay, Bauer Bay, Catch-me Point, Handspike Point, Brothers Point, Nuggets Point, Langdon Point, North Head, West Head, North End, Camp Hill, Wireless Hill, Plateau, Sub-plateau, Lambing Gully, Caroline Valley, and North East Coast, Macquarie Island (Dalenius & Wilson 1958, Wallwork 1962, 1963, Dalenius 1965, Watson 1967).
 — / — / Campbell I., Macquarie I.

H. intermedius Wallwork, 1963 — algae, herbs, soil, rock crevices, cave debris, and penguin rookeries at Aerial Cove, Garden Cove, Green Gorge, Catch-me Point, Nuggets Point, Isthmus, and North Head, Macquarie Island (Wallwork 1963, Watson 1967).
 — / — / Macquarie I.

H. macquariensis (Dalenius & Wilson, 1958) — under stones and driftwood at seepage and stream near top of beach, Middle Bay, Campbell Island (Wallwork 1966); margin of freshwater pools, Macquarie Island (Dalenius & Wilson 1958, Dalenius 1965); rock crevices and mud in penguin rookeries, mud banks of freshwater pools and

seal wallows, *Poa hamiltoni* tussocks, and coastal *Colobanthus muscoides*, Macquarie Island (Watson 1967).
 — / — / Campbell I., Macquarie I.

H. marinus (Lohmann, 1908) — under stones in molly-mawk colony, Courrejolles Peninsula, Campbell Island (Wallwork 1966); green seaweeds between tidemarks, below tidemarks, and in freshwater lakes, Macquarie Island (Womersley 1937); green algae from coastal rocks, Garden Cove, Buckles Bay, Nuggets Point, and Catch-me Point, Macquarie Island (Dalenius & Wilson 1958, Wallwork 1963, Dalenius 1965, Watson 1967).
 — / — / Campbell I., Macquarie I.

H. otagoensis Hammer, 1966 (Figure 47) — moist dung mixed with grass in penguin's nest on slope with *Phormium tenax* by sea, and in *Scirpus* in a spring or in oozing water on same slope, Otago Peninsula (Hammer 1966); salt-marsh soil, near Dunedin (Luxton 1967).
 — / DN.

H. plumosus Wallwork, 1966 — Rocky Bay, Campbell Island (Wallwork 1966).
 — / — / Campbell I.

REMARKS. Wallwork's (1966) *H. marinus* from Campbell Island was described as subspecies *minor*.

Genus *Podacarus* Grandjean, 1955: 109

Type-species *Podacarus auberti* Grandjean, 1955.
 Podacarid mites with a distinct angular dorsose-jugal suture; interlamellar setae minute or absent; notogaster with 15 pairs of setae; genital setae numbering 6 pairs (in a single row on each plate), aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

P. auberti Grandjean, 1955 (Figure 46) — grassed soils (?and in algae on surface of freshwater pools), Macquarie Island (Dalenius & Wilson 1958, Dalenius 1965); leaves and litter of *Poa foliosa*, *P. annua*, and *P. hamiltoni*, *Puccinellia macquariensis*, *Cotula plumosa*, *Stilbocarpa*, *Colobanthus muscoides*, *Rhizoclonium* sp., under stones in penguin and cormorant rookeries, nest material, and feathers at Hasselborough Bay, Tent Hill, Camp Hill, Aerial Cove, Langdon Bay, Gadget Gully, North Head, Catch-me Point, Garden Cove, Plateau, Buckles Bay, and Caroline Valley, Macquarie Island (Wallwork 1963, Watson 1967).
 — / — / Macquarie I.

Superfamily BELBOIDEA Family BELBIDAE

Genus *Metabelba* Grandjean, 1936: 67

Type-species *Damaeus papillipes* Nicolet, 1855.
 Belbid mites with 4 setae on genu IV, 3 setae on trochanter IV, and 4 setae on trochanter III; solenidia of tibiae II and III with a companion seta.

M. obtusus Hammer, 1966 (Figure 48) — moss on ground, on trees, at edge of swamp, and with liverworts on road and on stone post in deep shadow, Kerikeri; wet moss on stone in pond, Whakarewarewa; moss and clover on lawn, New Plymouth (Hammer 1966).

ND, BP, TK / —.

Superfamily CARABODOIDEA

Family CARABODIDAE

Genus *Austrocarabodes* Hammer, 1966: 59

Type-species *Carabodes ensifer* Sellnick, 1931.

Carabodid mites with 14 pairs of notogastral setae; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

01 No ridge leading obliquely from base of interlamellar setae to lamellae; notogastral setae over-reaching bases of setae posterior to them; posterior-most notogastral setae curving inwards on to their opposing partner ... (Fig. 51) ... *elegans*

— A ridge leading obliquely from base of interlamellar setae to lamellae; notogastral setae not, or barely, reaching bases of setae posterior to them ... 2

02(01) Posterior transverse ridge of prodorsum in 3 separate parts ... *nodosus*

— Posterior transverse ridge of prodorsum entire ... *maculatus*

A. elegans Hammer, 1966 (Figure 51) — cleft with water, thin moss, and grass on wet soil near brook, Kerikeri; dead *Nothofagus* leaves, moist moss, soaked moss near a spring, *Nothofagus* forest, and moss and lichens in manuka and *Nothofagus* forest, Lake Rotoiti; moss and dead leaves in native forest, moss on tree, and moss, liverworts, and grass in ditch through *Nothofagus* forest, Fox Glacier; thin layer of liverworts on rotten log, and dead *Nothofagus* leaves and wet moss, Milford Sound (Hammer 1966).

ND / BR, WD, FD.

A. maculatus Hammer, 1966 — moss and lichens on tree, and dead leaves and debris, Kerikeri; liverworts and moss in decayed wood, and moss on ground in native forest, Waitakere Range; dead leaves in native forest, New Plymouth; moss and dead leaves in *Nothofagus* forest, Lake Rotoiti; liverworts on dead branch, thick moss, *Nothofagus* forest, Milford Sound (Hammer 1966).

ND, AK, TK / BR, FD.

A. nodosus Hammer, 1966 — moist to wet luxuriant moss near brook, Kerikeri (Hammer 1966); *Histiopteris* leaf litter, low plants and grass above gannetry, and rotten pohutukawa log, Ohauora, White Island (Wise 1970); dead

leaves and small ferns in native forest, and dead leaves and moss, Lake Matheson; liverworts, moss, and grass in forest ditch near coast, Fox Glacier (Hammer 1966); Auckland Islands (Ramsay & Wallwork 1972).

ND, BP / WD / Auckland Is.

Genus alone recorded from Auckland Islands (Ramsay & Wallwork 1972).

— / — / Auckland Is.

Genus *Carabodes* Koch, 1836: 3, 15

Type-species *Carabodes coriaceus* Koch, 1836.

Carabodid mites with 10 pairs of notogastral setae; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

01 Interlamellar setae long, usually reaching base of lamellar setae; sculpture of notogaster consisting of round spots with lines radiating from them ... *ornatissimus*

— Interlamellar setae short, never reaching base of lamellar setae; sculpture of notogaster consisting of densely clustered angular spots ... (Fig. 50) ... *variabilis*

C. ornatissimus Hammer, 1966 — thick moss on tree trunk, and moss on ground, Puketi; liverworts on tree trunk in native forest, Waitakere Range; thick moss and lichens in manuka and *Nothofagus* forest, Lake Rotoiti (Hammer 1966).

ND, AK / BR.

C. variabilis Hammer, 1966 (Figure 50) — liverworts, mosses, and dead leaves on ground, and mosses on tree trunks in native forest, Fox Glacier; liverworts, moss, and dead leaves on rotten branches and on ground in *Nothofagus* forest, Milford Sound (Hammer 1966).

— / WD, FD.

Family TECTOCEPHEIDAE

Genus *Tectocepheus* Berlese, 1913: 93

Type-species *Tegeocranus velatus* Michael, 1880.

Tectocephid mites with notogaster bearing 10 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

T. velatus (Michael, 1880) (Figure 49) — moss on lawn, Kerikeri; Bay of Islands; moss on lawn, and liverworts and low ferns in native forest, New Plymouth; many records from Kerikeri and Puketi; also Waitakere Range, Rotorua, Waitomo, New Plymouth, Pauatahanui, Puppu Springs, Upper Takaka, Dunedin, Milford Sound (Hammer 1967); Kaipaki and Rukuhia peat pasture soils, near Hamilton (Luxton 1982c, 1983b); restiad and fern peat soils, near Hamilton (Luxton 1982c, 1983a); pasture on

Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971).

ND, AK, WO, BP, TK, WN / NN, FD, DN.

REMARKS. According to Hammer (1967), *T. velatus* is commonest in open land. Hammer distinguishes three subspecies — *sarekensis* Trägårdh, *minor* Berlese, and *novus* Hammer.

Superfamily CEPHEOIDEA TIKIZETIDAE new family

Cepheoid mites with propodosoma narrow relative to the rounded hysterosoma; notogaster laterally and posteriorly wrinkled; lamellae present; sensilli flagelliform; humeral projections present; notogastral setae numbering 9 pairs; genital setae numbering 7 pairs; anal setae numbering 2 pairs; monodactylous; femora and coxae III and IV toothed.

Type-genus *Tikizetes* Hammer.

Genus *Tikizetes* Hammer, 1967: 5

Type-species *Tikizetes spinipes* Hammer, 1967.

Tikizetid mites with true lamellae standing free of prodorsum as thin blades; notogaster with 6 pairs of long, pectinate, submarginal setae and 3 small posteromarginal ones; anal field very large; genital setae numbering 7 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

T. spinipes Hammer, 1967 (Figure 52) — moist to wet liverworts and low mosses on thick tree trunk in native forest, Fox Glacier; mouldering leaves in native forest, Lake Matheson (Hammer 1967).

— / WD.

Superfamily EREMULOIDEA Family DAMAEOLIDAE

Genus *Fosseremus* Grandjean, 1954: 340

Type-species *Damaeosoma laciniatum* Berlese, 1905.

Damaeolid mites with 4 semicircular depressions in the notogaster; notogastral setae numbering 11 pairs, genital setae 6 pairs, aggenital setae 3 pairs, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

F. laciniatus (Berlese, 1905) (Figure 54) — moss on ground, dead leaves, liverworts, and dripping wet moss, Kerikeri; also Waitakere Range, Waitomo, Rotorua, Pauatahanui, Queenstown, Milford Sound (Hammer 1966).

ND, AK, WO, BP, WN / OL, FD.

REMARKS. This species is recorded as *F. quadripartitus* Grandjean by Hammer (1966).

Family EREMULIDAE

Genus *Eremulus* Berlese, 1908: 10

Type-species *Eremulus flagellifer* Berlese, 1908.

Eremulid mites with a faintly punctate prodorsum and closely adjacent interlamellar setae; notogaster with 11 pairs of setae; genital setae numbering 6 pairs, aggenital setae 3 pairs, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

- 01 Sensilli set with spines resembling saw-teeth ... *serratus*
— Sensilli without such spines ... (Fig. 53) ... *flagellifer*

E. flagellifer Berlese, 1908 (Figure 53) — moss on ground under trees and tall vegetation, Kerikeri; liverworts and moss on slope, Lake Tarawera, Rotorua; moss on tree trunk in native forest, New Plymouth (Hammer 1966).

ND, BP, TK / —.

E. serratus Hammer, 1966 — dead leaves in native forest, and moss, grass, and low vegetation at roadside in native forest, Fox Glacier (Hammer 1966).

— / WD.

REMARKS. *E. flagellifer* is erroneously referred to as "*E. flagelliger*" in Hammer (1966).

Superfamily GYMNODAMAEOIDEA Family PLATEREMAEIDAE

Genus *Pedrocortesella* Hammer, 1961: 38

Type-species *Pedrocortesella pulchra* Hammer, 1961.

Plateremaeid mites with reticulate notogaster and lamellar setae originating dorsally; notogaster with 5 pairs of setae and 3 pairs of long fissures; genital setae numbering 7 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

- 01 Notogaster patterned with distinct and separate circular areas ... 2
— Notogaster apparently reticulated with contiguous cells ... 4
02(01) Length more than 700 μ m ... *latoclava*
— Length less than 700 μ m ... 3
03(02) Sculpturing of notogaster repeated on prodorsum ... *gymnonotus*
— Sculpturing of notogaster not repeated on prodorsum ... *sexpilosus*

- 04(01) Notogaster with a chequered pattern of hexagonal reticulations containing dark, round tubercles on their margins; bothridia and sensilli not conspicuously dark; sensilli stalks emerging from bothridia ... *cryptonotus*
 — Notogaster not patterned as above; bothridia and sensilli conspicuously dark; sensilli stalks not emerging from bothridia ... (Fig. 56) .. *nigroclava*

P. cryptonotus Hammer, 1966 — soaked moss and liverworts near a spring in *Nothofagus* forest, Lake Rotoiti; thick moss on ground and on dead branches in *Nothofagus* forest, Milford Sound (Hammer 1966).
 — / BR, FD.

P. gymnonotus Hammer, 1966 — thick, moist moss on dead branches in tree-fern forest, Milford Sound (Hammer 1966).
 — / FD.

P. latoclava Hammer, 1966 — wet mosses on stone in *Nothofagus* forest, Milford Sound (Hammer 1966).
 — / FD.

P. nigroclava Hammer, 1966 (Figure 56) — thin moss and lichens on tree, Kerikeri (Hammer 1966).
 ND / —.

P. sexpilosus Hammer, 1966 — luxuriant carpet of low plants, ferns, and mosses near brook in deep shadow, Kerikeri; moist *Selaginella* on tree trunk in native forest, New Plymouth (Hammer 1966).
 ND, TK / —.

Genus alone recorded from moss and white clover on lawn, New Plymouth (Hammer 1966).
 TK / —.

REMARKS. *P. gymnonotus*, *P. sexpilosus*, and *P. cryptonotus* are ascribed to Ramsay by Hammer (1966). However, the descriptions have never been formally published by him, and the names must therefore be ascribed to Hammer. *P. nigroclava* is erroneously referred to in the figure legends of Hammer (1966) as "*P. microclava*". The record of "*P. microclava*" in Spain & Luxton (1971) is therefore invalid.

Genus *Pedrocortesia* Hammer, 1958: 40

Type-species *Pedrocortesia mirabilis* Hammer, 1958.

Plateremaeid mites with foveolate notogaster and lamellar setae originating laterally; notogaster with 5 pairs of setae and 3 pairs of long fissures; genital setae numbering 7 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

- 01 Sensilli slender; pore *ia* vertically aligned ... (Fig. 55) .. *rotoruensis*
 — Sensilli fusiform; pore *ia* obliquely inclined ... 2

- 02(01) Anterior border of prodorsum with a pitted hyaline membrane; notogastral setae on tubercles ... *luteomarginata*
 — Not as above ... *?australis*

P. ?australis Hammer, 1962 — Campbell Island (precise locality unknown) (Wallwork 1966).
 — / — / Campbell I.

P. luteomarginata Hammer, 1966 — thick, moist moss on dead branches in tree-fern forest, Milford Sound (Hammer 1966).
 — / FD.

P. rotoruensis Hammer, 1966 (Figure 55) — thermal area, Rotorua (Hammer 1966).
 BP / —.

REMARKS. The specific identity of the Campbell Island material is queried by Wallwork (1966).

**Superfamily HERMANNIELLOIDEA
 Family HERMANNIELLIDAE**

Genus *Hermanniella* Berlese, 1908: 11

Type-species *Hermannia granulata* Nicolet, 1855. Hermanniellid mites with a pair of lateral, tube-like projections on notogaster; bothridia situated near prodorsal margins.

- 01 All notogastral setae simple ... 2
 — All, or some, notogastral setae clavate.. 3

- 02(01) All notogastral setae long, many whip-like ... *longisetosa*
 — Most notogastral setae minute ... (Fig. 57) .. *microsetosa*

- 03(01) All notogastral setae clavate... *clavasetosa*
 — Only setae *dp* clavate ... *diversisetosa*

H. clavasetosa Hammer, 1966 — liverworts, moss, and dead leaves in tree-fern forest along river, Waitomo (Hammer 1966).
 WO / —.

H. diversisetosa Hammer, 1966 — moist dead leaves and branches under tree ferns in native forest, New Plymouth (Hammer 1966).
 TK / —.

H. longisetosa Hammer, 1966 — slightly moist layer of lichens and mosses on dead branch on ground in deep shadow, and moss on dead tree trunk and in dead leaves in deep shadow, Kerikeri; liverworts and small ferns on dead tree trunk, Waitakere Range (Hammer 1966).
 ND, AK / —.

H. microsetosa Hammer, 1966 (Figure 57) — dense, very luxuriant carpet of small ferns and mosses near brook in

deep cleft, moss on dead tree trunk, mosses on ground, and dead leaves, Kerikeri (Hammer 1966).

ND / —.

Superfamily HYDROZETOIDEA Family HYDROZETIDAE

Genus *Hydrozetes* Berlese, 1902: 698

Type-species *Notaspis lacustris* Michael, 1882.

Hydrozetid mites with a thick, weakly serrate seta on each side of claw on tarsus I; notogastral setae numbering 16 or 17 pairs, genital setae 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

H. lemnae (de Coggi, 1899) (Figure 58) — wet moss on stone in brook, moss on edge of swamp, and thick, dead *Selaginella* in shadowed deep cleft, Kerikeri; wet moss on stone in shallows of pond, Rotorua; wet moss, *Lemna*, watercress on edge of spring, Pupu Springs; soaked moss on shore of Lake Hayes, Queenstown (Hammer 1966).

ND, BP / NN, OL.

Superfamily LIACAROIDEA Family ADHAESZETIDAE

Genus *Adhaesozetes* Hammer, 1966: 84

Type-species *Adhaesozetes barbarae* Hammer, 1966.

Adhaesozetid mites with complex lamellae, consisting of several parts; bothridia concealed under part of the lamellae; notogaster with 12 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tarsi tridactylous and each with a well developed pulvillus.

A. barbarae Hammer, 1966 (Figure 61) — liverworts and small plants under manuka in thermal area, and moist moss on vertical slope with ferns, Mirror Lake, Rotorua (Hammer 1966).

BP / —.

Family ASTEGISTIDAE

Genus *Cultroribula* Berlese, 1908: 9

Type-species *Notaspis juncta* Michael, 1885.

Astegistid mites with cuspis not projecting beyond rostrum; genital setae numbering 4 or 5 pairs, aggenital setae absent, anal setae 2 pairs, adanal setae 2 pairs; monodactylous.

C. lata Aoki, 1961 (Figure 59) — slightly moist moss and small ferns under manuka in thermal area, Rotorua (Hammer 1966); restiad and fern peat soils, near Hamilton (Luxton 1982c, 1983a) and Rukuhia peat pasture, near Hamilton (Luxton 1982d).

WO, BP / —.

Genus alone recorded from pasture on Taita hill soil, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).

WN / —.

MAORIZETIDAE new family

Liacaroid mites with lamellae fused medially; lamellar setae on cuspis; notogaster globular, aseptose; genital and anal fields touching; genital setae numbering 6 pairs; anal setae numbering 2 pairs; tridactylous.

Genus *Maorizetes* Hammer, 1966: 98

Type-species *Maorizetes ferox* Hammer, 1966.

Maorizetid mites with lamellae fused anteromedially, forming a broad arch; notogaster aseptose; genital and anal fields contiguous; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

M. ferox Hammer, 1966 (Figure 60) — moist moss, grass, lichens, dead leaves on ground, and on tree trunks, Kerikeri and Puketi; also Waitakere Range, Waitomo, Rotorua, New Plymouth, Christchurch, Milford Sound (Hammer 1966).

ND, AK, WO, BP, TK / MC, FD.

Family METRIOPIIDAE

Genus *Macquarioppia* Wallwork, 1964: 605

Type-species *Macquariella striata* Wallwork, 1963.

Metrioppiid mites with 9 pairs of notogastral setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

M. striata (Wallwork, 1963) (Figure 63) — herbfield plants, *Stilbocarpa* litter, *Pleurophyllum* litter, *Poa hamiltoni* litter, cave scrapings, green algae, and coastal rocks at Plateau, Subplateau, Gadget Gully, Caroline Valley, Brothers Point, and North Head, Macquarie Island (Wallwork 1963, Watson 1967).

— / — / Macquarie I.

Genus *Pseudoceratoppia* Hammer, 1967: 6

Type-species *Pseudoceratoppia sexsetosa* Hammer, 1967.

Metrioppiid mites with long, converging lamellae; hysterosoma without pteromorphae, globular, and with lateroanterior borders depressed; notogaster with 0–3 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; transverse ridge immediately anterior to genital field, with 2 curved ridges running from anterior border of genital field to discidium; tridactylous.

- 01 Notogastral setae apparently absent ... *asetosa*
 — Notogastral setae conspicuous ... 2
- 02(01) Length less than 900 μm ; interlamellar setae reaching rostrum ... *sexsetosa*
 — Length more than 900 μm ; interlamellar setae not reaching rostrum ... 3
- 03(02) Cuspis of lamella with an outer tooth; sensilli smooth and narrow ... (Fig. 62) .. *diversa*
 — Cuspis of lamella without conspicuous teeth; sensilli more or less fusiform ... 4
- 04(03) Notogastral setae simple ... *microsetosa*
 — Notogastral setae somewhat expanded and imbricate ... *clavasetosa*

P. asetosa Hammer, 1967 — thick moss and bone-dry lichens in open manuka scrub and *Nothofagus* forest a few hundred feet above Lake Rotoiti; dripping wet moss on vertical slope about 2000 feet above sea level, Queenstown; dense carpet of low mosses (?liverworts) on rotten tree trunk in shadow on beach, Milford Sound (Hammer 1967).

— / BR, OL, FD.

P. clavasetosa Hammer, 1967 — green foliage, Golden Downs State Forest (Hammer 1967).

— / NN.

P. diversa Hammer, 1967 (Figure 62) — thin moss on lawn, and moss and liverworts on stone post, Kerikeri (Hammer 1967).

ND / —.

P. microsetosa Hammer, 1967 — green foliage in State Forest, Whakarewarewa (Hammer 1967); rotten pohutukawa log, Ohauora, White Island (Wise 1970).

BP / —.

P. sexsetosa Hammer, 1967 — *Sequoia* forest at Forest Research Institute, Whakarewarewa; Kaingaroa State Forest; luxuriant moss on dead tree trunk, Fox Glacier (Hammer 1967).

BP, (?TO) / WD.

Superfamily LIODOIDEA

Family LIODIDAE

Genus *Liodes* von Heyden, 1826: 608

Type-species *Notaspis theleproctus* Hermann, 1804.

Liodid mites lacking lamellar setae and with 3 pairs of anal setae; dorsum of notogaster more or less convex and with sculpture.

L. nigricans Hammer, 1966 (Figure 64) — Kerikeri Falls (Hammer 1966).

ND / —.

REMARKS. *L. nigricans* is ascribed to Ramsay by Hammer (1966). However, the description was never formally published by him, and the name must therefore be ascribed to Hammer.

Superfamily OPPIOIDEA

Family AUTOGNETIDAE

Genus *Austrogneta* Balogh & Csiszar, 1963: 480

Type-species *Austrogneta multipilosa* Balogh & Csiszar, 1963.

Autognetid mites with an entire rostrum and 13 pairs of notogastral setae; genital setae numbering 5 or 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs.

- 01 Anterior edge of notogaster with 4 projections; sensilli smooth; genital setae numbering 6 pairs ... *quadridentata*
 — Anterior edge of notogaster with 2 projections; sensilli pilose; genital setae numbering 5 pairs ... (Fig. 66) .. *multipilosa*

A. multipilosa Balogh & Csiszar, 1963 (Figure 66) — slightly moist, luxuriant liverworts or moss under manuka in thermal area, Rotorua (Hammer 1966).

BP / —.

A. quadridentata Hammer, 1966 — dripping wet *Sphagnum*, grass, and watercress on edge of spring, Pupu Springs (Hammer 1966).

— / NN.

Family OPIIIDAE

Genus *Acutoppia* Balogh, 1983: 54

Type-species *Operculoppia crassiseta* Hammer, 1968.

Opiid mites with horseshoe-shaped costulae and transcostula; rostrum entire; sensilli short, lanceolate; bothridia closed with opercula; cristae absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

- 01 Length more than 800 μm ; notogastral setae smooth .. (Fig. 75) .. *crassiseta*
 — Length less than 700 μm ; notogastral setae pilose ... *jelevae*

A. crassiseta (Hammer, 1968) (Figure 75) — nest of *Nestor notabilis*, Arthurs Pass (Hammer 1968).

— / NC-WD.

A. jelevae (Hammer, 1968) — cleft with water, and thin moss on ground near brook in shadow, Kerikeri; moss and grass under bushes in garden, Waitakere Range; thick

moss and dead leaves in native forest, and grass and low plants by roadside in mixed *Nothofagus* forest, Fox Glacier; thick moss on ground in *Nothofagus* forest, and dead *Nothofagus* leaves, Milford Sound (Hammer 1968).
ND, AK / WD, FD.

Genus *Amerioppia* Hammer, 1961: 54

Type-species *Amerioppia rudentigera* Hammer, 1961.

Ooppiid mites lacking costulae and interlamellar setae; rostrum entire; sensilli slightly fusiform or lanceolate; cristae absent; notogaster with 9 or 10 pairs of setae, setae *ta* present or absent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

01 Sensilli fusiform ... (Fig. 93) .. *woolleyi*
— Sensilli lanceolate ... *longiclava*

A. longiclava Hammer, 1962 — slightly moist moss and grass under bushes in garden, and moss and grass in wood, Waitakere Range; dry moss on ground, and moist dead leaves and moss in thermal area, Rotorua; moist moss and liverworts on slope above Lake Tarawera; almost dry moss under manuka, Pupu Springs; thin, moist moss on ground in deep shadow at town reservoir, Nelson; thick moss and bone-dry lichens and *Lycopodium* in open manuka scrub a few hundred feet above Lake Rototiti; moist penguin dung mixed with grass in penguin's nest, Dunedin (Hammer 1968).

AK, BP / NN, BR, DN.

A. woolleyi Hammer, 1968 (Figure 93) — thin, dry moss and small plants scraped from bark of tree in native forest, Puketi; moist moss and liverworts on ground in native forest, Waitakere Range; moist moss and dead leaves, and thick, moist *Leucobryum*, thermal area, Rotorua; thin moss on tree trunk in native forest, New Plymouth; moist, dead leaves in (?) cypress forest, Pauatahanui; luxuriant green moss under trees on river bank, Hokitika; luxuriant moss on log in native forest, Fox Glacier (Hammer 1968).

ND, AK, BP, TK, WN / WD.

Genus alone recorded from pohutukawa leaf litter near landing, *Histiopteris* leaf litter, rotten pohutukawa log, and *Coprosma* leaf litter, Ohauora, White Island (Wise 1970).
BP / —.

Genus *Arcoppia* Hammer, 1977: 32

Type-species *Arcoppia brachyramosa* Hammer, 1977.

Ooppiid mites with horseshoe-shaped costulae and transcostula; rostrum tripartite; sensilli clavate with distal branches; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

01 Costulae conspicuous; sensilli clubbed, each ending in 2 flagella ... *arcualis*
— Costulae inconspicuous; sensilli swollen, each bearing 3 flagella ... (Fig. 95) .. *winkleri*

A. arcualis (Berlese, 1913) — in valley with river, moss on mouldering log, thin layer of moss and liverworts on grown-over road in deep shadow, and dead *Selaginella* vegetation under tall trees and shrubs, Kerikeri; moss and small ferns on log in native forest, Waitakere Range (Hammer 1968).

ND, AK / —.

A. winkleri (Hammer, 1968) (Figure 95) — moist grass and *Hieracium* by roadside, Kerikeri; thin layer of moist moss and small ferns under manuka, thermal area, Rotorua (Hammer 1968).

ND, BP / —.

Genus *Austroppia* Balogh, 1983: 34

Type-species *Oppia magellanis* Hammer, 1962.

Ooppiid mites with costulae and transcostula; rostrum tripartite; sensilli fusiform, with 4 or 5 short cilia; cristae absent; notogaster with 9 or 10 pairs of setae, setae *ta* present or absent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

A. crozetensis (Richters, 1908) (Figure 96) — *Colobanthus* cushions on rock, Macquarie Island (Dalenius & Wilson 1958, Dalenius 1965); cave rookery debris and *Poa hamiltoni* litter, *Pleurophyllum* debris, *Stilbocarpa* litter, nest material, *Colobanthus muscoides* and *Puccinellia macquariensis* litter, cave scrapings and soil, at North Head, North End, Langdon Point, Nuggets Point, Lambing Gully, Wireless Hill, Handspike Point, Aerial Cove, Mt Elder, Plateau, Brothers Point, Douglas Point, and Scoble Lake, Macquarie Island (Wallwork 1963, Watson 1967).
— / — / Macquarie I.

Baioppia new genus

Type-species *Lanceoppia moritzi* Hammer, 1968.

Ooppiid mites with costulae and transcostula distinct and tracing a quadrangle; rostrum entire; sensilli fusiform, smooth; lamellar setae very thin; cristae absent; notogaster with 9 pairs of short, smooth setae, setae *ta* absent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; setae *ad3* preanal, *ad1* postanal; pori *iad* in apoanal position; tibiae I and II with a long, pectinate seta medially.

B. moritzi (Hammer, 1968) (Figure 102) — wet moss and liverworts on vertical slope above small brook in *Nothofagus* forest, Lake Rototiti (Hammer 1968).

— / BR.

Genus *Belloppia* Hammer, 1968: 15

Type-species *Belloppia wallworki* Hammer, 1968.

Ooppiid mites with costulae; rostrum tripartite; sensilli capitate; cristae forming a projecting chitinous structure at anterior border of notogaster; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

- 01 Lamellar setae medial to costulae; notogaster with a conspicuous tooth on each anterolateral border ... 2
— Lamellar setae on costulae; notogastral shoulders without teeth ... 3

- 02(01) Notogastral setae long and robust, *ta* overreaching bases of *te* ... *beemanensis*
— Notogastral setae shorter ... (Fig. 89) .. *wallworki*

- 03(01) Lateral borders of costulae with strong incisions ... *evansi*
— Lateral borders of costulae entire... *shealsi*

B. beemanensis (Wallwork, 1964) — moss, Beeman Hill, Campbell Island (Wallwork 1964a).
— / — / Campbell I.

B. evansi Hammer, 1968 — thin moss on wet soil near brook in deep cleft with trees, and in moss on ground in deep shadow, Kerikeri (Hammer 1968).
ND / —.

B. shealsi Hammer, 1968 — thick, moist to wet moss on ground in native forest, Puketi; moist moss on ground under manuka, Waitakere Range; thick, moist moss under tree fern, in native forest, Pauatahanui; thick, moist moss on dead branches in tree-fern forest, Milford Sound (Hammer 1968).
ND, AK, WN / FD.

B. wallworki Hammer, 1968 (Figure 89) — moist to wet (?) *Leucobryum* on slope, thick, moist moss on dead tree trunk, dripping wet moss and liverworts in oozing water from brook, and moss and liverworts on vertical slope above brook in shadow, *Nothofagus* forest, Lake Rotoiti (Hammer 1968).
— / BR.

Genus *Brachioppiella* Hammer, 1962: 47

Type-species *Brachioppiella periculosa* Hammer, 1962.

Ooppiid mites with or without costulae; rostrum entire; sensilli pectinate or radiate; cristae absent; notogaster with 9 or 10 pairs of setae, setae *ta* present or absent; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

- 01 Length greater than 400 μ m; rostrum with a 'U'- or 'V'-shaped channel ... 2
— Length less than 350 μ m; rostrum without a channel ... 3

- 02(01) Setae *r3* posterior to pori *im*; dark lobes on posterior border of prodorsum ... *walkeri*
— Setae *r3* level with pori *im*; no lobes on posterior border of prodorsum ... *hartensteini*

- 03(01) Costulae indicated by faint lines; sensilli each with 6 or 7 branches ... *higginsii*
— Costulae conspicuous; sensilli each with 3 or 4 branches ... (Fig. 83) .. *rajskii*

B. hartensteini (Hammer, 1968) — moss and liverworts along track in dark native forest, Waitakere Range (Hammer 1968).
AK / —.

B. higginsii (Hammer, 1968) — green, moist to wet carpet of mosses and low ferns near brook in deep cleft with shrubs and tall trees, and moss on ground above small brook in deep shadow, Kerikeri; thick, moist moss, grass, and small plants at foot of tree fern in native forest, Pauatahanui (Hammer 1968).
ND, WN / —.

B. rajsikii Hammer, 1968 (Figure 83) — dead leaves in (?) cypress forest, Pauatahanui (Hammer 1968).
WN / —.

B. walkeri (Hammer, 1968) — thick, green carpet of mosses, ferns, etc. near small brook in deep cleft with tall vegetation, and in thick, moist moss on log and on ground, Kerikeri; moist moss on ground in native forest, Waitakere Range (Hammer 1968).
ND, AK / —.

***Campbelloppia* new genus**

Type-species *Oppia diaphora* Wallwork, 1964.

Ooppiid mites with costulae represented by ill defined, irregular ridges joined by transcostula; rostrum entire; sensilli fusiform, flattened, membranous, smooth; cristae absent; notogaster with 10 pairs of simple setae, setae *ta* present; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; setae *ad3* preanal, *ad1* postanal; pori *iad* anterolateral to anal field.

C. diaphora (Wallwork, 1964) (Figure 74) — moss, Beeman Hill, Campbell Island (Wallwork 1964a).
— / — / Campbell I.

Genus *Convergoppia* Balogh, 1983: 37

Type-species *Oppia pletzeni* Hammer, 1968.

Ooppiid mites with costulae converging to lamellar setae; rostrum entire; sensilli setiform; cristae

absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

C. pletzeni (Hammer, 1968) (Figure 104) — mouldering leaves and debris on slope above brook in deep shadow, Kerikeri (Hammer 1968).

ND / —.

Genus *Globoppia* Hammer, 1962: 44

Type-species *Globoppia intermedia* Hammer, 1962.

Oppiid mites without costulae, or with a costula remnant only, near lamellar setae; rostrum entire or incised; sensilli capitate or fusiform, with a long stalk; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

01 Length less than 400 μm ; costula remnant present, near lamellar setae
... *campbellensis*

— Length greater than 500 μm ; costulae absent ... 2

02(01) Rostrum with a pair of strongly incurved lateral points ... *gressitti*
— Rostrum entire ... (Fig. 99) .. *nidicola*

G. campbellensis Wallwork, 1964 — moss, Beeman Hill, Campbell Island (Wallwork 1964a).
— / — / Campbell I.

G. gressitti Wallwork, 1964 — moss, Beeman Hill, Campbell Island (Wallwork 1964a).
— / — / Campbell I.

G. nidicola Hammer, 1968 (Figure 99) — nest of *Puffinus griseus*, Greymouth (Hammer 1968).
— / BR.

Genus alone recorded from pohutukawa leaf litter near landing, *Histiopteris* leaf litter, low plants and grass above gannetry, rotten pohutukawa log, wet pohutukawa leaf litter at top of forest, and *Coprosma* leaf litter, Ohauora, White Island (Wise 1970); thin layer of moss on slope by roadside in shadow, Christchurch (Hammer 1968).
BP / MC.

Genus *Gressittoppia* Balogh, 1983: 55

Type-species *Brachioppia moresonensis* Hammer, 1967.

Oppiid mites with costulae absent or represented by faint lines; rostrum entire; sensilli pectinate; cristae absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

G. baderi (Hammer, 1968) (Figure 77) — moss, liverworts, grass, and low plants by roadside in mixed *Nothofagus* forest, Fox Glacier (Hammer 1968).

— / WD.

Genus *Hamoppia* Hammer, 1968: 28

Type-species *Hamoppia lionsi* Hammer, 1968.

Oppiid mites with linear costulae; rostrum entire, but with a 'V'-shaped fissure; sensilli setiform, apically finely dilated; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position; femora II bearing a small, hook-like process.

01 Costulae conspicuous
... (Fig. 105) .. *lionsi*
— Costulae not conspicuous ... *thamdrupi*

H. lionsi Hammer, 1968 (Figure 105) — thick, moist *Leucobryum*(?) near spring in *Nothofagus* forest, Lake Rotoiti (Hammer 1968).

— / BR.

H. thamdrupi Hammer, 1968 — moss and grass in native forest, Waitakere Range (Hammer 1968).

AK / —.

Genus *Insculptoppia* Subias, 1980: 295

Type-species *Damaeosoma insculpta* Paoli, 1908.

Oppiid mites without costulae; rostrum entire; sensilli pectinate or fusiform and unilaterally ciliate; cristae absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

I. suciui (Hammer, 1968) (Figure 91) — moist moss and grass under bushes in garden on edge of native forest, Waitakere Range (Hammer 1968).

AK / —.

Genus *Laminoppia* Hammer, 1968: 30

Type-species *Laminoppia blocki* Hammer, 1968.

Oppiid mites with horseshoe-shaped costulae and transcostula; rostrum entire; sensilli filiform; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position; all femora with broad laminae.

L. blocki Hammer, 1968 (Figure 71) — mouldering *Nothofagus* leaves, Lake Rotoiti; wet moss in *Nothofagus* forest, Milford Sound (Hammer 1968).

— / BR, FD.

Genus *Lanceoppia* Hammer, 1962: 42

Type-species *Lanceoppia hexapili* Hammer, 1962.

Oppiid mites with costulae absent or faintly developed; rostrum entire or incised; sensilli various – elongate, lanceolate, fusiform, or bacilliform; cristae absent; notogaster with 9 or 10 pairs of setae, setae *ta* present or absent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

- | | | | | | |
|--------|--|---------------------------|--------|---|-------------------------|
| 01 | Lamellar setae extending beyond base of rostral setae | ... 2 | 10(09) | Notogastral setae barbed | ... <i>*bertheti</i> |
| | — Lamellar setae not extending beyond base of rostral setae | ... 11 | | — Notogastral setae smooth | ... <i>rigidiseta</i> |
| 02(01) | Setae <i>ti</i> posterior to setae <i>te</i> on notogaster | ... 3 | 11(01) | Sensilli blunt at tip | ... 12 |
| | — Not as above | ... 7 | | — Sensilli thread-like at tip, or at least pointed | ... 16 |
| 03(02) | Interlamellar setae long, able to overlap dorsosejugal suture; length less than 700 μm ... (Fig. 106) ... <i>*willmanni</i> | | 12(11) | Sensilli bacilliform | ... <i>woodringi</i> |
| | — Interlamellar setae short; length more than 700 μm | ... 4 | | — Sensilli fusiform | ... 13 |
| 04(03) | Posterior borders of bothridia with lobes; notogaster longer than broad | ... <i>jacoti</i> | 13(12) | Length greater than 450 μm | ... <i>poppi</i> |
| | — Posterior borders of bothridia without lobes; notogaster circular | ... 5 | | — Length less than 450 μm | ... 14 |
| 05(04) | Bothridia surrounded by hyaline membranes with a radiating pattern | ... <i>thori</i> | 14(13) | Rostrum with a 'V'-shaped fissure on dorsal surface; setae <i>ta</i> absent | ... <i>haarlovi</i> |
| | — Not as above | ... 6 | | — Rostrum without a 'V'-shaped fissure; setae <i>ta</i> present | ... 15 |
| 06(05) | Anterior borders of coxae III with 4 strong teeth | ... <i>*berleseii</i> | 15(14) | Anterior edge of notogaster straight; 2 pairs of areoles between interlamellar setae | ... <i>schweizeri</i> |
| | — Anterior borders of coxae III without teeth | ... <i>banksi</i> | | — Anterior edge of notogaster rounded; 3 pairs of areoles between interlamellar setae | ... <i>ramsayi</i> |
| 07(02) | Interlamellar setae long, able to overlap dorsosejugal suture | ... 8 | 16(11) | Sensilli serrate on posterior border | ... <i>feideri</i> |
| | — Interlamellar setae short | ... 9 | | — Sensilli not serrate | ... 17 |
| 08(07) | Anterior border of notogaster with 2 low tubercles behind bothridia; no 'V'-shaped fissure behind tip of rostrum | ... <i>*vanderhammeni</i> | 17(16) | Sensilli pointed at tip, spindle-like | ... 18 |
| | — Anterior border of notogaster without tubercles; a 'V'-shaped fissure behind tip of rostrum | ... <i>*ewingi</i> | | — Sensilli elongate, usually thread-like at tip | ... 23 |
| 09(07) | Length less than 500 μm ; sensilli extremely long, narrow, and pilose, longer than prodorsum | ... <i>*mahunkai</i> | 18(17) | Setae <i>ta</i> present; pori <i>im</i> posterior to setae <i>r3</i> | ... <i>menkei</i> |
| | — Length more than 700 μm ; sensilli much shorter than prodorsum | ... 10 | | — Setae <i>ta</i> absent; pori <i>im</i> anterior to setae <i>r3</i> | ... 19 |
| | | | 19(18) | Setae <i>te</i> and <i>ti</i> at same horizontal level | ... 20 |
| | | | | — Setae <i>te</i> anterior to setae <i>ti</i> | ... 21 |
| | | | 20(19) | Rostrum produced into a very sharp point | ... <i>seydi</i> |
| | | | | — Rostrum rounded | ... <i>csiszarae</i> |
| | | | 21(19) | Interlamellar setae represented by alveoli | ... <i>perezinigoii</i> |
| | | | | — Interlamellar setae small but conspicuous | ... 22 |
| | | | 22(21) | Tip of rostrum with a 'W'-shaped lenticulus | ... <i>turki</i> |
| | | | | — Rostrum without a lenticulus | ... <i>luxtoni</i> |
| | | | 23(17) | Setae <i>ta</i> absent | ... 24 |
| | | | | — Setae <i>ta</i> present | ... 26 |
| | | | 24(23) | Three pairs of areoles between bothridia | ... <i>*maerkeli</i> |
| | | | | — No areoles between bothridia | ... 25 |

- 25(24) Interlamellar setae minute, not reaching bothridia; lamellar setae minute, not reaching each other ... **knullei*
 — Interlamellar setae long, reaching bothridia; lamellar setae as long as the distance between them ... **schusteri*
- 26(23) Two chitinous processes in interlamellar region ... 27
 — No chitinous processes in interlamellar region ... 28
- 27(26) Chitinous processes below interlamellar setae; at least 2 areoles in interlamellar region ... **vaneki*
 — Chitinous processes between interlamellar setae; no areoles in interlamellar region ... **becki*
- 28(26) Dorsosejugal suture with a pair of condyles below bothridia; length greater than 550 μm ... **sellnicki*
 — Dorsosejugal suture lacking condyles; length less than 550 μm ... 29
- 29(28) Sensilli conspicuously expanded in middle; 2 pairs of areoles between interlamellar setae ... **strenzkei*
 — Sensilli not expanded in middle; 1 pair of areoles between interlamellar setae ... **piffii*
- L. banksi* Hammer, 1968 — on stump in pine wood, Bay of Islands (Hammer 1968).
 ND / —.
- L. becki* Hammer, 1968 — dead, moist to wet leaves and moss under kauri tree, Puketi (Hammer 1968).
 ND / —.
- L. berleseii* Hammer, 1968 — thin layer of moss on ground near brook in deep cleft with tall trees, Kerikeri (Hammer 1968).
 ND / —.
- L. bertheti* Hammer, 1968 — thick carpet of mosses and small ferns near brook in deep cleft with tall vegetation, Kerikeri (Hammer 1968).
 ND / —.
- L. csiszarae* Hammer, 1968 — mouldering leaves and debris on slope above brook under tall trees and shrubs, Kerikeri (Hammer 1968).
 ND / —.
- L. ewingi* Hammer, 1968 — mouldering leaves under trees in cleft, Waitomo (Hammer 1968).
 WO / —.
- L. feideri* (Hammer, 1968) — liverworts and *Leucobryum* on log in native forest, Waitakere Range; *Nothofagus* forest in moist to wet (?) *Leucobryum* on slope, mosses on ground and on log, and wet moss and liverworts above small brook, Lake Rotoiti (Hammer 1968).
 AK / BR.
- L. haarlovi* (Hammer, 1968) — mouldering leaves in native forest, Waitomo (Hammer 1968).
 WO / —.
- L. jacoti* Hammer, 1968 — thin layer of moss on wet soil, lichens and moss on mouldering branch, and moss and needles under fir tree, Kerikeri; moss and liverworts on ground, and moss and small ferns on log, native forest, Waitakere Range; under manuka in thermal area, in moss, liverworts, and tiny ferns, and in luxuriant (?) *Leucobryum*, Rotorua; dead *Nothofagus* leaves, Lake Rotoiti (Hammer 1968).
 ND, AK, BP / BR.
- L. knullei* Hammer, 1968 — luxuriant liverworts on forest soil in native forest, Fox Glacier (Hammer 1968).
 — / WD.
- L. luxtoni* Hammer, 1968 — thick, wet mosses on ground by brook in deep cleft with dense trees and shrubs, moss on mouldering tree trunk, *Selaginella* vegetation, and dead leaves and debris, Kerikeri; moss, liverworts, and dead leaves in tree-fern forest between huge rocks, Waitomo; thick moss in native forest, Lake Matheson (Hammer 1968).
 ND, WO / WD.
- L. maerkeli* Hammer, 1968 — moss and dead leaves in native forest, Waitakere Range; mouldering *Nothofagus* leaves, Lake Rotoiti; grass and low plants by roadside in mixed forest between glacier and coast, Fox Glacier (Hammer 1968).
 AK / BR, WD.
- L. mahunkai* Hammer, 1968 — *Selaginella* vegetation and dead leaves under tree ferns in native forest, New Plymouth (Hammer 1968).
 TK / —.
- L. menkei* Hammer, 1968 — moist moss on ground in *Nothofagus* forest, Lake Rotoiti; wet liverworts, moss, and grass on slope with oozing water, Christchurch; thick moss at foot of giant tree and dead leaves in native forest, and moss, plants, and grass by roadside in more open forest, Fox Glacier (Hammer 1968).
 — / BR, MC, WD.
- L. perezinigoii* (Hammer, 1968) — moss and liverworts on ground in native forest, Waitakere Range (Hammer 1968).
 AK / —.
- L. piffii* Hammer, 1968 — liverworts and small ferns on log in native forest, Waitakere Range (Hammer 1968).
 AK / —.
- L. poppi* Hammer, 1968 — wet moss and liverworts in depression grown with low *Scirpus* by brook in native tree-fern forest, Pauatahanui (Hammer 1968).
 WN / —.
- L. ramsayi* Hammer, 1968 — on rotten bridge and in cleft with water, Kerikeri; moist liverworts and mosses on tree trunk in native forest, Waitakere Range; thin layer of moss

in shadow at vertical roadside, and moist *Polytrichum* and small plants on slope near oozing water, Christchurch; thick mosses on big tree in native forest, Fox Glacier; thick moss, grass, and white clover by roadside, Milford Sound (Hammer 1968).

ND, AK / MC, WD, FD.

L. rigidiseta Hammer, 1968 — nest of *Nestor notabilis*, Arthurs Pass (Hammer 1968).

— / NC-WD.

L. schusteri Hammer, 1968 — low ferns and mosses on wet soil near brook in deep cleft with tall trees, moss and needles under dead fir tree, and wet *Selaginella* under trees, Kerikeri; moist moss and liverworts on ground in native forest, Waitakere Range; dead leaves under trees in deep shadow by roadside, Waitomo; moist moss and liverworts on forest (?cypress) soil, Pauatahanui; luxuriant moss and liverworts under trees on riverbank, Hokitika (Hammer 1968).

ND, AK, WO, WN / WD.

L. schweizeri Hammer, 1968 — thick, moist moss on ground in *Nothofagus* forest, Lake Rotoiti; thick moss at foot of giant tree in native forest, Fox Glacier; thick moss on dead tree trunks and branches in *Nothofagus* forest, and luxuriant moss under shadowed ferns, Milford Sound (Hammer 1968).

— / BR, WD, FD.

L. sellnicki Hammer, 1968 — dead kauri leaves and wet mosses on ground in native forest, Puketi; thin moss on ground near brook in shadowed cleft, Kerikeri (Hammer 1968).

ND / —.

L. seydi Hammer, 1968 — thin layer of moist moss on ground near brook in deep cleft with shrubs and tall trees, Kerikeri (Hammer 1968).

ND / —.

L. strenzkei Hammer, 1968 — thick mosses, grass, and small ferns on ground near brook in deep, shadowed cleft, Kerikeri; dead leaves in shadow by roadside, Waitomo; thick, dry mosses, lichens, and *Lycopodium* in mixed manuka / *Nothofagus* forest a few hundred feet above Lake Rotoiti (Hammer 1968).

ND, WO / BR.

L. thori Hammer, 1968 — thin layer of moss on wet soil near brook in deep shadow, Kerikeri; moss and liverworts in native forest, Waitakere Range; mouldering leaves in small, shadowed cleft, Waitomo; mouldering *Nothofagus* leaves, Lake Rotoiti; moss on stone in brook rushing from Fox Glacier (Hammer 1968).

ND, AK, WO / BR, WD.

L. turki (Hammer, 1968) — moss and liverworts in cypress forest, Pauatahanui (Hammer 1968).

WN / —.

L. vanderhammeni Hammer, 1968 — mosses, ferns, and low plants carpeting ground near brook in deep, shadowed cleft with tall trees, and grass, moss, and dead leaves on slope of cleft, Kerikeri (Hammer 1968).

ND / —.

L. vaneki Hammer, 1968 — mouldering leaves, debris, and ferns on swampy ground in native forest, New Plymouth (Hammer 1968).

TK / —.

L. willmanni Hammer, 1968 (Figure 106) — moist *Polytrichum* and low plants on vertical slope near oozing water, Christchurch; thick, moist moss at foot of giant tree, and moss and dead leaves in native forest, Fox Glacier; dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1968).

— / MC, WD, FD.

L. woodringi Hammer, 1968 — thin layer of moss and small plants scraped from trunk of big tree in native forest, Puketi (Hammer 1968).

ND / —.

REMARKS. The status of genus *Lanceoppia* is currently not very satisfactory; it contains an assemblage of species which may later have to be reassigned. In order to avoid any proliferation of new genera until more is known of the fauna, the species are here keyed together under a widened generic diagnosis. Those with an asterisk in the key may confidently be considered as belonging to genus *Lanceoppia* in the strict sense.

Genus *Loboppia* Balogh, 1983: 39

Type-species *Oppia covarrubiasi* Hammer, 1968.

Oppiid mites without costulae; rostrum entire but with 2 membranous lobes at its tip; sensilli lanceolate; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

L. covarrubiasi (Hammer, 1968) (Figure 103) — moist penguin dung mixed with grass in penguin's nest, Dunedin (Hammer 1968).

— / DN.

Genus *Machuella* Hammer, 1961: 70

Type-species *Machuella ventrisetosa* Hammer, 1961.

Oppiid mites without costulae; rostrum entire; sensilli fusiform or capitate, with a long stalk; cristae long; notogastral setae numbering 10 pairs, setae *ta* present; epimeral setae long, directed medially; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

- 01 Cristae developed as 2 diverging lines on each side of notogaster, encompassing setae *te*, *ti*, and *r3*
... (Fig. 84) .. *pyriformis*
— Cristae developed as a single line on each side of notogaster, hardly reaching setae *te* ... *ventrisetosa*

M. pyriformis Hammer, 1968 (Figure 84) — dead leaves in cleft with tall trees, Waitomo (Hammer 1968).

WO / —.

M. ventrisetosa Hammer, 1961 — mosses on slope above small brook in deep shadow, Kerikeri; moist liverworts and moss on slope, Lake Tarawera, Rotorua (Hammer 1966); also New Plymouth, Pauatahanui, Nelson (Hammer 1968).

ND, BP, TK, WN / NN.

Genus *Membranoppia* Hammer, 1968: 25

Type-species *Membranoppia krivoluzkyi* Hammer, 1968.

Oppiid mites with costulae; rostrum entire; sensilli capitate, with a short stalk; bothridia covered with a narrow ribbon of membrane; cristae absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

01 Sensilli slender clubs, minutely pilose
on distal border ... *karppineni*
— Sensilli not pilose ... 2

02(01) Transcostula present
... (Fig. 98) ... *krivoluzkyi*
— Transcostula at best faint ... *sitnikovae*

M. karppineni Hammer, 1968 — moist moss by roadside in *Nothofagus* forest, Upper Takaka (Hammer 1968).

— / NN.

M. krivoluzkyi Hammer, 1968 (Figure 98) — thick *Leucobryum*(?) in *Nothofagus* forest, Lake Rotoiti; thick moss on dead branches in tree-fern forest, Milford Sound (Hammer 1968).

— / BR, FD.

M. sitnikovae Hammer, 1968 — moss on vertical slope grown with ferns, near Mirror Lake, Rotorua; moist to wet *Selaginella* in native forest, New Plymouth; dead leaves in native forest, Fox Glacier; wet moss in *Nothofagus* forest, Milford Sound (Hammer 1968).

BP, TK / WD, FD.

Genus *Microppia* Balogh, 1983: 25

Type-species *Damaeosoma minus* Paoli, 1908.

Oppiid mites without costulae; rostrum entire; sensilli short, capitate; cristae inconspicuous; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

01 Two ridges, and 1 pair of areoles,
medial to interlamellar setae
... (Fig. 92) ... *minutissima*

— No ridges, but 2 pairs of areoles,
medial to interlamellar setae ... *minus*

M. minus (Paoli, 1908 in the sense of Willmann, 1931) — moist moss on mouldering log in *Nothofagus* forest, Lake Rotoiti (Hammer 1968).

— / BR.

M. minutissima (Sellnick, 1950) (Figure 92) — restiad and fern peat soils, near Hamilton (Luxton 1982c, 1983a); Rukuhia and Kaipaki peat pasture soils, near Hamilton (Luxton 1982d, 1983b); moist liverworts and moss under trees on bank of Lake Tarawera, Rotorua (Hammer 1968); pasture soil, Nelson (Martin 1978); thin layer of moss on vertical roadside in shadow, Christchurch (Hammer 1968).

WO, BP / NN, MC.

Genus *Miroppia* Hammer, 1968: 18

Type-species *Miroppia zealandica* Hammer, 1968.

Oppiid mites with costulae represented by narrow lines and cristae by a broad arch; rostrum tripartite; sensilli short, capitate; lamellar setae absent, interlamellar setae very long; notogaster with 8 pairs of setae, setae *ta* present; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

M. zealandica Hammer, 1968 (Figure 86) — wet moss and liverworts on vertical slope above small brook in *Nothofagus* forest, Lake Rotoiti (Hammer 1968).

— / BR.

Nesoppia new genus

Type-species *Oppia tuxeni* Hammer, 1968.

Oppiid mites with distinct costulae and transcostula; rostrum entire; sensilli capitate, with a long stalk; cristae absent; interlamellar setae long; notogaster with 9 pairs of moderately long, smooth setae, setae *ta* missing; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; setae *ad3* preanal, *ad1* postanal; pori *iad* in apoanal position.

N. tuxeni (Hammer, 1968) (Figure 101) — thick, moist (?) *Leucobryum* in *Nothofagus* forest, Lake Rotoiti (Hammer 1968).

— / BR.

Genus *Operculoppia* Hammer, 1968: 22

Type-species *Operculoppia kunsti* Hammer, 1968.

Oppiid mites without costulae; rostrum entire; sensilli capitate; bothridia with opercula; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

O. kunsti Hammer, 1968 (Figure 79) — liverworts and *Leucobryum* on log in native forest, Waitakere Range (Hammer 1968).

AK / —.

Genus *Oppiella* Jacot, 1937: 356

Type-species *Eremaeus novus* Oudemans, 1902.

Oppiid mites with short, convergent costulae; rostrum entire; sensilli fusiform; cristae present or absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

- 01 Notogaster with conspicuous cristae ... *nova*
— Notogaster without conspicuous cristae ... 2
- 02(01) Chitinous ridges both above and below interlamellar setae ... (Fig. 90) .. *dubia*
— Chitinous ridges only below interlamellar setae ... *obsoleta*

O. dubia Hammer, 1962 (Figure 90) — moss and grass under *Eucalyptus* trees, grass, and *Hieracium* by roadside, and dead, moist *Selaginella* vegetation on forest soil, Kerikeri; moss and a little grass in native forest, Waitakere Range; thin moss and liverworts on slope behind hotel, Waitomo; moss and liverworts under trees on bank of Lake Tarawera, Rotorua; moss and grass on lawn under tall trees, New Plymouth (Hammer 1968).

ND, AK, WO, BP, TK / —.

O. nova (Oudemans, 1902) — restiad and fern peat soils, near Hamilton (Luxton 1982b, 1983a); Rukuhia and Kaipaki peat pastures, near Hamilton (Luxton 1982c, 1983b).
(?)Ubiquitous.

O. obsoleta (Paoli, 1908) — thin layer of moss and liverworts under trees on overgrown road, Kerikeri (Hammer 1968).

ND / —.

REMARKS. *O. nova* has been distinguished by Hammer (1968) as being the commonest oribatid in New Zealand, found everywhere, but most abundant in thick, moist mosses.

Genus *Oxyoppia* Balogh & Mahunka, 1969: 269

Type-species *Oppia spinosa* Hammer, 1958.

Oppiid mites with converging costulae connected by a transcostula; rostrum entire; sensilli fusiform, ciliate; cristae represented by 2 chitinous lobes opposite bothridia; notogaster with 10 pairs of notogastral setae, setae *ta* present; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

O. suramericana (Hammer, 1958) (Figure 82) — Kerikeri, Waitakere Range, Rotorua, Pauatahanui, Puppu Springs,

Lake Rotoiti, Christchurch, Hokitika, Fox Glacier, Milford Sound; most abundant at Puppu Springs in soaking wet (?) *Leucobryum*, grass, and watercress under manuka at edge of swamp (Hammer 1968).

ND, AK, BP, WN / NN, BR, WD, MC, FD.

Genus *Paroppia* Hammer, 1968: 19

Type-species *Paroppia lebruni* Hammer, 1968.

Oppiid mites without costulae; rostrum entire; sensilli lanceolate, long; cristae absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position; tibiae I each drawn out into a long process bearing a solenidion.

P. lebruni Hammer, 1968 (Figure 78) — moist moss on ground, and wet moss and liverworts on vertical slope above small brook, *Nothofagus* forest, Lake Rotoiti; dead leaves between logs in native forest, Fox Glacier; thick, moist moss on ground in *Nothofagus* forest, Milford Sound (Hammer 1968).

— / BR, WD, FD.

Genus *Pletzenoppia* Balogh, 1983: 36

Type-species *Oppia pletzenae* Kok, 1967.

Oppiid mites without costulae; rostrum entire; sensilli fusiform, unilaterally ciliate; cristae absent; notogaster with 9 or 10 pairs of setae, setae *ta* present or absent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

P. rafalskii (Hammer, 1968) (Figure 94) — thick, moist (?) *Leucobryum* in *Nothofagus* forest, Lake Rotoiti (Hammer 1968).

— / BR.

Genus *Polyoppia* Hammer, 1968: 9

Type-species *Polyoppia baloghi* Hammer, 1968.

Oppiid mites without costulae; rostrum entire; posterior margin of prodorsum with 2 pairs of condyles; sensilli setiform or slightly lanceolate; cristae absent; notogaster with 13 pairs of setae, setae *ta* present; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

P. baloghi Hammer, 1968 (Figure 80) — dead, moist leaves in cypress forest soil, Pauatahanui (Hammer 1968).

WN / —.

***Pravoppia* new genus**

Type-species *Oppia disjuncta* Wallwork, 1964.

Oppiid mites with well developed costulae and a disjunct transcostula; rostrum entire; integument

of interlamellar region developed in a series of transverse ridges; sensilli capitate; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; setae *ad3* preanal, *ad1* postanal; pori *iad* in apoanal position; aggenital setae midway between genital and anal plates, close to setae *ad3*; integument of epimeral region fenestrate or reticulate.

P. disjuncta (Wallwork, 1964) (Figure 100) — moss, Bee-man Hill, Campbell Island (Wallwork 1964a).

— / — / Campbell I.

Genus *Processoppia* Balogh, 1983: 57

Type-species *Oppia oudemansi* Hammer, 1968.

Oppiid mites with horseshoe-shaped costulae and transcostula; rostrum entire; sensilli lanceolate; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position; femora I and II each with a ventral protuberance bearing a seta.

P. oudemansi (Hammer, 1968) (Figure 72) — mouldering leaves on slope in native forest, New Plymouth (Hammer 1968).

TK / —.

Genus *Ptiloppia* Balogh, 1983: 28

Type-species *Oppiella bulanovae* Hammer, 1968.

Oppiid mites with short, complex costulae; rostrum tripartite; sensilli long, setiform, with long cilia; cristae reduced; notogaster with (?)8 pairs of setae, setae *ta* present; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

P. bulanovae (Hammer, 1968) (Figure 88) — luxuriant *Leucobryum*(?) under manuka in thermal area, Rotorua (Hammer 1968).

BP / —.

Genus *Quadroppia* Jacot, 1939: 323

Type-species *Notaspis quadricarinata*, Michael, 1885.

Oppiid mites with trapeziform costulae and transcostula; rostrum entire; sensilli short, capitate; cristae strongly developed, extending posteriorly to half or two-thirds length of notogaster; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 5 pairs; pori *iad* in adanal position.

01 Circumnotogastral ridge strong, originating solely from humeral cristae
... (Fig. 85) .. *circumita*

— Circumnotogastral ridge weak, originating both from humeral cristae and from points lateral to these

... *quadricarinata*

Q. circumita (Hammer, 1961) (Figure 85) — moss and liverworts on overgrown road under trees, Kerikeri; thick moss, white clover, and grass by roadside, Milford Sound (Hammer 1968).

ND / FD.

Q. quadricarinata (Michael, 1885) — Kerikeri, New Plymouth, Pauatahanui, Pupu Springs, and Lake Rototoi (Hammer 1968).

ND, TK, WN / NN, BR.

Genus *Ramusella* Hammer, 1962: 50

Type-species *Ramusella puertomonttensis* Hammer, 1962.

Oppiid mites without costulae; rostrum entire; sensilli pectinate; rostral setae densely pectinate in proximal half, the distal half slightly bent medially and smooth; cristae absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

R. sengbuschi Hammer, 1968 (Figure 87) — moist moss and grass under *Eucalyptus* hedge, and moist moss and grass on lawn, Kerikeri (Hammer 1968).

ND / —.

Genus alone recorded (queried) from Rukuhia peat pasture, near Hamilton (Luxton 1982d).

WO / —.

Genus *Rhaphoppia* Balogh, 1983: 57

Type-species *Oppia mihelcici* Hammer, 1968.

Oppiid mites with horseshoe-shaped costulae and transcostula; rostrum entire; sensilli lanceolate, long; cristae absent; notogaster with 9 pairs of setae, setae *ta* absent; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

R. mihelcici (Hammer, 1968) (Figure 76) — moss and grass near brook in deep cleft with tall vegetation, and moss, needles, and dead leaves under fir tree, Kerikeri; mouldering leaves under oak trees, New Plymouth; thick moss, grass, and low plants under tree fern, Pauatahanui; *Polytrichum* and low plants on vertical slope with oozing water, Christchurch (Hammer 1968).

ND, TK, WN / MC.

Genus *Setuloppia* Balogh, 1983: 39

Type-species *Oppia newelli* Hammer, 1968.

Oppiid mites with short costulae formed, with the transcostula, into a horseshoe shape; rostrum entire; sensilli setiform, sparsely ciliate; cristae absent;

notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position.

S. newelli (Hammer, 1968) (Figure 97) — moss and liverworts on soil, and moss on dead branches, native forest, Pauatahanui (Hammer 1968).

WN / —.

Genus *Solenoppia* Hammer, 1968: 20

Type-species *Solenoppia grandjeani* Hammer, 1968.

Ooppiid mites with horseshoe-shaped costulae and transcostula; interlamellar region with 2 small, chitinous hooks; rostrum entire; sensilli fusiform, unilaterally ciliate; cristae absent; notogaster with 9 or 10 setae, setae *ta* present or absent; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in apoanal position; solenidia of tarsi I and II, tibiae I–III, and genua III broad and short.

01 Length more than 200 μm ... *travei*
— Length less than 200 μm ... 2

02(01) Surface of prodorsum with a wrinkled appearance; seta *te* posterolateral to *ti* ... (Fig. 73) .. *grandjeani*
— Surface of prodorsum not wrinkled; setae *te* and *ti* at same level ... *tabertyi*

S. grandjeani Hammer, 1968 (Figure 73) — liverworts and small ferns on log in native forest, Waitakere Range; moist liverworts on wet clay on vertical slope by roadside in forest, and thick moss, grass, and small plants at foot of tree fern in native forest, Pauatahanui (Hammer 1968).

AK, WN / —.

S. tabertyi Hammer, 1968 — moss on slope above small brook shaded by tall trees, Kerikeri (Hammer 1968).

ND / —.

S. travei Hammer, 1968 — moist to wet (?) *Leucobryum* on slope, and wet liverworts and moss on vertical slope above small brook, *Nothofagus* forest, Lake Rotoiti; thick, moist moss in native forest, Lake Matheson; luxuriant moss on dead branches in tree-fern forest, and wet moss on stone in *Nothofagus* forest, Milford Sound (Hammer 1968).

— / BR, WD, FD.

Genus *Tripiloppia* Hammer, 1968: 10

Type-species *Tripiloppia aokii* Hammer, 1968.

Ooppiid mites with short, complex costulae; rostrum tripartite; sensilli pectinate; cristae inconspicuous or absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 4 pairs, aggenital setae 3 pairs, anal setae 2 pairs, adanal setae 3 pairs; pori *iad* in adanal position.

01 Anterior border of notogaster with prominent teeth ... 2
— Anterior border of notogaster without projections ... 3

02(01) Anterior border of notogaster with 2 teeth; tip of each sensillus branch reflexed ... *traegardhi*
— Anterior border of notogaster with 4 teeth; tips of sensillus branches not reflexed ... (Fig. 70) .. *aokii*

03(01) Length more than 600 μm ; costulae steeply inclined; lamellar setae set lateral to tip of costula ... *dalenii*
— Length less than 600 μm ; costulae not steeply inclined; lamellar setae set otherwise ... 4

04(03) Lamellar setae on costulae; oblique ridges connecting costulae with bothridia; 'S'-shaped ridges around interlamellar setae ... *forsslundi*
— Lamellar setae within inner apical edge of costulae; sculpturing of prodorsum not as above ... *tarraswahlbergi*

T. aokii Hammer, 1968 (Figure 70) — thick, moist moss on ground in native forest, Puketi; slightly moist moss under manuka, Waitakere Range; thick, slightly moist moss under manuka, thermal area, Rotorua; very thick, moist moss on ground, and wet moss and liverworts on vertical slope above brook, *Nothofagus* forest, Lake Rotoiti; moist to wet moss or liverworts on thick tree trunk covered by mosses in native forest, Fox Glacier (Hammer 1968).

ND, AK, BP / BR, WD.

T. dalenii Hammer, 1968 — mouldering leaves among dead tree trunks in native forest, and moss on a tree, Fox Glacier (Hammer 1968).

— / WD.

T. forsslundi Hammer, 1968 — in a river valley, Kerikeri (Hammer 1968).

ND / —.

T. tarraswahlbergi Hammer, 1968 — almost dry mosses under manuka, Pupu Springs (Hammer 1968).

— / NN.

T. traegardhi Hammer, 1968 — moss on steep slope above brook in deep shadow, and moss on mouldering tree trunk, Kerikeri (Hammer 1968).

ND / —.

Genus *Trizetes* Berlese, 1904: 26

Type-species *Trizetes pyramidalis* Berlese, 1904.

Ooppiid mites without costulae; prodorsum long, pointed; rostrum entire; sensilli pectinate; cristae absent; notogaster with 10 pairs of setae, setae *ta* present; genital setae numbering 5 pairs; epimeral

plates 3 and 4 conspicuously elongate; leg IV originating at a distance from leg III.

Recorded as genus only (Figure 81) from pasture on Taita hill soil, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).

REMARKS. Genus "*Oppia*" has been recorded from Rukuhia peat pasture, near Hamilton (Luxton 1982d); *Histiopteris* leaf litter, pohutukawa leaf litter near landing, and wet pohutukawa leaf litter near top of forest, Ohauora, White Island (Wise 1970); pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (MacMillan 1969); and pasture on Akatarawa hill soil, Hutt Valley (Adams 1971). *Oppia* in the strict sense does not occur in New Zealand, however, and the precise generic identity of these records cannot be ascertained.

Family SUCTOBELEBIDAE

Genus *Suctobelba* Paoli, 1908: 74

Type-species *Notaspis trigona* Michael, 1888.

Suctobelbid mites with several teeth on edges of rostrum and chitinous tubercles on prodorsum; lamellar setae originating near interlamellar setae.

- | | | |
|--------|--|-----------------------------------|
| 01 | Sensilli smooth | ... 2 |
| | — Sensilli pilose | ... 5 |
| 02(01) | Notogastral setae plumose | ... <i>plumata</i> |
| | — Notogastral setae smooth | ... 3 |
| 03(02) | Region of prodorsum lateral to bothridia set with small, pointed tubercles; lateral teeth of anterior edge of notogaster larger than middle pair | ... (Fig. 69) .. <i>nondivisa</i> |
| | — Not as above | ... 4 |
| 04(03) | Rostral teeth conspicuous, long, pointed, directed forwards | ... <i>falcata</i> |
| | — Rostral teeth inconspicuous, not all directed forwards | ... <i>longicurva</i> |
| 05(01) | Rostrum projecting forwards like a nose; lateral teeth on anterior border of notogaster more robust than inner teeth | ... <i>nasalis</i> |
| | — Rostrum not projecting forwards like a nose; teeth on anterior edge of notogaster subequal in size | ... <i>subcornigera</i> |

S. falcata Forsslund, 1941 — liverworts and small ferns on log in native forest, and moss in drier manuka scrub, Waitakere Range; moist moss and small ferns under

manuka, thermal area, Rotorua; thick moss, grass, and small plants in forest of tree ferns, Pauatahanui; thick moss in *Nothofagus* forest, and moss and lichens in manuka scrub, Lake Rotoiti (Hammer 1966).

AK, BP, WN / BR.

S. longicurva Hammer, 1966 — Kerikeri, Puketi, Waitakere Range, Waitomo, Rotorua, Pauatahanui, Pupu Springs, Fox Glacier, Queenstown, and Milford Sound; most numerous in slightly moist moss under manuka, Waitakere Range (Hammer 1966).

ND, AK, WO, BP, WN / NN, WD, OL, FD.

S. nasalis Forsslund, 1941 — moss, dead leaves, liverworts, *Selaginella*, and on the border of a swamp, Kerikeri; liverworts, moss, and dead leaves in tree fern forest, Waitomo; liverworts under manuka in thermal area, lawn at Forest Research Institute, and moist liverworts and moss on slope at Lake Tarawera, Rotorua; thick moss, white clover, and grass, Milford Sound (Hammer 1966).

ND, WO, BP / FD.

S. nondivisa Hammer, 1966 (Figure 69) — Kerikeri, Waitakere Range, Waitomo, Rotorua, New Plymouth, Pauatahanui, Pupu Springs, Queenstown, and Milford Sound; most numerous in moist moss and decaying leaves beneath manuka in thermal area, Rotorua, and slightly moist moss in native forest and under manuka, Waitakere Range (Hammer 1966).

ND, AK, WO, BP, TK, WN / NN, OL, FD.

S. plumata Hammer 1966 — slightly moist moss in manuka forest, Waitakere Range; slightly moist moss and dead leaves under manuka, thermal area, Rotorua; slightly moist moss in native forest, Lake Matheson (Hammer 1966).

AK, BP / WD.

S. subcornigera Forsslund, 1941 — moss, liverworts, and dead leaves, Kerikeri; also Lake Tarawera, Pupu Springs, Christchurch, Queenstown, and Milford Sound (Hammer 1966).

ND, BP / NN, MC, OL, FD.

Genus alone recorded from fern peat soils and from Kaipaki peat pasture, near Hamilton (Luxton 1983a,b).

Genus *Suctobelbilla* Jacot, 1937: 241

Type-species *Suctobelbilla punctillata* Jacot, 1937.

Suctobelbid mites with a medial tubercle on dorsosejugal suture; notogaster tuberculate and bearing 10 pairs of setae; genital setae numbering 6 pairs, anal setae 2 pairs.

S. dentata (Hammer, 1961) (Figure 67) — liverworts, moss, and debris on ground, Waitakere Range (Hammer 1966).

AK / —.

Genus *Zeasuctobelba* Hammer, 1966: 55

Type-species *Zeasuctobelba quinquenodosa* Hammer, 1966.

Suctobelbid mites lacking rostral teeth; notogaster bearing 10 pairs of setae; genital setae numbering

5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; distal joints of palps extended into threads bifurcate at tips.

01 Notogaster with 2 tubercles anteromedially ... 2
— Anterior border of notogaster without tubercles ... 3

02(01) Lateral teeth on anterior edge of notogaster well developed and overlapping notogaster as a keel; notogastrial setae overlapping base of setae immediately anterior to them; length less than 250 µm ... *quinquenodosa*
— Not as above ... *trinodosa*

03(01) Notogaster with a low, broad arch medially on anterior edge; sensilli club-shaped, rounded at tips ... *arcuata*
— Notogaster with no arch medially on anterior edge; sensilli lanceolate, the tips drawn out into long points ... (Fig. 68) .. *nodosa*

Z. arcuata Hammer, 1968 — moss and liverworts along track in native forest, Waitakere Range (Hammer 1968).
AK / —.

Z. nodosa Hammer, 1966 (Figure 68) — liverworts and moss on log in forest, Waitakere Range (Hammer 1966).
AK / —.

Z. quinquenodosa Hammer, 1966 — Nelson; wet sphagnum and thick moss near a spring in *Nothofagus* forest, Lake Rotoiti; moss and liverworts on ground and on trees in native forest, and thick, moist moss on ground in native forest, Lake Matheson; thick, moist moss on ground in native forest, and liverworts on decayed log under trees on seashore, Milford Sound (Hammer 1966).
— / NN, BR, WD, FD.

Z. trinodosa Hammer, 1966 — moss, pine needles, and dead leaves at foot of dead pine tree, Kerikeri (Hammer 1966); *Histiopteris* leaf litter, Ohauora, White Island (Wise 1970).
ND, BP / —.

Family TUPAREZETIDAE

Genus *Tuparezetes* Spain, 1969: 155

Type-species *Tuparezetes christineae* Spain, 1969.
Tuparezetid mites with large, paired spines on prodorsum; sensilli spheroidal; notogaster covered with a deep, white wax layer and bearing 9 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

01 Hysterosoma somewhat truncate posteriorly; median claw shorter than the 2 laterals; prodorsal spines short, conical ... *philodendrus*
— Hysterosoma not truncate posteriorly; median tarsal claw longer than the 2 laterals; prodorsal spines long, curved, closely appressed to dorsum ... (Fig. 65) .. *christineae*

T. christineae Spain, 1969 (Figure 65) — foliage of *Olearia colensoi* on Hinerua Ridge, Waipawa Saddle, Mt Wharite, and Rangiwahia Ski Club Hut area, Ruahine Range; Arête Stream basin, Tararua Range; Magister Ridge, Mt Fox, Strachan Range; Pillans Pass and Thomson Ridge, Stewart Island (Spain 1969).
RI, WN / WD, SL / SI.

T. philodendrus Spain, 1969 — foliage of *Olearia lacunosa*, Mt Robert; foliage of *Nothofagus solandri*, Hundalee Hills (Spain 1969).
— / NN, MB.

Superfamily OTOCEPHEOIDEA

Family OTOCEPHEIDAE

Genus *Clavazetes* Hammer, 1966: 86

Type-species *Clavazetes decorus* Hammer, 1966.

Otocephid mites with notogaster bearing 10 pairs of clavate setae; genital setae numbering 3 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; genital and anal fields widely separated; all tarsi with club-shaped setae; monodactylous.

C. decorus Hammer, 1966 (Figure 107) — luxuriant moss and liverworts on river bank in shadow under trees, Hokitika; dead leaves under tree ferns in *Nothofagus* forest, Milford Sound (Hammer 1966).
— / WD, FD.

Genus *Neotocepheus* Hammer, 1966: 68

Type-species *Neotocepheus colliger* Hammer, 1966.

Otocephid mites with 2 medial and 2 lateral condyles at posterior border of propodosoma; anterior border of hysterosoma with lateral tooth on each side; notogaster with 12 pairs of setae; genital setae numbering 3 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

N. colliger Hammer, 1966 (Figure 110) — moss and dead kauri leaves, Puketū (Hammer 1966).
ND / —.

Genus *Plenotocepheus* Hammer, 1966: 66

Type-species *Plenotocepheus mollicoma* Hammer, 1966.

Otocepheid mites with 2 condyles in middle of posterior border of propodosoma; anterior margin of hysterosoma with a large tooth on each side; notogaster with 14 pairs of setae; genital setae numbering 3 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

- 01 Length less than 700 μm ; notogaster with 2 condyles anteromedially; notogastral setae extraordinarily long
... *delicatissimus*
— Length more than 800 μm ; notogaster without condyles anteromedially
... (Fig. 109) .. *mollicoma*

P. delicatissimus Hammer, 1966 — debris and dead leaves near brook in deep shadow, Kerikeri (Hammer 1966).
ND / —.

P. mollicoma Hammer, 1966 (Figure 109) — luxuriant moss and small ferns by brook in deep shadow, and moss, debris, and dead leaves, Kerikeri (Hammer 1966).
ND / —.

Genus *Pseudotocepheus* Balogh, 1960: 23

Type-species *Pseudotocepheus pauliani* Balogh, 1960.

Otocepheid mites with 10 pairs of simple notogastral setae, 3 pairs of genital setae, 1 pair of aggenital setae, 2 pairs of anal setae, 3 pairs of adanal setae; monodactylous.

- 01 Notogastral setae conspicuously long, e.g., *h2* easily reaching base of *h1* ... 2
— Not as above ... *curtiseta*
- 02(01) Interlamellar setae slightly pectinate; fissure *iad* preanal ... *tenuiseta*
— Not as above ... 3
- 03(02) Length more than 900 μm ; dorsal notogastral setae arranged in 2 sub-parallel rows ... *punctatus*
— Length less than 800 μm ; dorsal notogastral setae not arranged in 2 parallel rows ... (Fig. 108) .. *foveolatus*

P. curtiseta Hammer, 1966 — thick, luxuriant moss and low ferns by small brook in deep shadow, Kerikeri (Hammer 1966).
ND / —.

P. foveolatus Hammer, 1966 (Figure 108) — dead leaves and moss near brook under tall trees, Kerikeri; moss and leaves on ground, Rotorua; almost dry moss under manuka, Pupū Springs (Hammer 1966).
ND, BP / NN.

P. punctatus Hammer, 1966 — dead leaves and moss on ground in *Nothofagus* forest, and liverworts on dead, rotten tree trunk, Milford Sound (Hammer 1966).
— / FD.

P. tenuiseta Hammer, 1966 — thick moss, small ferns, and dead leaves in native forest, Fox Glacier (Hammer 1966).

— / WD.

Superfamily POLYPTEROZETOIDEA

Family EUTEGAEIDAE

Genus *Bornebuschia* Hammer, 1966: 75

Type-species *Bornebuschia peculiaris* Hammer, 1966.

Eutegaeid mites with broad lamellar cuspis surrounding tongue-shaped central part of rostrum; pteromorphae broad, short, directed forwards; notogaster with 8 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; chelicerae elongate; monodactylous.

B. peculiaris Hammer, 1966 (Figure 117) — dead leaves and moist moss in *Nothofagus* forest, Lake Rotoiti; dead leaves in native forest, Lake Matheson (Hammer 1966).
— / BR, WD.

Genus *Compactozetes* Hammer, 1966: 76

Type-species *Compactozetes rotoruensis* Hammer, 1966.

Eutegaeid mites with lamellae fused anteriorly; tatoria very long and broad; lateral border of hysterosoma behind pteromorphae transparent; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

- 01 Length less than 500 μm ; tips of sensilli expanded ... (Fig. 118) .. *rotoruensis*
— Length about 1000 μm ; sensilli rod-shaped ... *niger*

C. niger Hammer, 1966 — moss and dead leaves on ground, Puketi; moist to wet moss on dead tree trunk, and moss and dead pine needles, Kerikeri; moss and a little grass in native forest, Waitakere Range; moist dead leaves, ferns, and debris, New Plymouth; moist dead leaves in *Nothofagus* forest, Lake Rotoiti; dead leaves and ferns in native forest, Fox Glacier; liverworts and dead *Nothofagus* leaves, Milford Sound (Hammer 1966).
ND, AK, TK / BR, WD, FD.

C. rotoruensis Hammer, 1966 (Figure 118) — slightly moist moss and fern on slope, Mirror Lake, and grass and *Scirpus* at soda spring, Lake Rotoehu, Rotorua (Hammer 1966).
BP / —.

Genus *Eutegaeus* Berlese, 1917: 62

Type-species *Oribata bostocki* Michael, 1908.

Eutegaeid mites with narrow, forward-projecting pteromorphae; lamellae large, almost horizontal, without an incurved apical tooth; notogaster with 9 pairs of setae; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

- 01 Interlamellar setae not reaching translamella ... 2
— Interlamellar setae reaching translamella ... 5
- 02(01) Setae emerging from posterior tubercles of hysterosoma shorter than dorsal notogastral setae ... 3
— Setae emerging from posterior tubercles of hysterosoma at least as long as dorsal notogastral setae ... 4
- 03(02) Lamellar setae, interlamellar setae, and 5 pairs of dorsal notogastral setae each with a thin membrane on outer edges ... *membraniger*
— Setae without membranes ... *bostocki*
- 04(02) Posterodorsal notogastral setae projecting only slightly beyond notogastral rim; posterior tubercles of hysterosoma touching ... *radiatus*
— Posterodorsal notogastral setae projecting beyond notogastral rim for half their length; posterior tubercles of hysterosoma separate ... (Fig. 115) .. *stylesi*
- 05(01) Dorsal notogastral setae pennate, arranged in a circle ... *pinnatus*
— Dorsal notogastral setae only slightly serrate, not arranged in a circle.. *curviseta*

E. bostocki (Michael, 1908) — Feilding (Michael 1908); semi-fossilised peat deposits, Campbell Island (Wallwork 1966).

WI / — / Campbell I.

E. curviseta Hammer, 1966 — slightly moist moss and dead leaves, thermal area, Rotorua; moss and dead leaves in native forest, Fox Glacier; thick, moist moss in native forest, Lake Matheson; dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1966).

BP / WD, FD.

E. membraniger Hammer, 1966 — dead leaves in native forest, Fox Glacier; dead leaves, Lake Matheson; dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1966).

— / WD, FD.

E. pinnatus Hammer, 1966 — dead leaves, Rotoehu Forest, Rotorua (Hammer 1966).

BP / —.

E. radiatus Hammer, 1966 — moss and a little grass in deep shadow, Waitakere Range (Hammer 1966).

AK / —.

E. stylesi Hammer, 1966 (Figure 115) — dead leaves of *Nothofagus*, Waipahihi Stream, Lake Taupo (Hammer 1966).

TO / —.

REMARKS. A further, unidentified, species in semi-fossilised form has been recorded by Wallwork (1966) from peat deposits at Tucker Cove, Campbell Island.

Genus *Neseutegaeus* Woolley, 1965: 384

Type-species *Neseutegaeus spinatus* Woolley, 1965.

Eutegaeid mites with large lamellae terminating in an incurved tooth; notogaster with 8 pairs of setae; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

- 01 Dorsal notogastral setae all of the same type ... 2
— Dorsal notogastral setae heterogeneous ... 4
- 02(01) Dorsal notogastral setae distended proximally, somewhat barbed ... (Fig. 116) .. *spinatus*
— Dorsal notogastral setae smooth ... 3
- 03(02) Dorsal notogastral setae narrow, arranged in a smooth, 'U'-shaped curve; no clear division between prodorsum and notogaster ... *consimilis*
— Dorsal notogastral setae distended, arranged otherwise; a conspicuous division between prodorsum and notogaster ... *distentus*
- 04(01) Three anterior pairs of dorsal notogastral setae sickle-shaped; 2 posterior pairs shaped like florets; space between lamellae narrow ... *angustus*
— Two anterior pairs of dorsal notogastral setae sickle-shaped; 3 posterior pairs clavate, smooth; space between lamellae broad ... *latus*

N. angustus Hammer, 1966 — dead leaves, Puketi; grass in thermal area, Rotorua; grass and low vegetation at roadside in mixed *Nothofagus* forest, Fox Glacier (Hammer 1966).

ND, BP / WD.

Family TUMEROZETIDAE

N. consimilis Hammer, 1966 — dripping wet moss and liverworts in *Nothofagus* forest, Lake Rotoiti (Hammer 1966).

— / BR.

N. distentus Hammer, 1966 — dead, humid leaves, Puketi; thick moss and dead leaves in native forest, Lake Matheson; moss and dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1966).

ND / WD, FD.

N. latus Hammer, 1966 — dead leaves, Puketi (Hammer 1966).

ND / —.

N. spinatus Woolley, 1965 (Figure 116) — McGraths Creek, Arthurs Pass; Alex Knob, Waiho; Lake Ianthe (Woolley 1965); thick moss and dead leaves, and liverworts on dead tree trunks in humid native forest, Fox Glacier; wet moss in *Nothofagus* forest, Milford Sound (Hammer 1966).

— / NC, WD, FD.

Genus *Nodocepheus* Hammer, 1958: 64

Type-species *Nodocepheus dentatus* Hammer, 1958.

Eutegaeid mites with a short, forward-directed humeral projection, notched anteriorly; notogastral setae numbering 6–8 pairs; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

N. dentatus Hammer, 1958 (Figure 113) — mosses and liverworts, and dripping wet moss in oozing water, Kerikeri; also Waitakere Range, Rotorua, Pauatahanui, Upper Takaka, Lake Rotoiti, Fox Glacier, Queenstown, and Milford Sound (Hammer 1966).

ND, AK, BP, WN / NN, BR, WD, OL, FD.

REMARKS. The lamellar setae of the New Zealand specimens are barbate, and Hammer (1966) designated the subspecies *barbatus* on this criterion.

Genus *Pterozetes* Hammer, 1966: 78

Type-species *Pterozetes novazealandicus* Hammer, 1966.

Eutegaeid mites with a very long, anteriorly directed pteromorph projection; lamellae broad and horizontal, fused anteriorly; genital setae numbering 6 pairs, aggenital setae 1 pair, adanal setae 3 pairs, anal setae possibly absent; monodactylous.

P. novazealandicus Hammer, 1966 (Figure 114) — leaves in Rotoehu Forest, Rotorua (Hammer 1966).

BP / —.

REMARKS. *P. novazealandicus* is the name given in Hammer's (1966) text, but the name *P. memorabilis* is given for this species in her figure legends. The latter name, which also appears in Spain & Luxton's (1971) catalogue, must be treated as a junior synonym.

Genus *Topalia* Balogh & Csiszar, 1963: 477

Type-species *Topalia problematica* Balogh & Csiszar, 1963.

Tumerozetid mites with wide lamellae covering most of prodorsum; lamellar and interlamellar setae very small; notogaster covered with cerotegument, with setae absent, minute, or few in number; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 2 pairs; monodactylous.

01 Lamellar setae on inner edge of cuspis; ridges on notogaster converging anteriorly and diverging posteriorly ... *granulata*
— Lamellar setae at midpoint on anterior edge of cuspis; ridges on notogaster not as above ... 2

02(01) Sensilli with heads disc-shaped, stalks hardly emerging from bothridia; lamellar cuspis one-third as long as lamellae; longitudinal ridges on notogaster short, subparallel ... *clavata*
— Sensilli without disc-shaped heads, stalks emerging from bothridia; lamellar cuspis one-quarter as long as lamellae; longitudinal ridges on notogaster long, divergent ... (Fig. 112) ... *velata*

T. clavata Hammer, 1966 — thick, wet moss on ground, Puketi; wet *Selaginella* and moss on tree trunk, New Plymouth; moss on dead tree trunk in native forest, Fox Glacier (Hammer 1966).

ND, TK / WD.

T. granulata Hammer, 1966 — dense moss in native forest, Lake Matheson (Hammer 1966).

— / WD.

T. velata Hammer, 1966 (Figure 112) — moist to wet moss on ground under tall vegetation, Kerikeri; liverworts on dead tree trunk in native forest, Waitakere Range (Hammer 1966).

ND, AK / —.

Genus *Tumerozetes* Hammer, 1966: 81

Type-species *Tumerozetes bifurcatus* Hammer, 1966.

Tumerozetid mites with propodosomal fields characteristically swollen; lateral sides of lamellae with 2 medially concave plates fused anteriorly; longitudinal ridges on notogaster more or less well developed, overlapping dorsosejugal suture; pteromorphae short, projecting forwards; notogaster with

10 pairs of setae around rim; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 2 pairs; monodactylous.

- 01 Central longitudinal ridges overlapping border of prodorsum and notogaster parallel, closely adjacent ... 2
 — Central ridges far apart ... 3
- 02(01) Medial borders of lamellar plates strongly chitinised ... *parallelus*
 — Medial borders of lamellar plates indistinct ... *indistinctus*
- 03(01) Lamellar plates curved and concave posteromedially; anterior edge of central ridges entire, strong, curving anteriorly to lamellar plates ... (Fig. 111) .. *circularis*
 — Not as above ... 4
- 04(03) Interlamellar setae and setae of notogastral dorsum bifurcate ... *bifurcatus*
 — Setae not bifurcate ... *pumilis*

T. bifurcatus Hammer, 1966 — liverworts and moss on dead tree trunk in native forest, Waitakere Range; thick, luxuriant moss on tree trunk in native forest, Fox Glacier; thick moss on dead branches in tree-fern forest, Milford Sound (Hammer 1966).
 AK / WD, FD.

T. circularis Hammer, 1966 (Figure 111) — thick, moist moss in native forest, Pauatahanui; moist moss on steep slope at 2000 feet, Port Hills, Christchurch (Hammer 1966).
 WN / MC.

T. indistinctus Hammer, 1966 — thick moss and liverworts on tree trunk, dead leaves and moss in native forest, and grass and low vegetation at roadside in native forest between beach and glacier, Fox Glacier (Hammer 1966).
 — / WD.

T. parallelus Hammer, 1966 — moist to wet, thick moss on rotten branch in *Nothofagus* forest, Milford Sound (Hammer 1966).
 — / FD.

T. pumilis Hammer, 1966 — moist liverworts and mosses on tree trunk, Waitakere Range (Hammer 1966).
 AK / —.

Cohort CIRCUMDEHISCENTIAE (Poronoticae)

Superfamily CERATOZETOIDEA AUSTRACHTERIIDAE new family

Ceratozetoid mites with lamellae and cuspis well developed, broad, covering most of prodorsum; translamella narrow, occasionally faint; lamellar setae inserted on ventral side of cuspis; anterolateral border of immobile pteromorphae reaching as

far forward as anterior border of notogaster; notogastral setae numbering 10 pairs, sacculi 3 or 4 pairs, genital setae 6 pairs, anal setae 2 pairs; number of claws variable.

Genus *Austrachipteria* Balogh & Mahunka, 1966: 599

Type-species *Austrachipteria lamellata* Balogh & Mahunka, 1966.

Austrachipteriid mites with large lamellae covering greater part of prodorsum; pteromorphae immobile; notogaster lacking areae porosae but with 3 or 4 pairs of sacculi and 10 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; number of claws variable.

- 01 Length less than 500 µm; tarsi heterodactylous ... *lobatus*
 — Length 500–700 µm ... 2
 — Length more than 800 µm ... 5
- 02(01) Monodactylous ... 3
 — Tridactylous ... 4
- 03(02) Cuspis with 1 tooth ... *bidentatus*
 — Cuspis with 2 teeth ... *quadridentatus*
- 04(02) Lamellae meeting at midpoint ... *furcatus*
 — Lamellae not meeting at midpoint ... *macrodentatus*
- 05(01) With a conspicuous horizontal translamella ... *giganteus*
 — Without a conspicuous horizontal translamella ... 6
- 06(05) Teeth of lamellar cuspis sharp, diverging ... *maximus*
 — Teeth of lamellar cuspis not diverging; medial tooth broad, rounded ... (Fig. 121) .. *grandis*

A. bidentatus (Hammer, 1967) — Puketi, Waitakere Range, Rotorua, New Plymouth, Pauatahanui, and Lake Matheson; found in huge numbers at Rotorua in low, moist mosses and in dead leaves on ground in thermal area (Hammer 1967).
 ND, AK, BP, TK, WN / WD.

A. furcatus (Hammer, 1967) — moist grass, moss, and dead leaves in native forest, Waitakere Range; thick moss in native forest, and dead leaves in shadowed cleft at roadside, Waitomo; dead leaves in native forest, New Plymouth (Hammer 1967).
 AK, WO, TK / —.

A. giganteus (Hammer, 1967) — dead leaves at Waipahihi Stream, north-east of Invercargill (Hammer 1967).
 — / SL.

A. grandis (Hammer, 1967) (Figure 121) — thin moss and lichens on trees and dead branches, and luxuriant moss on rimu tree, Puketi; cleft with water, Kerikeri Falls; dead leaves, Waitomo; dry moss on ground and in dead leaves, thermal area, Rotorua; lawns at Forest Research Institute, Whakarewarewa; dead leaves, and in moss on tree in native forest, New Plymouth; thick, moist moss on log in *Nothofagus* forest, Lake Rotoiti; dead leaves in native forest, Lake Matheson; moist moss on log, and dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1967); fern peat soils, near Hamilton (Luxton 1983a).

ND, WO, BP, TK / BR, WD, FD.

A. lobatus (Hammer, 1967) — thick moss in native forest, Lake Matheson (Hammer 1967).

— / WD.

A. macrodentatus (Hammer, 1967) — dead leaves, Kaiangaroa State Forest, Rotorua (Hammer 1967, Styles 1967). BP-TO / —.

A. maximus (Hammer 1967) — nest of *Nestor notabilis*, Arthurs Pass (Hammer 1967).

— / NC-WD.

A. quadridentatus (Hammer, 1967) — slightly moist, dead leaves in *Nothofagus* forest, Lake Rotoiti; dense mosses, small ferns, and dead leaves in native forest, and drier vegetation of grass and low plants outside forest, Fox Glacier (Hammer 1967).

— / BR, WD.

Family CERATOZETIDAE

Genus *Ceratozetes* Berlese, 1908: 4

Type-species *Oribata gracilis* Michael, 1884.

Ceratozetid mites with 10 or 11 pairs of notogastral setae and 4 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous or tridactylous.

01 Length more than 500 μm ... *gracilis*
— Length less than 400 μm ... 2

02(01) Interlamellar setae reaching beyond rostrum ... (Fig. 133) .. *bicornis*
— Interlamellar setae not reaching beyond rostrum ... 3

03(02) Anterior edge of notogaster with a considerable forward curve between interlamellar setae; rostrum rounded ... *hamobatooides*
— Anterior edge of notogaster without a considerable curve between interlamellar setae; rostrum sharply pointed ... *mediocris*

C. bicornis Hammer, 1967 (Figure 133) — fern peat soils, near Hamilton (Luxton 1983a); wet moss on stone in small, shadowed pond with goldfish, Forest Research

Institute, Whakarewarewa; wet, thick moss, *Mimulus*, low *Juncus*, and grass near a spring, Lake Moke, Queenstown (Hammer 1967).

WO, BP / OL.

C. gracilis (Michael, 1884) — moss on ground near small stream in deep cleft with tall trees, in mosses on rotten tree trunk, in dead leaves, and in dead fir needles, moss, and liverworts at roadside in shadow, Kerikeri; moss and grass under bushes in garden, Waitakere Range; moist liverworts and moss on slope, Lake Tarawera; moss and grass on lawn in park, New Plymouth (Hammer 1967).

ND, AK, BP, TK / —.

C. hamobatooides Hammer, 1967 — wet, low-growing *Scirpus*, Lake Matheson; wet liverworts and moss in ditch along road, Fox Glacier (Hammer 1967).

— / WD.

C. mediocris Berlese, 1908 — moist moss under bushes on lawn, and moist grass and *Hieracium* at roadside, Kerikeri (Hammer 1967).

ND / —.

Genus *Edwardzetes* Berlese, 1914: 85

Type-species *Oribata edwardsi* Nicolet, 1855.

Ceratozetid mites with 10 pairs of notogastral setae and 4 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

E. novazealandicus Hammer, 1967 (Figure 132) — Kerikeri, Waitomo, Rotorua, New Plymouth, Pauatahanui, Lake Rotoiti, Hokitika, Fox Glacier, and Milford Sound; usually in moist mosses, and especially abundant in thick moss under trees on riverbank at Hokitika (Hammer 1967).

ND, WO, BP, TK, WN / BR, WD, FD.

REMARKS. The records of *E. andicola* and *E. dentifer* for New Zealand in Spain & Luxton (1971) are erroneous.

Genus *Macrogena* Wallwork, 1966: 872

Type-species *Macrogena monodactyla* Wallwork, 1966.

Ceratozetid mites with edge of anterior notogastral tectum behind anterior border of pteromorphae; notogaster with 10 pairs of setae and 4 pairs of small areae porosae; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs, monodactylous.

01 Length more than 300 μm ; heads of sensilli smooth; outer teeth of lamellar cuspis longer than inner ones ... *monodactyla*

— Length less than 300 μm ; heads of sensilli set with small bristles; teeth of lamellar cuspis subequal in length ... 2

Family MYCOBATIDAE

Genus *Antarctozetes* Balogh, 1961: 288

Type-species *Oribata crozetensis* Richters, 1908.

Mycobatid mites with a characteristic ring partly surrounding rostrum; notogastral setae (?10) reduced to alveoli; notogaster with 4 pairs of areae porosae; genital setae numbering 5 or 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 2 pairs; tridactylous.

01 Lamellar setae short, not reaching tip of rostrum ... *luteus*
— Lamellar setae at least reaching tip of rostrum ... 2

02(01) Interlamellar setae not reaching translamella ... *intermedius*
— Interlamellar setae projecting beyond translamella ... (Fig. 128) .. *longicaulis*

A. intermedius (Hammer, 1967) — in a cleft and in wet moss on stone in river, and moss and lichens on tree about 1 m from stream, Kerikeri; on path at freezing works, and on water pipe, Moerewa; moss on tree trunk, Waitomo; wet moss on stone in pond with goldfish, Whakarewarewa; moss on ground in *Nothofagus* forest, Lake Rotoiti; moist moss and low plants on slope with oozing water, Christchurch; thick liverworts and dead leaves on ground in native forest, Fox Glacier (Hammer 1967); foliage of *Olearia colensoi* (precise localities not known) (Spain & Harrison 1968).

ND, WO, BP / BR, WD, MC.

A. longicaulis (Hammer, 1967) (Figure 128) — rotten pohutukawa log, Ohauora, White Island (Wise 1970); wet moss on stone in pond with goldfish, Rotorua; moist moss on dead tree trunk in *Nothofagus* forest, Lake Rotoiti; liverworts and moss on river bank under trees, Hokitika; moist moss and grass, *Carex*, and *Ranunculus* at roadside, Fox Glacier (Hammer 1967).

BP / BR, WD.

A. luteus (Hammer, 1967) — by a river, and in moss and lichens on tree, Kerikeri; liverworts and moss on tree trunk in native forest, Waitakere Range; liverworts, moss, and dead leaves in tree fern forest, and in deep cleft and moss on tree trunk, Waitomo; moss on stone in pond, Whakarewarewa; moss and dead leaves in native forest, and moss on dead tree trunk, Fox Glacier (Hammer 1967).

ND, AK, WO, BP / WD.

Genus *Baloghobates* Hammer, 1967: 31

Type-species *Baloghobates nudus* Hammer, 1967.

Mycobatid mites with a narrow or incomplete translamella; notogaster with 9 or 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

01 Length less than 900 μm ; sensilli broadly capitate, with a short stalk ... (Fig. 127) .. *nudus*
— Length more than 1000 μm ; sensilli minutely capitate, with a long stalk ... *parvoglobosus*

B. nudus Hammer, 1967 (Figure 127) — green foliage of low bush vegetation in redwood forest, Whakarewarewa; green foliage in *Pinus radiata* forest (Kaingaroa), Rotorua; green foliage, Anzac Park, Palmerston North; green foliage, 'Treelands', Himatangi; green foliage in State Forest, Tapanui (Hammer 1967).
BP, WI, WN / SL.

B. parvoglobosus Hammer, 1967 — in *Nestor notabilis* nest, Arthurs Pass (Hammer 1967).
— / NC-WD.

Genus alone recorded from restiad and fern peat soils, near Hamilton (Luxton 1982c, 1983a).

WO / —.

Genus *Cryptobothria* Wallwork, 1963: 757

Type-species *Cryptobothria monodactyla* Wallwork, 1963.

Mycobatid mites with anterior notogastral tectum covering bothridia and sensilli; notogaster with 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering 3 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

C. monodactyla Wallwork, 1963 (Figure 124) — litter of *Colobanthus muscoides*, *Stilbocarpa*, and *Pleurophyllum*, and herbfield plants at Douglas Point, Plateau, and Garden Cove, Macquarie Island (Wallwork 1963, Watson 1967).

— / — / Macquarie I.

Genus *Mycozetes* Spain, 1968: 516

Type-species *Mycozetes oleariae* Spain, 1968.

Mycobatid mites with a tripartite rostrum; notogaster with 9 pairs of setae and 4 pairs of areae porosae; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

M. oleariae Spain, 1968 (Figure 123) — foliage of *Olearia colensoi* at Mt Manuoha and Mt Whakataka, Huiarau Range; Waipawa Saddle, Rangiwahia Ski Club Hut area, and Mt Wharite, Ruahine Range; Mt Fox and Magister Ridge (Spain 1968, Spain & Harrison 1968).

GB, RI / WD.

Genus *Neomycobates* Wallwork, 1963: 760

Type-species *Neomycobates tridentatus* Wallwork, 1963.

Mycobatid mites with anterior notogastral tectum covering bothridia and much of sensilli; notogaster

with 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering 6 pairs; aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

N. tridentatus Wallwork, 1963 (Figure 126) — *Poa foliosa* leaves and green algae on coastal rocks at Hasselborough Bay, Tent Hill, and Garden Cove, Macquarie Island (Wallwork 1963, Watson 1967).

— / — / Macquarie I.

Genus *Punctoribates* Berlese, 1908: 6

Type-species *Oribates punctum* Koch, 1839.

Mycobatid mites with anterior notogastral tectum projecting forward into interlamellar region; notogastral setae (?10) reduced to alveoli; notogaster with 4 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

- 01 Anterior edge of notogaster produced into a horned process and extending beyond lamellar tips
... (Fig. 9, 125) .. *manzanoensis*
— Anterior edge of notogaster not as above ... (Fig. 8) .. *punctum*

P. manzanoensis Hammer, 1958 (Figures 9 and 125) — wet moss on stone in stream, and moist to wet moss on edge of swamp, Kerikeri (Hammer 1967).

ND / —.

P. punctum (Koch, 1839) (Figure 8) — moss on lawn, and moss and grass at roadside, Kerikeri; moss and grass under bushes in garden, Waitakere Range (Hammer 1967); pasture on Taita hill soil, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971); moss and grass on lawn, Nelson (Hammer 1967).

ND, AK, WN / NN.

Genus alone recorded from Rukuhia and Kaipaki peat pastures, near Hamilton (Luxton 1982d, 1983b).

WO / —.

ONYCHOBATIDAE new family

Ceratozetoid mites with a tectum on anterior edge of notogaster; translamella represented by a chitinous scale; pteromorphae not hinged, immobile; notogaster with 10 pairs of setae and 1 pair of areae porosae; heterodactylous (tarsi I–III monodactylous, IV bidactylous); genital setae numbering 6 pairs, anal setae 2 pairs.

Type-genus *Onychobates* Hammer, 1967.

Genus *Onychobates* Hammer, 1967: 23

Type-species *Onychobates nidicola* Hammer, 1967.

Onychobatid mites with true pteromorphae, lamellae, and cuspis; translamella represented by a chitinous scale; notogaster with 10 pairs of setae and 1 pair of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; heterodactylous.

O. nidicola Hammer, 1967 (Figure 122) — nest of *Gerygone igata*, Arthurs Pass (Hammer 1967).

— / NC-WD.

RAMSAYELLIDAE new family

Ceratozetoid mites with no tectum on anterior edge of notogaster; translamella an undulating line; pteromorphae hinged; notogaster lacking areae porosae and sacculi; tridactylous; notogastral setae numbering 13 pairs; genital setae numbering 6 pairs; anal setae numbering 2 pairs.

Type-genus *Ramsayellus* Balogh, 1972.

Genus *Ramsayellus* Balogh, 1972: 107

Type-species *Zealandobates grandis* Hammer, 1967.

Ramsayellid mites with no tectum on anterior edge of notogaster; translamella an undulating line; notogaster with 13 pairs of setae but lacking areae porosae and sacculi; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

R. grandis (Hammer, 1967) (Figure 119) — Puketi (Hammer 1968); moist grass and moss on ground near small stream in deep cleft with tall trees, Kerikeri; green foliage, 'Treelands', Himatangi; branches, Balmoral, Christchurch (Hammer 1967).

ND, WN / MC.

REMARKS. By directive of the International Commission on Zoological Nomenclature, genus *Ramsayellus* is ascribed to Balogh (1972), who first published a generic diagnosis under this new name. Hammer (1967) described *R. grandis*, although the name is ascribed to Ramsay in her paper.

Superfamily GALUMNOIDEA

Family GALUMNIDAE

Genus *Acrogalumna* Grandjean, 1956: 135

Type-species *Oribates longiplumus* Berlese, 1904.

Galumnid mites with a single chitinous line on each side of prodorsum; notogastral setae absent; notogaster without a median pore (females) or with several in a group (males); tridactylous.

A. longipluma (Berlese, 1904) (Figure 140) — thin layer of lichens and moss on rotten branch on ground, moss and grass on lawn, and moist to wet moss in bog, Kerikeri; moss and *Medicago* by roadside, Waitomo; thin layer

of moss on slope at town reservoir, Nelson (Hammer 1968).

ND, WO / NN.

Genus *Allogalumna* Grandjean, 1936: 105

Type-species *Galumna alamellae* Jacot, 1935.

Galumnid mites with a single chitinous line on each side of prodorsum; notogastral setae absent; notogaster with 1 median pore; tridactylous.

A. novazealandica Hammer, 1968 (Figure 139) — mouldering leaves under trees in cleft by roadside, Waitomo (Hammer 1968).

WO / —.

Genus *Galumna* von Heyden, 1826: 612

Type-species *Notaspis alatus* Hermann, 1804.

Galumnid mites with 2 chitinous lines on each side of prodorsum; lamellar setae originating between each pair of lines.

- 01 Notogaster set with tubercles; lamellar setae extremely long (overtopping rostrum), flagellate
... (Fig. 137) .. *scaber*
— Notogaster smooth; lamellar setae not overtopping rostrum ... 2

- 02(01) Length more than 1000 µm; lamellar setae smooth; pteromorphae with an oblique fissure ... *microfissum*
— Length less than 700 µm; lamellar setae pilose; pteromorphae without a fissure ... *rugosa*

G. microfissum Hammer, 1968 — thin layer of lichens and moss on dead branch, and moss on ground, Kerikeri; forest litter, Waiuku; moist mosses and small ferns on slope under manuka, thermal area, Rotorua; mouldering leaves under oak trees, New Plymouth; dead, mouldering *Nothofagus* leaves, Lake Rotoiti; thick moss, grass, and white clover by roadside, Milford Sound (Hammer 1968).

ND, AK, BP, TK / BR, FD.

G. rugosa Hammer, 1968 — thick carpet of mosses and small ferns near brook in deep cleft with shrubs and tall trees, and lichens and moss on dead tree trunk, Kerikeri; forest, pine wood, and citrus plantation, Bay of Islands; wet *Scirpus* near Soda Spring, Lake Rotoehu, Rotorua (Hammer 1968).

ND, BP / —.

G. scaber Hammer, 1968 (Figure 137) — thick moss on log in native forest, Fox Glacier (Hammer 1968).
—/ WD.

Genus alone recorded from Rukuhia and Kaipaki peat pastures, near Hamilton (Luxton 1982d, 1983b) and from pasture on Taita hill soil, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).

WO, WN / —.

Genus *Pergalumna* Grandjean, 1936: 106

Type-species *Oribates nervosus* Berlese, 1914.

Galumnid mites with 2 chitinous lines on each side of prodorsum; lamellar setae originating medial to each pair of lines; notogastral setae absent; tridactylous.

- 01 Area porosa postanal round; subintegumental channels at dorsosejugal suture tubercular
... (Fig. 138) .. *silvestris*
— Area porosa postanal oblong; subintegumental channels at dorsosejugal suture not tubercular ... 2
- 02(01) Dorsosejugal suture conspicuous; *Aa* reniform; subintegumental channels at dorsosejugal suture branched ... *reniformis*
— Dorsosejugal suture inconspicuous; *Aa* round; subintegumental channels not branched ... *remota*

P. remota (Hammer, 1968) — thick carpet of mosses and low ferns on wet soil near brook in deep cleft with tall vegetation, luxuriant moss on ground, and lichens and moss on dead branches, Kerikeri; moss, liverworts, and dead leaves in native forest, and moss in drier part of forest under manuka, Waitakere Range; thin, almost dry moss on ground, moist moss and small plants, and under manuka, thermal area, Rotorua (Hammer 1968).
ND, AK, BP / —.

P. reniformis Hammer, 1968 — thin moss on ground under manuka, thermal area, Rotorua (Hammer 1968).
BP / —.

P. silvestris Hammer, 1968 (Figure 138) — thick moss at foot of huge tree, and moss and dead leaves, native forest, Fox Glacier (Hammer 1968).
— / WD.

Genus alone recorded from fern peat soils, near Hamilton (Luxton 1983a).
WO / —.

Family PARAKALUMMIDAE

Genus *Neoribates* Berlese, 1914: 128

Type-species *Oribates roubali* Berlese, 1910.

Parakalummid mites with true lamellae; notogaster with sacculi.

N. barbatus Hammer, 1968 (Figure 136) — moss, liverworts, and mouldering leaves, Waitomo; thick *Sphagnum*, wet moss, and liverworts on vertical slope above small brook, *Nothofagus* forest, Lake Rotoiti; thick moss in native forest, Lake Matheson; liverworts on rotten log under trees, Milford Sound (Hammer 1968).

WO / BR, WD, FD.

Genus *Porokalumma* Wallwork, 1966: 18

Type-species *Sandenia rotunda* Wallwork, 1963.

Parakalummid mites with 4 pairs of areae porosae on notogaster; pteromorphae indented; anterior-most pair of adanal setae located posterolateral to adanal fissure.

P. rotunda (Wallwork, 1963) (Figure 135) — *Puccinellia macquariensis*, *Colobanthus muscoides*, *Poa hamiltoni*, algae, rockhopper penguin nest material, and *Stilbocarpa* litter at Nuggets Point, Aerial Cove, Garden Cove, North Head, Buckles Bay, Wireless Hill, and Caroline Valley, Macquarie Island (Wallwork 1963, Watson 1967).

— / — / Macquarie I.

Superfamily MICROZETOIDEA

Family MICROZETIDAE

Genus *Cuspitiegula* Hammer, 1966: 94

Type-species *Cuspitiegula stellifer* Hammer, 1966.

Microzetid mites with lamellae covering whole surface of prodorsum; notogaster with (?)7 pairs of setae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

C. stellifer Hammer, 1966 (Figure 141) — wet leaves and moss on ground, Puketi; shadowed moss on wet ground near brook, Kerikeri (Hammer 1966).

ND / —.

Superfamily ORIBATELLOIDEA

Family ORIBATELLIDAE

Genus *Lamellobates* Hammer, 1958: 100

Type-species *Lamellobates palustris* Hammer, 1958.

Oribatellid mites with broad lamellae bordered on inner edges by chitinous thickening and meeting medially at a knob-like process; notogaster with 10 pairs of setae and a few sacculi; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

L. palustris Hammer, 1958 (Figure 143) — thick, moist moss under manuka, thermal area, Rotorua (Hammer 1967).

BP / —.

Family TEGORIBATIDAE

Paraphysobates new genus

Type-species *Physobates monodactylus* Hammer, 1966.

Tegoribatid mites with lamellae fused into a shield covering almost the whole prodorsum; sensilli with

a swelling in middle of stalks; pteromorphae moveable; notogaster with 6 pairs of alveoli, 3 pairs of setae on posterior border, and 4 pairs of areae porosae; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 2 pairs; monodactylous.

P. monodactylus (Hammer, 1966) (Figure 142) — moss and dead leaves, Puketi and Waitakere Range; moss and ferns on slope with tall trees, Mirror Lake, Rotorua; wet moss and liverworts in swamp grown with *Scirpus* in native forest, Pauatahanui; dead leaves in *Nothofagus* forest, Upper Takaka; thick moss on tree trunk, and wet moss and liverworts in native forest, Fox Glacier; dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1966).

ND, AK, BP, WN / NN, WD, FD.

Superfamily ORIBATULOIDEA

Family HAPLOZETIDAE

Genus *Angullozetes* Hammer, 1967: 58

Type-species *Angullozetes rostratus* Hammer, 1967.

Haplozetid mites lacking a distinct dorsosejugal suture; notogaster with 10 pairs of minute setae and 3 pairs of areae porosae; genital setae numbering 3 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

A. rostratus Hammer, 1967 (Figure 145) — Kerikeri (Hammer 1968); thick mosses and decaying leaves in native forest, Fox Glacier; dead leaves in *Nothofagus* forest, and wet moss on rotten branch, Milford Sound (Hammer 1967).

ND / WD, FD.

Genus *Lauritzenia* Hammer, 1958: 83

Type-species *Lauritzenia longipluma* Hammer, 1958.

Haplozetid mites with lamellae reaching almost to base of rostral setae; notogaster with 10 pairs of setae and 4 pairs of sacculi; many setae of prodorsum and notogaster accompanied by a pore; pteromorphae moveable; genital setae numbering 4 or 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous (both New Zealand species) or monodactylous.

- 01 Length less than 500 μ m; rostrum pointed; sensilli thread-like along entire length ... *acutirostrum*
— Length more than 600 μ m; rostrum rounded; sensilli thread-like, but with tiny, expanded heads ending in points ... (Fig. 149) .. *rotundirostrum*

L. acutirostrum Hammer, 1968 — lichen and moss on rotten branch under trees, Kerikeri (Hammer 1968).

ND / —.

L. rotundirostrum Hammer, 1968 (Figure 149) — thin layer of moss and small plants scraped from bark of big tree, Puketi (Hammer 1968).

ND / —.

Genus *Magnobates* Hammer, 1967: 30

Type-species *Magnobates flagellifer* Hammer, 1967.

Haplozetid mites without translamella or cuspis; notogaster with 10 pairs of setae and 4 pairs of sacculi; pteromorphae moveable; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous, the lateral claws with an inner subsidiary tooth.

M. flagellifer Hammer, 1967 (Figure 150) — Puketi (Hammer 1968); thin moss on lawn, Kerikeri (Hammer 1967).

ND / —.

REMARKS. The specific epithet is erroneously spelled “*flagelliger*” in the text of Hammer (1968).

Genus *Peloribates* Berlese, 1908: 3

Type-species *Oribata peloptoides* Berlese, 1888.

Haplozetid mites with 14 pairs of long notogastral setae and 4 pairs of sacculi; genital setae numbering 5 pairs, aggenital setae 1–3 pairs, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

01 Sensilli capitate ... (Fig. 147) .. *fragilis*
— Sensilli lanceolate ... *magnisetosus*

P. fragilis Hammer, 1967 (Figure 147) — green foliage below tall redwood trees, Forest Research Institute, Whakarewarewa; moss on dead tree trunk in native forest, New Plymouth; nest of *Gerygone igata*, Arthurs Pass; thick, moist moss and liverworts on tree trunk in native forest, Fox Glacier (Hammer 1967).

BP, TK / NC, WD.

P. magnisetosus Hammer, 1967 — thick, green carpet of wet mosses and small ferns near brook in deep, shadowed cleft, Kerikeri (Hammer 1967); Rukuhia peat pasture, near Hamilton (Luxton 1982d).

ND, WO / —.

REMARKS. *P. magnisetosus* is ascribed to Ramsay by Hammer (1967), although no description was ever formally published by him.

Genus *Rostrozetes* Sellnick, 1925: 84

Type-species *Rostrozetes foveolatus* Sellnick, 1925.

Haplozetid mites with dorsosejugal suture in 3 arches; notogaster with 14 pairs of setae and 4 pairs

of sacculi; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

R. foveolatus Sellnick, 1925 (Figure 148) — moist moss and small ferns under manuka, thermal area, Rotorua (Hammer 1967).

BP / —.

Sicaxylobates new genus

Type-species *Xylobates sicafer* Hammer, 1968.

Haplozetid mites with broad, branched setae on femora I and II and tarsi I–III; sensilli thread-like; notogaster with 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

S. sicafer (Hammer, 1968) (Figure 151) — luxuriant moss and grass on lawn, Kerikeri (Hammer 1968).

ND / —.

Genus *Totobates* Hammer, 1961: 110

Type-species *Totobates discifer* Hammer, 1961.

Haplozetid mites lacking a distinct dorsosejugal suture; notogaster with 10 pairs of conspicuous setae and 3 pairs of areae porosae; genital setae numbering 3 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

01 Length more than 500 μ m ... *acutissimus*
— Length 400–500 μ m ... 2
— Length less than 400 μ m ... 3

02(01) Interlamellar setae not reaching tip of rostrum ... *elegans*
— Interlamellar setae reaching or exceeding tip of rostrum ... *anareensis*

03(01) Lamellar setae projecting beyond tip of rostrum ... 4
— Lamellar setae not projecting beyond tip of rostrum ... 7

04(03) Lamellar and rostral setae pilose; sensilli with heads and part of stalks projecting free of notogaster ... (Fig. 146) .. *capita*
— Lamellar and rostral setae smooth; sensilli with stalks and part of heads covered by anterior edge of notogaster ... 5

05(04) Claws long and slender; claw II nearly as long as tarsus II ... *macroonyx*
— Claws normal ... 6

06(05) Distance between *r1* setae equal to distance between *p1* setae ... *communis*

- Distance between *r1* setae twice distance between *p1* setae ... *ovalis*
- 07(03) Lamellar setae minute ... *microseta*
— Lamellar setae conspicuous ... 8
- 08(07) Length less than 300 µm ... *minus*
— Length more than 300 µm ... 9
- 09(08) Areae porosae subequal in size ... *antarcticus*
— Area porosa *A3* smaller than either *Aa* or *A2* ... *latus*

T. acutissimus (Hammer, 1967) — *Nestor notabilis* nest, Arthurs Pass (Hammer 1967).
— / NC-WD.

T. anarensis (Dalenius & Wilson, 1958) — *Colobanthus* cushion, Macquarie Island (Dalenius & Wilson 1958, Dalenius 1965); *Colobanthus muscoides*, *Poa annua*, *P. hamiltoni*, *P. foliosa* and litter, *Puccinellia macquariensis*, *Agrostis magellanica* and soil, *Stilbocarpa* and litter, nest material, dung and soil, soil with feathers, algae, and *Azorella* at Garden Cove, Wireless Hill, Handspike Point, Catch-me Point, Isthmus, Aerial Cove, Camp Hill, Nuggets Point, North Head, Langdon Point, Green Gorge, Caroline Valley, Subplateau, Plateau, Scoble Lake, and Lambing Gully, Macquarie Island (Wallwork 1963, Watson 1967).

— / — / Macquarie I.

T. antarcticus Wallwork, 1966 — Puketi (Hammer 1968); moss, lichens, liverworts, and decaying leaves, usually in *Nothofagus* forest, Kerikeri; also Waitakere Range, New Plymouth, Pauatahanui, Lake Rotoiti, Fox Glacier, and Milford Sound (Hammer 1967); moss, Beeman Hill, Campbell Island (Wallwork 1961, 1964a).

ND, AK, TK, WN / BR, WD, FD / Campbell I.

T. capita Hammer, 1968 (Figure 146) — thick moss and lichens on log under trees, and moss and liverworts on overgrown road in deep shadow, Kerikeri; moss and grass under bushes in garden on edge of forest, Waitakere Range (Hammer 1968).

ND, AK / —.

T. communis Hammer, 1967 — Kerikeri (Hammer 1968); moss and liverworts in native forest, Waitakere Range; decaying leaves under trees at roadside, Waitomo; thick moss with bone-dry lichens and *Lycopodium* in open manuka scrub and *Nothofagus* forest a few hundred feet above Lake Rotoiti (Hammer 1967).

ND, AK, W0 / BR.

T. elegans (Hammer, 1958) — *Stilbocarpa* litter, *Pleurophyllum* litter, albatross nest material, and herbfield plants at Handspike Point and Plateau, Macquarie Island (Wallwork 1963, Watson 1967).

— / — / Macquarie I.

T. latus Hammer, 1967 — liverworts and moss on log in native forest, Waitakere Range; moist to wet sphagnum near a spring in *Nothofagus* forest, Lake Rotoiti; decaying leaves and small ferns on ground in native forest, Fox

Glacier; thick moss by Lake Matheson; liverworts on dead branch in *Nothofagus* forest, Milford Sound (Hammer 1967).

AK / BR, WD, FD.

T. macroonyx Hammer, 1967 — dripping wet moss in *Nothofagus* forest, Lake Rotoiti (Hammer 1967).

— / BR.

T. microseta Hammer, 1968 — moist, brown *Polytrichum* and small plants on vertical slope near oozing water, Christchurch (Hammer 1968).

— / MC.

T. minus Hammer, 1967 — thick moss at foot of huge tree, decaying leaves, and moss on tree trunks, in native forest, Fox Glacier; thick moss, Lake Matheson (Hammer 1967).

— / WD.

T. ovalis Hammer, 1967 — moss, liverworts, and dead leaves, usually in native forest, at Kerikeri, Waitakere Range, Waitomo, Rotorua, New Plymouth, Pauatahanui, Upper Takaka, Fox Glacier, Lake Matheson, and Milford Sound (Hammer 1967); wet pohutukawa leaf litter at top of forest, Ohauora, White Island (Wise 1970).

ND, AK, WO, BP, TK, WN / NN, WD, FD.

Genus alone recorded from restiad and fern peat soils, near Hamilton (Luxton 1982c, 1983a); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971); semi-fossilised peat deposits, Tucker Cove, Campbell Island (Wallwork 1966); and from foliage and litter of *Olearia colensoi* (precise localities not known) (Spain & Harrison 1968).

WO, WN / — / Campbell I.

REMARKS. *T. acutissimus* was originally described in genus *Maculobates*.

Genus *Xylobates* Jacot, 1929: 429

Type-species *Oribates lophotrichus* Berlese, 1904.

Haplozetid mites with thread-like sensilli, somewhat expanded at tip; notogaster with 10 or 11 pairs of setae and 4 pairs of areae porosae; genital setae numbering 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

X. capucinus (Berlese, 1908) (Figure 152) — moist to wet luxuriant moss on ground in dense, entangled shrub vegetation, Kerikeri (Hammer 1967).

ND / —.

Family NEOTRICHOSZETIDAE

Genus *Neotrichozetes* Travé, 1961: 374

Type-species *Notaspis spinulosa* Michael, 1908.

Neotrichozetid mites with 32–35 pairs of extremely long notogastral setae and 8 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

N. spinulosa (Michael, 1908) (Figure 144) — moist moss on ground under tall trees near small brook, Kerikeri; luxuriant moss and liverworts on tree trunk in tree fern forest, Waitomo; wet liverworts on dead branch on mountainside with *Nothofagus* forest, Milford Sound (Hammer 1966).

ND, WO / FD.

REMARKS. Michael (1908) gave no precise details of location or habitat.

Family ORIBATULIDAE

Genus *Crassoribatula* Hammer, 1967: 46

Type-species *Crassoribatula maculosa* Hammer, 1967.

Oribatulid mites with short lamellae lacking cuspis and translamella; anterior border of notogaster concave; notogaster with tubercles, 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

C. maculosa Hammer, 1967 (Figure 162) — dead leaves and moss under manuka, thermal area, Rotorua; green foliage of understorey vegetation in redwood forest, Whakarewarewa; green foliage, 'Treelands', Himatangi; moss on decaying tree trunk in *Nothofagus* forest, Lake Rotoiti (Hammer 1967).

BP, WN / BR.

Genus *Ingella* Hammer, 1967: 48

Type-species *Ingella bullager* Hammer, 1967.

Oribatulid mites with an indistinct dorsosejugal suture; lamellae without cuspis; notogaster with 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering 2 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

I. bullager Hammer, 1967 (Figure 158) — thick moss on dead tree trunk in shadow, Waitomo; green foliage of understorey vegetation in redwood forest, Forest Research Institute, Whakarewarewa; green foliage, Rotoehu State Forest, Rotorua; on ground, Anzac Park, Palmerston North; thick moss, low plants on vertical slope at roadside, and wet moss and liverworts in depression grown with *Scirpus* in native forest, Pauatahanui; thick moss and liverworts on river bank in shadow, Hokitika (Hammer 1967); Milford Sound (Hammer 1968); foliage of *Olearia colensoi* (precise localities not known) (Spain & Harrison 1968).

WO, BP, WI, WN / WD, FD.

Genus alone recorded from bark on rotting pohutukawa, and *Coprosma* leaf litter, Ohauora, White Island (Wise 1970).

BP / —.

Genus *Liebstadia* Oudemans, 1906: 101

Type-species *Notaspis similis* Michael, 1888.

Oribatulid mites with 10 pairs of notogastral setae and 4 pairs of areae porosae; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

L. similis (Michael, 1888) (Figure 159) — grass and white clover on bank of small stream, Pauatahanui; moss, grass, and *Medicago* at roadside, Hokitika (Hammer 1967).

WN / WD.

Genus *Maculobates* Hammer, 1961: 61

Type-species *Maculobates longiporosus* Hammer, 1961.

Oribatulid mites lacking a distinct dorsosejugal suture; notogaster with 10 pairs of setae and 3 or 4 pairs of areae porosae; genital setae numbering 3 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

01 Length more than 500 μ m ... 2
— Length 400–500 μ m ... 3
— Length less than 400 μ m ... 4

02(01) Sensilli with broad heads ... *luteomarginatus*
— Sensilli with narrow heads ... *magnus*

03(01) Interlamellar setae not reaching tip of rostrum ... *vulgaris*
— Interlamellar setae reaching or exceeding tip of rostrum ... *luteus*

04(01) Notogastral setae long, all reaching base of nearest adjacent seta ... (Fig. 6, 7) .. *longipilosus*
— Notogastral setae short, none reaching base of nearest adjacent seta ... 5

05(04) Seta *r1*, pore *ip*, and area porosa *A3* close together in a group ... *minor*
— Not as above ... *longus*

M. longipilosus Hammer, 1967 (Figures 6 and 7) — by a river, in a steep cleft, Kerikeri; thick layer of slightly moist moss or (?)liverworts under manuka, thermal area, Rotorua (Hammer 1967).

ND, BP / —.

M. longus Hammer, 1967 — Kerikeri (Hammer 1968); thick moss and liverworts under trees on river bank, Hokitika; thick moss on dead branches in tree-fern forest, and in thick moss, white clover, and grass at roadside, Milford Sound (Hammer 1967); foliage of *Olearia colensoi* (precise localities not known) (Spain & Harrison 1968).

ND / WD, FD.

M. luteomarginatus Hammer, 1967 — thick liverworts and dead leaves on ground in native forest, Fox Glacier (Hammer 1967); also Christchurch and Milford Sound (Hammer 1968).

—/ MC, WD, FD.

M. luteus Hammer, 1967 — thick moss and liverworts on tree trunk in native forest, Waitomo (Hammer 1967).

WO / —.

M. magnus Hammer, 1967 — decaying leaves in native forest, Lake Matheson (Hammer 1967).

— / WD.

M. minor Hammer, 1967 — moss on rimu tree, Puketi; (?) liverworts under tree fern in deep shadow, Waitomo; moss and liverworts in depression with *Scirpus* in native forest, Pauatahanui; almost dry moss under manuka, Pupu Springs; thick moss and liverworts on tree trunk in native forest, Fox Glacier; moist to wet moss on rotten branch on ground in *Nothofagus* forest, Milford Sound (Hammer 1967); also Kerikeri and Waitakere Range (Hammer 1968).

ND, AK, WO, WN / NN, WD, FD.

M. vulgaris Hammer, 1967 — moss on lawn, Forest Research Institute, Whakarewarewa; moist, decaying leaves, wet liverworts, and thin mosses on dead branches in native forest, Pauatahanui (Hammer 1967).

WN / —.

Genus alone recorded from foliage of *Olearia colensoi* (precise localities not known) (Spain & Harrison 1968).

Genus *Sellnickia* Oudemans, 1927: 268

Type-species *Notaspis caudata* Michael, 1908.

Oribatulid mites with posterior edge of hysterosoma drawn out into a conical extension; notogaster with setae (10 pairs?) reduced to alveoli and 4 pairs of areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs; adanal setae 3 pairs; tridactylous.

S. caudata (Michael, 1908) (Figure 161) — green leaves, Rotoehu State Forest, Rotorua (Hammer 1966); foliage of *Nothofagus solandri*, Hundalee Hills (Spain & Harrison 1968).

BP / MB.

REMARKS. Michael (1908) gave no precise details of location or habitat.

Genus *Zygoribatula* Berlese, 1917: 317

Type-species *Oribatula connexa* Berlese, 1904.

Oribatulid mites with 13 pairs of notogastral setae and 4 pairs of areae porosae; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

01 Notogaster striate ... 2
— Notogaster not striate ... 3

02(01) Lamellar cusps well developed;
length more than 500 µm ... *magna*
— No lamellar cusps; length less than
500 µm ... *connexa*

03(01) Rostrum pointed; at most only anterior notogastral setae pilose
... (Fig. 160) ... *novazealandica*
— Rostrum rounded; all notogastral
setae pilose ... *terricola*

Z. connexa (Berlese, 1904) — Rukuhia and Kaipaki peat pastures, near Hamilton (Luxton 1982d, 1983b); wet liverworts and mosses under bushes on river bank, and liverworts on vertical slope, Pauatahanui (Hammer 1967).
WO, WN / —.

Z. magna Ramsay, 1966 — clover / ryegrass pasture, Silverstream (Ramsay 1966a).
WN / —.

Z. novazealandica Hammer, 1967 (Figure 160) — on slope with plantation, Kerikeri (Hammer 1967).
ND / —.

Z. terricola van der Hammen, 1952 — pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971).
WN / —.

REMARKS. Manson (1959) records "*Z. ?connexa*" from ryegrass pasture near Palmerston North.

Family SCHELORIBATIDAE

Genus *Campbellobates* Wallwork, 1964: 601

Type-species *Campbellobates acanthus* Wallwork, 1964.

Schelorbitid mites with bothridia covered by anterior edge of notogaster; notogaster with 10 pairs of setae and 1 or 2 pairs of sacculi; genital setae numbering 4 pairs, aggenital setae absent, anal setae 1 pair, adanal setae 3 pairs; monodactylous.

01 Integument with porose
microsculpture ... 2
— Integument smooth ... 3

02(01) Rostrum mid-dorsally with an indentation containing a small, sclerotised lobe ... *acanthus*
— Rostrum without a mid-dorsal indentation ... *aureus*

03(01) Rostrum incised laterally; hysterosoma hourglass-shaped
... (Fig. 153) ... *latohumeralis*
— Rostrum entire; sides of hysterosoma more nearly parallel ... *occultus*

C. acanthus Wallwork, 1964 — Beeman Hill, Campbell Island (Wallwork 1964b).

— / — / Campbell I.

C. aureus Hammer, 1967 — mosses below ferns in shadow near beach, Milford Sound (Hammer 1967).

— / FD.

C. latohumeralis Hammer, 1967 (Figure 153) — moist to wet liverworts on big tree trunk in native forest, Fox Glacier; wet liverworts and moss on rotten branch in *Nothofagus* forest, mosses on ground, and mosses on stone, Milford Sound (Hammer 1967).

— / FD.

C. occultus Hammer, 1967 — luxuriant moss on dead tree trunk in native forest, Fox Glacier (Hammer 1967); foliage of *Olearia colensoi* (precise localities not known) (Spain & Harrison 1968).

— / WD.

Genus *Grandjeanobates* Hammer, 1967: 36

Type-species *Grandjeanobates novaezealandicus* Hammer, 1967.

Scheloribatid mites with exceptionally elongate and narrow pteromorphae; notogaster with 10 pairs of setae and 4 pairs of sacculi; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

G. novaezealandicus Hammer, 1967 (Figure 155) — Puketi and Kerikeri (Hammer 1968); moist moss and dead leaves, and liverworts, moss, and small ferns on dead tree trunk in native forest, Waitakere Range; liverworts and moss on slope, Lake Tarawera; moss on tree trunk in native forest, New Plymouth (Hammer 1967).

ND, AK, BP, TK / —.

REMARKS. Hammer (1967) ascribed this genus to Ramsay, but no description was ever formally published by him. Ramsay (1960) recorded a subfossil specimen of Scheloribatidae from “industrial bore holes” in the Hutt Valley which may be a species of *Grandjeanobates*.

Genus *Incabates* Hammer, 1961: 108

Type-species *Incabates nudus* Hammer, 1961.

Scheloribatid mites with 8 pairs of setal alveoli, 2 pairs of setae, and 4 pairs of sacculi on notogaster; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

I. angustus Hammer, 1967 (Figure 156) — Puketi and Kerikeri (Hammer 1968); liverworts and small ferns on dead tree trunk in native forest, Waitakere Range; moss on tree trunk in native forest, New Plymouth (Hammer 1967).

ND, AK, TK / —.

Genus *Scheloribates* Berlese, 1908: 2

Type-species *Zetes latipes* Koch, 1844.

Scheloribatid mites with 10 pairs of notogastral setae and 4 pairs of sacculi; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

01 Length more than 500 μm ... 2
— Length 400–500 μm ... 4
— Length less than 400 μm ... 7

02(01) Lamellar and interlamellar setae smooth ... *pacificus*
— Lamellar and interlamellar setae somewhat pilose ... 3

03(02) Lamellar setae with a distinct curved ridge between bases ... *crassus*
— Lamellar setae without a ridge between bases ... *anzacensis*

04(01) Tridactylous ... 5
— Monodactylous ... 6

05(04) Anterior edge of pteromorphae sloping posteriorly; sensilli fusiform ... *maoriensis*
— Anterolateral edges of pteromorphae jutting forwards; sensilli lanceolate ... *aequalis*

06(04) Tips of sensilli produced into long threads ... (Fig. 157) ... *keriensis*
— Tips of sensilli not produced into long threads ... *conjuges*

07(01) Sensilli smooth, capitate; interlamellar setae flagelliform, reaching beyond tip of rostrum ... *flagellatus*
— Sensilli pilose, lanceolate; interlamellar setae not reaching beyond tip of rostrum ... *zealandicus*

S. aequalis Hammer, 1967 — Kerikeri and Waitakere Range (Hammer 1968); dry moss under manuka, thermal area, Rotorua (Hammer 1967).
ND, AK, BP / —.

S. anzacensis Hammer, 1967 — Puketi and Kerikeri (Hammer 1968); on ground, Anzac Park, Palmerston North (Hammer 1967).
ND, WI / —.

S. conjuges Hammer, 1967 — thick, moist moss on ground near small stream in deep cleft with tall trees, Kerikeri (Hammer 1967); wet pohutukawa leaf litter at top of forest, Ohauora, White Island (Wise 1970).
ND, BP / —.

S. crassus Hammer, 1967 — wet and moist sites at Puketi, Kerikeri, Waitakere Range, New Plymouth, Pauatahanui, Nelson, Upper Takaka, Lake Rotoiti, Fox Glacier, Milford Sound, and Dunedin (Hammer 1967).

ND, AK, TK, WN / NN, BR, WD, FD, DN.

S. flagellatus Wallwork, 1966 — moss, Beeman Hill, Campbell Island (Wallwork 1966).

— / — / Campbell I.

S. keriensis Hammer, 1967 (Figure 157) — thick, wet carpet of small ferns and mosses near small stream in deep cleft grown with tall trees, Kerikeri (Hammer 1967).

ND / —.

S. maoriensis Hammer, 1968 — thick green moss under manuka, thermal area, Rotorua (Hammer 1968).

BP / —.

S. pacificus Hammer, 1967 — luxuriant moss and liverworts under trees on river bank, and dry moss, grass, and *Medicago* at roadside, Hokitika (Hammer 1967).

— / WD.

S. zealandicus Hammer, 1967 — Puketi and Rotorua (Hammer 1968); Kerikeri; moist to wet *Sphagnum* near a spring in *Nothofagus* forest, and wet moss and liverworts on vertical slope above small stream in *Nothofagus* forest, Lake Rotoiti (Hammer 1967).

ND, BP / BR.

Genus alone recorded from pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969).

WN / —.

Genus *Setobates* Balogh, 1962: 122

Type-species *Setobates magnus* Balogh, 1962.

Schelioribatid mites with a striate, punctulate notogaster bearing 13 pairs of setae and 4 pairs of sacculi; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

- 01 Length less than 500 µm; borders of pteromorphae clearly demarcated, striped ... *schelioribatoides*
— Length more than 500 µm; borders of pteromorphae not strongly demarcated ... (Fig. 4, 5) .. *medius*

S. medius Hammer, 1967 (Figures 4 and 5) — Puketi (Hammer 1968); near river, and in thin layer of moss and lichens on tree near small stream in shadowed cleft, Kerikeri (Hammer 1967); Waitakere Range and Waitomo (Hammer 1968).

ND, AK, WO / —.

S. schelioribatoides (Ramsay, 1966) — Kerikeri Falls (Hammer 1967); Waitomo and Rotorua (Hammer 1968); moss, grass, and white clover on lawn shaded by tall trees in former native forest, New Plymouth; bitten-off grass and white clover on bank of small stream, Pauatahanui (Hammer 1967); clover/ryegrass pasture, Silverstream

(Ramsay 1966a); moss and grass on lawn, Nelson (Hammer 1967); pasture, Nelson (Martin 1978).

ND, WO, BP, TK, WN / NN.

REMARKS. There appear to be no real differences between *S. medius* and *S. discors* Hammer, 1967, as the small extra seta on the pteromorph edge of *S. discors* appears from Hammer's discussion to be an aberration on a single specimen. I propose that *S. discors* should be relegated to synonymy. *S. minor*, described by Hammer (1967), was subsequently synonymised with *S. schelioribatoides* by Hammer (1968).

Genus *Zeaschelorbates* Luxton, 1982: 325

Type-species *Zeaschelorbates palustris* Luxton, 1982.

Schelioribatid mites with 9 pairs of notogastral setae and 3 or 4 pairs of sacculi; genital setae numbering 3 pairs, aggenital setae absent, anal setae 2 pairs, adanal setae 3 pairs; monodactylous.

Z. palustris Luxton, 1982 (Figure 154) — restiad and fern peat soils, near Hamilton (Luxton 1982a, c, 1983a).

WO / —.

Superfamily PASSALOZETOIDEA

Family PASSALOZETIDAE

Genus *Paraphauloppia* Hammer, 1967: 45

Type-species *Paraphauloppia novaezealandica* Hammer, 1967.

Passalozetid mites with costulae; dorsosejugal suture indistinct; lenticulus absent; notogaster with 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering (?3) pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

P. novaezealandica Hammer, 1967 (Figure 164) — thick moss and bone-dry lichens and *Lycopodium* in open manuka and *Nothofagus* forest a few hundred feet above Lake Rotoiti (Hammer 1967).

— / BR.

Genus *Subphauloppia* Hammer, 1967: 44

Type-species *Subphauloppia dentonyx* Hammer, 1967.

Passalozetid mites lacking costulae; dorsosejugal suture distinct and arched; lenticulus absent; notogaster with 10 pairs of setae and 4 pairs of areae porosae; genital setae numbering 4 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

S. dentonyx Hammer, 1967 (Figure 165) — decaying leaves on shadowed slope above small stream, Kerikeri; wet moss and liverworts in small depression grown with

Scirpus near small stream in open forest, Pauatahanui; wet liverworts on dead branch in *Nothofagus* forest, Milford Sound (Hammer 1967).

ND, WN / FD.

Family SCUTOVERTICIDAE

Genus *Scutovertex* Michael, 1879: 241

Type-species *Scutovertex sculptus* Michael, 1879.

Scutoverticid mites with a quadrate lenticulus anteriorly on notogaster; notogaster with 9 pairs of setae and 2 pairs of minute areae porosae; genital setae numbering 6 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs; tridactylous.

S. sculptus Michael, 1879 (Figure 163) — moss and grass on lawns, and at roadsides, Kerikeri; also Waitomo, Rotorua, New Plymouth, and Nelson (Hammer 1966); Rukuhia and Kaipaki peat pastures, near Hamilton (Luxton 1982d, 1983b); pastures on Taita hill soil and Pomare silt loam, DSIR Soil Bureau Experimental Station, Lower Hutt (McMillan 1969); pasture on Akatarawa hill soil, Hutt Valley (Adams 1971).

ND, WO, BP, TK, WN / NN.

REMARKS. Hammer (1966) and Luxton (1982d, 1983b) record *Scutovertex minutus* (Koch) from New Zealand, and indeed *S. sculptus* and *S. minutus* are considered by some authorities to be synonymous. However, Strenzke (1943) and van der Hammen (1952) have established that the two species are separate. Van der Hammen (1952) remarks that "Koch described and figured the hairs at the posterior border of the hysterosoma as thin" (for *Cepheus minutus*). Thus, the *S. minutus* figured by Hammer (1966) and recorded by Luxton (1982d, 1983b) is probably *S. sculptus*.

Superfamily PELOPOIDEA

Family PELOPIDAE

Genus *Nesopelops* Hammer, 1973: 28

Type-species *Pelops punctatus* Hammer, 1966.

Pelopid mites with a broad, truncate notogaster bearing (?)7–10 pairs of setae situated more or less around circumference; genital setae numbering 6 pairs, aggenital setae absent, anal setae 2 pairs, adanal setae 2 pairs; monodactylous.

01 Sensilli pilose; interlamellar setae striate; setae *m*₃ similar in form to other notogastral setae

... (Fig. 166) .. *punctatus*

— Sensilli smooth; interlamellar setae smooth; setae *m*₃ different in form to other notogastral setae ... *monodactylus*

N. monodactylus (Hammer, 1966) — dead leaves, Puketi; dead leaves and moss in tree-fern forest, moss and liverworts on tree trunk, and dead leaves under tree outside forest, Waitomo; moist, dead leaves in mixed forest, Pauatahanui (Hammer 1966).

ND, WO, WN / —.

N. punctatus (Hammer, 1966) (Figure 166) — grass, moss, lichens, dead leaves, and on branches under shrubs and trees, Kerikeri; moss, dead leaves, and liverworts, Waitakere Range; dead leaves and moss, thermal area, Rotorua; moist, dead leaves in *Nothofagus* forest, Upper Takaka; thick moss in *Nothofagus* forest, Lake Rototiti; dead leaves in *Nothofagus* forest, Milford Sound (Hammer 1966).

ND, AK, BP / NN, BR, FD.

REMARKS. *N. punctatus* is ascribed to Ramsay by Hammer. However, since the first formally published description of the species is that of Hammer (1966), the species must be ascribed to her.

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APPENDIX: Species other than mites mentioned in text, and their family affiliation

(Recording authors' nomenclature has been cited as originally published, but family-group names are those currently recognised.)

- Agathis australis* (kauri) — Araucariaceae
- Agrostis magellanica* — Poaceae
- albatross; see *Diomedea* spp.
- Azorella* — Hydrocotylaceae
- Carex* sp. (sedge) — Cyperaceae
- Colobanthus muscoides* — Caryophyllaceae
- Coprosma* sp. — Rubiaceae
- cormorant; see *Phalacrocorax* sp.
- Cotula plumosa* — Asteraceae
- Cupressus* sp. (cypress) — Cupressaceae
- cypress; see *Cupressus* sp.
- Dacrydium cupressinum* (rimu) — Podocarpaceae
- Diomedea* spp. (albatrosses, mollymawks) — Diomedidae
- Eucalyptus* sp. — Myrtaceae
- Eudyptes crestatus* (rockhopper penguin) — Spheniscidae
- Gerygone igata* (grey warbler) — Muscicapidae
- hard beech; see *Nothofagus truncata*
- Hieracium* sp. — Asteraceae
- Histiopteris* sp. — Pteridaceae
- Hymenanthera chathamica* — Violaceae
- Juncus* sp. (rush) — Juncaceae

kauri; see *Agathis australis*

- Lemna* sp. (duckweed) — Lemnaceae
- Leptospermum scoparium* (manuka) — Myrtaceae
- Leucobryum* sp. — Dicranaceae
- Lolium perenne* (ryegrass) — Poaceae
- Lycopodium* sp. — Lycopodiaceae
- manuka; see *Leptospermum scoparium*
- Medicago* sp. — Papilionaceae
- Metrosideros excelsa* (pohutukawa) — Myrtaceae
- Mimulus* sp. — Scrophulariaceae
- mollymawk; see *Diomedea* spp.
- Muehlenbeckia australis* (pohuehue) — Polygonaceae
- Myrsine chathamica* — Myrsinaceae
- Nasturtium* sp. (watercress) — Brassicaceae
- Neopanax* sp. — Araliaceae
- Nestor notabilis* (kea) — Nestoridae
- Nothofagus solandri* (black beech) — Fagaceae
- Nothofagus truncata* (hard beech) — Fagaceae
- Olearia colensoi* (leatherwood) — Asteraceae
- Olearia lacunosa* — Asteraceae
- Olearia traversii* — Asteraceae
- Phalacrocorax* sp. (cormorant, shag) — Phalacrocoracidae
- Phormium tenax* (New Zealand flax) — Agavaceae
- Phyllocladus trichomanoides* (tanekaha) — Podocarpaceae
- Pinus radiata* (radiata pine) — Pinaceae
- Pleurophyllum* sp. — Asteraceae
- Poa annua* — Poaceae
- Poa foliosa* — Poaceae
- Poa hamiltoni* — Poaceae
- pohutukawa; see *Metrosideros excelsa*
- Polytrichum* sp. — Polytrichaceae
- Puccinellia macquariensis* — Poaceae
- Puffinus griseus* (muttonbird) — Procellariidae
- Ranunculus* sp. — Ranunculaceae
- redwood; see *Sequoia* sp.
- Rhizoclonium* sp. — Cladophoraceae
- rimu; see *Dacrydium cupressinum*
- rockhopper penguin; see *Eudyptes crestatus*
- ryegrass; see *Lolium perenne*
- Scirpus* sp. — Cyperaceae
- Selaginella* sp. — Selaginellaceae
- Sequoia* sp. — Taxodiaceae
- Sphagnum* sp. — Sphagnaceae
- Stilbocarpa* sp. — Araliaceae
- tanekaha; see *Phyllocladus trichomanoides*
- tree ferns — Cyatheaceae
- Trifolium repens* (white clover) — Papilionaceae
- watercress; see *Nasturtium* sp.
- white clover; see *Trifolium repens*

ILLUSTRATIONS

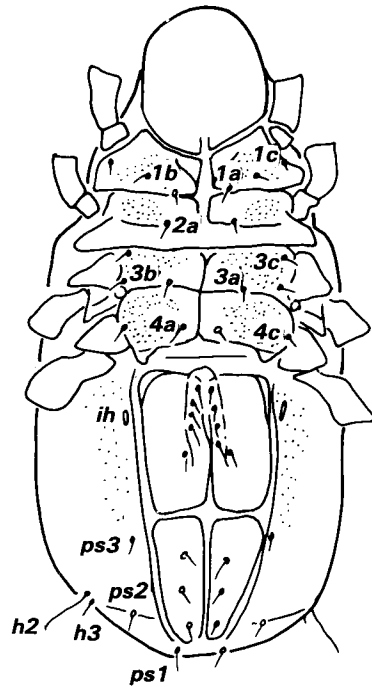
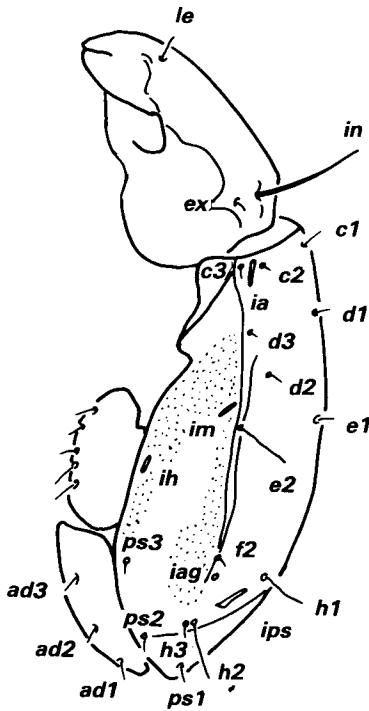
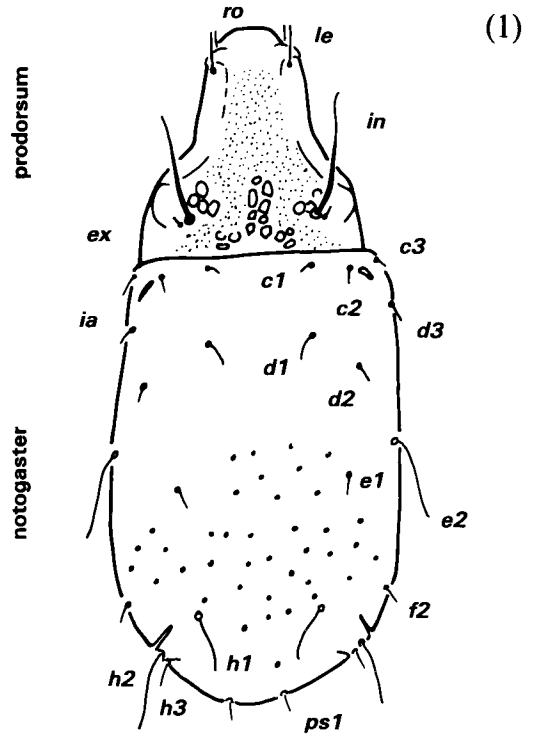
Figures 1–9 Morphological features of the Cryptostigmata, as typified by representative species.

Figures 10–166 Representative species from the genera of Cryptostigmata known from New Zealand (dorsal views, or slightly dorsolateral, except Fig. 13–19, which are in lateral view).

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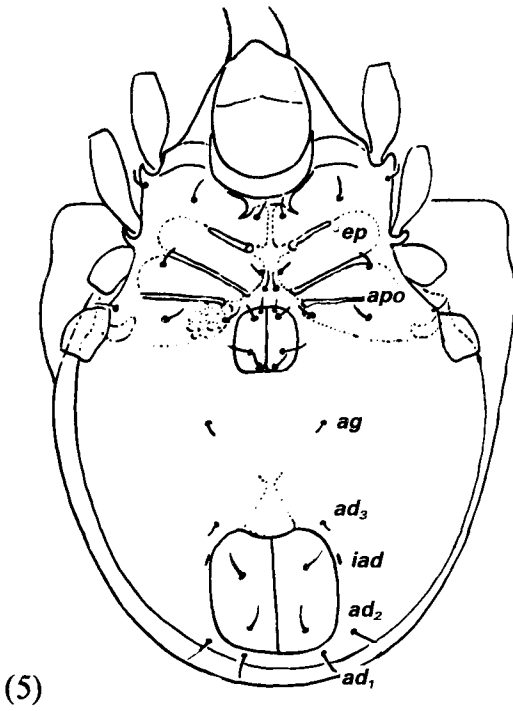
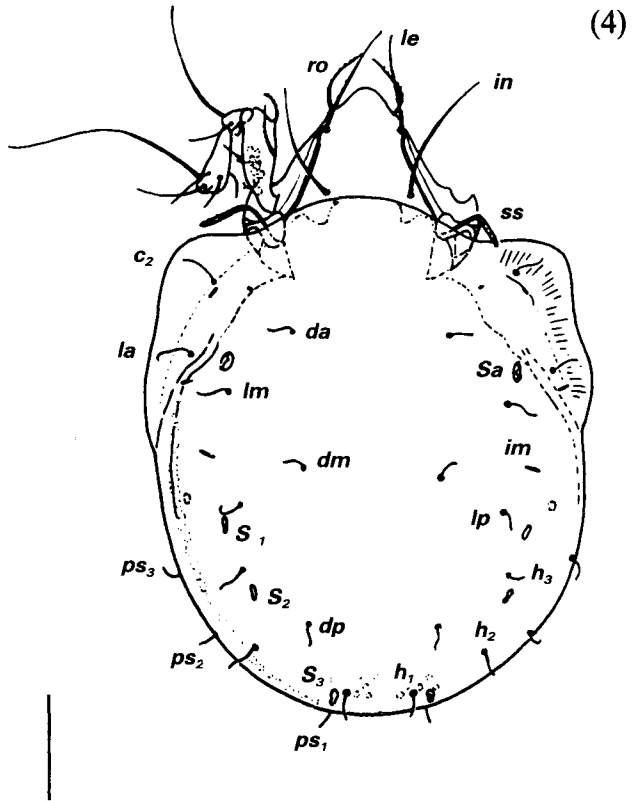


Figures 1–3 Features visible in dorsal, lateral, and ventral view respectively, *Trimalaconothrus tonkini*.



(2)

(3)

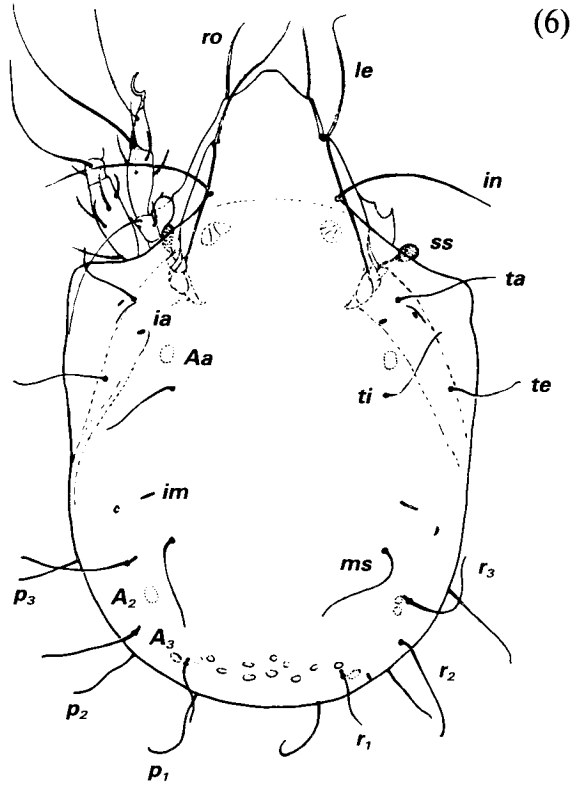


Figures 4 and 5 Features visible in dorsal and ventral view, *Setobates medius*.

KEY TO SYMBOLS

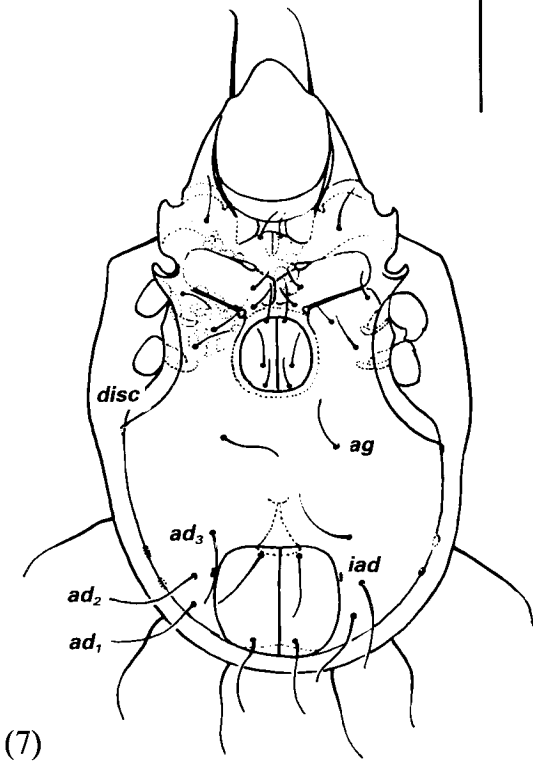
(Setal notation not listed here is described in the text section 'Morphology', p. 13.)

<i>Aa</i>	areae porosae adalares
<i>Al-3</i>	areae porosae mesonoticae 1-3
<i>ad</i>	adanal setae
<i>ag</i>	agenital setae
<i>apo</i>	apodematum
<i>bo</i>	bothridium
<i>cu</i>	cuspis
<i>disc</i>	discidium



(6)

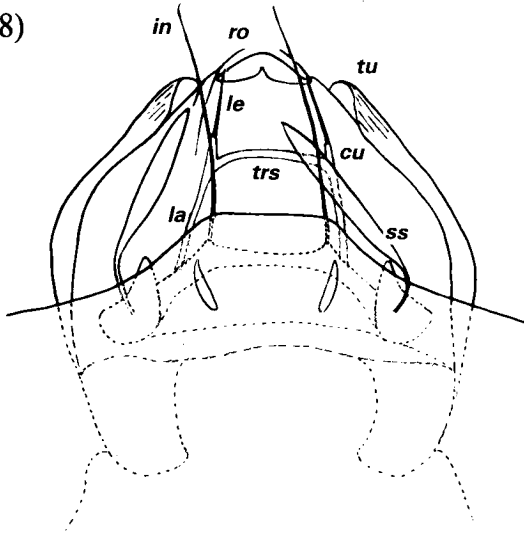
Figures 6 and 7 Features visible in dorsal and ventral view, *Maculobates longipilosus*.



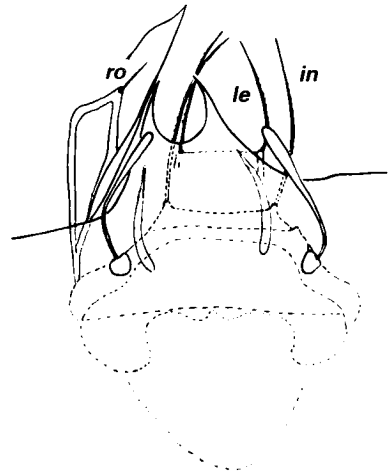
(7)

- ep epimeron
- ex exobothridial setae
- in interlamellar setae
- la lamellae
- le lamellar setae
- ro rostral setae
- Sa sacculi adalares
- SI-3 sacculi mesonoticae 1-3
- ss sensilli
- trs translamella
- tu tutorium

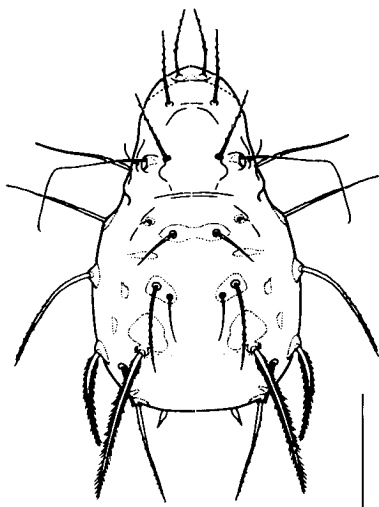
(8)



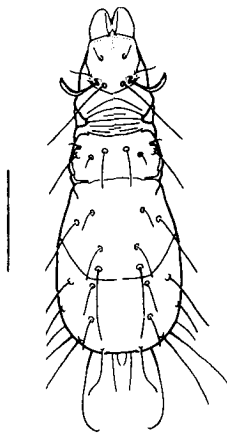
(9)



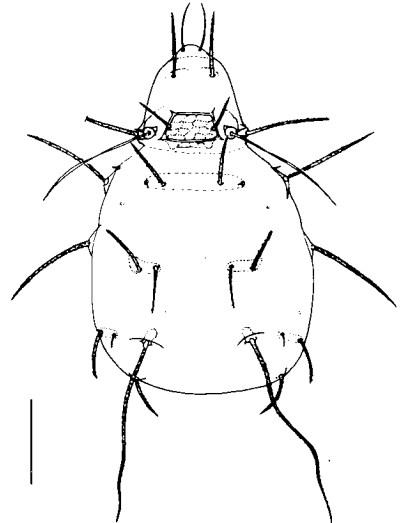
Figures 8 and 9 Features of prodorsum, *Punctoribates punctum* and *P. manzanoensis*.



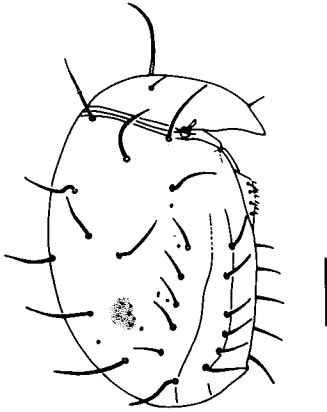
11. *Acaronychus* sp.



10. *Aphelacarus* sp.



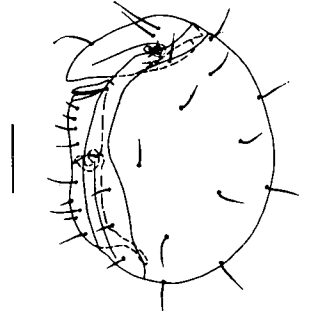
12. *Stomacarus ligamentifer*



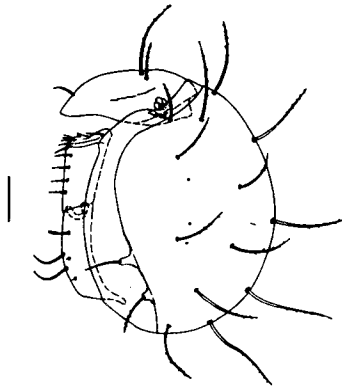
13. *Protophthiracarus neutrichus*



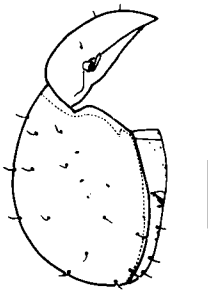
14. *Hoplophorella* sp.



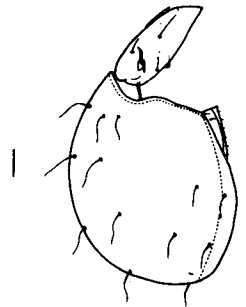
15. *Phthiracarus pellucidus*



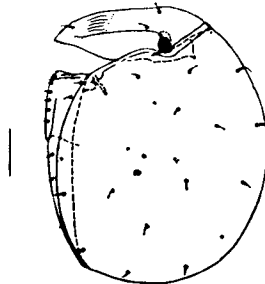
16. *Notophthiracarus australis*



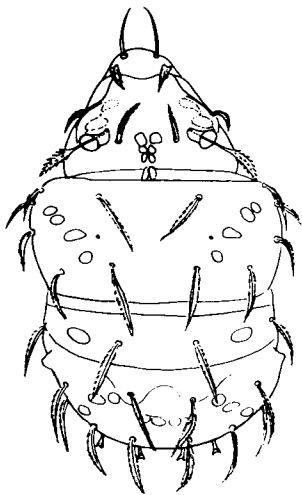
17. *Microtrititia* sp.



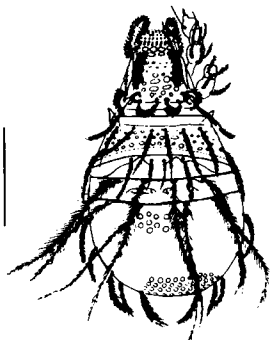
19. *Mesotrititia* sp.



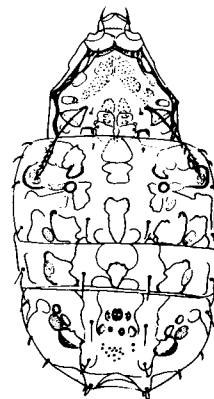
18. *Indotrititia aotearoana*



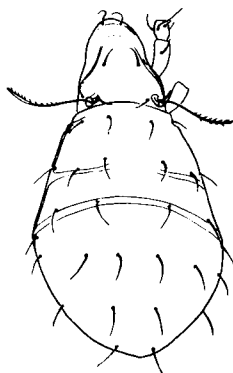
21. *Liochthonius fimbriatissimus*



20. *Cosmochthonius semiareolatus*



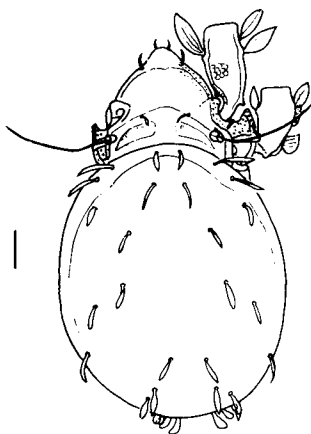
22. *Brachyochthonius novaezealandicus*



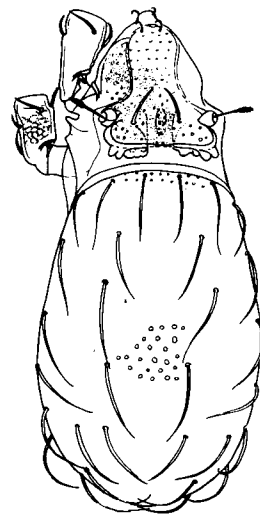
23. *Hypochthoniella minutissima*



24. *Hypochthonius luteus*



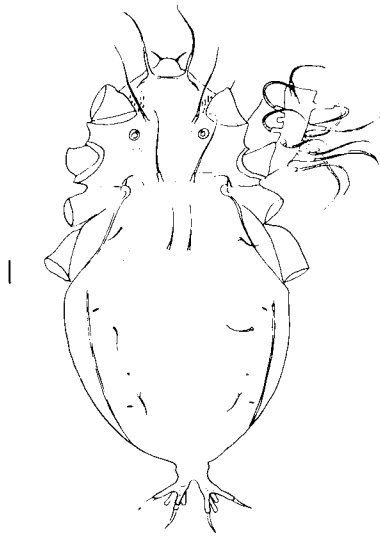
26. *Phyllhermannia phyllophora*



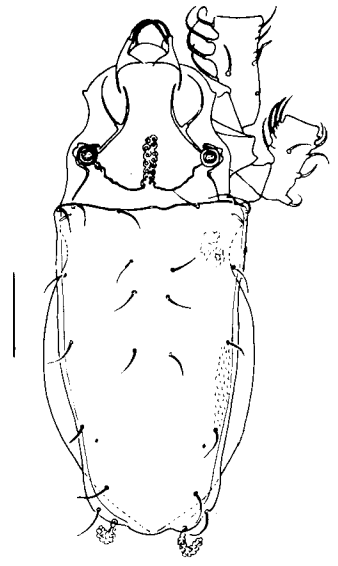
25. *Nanhermannia acutisetosa*



28. *Austronothrus curviseta*



27. *Crotonia caudalis*



29. *Holonothrus pulcher*



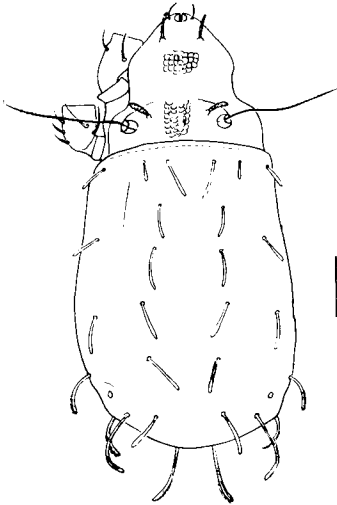
31. *Heminothrus microclava*



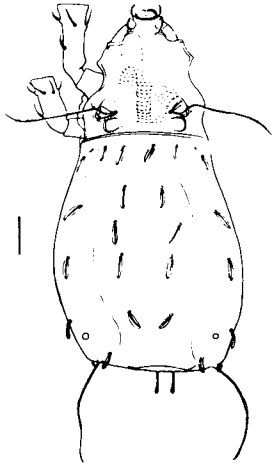
30. *Camisia segnis nova*



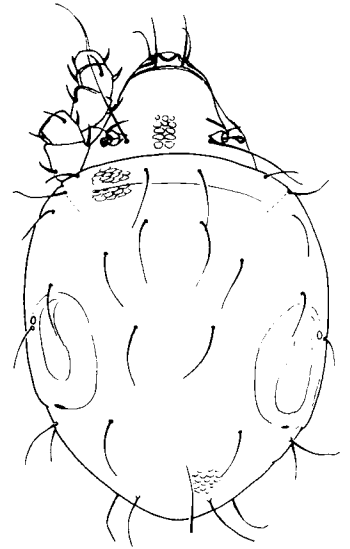
32. *Platynothrus major*



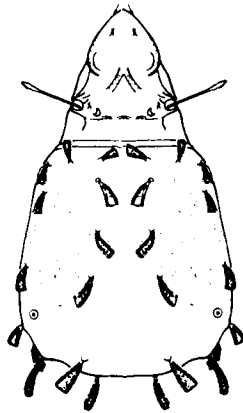
34. *Nothrus silvestris anauniensis*



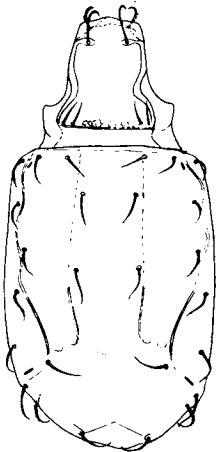
33. *Novonothrus pupuensis*



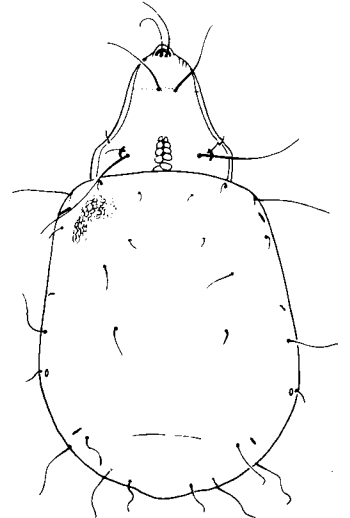
35. *Trhypochthonius excavatus*



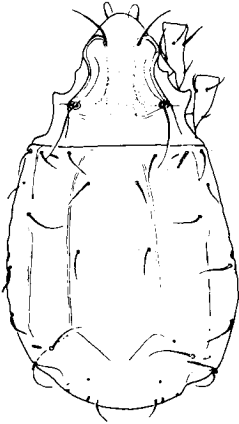
36. *Allonothrus* sp.



37. *Malaconothrus keriensis*



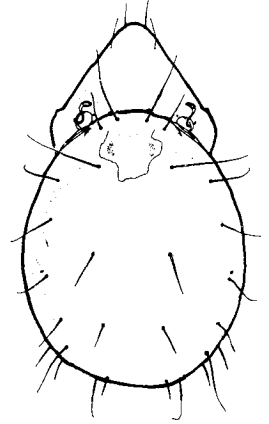
38. *Mucronothrus nasalis*



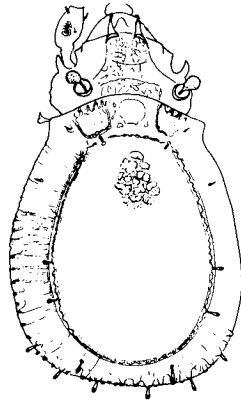
40. *Fossothrus novaezelandiae*



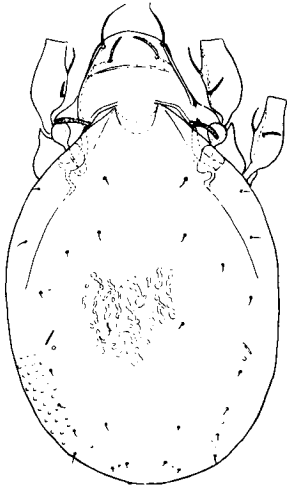
39. *Zeanothrus elegans*



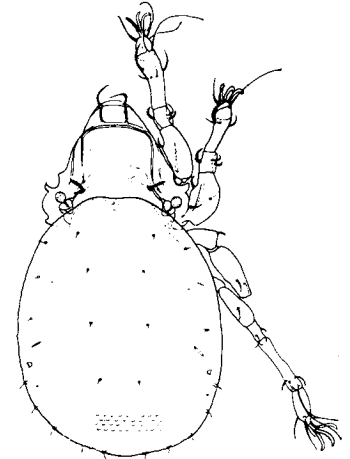
41. *Fortuynia elamellata*



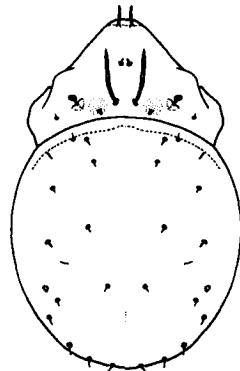
42. *Scapheremaeus insularis*



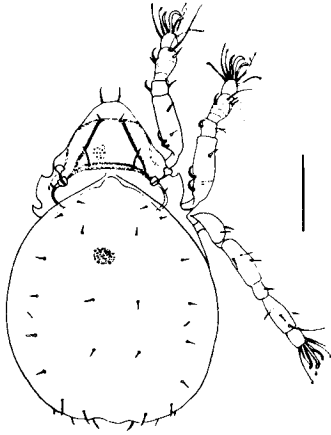
43. *Capillibates stagaardi*



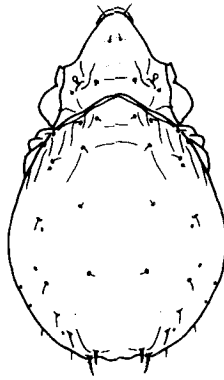
44. *Bulleremaeus tuberculatus*



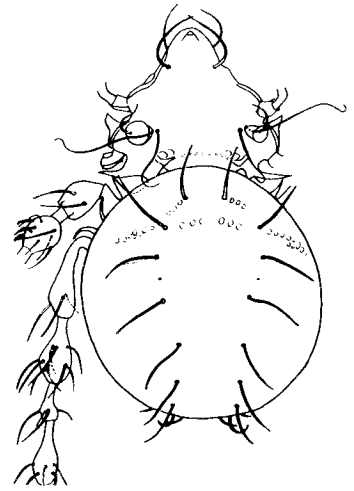
45. *Alaskozetes antarcticus*



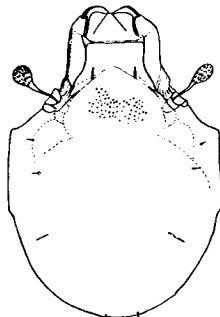
47. *Halozetes otagoensis*



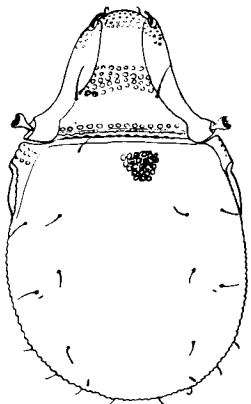
46. *Podacarus auberti*



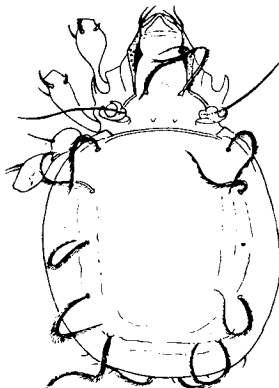
48. *Metabelba obtusus*



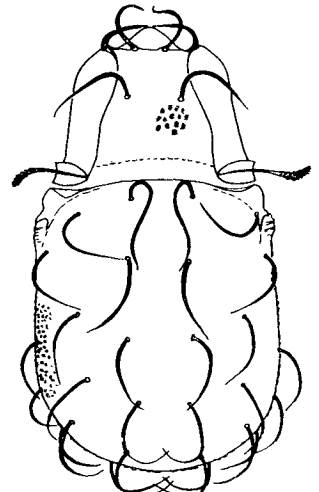
49. *Tectocephus velatus novus*



50. *Carabodes variabilis*



52. *Tikizetes spinipes*



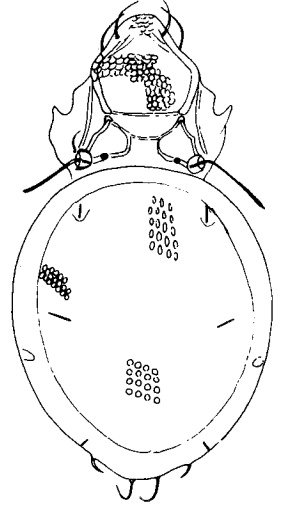
51. *Austrocarabodes elegans*



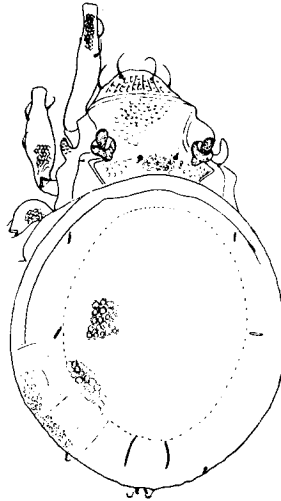
54. *Fosseremus laciniatus*



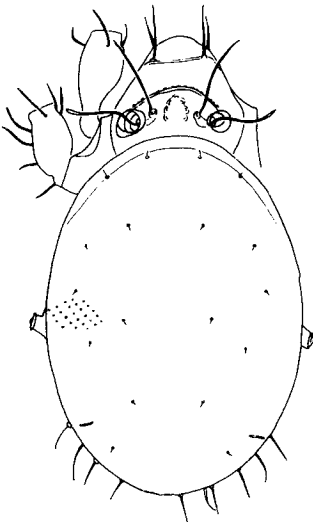
53. *Eremulus flagellifer*



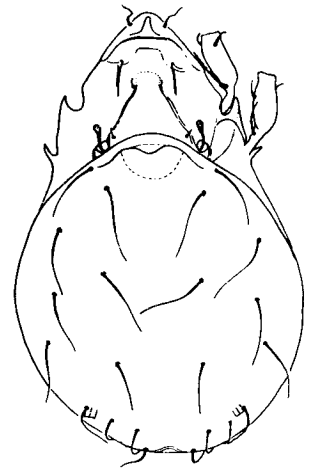
55. *Pedrocortesia rotoruensis*



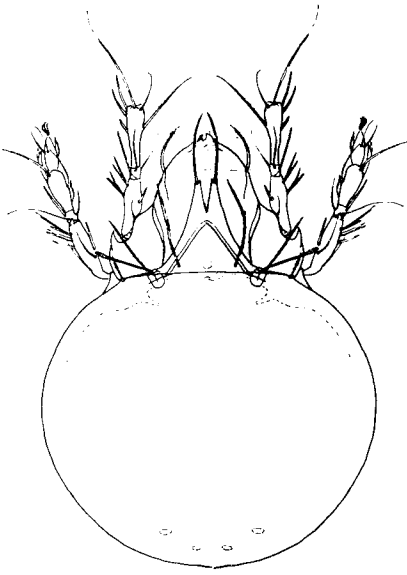
56. *Pedrocortesella nigroclava*



57. *Hermaniella microsetosa*



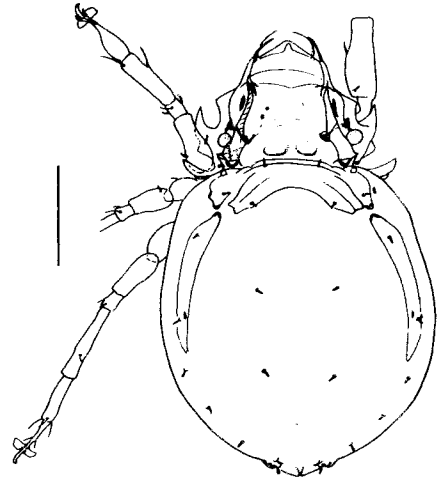
58. *Hydrozetes lemnae*



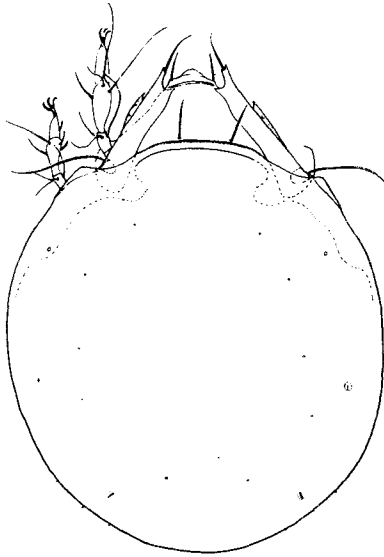
60. *Maorizetes ferox*



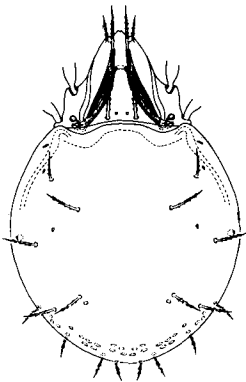
59. *Cultroribula lata*



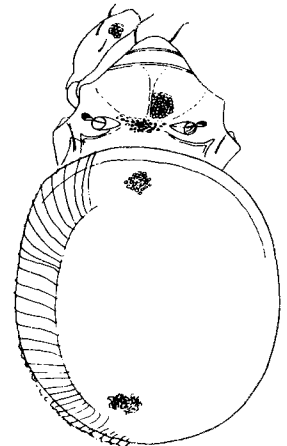
61. *Adhaesozetes barbarae*



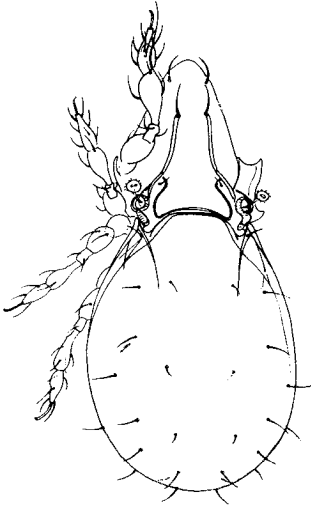
62. *Pseudoceratoppia diversa*



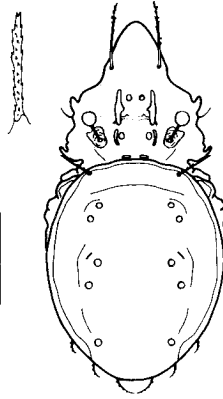
63. *Macquarioppia striata*



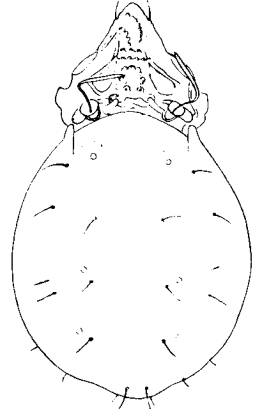
64. *Liodes nigricans*



66. *Austrogneta multipilosa*



65. *Tuparezetes christineae*



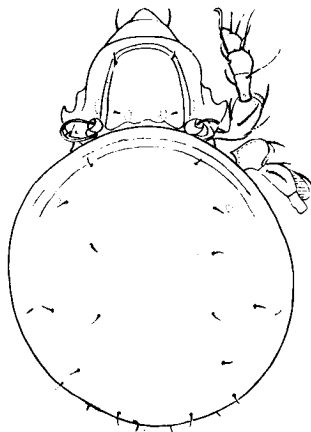
67. *Suctobelbila dentata*



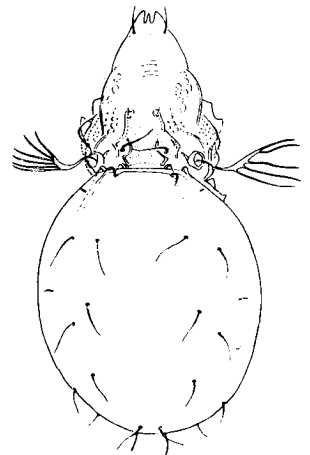
68. *Zeasuctobelba nodosa*



69. *Suctobelba nondivisa*



71. *Laminoppia blocki*



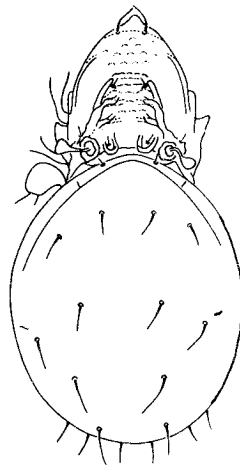
70. *Tripiloppia aokii*



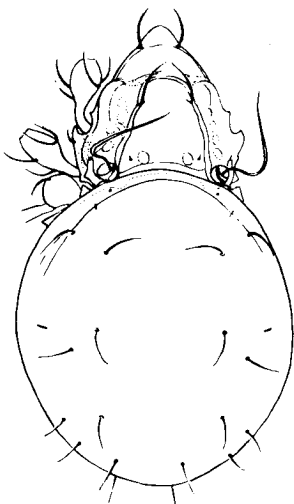
73. *Solenoppia grandjeani*



72. *Processoppia oudemansi*



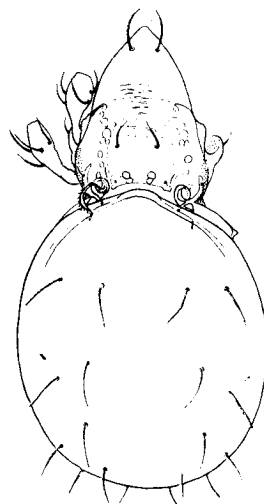
74. *Campbelloppia diaphora*



76. *Rhapsoppia mihelcici*



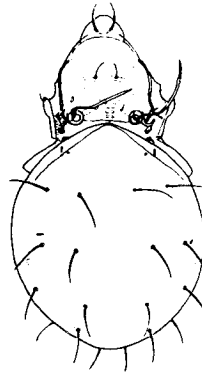
75. *Acutoppia crassiseta*



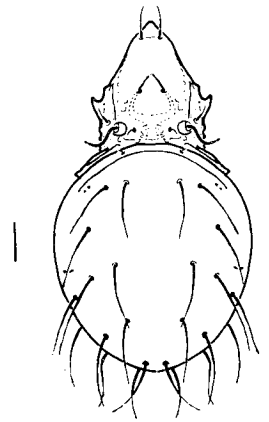
77. *Gressittoppia baderi*



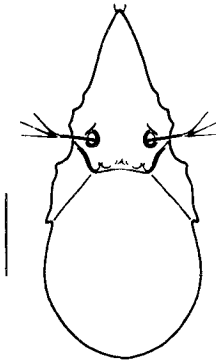
79. *Operculoppia kunsti*



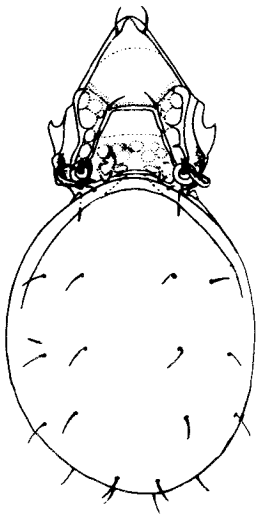
78. *Paroppia lebruni*



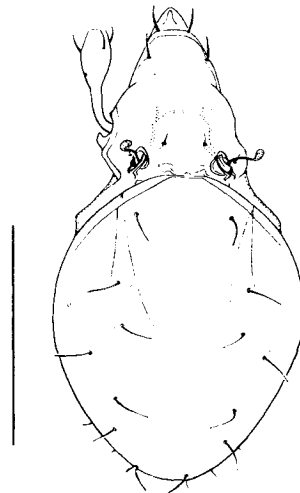
80. *Polyoppia baloghi*



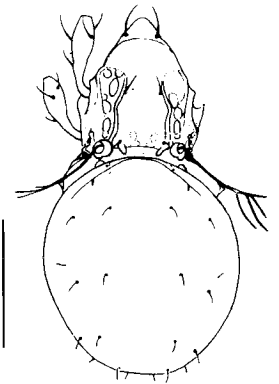
81. *Trizetes* sp.



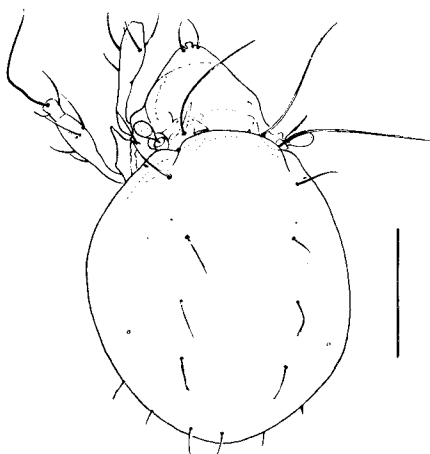
82. *Oxyoppia suramericana*



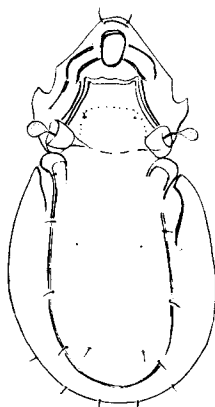
84. *Machuella pyriformis*



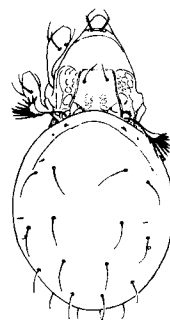
83. *Brachioppiella rajskii*



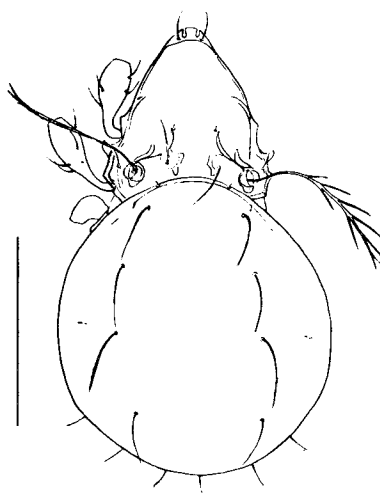
86. *Miropia
zealandica*



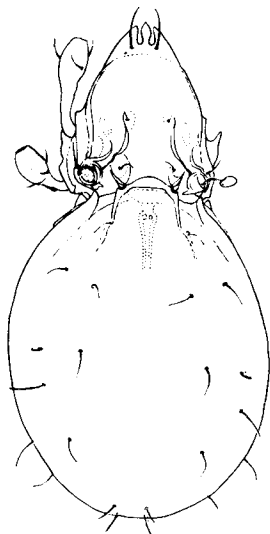
85. *Quadropia
circumita*



87. *Ramusella
sengbuschi*



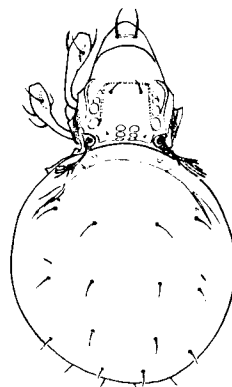
88. *Ptiloppia
bulanovae*



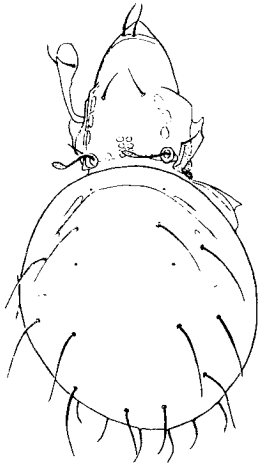
89. *Belloppia
wallworki*



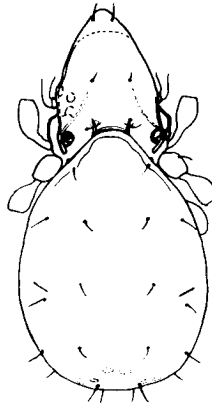
90. *Oppiella
dubia*



91. *Insculptoppia
suciui*



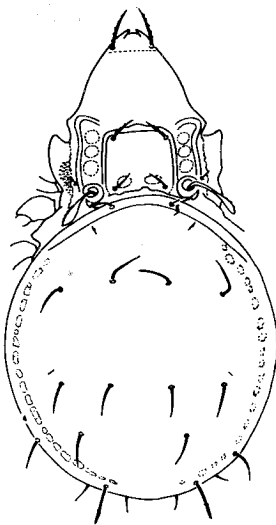
93. *Amerioppia woolleyi*



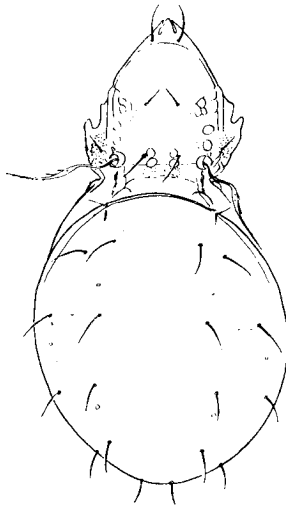
92. *Microppia minutissima*



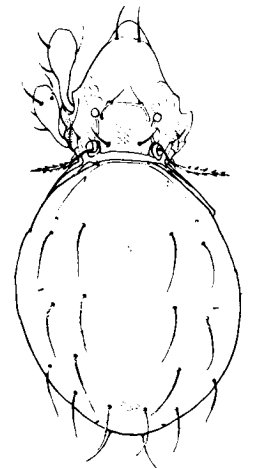
94. *Pletzenoppia rafalskii*



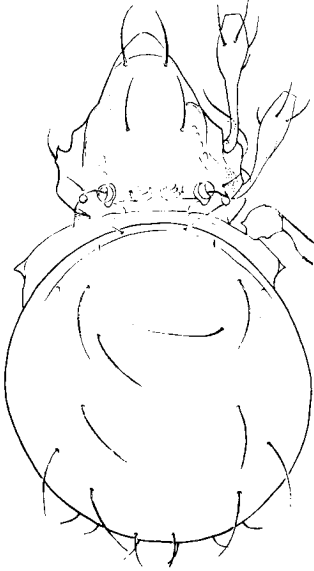
96. *Austroppia crozetensis*



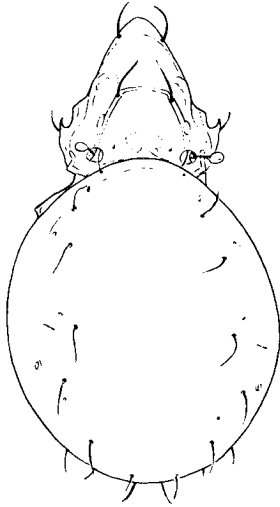
95. *Arcoppia winkleri*



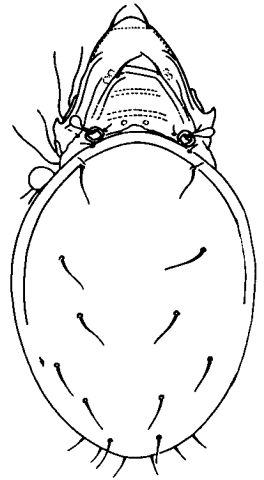
97. *Setuloppia newelli*



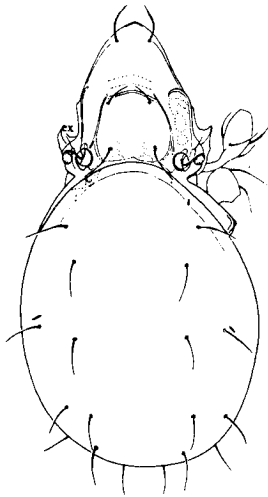
99. *Globoppia*
nidicola



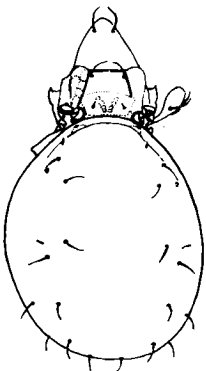
98. *Membranoppia*
krivoluzkyi



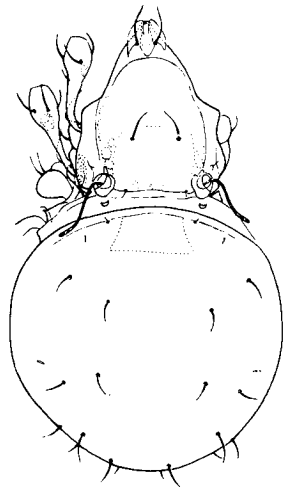
100. *Pravoppia*
disjuncta



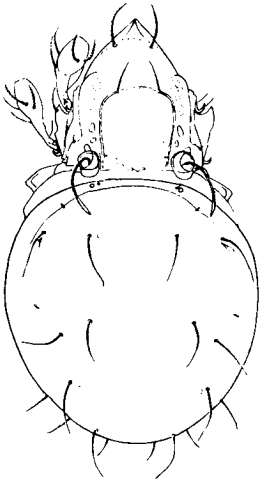
101. *Nesoppia*
tuxeni



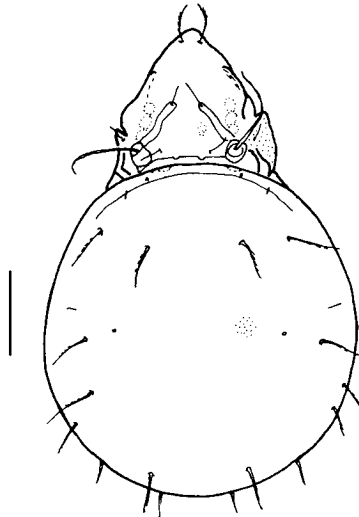
102. *Baioppia*
moritzi



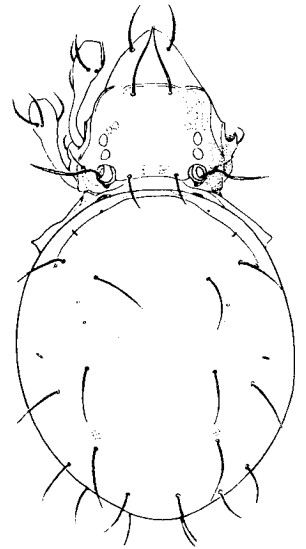
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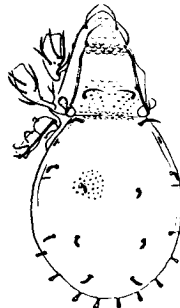
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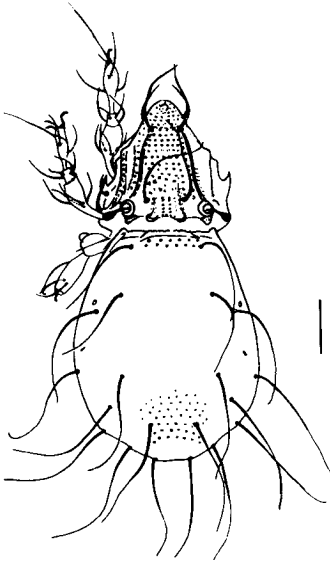
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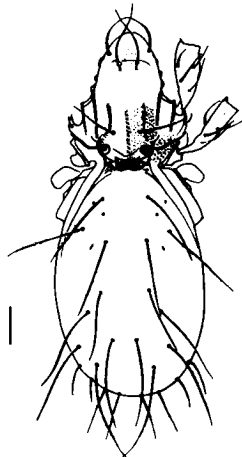
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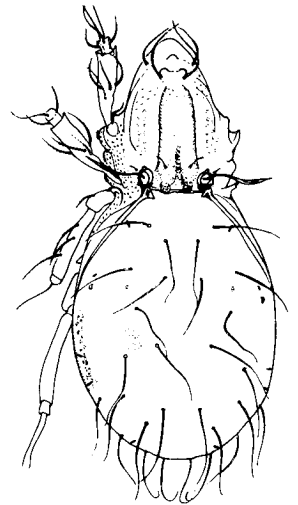
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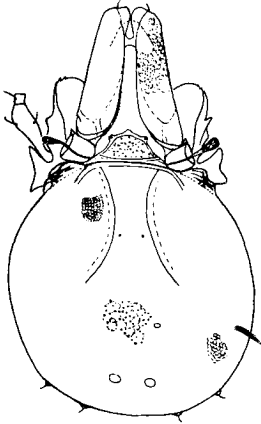
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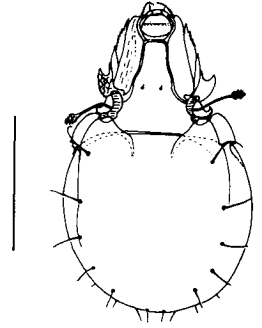
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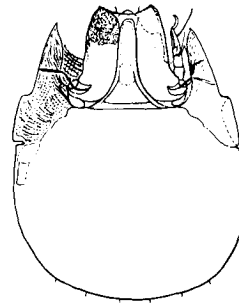
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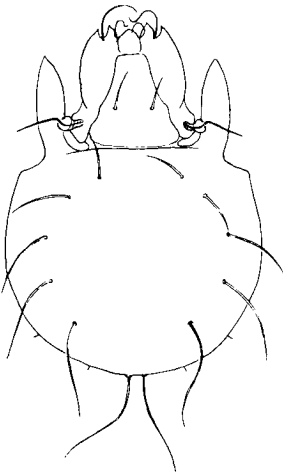
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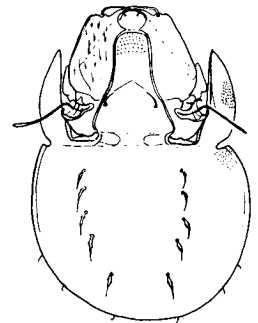
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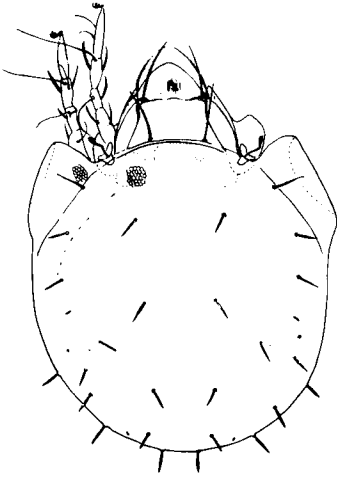
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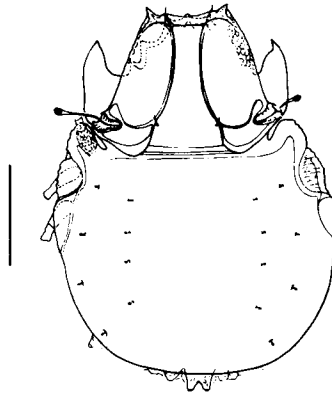
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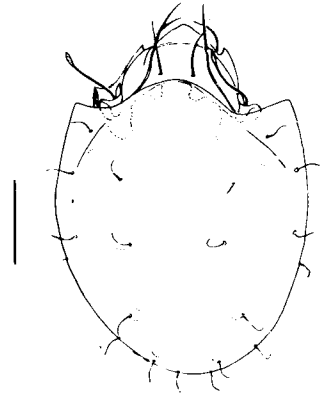
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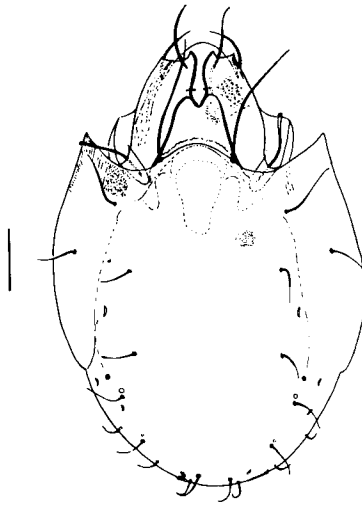
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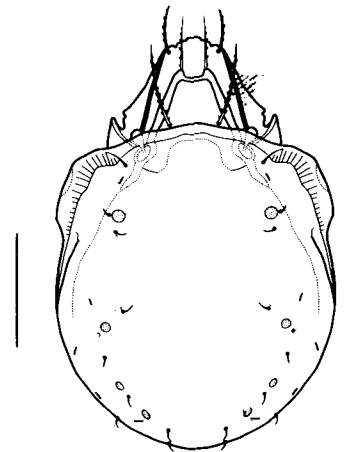
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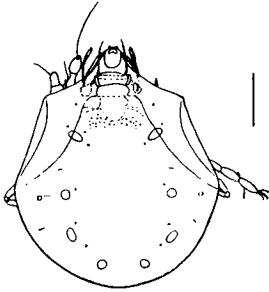
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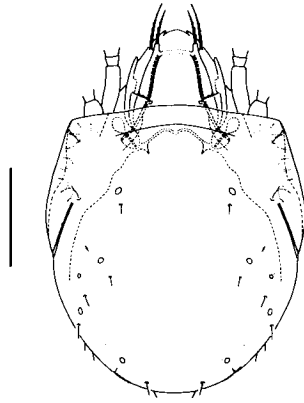
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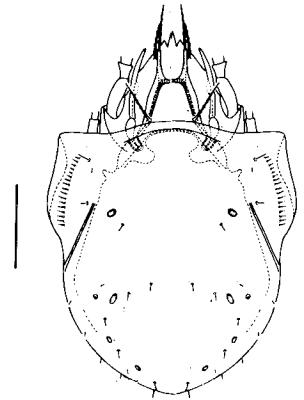
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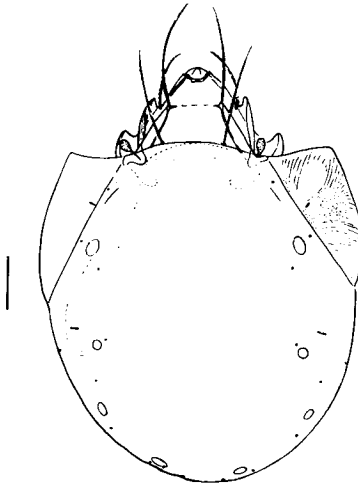
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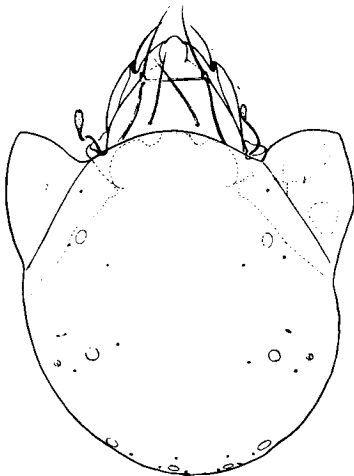
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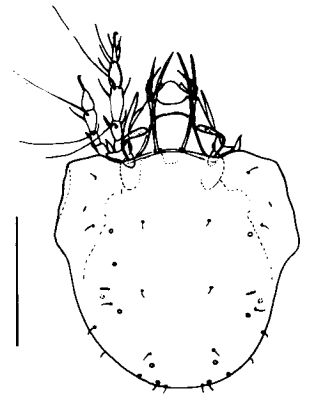
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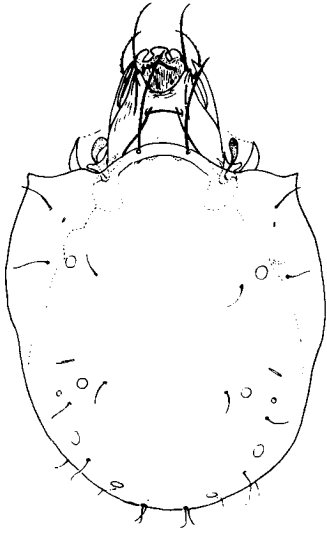
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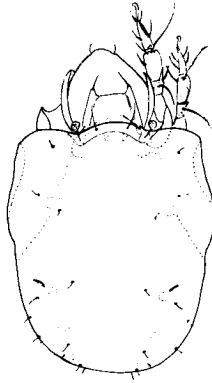
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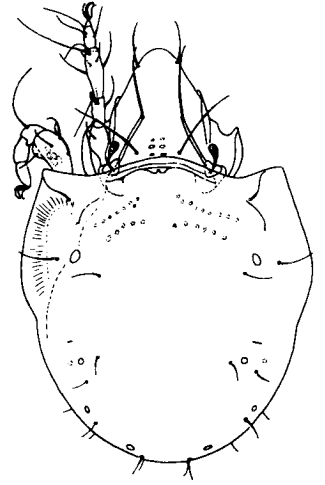
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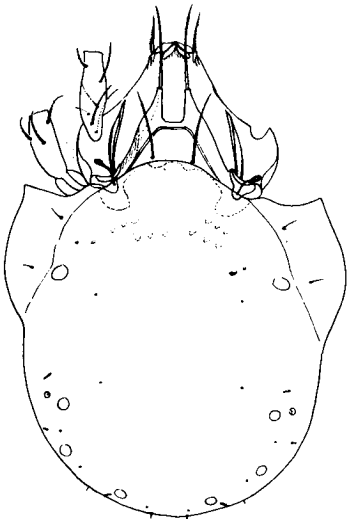
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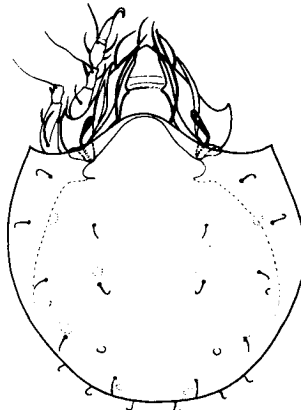
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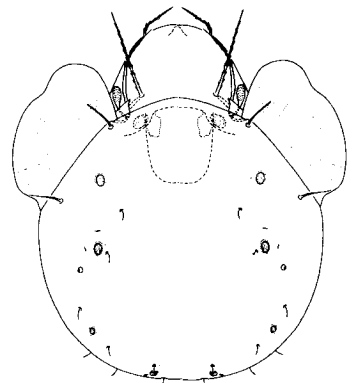
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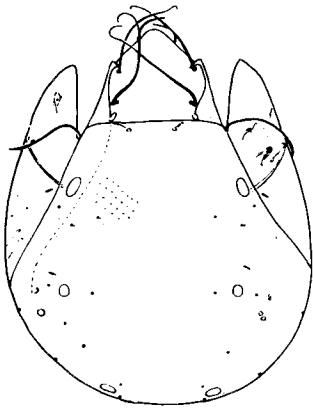
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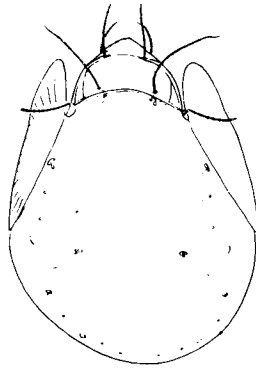
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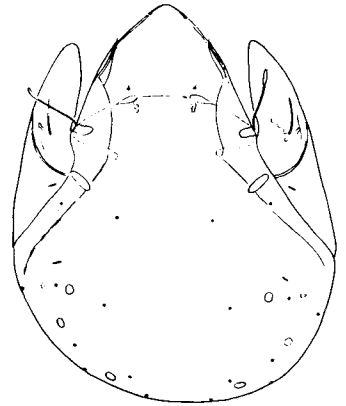
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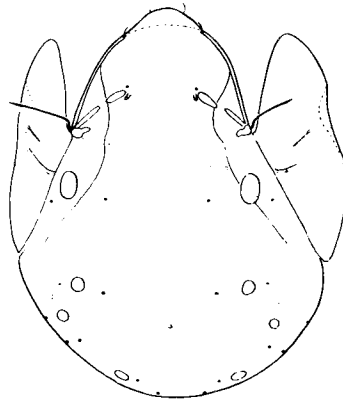
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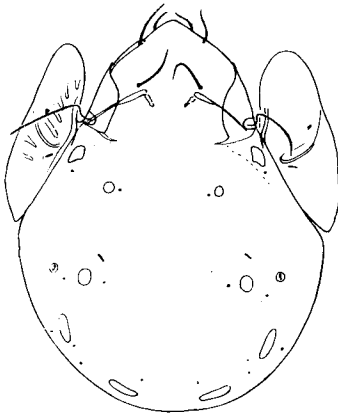
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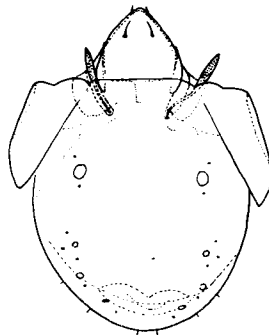
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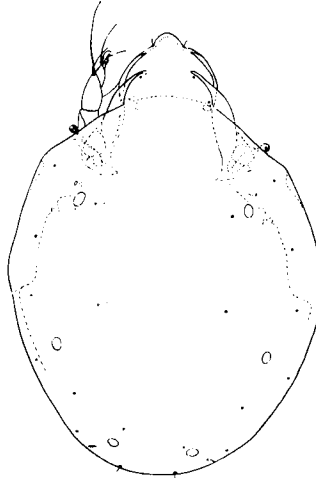
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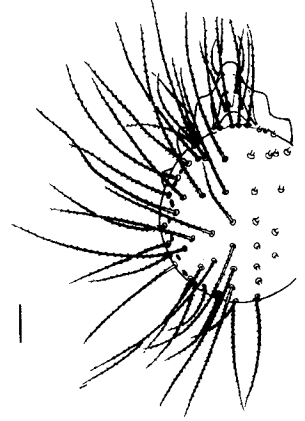
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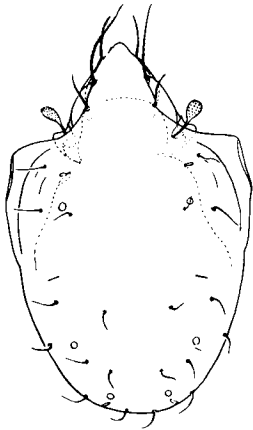
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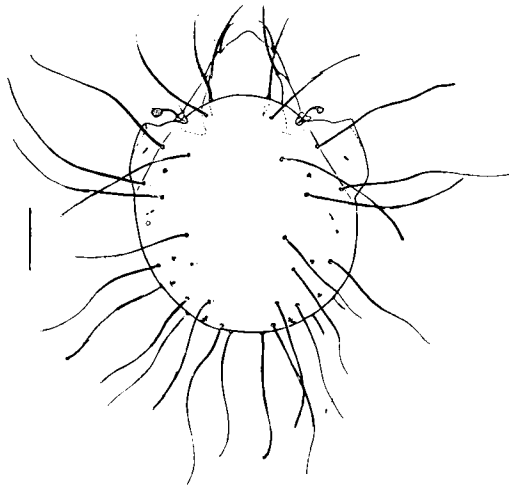
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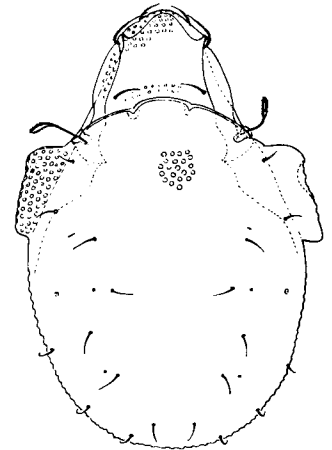
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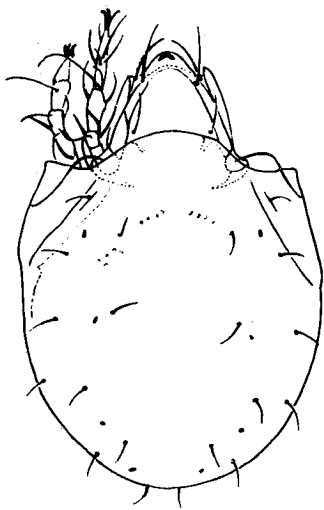
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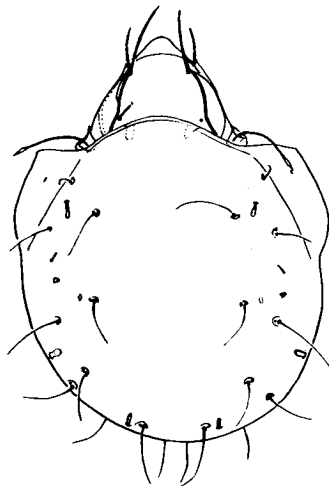
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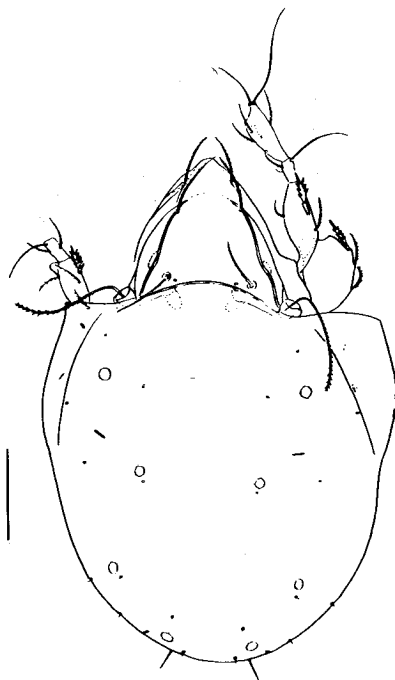
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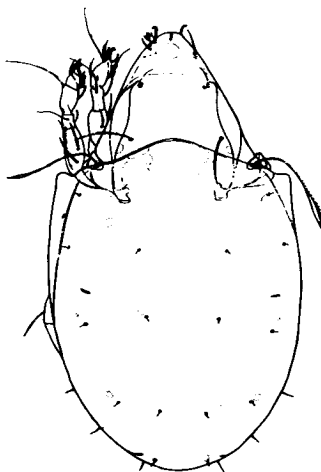
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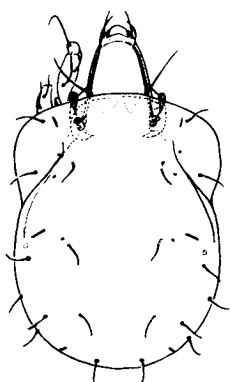
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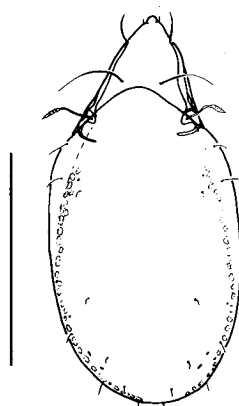
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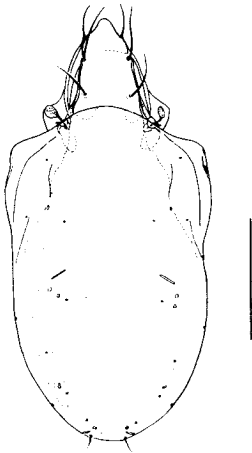
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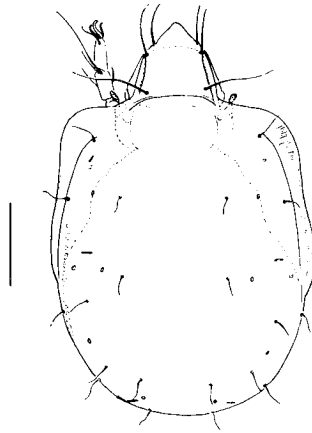
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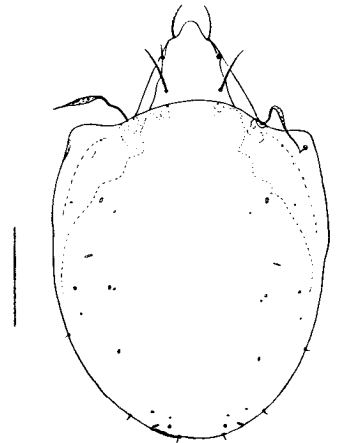
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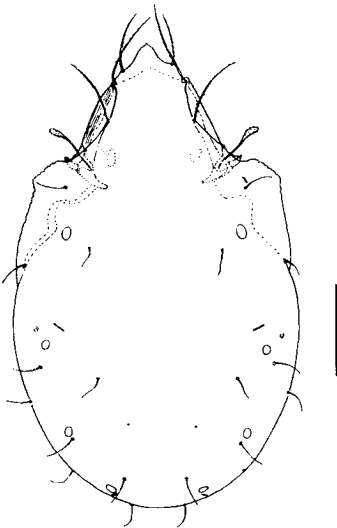
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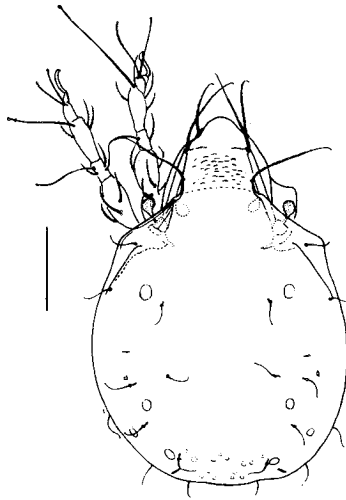
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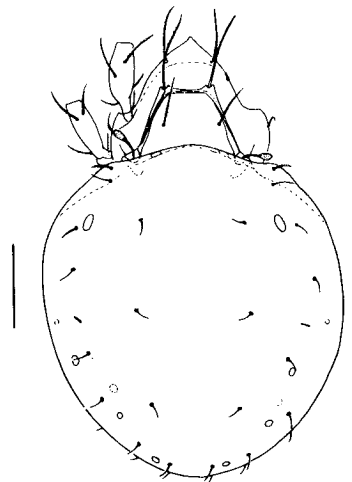
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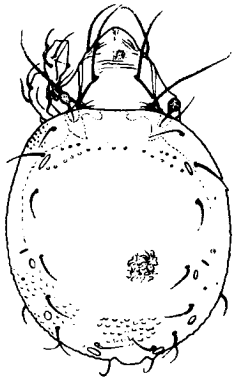
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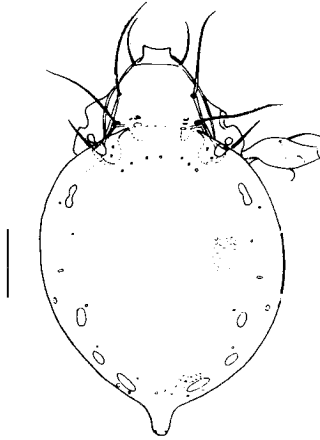
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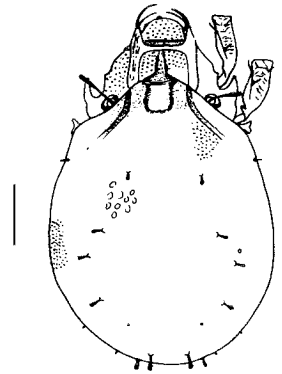
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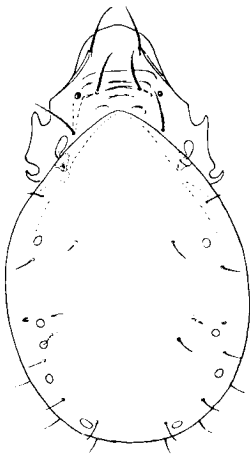
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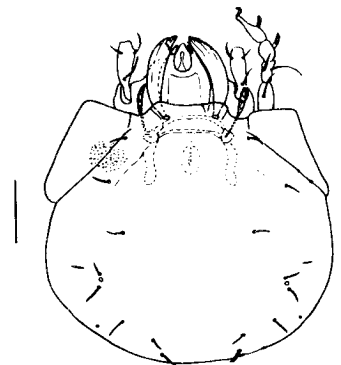
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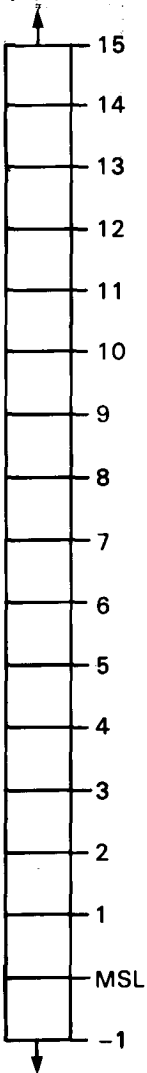
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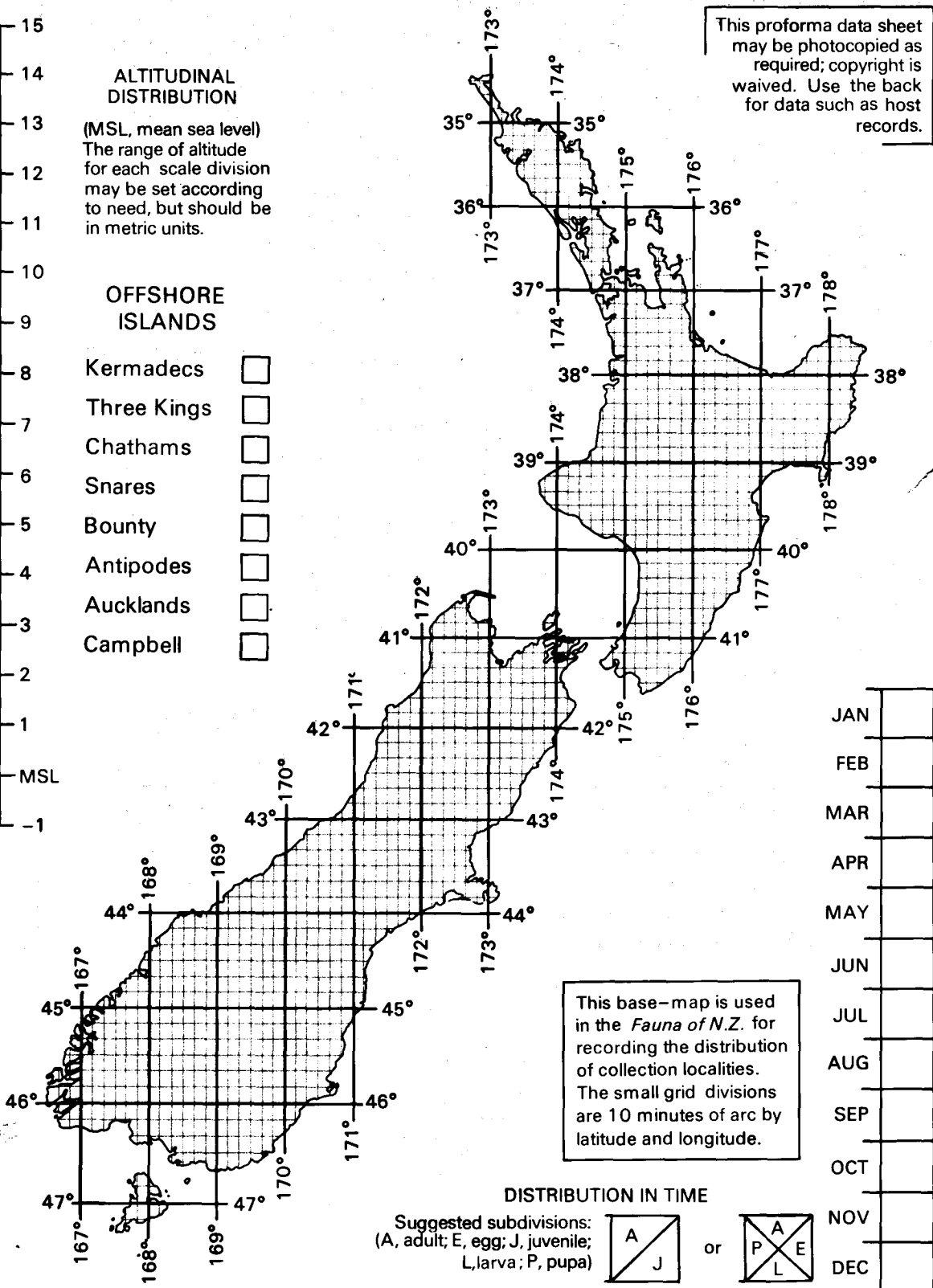


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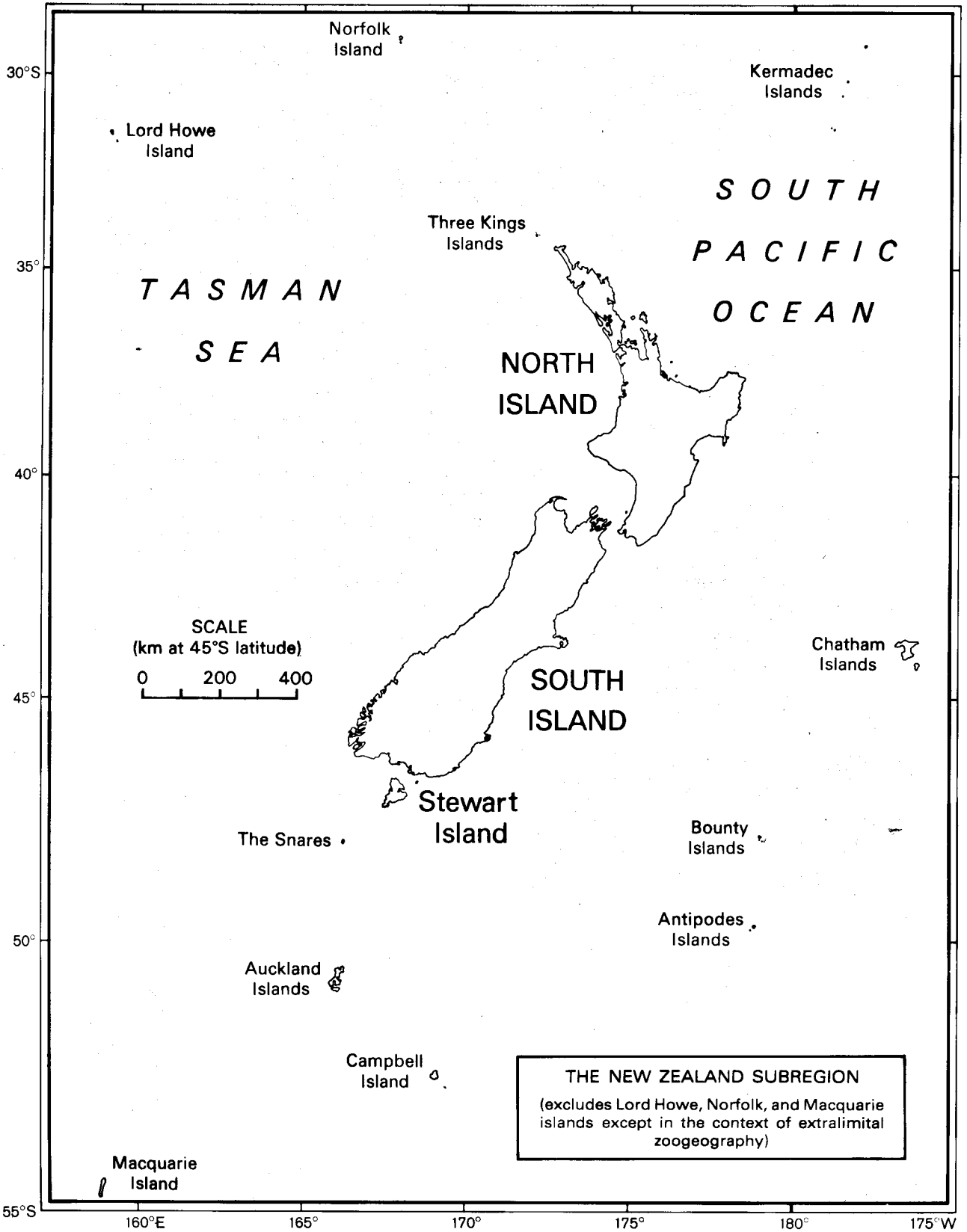
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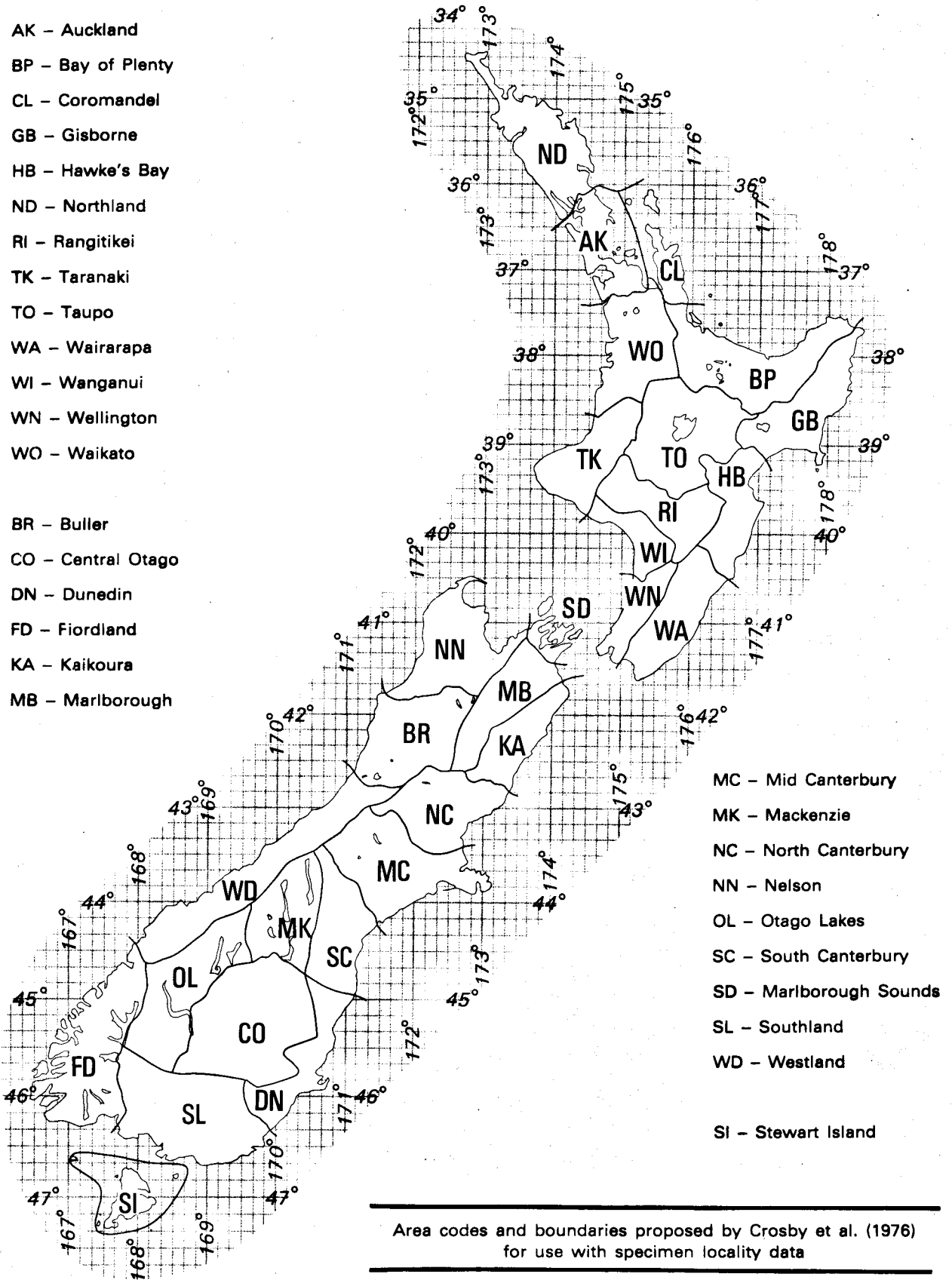
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