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Number 2

**Osoriinae**  
(Insecta: Coleoptera: Staphylinidae)

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**Front cover:** The insect depicted is *Nototrochus ferrugineus* (Broun)

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## ABSTRACT

The osoriine beetles of New Zealand formerly placed in genus *Holotrochus* Erichson are transferred to two new genera, *Nototrochus* and *Paratrochus*. *Holotrochus ferrugineus* Broun is designated as type-species of *Nototrochus*, which also includes *H. montanus* Broun. A new species, *P. tardus*, is designated as type-species of *Paratrochus*. *Holotrochus brevipennis* and *H. caecus* (both of Broun), *H. helmsi*, *H. vagepunctus*, *H. anophthalmus*, and *H. microphthalmus* (all of Fauvel), *H. monstrosus* and *H. arrowi* (both of Bernhauer), and 27 new species are included in *Paratrochus*. A male character, the 'copulatory piece', is well developed in this group and distinctive for each species. Though not previously used in staphylinid taxonomy, it is used here for species separation and is illustrated in scanning electron photomicrographs. Keys to identification are provided, and some aspects of phylogeny, ecology, and distribution are discussed.

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## INTRODUCTION

In a survey of forest-floor invertebrates on the West Coast of the South Island, I found that osoriine staphylinids were numerically the dominant beetle group - up to 1823 per m<sup>2</sup> were recorded (McCull 1974). Both adults and larvae were found to eat detritus, which suggests that they contribute significantly to litter breakdown and hence to nutrient recycling. Three species are commonly present under the West Coast forests, and examination of organic debris from other forests in New Zealand has revealed many others.

Previous work on osoriines in New Zealand is limited: brief species descriptions were published by Captain T. Broun (1893, 1910, 1912) and C. A. A. Fauvel (1900); and Dr M. Bernhauer (1939) produced a key and described a further three species. Identification from these descriptions has proved difficult, and I soon realised that many species have yet to be described. Because of their apparent importance in organic matter breakdown, and the wealth of new species, I decided that a revision of the New Zealand Osoriinae would be worth while, especially since the continued destruction of large areas of indigenous vegetation, on which these beetles are largely dependent, will make such a revision increasingly difficult in the future.

## HISTORICAL REVIEW

The Osoriinae are immediately recognisable by their lack of paratergites on the abdomen, which gives them a distinctively cylindrical form, and by their prominent

procoxae having a transverse sulcus on the anterior face. It was the absence of paratergites which led Blackwelder (1942) to elevate the tribe Osoriini of subfamily Oxytelinae to subfamily status. He placed three tribes - Osoriini, Leptochirini, and Lispinini - in Osoriinae, distinguishing Osoriini by the prominent procoxae with the transverse anterior sulcus. Moore (1964) used these characters to define Osoriinae, and does not regard the Lispinini, which he elevates to subfamily status, as being closely allied to Osoriinae.

*Holotrochus* Erichson, 1840, the genus to which all species described from New Zealand had been assigned, was included in the Osoriini by Blackwelder (1943). When erecting *Holotrochus*, Erichson distinguished it from *Osorius* by the absence of spines on the protibiae and by the rounded apex of the mentum. Lacordaire (1854) added the near-parallel borders of the prothorax to this definition. Blackwelder (1943) redefined the genus, retaining Duponchel's (1841) choice of *Holotrochus volvulus* Erichson, 1840 from Puerto Rico as the type-species. Other West Indian species were included. Blackwelder regarded the elevated prosternal process and the impunctate metasternum as important generic characters, and described secondary sexual characters of the seventh and eighth abdominal sternites of male *H. volvulus*.

Fagel (1955) revised the genus, keeping *H. volvulus* as the type-species but disagreeing with Blackwelder on the relevance of several characters. He included Palearctic, Ethiopian, Oriental, and Neotropical species. His diagnostic characters for

*Holotrochus* included the presence of sutural striae, lack of modification of the mandibles, which have a flat upper surface, and the absence of secondary sexual characters in the male. He further confused matters by assigning three New Zealand species described by Fauvel (1900) - *anophthalmus*, *helmsi*, and *vagepunctus* - to a new genus, *Typhlholotrochus*, on the basis of absence of sutural striae and, in the male, presence of a small carina on the right mandible and secondary sexual characters on the last sternite. These three species do not conform to Fagel's diagnosis of *Typhlholotrochus*. All have sutural striae, and in both sexes of *helmsi* and *vagepunctus* the right mandible has a small but obvious carina. *H. anophthalmus* is known only from Fauvel's two male specimens, which possess a similar mandibular carina. Male *helmsi* and *vagepunctus* show only very slight modification of sternites 7 and 8, and in *anophthalmus* these are unmodified. In *Typhlholotrochus* the eye is supposedly composed of 5 or 6 facets. The eye of *anophthalmus* is greatly reduced, consisting of 1 small facet (overlooked by Fauvel). The eye of *helmsi* comprises 6 to 9 facets, and that of *vagepunctus* about 10. Thus, inclusion of these New Zealand species in *Typhlholotrochus* is not warranted. (It is interesting to note that Fagel omitted *H. microphthalmus* Fauvel, 1900 from *Typhlholotrochus*, since the four Fauvel species were described together, and appear to have been kept together in the Fauvel collection.)

The New Zealand species of Osoriinae have characters that do not conform to Erichson's, Fagel's, or Blackwelder's con-

cept of *Holotrochus*. The sutural striae, carinate mandibles of both sexes, and in the male the frequent occurrence of secondary sexual characters do not fit Fagel's descriptions, and the small prosternal process, pubescence, punctate metasternum, and tibial spines deviate from Erichson's and Blackwelder's diagnoses. Thus, they are species in search of a genus, and I here propose two new genera for New Zealand's Osoriinae; *Nototrochus* and *Paratrochus*.

I am aware that erection of genera only on a geographical basis can be unsound, but until *Holotrochus* and its close relatives are redefined using constant characters, preferably of phylogenetic relevance, I feel that new genera for the New Zealand Osoriinae are justified.

### PHYLOGENY

Comment about phylogenetic relationships within New Zealand's Osoriinae and between them and other osoriines must be speculative at this stage. However, I regard *Nototrochus* as being representative of a primitive stock, and *Paratrochus* as having evolved from this stock. *Nototrochus* retains eyes and wings, the copulatory piece (see 'Terminology') lacks a side process, sternites 7 and 8 of the male are modified, and the spermatheca is a well sclerotised capsule (Figures 82, 83, 118, 119, 154, and 157). *Paratrochus* shows secondary reduction of eyes and wings (Figure 1), commonly found in cryptozoic - and particularly humus-dwelling - beetles, e.g., the staphylinids *Pseudopsis* (Herman 1975), *Anotylus*, and *Oxytelopsis* (Hammond 1976), and seen in

New Zealand in many coleopteran families (Anthribidae, Carabidae, Cerambycidae, Colydiidae, Curculionidae, Elateridae, Lucanidae, Scarabaeidae, and Tenebrionidae (Holloway 1963).

Herman (1975) records polymorphic wing development for *Pseudopsis monotoaria* and *P. obliterata*, both North American; 30% of specimens of the latter have reduced wings, the rest are macropterous. New Zealand lucanids show varying degrees of wing reduction within a group of related species, but not within a species (Holloway 1963). Montane African species of *Anotylus* have marked modifications associated with loss of flight. These are extreme in *A. (Onco-paria) leleupi* and *A. (O.) parasitus*, which have vestigial elytra, reduced disc, and more or less contiguous mesocoxae (Hammond 1976). In *Paratrochus* this extreme condition is not reached - the elytra are short but not vestigial, the disc not markedly reduced (see Figure 117), and the mesocoxae are well separated. In *Paratrochus* the copulatory piece usually has a side process, which I regard as being an advance on the primitive state; involvement of sternite 7 in secondary sexual modification of the male is rare, and where it occurs is slight; and the spermatheca is at most only weakly sclerotised.

### ECOLOGY

Until recently little attention has been given to the habitat requirements of osoriine beetles. Smith et al. (1978) studied the ecology of *Osorius planifrons* Le Conte, which they found in large numbers beneath a



golf green in Arizona. Moore & Legner (1974) indicate sandy margins of streams, rotting wood, and leaf litter as habitats for North American osoriines, and Smith et al. (1979) quote other sources as having found them "beneath stones and logs in damp places" and in accumulations of organic debris in the crowns of broomsedge in coastal South Carolina.

In New Zealand, osoriines exploit the litter, fermentation, and humus horizons beneath indigenous vegetation, usually evergreen forests of various kinds, though some species have been found under sub-alpine and alpine vegetation, and they have been recorded from rotting logs, moss, and, rarely, fungi on the forest floor. I found one species in organic debris in an epiphyte garden about 8 m from ground level. Occasionally they have been recorded from humus or rotting logs beneath *Pinus radiata* (McCull 1974).

Organic horizons beneath forests provide a stable environment with little risk of food shortage or exposure to climatic extremes (McCull 1975). Smith et al. (1978, 1979) regard the presence of organic detritus and high soil moisture as vital requirements for survival of *O. planifrons*. In New Zealand most species ingest detritus both as adults and larvae, and their mouthparts are suitably adapted for this purpose, with stout mandibles for gathering organic matter into the buccal area. Smith et al. (1979), however, regard the similar-shaped mandibles of *O. planifrons*, which they found to ingest organic detritus, as being adapted to push aside the soil to assist their passage through it. They fur-

ther suggest that the long, slender setae on the prementum, mentum, and gula of *O. planifrons* (which are also present in *Noto-trochus* and *Paratrochus*) are analogous to the ammochaetae of fossorial ants, which are used for carrying particles of sand or soil. I am unable to confirm this for New Zealand osoriines because I have not closely observed their burrowing behaviour. The New Zealand osoriines further lack the enlarged fossorial protibia of *Osorius* spp. Their habitat consists of loosely packed organic detritus rather than soil, so such modifications are probably unnecessary, since it can be easily pushed aside.

Smith et al. (1978, 1979) consider the main food source for *O. planifrons* to be "microbes" present in organic debris, and the failure of this beetle to survive in autoclaved soil supports this. However, McCull et al. (1980) found that numbers of bacteria were higher in the beetles' faecal material than in habitat litter, and were highest in the gut, which suggests a large, active bacterial fauna within the gut. Numbers of Actinomycetes and fungi were smaller in the gut than in habitat litter or faecal material, which suggests that *Paratrochus* may be feeding on these microorganisms. Low numbers of actinomycetes and fungi in the gut of *Paratrochus* may also indicate selective feeding against them, however.

The absence of commensal protozoans in the gut of *O. planifrons* was thought by Smith et al. (1979) to preclude utilisation of cellulose-rich substrates by this beetle. McCull et al. (1979) found three *Bacillus* strains in the gut of *Paratrochus*

that were able to digest the hemicellulose xylan, and that none of the *Bacillus* strains isolated from habitat litter had this ability. High levels of protease activity were recorded from the gut, indicating production of this enzyme both by the beetle and by symbiotic bacteria in the gut. Organisms isolated from the gut were generally better able to utilise gelatin, citrate, glucose, mannitol, sucrose, melibiose, and amygdalin, to synthesise  $\beta$ -galactosidase and oxidase, and to reduce nitrates than organisms from habitat litter or faecal material.

The complex digestive processes and the food sources of these detritus-ingesting beetles require further study.

### DISTRIBUTION

Generally, the known distribution of New Zealand osoriines reflects that of indigenous forest, and in areas where little of the original vegetation remains (e.g., parts of Northland, around Auckland, Hawkes Bay, south Taranaki and the southern West Coast of the North Island, and east of the Main Divide in the South Island) very little information regarding distribution could be obtained. Some species persist when native forests are cleared and planted with exotic species (e.g., McColl 1974). Certain species appear to be adapting to modification of their forest habitat, and are maintaining large populations. Others appear to be present in such small numbers, and/or in such scattered localities, that I can only surmise that these are relict populations which will ultimately disappear.

One species described by Broun from south Auckland appears to be extinct already. However, since exact habitat requirements for every species are not known, some apparently rare species may occur in adequate numbers in small microhabitats within the forest floor.

Sympatry is the rule rather than the exception, and is greatest at Mount Messenger (TK), where seven species occur. The continued separation of sympatric species is assured by the form of the copulatory piece and the bursa copulatrix, and these characters are considered to be of the greatest specific significance.

Full collecting data for all material examined are recorded in McColl (1981). These data are briefly summarised here: a paragraph each is devoted to substrate types and associated plant species; altitudinal range; months in which specimens have been taken; and sympatry with other Osoriinae. Sympatry is expressed at two levels - co-occurrence of species in a particular sample, and occurrence together at a particular locality (but not, so far, in the same litter sample).

It must be stressed that collecting data reflect the foraging habits and seasonality of entomologists first and foremost. Only intensive collecting and careful identification can lead us towards a true picture of the natural limits of species as inconspicuous as the Osoriinae. As an aid to visualisation of known range, distribution maps are given for all species, regardless of the richness or paucity of the known material.

It is hoped that collectors will respond actively to the challenge of the many gaps revealed by this study. New data, preferably supported by voucher specimens, will be welcomed by the author and by the Systematics Section of DSIR's Entomology Division.

### METHODS AND CONVENTIONS

Specimens were measured using a stereomicroscope with a micrometer eye piece. Where possible, at least five examples of each sex were measured for each species. Total length is considered not to be a particularly useful measurement, since the abdomen of these beetles tends to contract telescopically on drying to make up to 1 mm difference in the length. However, a range of measurements of body length, taken from the front of the labrum to the tip of the abdomen of both wet-preserved (70% ethanol) and dry-mounted specimens, is included where possible to give an impression of size. Dimensions regarded as being more specifically relevant are pronotal length along the midline, elytral length from shoulder to apical angle, and the greatest width of pronotum, elytra, and abdominal segment 7. The range and mean of these are given for each species.

Figures were prepared using a camera lucida microscope attachment; the material to be drawn was in glycerol. Material for examination by scanning electron microscope was dissected in ethanol, mounted on stubs using double sided Scotch® tape or PVC cement, and coated with carbon and gold/palladium.

A double-staining technique was used to clarify internal anatomy of digestive and reproductive systems. Dissected parts were stained in Grenacher's borax carmine (3-5 minutes), differentiated with acid ethanol (30 seconds), rinsed thoroughly with 70% ethanol, and then counterstained with chlorazol black (3-5 minutes). After thorough rinsing the preparations were examined in glycerol and photographed using a Zeiss MC 63 camera system.

Terminology generally follows that of Herman (1970). Abdominal segments are numbered from 3 to 10 according to their morphological origin.

The term 'copulatory piece' is used to describe the well developed structure which is the modified basal sclerite of the internal sac (Figure 1, inset).

The term 'clothing setae' is used to describe the general pubescence, does not include the generally longer tactile setae, and unless otherwise specified refers to the dorsal pubescence of segment 7 (Figure 1).

The term 'modified setae' is used to describe the flattened or tubular setae, often agglutinated at the tips, present on the protibiae and mesotibiae of many males (Figures 1 and 155).

### ABBREVIATIONS

Specimen repositories are indicated in the text by abbreviations, as follows:

- BMNH British Museum (Natural History),  
London;
- FMNH Field Museum of Natural History,  
Chicago;
- ISNB Institut Royal des Sciences Naturelles de Belgique, Brussels;

NMNZ National Museum of New Zealand,  
Wellington;  
NZAC New Zealand Arthropod Collection,  
Department of Scientific and Industrial Research,  
Auckland;  
OMNZ Otago Museum, Dunedin.

The area codes proposed by Crosby et al. (1976) are used in the text to help establish the location of collecting sites and summarise the known distribution of species. These codes and the areas they represent are explained on the inside back cover. For details of area boundaries, see the map in Crosby et al. (1976).

#### TYPE MATERIAL DESIGNATIONS

Where holotypes or lectotypes are designated, all the labels with the specimens are quoted. The word 'and' separates individual labels, and italic type indicates those in the handwriting of the original author, except as otherwise specified.

#### DIAGNOSTIC CHARACTERS

The homogeneous nature of these beetles' habitat is reflected in their relative lack of obvious diagnostic characters and the convergence or parallel development of characters separating species. Mouthparts, for example, show little interspecific variation. External characters useful for species separation include size, the shape, punctuation, and pubescence of the pronotum, eye shape and size, the shape of tergite 10, and secondary specialisation of sternite 8 in the male.

Copulatory piece morphology has not been used before in diagnostic studies of the Staphylinidae, but for the New Zealand

Osoriinae at least it is the most constant and easily recognised specific character. Although scanning electron micrographs are in the main used to illustrate this feature here, note that copulatory pieces can readily be dissected out and adequately examined under a binocular microscope at about  $\times 50$  magnification. Examination of this character in other osoriines may resolve phylogenetic problems and facilitate specific determinations.

#### IMMATURE STAGES

The immature stages of New Zealand Osoriinae have yet to be described - a task beyond the resources of this study. However, it may be helpful to include a few comments on our present, very limited, knowledge of them.

Larvae of *Nototrochus* are unknown, but larvae have been collected in samples with most species of *Paratrochus*, and many can be ascribed by association to a particular species. A late-instar larva of *P. tardus* is illustrated (Figure 2). Larvae (often mixed instars) appear to be present at all times of the year. The number of instars is unknown, though most staphylinids have three (Topp 1978). I have reared pupae of *P. curvisetis* (Figure 3) from final-instar larvae, and adults emerged from these within 6 days.

That larvae of *Paratrochus* co-exist with adults in the organic horizons of forest floors, and have similar feeding habits, is evident from the frequency with which they are collected together, and from the form of the gut and its contents. Larvae are

very active, and are capable of fast movement. They can be distinguished from other staphylinid larvae found in the same habitats by their plump, non-tapering body form, pale, lightly sclerotised head capsule, long legs, two-segmented urogomphi, and the presence (usually) of dark-coloured gut contents.

**KEY TO SUBFAMILIES OF STAPHYLINIDAE  
OCCURRING IN NEW ZEALAND  
AND NOTES ON THEIR STATUS**

by J.C. Watt and H.P. McColl

The key is based on several existing keys, especially Crowson's (1955, The natural classification of the families of Coleoptera), and Moore's (1964, *The coleopterists' bulletin* 18: 83-91). An original draft key was modified in accordance with comments by Mr P. M. Hammond of the British Museum (Natural History).

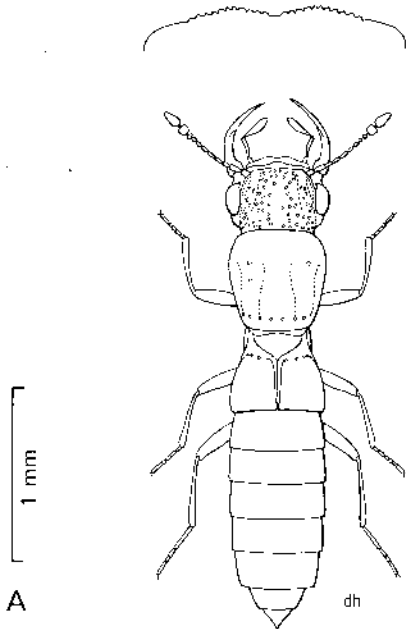
Following the key is a list of subfamilies occurring in New Zealand and a summary of the genera known to be present here. This latter is based on a list of genera kindly supplied by Mr Hammond. We have followed his subfamily classification, except that we have treated Eleusiinae as a subfamily rather than as a tribe of Osoriinae.

References to revisions are included where appropriate. In some subfamilies represented in New Zealand by one or few species (e.g., Piestinae, Proteininae) these revisions permit identification of all New Zealand members of the group.

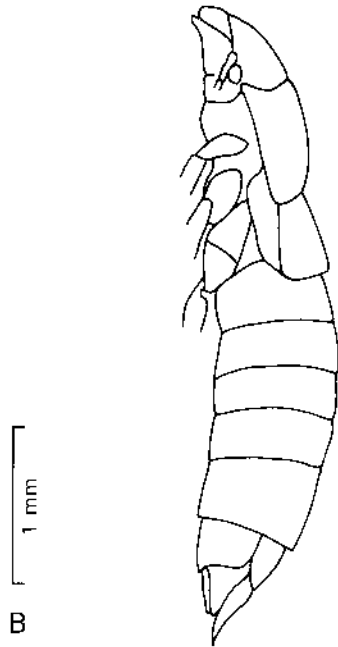
- 1 Antenna with distinct 2-segmented club (Figure A). Anterior margin of labrum minutely crenulate or denticulate (Figure A, enlargement). Small, less than 4.5 mm in length  
.... EUAESTHETINAE
- Antenna without distinct club. Anterior margin of labrum not minutely crenulate or denticulate .... 2
- 2 Body approximately cylindrical. Tergites and sternites of abdomen fused, forming complete rings; paratergites (= laterotergites) absent (Figure B)\*  
.... OSORIINAE
- Body not cylindrical, usually somewhat depressed. Tergites and sternites of abdomen not fused, usually with paratergites forming a prominent double lateral margin .... 3
- 3 Head with a pair of convex ocelli ('frontal calluses' of some authors)† on vertex between posterior margins of eyes, in addition to depressions representing tentorial maculae (Figure C). Paratergites single ... OMALIINAE
- Head without ocelli, but sometimes with a pair of depressions on vertex. Paratergites usually double .... 4
- 4 Antennae inserted on dorsolateral surface of frons between and behind or level with anterior margins of eyes (except in forms with reduced eyes).  
Terminal segment of maxillary palp

\* Paratergites are absent in all New Zealand Osoriinae and Eleusiinae, and in the euaesthetine genera *Agnosthaetus* and *Stictocranium*.

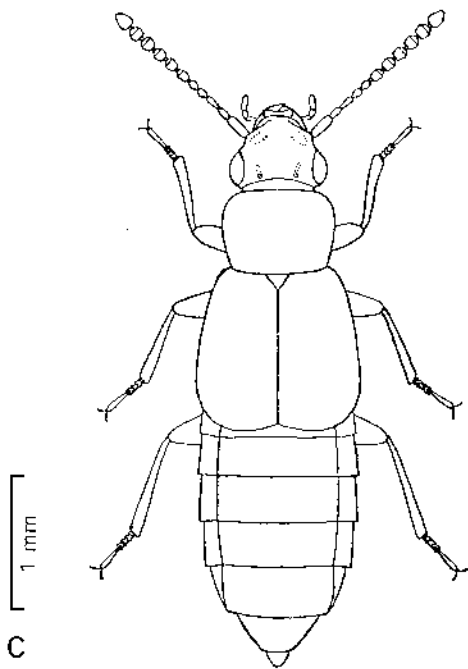
† Herman (1970, p. 349) shows that the structures in Omaliinae traditionally referred to as 'ocelli' have, in fact, been correctly interpreted as such.



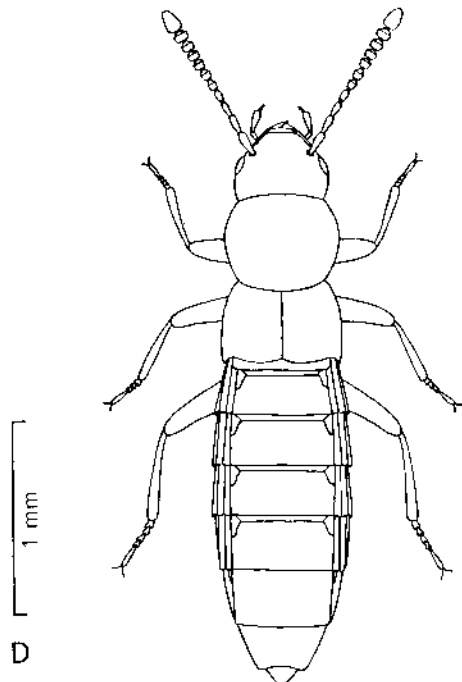
A  
EUAESTHETINAE. *Agnosthaetus vicinus* (Broun),  
and front margin of labrum, greatly enlarged;  
del. D. Helmore



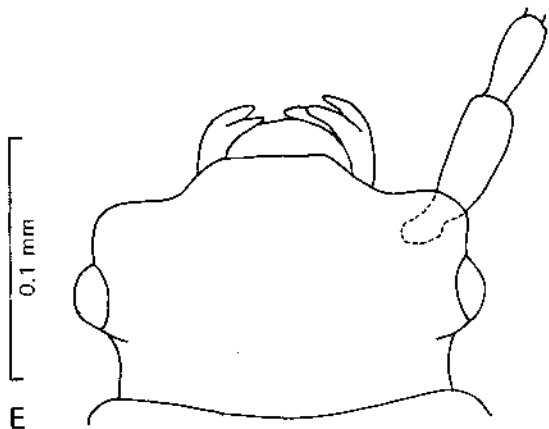
B  
OSORIINAE. *Paratrochus helmsi* (Fauvel);  
del. H. P. McColl



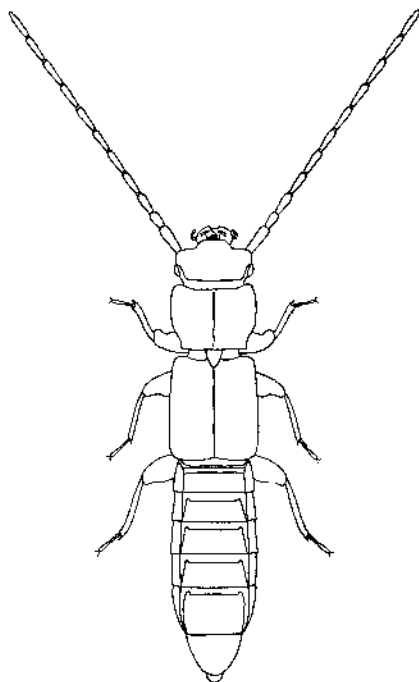
C  
OMALIINAE. *Omaliomimus albipenne* (Kiesenwetter);  
after Steel (1964: *Pacific Insects Monograph* 7:  
348, figure 5a)



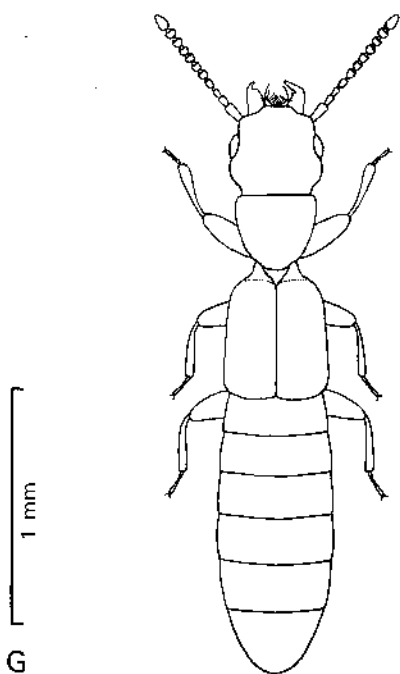
D  
ALEOCHARINAE. *Halmaeus nesiotes* Steel; after  
Steel (1964: *Pacific Insects Monograph* 7:  
370, figure 22a)



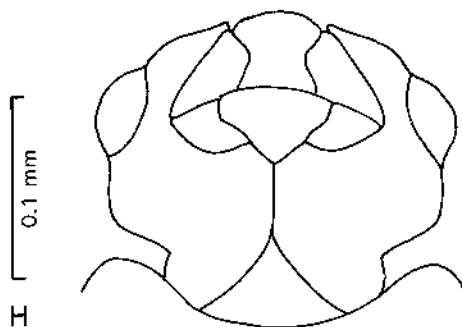
PIESTINAE. *Parasiagonum hudsoni* (Cameron),  
head showing antennal insertion; del. H. P. McColl



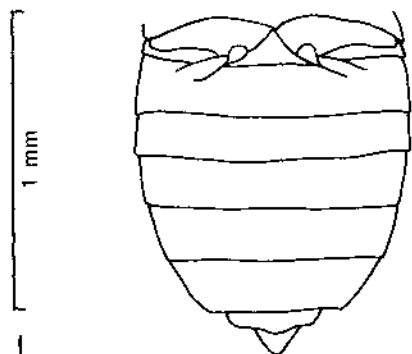
PIESTINAE. *Parasiagonum hudsoni* (Cameron),  
after Steel (1950, *Transactions of the Royal Society of  
New Zealand* 78: 206, figure 4)



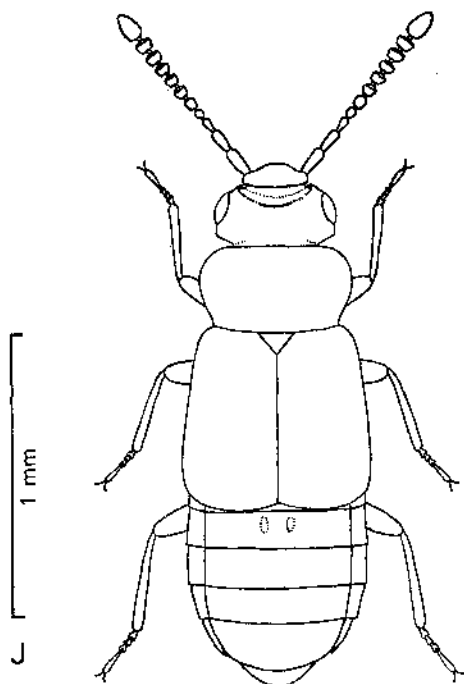
ELEUSIINAE. *Zeoleusis virgula* (Fauvel); after Steel  
(1950: *Transactions of the Royal Society of  
New Zealand* 78: 214, figure 1)



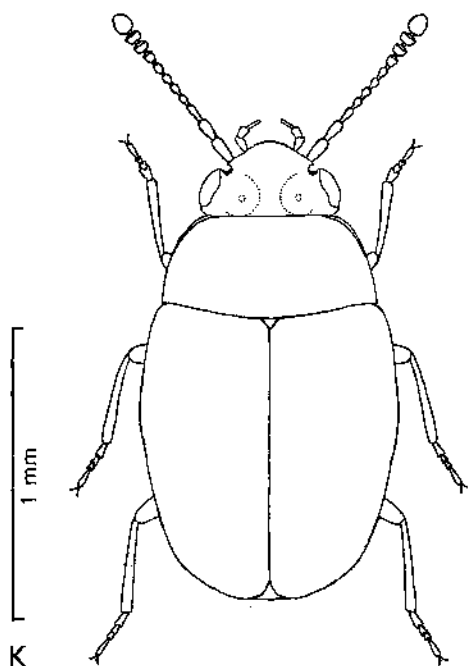
OXYTELINAE. *Anotylus complanatus* (Erichson),  
head, ventral view; del. H. P. McColl



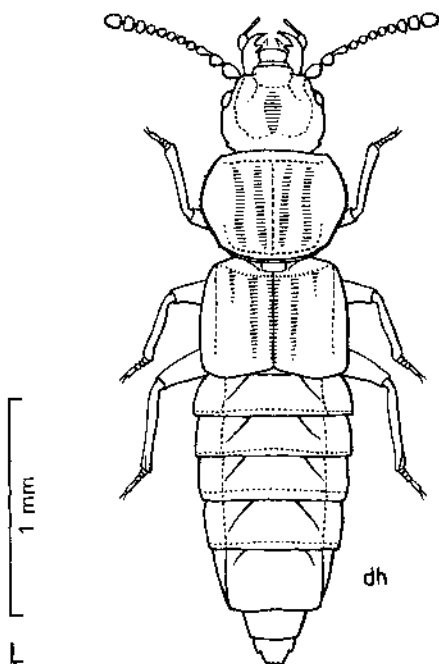
OXYTELINAE. *Anotylus complanatus* (Erichson),  
abdomen, ventral view; del. H. P. McColl



PROTEININAE. *Nesoneus acuticeps* Bernhauer;  
after Steel (1966: *Transactions of the Royal  
Entomological Society of London* 118: 294, figure 47)

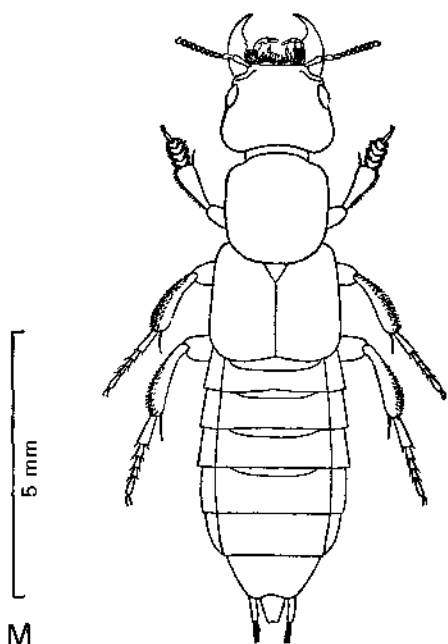


PROTEININAE. *Silphotelus nitidus* Broun; after  
Steel (1966: *Transactions of the Royal Entomological  
Society of London* 118: 304, figure 89)

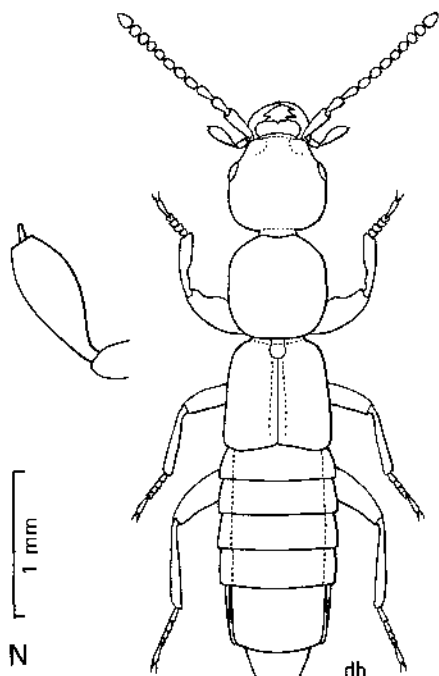


PSEUDOPSISINAE. *Pseudopsis arrowi* Bernhauer;  
del. D. Helmore

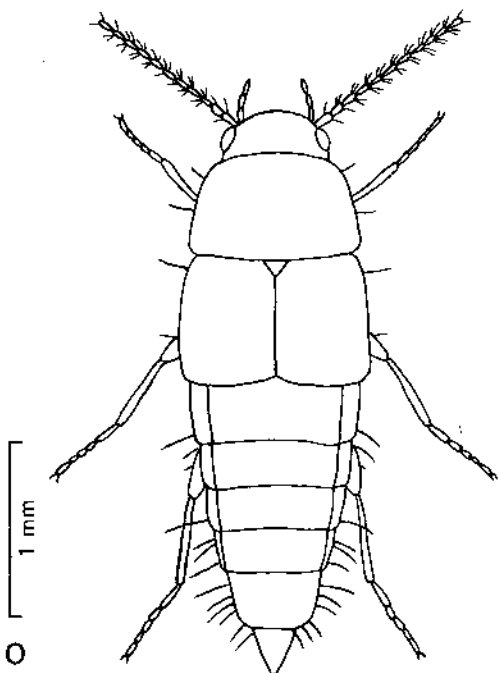




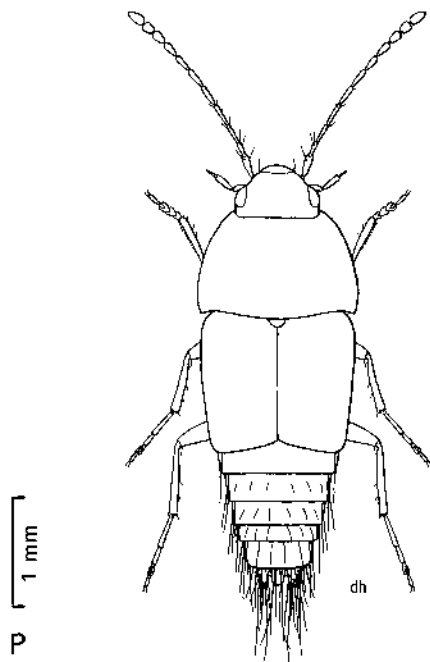
STAPHYLININAE. *Thinocafius insularis* Steel; after Steel (1949: *Entomologist's Monthly Magazine* 85: 309, figure 1)



PAEDERINAE. *Hypomedon zeelandicus* (Redtenbacher), and left maxillary palp, greatly enlarged; del. D. Helmore



HABROCERINAE. *Habrocerus capillaricornis* (Gravenhorst); after Lohse (1964: *Die Käfer Mitteleuropas* 4: 221, figure 107: 1)



TACHYPORINAE. *Sepedophilus flavithorax* (Broun); del. D. Helmore

(continued from page 13)

- subulate (i.e., very small and sharp-pointed - Figure D). Elytra completely rounded off laterally, without epipleural carina delimiting the epipleura (except in *Stylogymnusa*). Antennae not geniculate . ALEOCHARINAE
- Antennae inserted on front margin of frons, or inserted under shelf-like dorsolateral margins of frons, but always anterior to front margins of eyes. Terminal segments of maxillary palp rarely subulate. If elytra without epipleural carina delimiting the epipleura, antennae usually geniculate (i.e., elbowed, with a long scape - see Figure M) .... 5
- 5 Body strongly depressed. Front coxae globular. Antennae inserted under widely explanate dorsolateral projections of frons, their sockets facing ventrally (Figure E) .... 6
- Body rarely strongly depressed. Front coxae elongate, transverse or projecting. If antennae inserted under dorsolateral projections of frons, these are less prominent, and the sockets face laterally .... 7
- 6 Abdomen with distinct paratergites. Shape as in Figure F. Length more than 5 mm .... PIESTINAE
- Abdomen without paratergites. Shape characteristic (Figure G). Length less than 3 mm .... ELEUSIINAE
- 7 Gular sutures confluent (Figure H). Sternite 2 of abdomen complete (7 sternites, excluding genital segment, can be counted - Figure I). OXYTELINAE
- Gular sutures separate, at least anteriorly (if character state in doubt, head constricted to very narrow neck, and terminal segment of maxillary palp subulate). Sternite 2 of abdomen absent or rudimentary (6 sternites can be counted) .... 8
- 8 Elytra elongate, leaving no more than 5 tergites exposed (Figure J; almost completely covering abdomen in *Silphotelus* - Figure K). Lateral margin of frons with a small, semicircular incision on each side just in front of eye (Figures J and K). Less than 4 mm in length, rarely exceeding 2 mm .... PROTEININAE
- Elytra shorter, leaving at least 6 tergites exposed. Lateral margin of frons without incisions .... 9
- 9 Abdominal tergites except last each with a diagonal impressed line on either side (Figure L). Pronotum and elytra longitudinally costate. Tarsi short, about one-third as long as tibiae. Length about 3 mm .... PSEUDOPSINAE
- Abdominal tergites without such lines. Pronotum and elytra not longitudinally costate. Tarsi almost always more than one-third as long as tibiae .. 10
- 10 Head constricted behind eyes to form a distinct neck, which is clearly visible from above (Figure M) .... 11
- Sides of head converging evenly to base, without a neck constriction clearly visible from above .... 12
- 11 Last segment of maxillary palp less than half as long as the penultimate,

usually a little longer than width of penultimate segment, usually subulate or palpiform. Antennae inserted above or outside base of mandibles, under dorsolateral shelf-like expansions of margin of frons (Figure N). Antennae uniformly pubescent .... PAEDERINAE

--Last segment of maxillary palp at least half as long as the penultimate. Antennal insertions exposed, inside base of mandibles (Figure M). Basal antennal segments with a few tactile setae, in contrast with densely pubescent distal segments

.... STAPHYLININAE

12 Elytra with epipleura clearly delimited by epipleural carina .... 13

--Elytral epipleura not delimited, sides of elytra completely rounded off

.... PHLOEOCHARINAE

13 Antennae very slender, filiform. Head and pronotum without pubescence but with long, tactile setae. Length 3.0-3.5 mm. Shape as in Figure O

.... HABROCERINAE

--Antennae stouter, expanded towards apex. Head and pronotum densely pubescent. Shape characteristic (Figure P)

.... TACHYPORINAE

#### STATUS OF STAPHYLINID SUBFAMILIES IN NEW ZEALAND

Subfamily PIESTINAE (Figures E and F)  
*Parasiagonum hudsoni* (Cameron, 1927) is the only New Zealand representative. See Steel (1980, *Transactions of the Royal Society of New Zealand* 78: 203-212).

Subfamily PROTEININAE (= Pteroniinae)

(Figures J and K)

*Eupsorus*, *Nesoneus*, *Paranesoneus*, and *Silphotelus* are the only known New Zealand genera. See Steel (1966, *Transactions of the Royal Entomological Society of London* 118 (9): 285-311)

Subfamily OMALIINAE (Figure C)

There are 20 genera known in New Zealand. *Microsilpha*, described originally in Silphidae, is referred tentatively to Omaliinae, but may require a subfamily of its own. See Steel (1964, *Pacific insects monograph* 7: 340-375) for subantarctic species.

Subfamily OXYTELINAE (Figures H and I)

The following genera occur in New Zealand: *Anotylus*, *Blediotrogus*, *Bledius*, *Carpelimus*, *Coprostygnus*, *Oxytelus*, and *Teropaipus*.

Subfamily OSORIINAE (Figure B)

Two genera occur in New Zealand, *Noto-trochus* and *Paratrochus*.

Subfamily ELEUSIINAE (Figure G)

This group has often been treated as a tribe of Piestinae, and more recently of Osoriinae. We are not convinced that Eleusiinae are closely related to either subfamily, and we prefer to treat them as an independent subfamily. The only New Zealand species is *Zeoleusis virgula* (Fauvel, 1889). See Steel (1950, *Transactions of the Royal Society of New Zealand* 78: 213-235).

Subfamily PSEUDOPSINAE (Figure L)

*Pseudopsis arrowi* Bernhauer, 1939 is the only species known in New Zealand. See

Herman (1975, *Bulletin of the American Museum of Natural History* 155 (3): 245-317). Note that the type locality "Rotoiti" is certainly Lake Rotoiti in the Nelson Lakes National Park (BR), not the North Island locality of the same name (BP), as stated by Herman.

Subfamily PAEDERINAE (Figure N)  
There are 11 genera known to occur in New Zealand.

Subfamily STAPHYLININAE (Figure M)  
Included here are the tribes Xantholinini, Quediini, and Xanthopygini, which have sometimes been treated as subfamilies. There are 21 genera known in New Zealand.

Subfamily EUAESTHETINAE (Figure A)  
*Agnosthaetus*, *Protopristus*, and *Stictocranius* occur in New Zealand.

Subfamily PHLOEOCHARINAE  
The only species in New Zealand are *Phloeognathus monticola* Steel, 1953 and *Pseudophloeocharis australis* (Fauvel, 1903) (= *P. maori*). See Steel (1950, *Proceedings of the Linnaean Society of New South Wales* 75: 334-344; 1953, *Entomologist's monthly magazine* 82: 162-164).

Subfamily HABROCERINAE (Figure O)  
The only species known in New Zealand is *Habrocerus capillaricornis* (Gravenhorst, 1806), introduced from Europe.

Subfamily TACHYPORINAE  
Numerous native New Zealand species belong to *Sepedophilus* (= *Conosoma* of authors), and there is a single introduced European species, *Tachyporus nitidus* (Fabricius, 1781).

#### Subfamily ALEOCHARINAE

This is by far the largest and least understood subfamily, including 53 genera known in New Zealand. Subantarctic species were revised by Steel (1964, *Pacific insects monograph* 7: 363-375). The recently discovered, biogeographically and morphologically remarkable genus *Stylogymnusa* was described by Hammond (1975, *Journal of entomology (B)* 44: 153-173). New Zealand species of the distinctive genus *Oligota* were revised by Williams (1976, *New Zealand journal of zoology* 3: 247-255).

#### KEY TO NEW ZEALAND OSORIINAE

(NOTE. This key to species is based where possible on morphological characters that can be readily seen without destruction of the specimen. Copulatory piece morphology and spermathecal shape are unique for each species, and are used for confirmation.)

- 1 Eye obvious, large, composed of more than 15 facets; elytra longer than pronotum; wings not reduced; spermatheca strongly sclerotised  
.... (genus *Nototrochus*) .. 2
- Eye reduced, small, composed of less than 15 facets; elytra shorter than pronotum; wings reduced; spermatheca not strongly sclerotised  
.... (genus *Paratrochus*) .. 3

#### Genus *Nototrochus*

- 2 Eye with more than 100 facets; antennal segment 3 as long as segment 11 or longer; labrum without a strong median

indentation; basal angles of pronotum almost right-angled (Figure 4); sutural striae almost parallel to suture; spines on protibia not arising from prominent tubercles; sternite 7 of male with a median, spine-like projection (Figure 154); copulatory piece as in Figure 118. (North I. - ND, AK, CL, WO, BP, GB, TO, WN; South I. - NN)  
 .... *ferrugineus*

--Eye with about 50 facets; antennal segment 3 shorter than segment 11; labrum with a strong median indentation; basal angles of pronotum rounded, obtuse (Figure 5); sutural striae not parallel to suture; spines on protibia arising from prominent tubercles; sternite 7 of male with a median ridge (Figure 157); copulatory piece as in Figure 119. (South I. - KA, BR, WD, MC, FD) .... *montanus*

#### Genus *Paratrochus*

3 Larger species, length of pronotum  
 (1) 0.75 mm or more; if slightly shorter, then tergite 9 strongly produced behind, with 2 lateral projections and a shorter median projection (Figures 46 and 48). (South I.) .... 4

--Smaller species, length of pronotum less than 0.75 mm; tergite 9 not strongly produced behind. (North I., South I.) .... 7

4 Tergite 9 slightly produced behind,  
 (3) downturned, with 2 lateral projections; side process of copulatory piece absent or less than half as long as tubular part .... 5

--Tergite 9 strongly produced behind, upturned or horizontal, with 2 pointed lateral projections and a short, rounded median projection; side process of copulatory piece about as long as tubular part .... 6

5 Lateral margins of elytra parallel,  
 (4) with 1 weakly developed tooth near shoulder; shoulder with a round, shallow depression lacking microreticulate sculpturing; tergite 9 extended into 2 widely separated, pointed projections (Figure 44); sternite 7 of male with a shallow median depression extending through to a deeper depression on sternite 8; copulatory piece short, with a short side process (Figure 120); spermatheca elongate, more than 5 times longer than wide; middle part of spermathecal duct spirally twisted. (South I. - WD) .... *foveatus*

--Lateral margins of elytra slightly bowed, with several weakly developed teeth; shoulder without a depression; tergite 9 extended into 2 broad, blunt lateral projections which converge at midline (Figure 45); sternites 7 and 8 of male unmodified; copulatory piece a long, spirally twisted tube without a side process (Figure 121); basal part of spermathecal duct straight. (South I. - FD, SL) .... *monstrosus*

6 Pronotum with indistinct microreticulate sculpturing, shining; elytral shoulders almost right-angled; copulatory piece with a slender, pointed side process (Figure 122); spermatheca much longer than wide (Figure 86), its

- entire duct tightly, spirally twisted.  
(South I. - NN, BR) .... *helmsi*
- Pronotum with distinct, coarse microreticulate sculpturing; elytral shoulders rounded; copulatory piece with a stout, blunt side process (Figure 123); spermatheca oval, almost as wide as long (Figure 87), its duct not spirally twisted basally. (South I. - NN, BR, WD) .... *arrowi*
- 7 Length of pronotum 0.63 mm or more  
(3) .... 8
- Length of pronotum usually less than 0.63 mm, or if about this length then South Island species .... 12
- 8 Body setae sparse, shorter than distance between them; eye with 7 or more facets  
(7) .... 9
- Body setae dense, longer than distance between them; eye with up to 6 facets .... 10
- 9 Eye protruding, with 8 obvious facets and 2 smaller ones; tergite 9 projections small, blunt, widely separated (Figure 49); copulatory piece large (0.40 mm from apex to base of side process), with a stout, blunt side process and longer tubular part (Figure 124); spermatheca pear-shaped, 0.20 × 0.12 mm (Figure 88). (North I. - AK, BP, WO, TK, TO) .... *vagepunctus*
- Eye flat, with 4 obvious facets and 3 smaller ones; tergite 9 projections long, pointed, moderately separated (Figure 50); copulatory piece with a long, pointed side process, a shorter tubular part, and a further side process (0.21 mm from apex to base of second side process) (Figure 125); spermatheca oblong, 0.15 × 0.06 mm (Figure 89). (South I. - NN) .... *bifurcatus*
- 10 Eye small (0.050 × 0.038 mm), flat, with no discernible facets; pronotum with fine, shallow punctures. (North I. - AK) .... *caecus*  
(8)
- Eye larger (at least 0.088 × 0.050 mm), obvious, with 6 facets; pronotum with coarse, deep punctures .... 11
- 11 Pronotum about as wide behind as at middle (Figure 13); tergite 9 projections moderately separated, not curving inward (Figure 52); elytral shoulder almost right-angled; copulatory piece small (0.13 mm from apex to base of side process), with side process curving around tubular part (Figure 126); spermatheca slightly longer than wide (Figure 91). (North I. - TK) .... *curvisetis*  
(10)
- Pronotum narrower behind than at middle (Figure 14); tergite 9 projections well separated, long, curving slightly inward (Figure 53); elytral shoulder rounded, obtuse-angled; copulatory piece large (0.3 mm from apex to base of side process), with a broad, stout, straight side process longer than the tubular part (Figure 127); spermatheca much longer than wide (Figure 92). (North I. - TK, WI; South I. - NN) .... *hermes*

- 12 Eye with 3 or more facets, more than  
(7) 0.038 mm wide .... 13
- Eye with 1 or 2 facets, up to  
0.031 mm wide .... 19
- 13 Clothing setae shorter than spaces  
(12) between them .... 14
- Clothing setae as long as the spaces  
between them or longer .... 15
- 14 Eye small (0.050 × 0.038 mm), with 3  
(13) or 4 indistinct, flat facets; elytral  
shoulder blunt, right-angled; ster-  
nite 8 of male with a shallow median  
depression; copulatory piece with  
side process curved around tubular  
part (Figure 128); spermatheca oval,  
0.150 × 0.075 mm (Figure 93). (South  
I. - WD, OL) .... *brevisetis*
- Eye large (0.075 × 0.050 mm), with 4  
or 5 prominent facets; elytral shoul-  
der rounded, obtuse-angled; sternite  
8 of male unmodified; copulatory  
piece with a straight side process  
and apically hooked tubular part  
(Figure 129); spermatheca pear-  
shaped, 0.200 × 0.125 mm (Figure 94).  
(South I. - FD) .... *fiordensis*
- 15 Length of pronotum 0.45-0.50 mm; (eye  
(13) with 3 facets; sternite 8 of male  
with a shallow median depression;  
copulatory piece with a short, broad  
side process and longer, straight  
tubular part (Figure 130)). (North  
I. - WN) .... *tardus*
- Length of pronotum usually greater  
than 0.50 mm (if 0.50 mm, always  
South I.) .... 16
- 16 Projections of tergite 9 narrowly  
(15) separated (Figure 57); copulatory  
piece with a large, broad side pro-  
cess almost completely surrounding  
the small tubular portion (Figure  
131). (North I. - WO, TK, TO)  
.... *scapulifer*
- Projections of tergite 9 moderately  
separated (Figure 58) and sternite 8  
of male unmodified (*microphthalmus*)  
.... 17
- 17 Sternite 8 of male unmodified; copu-  
(16) latory piece variable, but always  
with a stout, broad side process  
about as long as tubular part (Fig-  
ures 132 and 133). (North I. - TK;  
South I. - NN, SD, MB, BR, WD, FD)  
.... *microphthalmus*
- Sternite 8 of male with a shallow  
median depression; copulatory piece  
not as above .... 18
- 18 Copulatory piece with a stout, broad-  
(17) based side process that curves around  
the slightly shorter tubular part  
(Figure 134); spermatheca oval, weak-  
ly sclerotised, without apical pro-  
tuberance (Figure 98). (South I. -  
WD, OL, FD) .... *homerensis*
- Copulatory piece with a narrow-based  
side process that curves around the  
tubular part, which is of similar  
length, and a second side process  
arising from base of tubular part and  
curving in opposite direction to  
first (Figure 135); spermatheca oval,  
with a pronounced apical protuberance  
moderately sclerotised (Figure 99).  
(South I. - NC, MC, WD) .... *humilis*

- 19 Pronotum expanding, its posterior  
(12) third broader than its anterior third  
(Figures 23-27) .... 20  
0.075 mm) (Figure 101); middle por-  
tion of spermathecal duct not spirally  
twisted. (North I. - AK)  
.... *trivialis*
- Pronotum parallel-sided (Figures 33,  
34, and 39) or narrowing, its post-  
erior third narrower than anterior  
third (Figures 28-32, 35-38, 40, and  
41) .... 24
- 20 Clothing setae dense, as long as the  
(19) spaces between them or longer.  
(North and South I. species) .... 21  
--Pronotum with setae mostly about as  
long as the spaces between them;  
copulatory piece as in Figure 139,  
its tubular part broad at apex;  
spermatheca acorn-shaped, small  
(0.125 × 0.088 mm) (Figure 102); mid-  
dle portion of spermathecal duct  
spirally twisted. (North I. - AK,  
CL) .... *decipiens*
- Clothing setae sparse, mostly shorter  
than the spaces between them. (South  
I. species) .... 23
- 21 Pronotum with deep microreticulate  
(20) sculpturing, coarse punctures, and  
setae mostly shorter than the spaces  
between them; sternite 8 of male un-  
modified or with a median patch lack-  
ing setae; copulatory piece as in  
Figures 136 and 137; parameres slen-  
der; spermatheca acorn-shaped (Figure  
100) or oval. (North I. - ND, AK,  
CL, BP, GB, TO, RI) .... *brevipennis*
- 23 Eye convex, small (0.025 × 0.018 mm);  
(20) sternite 8 of male unmodified; copu-  
latory piece with a short side pro-  
cess and slender tubular part (Figure  
140); spermathecal duct with middle  
and basal portions not spirally twist-  
ed. (South I. - NN, BR, WD, FD, OL)  
.... *hamatus*
- Pronotum with shallow microreticulate  
sculpturing, fine punctures, and  
setae mostly as long as the spaces  
between them or longer; sternite 8 of  
male with a shallow median depres-  
sion; copulatory piece not as above;  
parameres stout. .... 22
- Eye flat, large (0.05 × 0.31 mm);  
sternite 8 of male with a median dep-  
ression; copulatory piece with a  
short side process and broad, re-  
curved tubular part (Figure 141);  
spermathecal duct entirely spirally  
twisted. (South I. - NN, WD)  
.... *retroflexus*
- 22 Pronotum with setae mostly longer  
(21) than the spaces between them; copula-  
tory piece as in Figure 138, its  
tubular part narrow at apex; sperma-  
theca oval, elongate, large (0.175 ×  
0.125 mm) (Figure 102); middle  
portion of spermathecal duct  
spirally twisted. (North I. - AK,  
CL)  
.... *decipiens*
- 24 Clothing setae dense, as long as the  
(19) spaces between them or longer .... 25  
--Clothing setae sparse, shorter than  
the spaces between them .... 29
- 25 Pronotum with deep microreticulate  
(24) sculpturing, giving dull appearance  
.... 26



- Pronotum with shallow microreticulate sculpturing, giving shining appearance .... 27
- 26 (25) Clothing setae longer than the spaces between them; projections of tergite 9 slender, pointed (Figure 66); shallow depression in sternite 8 of male with a median longitudinal ridge; copulatory piece with a short side process and long, trumpet-shaped tubular part (Figure 142); spermatheca oval (Figure 105). (North I. - TK) .... *tubifer*
- Clothing setae as long as the spaces between them; projections of tergite 9 short, moderately blunt (Figure 67); shallow depression in sternite 8 of male with no median ridge; copulatory piece with a short, broad side process bearing a wing-like extension and long, slightly hooked tubular part (Figure 143); spermatheca almost round (Figure 106). (North I. - ND) .... *alifer*
- 27 (25) Junction between tergites and sternites visible on segments 3-7; clothing setae longer than the spaces between them; (projections of tergite 9 moderately separated, long, pointed (Figure 68); sternite 8 of male with a shallow median depression; copulatory piece with a short, slender side process and long, curved tubular part (Figure 144); spermatheca bean-shaped (Figure 107)). (South I. - NN) .... *pubescens*
- Junction between tergites and sternites obscured except on segment 3;
- 28 (27) Lateral projections of tergite 9 widely separated, long, pointed, with a small median projection (Figure 69); sternite 8 of male with a depression containing a median longitudinal ridge and 2 curved lateral ridges (Figure 156); copulatory piece with a very short side process and long, apically hooked tubular part (Figure 145); parameres clubbed distally (Figure 159); spermatheca elongate-oval (Figure 108). (North I. - TK) .... *tricarinatus*
- Lateral projections of tergite 9 moderately separated, short, blunt, with no median projection (Figure 70); sternite 8 of male unmodified; copulatory piece with a broad side process curving around the long, sharply bent tubular part (Figure 146); parameres simple; spermatheca oblong to oval (Figure 109). (North I. - ND) .... *flexuosus*
- 29 (24) Pronotum parallel-sided, its anterior half about as broad as posterior half (Figures 33 and 34) .... 30
- Pronotum not parallel-sided, its anterior half broader than posterior half, or broadest at about middle (Figures 35-41) .... 32
- 30 (29) Basal angle of pronotum and elytral shoulder sharply right-angled; copulatory piece with a broad side process curving around the larger

- tubular part, which is flanged as in Figure 147. (North I. - AK)  
 .... *angulatus*
- Basal angle of pronotum and elytral shoulder rounded; copulatory piece small (0.1 mm from apex to base of tubular part), with a short, blunt side process and C-shaped tubular part (Figure 80). (South I. - BR)  
 .... *anophthalmus*
- 31 (29) Pronotum with anterior half broader than posterior half (Figures 35 and 36) .... 32
- Pronotum broadest at about middle (Figures 37-41) .... 33
- 32 (31) Projections of tergite 9 narrowly separated (Figure 73); sternite 8 of male with a median depression; copulatory piece with a slender side process as long as the wide tubular part and curving round it (Figure 81). (North I. - AK) .... *insuetus*
- Projections of tergite 9 widely separated (Figure 74); sternite 8 of male unmodified; copulatory piece with a straight side process shorter than the tubular part (Figure 148). (North I. - WN) .... *bucinifer*
- 33 (31) Sternite 8 of male unmodified; spermatheca oval, slightly longer than wide (Figures 112 and 113) .... 34
- Sternite 8 of male with a median depression; spermatheca elongate-oval, pear-shaped, or bean-shaped, much longer than wide (Figures 114-116) .... 35
- 34 (33) Elytral shoulder almost right-angled; abdomen with short clothing setae and long, dark tactile setae almost at right-angles to body; copulatory piece with side process and tubular part pointed (Figure 149). (South I. - NN, BR) .... *parvulus*
- Elytral shoulder rounded; abdomen with short clothing setae and long, pale tactile setae angled backward; copulatory piece with side process and tubular part blunt (Figure 150). (South I. - BR) .... *angustus*
- 35 (35) Tergite 9 with a small median projection (Figure 77); copulatory piece large (0.45 mm from apex to base of tubular part), with no side process, its tubular part stout (Figure 151); spermatheca elongate-oval (Figure 114) .... *pelorensis*
- Tergite 9 with no median projection (Figures 78 and 79); copulatory piece with a side process; spermatheca bean-shaped or pear-shaped (Figures 115 and 116) .... 36
- 36 (35) Pronotum with fine microreticulate sculpturing and shallow punctures; sternite 8 depression of male not bordered laterally by prominent ridges; copulatory piece with a very short side process and small, thorn-like protuberances covering the broad tubular part (Figure 152); spermatheca pear-shaped, its duct with middle part straight. (North I. - AK) .... *aculeatus*
- Pronotum with coarse, obvious micro-

reticulate sculpturing and some deep punctures; sternite 8 depression of male bordered laterally by prominent ridges; copulatory piece with a broad side process longer than the tubular part (Figure 153); spermatheca bean-shaped, its duct with middle part weakly spirally twisted. (North I. - WO) . . . . *phaseolinus*

## DESCRIPTIONS

### *Nototrochus* new genus

*Holotrochus* Erichson, 1840, Genera et species staphylinorum insectorum 2: 757 (part).

TYPE-SPECIES *Holotrochus ferrugineus* Broun, 1893.

(The name *Nototrochus*, meaning 'southern *Trochus*', stems from the Greek 'notos', meaning 'south'; gender masculine, as for '*Trochus*'.)

With the characters of Osoriinae (Blackwelder 1942, Moore 1964). Length 3.5-5.0 mm. Form cylindrical. General coloration brownish-black; teneral specimens yellow, and reddish-brown specimens not uncommon. Upper surface moderately shining, with microreticulate sculpturing. Foreparts almost glabrous apart from scattered long, tactile setae. Abdomen sparsely pubescent. Pronotum shorter than elytra, both wider than long.

HEAD. Upper surface finely punctate. Eye almost round, flat or slightly convex, about 0.125 mm in diameter, comprising more than 50 facets. Antennae moderately stout, straight; segments 1 and 2 almost parallel-sided; segment 1 stout, twice as long as its greatest width and as segment 2; segment 2 one-third longer than its greatest width, with several short, stout setae at base; segment 3 incrassate, shorter or longer than segment 11; segments 4-10 gradually increasing in length and width; segment 11 apically pointed; apex of segment 3 and segments 4-11 with moderately dense, short pubescence and longer tactile setae.

Labrum twice as wide as long, its anterior margin asymmetrical (right side more produced), dorsally with 12-14 long, curved setae in a double row near anterior margin, 9-11 long setae in a single row towards base, and a comb of 5-7 shorter setae on basal half of lateral margins; long, membranous lobes arising ventrally from lateral margins, dividing into 2-5 finger-like, distally bifurcating processes. Mandibles stout, with a large apical tooth and 2 blunt subapical teeth, microreticulate sculpturing and about 4 long setae on outer face, and a tuft of about 4 flattened setae on inner face; right mandible with a more pronounced ridge on superior surface than left mandible. Maxillary palp with microreticulate sculpturing towards base of each segment; segment 1 about 3.3× longer than wide, without setae; segments 2 and 3 1.3× wider than long, with 2 and 4 stout setae respectively; segment 4 about 2.2× longer than its greatest width, narrowing towards apex, with 3 stout setae, 6-8 chordotonal organs (Hammond 1976) at base, and a group of sensilla basiconica (Herman 1970, Hammond 1976) at apex. Stipes with about 8 major setae. Galea stout, with a large tuft of setae at apex. Lacinia with 3 moderately pointed teeth and a small, blunt tooth at apex; a triple comb of about 14 very stout setae and about 6 other setae along inner face; about 5 major setae on outer face. Labial palp with faint microreticulate sculpturing; segment 1 2.5× longer than wide, with 2 setae; segment 2 about as long as wide, with 1 long seta; segment 3 2.5× longer than wide, glabrous, narrowing slightly towards apex, which bears a group of sensilla basiconica. Mentum with microreticulate sculpturing and about 24 setae, slightly wider than long.

THORAX. Pronotum wider than long, with faint microreticulate sculpturing, finely punctate, each puncture having a minute, peg-like seta; several setae on lateral margins. Prosternum glabrous, with distinct microreticulate sculpturing, not strongly carinate anteriorly; prosternal process small. Disc with microreticulate sculpturing and fine punctures.

Elytra about 1.1× wider than long; sutural striae present; shoulder prominent but rounded; lateral margins almost parallel, with several setae. Mesosternum glabrous, with distinct microreticulate sculpturing;

a small median carina continuous with mesosternal process.

Wings not reduced. Metasternum with several setae, distinct microreticulate sculpturing, and scattered fine punctures; no median carina or metasternal process.

Protibia not enlarged, with 4 or 5 spines along upper face and up to 8 at apex (including 4 spurs); a cleaning comb on lower face, not sexually dimorphic. Mesotibia with up to 13 spines in a double row on upper face, a row of 7 hairs on lower face, and 2 spines and 3 spurs at apex. Metatibia without major spines, with several fine setae on upper face, a comb of fine setae (lateral comb) on lower face, towards apex, continuous or not with an apical comb of short setae, and 4 spurs. All tarsi with 5 tarsomeres; tarsomere 1 about twice as long as wide and as tarsomeres 2, 3, and 4; tarsomeres 1-4 with 2 long setae on inner surface; tarsomere 4 with 2 short setae on outer surface; tarsomere 5 with about 9 setae, simple claws, and a bristle-like empodium shorter than claw. Legs with microreticulate sculpturing on all parts, generally with scant pubescence.

ABDOMEN. Tergites and sternites with distinct microreticulate sculpturing, more pronounced at base of segments; pubescence sparse, more concentrated on apical segments, consisting of short clothing setae and long tactile setae; punctures scattered, often with a minute, peg-like seta (Figures 154 and 157). Sternite 2 with a small, median, backward-projecting process continuous with median carina on sternite 3. Posterior margin of tergite 9 with 2 blunt projections (Figures 40 and 41).

MALE. Sternite 7 with a median spine or ridge. Sternite 8 with a median depression (Figures 154 and 157) bordered at posterior by rounded teeth. Median lobe of genitalia blunt at apex; parameres narrow. Copulatory piece without a side process (Figures 118 and 119).

FEMALE. Sternites 7 and 8 unmodified. Valvifer with about 8 long setae at apex; style with several setae at apex. Spermatheca strongly sclerotised, about 1.3× longer than wide (Figures 82 and 83); duct highly convoluted near spermatheca, with straight but loosely spiralled middle and basal portions.

DISTRIBUTION. *Nototrochus* is found in both the North and South Islands, though *ferrugineus* has been recorded in the South Island only from Nelson, and *montanus* is absent from the North Island and the northern part of the South Island.

REMARKS. *Nototrochus* is distinguishable from *Paratrochus* by the large eye, elytra longer than the pronotum, larger wings, form of the copulatory piece, and strongly sclerotised spermatheca.

### *Nototrochus ferrugineus* (Broun) new combination

Figures 4, 42, 82, 118, and 154

*ferrugineus* Broun, 1893, Manual of New Zealand Coleoptera V: 1034 (*Holotrochus*).

*brouni* Bernhauer, 1939, Annals and magazine of natural history 11 (4): 208 (*Holotrochus*). NEW SYNONYMY.

Antennae and legs reddish-brown (wet). Length - dry 3.5-5.2 mm, wet 4.0-5.4 mm; pronotal length 0.66-0.80 (0.75) mm, width 0.88-1.05 (0.96) mm; elytral length 0.80-1.00 (0.91) mm, width 0.93-1.13 (1.03) mm; abdominal width 0.83-1.03 (0.96) mm; (dimensions from 8 males and 6 females).

HEAD. Upper surface finely, shallowly punctate. Eye flat, comprising more than 100 facets. Antenna with segment 3 as long as segment 11 or longer. Labrum with anterior margin very slightly indented medially; lobes divided into 4 or 5 processes.

THORAX. Pronotum finely, shallowly punctate; lateral margins evenly expanded to midlength, then abruptly narrowed to almost right-angled, blunt basal angles (Figure 4). Elytra with sutural striae almost parallel to suture except towards posterior; shoulder not toothed. Protibia about 3.6× longer than its greatest width, with a row of 5 setae on external face and 4 or 5 spines on upper face, these spines and those of mesotibia not arising from prominent tubercles. Metatibial combs separate; about 7 setae in apical comb, 9 in lateral comb.

ABDOMEN. Shallowly punctate. Projections of tergite 9 (Figure 42) small, blunt.

MALE. Sternite 7 with a median, stout, spine-like projection arising one-quarter from base, reaching or not reaching posterior margin, overlying a deep depression continuous with that of sternite 8; depression of sternite 8 with posterior margin thickened medially into a vertical face bearing about 20 small, peg-like setae (Figure 154). Median lobe of gonitalia narrowing to a blunt point at apex (Figure 154). Copulatory piece (Figure 118) stout, straight; grooves at base of tube limited to basal third.

FEMALE. Style with several short setae and a long seta at apex. Spermatheca (Figure 82)  $0.20 \times 0.25$  mm.

TYPE DATA. *Nototrochus ferrugineus*: holotype - female, Woodhill (near Kaipara railway) (AK), T. Broun (BMNH), here designated. It bears labels: "Type" and "1849" and "Woodhill" and "New Zealand, Broun Coll. Brit. Mus. 1922 - 482" and "*Holotrochus ferrugineus*" and "HOLOTYPE, *Nototrochus ferrugineus*, (Broun) ♀. desig. H.P. McColl 1981" (last label my handwriting). This specimen is reddish brown.

*Nototrochus brouni*: only two (one male and one female) of the three mentioned by Bernhauer (1939) have been located. The male - Epsom (AK), 12 February 1912, J.J. Walker - is in the M. Bernhauer Collection (FMNH). The female - Te Aroha (AK), May 1902, J.J. Walker - is in the G.C. Champion Collection (BMNH).

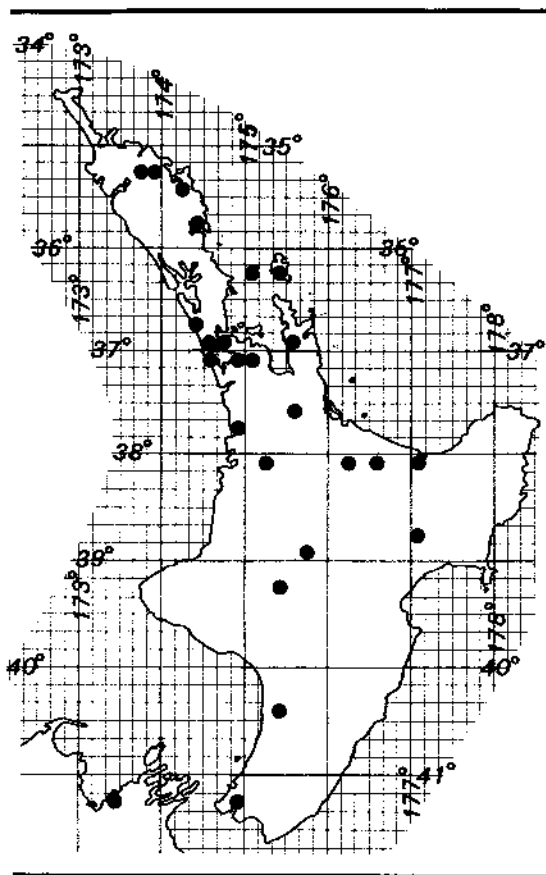
MATERIAL EXAMINED. 49 males and 59 females (BMNH, FMNH, NMNZ, NZAC), both wet-preserved and dried specimens.

ND, AK, CL, WO, BP, GB, TO, WN / NN.

*N. ferrugineus* has been found in litter and humus, most frequently under tarai-re-dominant vegetation (Puketi State Forest; Ngaiotonga Scenic Reserve; Papakura, Kirk Memorial Park; Opaheke, Ponga Road; Maketu Stream, Ramarama; south Waitomo; Lake Waikaremoana). Four specimens from Waimarino (National Park) were collected from under "old horse droppings".

Its altitudinal range is between 20 m (Kerikeri; Papakura) and 700 m (Lake Waikaremoana).

It has been collected in all months.



*N. ferrugineus* has been found in samples with *Paratrochus brevipennis* (Ngaiotonga Scenic Reserve; Papakura, Kirk Memorial Park; Opaheke, Ponga Bush; Maketu Stream, Ramarama; Hongi's Track, Rotorua; Rotorua/Whakatane State Highway; Lake Waikaremoana), *scapulifer* (south Waitomo), *flexuosus* (Puketi State Forest), and *aculeatus* (Opaheke, Ponga Road; Maketu Stream, Ramarama). It also occurs near *vagepunctus* (Epsom; Te Aroha; Mount Pirongia), *caecus* (Maketu, Ramarama), *brevipennis* (Hunua; Little Barrier Island; Whangaparapara, Great Barrier Island), *scapulifer* and *phaseolinus* (Mount Pirongia), and *insuetus* (Destruction Gully, Waitakere Range).

REMARKS. Variation within *ferrugineus* is limited to size, colour, and the length of the spine on sternite 7 of the male.

There has been some confusion between the names *ferrugineus* and *brouni*. In his

description of *ferrugineus*, Broun states that it "differs from *Holotrochus brouni* Fauvel in size, colour and sculpture". However, Fauvel never published a description of *brouni*, and even declared his reluctance to do so (Fauvel 1900) until complete comparative descriptions were available for both species, since he could not differentiate between them on the basis of Broun's description, and had not seen the unique holotype of *ferrugineus*. Bernhauer (1939), when describing *brouni*, separated *ferrugineus* by its lack of a spine and pit on sternite 7 of the male. It is interesting to speculate how this decision was reached, because at this stage *ferrugineus* was known only from the female holotype. I have examined Bernhauer's material of *brouni*, and confidently place it into synonymy with *ferrugineus*. A specimen in the Sharp Collection (BMNH) bearing the labels "Auckland New Zealand" and "Sharp Coll. 1905 - 313" and "Holotrochus brouni Fvl." and "Auckland 75" may be the third specimen mentioned by Bernhauer, but there is insufficient data to be certain.

*N. ferrugineus* can be separated from *montanus* by its larger eye, weakly indented labrum, the almost right-angled basal angles of the pronotum, protibial spines not arising from prominent tubercles, and form of sternite 7 of the male.

#### ***Nototrochus montanus* (Broun) new combination**

Figures 5, 43, 83, 119, and 157

*montanus* Broun, 1910, Bulletin of the New Zealand Institute I: 18 (*Holotrochus*).

Antennae and legs blackish-brown (wet). Length - dry 3.0-4.0 mm, wet 3.5-4.5 mm; pronotal length 0.65-0.75 (0.69) mm, width 0.80-0.90 (0.84) mm; elytral length 0.70-0.88 (0.78) mm, width 0.83-0.95 (0.87) mm; abdominal width 0.83-0.90 (0.86) mm; (dimensions from 5 males and 6 females).

HEAD. Upper surface finely but deeply punctate. Eye slightly convex, comprising more than 50 facets. Antenna with segment 3 shorter than segment 11. Labrum with anterior margin markedly indented medially; lobes divided into 2 or 3 processes.

THORAX. Pronotum finely but deeply punctate; lateral margins evenly expanded to

midlength, then evenly narrowed to obtuse, rounded basal angles (Figure 5). Elytra with sutural striae curving away from suture to midlength, then towards suture to posterior; shoulder with weak tooth. Protibia about 4× longer than its greatest breadth, with 2 rows of 4 short, stout spines on external face which, like those on upper face of protibia and mesotibia, arise from prominent tubercles. Metatibia with about 25 setae in a continuous row extending from apical third of lower edge and along apex.

ABDOMEN. Distinctly punctate. Projections of tergite 9 (Figure 43) more pronounced and more sharply pointed than in *ferrugineus*.

MALE. Sternite 7 with a median ridge arising one-third from base and projecting slightly from posterior margin, a shallow depression on either side continuous with a large median depression on sternite 8; depression of sternite 8 with posterior margin slightly thickened and bearing many small, peg-like setae (Figure 157). Median lobe of genitalia narrowing to rounded apex. Copulatory piece (Figure 119) moderately stout, twisted at about middle of tube; grooves at base of tube extending beyond basal third.

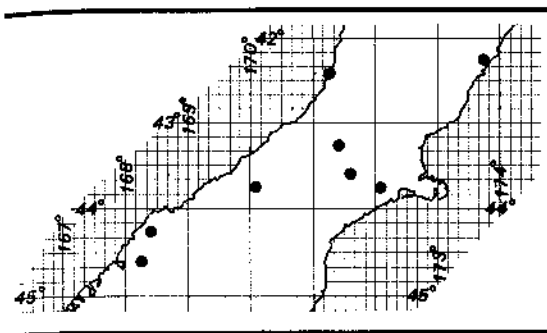
FEMALE. Style with short setae only. Spermatheca (Figure 83) 0.20 × 0.15 mm.

TYPE DATA. Lectotype: male, Mount Cook (near the Hermitage) (WD), 762 m, T.F. Cheeseman (BMNH), here designated. It bears labels "Type" and "Mt. Cook" and "3043" and "New Zealand Broun Coll. Brit. Mus. 1922 - 482" and "*Holotrochus montanus*" and "LECTOTYPE *Nototrochus montanus* (Broun) ♂. desig. H.P.McColl, 1981" (last label my handwriting). The second specimen mentioned by Broun in his original description is not present in his collection (BMNH), and has not been located elsewhere.

MATERIAL EXAMINED. 46 males and 38 females (BMNH, NZAC), both wet-preserved and dried specimens.

KA, BR, WD, MC, FD.

*N. montanus* has been collected from litter and humus beneath beech (Woodhen Creek; Lake Alabaster), pine (Mount Alexander, Puhī Puhī), and moss under beech (Mount Alexander).



Its altitudinal range is between 60 m (Woodhen Creek) and 762 m (Hermitage, Mount Cook).

It has been collected in January, March, September, and October.

*N. montanus* occurs near *Paratrochus arrowi* and *anophthalmus* (Greymouth) and *hamatus* (Woodhen Creek, Cascade Valley).

REMARKS. *N. montanus* can be separated from *ferrugineus* by its smaller eye, strongly indented labrum, rounded, obtuse basal angles of the pronotum, protibial spines arising from prominent tubercles, and the form of sternite 7 of the male.

### ***Paratrochus* new genus**

*Holotrochus* Erichson, 1840, *Genera et species staphylinorum insectorum* 2: 757 (part).

TYPE-SPECIES *Paratrochus hamatus* new species.

(The name *Paratrochus*, meaning 'like *Trochus*', stems from the Greek 'para', meaning 'nearby'; gender masculine, as for *Trochus*.)

With the characters of Osoriinae (Blackwelder 1942, Moore 1964). Length 2.3-5.5 mm. Form cylindrical. General coloration reddish-brown; teneral specimens yellow, and brownish-black specimens not uncommon in some species. Upper surface moderately shining, with microreticulate sculpturing. Foreparts and abdomen sparsely to moderately pubescent, with long tactile setae interspersed between shorter clothing setae

(Figure 1). Pronotum longer than elytra, both of these wider than long. Abdomen usually slightly wider in female than in male.

HEAD. Upper surface finely punctate. Eye comprising 1-10 facets. Antennae moderately stout, straight (Figure 1); segment 1 almost parallel-sided, 2-3× longer than its greatest width, with several setae; segment 2 parallel-sided or as in Figure 1, about twice as long as its greatest width, with several setae; segment 3 incrassate, shorter than segment 11 or of equal length; segments 4-8 approximately equal in length but increasing in width; segments 9 and 10 about as wide as long; segment 11 longer than wide, apically pointed; segments 3-11 with moderately dense, short pubescence and longer tactile setae.

Labrum 2.0-2.5× wider than long, its anterior margin slightly asymmetrical (right side slightly more produced), dorsally with 20-50 setae, and a comb of 3-11 short, fine setae on basal half of lateral margins; long, membranous lobes arising from lateral margins divide into 2-5 finger-like, sometimes distally bifurcating processes. Mandibles stout, with a large apical tooth and 2 blunt subapical teeth, microreticulate sculpturing, several long setae on outer face, and a tuft of about 5 broad setae on inner face. Maxillary palp with microreticulate sculpturing towards base of each segment; segment 1 longer than wide, sometimes much narrower than segments 2-4, glabrous; segment 2 with 2 setae; segment 3 with 4-8 setae; segment 4 usually shorter than segments 1-3 together, apically pointed, with up to about 13 setae, a group of sensilla basiconica at apex, and 6-8 chordotonal organs at base. Stipes with several setae. Galea stout, with a large tuft of setae at apex. Lacinia with 2 major, pointed or blunt teeth and a minor blunt tooth at apex, and a triple comb of 15-26 stout setae. Labial palp with segment 1 longer than wide, bearing 1 seta; segment 2 about as long as wide, bearing 1 or 2 setae; segment 3 longer than wide, glabrous, with a group of sensilla basiconica at apex. Mentum with microreticulate sculpturing and 12-18 setae; prementum with lateral membranous lobes bearing many setae.

THORAX. Pronotum wider than long, with a variable degree of microreticulate sculp-

turing and punctation; lateral margins with several setae. Prosternum with a fringe of short setae along anterior margin, a long seta either side of carina, and usually several shorter setae, with distinct microreticulate sculpturing, moderately to strongly carinate anteriorly; prosternal process small. Disc with microreticulate sculpturing and variable punctation and setae.

Elytra wider than long, shorter than pronotum; sutural striae variable, sometimes absent; shoulder prominent, rounded to sharply right-angled; lateral margins with several setae, with or without teeth. Mesosternum glabrous, with distinct microreticulate sculpturing; median carina continuous with mesosternal process.

Wings reduced. Metasternum with several setae, distinct microreticulate sculpturing, and scattered punctures; no median carina or metasternal process.

Protibia not enlarged, with 2-5 spines not arising from prominent tubercles; a comb of setae on inner face; up to one-third of apical setae of comb of male often flattened or tubular and joined towards tips (agglutinated setae); apex with 3 or 4 spines (including spurs). Mesotibia with 9-14 spines in a double row on outer face, 3 spurs at apex; some agglutinated setae towards apex on lower face in males of some species (Figure 155). Metatibia with a comb of 8-13 fine setae on lower face towards apex, continuous or not with a comb of 8-12 setae at apex, and 4 spurs. All tarsi with 5 tarsomeres; claws simple; empodium bristle-like or ribbon-like (Figure 158), about as long as claw or longer. Legs with microreticulate sculpturing and many minor setae.

**ABDOMEN.** Mostly with distinct microreticulate sculpturing, more pronounced at base of segments; pubescence variable, more concentrated on apical segments; punctation variable. Junction of tergites and sternites sometimes visible on segments 3-7. Sternite 2 with a small, median, backward-projecting process continuous with median carina on sternite 3. Posterior margin of tergite 9 with 2 or 3 projections.

**MALE.** Sternite 7 unmodified or with a very slight to moderate median depression. Sternite 8 unmodified or with a shallow, usually simple, median depression. (In *tricarinatus* this depression has 3 small

ridges, as in Figure 156.) Lateral plates of tergite 10 with distinct microreticulate sculpturing at base, about 5 long setae, and several shorter setae. Sternite 9 with microreticulate sculpturing; a fringe of very short setae at apex. Median lobe of genitalia blunt to sharply pointed at apex; parameres slender or (rarely) clubbed (Figure 159). Copulatory piece usually with a side process.

**FEMALE.** Sternites 7 and 8 unmodified. Valvifer with 5 long setae and several shorter setae; style with several short setae at apex. Spermatheca at most weakly sclerotised, oval, elongate-oval, pear-shaped, or bean-shaped; duct convoluted near spermatheca, its middle and basal portions straight or spirally twisted.

**DISTRIBUTION.** *Paratrochus* is widespread in the North and South Islands, though only *P. hermes* and *P. microphthalmus* are found in both. Species tend to be locally common, and reflect the distribution of vegetation, being largely confined to indigenous forest floors.

**REMARKS.** *Paratrochus* is distinguishable from *Nototrochus* by the small eye, elytra shorter than the pronotum, reduction of the wings, absence of major modifications of sternite 7 of the male, and weakly sclerotised spermatheca.

#### *Paratrochus foveatus* new species

Figures 6, 44, 84, and 120

Shining; reddish-brown to brownish-black; antennae and legs reddish-brown. Upper surface with irregular punctures and very short, sparse clothing setae. Length - dry 4.2-5.0 mm, wet 4.5-5.5 mm; pronotal length 0.83-0.90 (0.88) mm, width 1.09-1.18 (1.14) mm; elytral length 0.63-0.65 (0.64) mm, width 1.03-1.15 (1.09) mm; abdominal width 1.03-1.13 (1.08) mm, males slightly wider than females; (dimensions from 7 males and 7 females).

**HEAD.** Upper surface with clothing setae longer than on other parts. Eye pigmented, oval, 0.15 x 0.09 mm, comprising 6-8 coarse facets. Antennae with segment 3 almost equal in length to segment 11. Labrum with about 36 long setae on upper surface, and a comb of 6 or 7 setae on basal half of lateral margins; lobes divided into 2 or 3



bifurcating processes. Lacinia with pointed apical teeth.

**THORAX.** Pronotum (Figure 6) with evenly expanding lateral margins; blunt, right-angled basal angles enclosing a shallow fovea. Elytra with faint microreticulate sculpturing; sutural striae indistinct; shoulder rounded, with a fovea inside; lateral margins with several short setae but no teeth. Protibia with about 5 spines on upper face, 3 spurs at apex, 1 spur long, stout, equal in length to tarsomeres 1-4. Metatibial combs continuous, of about 19 setae. Empodium a curved bristle longer than the claw.

**ABDOMEN.** Junction of tergites and sternites visible on segments 3-7. Clothing setae much shorter than spaces between them. Tergite 9 (Figure 44) with 2 blunt posterior projections.

**MALE.** Apicalmost third of protibial comb setae (about 10) flattened and agglutinated at tips; about 10 modified setae towards apex on lower face of mesotibia. Sternite 7 with a median, shallow, glabrous depression extending from middle of segment to posterior margin, continuous with a more obvious, glabrous depression with distinct microreticulate sculpturing and thickened posterior margin on sternite 8. Median lobe of genitalia blunt at apex; parameres slender. Copulatory piece (Figure 120) with a short, stout, grooved tubular part and a small side process.

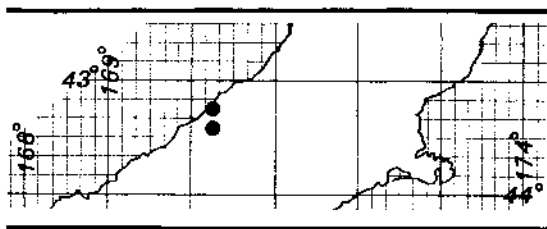
**FEMALE.** Spermatheca (Figure 84) elongate, 0.20 x 0.03 mm; duct convoluted near spermatheca, spirally twisted elsewhere.

**TYPE DATA.** Holotype: male, Lake Wahapo (WD), 54 m, 27 October 1966, J.I. Townsend (NZAC), here designated. It bears labels "HOLOTYPE, *Paratrochus foveatus* McColl ♂" and "66/345 Lake Wahapo WD *Weinmannia racemosa*, *Dacrydium cupressinum*, *Dicksonia* sp., *Blechnum* sp., J.I.T. 27.10.66". Paratypes: 3 males and 4 females, same data as holotype (NZAC).

**MATERIAL EXAMINED.** 9 males and 11 females (NZAC, OMNZ), mostly wet-preserved specimens.

WD.

*P. foveatus* has been collected from litter and humus beneath mixed forest includ-



ing rimu, kamahi, tree ferns, and ferns (Lake Wahapo), and from mixed forest including beech (Franz Josef area).

It has been found only at fairly low altitudes (below 300 m).

It has been collected in January, February, and October.

*P. foveatus* appears to be restricted to the Lake Wahapo - Franz Josef area, where it has been found in samples with *brevisetis*.

**REMARKS.** It is unusual for males of *Paratrochus* to have broader abdomens than females, but in *foveatus* males are on average 0.02 mm broader.

The large size, modification of sternites 7 and 8 of the male, and grooved tubular part of the copulatory piece suggest close affinities with *Nototrochus*.

*P. foveatus* is generally larger than *monstrosus*, from which it can be further distinguished by the fovea on the elytral shoulder, shape of tergite 9, modification of sternites 7 and 8 in the male, form of the copulatory piece, and elongate spermatheca.

The trivial name - Latin, 'pitted' - alludes to the depression on sternite 8 of the male.

#### ***Paratrochus monstrosus* (Bernhauer) new combination**

Figures 7, 45, 85, and 121

*monstrosus* Bernhauer, 1939, Annals and magazine of natural history 11 (4): 210 (*Holotrochus*).

Moderately shining; reddish-brown to brownish-black. Upper surface with coarse, irregular punctures and short, sparse clothing setae. Length - dry 3.2-4.2 mm,

wet 3.5-4.5 mm; pronotal length 0.75-0.85 (0.80) mm, width 0.86-1.00 (0.97) mm; elytral length 0.55-0.63 (0.60) mm, width 0.85-1.00 (0.96) mm; abdominal width 0.85-1.05 (0.97) mm, females wider than males; (dimensions from 5 males and 6 females).

**HEAD.** Upper surface with few setae and with coarse, deep punctures. Eye pigmented, oval, 0.100 × 0.075 mm, comprising 6 facets. Labrum with about 29 long setae on upper surface, and a comb of about 11 fine setae on basal half of lateral margins; lobes divided into about 4 processes. Lacinia with pointed apical teeth.

**THORAX.** Pronotum (Figure 7) with blunt, right-angled basal angles with a fovea inside. Elytra with faint microreticulate sculpturing; sutural striae parallel to suture; shoulder blunt, right-angled; lateral margins with several short setae and about 3 teeth. Protibia with about 5 spines on upper face. Metatibial combs continuous, of about 25 setae. Empodium a curved bristle longer than the claw.

**ABDOMEN.** Junction of tergites and sternites visible on segments 3-7; clothing setae about as long as spaces between them. Tergite 9 (Figure 45) with 2 blunt, narrowly separated posterior projections.

**MALE.** Apical third of protibial comb setae (about 8) flattened and agglutinated at tips; about 9 modified setae at apex of mesotibia. Sternites 7 and 8 unmodified. Median lobe of genitalia blunt at apex; parameres slender, slightly tapering towards apex. Copulatory piece (Figure 121) with a very long, spirally twisted tubular part; no side process.

**FEMALE.** Spermatheca (Figure 85) slightly elongate, 0.18 × 0.13 mm; duct convoluted near spermatheca, almost straight in middle portion, spirally twisted basally.

**TYPE DATA.** Lectotype: male, Hump Ridge (SL), February 1912, T. Broun (FMNH), here designated. It bears labels "New Zealand Broun Coll. Brit. Mus. 1922 - 482" and "Hump Ridge Feby 1912" and "N.sp. 3022" (the last two in Broun's handwriting) and "*Holotrochus monstrosus* Brnh. Bernhauer det." and "Brit. Mus. Don. Arrow" and "*monstrosus* Brnh. *Typus Holotrochus*" and "Chicago N.H. Mus. M. Bernhauer Collection" and "LECTOTYPE *Paratrochus monstrosus* (Bernh.) ♂ desig. H.P.McColl 1981" (last

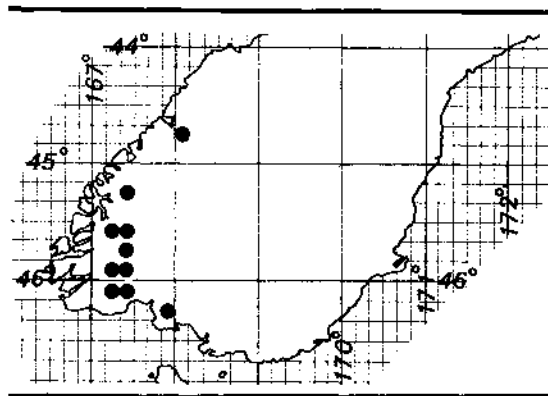
label my handwriting). Paralectotype: female, Hump Ridge (SL), February 1912, T. Broun (BMNH), here designated. It bears labels "New Zealand Broun Coll. Brit. Mus. 1922 - 482" and "n.sp. 3022" and "Hump Ridge Feby 1912" (the last two in Broun's handwriting) and "*Holotrochus monstrosus* Brnh. M. Bernhauer det." and "PARALECTOTYPE *Paratrochus monstrosus* (Bernh.) ♀ desig. H.P.McColl 1981" (last label my handwriting).

Although Broun's labels indicate his recognition of these specimens as representing a new species, he never described them; indeed, he described a carabid (*Parastethus pretiosus*) as new species 3022 (Broun 1910). Bernhauer compared *monstrosus* with *helmsi* (as *setigerus*), but overlooked the difference in their ninth tergites (Figures 45 and 46).

**MATERIAL EXAMINED.** 27 males and 21 females (BMNH, FMNH, NMNZ, NZAC), both wet-preserved and dried specimens.

FD, SL.

*P. monstrosus* has been collected from litter, humus, and moss under a range of vegetation, as follows: silver beech (Wilmot Pass; Wolfe Flat, Turret Range; Mount Burns, Hunter Mountains; Lake Hauroko; Longwood Range); moss on sunny river flats near beech forest (Highfalls Creek, Hollyford); *Olearia moschata* (Takahe Valley, Murchison Mountains), *O. ilicifolia* (Wilmot Pass), *O. crosbysmithiana* and *O. colensoi* (Mount Barber); *Ourisia crosbyi* (Wilmot Pass); *Dracophyllum* spp. (Takahe Valley; Mount Burns; Longwood Range); and *Nertera ciliata* mats (Spey River, western Manapouri).



Its altitudinal range is between 300 m (Wilmot Pass) and 915 m (Mount Barber; Mount Burns; Lake Monowai, Kaherekoau Mountains; Hump Ridge); it has been found in moss at the bushline (Longwood Range) and under alpine scrub (Mount Barber; Mount Burns).

It has been collected from December to March.

*P. monstrosus* has been found in samples with *fiordensis* (Wilmot Pass), *microphthalmus* (Wilmot Pass; Spey River), and *homerensis* (Takahe Valley).

REMARKS. Variation occurs in the degree of punctation and the shape of the pronotum, some specimens having much coarser and deeper punctures than others, and in some specimens a distinct constriction about one-third from the base is apparent.

*P. monstrosus* can be distinguished from *foveatus* by its generally smaller size, the absence of a fovea on the elytral shoulder, broad, blunt projections of tergite 9, long copulatory piece, and only slightly elongate spermatheca.

#### ***Paratrochus helmsi* (Fauvel) new combination**

Figures 8, 46, 86, 122, 155, and 158

*helmsi* Fauvel, 1900, Revue d'entomologie (Caen) 19: 187 (*Holotrochus*).

*nitidorsis* Broun, 1910, Bulletin of the New Zealand Institute I: 17 (*Holotrochus*).  
NEW SYNONYMY.

*setigerus* Broun, 1912, Transactions of the New Zealand Institute (1911) 44: 401 (*Holotrochus*). NEW SYNONYMY.

Shining; colour variable, mostly reddish-brown, though some yellowish and dark-brown specimens occur; antennae and legs paler. Upper surface with irregular, coarse, deep punctures and sparse clothing setae. Length - dry 3.5-4.0 mm, wet 3.6-5.5 mm; pronotal length 0.70-0.80 (0.74) mm, width 0.86-1.00 (0.97) mm; elytral length 0.45-0.58 (0.53) mm, width 0.85-1.00 (0.96) mm; abdominal width 0.85-1.05 (0.97) mm, females wider than males; (dimensions from 6 males and 6 females).

HEAD. Upper surface with faint microreticulate sculpturing. Eye pigmented,

oval, 0.125 × 0.075 mm, comprising 6-9 facets. Labrum with about 50 long setae on upper surface, and a comb of about 8 setae on basal half of lateral margins; lobes divided into about 4 processes. Lacinia with moderately pointed apical teeth.

THORAX. Pronotum (Figure 8) with very faint microreticulate sculpturing and blunt, obtuse basal angles. Elytra with scattered coarse punctures and faint microreticulate sculpturing; sutural striae distinct, almost parallel to suture; shoulder rounded, sloping; lateral margins with several short setae and coarse teeth. Protibia with about 5 spines on upper face. Metatibial combs separated, each of about 10 setae. Tarsal setae very long, flattened (Figure 158). Empodium a flat, leaf-like ribbon longer than the claw (Figure 158).

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae as long as spaces separating them or longer. Tergite 9 (Figure 46) strongly produced into 2 pointed posterolateral projections and a smaller, rounded median projection.

MALE. Apicalmost third of protibial comb setae (about 10) modified and agglutinated at tips; about 12 modified setae towards apex on lower face of mesotibia (Figure 155). Sternite 7 with a median, elongate-oval, slightly depressed glabrous area; sternite 8 with a small median depression inside posterior margin. Median lobe of genitalia blunt and spatula-like at apex; parameres slender. Copulatory piece (Figure 122) with a long, slender, tubular part about equal in length to a slender, sharply pointed side process.

FEMALE. Spermatheca (Figure 86) irregularly oval, 0.163 × 0.075 mm; entire duct tightly spirally twisted.

TYPE DATA. *Paratrochus helmsi*: lectotype - male, Greymouth (WD), no further locality data (C.A.A. Fauvel Collection, ISNB), here designated. It bears labels "Nlle Zélande Greymouth" and "Coll. et det. A. Fauvel *Holotrochus Helmsi* Fvl. R.I.Sc.N.B. 17.479" and "Ex-Typis" and "LECTOTYPE *Paratrochus helmsi* (Fauvel) ♂ desig. H.P. McColl 1981" (last label my handwriting). Paralectotypes - 1 male and 2 females, same locality data (C.A.A. Fauvel Collection, ISNB), here designated. The male bears identical

labels to the lectotype except for the last one in my handwriting, which reads "PARALECTOTYPE *Paratrochus helmsi* (Fauvel) ♂ desig. H.P.McColl 1981". One female bears identical labels to the lectotype except for the last one in my handwriting, which reads "PARALECTOTYPE *Paratrochus helmsi* (Fauvel) ♀ desig. H.P.McColl 1981". The other female bears labels "Nlle Zēlande Greymouth" and "Helmsi Fvl." and "Ex-Typis" and "PARALECTOTYPE *Paratrochus helmsi* (Fauvel) ♀ desig. H.P.McColl 1981" (last label my handwriting).

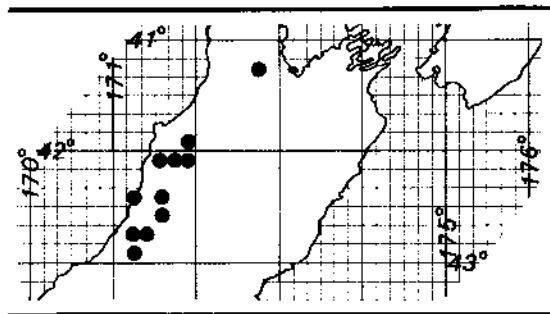
*Paratrochus nitidorsis*: only two (one male and one female) of the three specimens mentioned in Broun's (1910) description are present in the Broun Collection (BMNH). Both are from Greymouth, and were collected by J.H. Lewis.

*Paratrochus setigerus*: the single male specimen collected at Greymouth by J.H. Lewis is in the Broun Collection.

MATERIAL EXAMINED. 148 males and 172 females (BMNH, ISNB, NZAC), mostly wet-preserved specimens.

NN, BR, WD.

*P. helmsi* has been collected at only one locality in NN (South Flora Hut, Mount Arthur), where it was found in a damp stream bed, and at three localities in WD (Soil Bureau reference site, Flagstaff; Wainihinihi; Lake Kanierē). At Flagstaff it was found in moss, litter, and humus under mixed podocarp/hardwood forest with rimu, Hall's totara, bog-pine, kamahi, *Quintinia*, and *Coprosma* species. In BR it was found in litter and humus under semi-pakihi vegetation dominated by silver pine, manuka, and southern rata (Mawhera State Forest), but was most common under terrace forest of miro, matai, and red and silver beech (Fletcher's Creek, PB1 site;



Wallaby Creek). It was less common under podocarp/beech forest on slopes (rimu, yellow-silver pine, and red beech; Stony Creek, PB15 site), and was absent from the podocarp/beech forest (miro, and silver, red, and hard beech) at Caplestone (PB5 site). It was rarely collected from the young pine site at Fletcher's Creek and the adjacent silver beech site (XB2). It is difficult to evaluate this without detailed knowledge of the requirements of all stages of the species.

It has a wide altitudinal range, from about 140 m (Fletcher's Creek) to 1300 m (Lochnagar Ridge, Paparoa Range).

It has been collected in all months, and samples with larvae, apparently of this species, were collected in January, March, April, July, and September, which suggests that breeding occurs throughout the year.

*P. helmsi* has been found in samples with *microphthalmus* and *hamatus* (Fletcher's Creek, PB1, XPB1, XB2, and XPB9 sites; Stony Creek, PB15 site), *microphthalmus* (Mawhera State Forest), *humilis* (Soil Bureau reference site, Flagstaff), *brevisetis* (Paparoa Range; Rapahoe, Greymouth), *parvulus* (Mawhera State Forest), and *angustus* (Fletcher's Creek, PB1, XPB1, and XB2 sites). It also occurs near *arrowi* (Mount Arthur; Caplestone area; Greymouth).

REMARKS. This species was described as *nitidorsis* (Broun 1910) from three broken specimens, and as *setigerus* (Broun 1912) from one fresh specimen, all from Greymouth. Two of the *nitidorsis* specimens and the *setigerus* specimen have been examined and compared with Fauvel's type material and freshly collected material from Fletcher's Creek. Fauvel and Broun omitted to mention the characteristic form of tergite 9 (Figure 46) when describing *helmsi* and *setigerus*, although it is apparent in their specimens. Broun distinguished *setigerus* by the long clothing setae, and his specimen appears to be freshly emerged; the two *nitidorsis* specimens examined are very worn, which presumably gave rise to the confusion. I have also noticed some variation in the density of pubescence in this species. I have no hesitation in placing *nitidorsis* and *setigerus* into synonymy with *helmsi*.

*P. helmsi* has some characteristics in common with *arrowi*, which suggest a close relationship. The most significant of

these are the long, flattened tarsal setae, the form of the empodium, and the shape of tergite 9, and, in the male, the modification of sternite 7 and the form of the copulatory piece. However, *helmsi* can be readily distinguished from *arrowi* by the shining appearance of the pronotum, pointed side process of the copulatory piece, irregularly oval spermatheca, and entirely spirally twisted spermathecal duct.

***Paratrochus arrowi* (Bernhauer) new combination**

Figures 9, 47, 48, 87, and 123

*arrowi* Bernhauer, 1939, Annals and magazine of natural history 11 (4): 209 (*Holotrochus*).

Dull; colour variable, mostly dark reddish-brown, though some paler and darker specimens occur; antennae and legs paler. Upper surface with distinct microreticulate sculpturing, irregular punctures, and moderately dense clothing setae. Length - dry 3.6-4.7 mm, wet 3.6-5.2 mm; pronotal length 0.70-0.80 (0.74) mm, width 0.85-1.00 (0.95) mm; elytral length 0.50-0.53 (0.51) mm, width 0.85-1.00 (0.95) mm; abdominal width 0.85-1.05 (0.97) mm, females wider than males; (dimensions from 5 males and 7 females).

HEAD. Eye pigmented, oval, 0.125 × 0.075 mm, comprising 8-10 facets. Labrum with about 46 long setae on upper surface, and a comb of about 6 setae on basal half of lateral margins; lobes divided into about 3 bifurcating processes. Lacinia with moderately pointed apical teeth.

THORAX. Pronotum (Figure 9) with deep microreticulate sculpturing. Elytra with moderately distinct sutural striae almost parallel to suture, less pronounced than in *helmsi*; shoulder rounded; lateral margins weakly toothed. Protibia with about 6 spines on upper face. Metatibial combs separated, of about 10 setae each. Tarsal setae very long and flattened; empodium a flat, leaf-like ribbon longer than the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae about as long as spaces between them. Tergite 9 (Figures 47 and 48) variably pro-

duced, with or without median posterior projection.

MALE. Apicalmost third of protibial comb setae (about 10) modified and agglutinated at tips; about 12 modified setae towards apex on lower face of mesotibia. Sternite 7 with a median, oval, glabrous depressed area. Sternite 8 unmodified. Median lobe of genitalia blunt at apex; parameres moderately slender, tapering towards apex. Copulatory piece (Figure 123) with a long, straight tubular part and a spatula-shaped side process about as long as the tubular part.

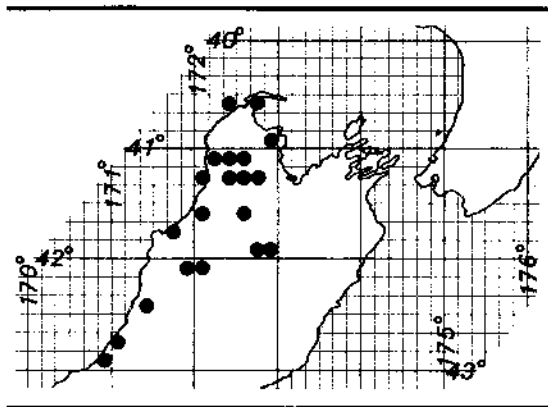
FEMALE. Spermatheca (Figure 87) oval, 0.050 × 0.075 mm; duct convoluted near spermatheca, straight elsewhere.

TYPE DATA. Lectotype: male, Mount Owen (NN), 26 December 1914 (FMNH), here designated. It bears labels "Mt. Owen 26.12.1914" and "New Zealand Broun Collection Brit. Mus. 1922" and "*Holotrochus arrowi* Bernh. Bernhauer det. Type" and "BRIT. MUS. DON. ARROW" and "*arrowi* Bernh. *Typus Holotrochus*" and "Chicago N.H. Mus. M. Bernhauer collection" and "LECTOTYPE *Paratrochus arrowi* (Bernh.) ♂ desig. H.P. McColl, 1981" (last label my handwriting). Paralectotype female, Mount Owen (NN), 26 December 1914 (BMNH), here designated. It bears labels "Type" and "New Zealand Broun Coll. Brit. Mus. 1922 - 482" and "Mt. Owen 26.12.14" (Broun's handwriting) and "sp." and "*Holotrochus arrowi* Bernh. M. Bernhauer det. Type" and "PARALECTOTYPE *Paratrochus arrowi* (Bernh.) ♀ desig. H.P. McColl 1981" (last label my handwriting).

MATERIAL EXAMINED. 68 males and 58 females (BMNH, FMNH, NZAC), mostly wet-preserved specimens.

NN, MB, BR, WD.

*P. arrowi* has been collected from litter and humus beneath a range of vegetation, including podocarp/hardwood (Oparara River), rimu, beech, and kamahi (Mangarakau Sawmill; Oparara River), beech, totara, and kanuka (Mount Arthur), hard beech and *Quintinia* (Pakawau State Forest), black beech (St Rowans and Schroedess Creek, Wairau Valley; Lewis Pass), *Astelia* (Mount Domett), *Dracophyllum* (Lake Sylvester; Mount Arthur), *Freyinetia banksii*, southern rata, and supplejack (Karamea Valley), under a pine log (Mahinapua State Forest),



curled and midribbed snow tussock (Mount Domett), and mosses (Lake Aorere, Mount Domett).

It is found in the subalpine zone at Mount Domett, and above 1200 m at Lake Sylvester, Mount Arthur, Mount Robert, and Kirwan's Hill, but also occurs at lower altitudes (Mangarakau Sawmill, 305 m; Karamea Bluffs, 420 m; Maruia Springs, 610 m).

It has been collected in every month except July.

*P. arrowi* has been found in samples with *microphthalmus* (Mangarakau Sawmill; Heaphy Track; Lewis Pass), *humilis* (Mahinapua State Forest), *hamatus* (Oparara River; Deniston), *retroflexus* (Oparara River; Mount Domett), and *parvulus* (Karamea Bluffs, Heaphy Track; Mangarakau Sawmill). It also occurs near *helmsi* (Mount Arthur; Capleston area; Greymouth), *microphthalmus* (Mount Arthur; Karamea River; Capleston area; Maruia Springs), *hamatus* (Mount Arthur; Mount Robert), *parvulus* (Karamea River), and *Nototrochus montanus* (Greymouth).

REMARKS. *P. arrowi* is variable, and at the extremes of the range two forms occur: a large form without a median posterior projection on tergite 9 (Figure 47); and a smaller form, which has a pronounced projection (Figure 48). The lectotype is at about the middle of the size range, and has a median projection on tergite 9.

*P. arrowi* has close affinities with *helmsi*, from which it can be distinguished by the more pronounced microreticulate sculpturing on the pronotum, spatulate side process of the copulatory piece, and oval spermatheca.

### *Paratrochus vagepunctus* (Fauvel) new combination

Figures 10, 49, 88, and 124

*vagepunctus* Fauvel, 1900, Revue d'entomologie (Caen) 19: 187 (*Holotrochus*).

*laevigatus* Broun, 1910, Bulletin of the New Zealand Institute I: 16 (*Holotrochus*).  
NEW SYNONYMY.

*vagepunctatus* Bernhauer, 1939, Annals and magazine of natural history 11 (4): 208 (*Holotrochus*).

Shining; reddish to reddish-brown. Upper surface with faint microreticulate sculpturing, except on abdomen, where it is distinct, sparse, scattered punctures, and sparse pubescence, with very short clothing setae. Length - dry 3.0-4.0 mm, wet 3.2-4.2 mm; pronotal length 0.63-0.73 (0.67) mm, width 0.83-0.93 (0.87) mm; elytral length 0.43-0.50 (0.47) mm, width 0.83-0.93 (0.87) mm; abdominal width 0.78-0.98 (0.87) mm, females wider than males; (dimensions from 10 males and 6 females).

HEAD. Eye pigmented, almost round, about 0.09 mm in diameter, comprising about 10 facets. Antennae with segment 3 about equal in length to segment 11. Labrum with about 34 long setae on upper surface, and a comb of about 6 setae on basal half of lateral margins; lobes divided into about 3 processes. Lacinia with moderately blunt apical teeth.

THORAX. Pronotum (Figure 10) with almost parallel lateral margins and blunt, right-angled basal angles. Elytra with distinct sutural striae parallel to suture; shoulder blunt, right-angled; lateral margins with a coarse tooth and a small seta near shoulder, and several smaller setae. Protibia with about 3 spines on upper face. Metatibial combs separated; 7 setae in apical comb, 5 in lateral comb. Empodium a flattened bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae shorter than spaces between them. Tergite 9 (Figure 49) weakly produced into 2 blunt posterior projections.

MALE. Apicalmost third of protibial comb setae (about 5) modified and agglutinated at tips; about 6 modified setae to-

wards apex on lower face of mesotibia. Sternite 8 with a median, shallow, glabrous depression with distinct microreticulate sculpturing near posterior margin. Median lobe of genitalia moderately pointed at apex; parameres slender. Copulatory piece (Figure 124) with a straight tubular part and a shorter side process slightly bent towards apex.

FEMALE. Spermatheca (Figure 88) oval, narrowing towards apex,  $0.20 \times 0.13$  mm; duct convoluted near spermatheca, spirally twisted elsewhere.

TYPE DATA. *Paratrochus vagepunctus*: lectotype - male, no collecting data (ISNB), here designated. It bears labels "Nlle. Zélande" and "Coll. et det. A.Fauvel *Holotrochus vagepunctus* Fvl. R.I.Sc.N.B. 17.479" and "Ex-Typis" and "LECTOTYPE *Paratrochus vagepunctus* (Fauvel) ♂ desig. H.P.McColl 1981" (last label my handwriting). Paralectotypes - two females (ISNB), here designated. One bears identical labels to the lectotype except for the last one in my handwriting, which reads "PARALECTOTYPE *Paratrochus vagepunctus* (Fauvel) ♀ desig. H.P.McColl 1981". The second bears labels "Nlle Zélande" and "*Vagepunctus* Fvl." and "Coll. et det. A.Fauvel *Holotrochus vagepunctus* Fvl. R.I.Sc.N.B. 17.479" and "Ex-Typis" and "PARALECTOTYPE *Paratrochus vagepunctus* (Fauvel) ♀ desig. H.P.McColl 1981" (last label my handwriting).

*Paratrochus laevigatus*: only one (male) specimen of the two mentioned by Broun (1910) is present in the Broun Collection (BMNH). It is from Pirongia (WO), and was collected by T. Broun.

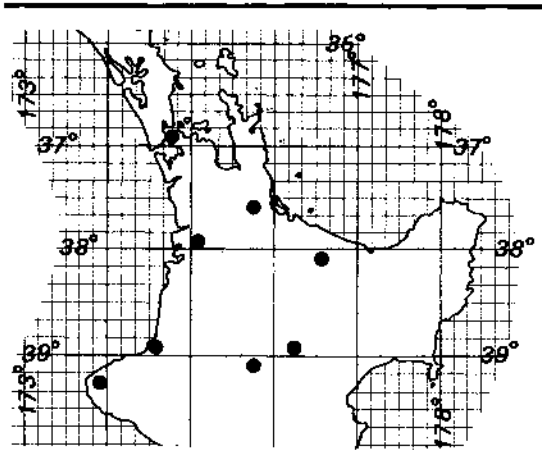
MATERIAL EXAMINED. 24 males and 44 females (BMNH, ISNB, NZAC, OMNZ), mostly wet-preserved specimens.

AK, WO, BP, TO, TK.

*P. vagepunctus* has been collected from litter and humus beneath kamahi-dominant mixed forest (Mount Pirongia; Desert Road, Turangi; Mount Messenger; Pukeiti, Mount Egmont), silver and red beech forest (Kaimanawa), podocarp/beech forest (Tarawera), and tawa (Kaimai Range; Mamaku Range).

Its altitudinal range is between 200 m (Mount Messenger) and 700 m (Kaimanawa).

It has been collected in January, July, October, November, and December.



*P. vagepunctus* has been found in samples with *microphthalmus*, *tubifer*, and *tricaratus* (Mount Messenger) and *scapulifer* (Mount Pirongia; Mount Messenger; Pukeiti, Mount Egmont; Turangi). It also occurs near *curvisetis* and *hermes* (Mount Messenger), *phaseolinus* (Mount Pirongia), and *Nototrochus ferrugineus* (Epsom; Te Aroha; Mount Pirongia).

REMARKS. The male specimen in the Broun Collection (BMNH) described by Broun as *laevigatus* has been examined, and is without doubt *vagepunctus*; it was collected with another from decaying leaves on Mount Pirongia. There is a specimen in the A.E. Brookes Collection (NZAC) with the following data, in Broun's handwriting: "coll. T. Broun. Dec.1909" and "*Holotrochus laevigatus*?" and "3039?". There is a further label giving Mount Pirongia as the locality. It is likely that this is the specimen missing from the Broun Collection (BMNH).

*P. vagepunctus* can be distinguished readily from species of similar size (*bifurcatus*, *caecus*, *curvisetis*, and *hermes*) by its sparse pubescence, obvious protruding eye, short, blunt projections of tergite 9, large copulatory piece, and oval spermatheca.

#### ***Paratrochus bifurcatus* new species**

Figures 11, 50, 89, and 125

Moderately shining; antennae and legs mostly reddish-brown. Upper surface finely

though sparsely punctate, with very short, sparse clothing setae. Length - wet 3.6-4.0 mm; pronotal length 0.66-0.73 (0.71) mm, width 0.80-0.96 (0.92) mm; elytral length 0.46-0.53 (0.50) mm, width 0.86-0.93 (0.90) mm; abdominal width 0.86-0.96 (0.92) mm, females wider than males; (dimensions from 3 males and 7 females).

HEAD. Eye pigmented, oval,  $0.125 \times 0.070$  mm, comprising about 7 flat facets. Antenna with segment 3 about equal in length to segment 11. Labrum with about 36 long setae on upper surface, and a comb of about 9 setae on basal half of lateral margins; lobes divided into about 3 bifurcating processes. Lacinia with blunt apical teeth.

THORAX. Pronotum (Figure 11) with distinct microreticulate sculpturing and rounded, almost right-angled basal angles. Elytra with microreticulate sculpturing visible, though not as distinct as on other parts; sutural striae distinct, about parallel to suture; shoulder rounded; lateral margins with several small setae and weak teeth. Protibia with about 5 spines on upper face. Metatibial combs separated, of 8 or 9 setae each. Empodium a stout seta, about as long as the claw or slightly longer.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae mostly about half as long as spaces separating them. Tergite 9 (Figure 50) with 2 moderately separated, long, pointed posterior projections.

MALE. Apicalmost third of protibial comb setae (about 10) modified and agglutinated at tips; about 6 modified setae towards apex on lower face of mesotibia. Sternite 8 with a shallow median depression inside posterior margin. Median lobe of genitalia blunt at apex; parameres slender. Copulatory piece (Figure 125) with a short tubular part and 2 side processes; one broad, blunt at apex, curving around tubular part, the other longer, pointed at apex.

FEMALE. Spermatheca (Figure 89) oblong-oval,  $0.150 \times 0.063$  mm; duct highly convoluted near spermatheca, its middle portion moderately spirally twisted, its basal portion greatly so.

TYPE DATA. Holotype: male, Canaan (NN), 650 m, litter under red and silver beech,

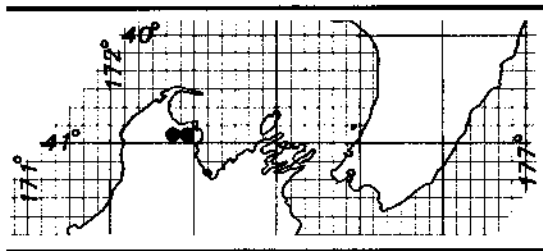
18 April 1966, J.I. Townsend (NZAC). Paratypes: 3 males, 3 females, same data as holotype; 1 male, same data except 16 March 1974; 1 male, same data except 20 October 1969 and associated with the ant *Huberia striata*; 1 male, Takaka Hill (NN), 854 m, moss under black and silver beech, 27 February 1967, J.I. Townsend (NZAC).

MATERIAL EXAMINED. Type series only.

NN.

*P. bifurcatus* has been found under red and silver beech at Canaan, and in moss under black and silver beech at Takaka Hill. One specimen was found in association with a nest of *Huberia striata* (Hymenoptera: Formicidae) at Canaan. Sampling of litter and humus beneath red and silver beech at Canaan on 13 November 1978 produced no further material. I suspect that this species may require a specific microhabitat (possibly a commensal or symbiotic association with *H. striata*).

It has been found in samples only with *microphthalmus* (Canaan, Takaka Hill), although *hamatus* occurs also at Canaan.



REMARKS. *P. bifurcatus* is easily distinguished from species of similar size (*vagepunctus*, *caecus*, *curvisetis*, and *hermes*) by its short, sparse pubescence, flat eye, long, pointed projections of tergite 9, two side processes of the copulatory piece, and shape of the spermatheca.

The trivial name - Latin, 'two-pronged' - alludes to the two side processes of the copulatory piece.

#### ***Paratrochus caecus* (Broun) new combination**

Figures 12, 51, and 90

*caecus* Broun, 1910, Bulletin of the New Zealand Institute I: 17 (*Holotrochus*).



Holotype female shining, reddish-brown; antennae and legs yellowish-brown. Upper surface finely punctate, with short clothing setae. Length - dry 3.4 mm; pronotal length 0.63 mm, width 0.83 mm; elytral length 0.45 mm, width 0.80 mm; abdominal width 0.83 mm.

HEAD. Upper surface with distinct microreticulate sculpturing and several scattered punctures (setae mostly damaged). Eye unpigmented, oval, 0.050 × 0.038 mm, comprising several flattish facets. Labrum not examined. Lacinia with blunt apical teeth.

THORAX. Pronotum (Figure 12) with lateral margins slightly constricted one-third from base, rounded, right-angled basal angles, and faint microreticulate sculpturing. Elytra with lateral margins almost parallel; sutural striae almost parallel to suture; shoulder blunt, right-angled; lateral margins without teeth. Protibia with about 5 spines on upper face. Metatibial combs continuous; about 9 setae in apical comb, about 13 in lateral comb. Empodium a stout, curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Punctures very shallow. Clothing setae about as long as spaces between them or longer. Tergite 9 (Figure 51) with 2 widely spaced, short, blunt posterior projections.

MALE. Unknown.

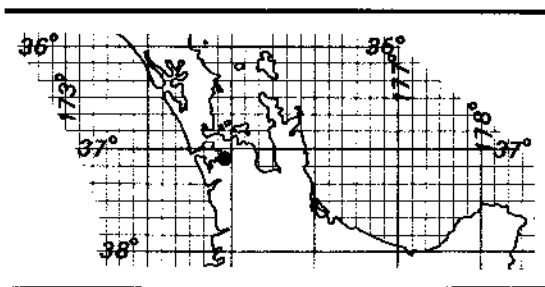
FEMALE. Spermatheca (Figure 90) elongate-oval, 0.125 × 0.050 mm; duct convoluted near spermatheca, spirally twisted elsewhere except near junction with oviduct, where it is straight.

TYPE DATA. Holotype: female, Maketu, Hunua Range (AK), T. Broun (BMNH), here designated. It bears labels "Type" and "3040" and "Hunua Maketu" and "New Zealand Broun Coll. 1922 - 482" and "*Holotrochus caecus*" and "HOLOTYPE *Paratrochus caecus* (Broun) ♀ desig. H.P. McColl 1981" (last label my handwriting).

MATERIAL EXAMINED. Unique holotype.

AK.

REMARKS. Broun's description of the specimen is misleading. Close examination revealed many clothing setae, which were not



obvious because they were glued flat to the abdomen, giving an impression of sparse pubescence. The metatibia has spines at the apex. The eye is small and flat, and was overlooked by Broun.

Litter samples collected from the few remnants of indigenous vegetation in the Maketu area have produced no further specimens.

The possibility of *caecus* being confused with *curvisetis*, *hermes*, and *vagepunctus* was considered. These species were compared because of their similar size and occurrence in the North Island, though *curvisetis* and *hermes* are unknown to the north of Mount Messenger. However, *curvisetis* and *hermes* differ from *caecus* in eye shape and size and the punctation of the pronotum. The shape of the spermatheca is similar in *hermes* and *caecus*, but their spermathecal ducts differ. In *vagepunctus* too the eye differs from that of *caecus*, and differences in pronotal shape, setation, spermatheca, and tergite 9 further eliminate confusion.

#### ***Paratrochus curvisetis* new species**

Figures 3, 13, 52, 91, and 126

Moderately shining; mostly reddish-brown, including antennae and legs. Upper surface with variable punctation and long, dense clothing setae. Length - dry 3.1-3.5 mm, wet 3.2-4.9 mm; pronotal length 0.63-0.68 (0.65) mm, width 0.85-0.93 (0.88) mm; elytral length 0.50-0.53 (0.51) mm, width 0.85-0.93 (0.88) mm; abdominal width 0.83-0.95 (0.87) mm, females wider than males; (dimensions from 7 males and 8 females).

HEAD. Upper surface with some fine and some coarser punctures. Eye pigmented,

irregularly oval,  $0.088 \times 0.050$  mm, of about 6 flattish facets. Labrum with about 30 long setae on upper surface, and a comb of about 6 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with blunt apical teeth.

**THORAX.** Pronotum (Figure 13) with almost parallel lateral margins, blunt, obtuse basal angles, coarse punctures, and faint microreticulate sculpturing. Elytra with coarse punctures and faint microreticulate sculpturing; sutural striae parallel to suture; shoulder rounded, right-angled; lateral margins with several short setae, and 1 weakly defined tooth near shoulder. Protibia with about 5 spines on upper face, and many long setae between these and comb. Metatibial combs separated; about 9 setae in apical comb, about 13 in lateral comb. Empodium a stout seta slightly shorter than the claw.

**ABDOMEN.** Junction of tergites and sternites visible on segments 3-7. Clothing setae longer than spaces between them. Tergite 9 (Figure 52) with 2 short, blunt posterior projections.

**MALE.** Apicalmost quarter of protibial comb setae (about 5) modified and agglutinated at tips; no modified setae on mesotibia. Sternite 8 with a median, shallow, almost glabrous depression. Median lobe of genitalia very blunt at apex; parameres slender, expanding slightly towards apex. Copulatory piece (Figure 126) with a short tubular part around which the side process curves.

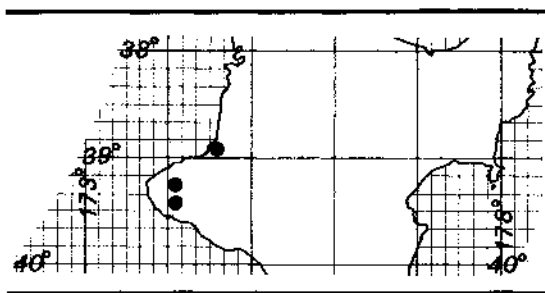
**FEMALE.** Spermatheca (Figure 91) almost round,  $0.075 \times 0.088$  mm; duct convoluted near spermatheca, almost straight elsewhere.

**TYPE DATA.** Holotype: male, Pouakai Range, Ahukawakawa Track (TK), 1006 m, litter under pahautea, kamahi, and pepperwood, 11 January 1978, J.C. Watt (NZAC). Paratypes: 35 males and 29 females, same data as holotype.

**MATERIAL EXAMINED.** 112 males and 103 females (NZAC, OMNZ), mostly wet-preserved specimens.

TK.

*P. curvisetis* appears to be common in litter and humus under the Hall's totara/



kamahi forest on Mount Egmont. Good series have been collected from Dawson Falls and Stratford Mountain House, and it has also been found at Wilkies Pool. It has otherwise been recorded only from litter under kamahi, tawa, and rewarewa (Mount Messenger).

Its altitudinal range is between about 200 m (Mount Messenger) and 1067 m (Ahukawakawa Track, Pouakai Range). It has not been collected above 1000 m on Mount Egmont.

It has been collected in all months. A series including larvae was taken from litter and humus on the Moss Walk at Stratford Mountain House in October. Some of the larvae were reared, and some pupae were retained. The pupal stage (Figure 3) lasted about 5 days in damp humus in the laboratory.

*P. curvisetis* has been found in samples only with *scapulifer* (Mount Messenger; Dawson Falls), although *hermes*, *tubifer*, *vagepunctus*, *microphthalmus*, and *tricarinatus* also occur on Mount Messenger.

**REMARKS.** *P. curvisetis* is easily distinguishable from species of similar size by its long, curved clothing setae, pronotal shape and coarse punctation, right-angled elytral shoulder, short, blunt projections of tergite 9, copulatory piece, and almost round spermatheca.

The trivial name - Latin, 'having curved setae' - alludes to the long clothing setae.

#### *Paratrochus hermes* new species

Figures 14, 53, 92, and 127

Shining; mostly brownish black; antennae and legs yellowish-brown. Upper surface

moderately deeply punctate, with long clothing setae. Length - dry 2.7-3.5 mm, wet 3.0-4.0 mm; pronotal length 0.67-0.70 (0.65) mm, width 0.86-0.93 (0.87) mm; elytral length 0.43-0.48 (0.46) mm, width 0.83-0.93 (0.88) mm; abdominal width 0.83-0.93 (0.87) mm, females wider than males; (dimensions from 5 males and 2 females).

**HEAD.** Eye pigmented, oval,  $0.088 \times 0.063$  mm, comprising about 6 facets. Labrum with about 46 long setae on upper surface, and a comb of 4 or 5 setae on basal half of lateral margins; lobes divided into 3 or 4 bifurcating processes. Lacinia with moderately pointed apical teeth.

**THORAX.** Pronotum (Figure 14) with coarse punctures, faint microreticulate sculpturing, evenly expanded lateral margins, and blunt, obtuse basal angles. Elytra with coarse punctures and faint microreticulate sculpturing; sutural striae almost parallel to suture; shoulder rounded; lateral margins with a coarse tooth and a seta below shoulder, and several weak teeth. Protibia with about 5 spines on upper face. Metatibial combs separated; about 9 setae in apical comb, about 7 in lateral comb. Empodium a curved, flattened seta longer than the claw.

**ABDOMEN.** Junction of tergites and sternites visible on segments 3-7. Clothing setae longer than the spaces between them. Tergite 9 (Figure 53) with 2 pointed posterior projections.

**MALE.** Apicalmost quarter of protibial comb setae (about 10) modified and agglutinated at tips; about 6 modified setae towards apex on lower face of mesotibia. Sternite 8 with a median, shallow, almost glabrous depression. Median lobe of genitalia blunt at apex; parameres very slender, tapering towards apex. Copulatory piece (Figure 127) with a short tubular part and a longer, very stout side process.

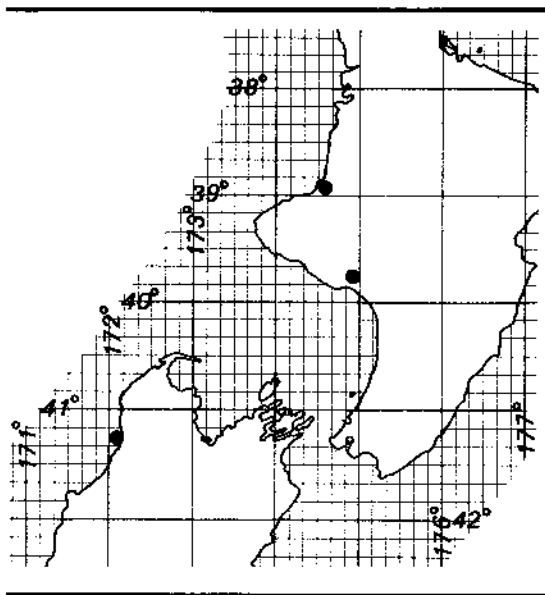
**FEMALE.** Spermatheca (Figure 92) elongate-oval,  $0.213 \times 0.094$  mm; duct highly convoluted near spermatheca, spirally twisted elsewhere; an obvious chitinous ring where duct enters oviduct.

**TYPE DATA.** Holotype: male, 15 km northwest of Karamea (NN), 15 m, litter under mahoe, makomako, and punga, 19 June 1967, F.D. Alack (NZAC). Paratypes: 1 male and 2 females, same data as holotype; 2 males,

Mount Messenger (TK), 200 m, litter under *Elatosterna rugosum* and ferns, 21 June 1966, A.K. Walker (NZAC); 2 males, Bushy Park, near Wanganui (WI), 260 m, 28 November 1971, A.W. Don (1 BMNH, 1 NZAC).

**MATERIAL EXAMINED.** Type series only.

TK, WI / NN.



*P. hermes* has been found only with *pubescens* (Karamea), although *tubifer*, *vagepunctus*, *curvisetis*, *scapulifer*, *microphthalmus*, and *tricarinatus* also occur at Mount Messenger.

Although many samples have been collected from Mount Messenger, and several from Bushy Park, no further specimens of *hermes* have been found. It is likely that this species has specific microhabitat requirements, as yet undetermined.

**REMARKS.** *P. hermes* can be distinguished from species of similar size (*vagepunctus*, *bifurcatus*, *curvisetis*, and *caecus*) by its long clothing setae, obvious eye, pronotal shape, long projections of tergite 9, large, stout copulatory piece, and elongate spermatheca.

The trivial name - Latin (myth.), the messenger of the Gods - alludes to Mount Messenger, the locality from which the species was first collected.

***Paratrochus brevisetis* new species**

Figures 15, 54, 93, and 128

Moderately shining; reddish-brown; antennae and legs yellowish-brown. Upper surface with fine punctures and very short, sparse clothing setae. Length - dry 2.5-3.0 mm, wet 2.5-3.8 mm; pronotal length 0.50-0.55 (0.53) mm, width 0.65-0.73 (0.68) mm; elytral length 0.40-0.43 (0.41) mm, width 0.65-0.73 (0.68) mm; abdominal width 0.65-0.73 (0.68) mm, females only slightly wider than males; (dimensions from 10 males and 5 females).

**HEAD.** Eye without pigment, elongate-oval,  $0.050 \times 0.038$  mm, comprising 3 or 4 facets. Labrum with about 21 long setae on upper surface, and a comb of about 4 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with very blunt apical teeth.

**THORAX.** Pronotum (Figure 15) with slight constriction of lateral margins one-third from base, distinct microreticulate sculpturing, and blunt, right-angled basal angles. Elytra with distinct microreticulate sculpturing; sutural striae indistinct; shoulder blunt, right-angled; lateral margins with several weak teeth. Protibia with about 4 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 11 in lateral comb. Empodium a curved bristle slightly shorter than the claw or about as long.

**ABDOMEN.** Junction of tergites and sternites visible on segments 3-7. Clothing setae much shorter than the spaces between them. Tergite 9 (Figure 54) with 2 pointed posterior projections.

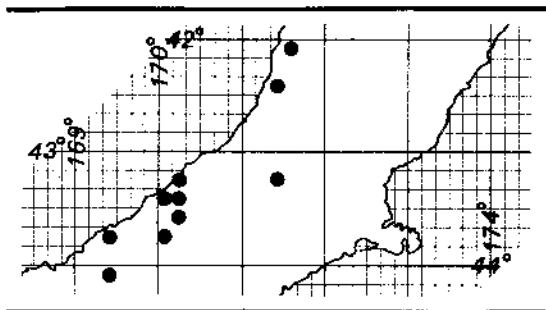
**MALE.** Apicalmost third of protibial comb setae (about 5) flattened and agglutinated at tips; about 3 modified setae towards apex on lower face of mesotibia. Sternite 8 with a shallow median depression from about middle to posterior margin. Median lobe of genitalia blunt at apex; parameres slender. Copulatory piece (Figure 128) with a short tubular part around which the side process curves.

**FEMALE.** Spermatheca (Figure 93) oval,  $0.150 \times 0.075$  mm; duct highly convoluted near spermatheca, spirally twisted elsewhere.

**TYPE DATA.** Holotype: male, Lake Wahapo (WD), 54 m, litter under rimu, kamahi, tree ferns, and ferns, 21 October 1966, J.I. Townsend (NZAC). Paratypes: 56 males and 37 females, some data as holotype; 2 males and 2 females, same data except BMNH.

**MATERIAL EXAMINED.** 143 males and 110 females (NZAC, OMNZ), mostly wet-preserved specimens.

BR, WD, MC, OL.



*P. brevisetis* has been collected from moss and litter under silver beech (Paparoa Range), beech (Franz Josef; Fox Glacier; Lake Paringa), totara, rimu, and kamahi (Okarito Forks Road), kamahi, rata, mahoe, pepperwood, and tree ferns (Fox Glacier), and *Dracophyllum* and ferns (Mount Sebatopol, Mount Cook).

Its altitudinal range is between 54 m (Lake Wahapo) and 930 m (Paparoa Range).

It has been collected in all months except April, June, July, and August.

*P. brevisetis* has been found in samples with *foveatus* (Lake Wahapo; Franz Josef), *helmsi* (Paparoa Range; Rapahoe, Greymouth), *microphthalmus* (Okarito Forks Road), and *hamatus* (Makarora, Haast). It also occurs near *Nototrochus montanus* (Mount Algidus).

**REMARKS.** *P. brevisetis* can be separated from species of similar size (*fiordensis*, *tardus*, *scapulifer*, *microphthalmus*, *homerensis*, and *humilis*) by its clothing setae being shorter than the spaces between them, small eye, blunt, right-angled elytral shoulder, median depression of sternite 8 of the male, form of the copulatory piece, and oval spermatheca.

The trivial name - Latin, 'having short setae' - alludes to the short clothing setae.

***Paratrochus fiordensis* new species**

Figures 16, 55, 94, and 129

Moderately shining; yellowish-brown or reddish-brown; antennae and legs yellowish-brown. Upper surface finely punctate, with sparse, short clothing setae. Length - dry 2.3-2.8 mm, wet 2.4-4.0 mm; pronotal length 0.55-0.60 (0.57) mm, width 0.75-0.80 (0.76) mm; elytral length 0.40-0.45 (0.43) mm, width 0.75-0.88 (0.78) mm; abdominal width 0.66-0.83 (0.75) mm, females wider than males; (dimensions from 9 males and 6 females).

HEAD. Eye pigmented, oval,  $0.075 \times 0.050$  mm, comprising about 4 prominent facets. Labrum with about 35 long setae on upper surface, and a comb of 6 or 7 setae on basal half of lateral margins; lobes divided into about 3 bifurcating processes. Lacinia with moderately blunt apical teeth.

THORAX. Pronotum (Figure 16) with distinct microreticulate sculpturing and blunt, right-angled basal angles. Elytra with faint microreticulate sculpturing; sutural striae indistinct; shoulder sloping, rounded, obtuse-angled; lateral margins with several short setae and weak teeth. Protibia with about 6 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 11 in lateral comb. Empodium a flattish bristle longer than the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae about as long as the spaces separating them or slightly shorter. Tergite 9 (Figure 55) with 2 blunt posterior projections.

MALE. Apicalmost quarter to third of protibial comb setae (about 5) flattened and agglutinated at tips; no modified setae on mesotibia. Sternite 8 unmodified. Median lobe of genitalia produced at apex to a moderately blunt point; parameres slender. Copulatory piece (Figure 129) with a long, slender tubular part, hooked at apex, and a slender, straight side process.

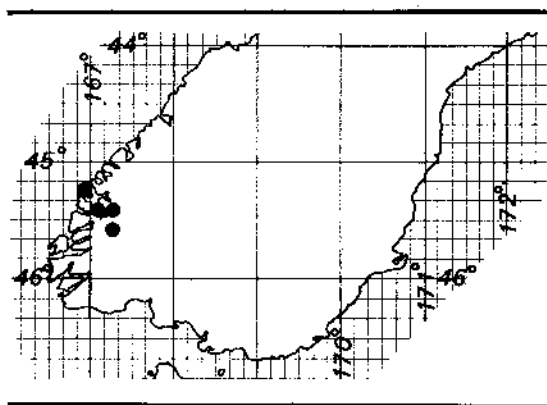
FEMALE. Spermatheca (Figure 94) pear-shaped,  $0.200 \times 0.125$  mm; entire duct spirally twisted.

TYPE DATA. Holotype: male, Spey River, western Manapouri (FD), 180 m, from very wet mats of litter under *Nertera ciliata*,

19 January 1970, A.C. Eyles (NZAC). Paratypes: 47 males and 60 females, same data as holotype; 2 males and 2 females, same data as holotype except BMNH.

MATERIAL EXAMINED. 146 males and 146 females (NZAC, OMNZ), mostly wet-preserved specimens.

FD.



*P. fiordensis* has been collected from moss and litter beneath beech and broadleaf (Wilmot Pass), silver beech, rata, and miro (Wilmot Pass), silver beech, pepperwood, kamahi, and tree ferns (Deep Cove), *Olearia ilicifolia* (Wilmot Pass), *Ourisia crosbyi* (Wilmot Pass), and swards of a small tussock grass (Mount Grey, Turret Range).

Its altitudinal range is between sea level (Thompson Sound) and 1200 m (Mount Grey, Turret Range).

It has been collected only in January.

*P. fiordensis* has been found in samples with *monstrosus* and *microphthalmus* (Wilmot Pass; Spey River, western Manapouri).

REMARKS. *P. fiordensis* can be separated from species of similar size by its clothing setae being shorter than the spaces between them, rounded, obtuse-angled elytral shoulder, large eye, absence of modification of sternite 8 of the male, form of the copulatory piece, and pear-shaped spermatheca.

The trivial name - Latinised, 'of the fiords' - alludes to the known range of this species.

***Paratrochus tardus* new species**

Figures 2, 17, 56, 95, and 130

Shining; yellowish-brown. Upper surface finely punctate, pubescent. Length - dry 2.3-2.5 mm, wet 2.3-3.4 mm; pronotal length 0.45-0.50 (0.49) mm, width 0.60-0.70 (0.65) mm; elytral length 0.33-0.38 (0.36) mm, width 0.65-0.70 (0.66) mm; abdominal width 0.60-0.70 (0.66) mm, females wider than males; (dimensions from 5 males and 6 females).

HEAD. Eye pigmented, almost round, 0.050 × 0.038 mm, comprising 3 slightly convex facets. Labrum with about 22 long setae on upper surface, and a comb of 5 or 6 setae on basal half of lateral margins; lobes divided into 2 or 3 processes. Lacinia with moderately blunt apical teeth.

THORAX. Pronotum (Figure 17) broadest at about middle, with distinct microreticulate sculpturing and blunt, slightly obtuse basal angles. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder almost right-angled; lateral margins with several short setae and very weak teeth. Protibia with about 3 spines on upper face. Metatibial combs separated; about 7 setae in apical comb, 11 in lateral comb. Empodium a curved bristle longer than the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae longer than the spaces between them. Tergite 9 (Figure 56) with 2 short, blunt posterior projections.

MALE. Apicalmost eighth of protibial comb setae (about 5) flattened and agglutinated at tips; about 3 modified setae towards apex on lower face of mesotibia. Sternite 8 with a shallow median depression from about middle to posterior margin. Median lobe of genitalia produced at apex to a moderately acute point; parameres slender. Copulatory piece (Figure 130) with a short, straight tubular part and a shorter, curved side process.

FEMALE. Spermatheca (Figure 95) oval, 0.150 × 0.067 mm, with a terminal 'nipple'; duct highly convoluted near spermatheca, spirally twisted in middle portion, straight or slightly kinked in basal portion.

TYPE DATA. Holotype: male, Kaitoke Waterworks, Bush Walk (WN), 200 m, litter under rata, kamahi, hard beech, and rimu, 24 November 1975, H.P. McCoil (NZAC). Paratypes: 46 males and 25 females, same data as holotype.

MATERIAL EXAMINED. 112 males and 98 females (NMNZ, NZAC, OMNZ), mostly wet-preserved specimens.

WN.



*P. tardus* has been collected from litter and humus beneath several species of beech (Mount Holdsworth; Hector Track, Tararua Range; Lake Wairarapa; Orongorongo Valley), mixed beech and broadleaf (Orongorongo Valley), beech, kawakawa, nikau, kowhai, and tree ferns (Lake Wairarapa), moss under mahoe (Waiohine Gorge, Tararua Range), and humus in an epiphyte garden (Orongorongo Valley).

Its altitudinal range is between 10 m (Day's Bay) and 610 m (Hector Track, Mount Marchant).

It has been collected in all months.

*P. tardus* has been found in samples with *bucinifer* (Kaitoke Waterworks).

REMARKS. *P. tardus* is designated type-species of its genus, which it represents well, being about the middle of the size range and having a simple modification of sternite 8 of the male.

*P. tardus* can be separated from species of similar size by its clothing setae being longer than the spaces between them, eye with three facets, shallow median depression on sternite 8 of the male, form of the copulatory piece, and shape of the spermatheca.

The trivial name - Latin, 'slow, clumsy' - alludes to its rather stout, unremarkable appearance and slow movement, particularly in contrast with the sympatric species *bucinifer*.

***Paratrochus scapulifer* new species**

Figures 18, 57, 96, and 131

Shining; reddish-brown or yellowish-brown. Upper surface moderately finely punctate, pubescent. Length - dry 2.6-2.9 mm, wet 2.8-3.8 mm; pronotal length 0.53-0.55 (0.54) mm, width 0.68-0.75 (0.71) mm; elytral length 0.36-0.43 (0.40) mm, width 0.65-0.75 (0.70) mm; abdominal width 0.65-0.75 (0.69) mm, females wider than males; (dimensions from 9 males and 5 females).

**HEAD.** Eye pigmented, oval,  $0.075 \times 0.050$  mm, comprising 5 convex facets, 4 in a vertical row and 1 lateral to these. Labrum with about 27 long setae on upper surface, and a comb of about 4 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with moderately blunt apical teeth.

**THORAX.** Pronotum (Figure 18) with indistinct microreticulate sculpturing and blunt, right-angled basal angles. Elytra with indistinct microreticulate sculpturing; sutural striae indistinct; shoulder rounded, obtuse-angled; lateral margins with short setae and weak teeth. Protibia with about 4 spines on upper face. Metatibial combs separated; about 7 setae in apical comb, 11 in lateral comb. Empodium a curved bristle about as long as the claw.

**ABDOMEN.** Junction of tergites and sternites visible on segments 3-7. Clothing setae about as long as the spaces between them. Tergite 9 (Figure 57) with 2 short, blunt posterior projections.

**MALE.** Apicalmost quarter of protibial comb setae (about 5) flattened and agglutinated at tips; about 5 modified setae towards apex on lower face of mesotibia. Sternite 8 with a shallow, oval, median depression from middle to posterior margin. Median lobe of genitalia produced at apex to a truncated point; parameres moderately slender. Copulatory piece (Figure 131) with a very short tubular part surrounded by a broad side process.

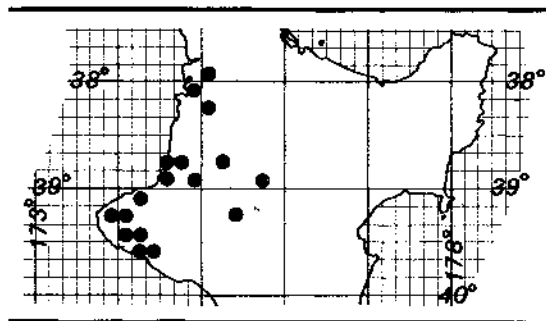
**FEMALE.** Spermatheca (Figure 96) elongate-oval,  $0.138 \times 0.050$  mm; duct convoluted near spermatheca, spirally twisted elsewhere.

**TYPE DATA.** Holotype: male, Dawson Falls, Mount Egmont (TK), 900 m, litter under

putaputaweta, pigeonwood, and hangehange, 28 October 1975, H.P. McColl (NZAC). Paratypes: 25 males and 35 females, same data as holotype.

**MATERIAL EXAMINED.** 278 males and 313 females (BMNH, NMNZ, NZAC, OMNZ), mostly wet-preserved specimens.

WO, TO, TK.



*P. scapulifer* appears to be common in litter and humus under kamahi forest (Mount Egmont; Mount Pirongia; Pihanga Scenic Reserve, Turangi; Mount Messenger; Te Ngatu-o-Te Mata, Okaiawa), tree ferns and punga (Mokau River Road; Hutuwai Road, Tongaporutu; Okoki Pa; Meremere), and titoki, tawa, rangiora, rata, and mahoe (Awakino Gorge).

Its altitudinal range is between 182 m (Mount Messenger) and 1220 m (Pouakai Saddle).

It has been collected in all months except August and September.

*P. scapulifer* has been found in samples with *vagepunctus* (Mount Pirongia; Tuhua Saddle, Taumarunui; Pihanga Scenic Reserve, Turangi; Mount Messenger; Pukeiti, Mount Egmont), *curvisetis* (Mount Messenger; Dawson Falls, Mount Egmont), and *phaseolinus* (Mount Pirongia). It also occurs near *hermes*, *microphthalmus*, and *tubifer* (Mount Messenger) and *tricarinatus* (Mount Messenger; Pouakai Saddle).

**REMARKS.** *P. scapulifer* can be separated from species of similar size by its clothing setae being about as long as the spaces between them, large eye, narrowly separated projections of tergite 9, median depression on sternite 8 of the male, form of the copulatory piece, and elongate-oval spermatheca.

The trivial name - Latin, 'scapula-bearer' - alludes to the shape of the copulatory piece, like a human shoulder-blade.

***Paratrochus microphthalmus* (Fauvel) new combination**

Figures 19, 20, 58, 97, 132, and 133

*microphthalmus* Fauvel, 1900, Revue d'entomologie (Caen) 19: 188 (*Holotrochus*).

Moderately shining; reddish-brown. Upper surface moderately finely punctate, pubescent. Length - dry 2.7-3.4 mm, wet 2.8-3.7 mm; pronotal length 0.40-0.63 (0.57) mm, width 0.65-0.80 (0.75) mm; elytral length 0.38-0.48 (0.43) mm, width 0.68-0.80 (0.75) mm; abdominal width 0.68-0.80 (0.75) mm, females wider than males; (dimensions from 23 males and 13 females).

HEAD. Eye pigmented, oval,  $0.063 \times 0.038$  mm, comprising 3-6 flattish facets, which may be more obvious in some specimens than in others from the same locality and sample. Labrum with about 26 long setae on upper surface, and a comb of about 6 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with very blunt apical teeth.

THORAX. Pronotum (Figures 19 and 20) with evenly expanded lateral margins and blunt, right-angled basal angles; microreticulate sculpturing mostly distinct. Elytra with faint microreticulate sculpturing; sutural striae not always distinct; shoulder rounded; lateral margins with several short setae and very weak teeth. Protibia with about 5 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 13 in lateral comb. Empodium a curved bristle shorter than the claw or about as long.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae longer than the spaces between them. Tergite 9 (Figure 58) with 2 short, blunt posterior projections.

MALE. Apicalmost quarter of protibial comb setae (about 5) flattened and agglutinated at tips; no modified setae on mesotibia. Sternite 8 unmodified. Median lobe of genitalia moderately pointed at apex;

parameres slender, expanding slightly towards apex. Copulatory piece (Figures 132 and 133) usually with a moderately straight tubular part and a stout, straight or apically bent side process with a tooth at base, about equal in length to tubular part.

FEMALE. Spermatheca (Figure 97) oval, usually about  $0.150 \times 0.175$  mm; duct highly convoluted near spermatheca, spirally twisted in middle portion, straight in basal portion, which may be longer in some specimens than in others.

TYPE DATA. Holotype: male, no collecting data (ISNB), here designated. It bears labels "*microphthalmus* Fv1." and "*Nile Zélande*" and "Coll. et det. A. Fauvel *Holotrochus* R.I.Sc.N.B. 17.479" and "Ex-Typis" and "HOLOTYPE *Paratrochus microphthalmus* (Fauvel) ♂ desig. H.P.McColl 1981" (last label my handwriting). This specimen has a small eye comprising three flattish facets, and the copulatory piece has a moderately straight tubular part and a stout, straight side process slightly shorter than the tubular part.

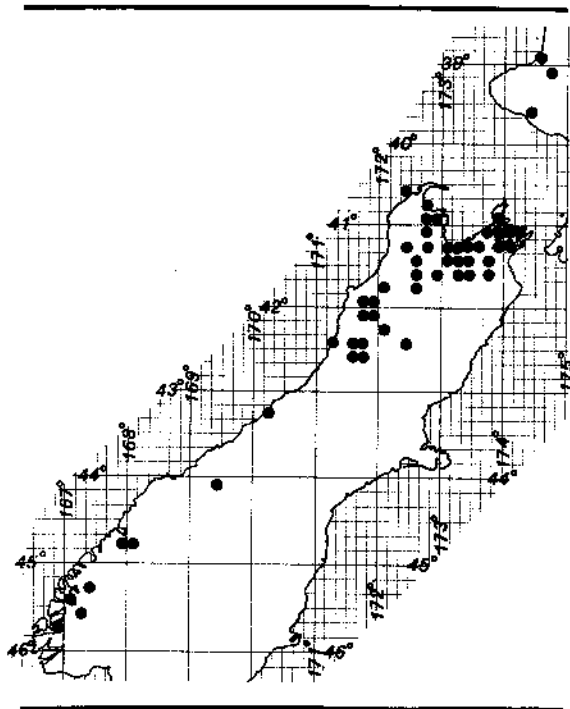
MATERIAL EXAMINED. 1186 males and 1252 females (BMNH, ISNB, NMNZ, NZAC, OMNZ), mostly wet-preserved specimens.

TK / NN, SD, MB, KA, BR, WD, FD.

*P. microphthalmus* is the most widespread species of the genus, having been collected from Mount Messenger in the north ( $38^{\circ}54'S$ ) and from Dusky Sound in the south ( $45^{\circ}43'S$ ). It has been collected from moss, litter, and humus beneath a wide variety of vegetation: low coastal forest (Shakespeare Bay, Picton; World's End, Tenynson Inlet); beech/podocarp forests on terraces and slopes (Fletcher's Creek; Stony Creek; Capleston); podocarp/hardwood forest (Flagstaff Biological Reserve); kamahi-dominant forest (Mount Messenger); semi-pakihi terrace vegetation (Mawhera State Forest); and alpine *Dracophyllum* species, *Cassinia vauvilliersii*, and mountain daisies (Fell Peak, Richmond Range).

In the North Island it has been collected from litter beneath kamahi, heketara, rangiora, and rewarewa (Mount Messenger), rimu, tawa, and tree ferns (Whanganomona Road), and kamahi, five-finger, and tree ferns (Meremere). It is apparent that its distribution in the North Island reflects an ancient pattern, probably linked with a





Bridge; Dusky Sound) to over 1300 m (Fell Peak, Richmond Range).

It has been collected in all months.

*P. microphthalmus* has been found in samples with *vagepunctus*, *scapulifer*, *tubifer*, and *tricarinatus* (Mount Messenger), *monstrosus* and *fiordensis* (Wilmot Pass; Spcy River, western Manapouri), *helmsi* (Inangahua; Fletcher's Creek, pine, XB2, and PBI sites; Redman's Valley; Wallaby Creek; Mawhera State Forest, semi-pakihi site), *arrowi* (near Mangarakau Sawmill; Heaphy Track; Dublin Terrace, Buller; Lewis Pass), *bifurcatus* (Takaka Hill, Canaan), *homerensis* (Mount Lyttle, Hollyford), *brevisetis* (Okarito Forks Road), *hamatus* (Fletcher's Creek, pine, XB2, and PBI sites; Stony Creek, PB15 site; Tawhai, Big River Road; Milford Sound), *parvulus* (near Mangarakau Sawmill; Heaphy Track; Karamea River; Fletcher's Creek, pine site; Caplestone, PB5 site; Mawhera State Forest, semi-pakihi site), *angustus* (Fletcher's Creek, pine, XB2, and PBI sites; Caplestone, PB5 site), and *pelorensis* (Ship Cove; Mount Stokes; Pelorus Bridge). It also occurs near *curvisetis* and *hermes* (Mount Messenger).

Pleistocene land bridge to the South Island, rather than an opportunistic spread northwards. This is further supported by its occurrence on Maud Island, Cook Strait.

In the South Island it appears to be able to exploit more vegetation types than any other species, which indicates a greater adaptability and versatility than in other species. It has been found in moss, fungi, litter, humus, or mineral soil (sometimes all) under all species of beech, rimu, miro, silver pine, bog pine, matai, yellow-silver pine, southern rata, hinau, supplejack, mahoe, hangehange, *Freycinetia*, *Olearia*, putaputaweta, broadleaf, houhere, *Astelia*, *Quintinia*, pepperwood, manuka, porokaiwhiri, *Dracophyllum*, tree ferns, and ferns. It was also collected from litter under *Pinus laricio* (Tawhai, Big River Road) and *P. radiata* (Fletcher's Creek, pine site; Tawhai). Of the six forest types studied on the West Coast (McCull 1974), the Caplestone PB5 site (slope podocarp/beech with miro and silver, red, and hard beech) had the highest number of *microphthalmus*.

Its altitudinal range is from less than 100 m (Shakespeare Bay, Picton; Pelorus

REMARKS. *P. microphthalmus* is the most variable species of the genus; variation occurs both between localities and within specimens from the same locality. Size is within the normal variation for each species, though the majority of specimens from some localities may fall at the lower or upper end of the range. The eye varies, and commonly is in the form of three flattish facets or four convex facets and two flattish facets; both forms can occur at the same locality. Some specimens have deep microreticulate sculpturing on the pronotum, though in others this can be very shallow.

The form of the copulatory piece varies slightly. The tubular part may be apically bent, as in specimens from Ohikanui River and Karamea Saddle, or broader and more strongly twisted, as in specimens from Milford Sound. In both these extremes the side process is typical and the basal tooth is present. Spermathecal shape varies also. In specimens from TK, NN, and FD the spermatheca is mostly elongate (up to 0.2 mm long), and a greater part of the duct is straight.

Since variation of the above characters is not constant for a particular locality,

this species is considered to be 'plastic'.

*P. microphthalmus* can be separated from species of similar size by its clothing setae being longer than the spaces between them, pronotal length, moderately separated projections of tergite 9, unmodified sternite 8 of the male, and stout, straight side process of the copulatory piece.

### *Paratrochus homerensis* new species

Figures 21, 59, 98, and 134

Moderately shining; reddish-brown; antennae and legs yellowish-brown. Upper surface finely punctate, moderately pubescent. Length - dry 2.9-3.8 mm, wet 3.0-4.2 mm; pronotal length 0.48-0.63 (0.56) mm, width 0.68-0.80 (0.73) mm; elytral length 0.38-0.48 (0.43) mm, width 0.65-0.80 (0.73) mm; abdominal width 0.70-0.88 (0.78) mm, females wider than males; (dimensions from 7 males and 8 females).

HEAD. Eye lightly pigmented, oval,  $0.075 \times 0.050$  mm, comprising about 3 flat facets. Labrum with about 26 long setae on upper surface, and a comb of about 9 setae on basal half of lateral margins; lobes divided into about 3 processes. Lacinia with moderately blunt apical teeth.

THORAX. Pronotum (Figure 21) with evenly expanded lateral margins, slightly rounded, right-angled basal angles, and shallow microreticulate sculpturing. Elytra with faint microreticulate sculpturing; sutural striae not always distinct; shoulder blunt, right-angled; lateral margins with several short setae and weak teeth. Protibia with about 5 spines on upper face. Metatibial combs separated; about 7 setae in apical comb, and 11 in lateral comb. Empodium a curved bristle slightly longer than the claw or about as long.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae about as long as the spaces between them or slightly longer. Tergite 9 (Figure 59) with 2 short, blunt, posterior projections.

MALE. Apicalmost quarter of protibial comb setae (about 6) agglutinated at tips; no modified setae on mesotibia. Sternite 8 with a very shallow, oval, median depres-

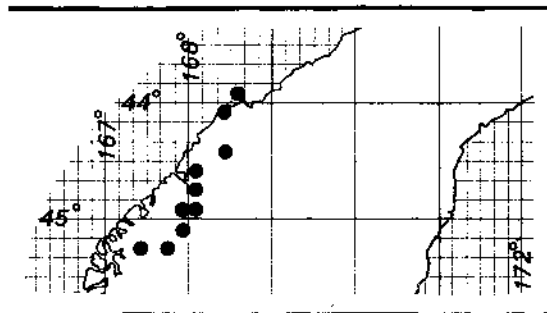
sion inside posterior margin. Median lobe of genitalia blunt at apex; parameres slender. Copulatory piece (Figure 134) with a short, curved tubular part around which the broad, stout side process curves.

FEMALE. Spermatheca (Figure 98) oval,  $0.175 \times 0.100$  mm; duct highly convoluted near spermatheca, weakly spirally twisted elsewhere.

TYPE DATA. Holotype: male, Mackay Creek, Eglinton Valley (FD), 400 m, moss under mountain beech, 30 October 1966, J.I. Townsend (NZAC). Paratypes: 21 males and 11 females, same data as holotype.

MATERIAL EXAMINED. 89 males and 55 females (NMNZ, NZAC, OMNZ), mostly wet-preserved specimens.

WD, OL, FD.



*P. homerensis* has been collected from moss and litter mostly beneath beech-dominant forest (Jackson Bay; confluence, Cascade River and Woodhen Creek; Simonin Pass and Tempest Spur, western Olivine Range; Tutoko Bench, Darran Mountains; Key Summit track and Lake Howden, Hollyford Valley; north of Te Anau), but has also been found beneath alpine and subalpine vegetation (alpine *Pygmaea* and blue tussock at Tempest Spur; *Cassinia* sp. and mountain lily at head of Gertrude Valley, Hollyford Valley), *Olearia moschata* and *Coprosma* sp. (Takahe Valley, Murchison Mountains), and *Dracophyllum* sp. (Point Burn, Fiordland National Park).

Its altitudinal range is between 183 m (confluence, Cascade River and Woodhen Creek) and 1463 m (Tempest Spur).

It has been collected only in October, December, January, February, and March.

*P. homerensis* has been found in samples with *microphthalmus* (Mount Lyttle, Murchison Mountains) and *monstrosus* (Takahe Valley). It also occurs near *hamatus* (Cascade Creek; Takahe Valley).

REMARKS. *P. homerensis* bears a superficial resemblance to *humilis*, from which it can be readily separated by examination of the copulatory piece and spermatheca (compare Figures 134 and 135, 98 and 99). Also, there is no overlap in the known distribution of these species. Its long clothing setae, the short, blunt projections of tergite 9, and median depression of sternite 8 of the male distinguish *homerensis* from other species of similar size.

The trivial name - Latinised, 'of the Homer area' - alludes to the locality from which this species was first recorded.

#### ***Paratrochus humilis* new species**

Figures 22, 60, 99, and 135

Moderately shining; yellowish-brown or reddish-brown. Upper surface with moderately coarse punctures, moderately pubescent. Length - dry 2.7-3.4 mm, wet 3.0-4.2 mm; pronotal length 0.53-0.58 (0.55) mm, width 0.68-0.75 (0.72) mm; clytral length 0.38-0.43 (0.42) mm, width 0.65-0.78 (0.73) mm; abdominal width 0.73-0.80 (0.77) mm, females wider than males; (dimensions from 5 males and 5 females).

HEAD. Eye pigmented, oval, 0.075 × 0.050 mm, comprising 4 convex facets, 3 in a vertical row and 1 adjacent. Labrum with about 27 long setae on upper surface, and a comb of about 7 setae on basal half of lateral margins; lobes divided into about 4 bifurcating processes. Lacinia with blunt apical teeth.

THORAX. Pronotum (Figure 22) with evenly expanded lateral margins, rounded, right-angled basal angles, and shallow microreticulate sculpturing. Elytra with faint microreticulate sculpturing; sutural striae not always distinct; shoulder blunt, right-angled; lateral margins with several short setae and weak teeth. Protibia with about 3 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 11 in lateral comb. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae about as long as the spaces between them. Tergite 9 (Figure 60) with 2 short, pointed posterior projections.

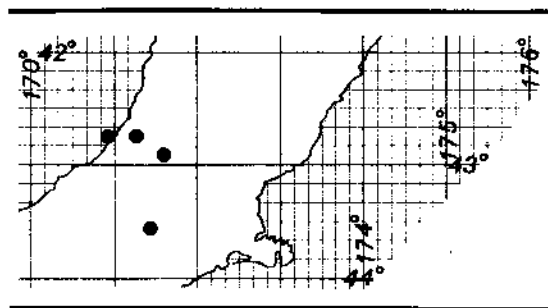
MALE. Apicalmost quarter of protibial comb setae (about 6) modified and agglutinated at tips; about 3 modified setae towards apex on lower face of mesotibia. Sternite 8 with a very shallow, oval, median depression inside posterior margin. Median lobe of genitalia broad and blunt at apex; parameres slender. Copulatory piece (Figure 135) with a slender, bent tubular part around which the side process curves; a further broad process arises from base of tubular part and curves in opposite direction.

FEMALE. Spermatheca (Figure 99) oval, moderately sclerotised, with a pronounced apical protuberance ('nipple'), 0.150 × 0.100 mm; duct convoluted near spermatheca, spirally twisted elsewhere.

TYPE DATA. Holotype: male, Arthur's Pass (NC?), 730 m, litter under beech-dominated forest, 29 September 1966, R.R. Forster and C.L. Wilton (NZAC). Paratypes: 16 males and 11 females, same data as holotype; 5 males and 5 females, same data but OMNZ.

MATERIAL EXAMINED. 37 males and 36 females (NZAC, OMNZ), mostly wet-preserved specimens.

NC, MC, WD.



*P. humilis* has been collected from moss, litter, and humus beneath mountain and silver beech (Arthur's Pass), podocarp/hardwood forest with rimu, Hall's totara, bog pine, kamahi, *Quintinia*, and *Coprosma* spp. (Soil Bureau reference site, Flagstaff), tree groundsel, *Dracophyllum*, and

*Phyllocladus alpinus* (Otira Valley, Arthur's Pass) prickly shield fern (Devil's Punch Bowl), and *Pinus radiata* (Mahinapua State Forest).

Its altitudinal range is between 60 m (Mahinapua State Forest) and 1158 m (Avalanche Peak, Scott's Track, Arthur's Pass).

It has been collected in February, March, September, and November.

*P. humilis* has been found in samples with *helmsi* (Soil Bureau reference site, Flagstaff).

REMARKS. The form of the spermatheca, with its unique apical 'nipple', immediately separates female *humilis* from other species. The male can be distinguished by its long clothing setae, pointed projections of tergite 9, median depression of sternite 8, and characteristic copulatory piece.

The trivial name - Latin, 'undistinguished' - alludes to the lack of prominent diagnostic characters.

#### ***Paratrochus brevipennis* (Broun) new combination**

Figures 23, 61, 100, 136, and 137

*brevipennis* Broun, 1893, Manual of the New Zealand Coleoptera V: 1034 (*Holotrochus*).

*gracilis* Broun, 1910, Bulletin of the New Zealand Institute I: 17 (*Holotrochus*).

#### NEW SYNONYMY.

Moderately shining; reddish-brown. Punctuation of upper surface variable, mostly moderately fine, pubescent. Length - dry 2.3-3.0 mm, wet 2.5-3.3 mm; pronotal length 0.45-0.55 (0.50) mm, width 0.58-0.75 (0.71) mm; elytral length 0.35-0.43 (0.37) mm, width 0.58-0.73 (0.66) mm; abdominal width 0.58-0.73 (0.66) mm, females wider than males; (dimensions from 12 males and 10 females).

HEAD. Eye pigmented, oval, 0.038 × 0.031 mm, comprising 1 or 2 flattish facets. Labrum with about 25 long setae on upper surface, and a comb of 4 or 5 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with blunt apical teeth.

THORAX. Pronotum (Figure 23) with evenly expanded lateral margins and rounded, right-angled basal angles; microreticulate sculpturing mostly distinct. Elytra largely with faint microreticulate sculpturing; sutural striae usually distinct; shoulder rounded; lateral margins with 1 weak tooth below shoulder, and several short setae. Protibia with about 5 spines on upper face. Metatibial combs separated, of about 10 setae each. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-5, obscured on segments 6 and 7. Clothing setae longer than the spaces between them. Tergite 9 (Figure 61) with 2 short, moderately blunt posterior projections.

MALE. Apicalmost third of protibial comb setae (5-7) modified and agglutinated at tips; about 5 modified setae towards apex on lower face of mesotibia. Sternite 8 unmodified or with a median, oval, glabrous patch from middle to posterior margin. Median lobe of genitalia stout and blunt at apex; parameres slender. Copulatory piece (Figures 136 and 137) with tubular part moderately straight except for bend towards apex, either narrow or broader; side process broad, always curved around tubular part.

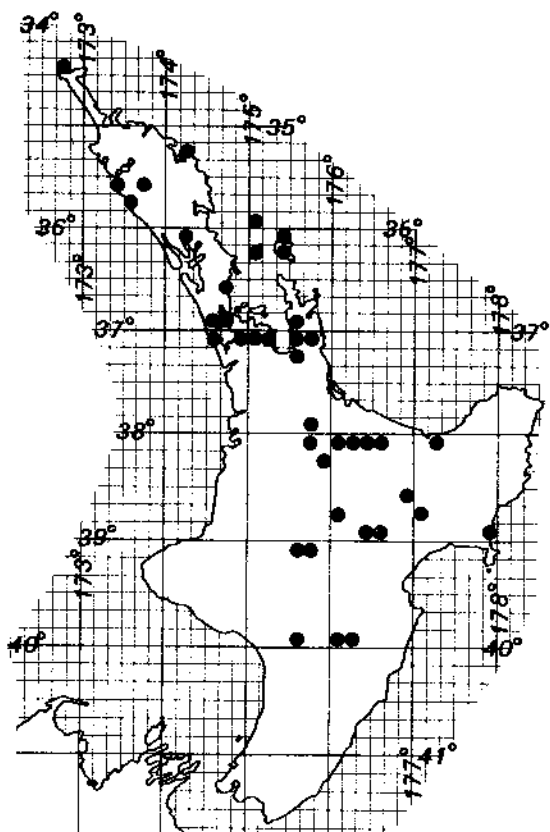
FEMALE. Spermatheca (Figure 100) acorn-shaped (oval in some specimens from Waiwera (ND)), about 0.125 × 0.075 mm; duct highly convoluted near spermatheca, weakly spirally twisted or kinked elsewhere.

TYPE DATA. *Paratrochus brevipennis*: holotype - male, Mokohinau Island (ND), P. Sandager (BMNH), here designated. It bears labels "Type" and "1850" and "Mokohinau" and "New Zealand Broun Coll. Brit. Mus. 1922 - 482" and "*Holotrochus brevipennis*" and "HOLOTYPE *Paratrochus brevipennis* (Broun) ♂ desig. H.P. McColl 1981" (last label my handwriting).

*Paratrochus gracilis* (Broun): the female specimen collected from the "Waitakerei Range" (AK), March 1909, by T. Broun is in the Broun Collection (BMNH).

MATERIAL EXAMINED. 787 males and 722 females (BMNH, NMNZ, OMNZ), mostly wet-preserved specimens.

ND, AK, CL, BP, GB, TO, RI.



*P. brevipennis* has been collected from moss, litter, and humus beneath a range of vegetation: kauri-dominant forest (Ngaio-tonga Scenic Reserve; Katui, Waipoua Forest; Waitakere Ranges; Tapu-Coroglen Road, Coromandel); manuka on the edge of a kauri forest (Pawakatutu, Waipoua Forest); taraire-dominant forest (Waimatenui, Waipoua Forest; Kirk Memorial Park, Papakura; Ponga Bush; Maketu Stream, Ramarama; Peach Hill Road, Drury); tawa-dominant forest (Waimatenui; Waipoua Forest; Mount Maunau-paki; Coromandel Road, near summit; Mamaku Range; Huiarau; Mount Ngongotaha; Lake Waikaremoana); kamahi-dominant forest (Coromandel Road, near summit; Mount Ngongotaha; Lake Waikaremoana; Ahimanawa Range); pink pine and *Phyllocladus* (Ruahine Corner); mountain beech (Ruahine Corner); cedar and pepperwood (Whanahuia Range); midribbed snow tussock (Hikurangi Range; Mokai Patea Range); and red tussock (Ruahine Range).

Its altitudinal range is between 20 m (Kirk Memorial Park, Papakura) and 1615 m (Hikurangi Range).

It has been collected in all months.

*P. brevipennis* has been found in samples with *vagepunctus* (Kaimai Range), *decipiens* (Kauri Grove Track, Waitakere Range; Coromandel Road, near summit), *aculeatus* (Kirk Memorial Park; Maketu Stream, Ramarama; Ponga Road, Opaheke; Peach Hill Road, Drury), and *Nototrochus ferrugineus* (Ngaio-tonga Scenic Reserve; Destruction Gully, Waitakere Range; Kirk Memorial Park; Ponga Road; Hongi's Track, Rotorua; Lake Waikaremoana). It also occurs near *caecus* (Maketu) and *insuetus* (Destruction Gully).

REMARKS. Some geographical variation occurs within this species. The majority of specimens from some localities may fall at the lower or upper end of the size range. The holotype male is towards the top end of the size range, being almost 3 mm long and 0.7 mm wide. It is pubescent, and has many punctures on the thorax (Broun described it as being "sparsely clothed with short, greyish hairs" and the pronotum as having "only a very few scattered punctures"). The eye may be either a single convex facet or two small convex facets. Broun refers to the eye of *brevipennis* in his description of *laevigatus* (see *vagepunctus*) as being "obsolete or absent"; the eye of the type specimen is composed of one convex facet, which can be clearly seen. The copulatory piece is very similar to Figure 137, having a straight, narrow tubular part, only slightly bent apically, and a broad side process curving around the tubular part. The copulatory piece may have a broader tubular part in specimens from some localities (Figure 136). The spermatheca, though usually acorn-shaped (Figure 100), is sometimes oval (e.g., specimens from Waiwera).

I have examined the female specimen in the Broun Collection (BMNH) described as *gracilis* by Broun; it is *brevipennis*. It has a small eye (0.030 × 0.025 mm) and an acorn-shaped spermatheca.

*P. brevipennis* can be separated from species of similar size by its pronotal shape, eye pigment, long abdominal clothing setae, unmodified sternite 8 of the male, form of the copulatory piece, slender parameres, and acorn-shaped spermatheca.

***Paratrochus trivialis* new species**

Figures 24, 62, 101, and 138

Moderately shining; reddish-brown; antennae and legs yellowish-brown. Upper surface finely punctate, pubescent. Length - dry 2.5-3.3 mm, wet 2.9-3.5 mm; pronotal length 0.50-0.55 (0.52) mm, width 0.63-0.68 (0.66) mm; elytral length 0.38 mm, width 0.65-0.70 (0.66) mm; abdominal width 0.65-0.70 (0.68) mm, females slightly wider than males; (dimensions from 8 males and 6 females).

HEAD. Eye pigmented, oval, 0.038 × 0.025 mm, comprising 1 convex facet. Labrum with about 27 long setae on upper surface, and a comb of about 4 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with blunt apical teeth.

THORAX. Pronotum (Figure 24) with almost parallel lateral margins, rounded, right-angled basal angles, and distinct but fine microreticulate sculpturing. Elytra with fine microreticulate sculpturing; sutural striae usually distinct; shoulder rounded; lateral margins with several weak teeth and short setae. Protibia with about 4 spines on upper face. Metatibial combs separated, of about 9 setae each. Empodium a curved bristle slightly longer than the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae longer than the spaces between them. Tergite 9 (Figure 62) with 2 short, pointed posterior projections.

MALE. Apicalmost third of protibial comb setae (about 5 double) modified and agglutinated at tips; about 9 modified setae towards apex on lower face of mesotibia. Sternite 8 with a shallow, glabrous, median depression from about middle to posterior margin. Median lobe of genitalia pointed at apex; parameres relatively stout, expanding slightly towards apex. Copulatory piece (Figure 138) with a short tubular part, slightly bent at apex, and a broad side process curved around the tubular part; a further flange, attached to the tubular part, curves round it above the side process.

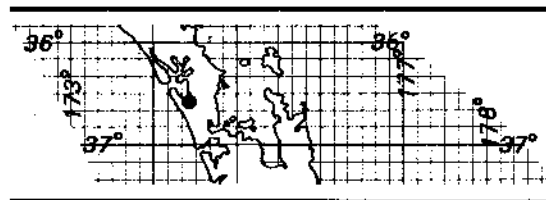
FEMALE. Spermatheca (Figure 139) oval, elongate, 0.175 × 0.075 mm, moderately sclerotised; duct slightly convoluted near spermatheca, its middle portion straight and then with 4 large loops, the 4th

spirally twisted, leading to kinked basal part, which loops around the oviduct before joining it.

TYPE DATA. Holotype: male, Pinchgut Road, Kaukapakapa (AK), 91 m, litter under rimu, tanekaha, rangiora, *Gahnia* sp., and tree ferns, 17 February 1977, H.P. McColl (NZAC). Paratypes: 6 males and 5 females, same data as holotype; 1 male and 1 female, same data but BMNH; 2 males, same data as holotype but from litter under kauri.

MATERIAL EXAMINED. Type series only.

AK.



*P. trivialis* was found in the same sample as *angulatus*.

REMARKS. *P. trivialis* can be distinguished from *brevipennis* by its pronotal shape, median depression on sternite 8 of the male, and moderately stout parameres. The form of the copulatory piece, moderately sclerotised, elongate-oval spermatheca, and form of the spermathecal duct separate it from *decipiens*.

The trivial name - Latin, 'ordinary' - alludes to the lack of useful diagnostic characters.

***Paratrochus decipiens* new species**

Figures 25, 63, 102, and 139

Moderately shining; reddish-brown; antennae and legs yellowish-brown. Upper surface finely punctate, pubescent. Length - dry 2.5-3.5 mm, wet 2.6-3.1 mm; pronotal length 0.48-0.55 (0.53) mm, width 0.63-0.73 (0.68) mm; elytral length 0.38-0.43 (0.40) mm, width 0.63-0.73 (0.68) mm; abdominal width 0.63-0.75 (0.68) mm, females wider than males; (dimensions from 6 males and 5 females).

HEAD. Eye pigmented, almost round, 0.031 × 0.025 mm, comprising 1 flattish facet. Labrum with about 25 long setae on upper surface, and a comb of about 7 setae on basal half of lateral margins; lobes divided into about 4 processes. Lacinia with moderately blunt apical teeth.

THORAX. Pronotum (Figure 25) with almost parallel lateral margins, rounded, obtuse basal angles, and distinct microreticulate sculpturing. Elytra with fine microreticulate sculpturing; sutural striae distinct; shoulder sloping; lateral margins with several very weak teeth and short setae. Protibia with about 4 spines on upper face. Metatibial combs continuous, of about 23 setae. Empodium a curved bristle longer than the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae slightly longer than the spaces between them. Tergite 9 (Figure 63) with 2 short, pointed posterior projections.

MALE. About half of protibial comb setae (about 11) modified and agglutinated at tips; about 12 (double) modified setae towards apex on lower face of mesotibia. Sternite 8 with a very shallow, oval, median depression from about middle to posterior margin. Median lobe of genitalia elongate and slender towards slightly spatulate apex; parameres stout, expanding slightly towards apex. Copulatory piece (Figure 139) with a short, wide tubular part around which a broad side process curves.

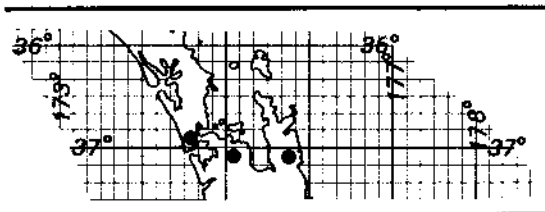
FEMALE. Spermatheca (Figure 102) almost round, 0.125 × 0.088 mm; duct convoluted near spermatheca, its middle portion spirally twisted, its basal portion straight, looping around oviduct before joining it.

TYPE DATA. Holotype: male, Kauri Grove Track, Waitakere Range (AK), 122 m, litter and surface roots under punga in mixed broadleaf forest, 16 February 1977, H.P. McColl (NZAC). Paratypes: 19 males and 29 females, same data as holotype.

MATERIAL EXAMINED. 54 males and 64 females (NZAC), wet-preserved specimens.

AK, CL.

*P. decipiens* has been collected from litter and humus beneath mixed forest of



kamahi, tawa, rangiora, patete, five-finger, and tree ferns (Kauri Grove track, Waitakere Range; Table Mountain, and Coromandel Road near summit, Coromandel), manuka litter (Waitakere Range), rewarewa and hinau (Parau), and rimu and rangiora (Cossey's Road, Hunua).

Its altitudinal range is between 60 m (Parau) and 792 m (Table Mountain).

It has been collected in January, February, May, August, and October.

*P. decipiens* has been found in samples with *brevipennis* (Kauri Grove Track; Coromandel Range).

REMARKS. *P. decipiens* can be readily separated from *brevipennis* by its pronotal shape, median depression of sternite 8 of the male, stout parameres, characteristic form of the copulatory piece, and almost round spermatheca.

The trivial name - Latin, 'deceiving' - alludes to the superficial similarity to *brevipennis*.

#### ***Paratrochus hamatus* new species**

Figures 1, 26, 64, 103, and 140

Moderately shining; reddish-brown; antennae and legs yellowish-brown. Upper surface finely punctate, sparsely pubescent. Length - dry 2.3-2.6 mm, wet 2.5-3.2 mm; pronotal length 0.45-0.50 (0.48) mm, width 0.60-0.63 (0.62) mm; elytral length 0.35-0.40 (0.37) mm, width 0.60-0.65 (0.63) mm; abdominal width 0.60-0.66 (0.64) mm, females slightly wider than males; (dimensions from 6 males and 6 females).

HEAD. Eye pigmented, elongate-oval, 0.025 × 0.018 mm, comprising 1 flat facet. Labrum with about 28 long setae on upper surface, and a comb of about 4 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with 2 moderately blunt apical teeth.

THORAX. Pronotum (Figure 26) broadest at middle, with rounded, right-angled basal angles and distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder almost right-angled; lateral margins expanding slightly from middle to posterior, with several weak teeth and short setae. Protibia with about 4 spines on upper face. Metatibial combs separated; about 7 setae in apical comb, 11 in lateral comb. Empodium a slightly flattened bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing setae shorter than the spaces between them. Tergite 9 (Figure 64) with 2 short, blunt posterior projections.

MALE. Apicalmost quarter of protibial comb setae (about 5) modified and agglutinated at tips; about 4 modified setae towards apex on lower face of mesotibia. Sternite 8 unmodified. Median lobe of genitalia blunt at apex; parameres slender, expanding slightly towards apex. Copulatory piece (Figure 140) with a long, slender tubular part and a short side process not curving around the tubular part.

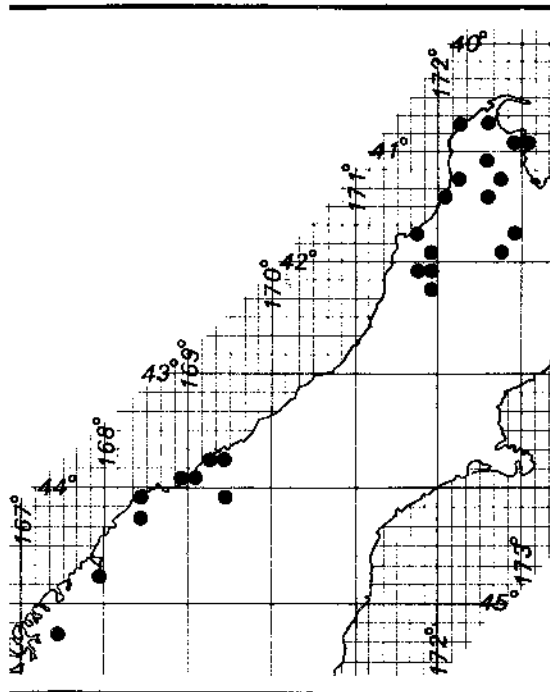
FEMALE. Spermatheca (Figure 103) elongate, almost bean-shaped,  $0.125 \times 0.040$  mm; duct convoluted near spermatheca, straight elsewhere.

TYPE DATA. Holotype: male, Fletcher's Creek (BR), 230 m, litter and humus under silver beech, red beech, miro, matai, and pepperwood, 9 November 1971, J.G. McBurney (NZAC). Paratypes: 92 males and 91 females, same data as holotype.

MATERIAL EXAMINED. 1165 males and 1065 females (NMNZ, NZAC, OMNZ), mostly wet-preserved specimens.

NN, BR, WD, OL, FL.

*P. hamatus* has been found in moss, litter, humus, and mineral soil, mostly beneath forest with red and/or silver beech and some podocarps (Little Canaan; Harewood's Track, Canaan; Oparara River; Devil's Thumb; Denniston; Lake Rotoiti; Fletcher's Creek, XB2, PB1, PB4, and PB9 sites; Stony Creek, PB15 site; Reefton; Lake Paringa; Cascade River valley; Haast Pass; Woodhen Creek; Takahe Valley, Murchi-



son Mountains) but also in moss and litter under *Hebe toparia* (Mount Arthur), podocarp/hardwood forest (Oparara River), kamahi, supplejack, punga, and water fern (Little Wanganui River), fuchsia, *Coprosma*, and tree ferns (Greenstone Creek, Haast Pass), and mahoe, porokaiwhiri, *Coprosma*, and tree ferns (Milford Sound). It has been collected under *Pinus radiata* (Fletcher's Creek, pine site; Big River Road, Tawhai) and *Pinus laricio* and *Pseudotsuga menziesii* (Big River Road).

It is interesting to note that *hamatus* has not been collected from the beech/podocarp forest at Caplestone (PB5 site) and Redman's Valley, or from the semi-pakihi forest at Mawhera.

Its altitudinal range is between 12 m (Lake Paringa) and 1440 m (Lodestone, Mount Arthur).

It has been collected in all months.

*P. hamatus* has been found in samples with *helmsi* (Fletcher's Creek, XB2 and PB1 sites; Stony Creek, PB15 site), *arrowi* and *retroflexus* (Oparara River), *brevisetis* (Makarora), *microphthalmus* (Harewood's Track, Canaan; Mount Arthur; Fletcher's Creek, XB2 and PB1 sites; Stony Creek, PB15



site; Big River Road, Tawhai; Milford Sound), *parvulus* (Little Wanganui River), and *angustus* (Fletcher's Creek, XB2 and PBI sites; Stony Creek, PBI5 site).

REMARKS. *P. hamatus* can be separated from species of similar size by its pronotal shape, clothing setae shorter than the spaces between them, unmodified sternite 8 of the male, form of the copulatory piece, and straight spermathocal duct.

The trivial name - Latin, 'hooked' - alludes to the shape of the copulatory piece, not unlike a Maori fish-hook.

### *Paratrochus retroflexus* new species

Figures 27, 65, 104, and 141

Moderately shining; reddish-brown or yellowish-brown; antennae and legs reddish-brown. Upper surface finely punctate, moderately pubescent, though clothing setae very short, giving impression of sparse pubescence. Length - dry 2.8-3.2 mm, wet 2.8-4.2 mm; pronotal length 0.48-0.58 (0.52) mm, width 0.58-0.73 (0.66) mm; elytral length 0.35-0.43 (0.39) mm; width 0.60-0.73 (0.66) mm; abdominal width 0.63-0.73 (0.68) mm; females and males about equally wide; (dimensions from 11 males and 5 females.

HEAD. Eye without pigment, elongate-oval,  $0.050 \times 0.031$  mm, comprising 1 slightly convex facet. Labrum with about 31 long setae on upper surface, and a comb of about 4 setae on basal half of lateral margins; lobes divided into 2 or 3 bifurcating processes. Lacinia with 2 pointed apical teeth.

THORAX. Pronotum (Figure 27) with very slightly expanded lateral margins, rounded, right-angled basal angles, and distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded; lateral margins with several weak teeth and short setae. Protibia with about 4 spines on upper face. Metatibial combs separated, of about 10 setae each. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites visible on segments 3-7. Clothing

setae about half as long as the spaces between them. Tergite 9 (Figure 65) with 2 very short, blunt posterior projections.

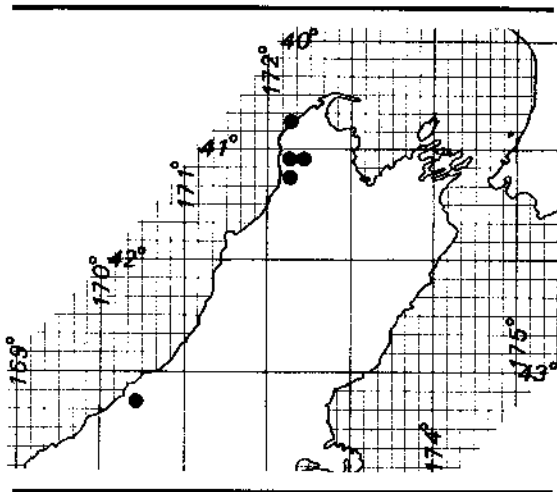
MALE. Apicalmost sixth of protibial comb setae (about 5) modified; about 4 modified setae towards apex on lower face of mesotibia. Sternite 8 with a shallow, glabrous, median depression from about middle to posterior margin. Median lobe of genitalia pointed at apex; parameres slender, expanding slightly towards apex. Copulatory piece (Figure 141) with a moderately broad tubular part, strongly bent about mid-way, and a short, slender side process.

FEMALE. Spermatheca (Figure 104) oval,  $0.175 \times 0.075$  mm; duct convoluted near spermatheca, loosely spirally twisted elsewhere.

TYPE DATA. Holotype: male, Lako Aorere, Mount Domett (NN), 1260 m, litter under midribbed snow tussock, 2 February 1977, A.P. Druce (NZAC). Paratypes: 10 males and 11 females, same data as holotype.

MATERIAL EXAMINED. 40 males and 36 females (NZAC), mostly wet-preserved specimens.

NN, BR.



*P. retroflexus* has been collected from litter beneath beech/podocarp forest (Kahurangi Lighthouse; Oparara River), moss beneath kamahi, rimu, and ferns (Mount Hercules), and litter under midribbed and curly snow tussock (Mount Domett).

Its altitudinal range is between 180 m (Mount Hercules) and 1525 m (Mount Domett).

It has been collected in February, March, August, and November.

*P. retroflexus* has been found in samples with *arrowi* and *hamatus* (Oparara River).

REMARKS. *P. retroflexus* can be separated from species of similar size by its pronotal shape and shallow microreticulate sculpturing, sparse clothing setae about half as long as the spaces between them, lack of eye pigment, median depression of sternite 8 of the male, characteristic copulatory piece, and spirally twisted spermathecal duct.

The trivial name - Latin, 'curved back' - alludes to the bend in the copulatory piece.

### ***Paratrochus tubifer* new species**

Figures 28, 66, 105, and 142

Dull; yellowish-brown; antennae and legs paler, yellowish. Upper surface finely punctate, pubescent. Length - dry about 2.3 mm, wet 2.3-3.1 mm; pronotal length 0.40-0.43 (0.41) mm, width 0.48-0.53 (0.50) mm; elytral length 0.25-0.33 (0.29) mm, width 0.45-0.53 (0.49) mm; abdominal width 0.50-0.58 (0.54) mm, females wider than males; (dimensions from 17 males and 8 females).

HEAD. Eye pigmented, oval, 0.038 × 0.025 mm, comprising 1 convex facet. Labrum with about 28 long setae on upper surface, and a comb of 3 or 4 setae on basal half of lateral margins; lobes divided into 2 or 3 bifurcating processes. Lacinia with 3 very blunt apical teeth.

THORAX. Pronotum (Figure 28) narrowing towards base, with rounded, obtuse basal angles and deep, distinct microreticulate sculpturing giving a dull appearance. Elytra with indistinct microreticulate sculpturing; sutural striae indistinct; shoulder sloping; lateral margins with a tooth near shoulder and several short setae. Protibia with 4 spines on upper face. Metatibial combs separated, of about 9 setae each. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae longer than the spaces between them. Tergite 9 (Figure 66) with 2 pointed posterior projections.

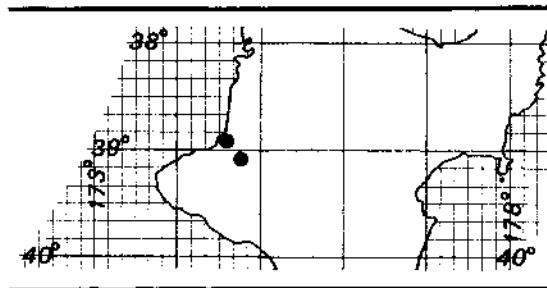
MALE. Apicalmost sixth of protibial comb setae (about 5) modified; no modified setae on mesotibia. Sternite 8 with a median, longitudinal ridge on posterior third, surrounded by a slight depression. Median lobe of genitalia pointed at apex; parameres slender, not expanding towards apex. Copulatory piece (Figure 142) with a long, straight, trumpet-shaped tubular part and a short side process, slightly twisted at about middle.

FEMALE. Spermatheca (Figure 105) oval, 0.175 × 0.088 mm; duct convoluted near spermatheca, straight elsewhere.

TYPE DATA. Holotype: male, Mount Messenger (TK), 200 m, litter under rewarewa, kamahi, and rata, 7 June 1977, H.P. McColl (NZAC). Paratypes: 3 males and 5 females, same data as holotype.

MATERIAL EXAMINED. 19 males and 16 females (NZAC), mostly wet-preserved specimens.

TK.



*P. tubifer* has been collected from litter and humus beneath kamahi-dominant mixed forest (Mount Messenger) and from the base of a tree fern in tawa-dominant forest (Whangamomona Road).

Its altitudinal range is between 200 m (Mount Messenger) and 250 m (Whangamomona Road).

It has been collected in June, July, and October.

*P. tubifer* has been found in samples with *vagepunctus*, *scapulifer*, *microphthalmus*, and *tricarinatus* at Mount Messenger,

but not in samples with *curvisetis* and *hermes* from this locality, nor in samples with *microphthalmus* and *tricarinatus* from Whangamomona Road.

REMARKS. *P. tubifer* can be distinguished from species of similar size by its pronotal shape and deep microreticulate sculpturing, dense clothing setae longer than the spaces between them, long, slender, pointed 9th tergite projections, median ridge on sternite 8 of the male, form of the copulatory piece, and shape of the spermatheca.

The trivial name - Latin, 'tuba-bearer' - alludes to the straight trumpet shape of the copulatory piece.

### ***Paratrochus alifer* new species**

Figures 29, 67, 106, and 143

Dull; yellowish brown; antennae and legs paler. Upper surface finely punctate, moderately pubescent. Length - dry about 2.9 mm, wet 2.9-3.5 mm; pronotal length 0.45-0.48 (0.47) mm, width 0.58-0.60 (0.59) mm; elytral length 0.33-0.35 (0.34) mm, width 0.58-0.60 (0.59) mm; abdominal width 0.55-0.63 (0.60) mm, females wider than male; (dimensions from 1 male and 4 females).

HEAD. Eye unpigmented, almost round, 0.025 × 0.025 mm, comprising 1 convex facet. Labrum with about 27 long setae on upper surface, and a comb of about 4 setae on basal half of lateral margins; lobes divided into 3 processes. Lacinia with 2 moderately pointed apical teeth.

THORAX. Pronotum (Figure 29) broadest at middle, with almost parallel lateral margins, rounded, right-angled basal angles, and deep, distinct microreticulate sculpturing giving a dull appearance. Elytra with distinct sutural striae; shoulder almost right-angled; lateral margins with several short setae. Protibia with about 3 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 12 in lateral comb. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae about as long as the spaces between them. Tergite 9 (Figure 67) with 2

short, moderately pointed posterior projections.

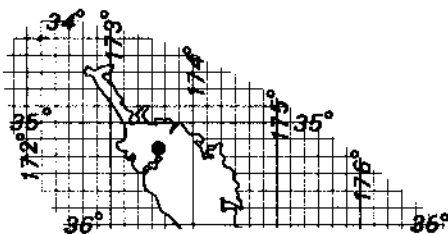
MALE. Apicalmost half of protibial comb setae (about 12) modified, flattened and agglutinated at tips; a row of about 12 modified setae along lower face of mesotibia. Sternite 8 with a well defined median depression from about middle to posterior margin. Median lobe of genitalia blunt at apex; parameres stout, expanding towards apex. Copulatory piece (Figure 143) with tubular part long, slender, slightly hooked at apex, bearing 4 spine-like projections; side process with an upright portion and a broad portion which curves around the tubular part.

FEMALE. Spermatheca (Figure 106) almost round, 0.088 × 0.076 mm; duct slightly convoluted near spermatheca, straight elsewhere, looping around the oviduct several times before joining it.

TYPE DATA. Holotype: male, Omahuta Kauri Reserve (ND), 135 m, litter under kauri, tawa, tawari, aka, and kauri grass, 10 October 1974, J.C. Watt (NZAC). Paratypes: 3 females, same data as holotype; 1 female, same locality but 8 May 1974, G. Kuschel (NZAC).

MATERIAL EXAMINED. Type series only.

ND.



*P. alifer* has been collected only from Omahuta Kauri Reserve, from litter beneath kauri-dominant forest. I have examined litter samples from beneath kauri at other Northland localities, but this species was not present, which suggests a limited distribution.

No other osorine species have been collected with *alifer*.

REMARKS. *P. alifer* can be distinguished from species of similar size by its prono-

tal shape and deep microreticulate sculpturing, dense clothing setae as long as the spaces between them, short projections of tergite 9, median depression of sternite 8 of the male, form of the copulatory piece, and small, almost round spermatheca.

The trivial name - Latin, 'wing-bearer' - alludes to the wing-like side process of the copulatory piece.

### ***Paratrochus pubescens* new species**

Figures 30, 68, 107, and 144

Moderately shining; reddish-brown or yellowish-brown; antennae and legs paler. Upper surface finely punctate, pubescent. Length - dry about 2.5 mm, wet 2.4-3.2 mm; pronotal length 0.43-0.45 (0.44) mm, width 0.58-0.63 (0.60) mm; elytral length 0.33-0.35 (0.33) mm, width 0.58-0.65 (0.61) mm; abdominal width 0.58-0.65 (0.61) mm, females wider than males; (dimensions from 5 males and 5 females).

**HEAD.** Eye pigmented, almost round, 0.038 × 0.031 mm, comprising 1 moderately convex facet. Labrum with about 27 long setae on upper surface, and a comb of about 6 setae on basal half of lateral margins; lobes divided into 2 bifurcating processes. Lacinia with 2 moderately blunt apical teeth.

**THORAX.** Pronotum (Figure 30) broadest at middle, with rounded, right-angled basal angles and distinct but shallow microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded; lateral margins with several weak teeth and short setae. Protibia with about 3 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 11 in lateral comb. Empodium a curved bristle about as long as the claw.

**ABDOMEN.** Junction of tergites and sternites visible on segments 3-7. Clothing setae longer than the spaces between them. Tergite 9 (Figure 68) with 2 long, pointed posterior projections.

**MALE.** Apicalmost quarter of protibial comb setae (about 5) modified and agglutinated at tips; 5 modified setae towards apex on lower face of mesotibia. Sternite 8

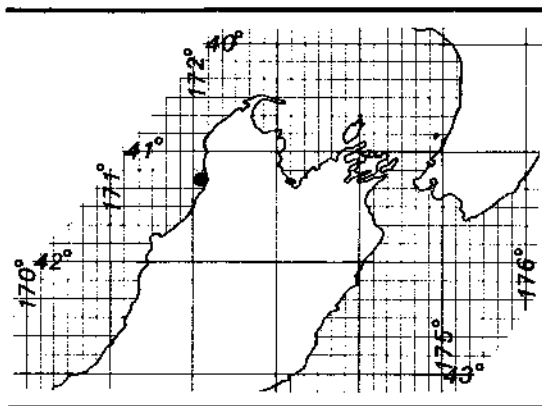
with a shallow median depression on posterior third. Median lobe of genitalia pointed at apex; parameres moderately slender, expanding towards apex. Copulatory piece (Figure 144) with a long tubular part, bent at about mid-length, and a slender side process, curving around base of tubular part.

**FEMALE.** Spermatheca (Figure 107) elongate, bean-shaped 0.188 × 0.063 mm; duct convoluted near spermatheca, its middle portion moderately spirally twisted, its basal portion straight.

**TYPE DATA.** Holotype: male, 15 km northwest of Karamea (NN), 15 m, litter under mahoe, wineberry, *Coprosma* sp., and punga, 19 June 1967, F.D. Alack (NZAC). Paratypes: 24 males and 23 females, same data as holotype; 2 males and 2 females, same data but BMNH.

**MATERIAL EXAMINED.** Type series only.

NN.



*P. pubescens* has been found with *hermes* (Karamea).

**REMARKS.** *P. pubescens* can be distinguished from species of similar size by its pronotal shape and shallow microreticulate sculpturing, dense clothing setae longer than the spaces between them, visible junction between tergites and sternites on segments 3-7, long, pointed 9th tergite projections, shallow depression on sternite 8 of the male, form of the copulatory piece, and bean-shaped spermatheca.

The trivial name - Latin, 'pubescent' - alludes to the long, dense clothing setae.

***Paratrochus tricarinatus* new species**

Figures 31, 69, 108, 145, 156, and 159

Shining; reddish-brown; antennae and legs paler. Upper surface finely punctate, moderately pubescent. Length - dry about 2.3 mm, wet 2.3-2.6 mm; pronotal length 0.38-0.45 (0.42) mm, width 0.48-0.55 (0.51) mm; elytral length 0.28-0.33 (0.31) mm, width 0.48-0.53 (0.50) mm; abdominal width 0.50-0.60 (0.54) mm, females slightly wider than males; (dimensions from 3 males and 4 females).

**HEAD.** Eye pigmented, almost round,  $0.031 \times 0.025$  mm, comprising 1 convex facet. Labrum with about 35 long setae on upper surface, and a comb of about 5 setae on basal half of lateral margins; lobes divided into 3 or 4 bifurcating processes. Lacinia with 3 moderately blunt apical teeth, 2 major and 1 minor.

**THORAX.** Pronotum (Figure 31) broadest at about middle, with obtuse basal angles and moderately distinct though shallow microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder almost right-angled; lateral margins with several weak teeth and short setae. Protibia with about 3 spines on upper face. Metatibial combs separated; about 7 setae in apical comb, 8 in lateral comb. Empodium a curved bristle slightly shorter than the claw or about as long.

**ABDOMEN.** Junction of tergites and sternites obscured except on segment 3. Clothing setae about as long as the spaces between them. Tergite 9 (Figure 69) with 2 slender, pointed posterior projections separated by a median, rounded projection.

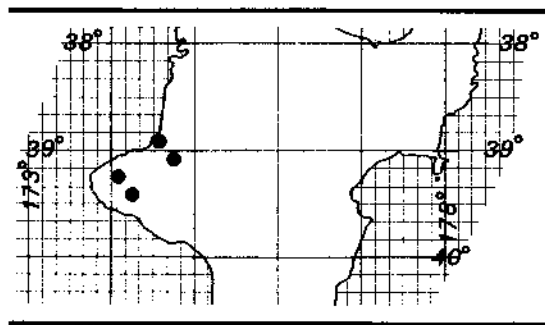
**MALE.** Apicalmost half of protibial comb setae (about 9) modified, flattened and agglutinated at tips; no modified setae on mesotibia. Sternite 8 (Figure 156) with a median longitudinal ridge flanked on either side by curved ridges, all 3 occupying a shallow depression. Median lobe of genitalia blunt at apex; parameres slender, expanding greatly towards apex to form a club (Figure 159). Copulatory piece (Figure 145) with a long, slender, apically hooked tubular part, and a very short side process curving around base of tubular part.

**FEMALE.** Spermatheca (Figure 108) oval, elongate,  $0.175 \times 0.075$  mm; duct convoluted near spermatheca, its middle portion slightly kinked, its basal portion looping around oviduct before joining it.

**TYPE DATA.** Holotype: male, Mount Messenger (TK), 200 m, litter under kamahi, *Astelia* sp., and *Olearia* sp., 26 July 1977, H.P. McColl (NZAC). Paratypes: 2 females, same data as holotype; 1 male, same data but from litter under kamahi, rewarewa, and rangiora, 7 June 1977.

**MATERIAL EXAMINED.** 3 males and 4 females (NZAC), all wet-preserved specimens.

TK.



*P. tricarinatus* has been collected from litter beneath punga and tawa (Whangamomona Road), kamahi-dominant forest (Stratford, King Edward Park), and mosses (Pouakai Saddle).

Its altitudinal range is between 200 m (Mount Messenger) and 1220 m (Pouakai Saddle).

It has been collected in June, July, October, and December.

*P. tricarinatus* has been found in samples with *vagepunctus*, *scapulifer*, *microphthalmus*, and *tubifer* at Mount Messenger. It also occurs near *curvisetis* and *hermes* (Mount Messenger), *scapulifer* and *microphthalmus* (Whangamomona Road).

**REMARKS.** Although many samples have been collected from Mount Messenger, only two have contained *P. tricarinatus*, which suggests that it may have precise habitat requirements, as yet undefined. This distinctive species is easily separated from *tubifer*, with which it occurs, by the three

ridges on sternite 8 of the male, clubbed parameres, and bean-shaped spermatheca. Its pronotal shape and shallow microreticulate sculpturing, dense clothing setae as long as the spaces between them, and shape of tergite 9 further distinguish it from species of similar size.

The trivial name - Latin, 'three-keeled' - alludes to sternite 8 of the male.

### ***Paratrochus flexuosus* new species**

Figures 32, 70, 109, and 146

Moderately shining; reddish-brown; antennae and legs paler. Upper surface finely punctate, moderately pubescent. Length - dry about 2.6 mm, wet 3.0-3.3 mm; pronotal length 0.43-0.45 (0.45) mm, width 0.53-0.55 (0.54) mm; elytral length 0.33-0.35 (0.33) mm, width 0.50-0.55 (0.53) mm; abdominal width 0.53-0.58 (0.56) mm, females wider than males; (dimensions from 2 males and 3 females).

**HEAD.** Eye pigmented, almost round, 0.031 × 0.025 mm, comprising 1 slightly convex facet. Labrum with about 25 long setae on upper surface, and a comb of 3 or 4 setae on basal half of lateral margins; lobes divided into 2 or 3 processes. Lacinia with 2 blunt apical teeth.

**THORAX.** Pronotum (Figure 32) broadest at about middle, with rounded, obtuse basal angles and distinct though shallow microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded; lateral margins with several long, weak teeth and short setae. Protibia with 3 spines on upper face. Metatibial combs separated, of about 8 setae each. Empodium a curved bristle slightly longer than the claw.

**ABDOMEN.** Junction of tergites and sternites obscured except on segment 3. Clothing setae about as long as the spaces between them. Tergite 9 (Figure 70) with 2 short, blunt posterior projections.

**MALE.** Apicalmost quarter of protibial comb setae (about 5) modified, flattened and agglutinated at tips; about 4 modified setae towards apex on lower face of mesotibia. Sternite 8 unmodified. Median lobe of genitalia pointed at apex; parameres slender, expanding very slightly towards

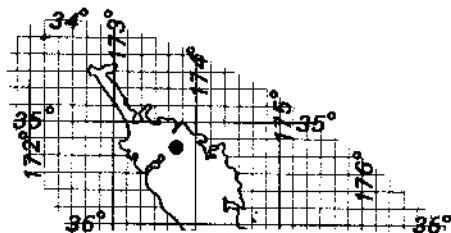
apex. Copulatory piece (Figure 146) with a slender tubular part, bent from about middle to apex, and a broad side process curving around the tubular part.

**FEMALE.** Spermatheca (Figure 109) oval, 0.125 × 0.063 mm; duct slightly convoluted near spermatheca, its middle portion straight, its basal portion with a short, spirally twisted part near junction with oviduct.

**TYPE DATA.** Holotype: male, Puketi State Forest (ND), litter under totara, kohekohe, taraire, tawa, and *Pittosporum* sp., 21 January 1972, G.W. Ramsay (NZAC). Paratypes: 1 male and 3 females, same data as holotype.

**MATERIAL EXAMINED.** Type series only.

ND.



*Nototrochus ferrugineus* was found in the sample with this species.

**REMARKS.** *P. flexuosus* can be distinguished from species of similar size by its pronotal shape and shallow microreticulate sculpturing, dense clothing setae as long as the spaces between them, short, blunt projections of tergite 9, absence of modification of sternite 8 in the male, form of the copulatory piece, and oval spermatheca.

The trivial name - Latin, 'with bends' - alludes to the bent tubular part of the copulatory piece.

### ***Paratrochus angulatus* new species**

Figures 33, 71, 110, and 147

Shining; reddish-brown; antennae and legs paler. Upper surface finely punctate, moderately pubescent, though setae short.

Length - dry about 2.4 mm, wet 2.6-3.2 mm; pronotal length 0.48-0.50 (0.50) mm, width 0.63-0.68 (0.64) mm; elytral length 0.33-0.38 (0.36) mm, width 0.58-0.65 (0.62) mm; abdominal width 0.65-0.70 (0.66) mm, females wider than males; (dimensions from 2 males and 3 females).

HEAD. Eye unpigmented, round,  $0.025 \times 0.025$  mm, comprising 1 flat facet. Labrum with about 29 long setae on upper surface, and a comb of about 4 setae on basal half of lateral margins; lobes divided into 5 bifurcating processes. Lacinia with 2 very blunt apical teeth.

THORAX. Pronotum (Figure 33) with almost parallel lateral margins, sharply right-angled basal angles, and distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder sharply right-angled; lateral margins with several weak teeth and short setae. Protibia with 4 spines on upper face. Metatibial combs separated, of about 12 setae each. Empodium a curved bristle shorter than the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae shorter than the spaces between them. Tergite 9 (Figure 71) with 2 short, blunt, posterior projections.

MALE. Apicalmost quarter of protibial comb setae (about 5) modified and agglutinated at tips; about 6 modified setae towards apex on lower face of mesotibia. Sternite 8 unmodified. Median lobe of genitalia moderately pointed at apex; parameres slender, expanding slightly towards apex to form a small club. Copulatory piece (Figure 147) with tubular part moderately straight, bearing a semicircular, flange-like extension; side process broad, narrowing towards apex, curving around the tubular part.

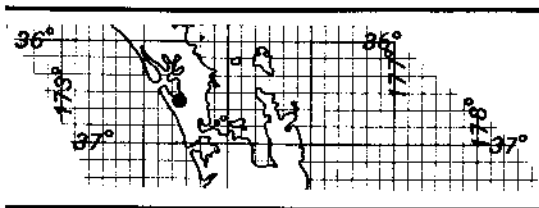
FEMALE. Spermatheca (Figure 110) pear-shaped,  $0.180 \times 0.075$  mm; duct convoluted near spermatheca, its middle portion very slightly spirally twisted or straight, its straight basal portion looping around oviduct before joining it.

TYPE DATA. Holotype: male, Pinchgut Road, Kaukapakapa (AK), 91 m, litter under kauri, 17 February 1977, H.P. McColl (NZAC). Paratypes: 1 male and 2 females, same data as holotype; 1 female, same data but from

litter under rimu, rangiora, tanekaha, *Gahnia* sp., and tree ferns.

MATERIAL EXAMINED. Type series only.

AK.



*P. angulatus* was found in the same sample as *trivialis*.

REMARKS. *P. angulatus* can be readily separated from species of similar size by the sharply right-angled basal angles of the pronotum and elytral shoulders, form of the copulatory piece, and shape of the spermatheca.

The trivial name - Latin, 'angular' - alludes to the basal angles of the pronotum and elytral shoulders.

#### *Paratrochus anophthalmus* (Fauvel) new combination

Figures 34, 72, and 80

*anophthalmus* Fauvel, 1900, Revue d'entomologie (Caen) 19: 188 (*Holotrochus*).

Moderately shining; dark brown; antennae and legs reddish-brown. Upper surface finely punctate, with several scattered, coarser punctures, moderately pubescent, though setae short. Length - dry about 2.5 mm; pronotal length 0.45 mm, width 0.55-0.58 (0.56) mm; elytral length 0.30-0.33 (0.31) mm, width 0.55-0.58 (0.56) mm; abdominal width 0.55-0.60 (0.58) mm; (dimensions from 2 males).

HEAD. Eye unpigmented, oval,  $0.038 \times 0.025$  mm, comprising 1 flat facet. Labrum with about 26 long setae on upper surface, and a comb of about 5 setae on basal half of lateral margins; lobes divided into 3 bifurcating processes. Lacinia not examined.

THORAX. Pronotum (Figure 34) with almost parallel lateral margins, blunt, right-

angled basal angles, and distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded; lateral margins with several teeth and short setae. Protibia with 3 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 10 in lateral comb. Empodium a curved bristle shorter than the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae shorter than the spaces between them. Tergite 9 (Figure 72) with 2 short, moderately blunt, posterior projections.

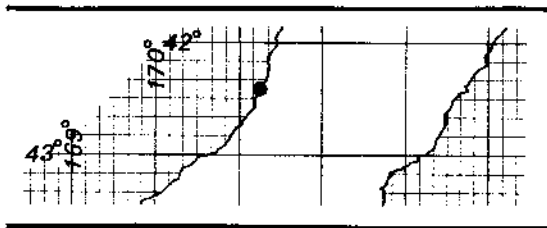
MALE. Apicalmost quarter of protibial comb setae (about 4) modified, flattened and agglutinated at tips; about 6 modified setae towards apex on lower face of mesotibia. Sternite 8 unmodified. Median lobe of genitalia moderately pointed at apex; parameres very slender. Copulatory piece (Figure 80) with tubular part moderately broad, twisted so that apical part is almost at right-angles to the rest; side process short.

FEMALE. Unknown.

TYPE DATA. Lectotype: male, Greymouth (BR), collected by R. Helms (ISNB), here designated. It bears labels "Nlle Zélande Greymouth" and "*anophthalmus* FvL." and "Coll. et det. A. Fauvel *Holotrochus* R.I. Sc.N.B. 17.479" and "Ex-typis" and "LECTO-TYPE *Paratrochus anophthalmus* (Fauvel) ♂ desig. H.P.McColl 1981" (last label my handwriting). Paralectotype: male, same collecting data as lectotype. It bears labels "Nlle Zélande Greymouth" and "Coll. et det. A. Fauvel *Holotrochus anophthalmus* FvL. R.I.Sc.N.B. 17.479" and "Ex-Typis" and "PARALECTOTYPE *Paratrochus anophthalmus* (Fauvel) ♂ desig. H.P.McColl 1981" (last label my handwriting).

MATERIAL EXAMINED. Type specimens only,

BR.



REMARKS. Litter samples collected from around Greymouth and from many localities in the Grey Valley and south of Greymouth have produced no further specimens of this species.

*P. anophthalmus* can be separated from other species of similar size by its pronotal shape, rounded basal angles of the pronotum and the elytral shoulder, sparse clothing setae shorter than the spaces between them, and form of the copulatory piece.

### *Paratrochus insuetus* new species

Figures 35, 73, and 81

Shining; reddish-brown; antennae and legs yellowish-brown. Upper surface finely punctate, sparsely pubescent. Length - wet 2.5 mm; pronotal length 0.45 mm, width 0.53 mm; elytral length 0.28 mm, width 0.53 mm; abdominal width 0.55 mm; (dimensions from the holotype male).

HEAD. Eye unpigmented, elongate-oval, 0.031 × 0.018 mm, comprising 1 flattish facet. Labrum with about 31 long setae on upper surface, and a comb of 5 setae on basal half of lateral margins; lobes divided into 3 or 4 bifurcating processes. Lacinia not examined.

THORAX. Pronotum (Figure 35) broader anteriorly, narrowing evenly to rounded, obtuse basal angles, with distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder sloping; lateral margins bowed slightly outward, with several weak teeth and short setae. Protibia with 3 spines on upper face. Metatibial combs separated; about 6 setae in apical comb, 9 in lateral comb. Empodium a curved bristle slightly longer than the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae shorter than the spaces between them. Tergite 9 (Figure 73) with 2 short, pointed, narrowly separated posterior projections.

MALE. No modified setae on protibiae or mesotibiae. Sternite 8 with a shallow median depression on posterior third. Median lobe of genitalia pointed at apex; para-



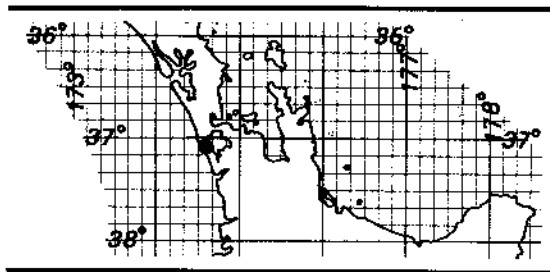
meres very slender. Copulatory piece (Figure 81) with tubular part expanding towards apex, becoming horn-shaped, and slender side process curving around base of tubular part.

FEMALE. Unknown.

TYPE DATA. Holotype: male, Destruction Gully, Waitakere Range (AK), 31 m, puna roots, 10 September 1975, H.P. McColl (NZAC).

MATERIAL EXAMINED. Unique holotype.

AK.



*P. insuetus* occurs near *brevipennis*.

REMARKS. *P. insuetus* can be distinguished from species of similar size by its pronotal shape, sparse clothing setae shorter than the spaces between them, short, narrowly separated projections of tergite 9, and form of the copulatory piece.

The trivial name - Latin, 'unusual' - alludes to the unique holotype specimen.

### ***Paratrochus bucinifer* new species**

Figures 36, 74, 111, 117, and 148

Moderately shining; reddish-brown to yellowish-brown; antennae and legs paler. Upper surface finely punctate, sparsely pubescent. Length - dry 2.3-2.9 mm, wet 2.5-3.7 mm; pronotal length 0.45-0.50 (0.48) mm, width 0.55-0.58 (0.57) mm; elytral length 0.30-0.38 (0.34) mm, width 0.55-0.63 (0.57) mm; abdominal width 0.58-0.65 (0.62) mm, females wider than males; (dimensions from 6 males and 5 females).

HEAD. Eye unpigmented, oval, 0.038 × 0.025 mm, comprising 1 flattish facet. Labrum with about 29 long setae on upper surface,

and a comb of about 5 setae on basal half of lateral margins; lobes divided into about 5 bifurcating processes. Lacinia with 2 very blunt apical teeth.

THORAX. Pronotum (Figures 36 and 117) broadest anteriorly, narrowing evenly to rounded, slightly obtuse basal angles, with distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulders sloping; lateral margins with several weak teeth and short setae (Figure 117). Protibia with 4 spines on upper face. Metatibial combs separated; about 7 setae in apical comb, 13 in lateral comb. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3 (Figure 117). Clothing setae about half as long as the spaces between them. Tactile setae dark, almost at right-angles to body. Tergite 9 (Figure 74) with 2 widely separated, pointed posterior projections.

MALE. Apicalmost third of protibial comb setae (about 6) modified, flattened and agglutinated at tips; no modified setae on mesotibia. Sternite 8 with microreticulate sculpturing more pronounced medially on posterior third. Median lobe of genitalia moderately pointed at apex; parameres slender. Copulatory piece (Figure 148) with a trumpet-shaped tubular part and a straight side process not curving around the tubular part.

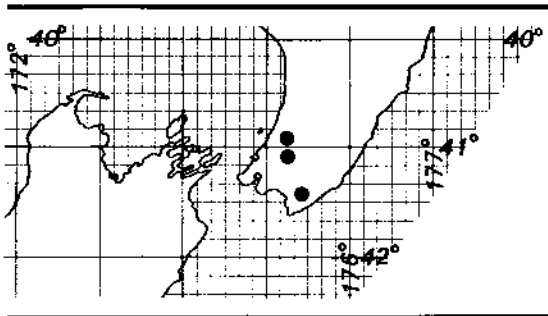
FEMALE. Spermatheca (Figure 111) oval, elongate, 0.188 × 0.075 mm; duct convoluted near spermatheca, its middle portion weakly spirally twisted, its basal portion straight.

TYPE DATA. Holotype: male, Kaitoke Waterworks, Bush Walk (WN), 200 m, litter under hard beech, rata, kamahi, and rimu, 8 December 1975, H.P. McColl (NZAC). Paratypes: 19 males and 26 females, same data as holotype; 6 males and 6 females, same data but BMNH.

MATERIAL EXAMINED. 51 males and 69 females (NZAC), wet-preserved specimens.

WN, WA.

*P. bucinifer* has also been collected from moss in high tussock grassland above



Field Hut (Tararua Range) and on Haurangi (Aorangi Range).

Its altitudinal range is between 200 m (Kaitoke) and 1006 m (Field Hut).

It has been collected in November, December, and February at Kaitoke, and in September at the other localities.

*P. bucinifer* is commonly found in samples with *tardus* at Kaitoke.

REMARKS. *P. bucinifer* can be separated readily from *tardus* by its pronotal shape. Its sparse, short pubescence, widely separated projections of tergite 9, absence of modification of sternite 8 of the male, form of the copulatory piece, and shape of the spermatheca further distinguish *bucinifer* from other species of similar size.

The trivial name - Latin, 'trumpet-bearer' - alludes to the curved trumpet shape of the copulatory piece.

### ***Paratrochus parvulus* new species**

Figures 37, 75, 112, and 149

Shining; yellowish-brown; antennae and legs paler. Upper surface finely punctate, sparsely pubescent. Length - dry 2.7-3.1 mm, wet 2.7-3.5 mm; pronotal length 0.43-0.45 (0.43) mm, width 0.50-0.55 (0.52) mm; elytral length 0.30-0.33 (0.32) mm, width 0.50-0.55 (0.52) mm; abdominal width 0.55-0.58 (0.57) mm, males and females about equally wide; (dimensions from 6 males and 6 females).

HEAD. Eye unpigmented, oval,  $0.036 \times 0.031$  mm, comprising 1 flat facet. Labrum with about 28 long setae on upper surface, and a comb of about 4 setae on basal half of

lateral margins; lobes divided into 3 or 4 bifurcating processes. Lacinia with 2 very blunt apical teeth.

THORAX. Pronotum (Figure 37) broadest at about middle, with rounded, right-angled basal angles and distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded; lateral margins with a distinct tooth near shoulder, several weaker teeth, and several short setae. Protibia with spines on upper surface. Metatibial combs separated; about 7 setae in apical comb, 8 in lateral comb. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae shorter than the spaces between them. Tactile setae dark, at right-angles to body. Tergite 9 (Figure 75) with 2 widely spaced, moderately pointed posterior projections.

MALE. Apicalmost sixth of protibial comb setae (about 4) modified and agglutinated at tips; no modified setae on mesotibia. Sternite 8 unmodified. Median lobe of genitalia moderately pointed at apex; parameres slender. Copulatory piece (Figure 149) with tubular part moderately straight, fluted at apex, less than twice as long as apically pointed side process.

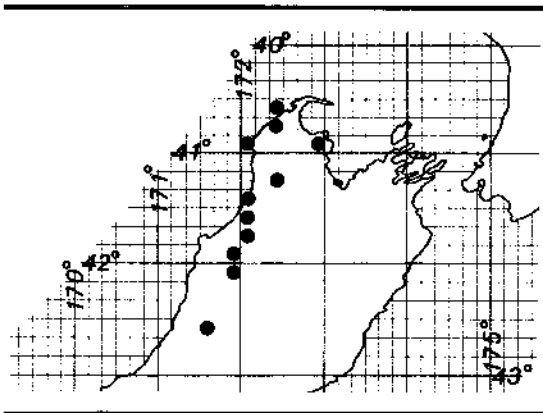
FEMALE. Spermatheca (Figure 112) oval,  $0.138 \times 0.025$  mm; duct convoluted near spermatheca, spirally twisted elsewhere.

TYPE DATA. Holotype: male, Karamea Bluff, Summit Scenic Reserve (NN), 420 m, litter under mixed podocarp/beech forest, 17 March 1978, P.L. Searle and G. Mew (NZAC). Paratypes: 19 males and 13 females, same data as holotype.

MATERIAL EXAMINED. 58 males and 38 females (NZAC, OMNZ), wet-preserved specimens.

NN, BR.

*P. parvulus* has been collected from litter and humus beneath a range of vegetation, including nikau, mahoe, rangiora, and punga (Anatoru River; Heaphy River), kamahi, supplejack, punga, and water fern (Little Wanganui River), miro, supplejack, and punga (Heaphy Track), beech, rimu, miro, and kamahi (near Mangarakau Sawmill;



Capleston, PB5 site), rimu, silver pine, southern rata, kamahi, and manuka (Mawhera semi-pakihi site), and pine and Formosan bamboo (Fletcher's Creek, pine site).

Its altitudinal range is between 140 m (Fletcher's Creek, pine site) and 420 m (Karamea Bluffs).

It has been collected in March, June; August, September, and November.

*P. parvulus* has been found in samples with *helmsi* (Mawhera semi-pakihi site), *arrowi* (Karamea Bluffs; Heaphy Track; Mangarakau sawmill), *microphthalmus* (Heaphy Track) Dublin Terrace, Buller River; Capleston, PB5 site; Mawhera semi-pakihi site), and *angustus* (Capleston, PB5 site).

REMARKS. *P. parvulus* can be separated from species of similar size by its pronotal shape, sparse, short, pale clothing setae and long, dark tactile setae, right-angled elytral shoulder, unmodified sternite 8 of the male, form of the copulatory piece, and shape of the spermatheca.

The trivial name - Latin, 'smallish' - alludes to the size of the animal.

### ***Paratrochus angustus* new species**

Figures 38, 76, 113, and 150

Moderately shining; reddish-brown or yellowish-brown; antennae and legs paler. Upper surface finely punctate, sparsely pubescent. Length - dry 2.3-2.7 mm, wet 2.5-3.1 mm; pronotal length 0.43-0.45 (0.44) mm, width 0.50-0.55 (0.53) mm; elytral length 0.30-0.35 (0.32) mm, width

0.53-0.55 (0.53) mm; abdominal width 0.55-0.63 (0.59) mm, females wider than males; (dimensions from 5 males and 5 females).

HEAD. Eye unpigmented, oval, 0.030 × 0.025 mm, comprising 1 convex, moderately prominent facet. Labrum with about 28 long setae on upper surface, and a comb of about 5 setae on basal half of lateral margins; lobes divided into 3 bifurcating processes. Lacinia with 2 very blunt apical teeth.

THORAX. Pronotum (Figure 38) broadest at about middle, with slightly obtuse basal angles and distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded; lateral margins with a distinct tooth near shoulder, several weaker teeth, and short setae. Protibia with 3 spines on upper face. Metatibial combs separated; about 10 setae in apical comb, 12 in lateral comb. Empodium a curved bristle about as long as the claw.

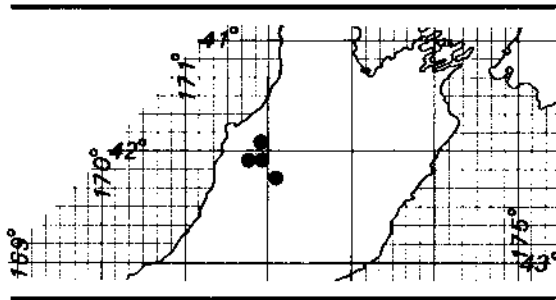
ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae shorter than the spaces between them. Tactile setae pale, angled towards posterior. Tergite 9 (Figure 76) with 2 pointed, widely spaced posterior projections.

MALE. Apicalmost quarter of protibial comb setae (about 4) modified, tubular, agglutinated at tips; no modified setae on mesotibia. Sternite 8 unmodified. Median lobe of genitalia moderately pointed at apex; parameres slender, expanding slightly towards apex. Copulatory piece (Figure 150) with a short, straight tubular part, slightly fluted at apex, and a shorter, broad, apically rounded side process.

FEMALE. Spermatheca (Figure 113) oval, 0.125 × 0.075 mm; duct convoluted near spermatheca, its middle portion weakly spirally twisted, its basal portion straight.

TYPE DATA. Holotype: male, Fletcher's Creek, PB1 site (BR), 230 m, humus and 'A' horizon under silver beech, red beech, miro, and matai, 18 April 1972, H.P. McColl (NZAC). Paratypes: 31 males and 41 females, same data as holotype.

MATERIAL EXAMINED. 141 males and 126 females (NMNZ, NZAC), all wet-preserved specimens.



BR.

*P. angustus* has been collected from humus and 'A' horizon beneath red beech, silver beech, and miro (Fletcher's Creek, PB1 site), silver beech (Fletcher's Creek, XB2 site), red beech, kamahi, *Quintinia*, and rimu (Fletcher's Creek, PB15 site), red beech, silver beech, kamahi, and miro (Caplestone, PB5 site), pine and Formosan bamboo (Fletcher's Creek, pine site), and moss under beech (Rahu Saddle).

Its altitudinal range is between 140 m (Fletcher's Creek) and 670 m (Rahu Saddle).

It has been collected in all months.

*P. angustus* has been found in samples with *helmsi*, *michrophthalmus*, and *hamatus* (Fletcher's Creek, PB1 and PB15 sites), *michrophthalmus* and *hamatus* (Fletcher's Creek, pine site), *michrophthalmus* (Caplestone, PB5 site; Rahu Saddle), and in the same sample pit as *parvulus* but in deeper horizons (Caplestone, PB5 site).

REMARKS. Of the specimens collected, 86 males and 67 females were from the 'A' horizon (top of the soil mineral profile), and apart from one male and three females the rest were from the 'H' (humus) horizon. This, along with the absence of this species from the large numbers of litter samples from the same sites processed by Entomology Division, DSIR, indicates a preference of *angustus* for deeper horizons. This suggests that it exploits a specific microhabitat, and may have more specialised food requirements (such as fungal mycelium, which occurs in dense mats in these horizons) than other species. However, its mouthparts have no apparent modifications.

*P. angustus* can be separated from species of similar size by its pronotal shape, sparse, short, pale clothing setae and long, pale tactile setae angled towards the

posterior, unmodified sternite 8 of the male, form of the copulatory piece, and shape of the spermatheca.

The trivial name - Latin, 'narrow' - alludes to the slenderness of the animal.

### *Paratrochus pelorensis* new species

Figures 39, 77, 114, and 151

Moderately shining; reddish-brown to yellowish-brown; antennae and legs paler. Upper surface finely punctate, sparsely pubescent. Length - dry about 2.3 mm, wet 2.3-3.1 mm; pronotal length 0.40-0.45 (0.43) mm, width 0.50-0.55 (0.53) mm; elytral length 0.30-0.33 (0.31) mm, width 0.50-0.55 (0.52) mm; abdominal width 0.55-0.60 (0.58) mm, females wider than males; (dimensions from 2 males and 9 females).

HEAD. Eye unpigmented, oval,  $0.038 \times 0.025$  mm, comprising 1 flattish facet. Labrum with about 27 long setae on upper surface, and a comb of 5 or 6 setae on basal half of lateral margins; lobes divided into 4 or 5 bifurcating processes. Lacinia with 2 very blunt apical teeth.

THORAX. Pronotum (Figure 39) broadest at about middle, with rounded, slightly obtuse basal angles and distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded; lateral margins with a distinct tooth near shoulder, several very weak teeth, and short setae. Protibia with 3 spines on upper face. Metatibial combs separated; about 12 setae in apical comb, 10 in lateral comb. Empodium a curved bristle about as long as the claw.

ABDOMEN. Junction of tergites and sternites obscured except on segment 3. Clothing setae shorter than the spaces between them. Tergite 9 (Figure 77) with 2 widely spaced, long, pointed posterior projections and a median, rounded prominence.

MALE. Apicalmost third of protibial comb setae (about 9) modified, flattened and agglutinated at tips; no modified setae on mesotibia. Sternite 8 with an obvious median depression on posterior half. Median lobe of genitalia pointed at apex; parameres moderately slender. Copulatory piece (Figure 151) with a long, very stout

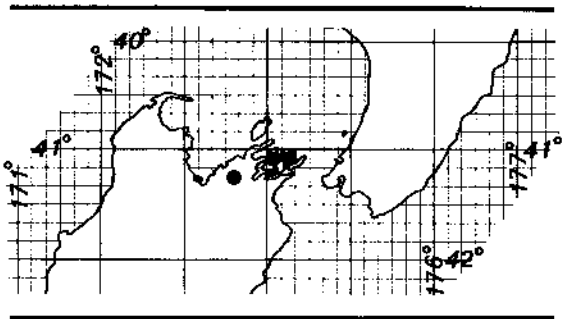
tubular part (0.45 mm from base to apex) with striations on basal third, but no side process.

**FEMALE.** Spermatheca (Figure 114) elongate,  $0.213 \times 0.063$  mm; duct convoluted slightly near spermatheca, its middle portion very slightly spirally twisted, its basal portion straight, closely applied to oviduct, which it joins at an obvious sclerotised ring.

**TYPE DATA.** Holotype: male, Pelorus Bridge (SD), 31 m, litter under fivefinger, southern rata, kamahi, ferns, and punga, 16 April 1979, H.P. McColl (NZAC). Paratypes: 1 female, same locality as holotype, 25 July 1967, G. Kuschel (NZAC); 1 female, same locality, litter under totara and bog pine, 13 March 1978, H.P. McColl (NZAC); 1 male, same data as holotype except from litter under black beech, raurekau, and ferns, 13 March 1978; 3 females, same data as holotype except 26 June 1978, J.C. Heine (NZAC); 3 females, same locality data as holotype, litter under kahikatea, black beech, raurekau, and ferns, 25 June 1978, J.C. Heine (NZAC).

**MATERIAL EXAMINED.** 3 males and 13 females (NZAC), wet-preserved specimens.

SD.



*P. pelorensis* has also been collected from litter under red beech and ferns (Ship Cove).

Its altitudinal range is between 31 m (Pelorus Bridge) and 365 m (Ship Cove).

It has been collected in March, April, June, July, October, and November.

*P. pelorensis* has been found in samples with *microphthalmus* (Ship Cove; Mount Stokes; Pelorus Bridge).

**REMARKS.** No large series of *pelorensis* has been collected, although many samples from Pelorus Bridge have been examined. This suggests that it may have specific microhabitat requirements.

*P. pelorensis* is unusual in having a very large copulatory piece (Figure 151). This, and its pronotal shape, short, sparse clothing setae, median projection of tergite 9, modification of sternite 8 of the male, and elongate-oval spermatheca, distinguish it from species of similar size.

The trivial name - Latinised, 'of the Pelorus area' - alludes to the type locality, Pelorus Bridge.

### *Paratrochus aculeatus* new species

Figures 40, 78, 115, and 152

Shining; reddish-brown; antennae and legs slightly paler. Upper surface finely punctate, sparsely pubescent. Length - dry about 2.3 mm, wet 2.3-3.2 mm; pronotal length 0.45-0.48 (0.47) mm, width 0.53-0.58 (0.55) mm; elytral length 0.30-0.33 (0.32) mm, width 0.53-0.55 (0.55) mm; abdominal width 0.58-0.63 (0.60) mm, females slightly wider than males; (dimensions from 5 males and 5 females).

**HEAD.** Eye unpigmented, oval,  $0.037 \times 0.025$  mm, comprising 1 flat facet. Labrum with about 28 long setae on upper surface, and a comb of about 5 setae on basal half of lateral margins; lobes divided into 4 or 5 bifurcating processes. Lacinia with 2 blunt apical teeth.

**THORAX.** Pronotum (Figure 40) broadest at about middle, with rounded, slightly obtuse basal angles and distinct microreticulate sculpturing. Elytra with microreticulate sculpturing more distinct on apical portion; sutural striae distinct; shoulder rounded, right-angled; lateral margins with several very weak teeth and short setae. Protibia with 4 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 11 in lateral comb. Empodium a curved bristle about as long as the claw.

**ABDOMEN.** Junction of tergites and sternites obscured except on segment 3. Clothing setae about half as long as the spaces

between them; tactile setae pale, at right-angles to abdomen. Tergite 9 (Figure 78) with 2 short, widely spaced, pointed posterior projections.

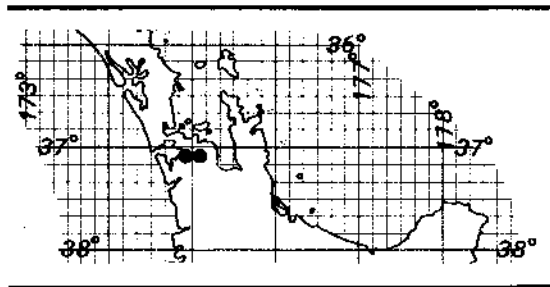
**MALE.** No modified setae on protibiae or mesotibiae. Sternite 8 with a shallow median depression on posterior half. Median lobe of genitalia strongly produced at apex to form a point; parameres slender. Copulatory piece (Figure 152) with a broad, straight tubular part, fluted at apex and bearing many short, thorn-like projections, and a very short side process.

**FEMALE.** Spermatheca (Figure 115) pear-shaped,  $0.175 \times 0.075$  mm; duct convoluted near spermatheca, straight elsewhere.

**TYPE DATA.** Holotype: male, Kirk Memorial Park, Papakura (AK), 20 m, litter under taraire, hangehange, kohekohe, and punga roots, 15 February 1977, H.P. McColl (NZAC). Paratypes: 16 males and 12 females, same data as holotype; 5 males and 5 females, same data but BMNH.

**MATERIAL EXAMINED.** 31 males and 23 females (NZAC), wet-preserved specimens.

AK.



*P. aculeatus* has been collected from litter and humus under the same species as the type-series at Drury (Peach Hill Road), Opaheke (Ponga Road), and Maketu Stream (Ramarama).

Its altitudinal range is between 20 m (Papakura) and 274 m (Opaheke).

It has been collected in January and February.

*P. aculeatus* has been found in samples with *Nototrochus ferrugineus* (Opaheke; Ramarama) and *P. brevipennis* (Papakura; Opaheke; Ramarama; Drury).

**REMARKS.** *P. aculeatus* can be separated from species of similar size by its pronotal shape and shallow microreticulate sculpturing, short, sparse clothing setae, lack of a median projection of tergite 9, median depression of sternite 8 of the male, form of the copulatory piece, and pear-shaped spermatheca.

The trivial name - Latin, 'prickly' - alludes to the thorn-like protuberances of the copulatory piece.

### ***Paratrochus phaseolinus* new species**

Figures 41, 79, 116, and 153

Moderately shining; reddish-brown; antennae and legs paler. Upper surface finely punctate, with some scattered coarser punctures, sparsely pubescent. Length - dry about 2.3 mm, wet 2.3-3.5 mm; pronotal length 0.43-0.48 (0.45) mm, width 0.50-0.58 (0.53) mm; elytral length 0.30-0.35 (0.33) mm, width 0.50-0.55 (0.53) mm; abdominal width 0.55-0.60 (0.57) mm, females wider than males; (dimensions from 7 males and 5 females).

**HEAD.** Eye unpigmented, oval,  $0.031 \times 0.025$  mm, comprising 1 flat facet. Labrum with about 22 long setae on upper surface, and a comb of about 6 setae on basal half of lateral margins; lobes divided into 5 bifurcating processes. Lacinia with 2 very blunt apical teeth.

**THORAX.** Pronotum (Figure 41) broadest at about middle, with rounded, slightly obtuse basal angles and deep, distinct microreticulate sculpturing. Elytra with distinct microreticulate sculpturing; sutural striae distinct; shoulder rounded, right-angled; lateral margins with several weak teeth and short setae. Protibia with 4 spines on upper face. Metatibial combs separated; about 8 setae in apical comb, 10 in lateral comb. Empodium a curved bristle about as long as the claw.

**ABDOMEN.** Junction of tergites and sternites obscured except on segment 3. Clothing setae about half as long as the spaces between them; tactile setae pale, at about right-angles to abdomen. Tergite 9 (Figure 79) with 2 short, widely spaced, moderately pointed posterior projections.

## REFERENCES

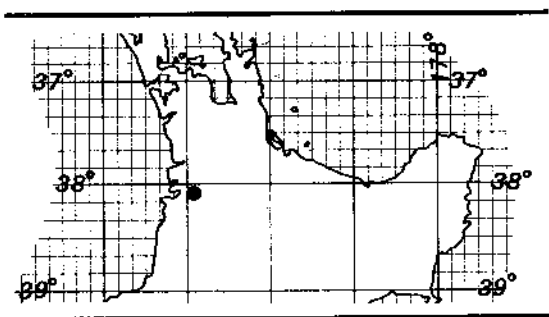
MALE. No modified setae on protibiae or mesotibiae. Sternite 8 with a median depression, bordered laterally by prominent ridges, on posterior half. Median lobe of genitalia moderately pointed at apex; parameres moderately slender, expanding slightly towards apex. Copulatory piece (Figure 153) with tubular part almost straight except for a slight bend at apex, and long, very broad side process bent at about middle.

FEMALE. Spermatheca (Figure 116) bean-shaped, 0.175 × 0.075 mm; duct convoluted near spermatheca, its middle portion weakly spirally twisted, its basal portion straight.

TYPE DATA. Holotype: male, Mount Pirongia (WO), 460 m, litter under kamahi, tawa, horopito, and *Quintinia serrata*, 28 July 1977, H.P. McColl (NZAC). Paratypes: 5 males and 4 females, same data as holotype; 1 male and 1 female, same data but BMNH.

MATERIAL EXAMINED. Type series only.

WO.



*P. phaseolinus* was found in the same sample as *scapulifer* (Mount Pirongia); *vagepunctus* was also found at this locality, but not in the same sample.

REMARKS. *P. phaseolinus* can be separated from species of similar size by its pronotal shape and deep microreticulate sculpturing, short, sparse clothing setae, lack of a median projection on tergite 9, median depression and ridges of sternite 8 of the male, form of the copulatory piece, and bean-shaped spermatheca.

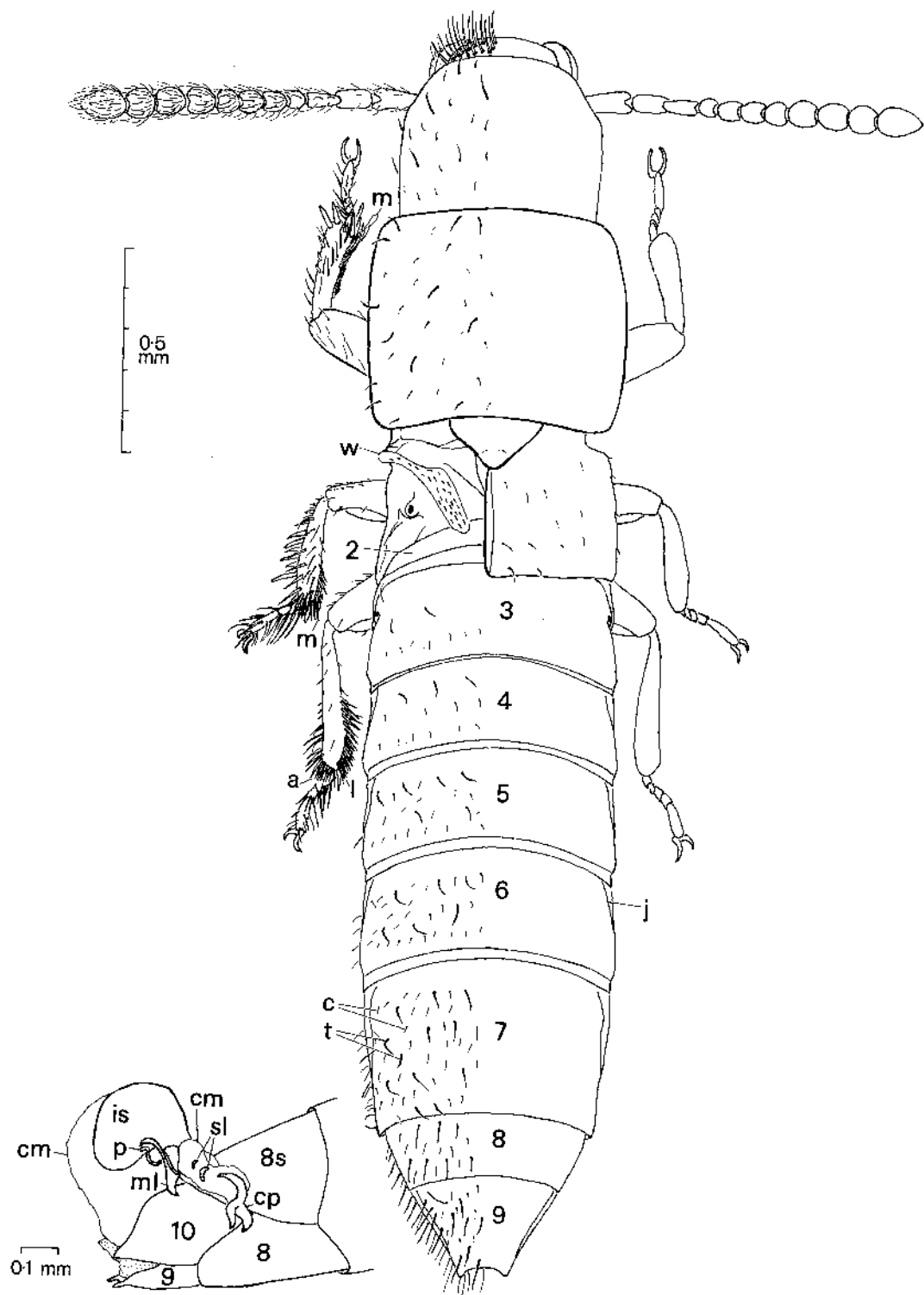
The trivial name - Latin, 'like a kidney bean' - alludes to the shape of the spermatheca.

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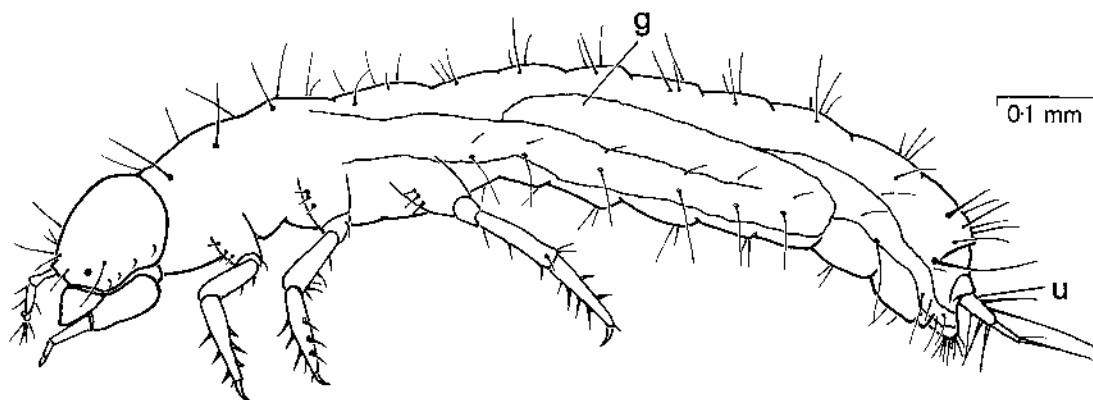
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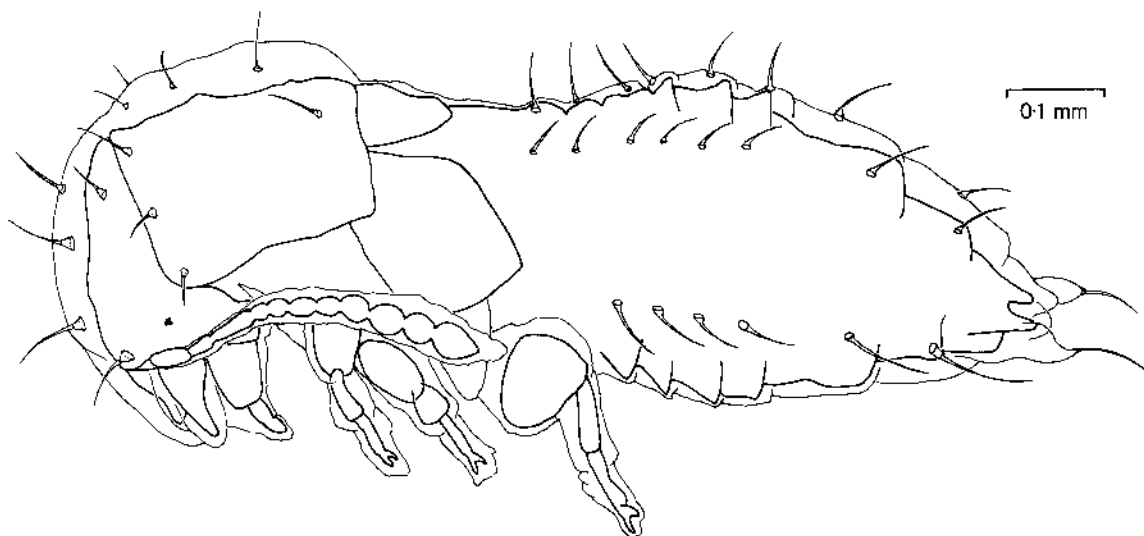
## ILLUSTRATIONS



**Figure 1** (opposite page) Dorsal aspect of male *Paratrochus hamatus*, type-species of its genus and a typical osoriine staphylinid. KEY: 2, 3, . . . 9 – tergites 2–9; a – apical comb of setae on metatibia; c – clothing setae; j – junction between tergites and sternites; l – lateral comb of setae on metatibia; m – modified setae on protibia and mesotibia; w – wing (non-functional). Lower left, Lateral view of terminal segments of male *P. microphthalmus*, showing everted internal sac and copulatory piece. KEY: 8s – sternite 8; 8, 9, 10 – tergites 8–10; cm – connecting membranes; cp – copulatory piece; is – internal sac; ml – median lobe; p – paramere; sl – small sclerites.



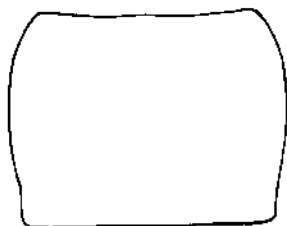
**Figure 2** Lateral view of late-instar larva of *Paratrochus tardus*. KEY: g – gut filled with dark-coloured organic material; u – urogomphi (jointed).



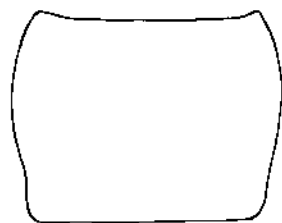
**Figure 3** Lateral view of pupa of *Paratrochus curvisetis*.

Figures 4-41  
Pronotal outlines  
of Osoriinae.

Genus *Nototrochus*



4. *ferrugineus*

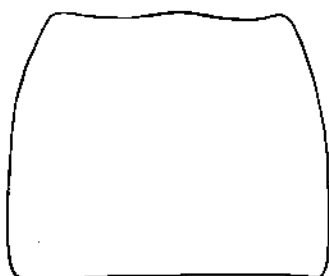


5. *montanus*

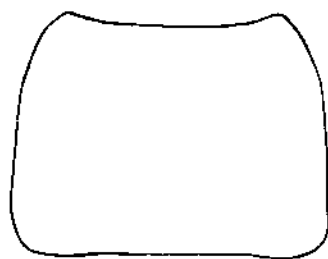
0.1 mm



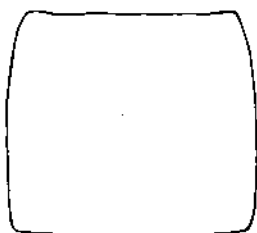
Genus *Paratrochus*



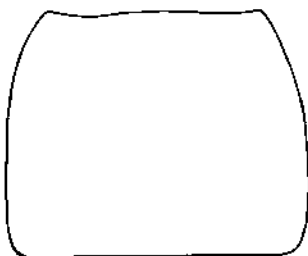
6. *foveatus*



7. *monstrosus*



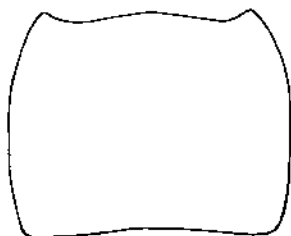
8. *helmsi*



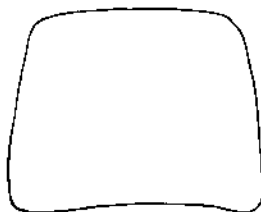
9. *arrowi*



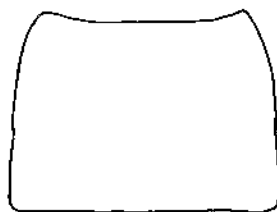
10. *vagepunctus*



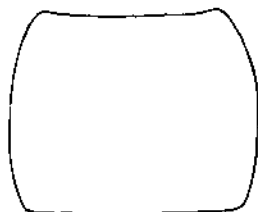
11. *bifurcatus*



12. *caecus*



13. *curvisetis*



14. *hermes*



15. *brevisetis*



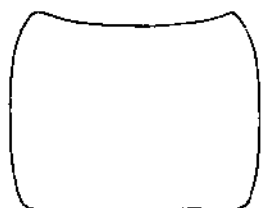
16. *fiordensis*



17. *tardus*



18. *scapulifer*



19. *microphthalmus*  
(holotype)



20. *microphthalmus*  
(variant)



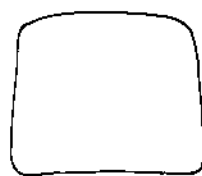
21. *homerensis*



22. *humilis*



23. *brevipennis*



24. *trivialis*



25. *decipiens*



26. *hamatus*



27. *retroflexus*



28. *tubifer*



29. *alifer*



30. *pubescens*



31. *tricarinatus*



32. *flexuosus*



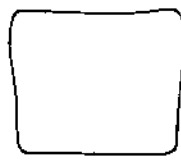
33. *angulatus*



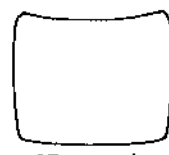
34. *anophthalmus*



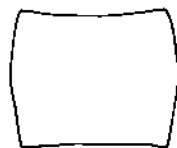
35. *insuetus*



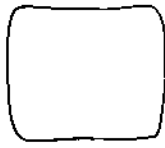
36. *bucinifer*



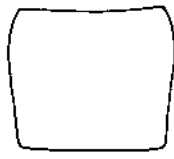
37. *parvulus*



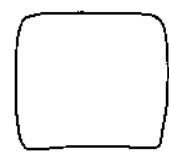
38. *angustus*



39. *pelorensis*



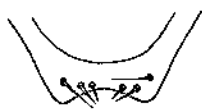
40. *aculeatus*



41. *phaseolinus*

**Figures 42-79** Tergite 9 of Osoriinae,  
ventral view (except Figure 51).

Genus *Nototrochus*



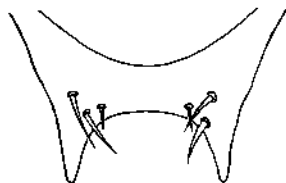
42. *ferrugineus*



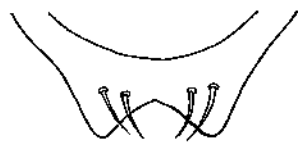
43. *montanus*

0.1 mm

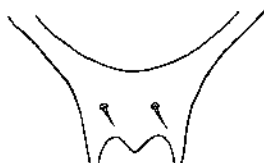
Genus *Paratrochus*



44. *foveatus*



45. *monstrosus*



46. *helmsi*



47. *arrowi*  
(no median projection)



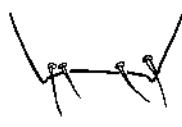
48. *arrowi*  
(with median projection)



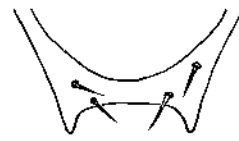
49. *vagepunctus*



50. *bifurcatus*



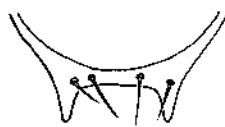
51. *caecus*  
(dorsal view)



52. *curvisetis*



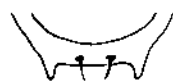
53. *hermes*



54. *brevisetis*



55. *fiordensis*



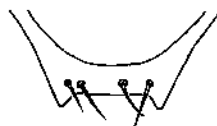
56. *tardus*



57. *scapulifer*



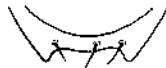
58. *microphthalmus*



59. *homerensis*



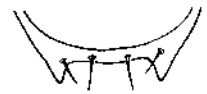
60. *humilis*



61. *brevipennis*



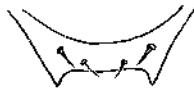
62. *trivialis*



63. *decipiens*



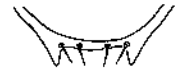
64. *hamatus*



65. *retroflexus*



66. *tubifer*



67. *alifer*



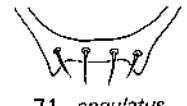
68. *pubescens*



69. *tricarinatus*



70. *flexuosus*



71. *angulatus*



72. *anophthalmus*



73. *insuetus*



74. *bucinifer*



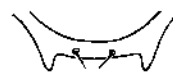
75. *parvulus*



76. *angustus*



77. *pelorensis*

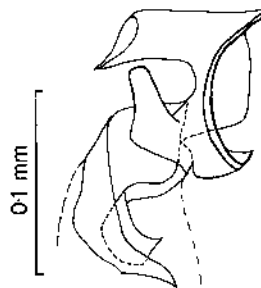


78. *aculeatus*

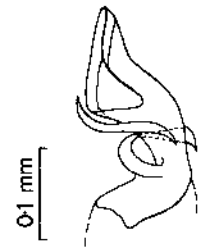


79. *phaseolinus*

**Figures 80 and 81**  
Copulatory pieces of  
(80) *Paratrochus anophthalmus*  
and (81) *P. insuetus*,  
lateral view.

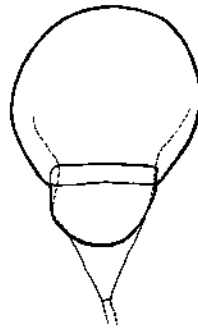


80.

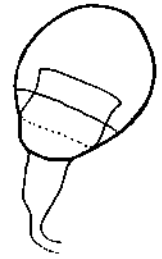


81.

Figures 82-116  
Spermathecae  
of Osoriinae.



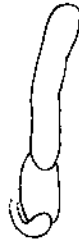
82. *ferrugineus*



83. *montanus*

Genus *Nototrochus*

0.1 mm



84. *foveatus*



85. *monstrosus*

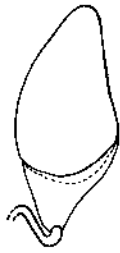


86. *helmsi*

Genus *Paratrochus*



87. *arrowi*



88. *vagepunctus*



89. *bifurcatus*



90. *caecus*



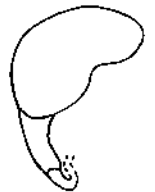
91. *curvisetis*



92. *hermes*



93. *brevisetis*



94. *fiordensis*



95. *tardus*



96. *scapulifer*



97. *microphthalmus*



98. *homerensis*





99. *humilis*



100. *brevipennis*



101. *trivialis*



102. *decipiens*



103. *hamatus*



104. *retroflexus*



105. *tubifer*



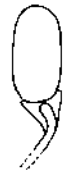
106. *alifer*



107. *pubescens*



108. *tricarinatus*



109. *flexuosus*



110. *angulatus*



111. *bucinifer*



112. *parvulus*



113. *angustus*



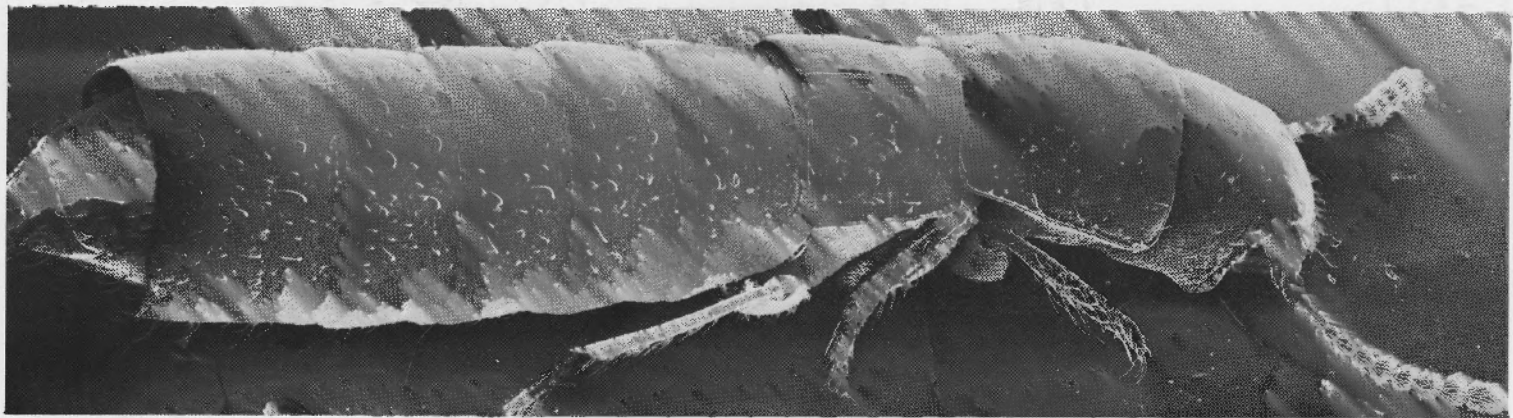
114. *pelorensis*



115. *aculeatus*



116. *phaseolinus*



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**Figure 117** Scanning electron micrograph of *Paratrochus bucinifer* ( $\times 60$ ), to show general appearance of a representative osoriine beetle.

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**SUCCEEDING PAGES**

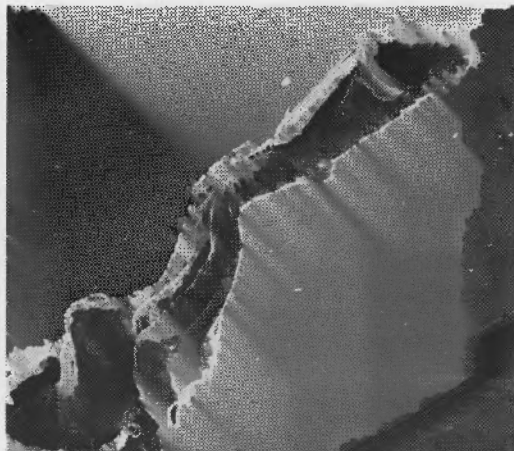
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**Figures 118-153** Scanning electron micrographs of copulatory pieces of Osoriinae.

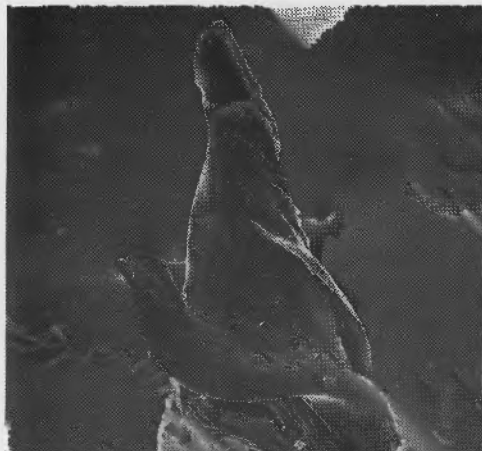
**Figures 154-159** Scanning electron micrographs of various structures of Osoriinae.



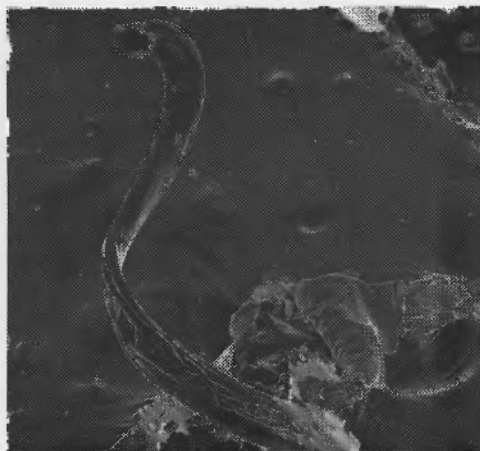
118. *Nototrochus ferrugineus* ( $\times 175$ )



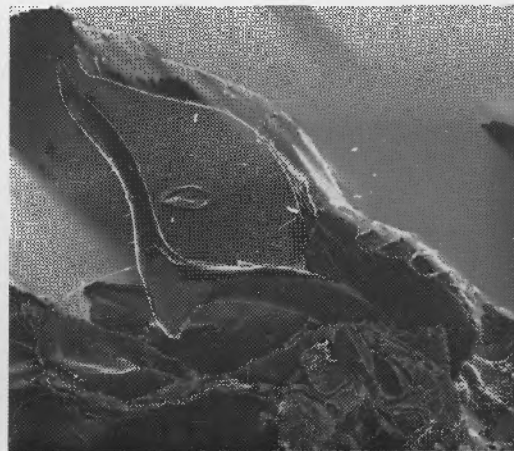
119. *N. montanus* ( $\times 305$ )



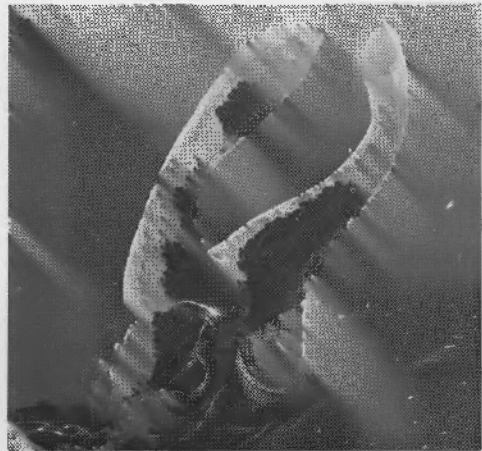
120. *Paratrochus foveatus* ( $\times 260$ )



121. *P. monstrosus* ( $\times 150$ )



122. *P. helmsi* ( $\times 245$ )



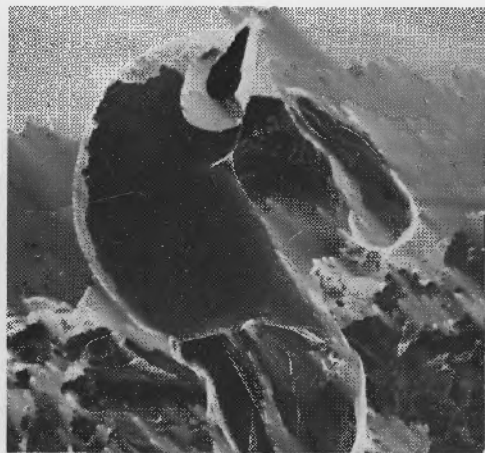
123. *P. arrowi* ( $\times 295$ )



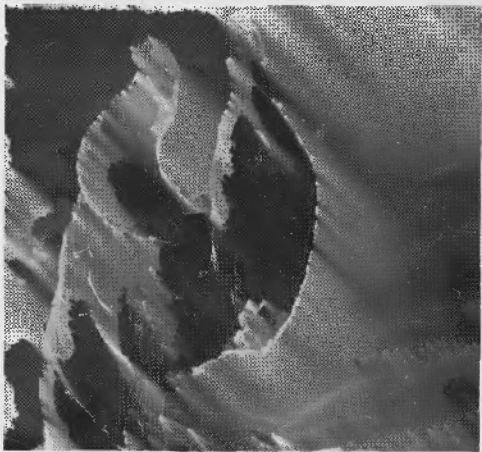
124. *P. vagepunctus* ( $\times 210$ )



125. *P. bifurcatus* ( $\times 260$ )



126. *P. curvisetis* ( $\times 435$ )



127. *P. hermes* ( $\times 325$ )



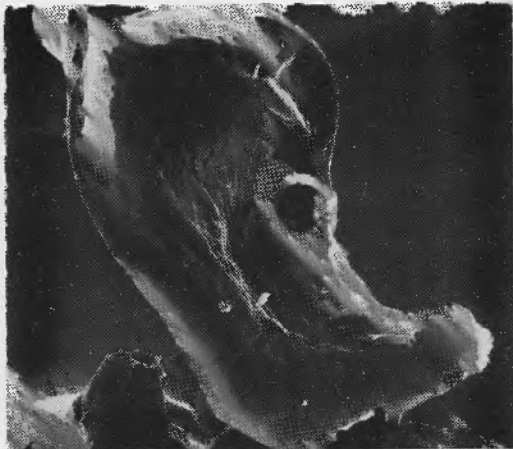
128. *P. brevisetis* ( $\times 390$ )



129. *P. fiordensis* ( $\times 260$ )



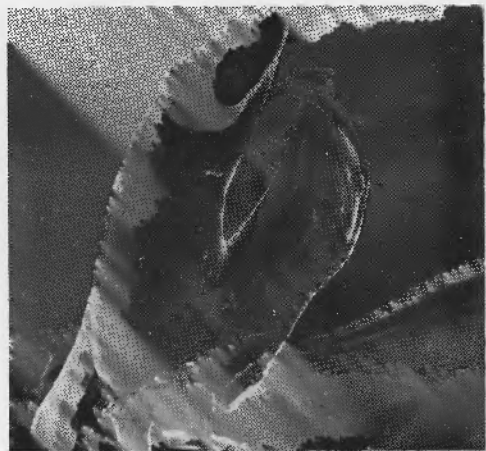
130. *P. tardus* ( $\times 305$ )



131. *P. scapulifer* ( $\times 585$ )



132. *P. microphthalmus* ( $\times 340$ )  
Fletcher's Creek



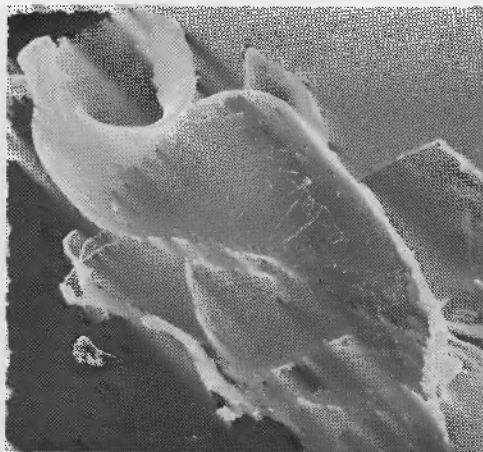
133. *P. microphthalmus* ( $\times 410$ )  
Spey R., W Manapouri



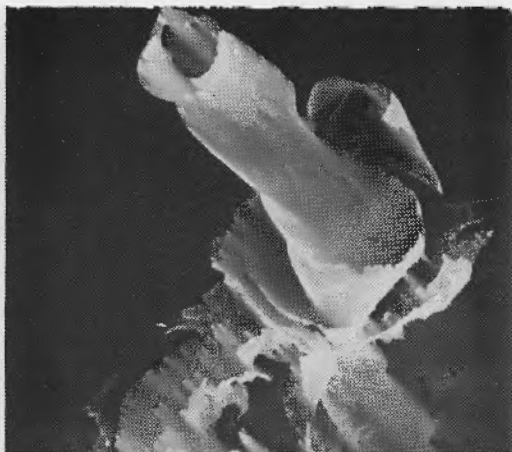
134. *P. homerensis* ( $\times 390$ )



135. *P. humilis* ( $\times 320$ )



136. *P. brevipennis* ( $\times 390$ )  
Destruction Gulley, Waitakere Ra.



137. *P. brevipennis* ( $\times 325$ )  
Table Mtn, Coromandel



138. *P. trivialis* ( $\times 360$ )



139. *P. decipiens* ( $\times 260$ )



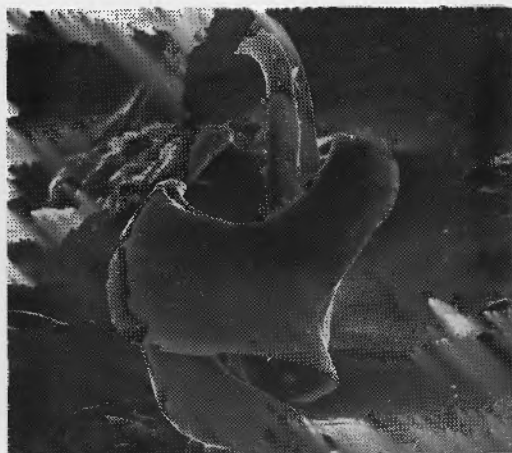
140. *P. hamatus* ( $\times 390$ )



141. *P. retroflexus* ( $\times 455$ )



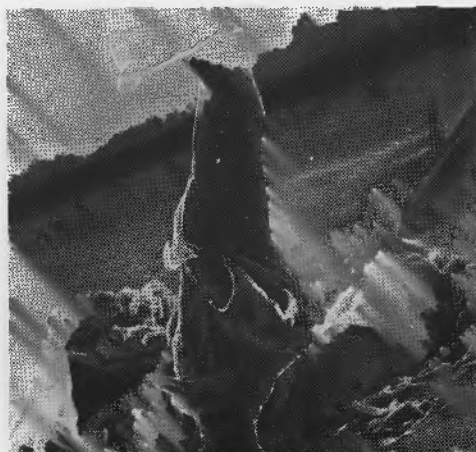
142. *P. tubifer* ( $\times 390$ )



143. *P. alifer* ( $\times 265$ )



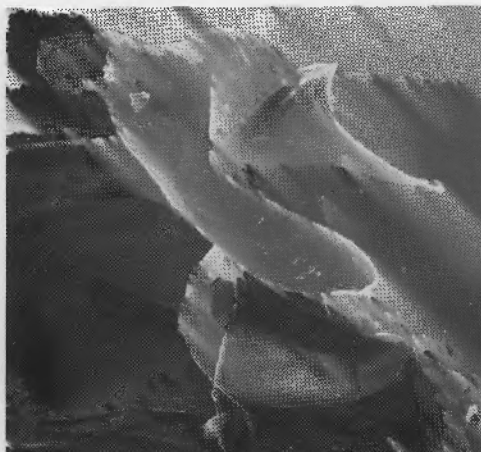
144. *P. pubescens* ( $\times 325$ )



145. *P. tricarinatus* ( $\times 285$ )



146. *P. flexuosus* ( $\times 235$ )



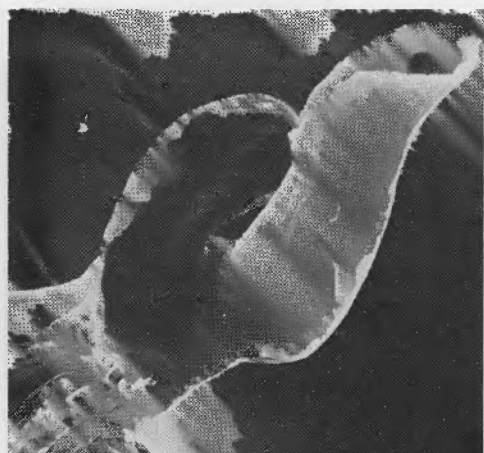
147. *P. angulatus* ( $\times 390$ )



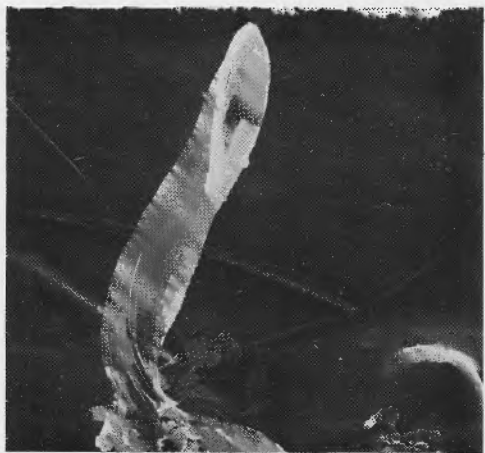
148. *P. bucinifer* ( $\times 425$ )



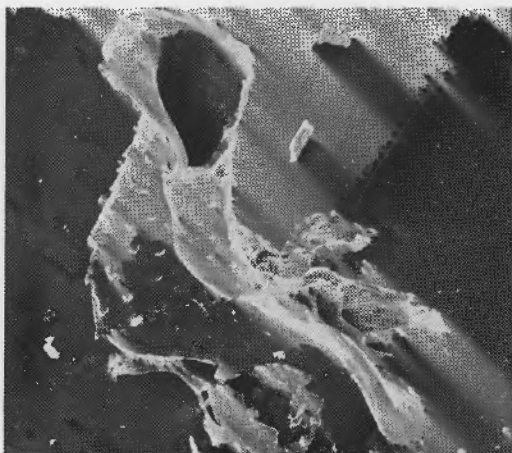
149. *P. parvulus* ( $\times 425$ )



150. *P. angustus* ( $\times 585$ )



151. *P. pelorensis* ( $\times 165$ )

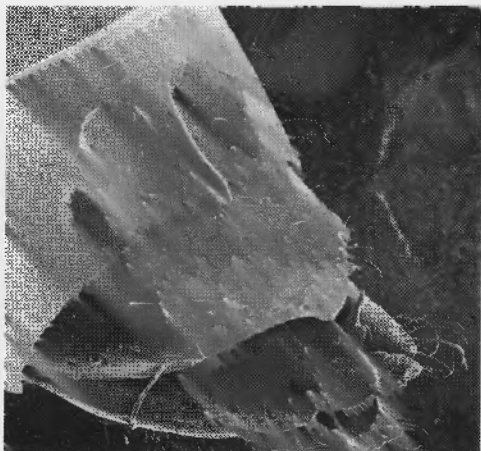


152. *P. aculeatus* ( $\times 285$ )

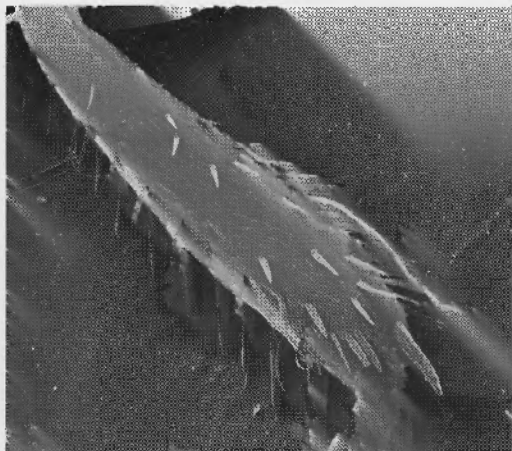


153. *P. phaseolinus* ( $\times 375$ )





154. Posterior abdomen, ventral,  
*N. ferrugineus* ( $\times 52$ )



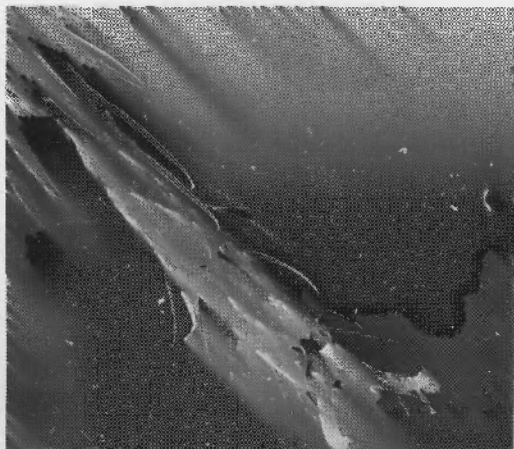
155. Male mesotibia,  
*P. helmsi* ( $\times 165$ )



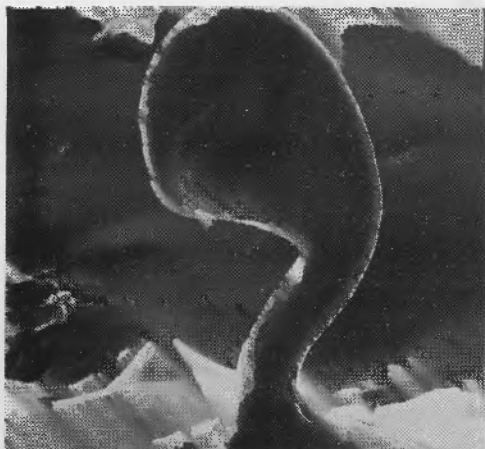
156. Male sternite 8,  
*P. tricarinatus* ( $\times 260$ )



157. Posterior abdomen, ventral,  
*N. montanus* ( $\times 59$ )



158. Male metatarsus,  
*P. helmsi* ( $\times 195$ )



159. Paramere,  
*P. tricarinatus* ( $\times 415$ )

# Fauna of New Zealand

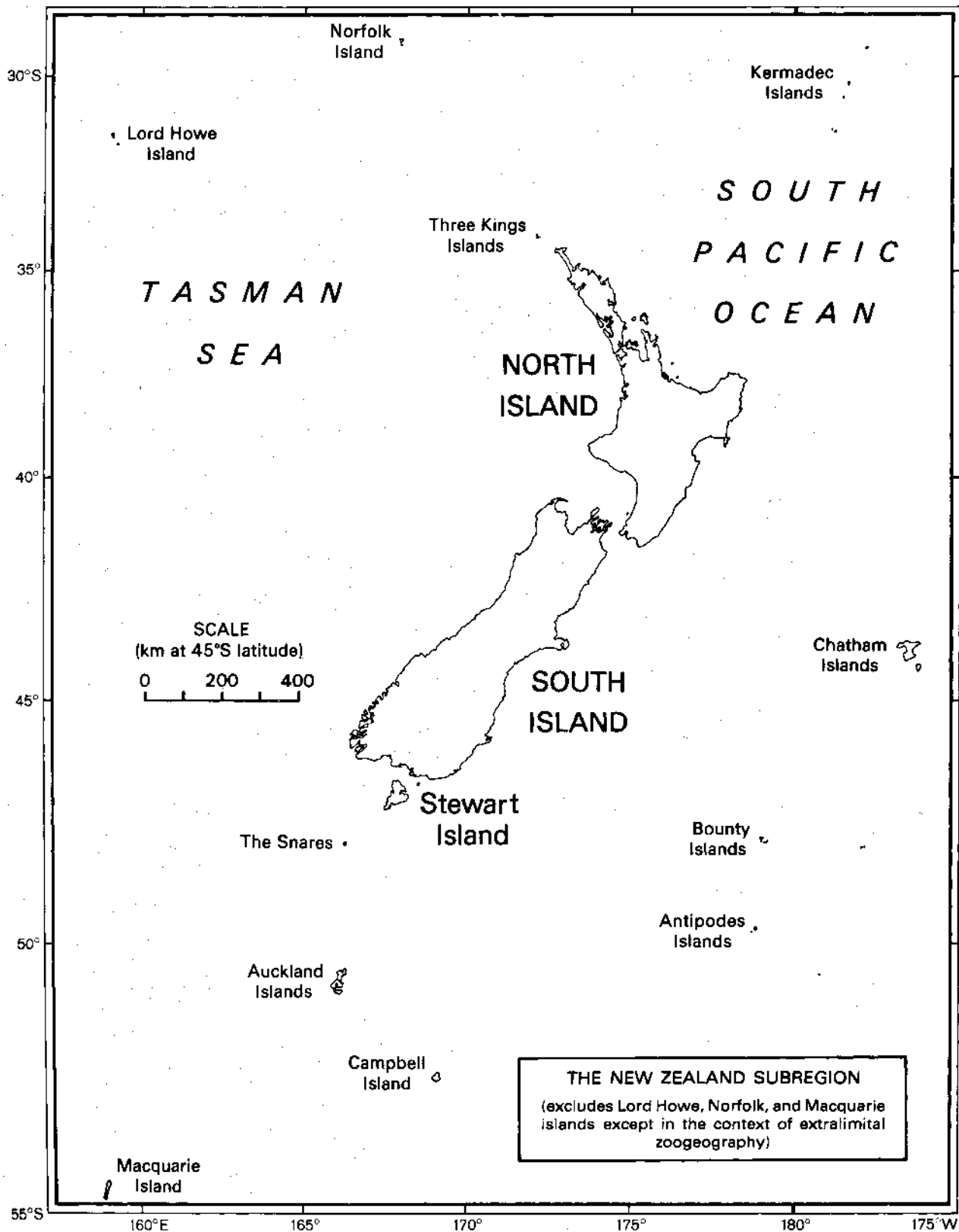


Number 2

## **Osoriinae**

(Insecta: Coleoptera:  
Staphylinidae)

H. Pauline McColl

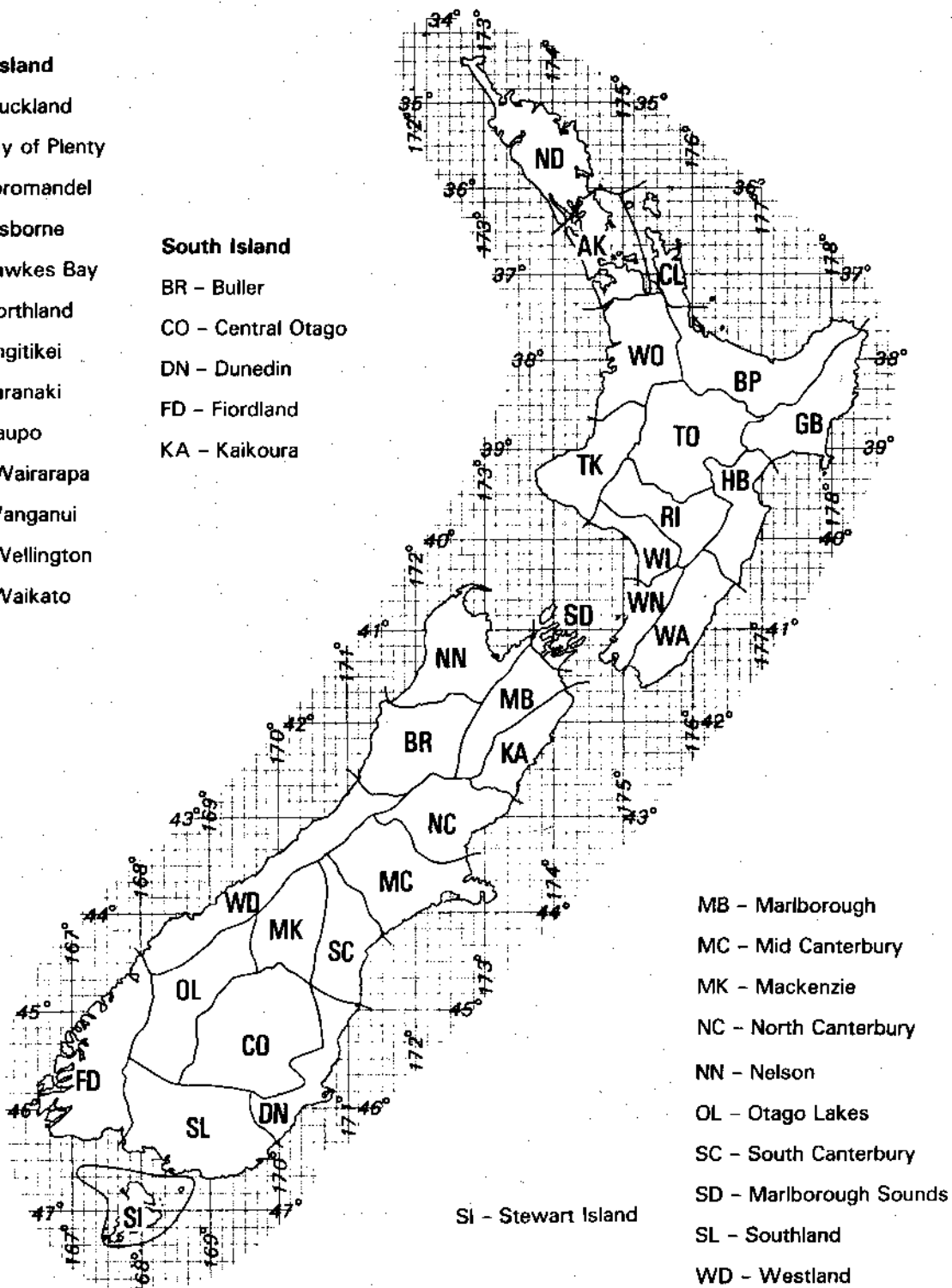


**North Island**

- AK - Auckland
- BP - Bay of Plenty
- CL - Coromandel
- GB - Gisborne
- HB - Hawkes Bay
- ND - Northland
- RI - Rangitikei
- TK - Taranaki
- TO - Taupo
- WA - Wairarapa
- WI - Wanganui
- WN - Wellington
- WO - Waikato

**South Island**

- BR - Buller
- CO - Central Otago
- DN - Dunedin
- FD - Fiordland
- KA - Kaikoura



SI - Stewart Island

- MB - Marlborough
- MC - Mid Canterbury
- MK - Mackenzie
- NC - North Canterbury
- NN - Nelson
- OL - Otago Lakes
- SC - South Canterbury
- SD - Marlborough Sounds
- SL - Southland
- WD - Westland

Area codes and boundaries proposed by Crosby *et al.* (1976)  
for use with specimen locality data

# Fauna of New Zealand

This series of occasional publications has been established with two major objectives: to encourage those with expert knowledge of elements in the New Zealand fauna to publish concise yet comprehensive accounts; and to provide a means of identification accessible to the non-specialist. It will deal largely with non-marine invertebrates, since the vertebrates are well documented, and marine forms are covered by the series *Marine Fauna of New Zealand*.

Contributors should discuss their intentions with an appropriate member of the Editorial Advisory Group or with the Series Editor before commencing work (for names and addresses, see page ii). All necessary guidance will be given.

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## CHECKLIST OF TAXA

## INTRODUCTION

## KEY TO TAXA

## DESCRIPTIONS

## ILLUSTRATIONS

### IN PRINT

**No. 1** Terebrantia (Insecta: Thysanoptera), by Laurence A. Mound & Annette K. Walker. ISBN 0-477-06687-9. \*Published December 1982. Price to be announced.

**No. 2** Osoriinae (Insecta: Coleoptera: Staphylinidae), by H. Pauline McColl. ISBN 0-477-06688-7. \*Published December 1982. Price to be announced.

**No. 3** Anthribidae (Insecta: Coleoptera), by B. A. Holloway. ISBN 0-477-06703-4. \*Published December 1982. Price to be announced.

\* Provisional, see this list in later numbers for confirmation.

### IN PRESS

**No. 4-6** Eriophyoidea (Arachnida: Acari), by D. C. M. Manson. No. 4 -- Introduction and keys to the superfamily, Sierraphytoptidae, and Diptilomiopidae; No. 5 -- Eriophyoidea except Phytocoptinae; No. 6 -- Phytocoptinae.

**No. 7** Hydraenidae (Insecta: Coleoptera), by R. G. Ordish.

**No. 8** Calliphoridae (Insecta: Diptera), by J. P. Dear.

### IN PREPARATION

**Mollusca**: Gastropoda — Punctidae, by F. M. Climo; Introduced Pulmonata, by G. M. Barker.

**Arachnida**: Acari — Ixodidae, by G. W. Ramsay.

**Insecta**: Coleoptera — Nemonychidae, by G. Kuschel; Introduced Curculionidae,

by G. Kuschel; Key to families, by J. C. Watt. Hymenoptera — Chalcidoidea, by J.

S. Noyes & E. W. Valentine. Thysanoptera — Tubulifera, by L. A. Mound & A. K.

Walker. Hemiptera — Psyllidae, by P. Dale. Diptera -- Bibionidae, by R. A. Harrison

Protura, by S. L. Tuxen. A further eleven contributions had been promised up to the time this number went to press.

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