THE COCKROACHES OF NEW ZEALAND

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ABSTRACT

The introduced and endemic cockroaches of New Zealand are taxonomically clarified. Species of *Celeriblattina n. gen.* (2 species), *Celatoblatta* n. gen. (13 species), *Platyzosteria* (2 species), *Parellipsidion n. gen.* (3 species), and *Ornatiblatta n. gen.* (1 species) are endemic, with *Periplaneta americana*, *Blattella germanica* and *Shawella couloniana* being the only exotic species known to be established.

INTRODUCTION

In the middle part of the nineteenth century several expeditions visited New Zealand and the attached naturalists returned to Europe with many specimens of various insects. In comparison with other groups it is surprising that only a few of the New Zealand cockroaches became known and it is even more surprising that later, resident naturalists neglected this group. Only since 1950 has any interest been shown in the New Zealand forms (Princis 1954, 1957, 1959).

The largest New Zealand blattid was first described as *Polyzosteria novae-seelandiae* Brunner, 1865, only to be named again a few years later as *Periplaneta fortipes* Walker, 1869. At the same times, by the same authors, another species was described but the name given by Brunner is now restricted to a Ceylonese species and thus Walker's name (*Blatta conjuncta*) stands. Walker's *Periplaneta undulivitta* also dates from this time. *Platyzosteria brunni* Alfken, 1901 was taken on the Chatham Islands during the visit of the Schauinsland Expedition. A short visit by a Frenchman brought to light a common northern species *Polyzosteria sedilloti* Bolivar, 1882. A further relatively common species was described in 1904 (*Ectobius maori* Rehn, 1904) but no new endemic species have been described since, although at least Hebard (1943) knew of new forms in New Zealand. It is regrettable to note that two introduced species have been described and although one name has been sunk in synonymy (*Cutilia philpotti* Shaw, 1922: Princis 1957) the other, *Pelmatosilpha vagabunda* Princis, 1954, has New Zealand as its type area yet it is not to be found here.

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Various workers have indicated recombinations. These will be dealt with under the respective genera and species.

The author knows of several new species in *Celatoblatta* represented by only a few specimens. Their formal description has been anticipated by their inclusion in the key to species. The differences seen between some populations of the present species could well be considered indicative of separate but related taxa but as so few specimens are known no detailed analysis could be made.

The author's collection, from which most of the types have been selected, has been placed in the Canterbury Museum. Paratypes will be distributed to other Museums both in New Zealand and elsewhere as indicated. To conserve space no detailed locality records are given. A result of this is that some collectors and their material are not directly acknowledged. A complete list of the material examined is recorded on cards in the Canterbury Museum.

Abbreviations:

A.N.I.C.	Australian National Insect Coll. C.S.I.R.O., Canberra.
A.M.	Auckland Institute and Museum.
C.M.	Canterbury Museum, Christchurch.
D.M.	Dominion Museum, Wellington.
Ent. Div.	Entomology Division, D.S.I.R., Nelson.
Ent. Div. Auck.	Entomology Division, Auckland substation.
L.U.	Zoological Institute, The University, Lund, Sweden.
O.M.	Otago Museum, Dunedin.
U.S.N.M.	United States National Museum.

TAXONOMIC ARRANGEMENT AND CHECKLIST

The higher taxonomy of the cockroaches follows that of Princis (1960) although it is known that the system of Beier (1961) differs in the placement of some of the families and the recognition of certain genera. The system of McKittrick (1964) also differs in many details. These differences affect considerably the generic status of the two New Zealand species regarded here as belonging to *Platyzosteria*.

Order Blattariae

Suborder Blaberoidea

CHORISONEURIDAE

Celeriblattina new genus
- *C. major* new species
- *C. minor* new species

Suborder Blattoidea

BLATTIDAE

Periplaneta
- *P. americana* (introduced)
- *P. australasiae* (introduced)

Platyzosteria
P. novaeseelandiae (Br. v. Watt.)
P. rufoterminata (Br. v. Watt.)
Celatoblatta new genus
C. brunni (Alfken) new combination
C. fuscipes new species
C. hesperia new species
C. laevispinata new species
C. montana new species
C. notialis new species
C. pallidicauda new species
C. peninsularis new species
C. quinquemaculata new species
C. sedilloti (Bolivar) new combination
C. subcorticaria new species
C. undulivitta (Walker) new combination
C. vulgaris new species

Suborder Epilamproidea

BLATTELLIDAE

Blattella germanica (introduced)
Shawella couloniana (Saussure) (introduced)
Parellipsidion new genus
P. conjunctum (Walker) new combination
P. pachycercum new species
P. inaculeatum new species
Ornatiblatta new genus
O. maori (Rehn) new combination

There are occasional specimens of species that have been collected from fruit-shops, timber yards, wharves and ships. Their frequent recurrent appearance warrants recording for these species could well become established.
Blatta orientalis (common on ships)
Panchlora cubensis (banana ships and fruit)
Melanozosteria semivitta (Australian timber)
species near *Ectoneura pallida* (Australian timber and fruit)

Key to the genera (adults only)

1a All femora with a series of stout spurs on prolateral and retrolateral ventral edges, all tibial spurs smooth or but finely rugose ... 2
1b Forefemur without ventral spurs, mid and hind femora with only terminal pro- and retrolateral ventral spurs. All tibial spurs distinctly biserially pectinate (Fig. 18). ... ... *Celeriblattina*

2a Male subgenital plate quite symmetrical, unmodified, its hind edge straight or only slightly convex or concave, styles equal, unmodified. Female subgenital plate forming two large lateroventral valves 3

2b Male subgenital plate asymmetrical with at least one style always reduced, or, if symmetrical, the styles flattened, closely applied to edge of plate and dorsally spinose. Female subgenital plate single, broad, hind edge convex 5

3a Fully winged in both sexes ... ... *Periplaneta*

3b Brachypterous in both sexes, the tegmina reaching at the most 2nd abd. tergite 4

4a Dark, almost uniform black colouration; entire dorsum finely punctate; all metatarsi without biserial row of spinules *Platyzosteria*

4b Non-uniform colouration; dorsum with narrow pale margin bordered by dark band leaving the centre pale or variously darkened, smooth and shining; at least hind metatarsi with ventral biserial row of spinules ... ... *Celatoblatta*

5a Uniformly dark brown; brachypterous; length 15 to 18mm. Male subgenital plate symmetrical, the styles flat, dorsally spinose and applied to hind edge of plate ... *Shawella couloniana* (Saussure) (introduced)

5b Non-uniform often pale colouration; alate, or when brachypterous less than 12mm in length. Male subgenital plate markedly asymmetrical 6

6a Alate, pale colouration but pronotum with two distinct parallel longitudinal dark brown bars ... ... *Blattella germanica* (introduced)

6b Alate or brachypterous, mottled colouration on pronotum 7

7a Alate, highly coloured (in life) with red, orange, white and brown. Male suranal plate weakly crenulate (Fig. 82), subgenital plate triangular with narrow median cleft, the styles spine-like, set close together on either side of cleft. Female suranal plate triangular with terminal emargination ... ... *Ornatiblatta*

7b Alate or brachypterous, pale colouration. Male suranal plate emarginate, or weakly convex, subgenital plate straight between widely set styles, the right style much reduced. Female suranal plate roughly triangular its tip evenly rounded ... ... *Parellipsidion*

Genus CELERIBLATTINA n. gen.
Type species *Celeriblattina major* n. sp.

Small, fully winged insects, extremely fast running, usually found under the thin bark of Kanuka (*Leptospermum ericoides*), on tree ferns inside the hollow dead

fronds that still remain attached to the head, under bark of Totara (*Podocarpus totara*), Pohutukawa and Rata (*Metrosideros spp.*) and in the bases of Kiekie (*Freycinetia banksii*) fronds and the dead dry leaves of Flax (*Phormium tenax*). Often found with *Parellipsidion conjunctum* and possibly confused with the juveniles of this species if not caught and definitely identified.

Variegated yellow-brown colouration, the abdomen usually darker than thorax and head, male with only 7th abdominal tergite modified, the suranal plate triangular, subgenital plate asymmetrical the right style much reduced. Female suranal plate not produced but broadly convex between the cerci, subgenital plate broadly convex. All femora (Fig. 18) with single pro- and retro-lateral ventral apical spurs, no subapical ventral spurs but rows of fine setae present as is usual in the Chorisoneuridae. All tibial and most other spurs biserially pectinate (Fig. 18). Pulvulli of proximal three joints of tarsi much reduced, arolia large, claws asymmetrical. Hind edge of metanotum in females on each side with small tooth partly covering a very shallow depression on each side of 1st abd. tergite.

Celeriblattina major n. sp.

Figs. 3, 4, 6, 7, 10, 18

Length 8-9mm, no distinct sexual size difference. *Colour*: yellow-brown, vertex with two indistinct brown patches, sometimes continuous with arch of colour on frons: male abdomen with indistinct markings dorsally and ventrally, female with 7th and 8th tergites and lateral parts of sternites quite dark; cerci pale, the tip brown or black. Tegminal and wing venation as in Figs. 3, 4. *Male*: 6th sternite edge deeply emarginate, pit of 7th tergite shallow, unsclerotised, without median ridge and hairs but with mat of fine setae, edge of 7th medially emarginate (Fig. 6); suranal plate unsclerotised except basally; subgenital plate asymmetrical the right style extremely small (Fig. 7). *Female*: suranal plate short, convex and lightly setose. Ootheca (Fig. 10).

Distribution and Biology.

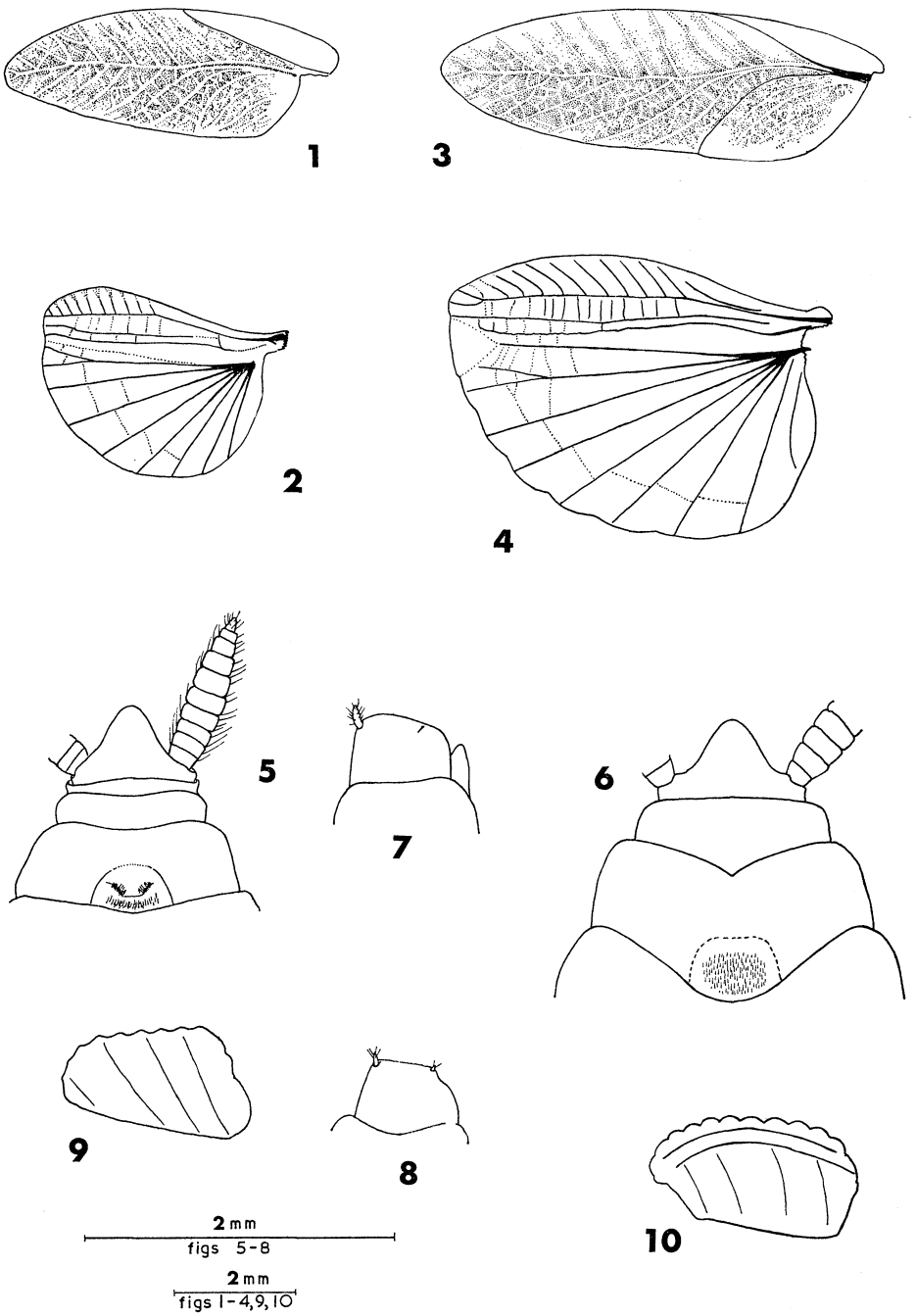
Known only from a few records near Auckland and in North Auckland. The species appears to be confined to Kauri forest and is usually found under bark of Kauri (*Agathis australis*) or Kanuka (*Leptospermum ericoides*) or in dead fronds of treeferns (*Dicksonia* sp., *Cyathe* sp.)

Material examined.

Holotype♂, allotype♀, paratypes 1♂, 4♀♀ (C.M.); paratypes 1♂, 1♀ (Ent. Div. Auck.); paratype 1♂ (L.U.); paratype 1♂ (U.S.N.M.); Piha Gorge, Waitakere Ranges, Auckland, in regenerating Kauri forest, mainly in dead treefern fronds, 11 January 1964, P. M. & M. Johns.

Other records.

Manganui Bluff; Mangamuku; Mohakatino River; Swanson; Titirangi; Hunua Ranges; Waiheke Is.; Pollok. (Ent. Div. Auck., D.M., C.M.).



Figs. 1-10. 1. Left tegmen *C. minor* (holotype). 2. Left wing *C. minor* (holotype). 3. Left tegmen *C. major* (holotype). 4. Left wing *C. major* (holotype). 5. Dorsum, terminal segments *C. minor* (holotype). 6. Dorsum, terminal segments *C. major* (holotype). 7. *C. major*, subgenital plate (holotype). 8. *C. minor*, subgenital plate (holotype). 9. Ootheca, *C. minor*. 10. Ootheca, *C. major*.

Celeriblattina minor n. sp.

Figs. 1, 2, 5, 8, 9

Length 6-8mm, the female slightly larger than the male. *Colour*: pale yellow-brown, vertex unmarked, frons with faint brown patch extending in an arch between the antennae, pronotum and dorsum indistinctly marked in brown but lateral borders of 7th and 8th segments distinctly pale, abdominal sternites quite pale in male but with lateral markings in female. Tegminal and wing venation as in Figs. 1, 2. *Male*: posterior border of 6th tergite slightly emarginate, only the 7th with pit, its anterior surface with fine setae and central raised portion with fine golden hairs, posterior edge of 7th slightly emarginate medially (Fig. 5); suranal plate triangular, pale brown at bases of cerci, white and unsclerotised medially, cerci pale yellow-brown their tips black, smooth without setae dorsally, long setae ventrally; subgenital plate as in Fig. 8. *Female*: head and pronotal maculation as for male, wings darker than male, abdomen quite dark dorsally and ventrally; suranal plate very short, slightly convex, setose; cerci with black tip; subgenital plate large, regularly convex. Ootheca (Fig. 9).

Distribution and Biology.

Widely distributed throughout the North Island and reaching Kaikoura in the eastern part of the South Island. Normally found under bark of various podocarp trees but often also in *Nothofagus* forest under bark or in *Freycinetia banksii*. Occasionally found in dry broadleaf scrub or in dry *Phormium tenax*. It is active at night.

Material examined.

Holotype♂, allotype♀, paratypes 11♂♂, 7♀♀, 3 imm. (C.M.); paratypes 1♂, 1♀ (Ent. Div.); paratypes 1♂, 1♀ (D.M.); paratypes 1♂, 1♀ (L.U.); paratypes 1♂, 1♀ (U.S.N.M.); paratypes 1♂, 1♀ (A.N.I.C.). York Bay, Wellington, in Kiekie (*Freycinetia banksii*) in *Nothofagus* forest, 15 January 1964, M. Johns.

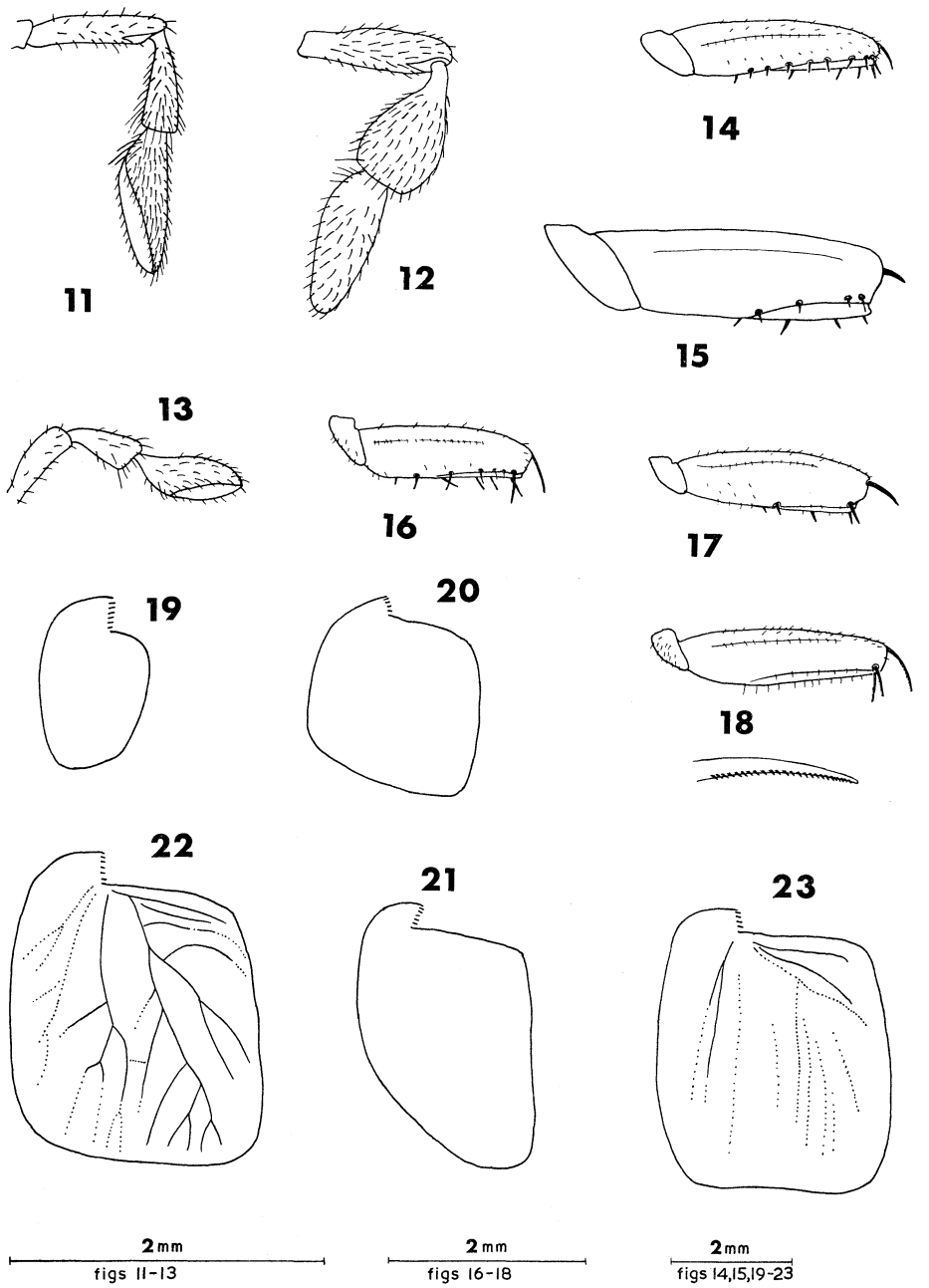
Other records.

Three Kings Islands; North Cape; Auckland (various localities); Hen Island; Tauranga; Opotiki; Napier; Wellington; D'Urville Island; Kaikoura.

Genus CELATOBLATTA n. gen.

Type species *Celatoblatta vulgaris* n. sp.

Brachypterous species of medium size, having general blattine facies. Colour generally yellow-brown with distinct red-brown or brown maculations on frons and vertex; lateral bands (vittae) on pronotum and elytra extending onto dorsum of abdomen which is much darker posterior to the third segment dorsally and entirely ventrally. Several, all alpine species, have dorsum black with pale margin or pale patches on the nota. The colour pattern cannot be used with certainty in distinguishing some species owing to lack of distinction and slight variability. Tegmina much reduced, reaching as far as 2nd abdominal tergite in some species



FIGS 11-13. Left palp. 11. *C. vulgaris*. 12. *C. laevispinata*. 13. *C. fuscipes*.
FIGS. 14-18. Left middle femur, ventral view. 14. *Celatoblatta vulgaris*. 15. *Platyzosteria novaeseelandiae* (Durville Is.). 16. *Ornatiblatta maori*. 17. *Parellipsidion pachycercum*. 18. *Celeriblattina major*.
FIGS. 19-23. Left tegmina. 19. *C. vulgaris* (paratype ♂). 20. *C. anisoptera* (allotype). 21. *C. anisoptera* (holotype). 22. *C. notialis* (holotype). 23 .*C. hesperia* (holotype).

or only the hind edge of the mesonotum in others. Wings present as a thin attachment to the metanotum in those species which have tegmina reaching the second abd. segment, otherwise absent. Head, thorax, abdomen and legs smooth, shining, very few scattered setae on head and thorax. Legs typically of blattine form, fore-femora with series of 5-12 prolateral ventral spines, mid- (Fig. 14) and hind-femora with 4-8 prolateral and retrolateral spines, mid- and hind metatarsi with biserial row of ventral spinules and 2nd and 3rd tarsal segments with at least one apical spinule on each side of pulvillus, pulvilli usually well developed, sometimes reduced especially on hind tarsi of alpine species; arolia well developed, claws symmetrical. Females have posterior corners of tergites 6 and 7 developed as small acute projections, those of the male not well developed, often rounded. Secondary sexual characters are various. Males of *C. laevispinata* and *C. fuscipes* have the penultimate segment of maxillary palp swollen. Most species have males with variously developed pit on first abdominal segment. Male suranal plate always quadrangular, that of female truncate triangular; male subgenital plate and styles symmetrical, unmodified.

Princis (1954, 1957) after examining the holotype of *Periplaneta undulivitta* Walker 1868 placed it within the North American genus *Eurycotis*. Superficially *Celatoblatta* and *Eurycotis* are very similar if only *C. undulivitta* and the other species with large tegmina are considered. If all the New Zealand species are examined it is obvious that they form a group which has had a long evolutionary history within the country. After comparing them with *E. similis* Caudell, *E. floridana* (Walk.) and *E. biolleyi* Rehn the N.Z. forms cannot be considered congeneric with these North American species.

Four species are left undescribed owing to uncertainty in associating females with males in a mixed population or through the lack of material. Two of these species occur together in the very north of New Zealand (one figured in Fig. 36, North Cape and Three Kings Islands) and are close relatives of *C. undulivitta*. A third species is to be found in the alpine zone in the eastern mountains of Canterbury while a fourth, also alpine, is known only from the mountains above Thompson Sound in Fiordland. The Canterbury alpine species is accounted for in the key but the fourth species falls into the *C. notialis*—*C. hesperia* group.

KEY TO THE SPECIES OF *Celatoblatta*

1a Always with short to very short tegmina, mesonotum not as broad as metanotum 2

1b Without trace of tegmina, mesonotum as broad as metanotum juveniles (At present juveniles cannot be determined with certainty to species).

2a 4 terminal abdominal projections: 2 cerci and 2 styles ... (males) 3

2b 2 terminal cerci, genital orifice enclosed by two very large lateroventral valves ... ... (females) 18

3a Tegmina well developed, meeting each other in midline and reaching posterior border of 1st abd. tergite 4

3b Tegmina small, as long as mesonotum and separated by at least half the mesonotal width 8

4a Tegmina quadrangular, outer and inner edges straight or weakly convex and roughly parallel (Figs. 22, 23), metanotum entirely covered 5

4b Tegmina roughly triangular the outer edge strongly convex (Fig. 21), lateral parts of metanotum uncovered *C. anisoptera*, p. 113

5a Tegmina mainly red-brown, dorsum almost uniformly dark red-brown only the disc of the pronotum and lateral edges of pronotum, tegmina and abdomen yellow-brown 6

5b Pronotum, tegmina and abdomen generally yellow-brown, thin dark lateral bands (vittae) extend posteriorly from pronotum onto tegmina and down abdomen 7

6a Posterior border of metanotum with distinct lobe and notch at the wing-rudiment junction, abd. 1 pit deep, arcuate depression immediately posterior of central ridge, hairs long and curled ... ... *C. notialis*, p. 110

6b Posterior border of metanotum without any lobe or notch. Abd. 1 pit shallow, no associated posterior depression, hairs short and almost straight ... ... *C. hesperia*, p. 112

7a Abd. 1 pit deep, dorsal surface of suranal plate with no long terminal hairs ... ... *C. undulivitta*, p. 108

7b Abd. 1 pit shallow, suranal plate with long terminal hairs ... ... 2 undescribed species

8a Abd. 1 pit absent but position sometimes indicated by some scattered setae; in suranal plate, ratio of posterior edge width to middorsal length at least 2x; cerci short very bluntly rounded, length width ratio at the most 3 x 9

8b Abd. 1 pit always present; suranal plate ratio at the most 1.5x; cercal tips sharp or if rounded, very narrow, length width ratio at least 3.5x 10

9a Hind metatarsal pulvilli present, hind tarsal joints 2 and 3 with one spinule on each side of pulvillus, pretarsus with distal one-third to one-half distinctly darker ... ... *C. fuscipes*, p. 121

9b Hind metatarsal pulvilli much reduced, hind tarsal joints 2 and 3 with 4-6 spinules on each side of pulvillus, pretarsus unicolorous. Nota with 5 characteristic large pale patches *C. quinquemaculata*, p. 122

10a Vertex and frons with continuous dark macula that extends onto

part of clypeus, dorsum almost uniformly dark apart from pale margin ... ... undescribed species (Canterbury)

10b Vertex dark, frons macula diffuse or absent and entire clypeus always pale; dorsum maculate with distinct dark vittae on pale background on thorax and at least the anterior tergites of abdomen 11

11a Hind metatarsal pulvilli reduced to tiny white spots *C. montana*, p. 117

11b Hind metatarsal pulvilli fully developed 12

12a Abd. 7 tergite with two distinct shallow lateral depressions fainter on tergites 6 and 5, suranal plate without long hairs ... ... *C. sedilloti*, p. 115

12b Abd. 7 tergite without depressions but may have pale circular spots, suranal plate always with many long hairs dorsal, ventral or terminal to the hind edge 13

13a Abd. 1 pit very deep its hind edge partly expanded over cavity, no median ridge and few hairs ... ... *C. subcorticaria*, p. 115

13b Abd. 1 pit relatively shallow, no distinct hind edge, always with median hair-bearing ridge 14

14a Penultimate segment of maxillary palp swollen (Fig. 12) 9th left pleurite with spine extending under cercus ... *C. laevispinata*, p. 120

14b Maxillary palp normal, 9th pleurites normal 15

15a 6th and 7th tergites rugose and setose (Chatham Is. only) *C. brunni*, p. 118

15b 6th and 7th tergites not rugose and only sparsely setose. (all mainland species) 16

16a Series of distinct pale spots across each abdominal tergite *C. vulgaris*, p. 105

16b Pale spots if present, few and indistinct confined to lateral parts of tergites 6 and 7 17

17a Abd. 1 pit quite pale, the hairs relatively short though curled, arcuate ridge and associated secondary pit immediately posterior to hair bearing ridge. Cerci distinctly pointed ... ... *C. peninsularis*, p. 119

17b Abd. 1 pit dark brown, hairs relatively long (reaching three-quarter-way across pit), curled, no associated pit immediately posterior, cercal tips rounded ... ... *C. pallidicauda*, p. 119

18a Tegmina large, meeting each other in midline, covering entire mesonotum 19

18b Tegmina small leaving at least half the mesonotum uncovered ... 22

19a Tegmina slightly elongate (Fig. 22, 23) covering at least entire metanotum 20

19b Tegmina slightly transverse (Fig. 20) covering only part of metanotum ... ... *C. anisoptera*, p. 113

20a Tegmina mainly red-brown; dorsum almost uniformly dark red-brown, only the disc of the pronotum and lateral edges of pronotum, tegmina and abdomen yellow-brown 21

20b Tegmina, much of abdomen and disc of pronotum yellow-brown; dorsum darkened only by the lateral vittae and distinct dark maculae on the lateral parts of the tergites ... *C. undulivitta*, p. 108 and 2 undescribed species

21a Posterior border of metanotum with a distinct lobe and notch at the wing-rudiment junction ... ... *C. notialis*, p. 110

21b Posterior border of metanotum without any distinct lobe or notch ... ... *C. hesperia*, p. 112

22a Vertex and frons with continuous vertical dark macula that extends onto median part of clypeus; abdomen dark apart from pale margins 23

22b Vertex dark, frons often and entire clypeus always pale, thus front of head without continuous vertical dark macula; abdomen variegated dark brown on yellow-brown 25

23a Thorax with five large distinct pale spots, one on pronotum and 2 on both mesonotum and metanotum; cerci distinctly bicolorous dorsally, dark proximal, pale terminal segments *C. quinquemaculata* p. 122

23b Thorax with paler median areas ill-defined, not forming distinct pale yellow-brown patches; cerci pale dorsally often with dark spots on middle segments 24

24a To the naked eye thorax quite paler than abdomen; posterior extensions of laterosternal shelf relatively short, stubby, sparse field of spine-like setae lateral to sclerotised axes of laterosternal shelf (Fig. 71) ... ... *C. fuscipes*, p. 121

24b To the naked eye thorax and abdomen almost uniformly dark brown apart from pale margin; posterior extensions of laterosternal shelf relatively long, incurved (Fig. 72), no spine-like setae lateral to the sclerotised axes of the laterosternal shelf ... ... undescribed species (Canterbury)

25a Fore and mid-metatarsi without any ventral biserial row of spinules, hind metatarsi with only an unevenly developed biserial row, spinules lateral to pulvilli on fore and mid-tarsal segments 2 and 3 if present, very small 26

25b Often the fore metatarsi and always middle and hind metatarsi with a ventral biserial row of spinules, corresponding 2nd and 3rd tarsal segments with a terminal spinule on each side of pulvillus 27

26a Suranal plate with anterior edge dark brown otherwise entirely pale yellow-brown ... ... *C. sedilloti*, p. 115

26b Suranal plate with dark anterior edge and only slightly paler median area, only the lateral and posterior margins pale yellow-brown ... ... *C. subcorticaria*, p. 115

27a Hind metatarsal and 2nd segment pulvilli much reduced their ventral biserial rows of spinules continuous along entire length ... ... *C. montana*, p. 117

27b Hind metatarsal and 2nd segment pulvilli normal, biserial spinule rows with a gap on either side of corresponding pulvillus, the distal terminal spinule being quite separate in each case ... 28

28a Abdominal tegites each with a transverse series of small pale spots, somewhat indistinct medially 29

28b Abdomen without spots or with only indistinct lateral pale spots on 6th and 7th tergites 30

29a Ventral surfaces of fore and hind tibiae with many setae between the spurs; pronotum and metanotum mottled (Chatham Islands) ... ... *C. brunni*, p. 118

29b Ventral surfaces of fore and hind tibiae only sparsely setose between the spurs, pronotum and metanotum with well defined vittae, not mottled. (N.Z. mainland) ... *C. vulgaris*, p. 105

30a Tegmina ovoid, no definite posterior border, suranal plate markings distinct 31

30b Tegmina roughly rectangular, the posterior border distinct, suranal plate markings indistinct ... ... *C. peninsularis*, p. 119

31a Suranal plate with narrow dark anterior border and thin median line, otherwise quite pale, its hind edge straight or very weakly emarginate ... ... *C. laevispinata*, p. 120

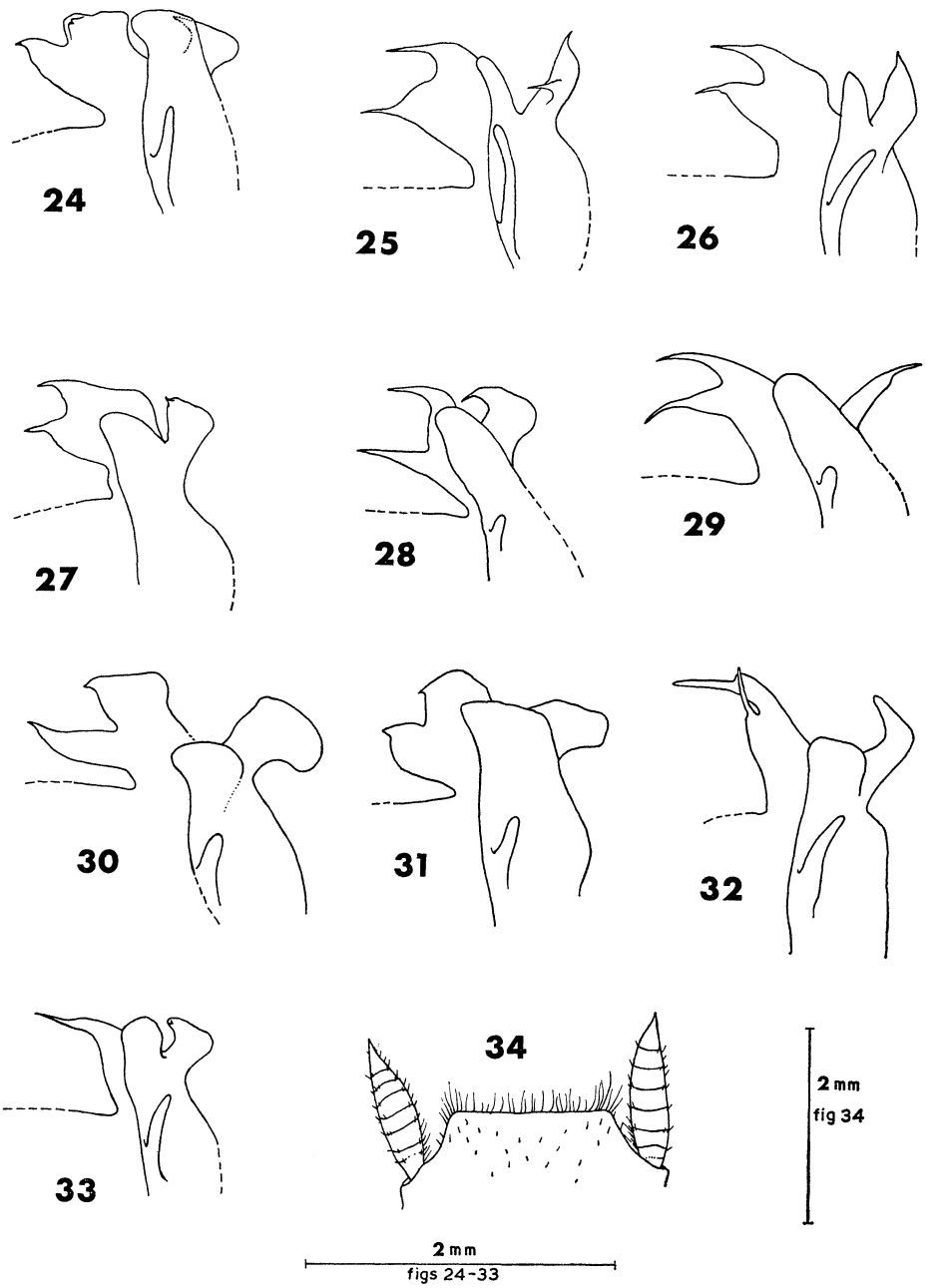
31b Suranal plate with broad dark anterior border, median area quite dark leaving only lateral and posterior borders pale, its hind edge distinctly emarginate ... ... *C. pallidicauda*, p. 119

Celatoblatta vulgaris n. sp.

Figs. 11, 14, 19, 24, 43, 45, 55

C. vulgaris: Johns, 1966.

Length: 14-16mm. *Colour*: vertex with dark band rarely meeting with paler maculae of frons; pronotal vittae broad, dark brown, vittae slightly less pronounced on tegmina, mesonotum and metanotum; median area of thorax yellow-brown; abd. tergites with very narrow lateral yellow-brown border, dark brown immediately median of this border paling towards centre, each tergite with



FIGS. 24-23 Left epiphalli (ventral view). 24. *C. vulgaris* (holotype). 25. *C. pallidicauda* (holotype). 26. *C. peninsularis* (holotype). 27. *C. brunni*. 28. *C. fuscipes* (holotype). 29. *C. laevispinata* (holotype). 30. *C. notialis* (holotype). 31. *C. hesperia* (holotype). 32. *C. anisoptera* (holotype). 33. *C. quinquemaculata* (holotype).
FIG. 34. ♂ suranal plate and cerci. *C. anisoptera* (holotype).

transverse series of pale spots; ventral parts of thorax and legs pale, venter of abdomen quite dark. Southern populations are darker than those of the North Island. Maxillary palp as in Fig. 11. Tegmina small, oval (Fig. 19), but somewhat variable especially in southern populations. Fore-tibia not expanded and all tibiae with only sparse ventral setation; metatarsal pulvilli small, others larger, segments 2 and 3 of fore and mid-tarsi with one terminal spinule on each side of pulvillus, those of hind tarsi with 1-5 such spinules. *Male*: abd. 1 pit shallow; hairs short, arising from broad median ridge, anterior floor of depression with fine hairs; suranal plate (Fig. 45) with slightly emarginate posterior edge, very pale apart from dark anterior band, with long hairs dorsal, terminal and ventral to the posterior edge; terminal segment of cerci rounded with a small dark subterminal band; subgenital plate (Fig. 43) weakly emarginate, with distinct pale markings at the bases of the styles; epiphallus as in Fig. 24, but there is some variation, probably clinal, where the epiphallus has a pronounced lobe above on the incurved spine in the northern populations of the Coromandel Peninsula, Hunua Range-Rotorua areas. *Female*: colouration as for male, the suranal plate as in Fig. 55, with a very dark anterior band, no median dark area, the rest being quite pale.

C. vulgaris is occasionally found with *C. montana* and *C. pallidicauda*, but is easily distinguished from the former by the nature of the hind tarsal pulvilli and from the latter by the maculation, subgenital plate, cerci and female suranal plate.

Distribution and Biology.

C. vulgaris is the most widely distributed of all endemic cockroaches and is usually abundant wherever it is found. Its wide distribution is probably related to its very wide range of habitats: from lowland Kauri forest, Podocarp forest, *Nothofagus* forest through various types of secondary growth and scrub to the alpine habitat of rock screes. Although of wide distribution there appears little structural variation except in the northern part of its range, but this is little understood owing to the paucity of material.

Material examined.

Holotype♂, allotype♀, paratypes 3♂♂, 2♀♀, 2 imm., (C.M.), Maruia Springs, grid. ref. N.Z.M.S. 1 sheet S46 (Lewis): 748962, 6 November 1962, P.M. Johns. Paratypes 1 ♂, 1 ♀ (D.M.); paratypes 3♂♂ (C.M.), Maruia Springs, 29 June 1963, P. M. Johns. Paratypes 1♂, 1 ♀ (Ent. Div.); paratypes 1 ♂, 1 ♀ (U.S.N.M.); paratypes 1 ♂, 1 ♀ (L.U.); paratypes 4 ♀♀, 7 imm. (C.M.), 2 miles west of Maruia Springs, *Nothofagus* forest, 15 September 1962, P. M. & M. Johns.

Other records.

Hunua Range; Te Aroha; Rotorua; Cambridge; Pureora Forest; Tongariro Nat. Park; Mt. Hikurangi, East Cape; Taruarau Hill, Taihape; Raetihi; Wellington; Marlborough Sounds; D'Urville Island; Boulder Lake, Nelson; Gordon's Knob, Nelson; Murchison; Awatere Valley; Kaikoura; Hanmer; Waiau Valley; Lewis Pass; Rahu saddle, Westland; Moana, Westland; Otira; Hurunui Valley; Waimakariri Valley; Staveley; Rakaia Valley; Geraldine;

Haast Pass; (C.M.). Waiheke Island, Auckland; Ohakune; Boulder Lake, Nelson; Wellington; Marlborough Sounds; (D.M.). Mt Egmont; (Ent. Div. Auck.).

Celatoblatta undulivitta (Walker, 1868)

new combination

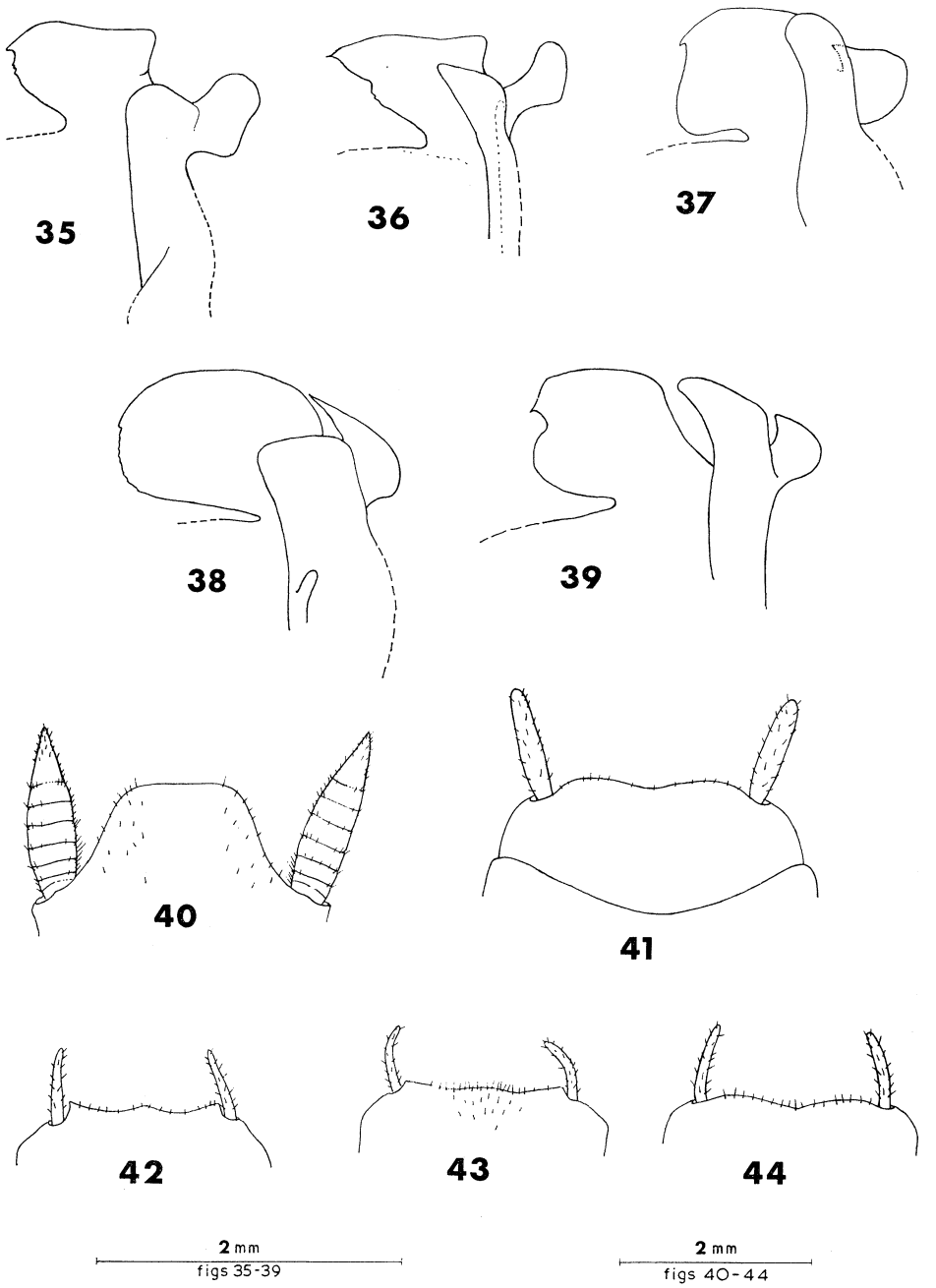
Figs. 35, 51, 60

Periplaneta undulivitta Walker, 1868, p.144.
Loboptera undulivitta: Tepper, 1893, p.37.
Periplaneta undulivitta: Alfken, 1901, p.142.
Zonioploca truncata (Brunner v. Wattenwyl) Kirby, 1904, p.137 (not of Br. v. Watt.).
Platyzosteria undulivitta: Hutton, 1904, p.234.
Temnelytra undulivitta (Walker) Shelford, 1909, p.304, Fig. 36.
Temnelytra undulivitta: Caudell, 1924, p.18.
not *Temnelytra undulivitta*: Shaw 1925.
not *Platyzosteria undulivitta*: Salmon, 1948.
Eurycotis undulivitta (Walker) Princis, 1954, p.6.
Eurycotis undulivitta (Walker): Princis, 1957, p. 96.

Length 16-18mm. *Colour*: variable, the basic pattern vertex brown, clypeus frons and occiput yellow-brown with two dark patches median of and slightly below antennae; antennae basally yellow-brown, darkening distally, dorsum pale red-brown with brown maculae and distinct yellow-brown marginal band, the maculae very dense along edge of this margin, posterior tergites and all sternites much darker. Elytra square similar to Fig. 23, without trace of venation, reaching and partly covering 1st abd. tergite, wings thin, short, fused to metanotum but distinctly outlined, no venation. Posterior metatarsi equal in length to following tarsal segments, pulvilli small, metatarsi with two ventral rows of spinules, other tarsal segments with at least one spinule on each side of pulvillus. There are normally five segments but specimens are known with four. The spination is also variable, the posterior metatarsi normally have a full series of spinules but occasionally these are reduced in number or are absent. *Male*: first abdominal tergite with broad, quite deep, double pit, the central ridge with long golden hairs; corners of abdominal tergites 6 and 7 weakly produced, acute; suranal plate rectangular (Fig. 51) scattered short setae on top and posterior edge; cerci elongate, tips rounded, smooth dorsally, with few dorsal and lateral spinules, many short spines and long hairs on ventral surface; subgenital plate simple, edge straight with few moderately long setae; epiphallus as in Fig. 35. *Female*: abdomitergite 7 corners distinctly produced, acute; suranal plate (Fig. 60) truncate, the hind edge emarginate; cerci sharply pointed, tips black.

Distribution and Biology.

The distribution covers almost the entire North Island from Waipoua south but there is a lack of collections from the Wairarapa district. It extends to the South Island only as a beach litter inhabitant of west Nelson. Although often found with *C. vulgaris*, *C. undulivitta* appears to require a much wetter habitat being found in



FIGS. 35-39. Left epiphalli. 35. *C. undulivitta*. 36. *C. undescribed species* (North Cape). 37. *C. subcorticaria* (holotype). 38. *C. montana* (holotype). 39. *C. sedilotti*, (Hunua Range, Auckland).

FIG. 40. *C. laevispinata* female suranal plate (allotype).

FIGS. 41-44. Male subgenital plates. 41. *C. sedilloti*. 42. *C. anisoptera* (holotype). 43. *C. vulgaris* (holotype). 44. *C. montana* (holotype).

sodden logs of *Agathis australis*, *Dacrydium cupressinum*, *Podocarpus totara* and associates with these tress. It appears to be very rare in pure *Nothofagus* forest and occurs in secondary growth and scrub only in very wet areas.

It has two close relatives, undescribed species in the far north of New Zealand (one figured in Fig. 36), and, with these, forms a species group superficially similar to, but distinct from, *C. hesperia* and *C. notialis*.

Material examined.

2 ♂♂, 1♀, Mangatangi River, Hunua Range, Auckland, under *Leptospermum ericoides* bark, 12 January 1964, P. M. & M. Johns. Figures 35, 50, 60 are taken from this material.

Other records.

Waipoua Kauri forest; Auckland (various); Coromandel; Te Aroha; Cambridge; Whakatane; Motu Stream, East Cape; Napier; Raetihi; Wanganui; Hutt Valley; Wellington; Anatori Beach, Nelson; (C.M.) Clevedon; Coromandel Peninsula; Wimbledon, Hawkes Bay; (Ent. Div. Auck.).

Celatoblatta notialis n. sp.

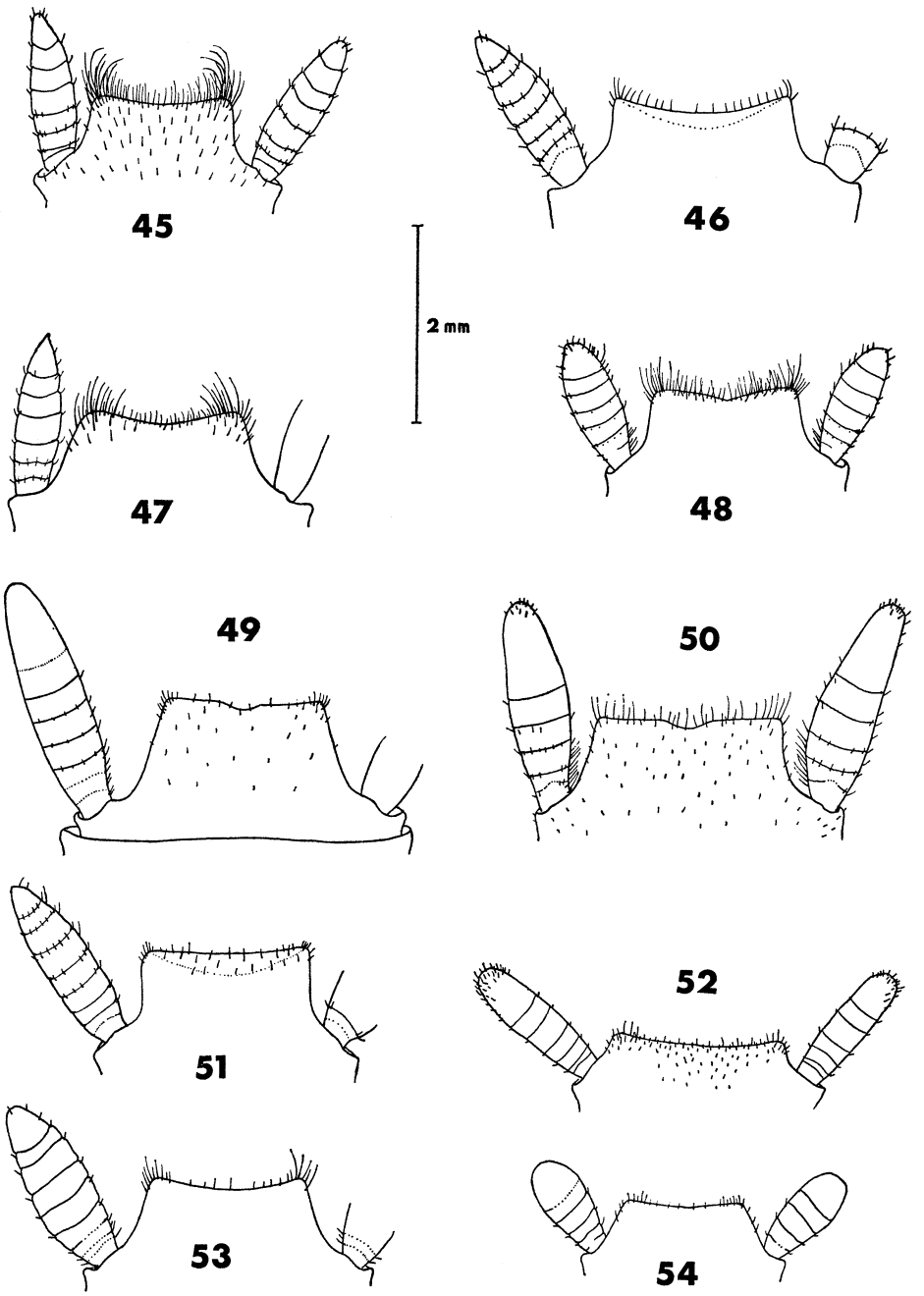
Figs. 22, 30, 46, 59

Temnelytra undulivitta (Walker): Shaw, 1925, (not of Walker).

Length 15-17mm. *Colour*: dark macula of vertex extends below epicranial suture to fuse with paler maculations of the frons below the antennae; pronotal vittae broad, dark brown, pronotal centre yellow-brown; abdomen dark red-brown with distinct pale edges and dorsum marked with small pale spots similar to *C. vulgaris*. Tegmina of both sexes reaching to abdominal tergite 2, square, the inner and outer edges almost straight and parallel, posterior edge straight, corners rounded (Fig. 22), red-brown with distinct yellow lateral border; hind edge of metanotum with large lobe and adjacent notch on each side at the junction of the wing rudiment with the metanotum. Pulvilli moderately developed, tarsal segments 2 and 3 of fore and middle legs with only one spinule on each side of pulvillus, segments of hind tarsus with 3 and 1 respectively. *Male*: abd. 1 pit deep, median ridge broad, well developed, with small arcuate depression immediately posterior, hairs extremely long and curled; suranal plate (Fig. 46) very similar to that of *C. undulivitta*, dark red-brown, paler to the posterior, margin white, unsclerotised; cerci red-brown, the two terminal segments yellow-brown; epiphallus as in Fig. 30. *Female*: suranal plate (Fig. 59) red-brown without any distinct pale markings, cerci shorter, not as markedly tapered or pointed as in *C. undulivitta*.

Distribution and Biology.

This species is confined to the high rainfall, low, even temperature regions of the southern parts of New Zealand. It is normally found in the fallen logs in the



FIGS. 45-54. Suranal plates. 45. *C. vulgaris* (holotype). 46. *C. notialis* (holotype). 47. *C. montana* (holotype). 48. *C. brunni*. 49. *C. sedilloti* 50. *C. subcorticaria* (holotype). 51. *C. undulivitta*. 52. *C. quinquemaculata* (holotype). 53. *C. hesperia* (holotype). 54. *C. fuscipes* (holotype).

Dacrydium cupressinum—Metrosideros umbellata forests. It is often found under the bark of these trees in association with *C. subcorticaria* and is occasionally found near the tree-line in *Olearia* and *Hebe* scrub. It has not been found as yet in *Nothofagus* forest.

Material examined.

Holotype ♂, allotype ♀, paratypes 2♂♂, 2 ♀♀, 2 imm., (C.M.); paratype ♂ (D.M.); paratype♂ (O.M.); paratype♂ (U.S.N.M.); paratype♂ (L.U.); paratype ♂ (A.N.I.C.); ex logs in Rimu-Rata-broadleaf forest, Codfish Island, off Stewart Island, 11 August 1964, P. M. Johns. Paratypes 1♂, 1♀ (C.M.); paratypes 1♂, 1♀ (Ent. Div.); ex Kamahi leaf litter, Codfish Island, Stewart Is., 13 August 1964, P. M. Johns

Other Records.

Bruce Bay, South Westland; Harris Saddle; Routeburn Valley; Lake McKerrow; Lake Hankinson; Caswell Sound; Thompson Sound; Deep Cove; Orepuki; Easy Cove, Stewart Island; Port Pegasus; Stewart Island; (C.M.). Homer Tunnel; Dusky Sound; Port Pegasus, Stewart Is; (D.M.)

Celatoblatta hesperia n. sp.

Fig. 23, 31, 53

Lenth 12-15mm. *Colour*: very similar to *C. notialis* but frontal maculae diffuse, pronotal vittae thin, pronotum otherwise yellow-brown. Tegmina (Fig. 23) and abdomen as for *C. notialis* though slightly paler. Hind edge of metanotum without any large, distinct lobe or notch at each side at the wing rudiment junction. *Male*: abd. 1 pit shallow, median ridge broad with no arcuate depression immediately posterior and hairs short and not curled; suranal plate (Fig. 53) similar to *C. notialis* but posterior pale region more extensive; subgenital plate with distinct pale spots basal to styles; epiphallus as in Fig. 31. *Female*: suranal plate similar to *C. undulivitta*, with dark anterior border and thin dark median line, lateral regions quite pale.

Distribution and Biology.

The records are so few that little is known of the biology. It appears that the species is confined to the very high rainfall areas (greater than 80 ins. per annum) near the Main Divide.

Material Examined.

Holotype♂, allotype♀, paratypes 1♂, 1♀, 1 imm. (C.M.); Kelly Range, Otira, Westland, 3000 ft. under *Fuchsia excorticata* bark, 24 November 1963, P. M. Johns. Paratype ♀ (C.M.), Kelly's Creek, Otira, ex log in *Podocarp* forest, 23 November 1963, P. M. Johns. ...

Other records.

Kelly Range 3,800-4,100 ft., alpine tussock; Upper Rakaia Valley, *Podocarpus halli* and scrub; Lewis Pass, *Nothofagus* forest; (C.M.).

Celatoblatta anisoptera n. sp.

Figs. 20, 21, 32, 34, 42

C. anisoptera: Johns, 1966.

Length 12-15mm. *Colour*: vertex dark brown, frons paler, two dark areas between antennal bases, pronotal disc and margin yellow-brown, vittae narrow, dark brown. Tegmina yellow-brown with slightly paler margin; abdomen dark brown, each anterior tergite paler medially. Tegmina in male (Fig. 21) elongate, almost triangular, the outer edge strongly convex, no posterior edge, the outer parts of metanotum being left uncovered. In the female (Fig. 20) they are transversely rectangular much of the metanotum being left uncovered, posterior edge of metanotum strongly emarginate with small median tooth. Hind metatarsi with pulvilli reduced. *Male*: abd. 1 pit moderately deep, median ridge well developed, hairs long; lateral depressions weakly developed but present on tergites 6-7, occasionally on tergites 3-5; suranal plate (Fig. 34) dark at cercal bases, diffuse dark median area, quite pale lateral and posterior borders, long terminal and ventral setae, cerci pointed, quite pale; subgenital plate (Fig. 42) with quite pale posterior border; epiphallus as in Fig. 32. *Female*: suranal plate similar to *C. notialis*, very dark anterior and median areas, quite pale lateral and posterior borders.

Distribution and Biology.

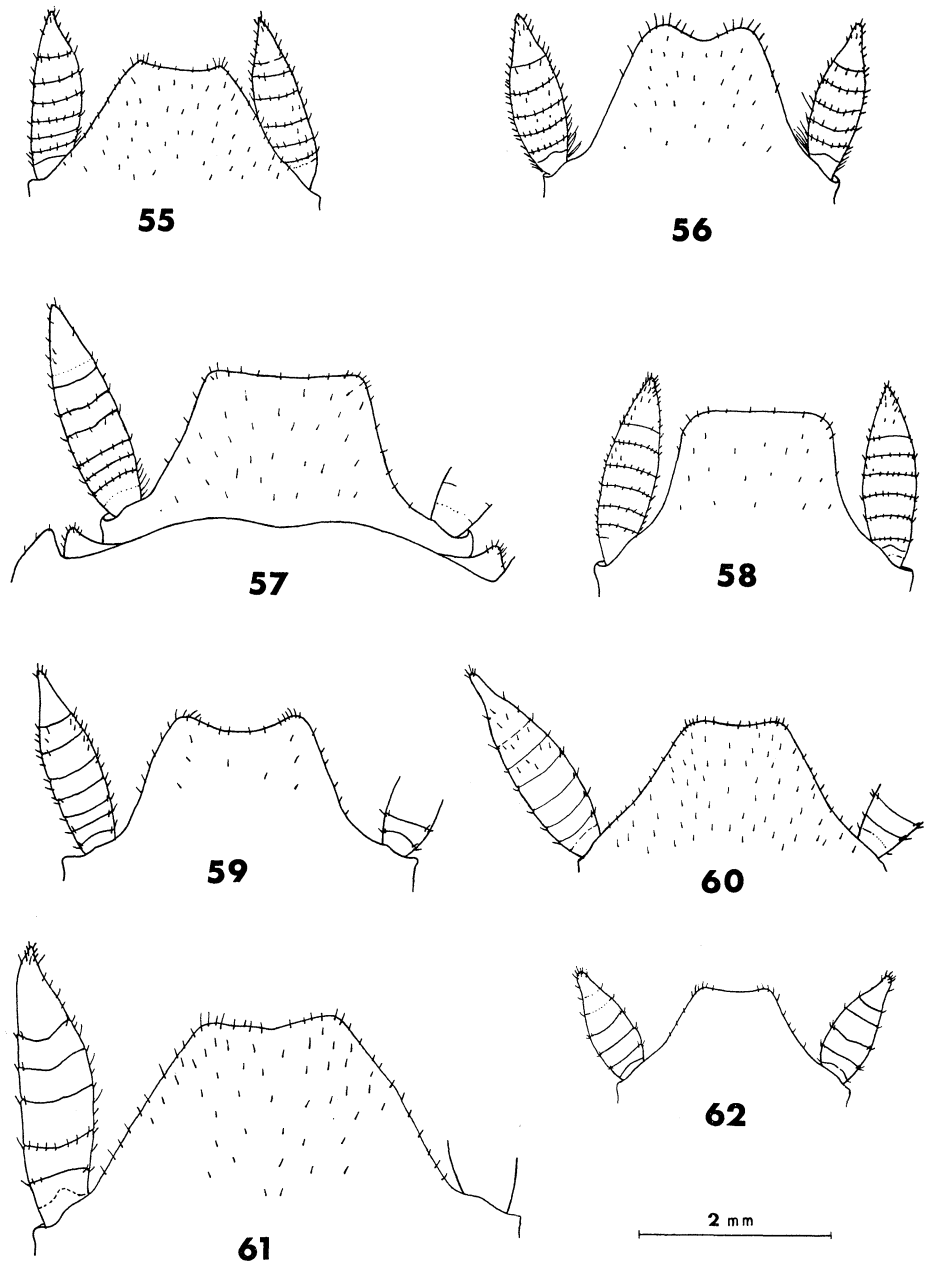
The rock screes and moraines of the Mackenzie Basin and the surrounding mountains and southwards into Central Otago, are the habitat of *C. anisoptera*. It does not appear to reach much above 3,500 ft. altitude, indeed it appears to prefer the low altitude rocky areas where some scrubby lowland vegetation of *Discaria toumatou*, *Muehlenbeckia axillaris* and *Coprosma* spp. is found, and the edges of dry *Nothofagus* forest. The entire area is subject to warm, dry summer and cold, dry winter conditions. In wetter parts of the area, the populations are confined to deep rock screes or moraines.

Material Examined.

Holotype♂, allotype♀, paratypes 1♂, 2♀♀, 3 imm. (C.M.); Terminal Moraine of Tasman Glacier, Mt. Cook National Park, 9 December 1962, P. M. & M. Johns. Paratypes 2♂♂, 1♀, 5 imms. (C.M.); paratype♂ (D.M.); paratype♂ (Ent. Div.); paratype♂ (L.U.); Whitehorse Hill, Hermitage, Mt. Cook National Park, under stones in old terminal moraine (vegetation: *Coriaria angustissima*, *Muehlenbeckia axillaris*, *Gaultheria rupestris*, *Dracophyllum longifolium*). 8 December 1962, P. M. & M. Johns. Paratypes 4♂♂, 1♀, 4 imm. (C.M.); paratypes 1♂, 1♀ (U.S.N.M.); paratype 1♂ (A.N.I.C.); Mt. Sebastopol, 3000-4000 ft., Hermitage, Mt. Cook National Park, 28 January 1965, R. S. Bigelow.

Other records.

Black Forest Ck., Mackenzie Basin; Lake Ohau beaches; Mt. St. Bathans; Lindis Pass; Lake Wanaka (various areas); Clyde; (C.M.).



FIGS. 55-62. Suranal plates and cerci. 55. *C. vulgaris* (allotype). 56. *C. brunni* (allotype). 57. *C. sedilloti*. 58. *C. subcorticaria* (allotype). 59. *C. notialis* (allotype). 60. *C. undulivitta*. 61. *C. montana* (allotype). 62. *C. fuscipes* (allotype).

Celatoblatta sedilloti (Bolivar, 1882)
new combination

Figs. 39, 41, 49, 57.

Platyzosteria sedilloti Bolivar, 1882.
Cutilia sedilloti: Caudell, 1924, p.19.

Length 16-19mm. *Colour*: vertex with distinct brown band, frons with two slightly diffuse marks median of and slightly below antennae; pronotal and metanotal vittae quite dark, extending posteriorly, with inner edge becoming quite diffuse at the 5th abd. tergite, dorsum forward of abd. 5 quite pale, 6th darker, 7th quite dark brown, abd. sternites dark brown. Tegmina rectangular, quite large, with a distinct straight hind edge. Fore tibiae swollen distally, their ventral surfaces and those of hind tibiae distinctly setose. All tarsi with pulvilli quite well developed, ventral spination weak, segments 2 and 3 of fore-and mid-tarsi without lateral spinules, those of hind tarsi with one spinule on each side of the pulvilli. *Male*: abd. 1 with shallow pit divided by central hair-bearing ridge; abd. 7 tergite with two distinct shallow depressions and smaller indistinct depressions on tergites anterior to 7th; suranal plate (Fig. 49) dark at cercal bases and medial region, posterior margin white, unsclerotised, slightly darker submarginal band, lateral regions yellow-brown, no long marginal setae and few ventrally; cerci quite smooth and regular, with a white tip and black ventral subterminal band; subgenital plate biconvex (Fig. 41) pale marginally and medially, epiphallus as in Fig. 39, without the very long flexible process of the left phallomere that is found in *C. subcorticaria*. *Female*: suranal plate (Fig. 57) with straight or slightly emarginate margin, thin black anterior marginal border otherwise pale yellow-brown with faint darkening on posterior edge.

Overall, *C. sedilloti* is very similar to *C. subcorticaria* but is may be distinquished from this species at once in the male by the form of the first abdominal pit, the presence of the 7th abdominal depressions and by the genitalia, and in the female by the form and colouration of the suranal plate (Figs. 57, 58).

Distribution and Biology.

The few records indicate that *C. sedilloti* is found under bark of various trees in the northern part of the North Island and the Kermadec Islands 600 miles north-east of Auckland.

Material examined.

Kermadec Islands; Kerr Point, North Cape; Piha Gorge, Waitakere Ranges; Waiuku; Hunua Range; Opotiki; Lake Taupo, west side; (C.M.).

Celatoblatta subcorticaria n sp.

Figs. 37, 50, 58

Length 16-18mm. *Colour*: vertex with dark brown band, frons with only very pale brown areas, pronotal vittae quite dark but those of metanotum and tergites

1 to 4 medium to pale brown and diffuse, 5th tergite pale brown, 6th and 7th darker, dorsum otherwise yellow-brown. Ventral biserial spinules absent from fore- and mid-metatarsi, few and small on hind metatarsi, tarsal segments 2 and 3 of all legs with one spinule on each side of pulvillus though sometimes absent from foreleg tarsal segments. *Male*: abd. 1 pit very deep, the posterior wall evaginated over the deepest part, faint median ridge, hairs moderately long, arranged in a small median posterior group and a large anterior group; tergites 5, 6 and 7 with very faint pale spots in positions similar to the depressions on *C. sedilloti*; suranal plate (Fig. 50) rectangular, few long marginal setae, many ventrally, very dark patches at the bases of the cerci, separate wide pale brown median band that is slightly darker posteriorly, lateral areas pale; cerci with a distinct pale tip bordered by a black band ventrally; the genitalia with epiphallus as in Fig. 37, and characteristic elongated flexible process of the left phallomere; subgenital plate with hind edge emarginate, the lateral parts not markedly rounded, slightly paler laterally beneath styles. *Female*: suranal plate (Fig. 58) almost rectangular, the hind edge straight or slightly emarginate, corners rounded, dark at bases of cerci, diffuse brown median area, quite pale laterally and terminally.

Distribution and Biology.

The characteristic habitat of *C. subcorticaria* is within the dry cavities under loose bark or within dead standing trunks of a wide variety of trees found in diverse forest types. Examples are various species of *Podocarpus*, *Dacrydium*, *Metrosideros*, *Leptospermum*, *Nothofagus*, *Dysoxylum*, *Griselinia*, *Olearia*, *Fuchsia* and occasionally dry *Phormium tenax*. In the North Island it is found east and south of the Rotorua-Taupo volcanic areas, these and the regions to the north being occupied by the related *C. sedilloti*. It is in the South Island that there appears a discontinuous distribution pattern. Common to the north, especially in the warm dry areas of Marlborough and North Canterbury, it is not found at all in Mid-Canterbury south to Otago, only to appear again in the very wet cool forests of Fiordland, coastal Southland and Stewart Island. It is rare in northern Nelson. Further south, the author has not seen it during many visits to Lewis Pass area, and it appears likely that it is absent in Westland. On this basis the distribution is fully disjunct, the pattern being very similar to that of many plants (Burrows 1965), but the two patterns cannot be directly related as the preferred plants of *C. subcorticaria* show no such pattern.

Material Examined.

Holotype ♂, allotype ♀, paratypes 2♂♂, 2♀♀, 9 imm (C.M.); paratypes 1♂, 1♀ (Ent. Div.); paratypes 1♂, 1♀ (D.M.); paratypes 1♂, 1♀ (L.U.); Inner Chetwode Island, Marlborough Sounds, under bark of *Leptospermum ericoides*, 29 July 1963, P. M. Johns. Paratypes 1♂, 1 imm. (U.S.N.M.), same locality, under *Dysoxylum spectabile* bark, 29 July 1963, P. M. Johns.

Other records.

Northern: Napier; Raetihi; Ohakune; Taruarau Hill, Ruahine Range;

Wellington; Marlborough Sounds; D'Urville Island; Patarau; Boulder Lake, Nelson; Hope River, Nelson; Murchison; Kaikoura; Waiau Valley; Hurunui Valley; Okuku Pass, North Canterbury; (C.M., D.M., Ent. Div.).

Southern: Awarua Bay; Martins Bay; George Sound; Orepuki; Bluff; Foveaux Strait Islands; Solander Is.; Stewart Is. (throughout); Codfish Island; (C.M., D.M.).

Celatoblatta montana n. sp.

Figs. 38, 44, 47, 61

C. montana: Johns, 1966.

Length 15-17mm. *Colour*: variable in density, generally yellow-brown with diffuse maculae, vertex colour band weak and ill-defined in male, darker in female, weak or no maculation on frons; pale, thin vittae on dorsum, 7th and 8th tergites brown but the more anterior tergites may be quite dark and approach *C. vulgaris* in the form of their maculation; sometimes with small pale spots or indistinct depressions on the 7th tergite indicating some relationship with *C. sedilloti*. Hind metatarsal and second tarsal segments with characteristic greatly reduced pulvilli, others with small pulvilli; all tarsal segments with biserial row of spinules, the second and third segments with 2, 3 or 4 spinules on each side of reduced pulvilli. *Male*: abd. 1 pit very shallow, the hairs short, similar to that of *C. vulgaris* but without scattered setae on the floor of the depression; suranal plate (Fig. 47) with long setae on posterior edge and ventrally, dark at bases of cerci, the greater part of the median area diffuse pale brown, lateral and posterior edges yellow-brown, cerci unicolourous dorsally, smooth, with few dorsal setae; epiphallus as in Fig. 38; subgenital plate (Fig. 44) weakly biconvex as in *C. sedilloti*. *Female*: suranal plate (Fig. 61) with dark anterior band expanding medially, otherwise markings quite pale and sharply delineated.

Distribution and Biology.

C. montana may be found throughout the mountain ranges of the eastern side of the Main Divide and further north in the Seaward Kaikoura Range. It has been taken in association with *C. vulgaris*, *C. laevispinata* and and undescribed species of *Celatoblatta*.

From field observations, the main population appears to be concentrated at the 3,500-4,500 ft. altitude level, in the rock screes where they enter the forest at the treeline or are sparsely covered with the shrubs, *Podocarpus nivalis*, *Hebe* spp., *Gaultheria crassa* and their associates. Even though the species may reach 6,000 ft. and is considered to be an alpine inhabitant, it is capable of living at 1,300 ft. in often very hot and dry conditions in a region where *C. vulgaris* and *C. subcorticaria* thrive in the manuka and broadleaf scrub nearby. Its association with *C. vulgaris* at higher levels appears to have come about through the modification of the habitat with the extension of screes into previously forested areas after burning.

Material Examined.

Holotype ♂, allotype ♀, paratypes 6 ♂♂, 3 ♀♀, 1 imm. (C.M.); paratypes 1 ♂, 1 ♀ (Ent. Div.); paratypes 1 ♂, 1 ♀ (D.M.); paratypes 1 ♂, 1 ♀ (O.M.); Mt. Binser, Arthurs Pass National Park, 3,000-4,000 ft. in rock scree, 24 February 1963, P. M. Johns.

Other records.

Seaward Kaikoura Range, 5,000-5,500 ft; Mt. Percival, Hanmer, 3,000-5,000ft; Crystal Peak, Lake Tennyson, 4,500-6,200 ft; Clarence Valley; Hurunui Valley; Arthurs Pass National Park (various mountains); Sugarloaf, Cass, 3,500 ft; Craigieburn Range, 4,000 ft; Fog Peak, Torlesse Range, 3,800-5,600 ft; vicinity of Cameron Glacier, Mid-Canterbury, 3,500-5,500 ft; Lawrence Valley, Rangitata, moraine, 3,500 ft; (C.M.).

Celatoblatta brunni (Alfken, 1901)

new combination

Figs. 27, 48, 56

Platyzosteria brunni Alfken, 1901, p.142.
Zonioploca brunni: Kirby, 1904, p. 137.
Platyzosteria brunni: Hutton 1904.
Cutilia brunni: Shelford, 1909, p.292.
not *Platyzosteria brunni*: McKittrick, 1964.

Length 10-14mm. *Colour*: vertex band dark, not joined to the maculations of the frons, thoracic markings as in *C. vulgaris* but darker, abdomen with yellow-brown border, otherwise almost uniformly red-brown in female but with pale markings medially in male. Second hind tarsal segment with 1-3 spinules on each side pulvillus, all other tarsal segments with only one spinule on each side of pulvillus, pulvilli moderately developed. *Male*: abd. 1 pit deep, with median ridge and moderately long hairs; dorsal posterior surfaces of abd. segments 5, 6 and 7 finely rugose and covered in short setae; suranal plate long, rectangular, the posterior border concave, long hairs terminally and ventrally (Fig. 48), quite dark, pale only on lateral and hind borders; cerci short, and the broad tip abruptly pointed; epiphallus as in Fig. 27; subgenital plate with straight posterior edge, pale markings below styles. *Female*: no dorsal rugosity or setation as in male, suranal plate reaching almost to tip of cerci, medially deeply concave (Fig. 56), dark at bases of cerci, paler medially, quite pale posteriorly.

Distribution and Biology.

Known only from areas of scrub or stones on the Chatham Island Group.

Material Examined.

Chatham Island, Pitt Island, Southeast Island, The Sisters. (Collected mainly by 1954 Chatham Island Expedition). (C.M.).

Celatoblatta pallidicauda n. sp.

Fig. 25

C. pallidicauda: Johns, 1966.

Length 14-16mm. *Colour*: vertex dark, frontal maculae weak, lateral dorsal vittae dark, distinct, the 6th and 7th tergites almost completely darkened. 2nd and 3rd segments of fore- and mid-tarsi with only one spinule on each side of pulvillus; hind tarsal segments 2 and 3 with 1-3 and 1 spinules on each side of the respective pulvilli. *Male*: abd. 1 pit moderately deep, the median ridge large and the hairs long and curled; suranal plate as in *C. vulgaris* but with only short setae on margin at the corners and long setae ventrally, small black markings at the bases of the cerci and a separate or indistinctly joined median dark area leaving the rest pale yellow-brown, sometimes white; cerci quite pale apart from some dark markings on middle segments, the terminal segment quite large and rounded, the tip white; subgenital plate with straight posterior margin and large diffuse pale areas at the bases of the styles; epiphallus as in Fig. 25, the structure of which indicates a close relationship to *C. vulgaris*, *C. peninsularis* and *C. brunni*. *Female*: suranal plate large similar to *C. vulgaris* but margin with a slightly deeper emargination, dark at bases of cerci and on median area leaving extensive lateral and posterior areas pale; cerci pointed, yellow-brown or white, with dark spots on middle segments.

Distribution and Biology.

This species is common in the South Canterbury foothills in scrub of low broadleaf trees and shrubs. It does not appear to be commonly co-existant with any other species of *Celatoblatta* although *C. vulgaris* has been taken with it in one area. It is often found with *Parellipsidion pachycercum*. There is one anomalous record of a male and female from Waiheke Is. in Auckland Harbour.

Material Examined.

Holotype♂, allotype♀, paratypes 2♂♂, 3♀♀, 5 imm, (1 paratype♂, genitalia on slide, (C.M.); paratypes 1♂, 1♀ (D.M.), paratypes 1♂, 1♀ (Ent. Div.); Hook Bush, Waimate, grid. ref. N.Z.M.S. 1 sheet S118 (Hakataramea): 542214, in scrub alongside stream, 23 September 1962, P. M. Johns.

Other records.

Lake Coleridge; Rakaia Gorge; Wilberforce River, Rakaia; Ashburton River Gorge (South Branch); Clyde River bed, Rangitata Valley; Geraldine; Mackenzie Pass; Mt. Hay, Lake Tekapo; Grays Hill, Tekapo; Aviemore; (C.M.). Waiheke Is; (D.M.).

Celatoblatta peninsularis n. sp.

Fig. 26

C. peninsularis: Johns, 1966.

Length 12.5-15mm. *Colour* pattern similar to *C. vulgaris* but pale spots in-

distinct or absent. The tegmina are shorter and have a distinct straight posterior edge. Tarsal segments 2 and 3 on all legs with only one spinule on each side of the pulvillus. *Male*: abd. 1 pit deeper than *C. vulgaris*, with distinct median ridge and arcuate depression immediately posterior to it, hairs not long nor curled; suranal plate and cercal shape similar to *C. vulgaris*, dark areas at bases of cerci, weak anterior band and indistinct central brown patch, sides pale yellow-brown, posterior edge white, no long dorsal or terminal but many ventral hairs, cerci with dark patches dorsally on middle joints and tips rather sharper than in *C. vulgaris*; subgenital plate with hind edge faintly convex, indistinct pale patches below the styles; epiphallus as in Fig. 26. *Female*: suranal plate similar to that of *C. vulgaris*, very dark anterior band, median area pale brown, lateral and terminal regions translucent yellow-brown.

Distribution and Biology.

C. peninsularis is endemic to Banks Peninsula. It appears to have broad habitat requirements, being found in tussock, scrub, open forest and stony areas. It has not been found in wet Podocarp forest on the southern slopes but this possible habitat is now much restricted through felling and burning so that it may be never known whether it was occupied by this species.

Material Examined.

Holotype ♂, allotype ♀, paratypes 8 ♂♂, 3 ♀♀, 11 imm. (C.M.); paratypes 1 ♀, 1 ♀ (Ent. Div.); paratype 1 ♂ (D.M.); paratype 1 ♂ (L.U.); paratype 1 ♂ (A.N.I.C.); paratype 1 ♂ (U.S.N.M.); Kaituna Valley, Banks Peninsula, grid. ref. N.Z.M.S.1. sheet S84 (Christchurch): 100325, under bark of *Fuchsia excorticata* and *Leptospermum scoparium*, 11 October 1964, P. M. & M. Johns. Paratypes 3 ♀♀, 1 imm. (C.M.); Kaituna Valley, grid. ref. sheet S84 (Christchurch): 095334 in *Fuchsia*-broadleaf scrub along banks of stream, 11 October, 1964, P. M. Johns.

Other records.

Various localities on Banks Peninsula, (C.M.).

Celatoblatta laevispinata n. sp.

Figs. 12, 29, 40

C. laevispinata: Johns, 1966.

Length: males 14.5—16 mm, females 16—18mm. *Colour*: vertex brown, frons and clypeus without markings, dorsum entirely yellow-brown with thin, irregular brown vittae down each side, posterior abdominal sternites dark brown. *Male*: penultimate segment of maxillary palp greatly swollen (Fig. 12); suranal plate rectangular, pale yellow-brown apart from brown anterior edge, long hairs on ventral surface only; left pleurite of ninth segment enlarged, heavily chitinised fused with tergite, its ventral posterior corner produced as a long sharp spine under the cercus, right pleurite rectangular, lightly chitinised and weakly fused to

the tergite as is the case in other species; subgenital plate with straight or slightly emarginate posterior edge; epiphallus as in Fig. 29. *Female*: suranal plate with dark brown anterior edge, otherwise pale yellow-brown; cerci not tapering sharply to a point and unmarked (Fig. 40).

Distribution and biology.

C. laevispinata is known only from the alpine screes of Nelson and western Marlborough and follows in general the distribution pattern of other alpine arthropods that are endemic to this region. In the southern end of the St Arnaud Range it mixes with the Canterbury alpine species *C. montana* with no indication of any interbreeding.

Material examined.

Holotype ♂, allotype ♀, paratypes 30 ♂♂, 16 imm., (C.M.); paratypes 1 ♂, 1 ♀ (D.M.); paratypes 1 ♂, 1 ♀, (Ent. Div.); paratypes 1 ♂, 1 ♀ (U.S.N.M.); paratypes 1 ♂, 1 ♀ (L.U.); paratypes 1 ♂, 1 ♀ (A.N.I.C.); Lead Hills, Boulder Lake, Nelson, grid. ref. N.Z.M.S. 1 sheet S8 (Takaka): 985766, under stones in granite rock scree 4,000 ft, 27 October 1963, P. M. & M. Johns.

Other records.

Brown Cow, Boulder Lake, 4,600 ft; Gordon's Knob ridge, Nelson, 3,500-3,800 ft; Mt. Princess, Lake Tennyson 5,800 ft; Crystal Peak, Lake Tennyson, 3,500-6,200 ft; (C.M.). Brown Cow, Boulder Lake, 5,000 ft; (Ent. Div.).

Celatoblatta fuscipes n. sp.

Figs. 13, 28, 54, 62, 71

C. fuscipes: Johns, 1966.

Length males 8—10mm, females 10—12mm. *Colour*: vertex and frons uniformly brown, pale margin to clypeus, labrum brown, small pale region above antennal bases and occiput pale; entire dorsum dark brown with distinct pale margin, no distinct pale maculations but central portions of tergites especially 1st and 2nd, slightly paler, sternites uniformly dark brown with pale margin; coxae with distinct large brown areas, legs dark at bases of spines, the outer edges of tibiae completely darkened. Hind metatarsi relatively short, pulvilli well developed, few ventral spinules; tarsal joints 2 and 3 of all legs with only one spinule on each side of pulvillus, pretarsus of all legs with distal $\frac{1}{3}$ to $\frac{1}{2}$ darkened. *Male*: penultimate segment of maxillary palp swollen (Fig. 13) but not as greatly as in *C. laevispinata*; abd. 1 pit absent, its position indicated by two light brown spots and scattered setae hidden by metanotum; suranal plate (Fig. 54) short but wide, long hairs only along posterior ventral margin, cerci swollen, broadest near the tip, dark brown basally with very pale, rounded tip; epiphallus as in Fig. 28; subgenital plate straight or slightly emarginate. *Female*: suranal plate (Fig. 62), very dark anterior border, the darkened are slightly expanded at bases of cerci and medially, otherwise pale translucent brown. Laterosternal shelf with

field of spinelike setae lateral to the sclerotised axes (Fig. 71) as in most species of *Celatoblatta*. (The laterosternal shelf is the ventralmost internal plate of the genitalia).

Material examined.

Holotype ♂, allotype ♀, paratypes 4 ♂♂, 1 ♀, 9 imm (C.M.); paratypes 1 ♂, 1 ♀ (Ent. Div.); paratypes 1 ♂, 1 ♀ (D.M.); paratypes 1 ♂, 1 ♀ (L.U.); paratypes 1 ♂, 1 ♀ (U.S.N.M.); paratype 1 ♂ (A.N.I.C.); Kelly Range, Arthurs Pass National Park, Kelly Range track from Otira, alpine tussock and rocks, 3,800-4,100 ft. altitude, 24 November 1963, P. M. Johns. Paratypes 3 ♂♂, 2 ♀♀, 6 imm., (C.M.); same locality, 3,700-4,300 ft. altitude, 20 March 1963, R. S. Bigelow.

Other records.

Trovatore Ridge, Lewis Pass; Garnet Peak, east of Lewis Pass; (C.M.).

Celatoblatta quinquemaculata n. sp.

Figs. 33, 52

Length 13—15mm. *Colour*: vertex and frons uniform brown, pale yellow-brown patches above bases of antennae extending onto the lower part of the frons, clypeus and labrum; pale brown margin to the entire dorsum, extending medially along posterior edges of tergites 6, 7 and 8, rest of abdomen dark brown; pronotum with disc pale brown but slighly darker median band, mesonotum and metanotum each with two such pale brown patches, the five maculae of the thorac forming the very characteristic maculation of the species. Metatarsal and tarsal pulvilli much reduced, one spinule on each side of those of forelegs, 1 to 3 on tarsi of middle legs, 5, or 6 on tarsi of hind legs. *Male*: abd. 1 pit absent; abd. tergite 7 occasionally with two depressions as in *C. sedilloti*, suranal plate (Fig. 52) very broad and short, very dark anterior and lateral edges and median band, two very pale lateroposterior patches, cerci relatively narrow, subcylindrical, blunt, smooth dorsally, the sections scarcely distinguishable, black apart from pale tip; epiphallus as in Fig. 33; subgenital plate margin straight, with thin pale border. *Female*: suranal plate with slight median emargination, dark anterior band extending somewhat posteriorly along midline, otherwise translucent pale brown, cerci only slightly longer than suranal plate, black, with pale rounded tips.

Distribution and Biology.

Known only from the alpine zone of some Otago ranges.

Material Examined.

Holotype ♂, allotype ♀, paratypes 11 ♂♂, 5 ♀♀ (C.M.); paratypes 1 ♂, 1 ♀ (Ent. Div.); paratypes 1 ♂, 1 ♀ (D.M.); paratypes 1 ♂, 1 ♀ (U.S.N.M.); paratypes 1 ♂, 1 ♀ (L.U.); Obelisk, Old Man Range, Central Otago; under rocks at 4,200-

4,700 ft. altitude, 21 October 1964, P. M. Johns. Paratypes 16♂♂, 19♀♀, 20 imm. (C.M.); paratypes 2♂♂, 2♀♀ (O.M.); paratypes 1♂, 1♀ (A.N.I.C.); Obelisk, Old Man Range, 5,000 ft. alt., 2 December 1963, R. S. Bigelow.

Other records.

Rock and Pillar Range, Otago 3,000-4,700 ft; Routeburn Valley; Harris Saddle; Lake Mackenzie; Fiordland Nat. Park; (C.M.).

Genus Platyzosteria Brunner v. Wattenwyl

This work was mostly completed before the work of McKittrick (Oct. 1964) came to hand. She examined both *Platyzosteria novaeseelandiae* and *P. rufoterminata* (the latter recorded as *M. brunni*) and this placement within the *Polyzosterinae* seems far more apt than within the Blattinae as Princis would have, based mainly on the symmetry of the tarsal claws (Princis 1960, & pers. comm.). On examination of a single male of *Melanozosteria* sp. from Tonga Islands, the genitalia show a very close relationship, the differences between the Tongan and N.Z. species being of much the same order as between the two New Zealand species. However, there are some striking differences in the form of the suranal and subgenital plates and, of course, the tarsal claws. In the genitalic characters these three species in no way resemble *Melanozosteria semivitta* (Walker) Princis, 1954. As there appears to be still some confusion in the composition of the south-west Pacific genera, the two New Zealand species are, at the moment, retained within *Playtyzosteria* the genus to which *P. novaeseelandiae* has been referred for so many years.

Key to the N.Z. species of *Platyzosteria*

1a Large size, 25-29mm (adult); colour of antennae changing *gradually* from dark-brown basally to light brown distally (all stages), female suranal plate triangular with shallow, median, terminal emargination (all female stages), male epiphallus and hypophallus as in Figs. 63, 69 ... ... *novaeseelandiae*

1b Medium size, 15-18mm (adult); colour of antennae changing abruptly at segments 9-11 from dark brown basally to yellow-brown distally (all stages), female suranal plate broadly convex, without emargination (all female stages), male epiphallus and hypophallus Figs. 65, 68 ... ... *rufoterminata*

Platyzosteria novaeseelandiae (Brunner v. Wattenwyl, 1865)

Figs. 15, 63, 64, 66, 67, 69

Polyzosteria Novae-Seelandiae Br. v. Watt., 1865, p.218.
Periplaneta fortipes Walker, 1869, p.137.
Platyzosteria Novae-Zealandiae: Tepper, 1883, p.90.
Syntomptera novae-seelandiae: Kirby, 1904, p.129.
Polyzosteria novae-Zealandiae: Hutton, 1904.
Platyzosteria novae-seelandiae: Shelford, 1909, p.279, Fig. 12.
Platyzosteria novae-seelandiae: Caudell, 1927, p.18.
Platyzosteria novae-seelandiae: Tillyard, 1926, p.69.
Platyzosteria novae-seelandiae: Princis, 1957.

Holotype in Naturhistorisches Museum, Vienna.

Length 25—29mm, width mesonotum 9—11mm. *Colour*: very dark, deep red-brown, almost black, deep red on ventral surface of abdomen, legs and thinner parts of integument; antennae brown proximally gradually changing to paler brown distally. Entire dorsum finely and evenly punctate. Tegmina fused basally to mesonotum, small, pointed, reaching hind edge of mesonotum, hind wings absent. Spination of middle femora as in Fig. 15. *Male*: suranal plate (Fig. 66) trapezoidal the hind edge slightly but variably set with long setae; subgenital plate with hind edge straight, set with fine setae; cerci (Fig. 66) rigid, pointed, the joints scarcely distinguishable, flat and smooth dorsally, convex ventrally, fine spinules on edges and ventrally, long fine hairs scattered ventrally, tips pale. The very northern populations are slightly different as indicated by the right epiphallus of the genitalia (Figs. 63, 64); this variation is probably clinal. *Female*: suranal plate (Fig. 67) truncate, the hind edge slightly concave.

Distribution and Biology.

A very common species in the lowlands of the North Island and the northern part of the South Island. It does not reach very high on the central highlands of the North Island, being confined to the north-facing slopes and ridges when it does reach 1500-2000 feet altitude. It is an almost entirely coastal species in the South Island.

Records.

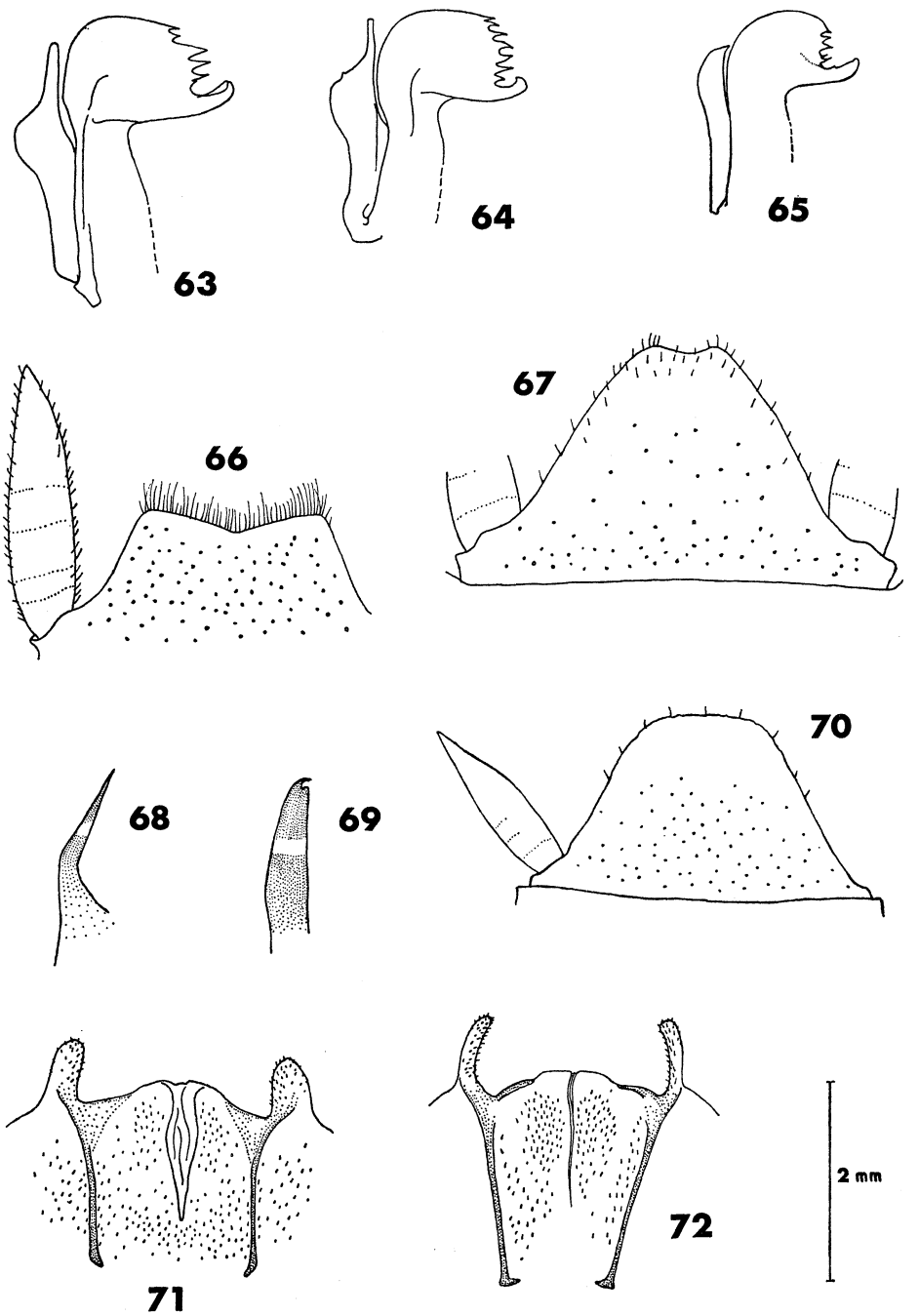
Three Kings Is.; (A.M. and C.M.). Kerr Point, North Auckland; Waipoua; Little Barrier Island; Raetihi; Atene, Wanganui; D'Urville Island; Marlborough Sounds; Anatori Beach, West Nelson; Woodside Ck, Kaikoura; (C.M.). Rotorua; Paraparaumu; Marlborough Sounds; (D.M.).

Platyzosteria rufoterminata (Brunner von Wattenwyl 1865)

Figs. 65, 68, 70

Platyzosteria rufoterminata Brunner 1865 p. 219.
Melanozosteria brunni: McKittrick 1964 (not of Alfken).

Holotype (female) in Naturhistorishes Museum, Vienna. While examining



FIGS. 63-72. 63. *P. novaeseelandiae*, epiphallus, (D'Urville Is.) 64. *P. novaeseelandiae*, epiphallus, (North Cape). 65. *P. rufoterminata*, epiphallus. 66. *P. novaeseelandiae*, ♂ suranal plate. 67. *P. novaeseelandiae*, ♀ suranal plate. 68. *P. rufoterminata*, left hypophallus. 69. *P. novaeseelandiae*, left hypophallus (non-stippled region represents unsclerotised flexible portion). 70. *P. rufoterminata*, ♀ suranal plate. 71. *C. fuscipes*, ♀ laterosternal plate (paratype). 72. *Celatoblatta* n.sp. Canterbury mountains, ♀ laterosternal plate.

several of Brunner's types Dr M. J. Mackerras found that the holotype label of this species clearly states "Neu Seeland, Hochst. 1861" not "Nouvelle-Hollande" (Australia) as published (Brunner, 1865). Recent specimens from the Auckland area where Hochstetter collected are conspecific with the holotype.

Length ♂ 15mm, ♀ 18mm. *Colour*: dark brown to black, legs and thinner parts of the integument red-brown, basal 9—11 segments of the antennae brown, following segments yellow-brown, the abrupt colour change serving to distinguish this species at all stages of development from *P. novaeseelandiae*. In most other general features *P. rufoterminata* is but a miniature of *P. novaeseelandiae*. *Male*: suranal plate with posterior edge straight, subgenital plate regularly convex. In the genitalia there are clear distinctions between *P. rufoterminata* and *P. novaeseelandiae* in the shape of the right epiphallus (Figs. 63, 65) and the structure of the hypophallus (Figs. 68, 69). *Female*: suranal plate (Fig. 70) broadly convex with no terminal sinus, this feature being constant at all stages in the female.

Distribution and Biology.

Confined to the northern part of the North Island, *P. rufoterminata* appears to be an associate of the Kauri (*Agathis australis*) forest, or scrub following milling of such forest.

Records.

Waipoua Kauri forest; Piha; Auckland; Pollok; Little Barrier Island; Great Barrier Island. (Ent. Div. Auck., A.M., C.M., D.M.); Hunua Ranges.

Genus Periplaneta

The two species *P. americana* and *P. australasiae* are cosmopolitan; the former is well known in New Zealand, and while the latter is not definitely known to be established, it so often appears in fruit shops and ships that its inclusion is warranted. Both species are large and fully winged and appear superficially similar. *Periplaneta americana* is used in Christchurch schools where cultures are maintained. It is often reported as inhabiting bakehouses and restaurants in the main cities.

Key to the species of *Periplaneta*.

1a Posterior part of yellow pronotal maculation broad and diffuse: tegmina unicolorous; male and female suranal plate bilobed with deep median cleft ... ... *americana*

1b Posterior part of yellow pronotal maculation narrow and well defined: tegmina with yellow costal area: male suranal plate quadrangular, slightly emarginate posteriorly; female suranal plate bilobed with shallow median cleft... ... *australasiae*

Genus PARELLIPSIDION n. gen.

Type species *Parellipsidion conjunctum* (Walker, 1868)

Fully winged or brachypterous forms having general Blattellid facies. Seven to fourteen millimeteres in length, variable in colour and pattern. Fore femora with two prolateral ventral apical spines, mid and hind femora with one ventral apical spine and 1 to 3 subapical retrolateral ventral spines (Fig. 17), occasional subapical prolateral ventral spines, tibial spurs finely rugose. Tarsi with well developed pulvilli, setose, but no ventral spinules, one spinule on each side of pulvilli of hind metatarsi and the second and third segments, usually absent from fore- and mid-tarsal pulvilli, ariolia large, claws strongly asymmetrical. Male with 1st, 2nd and 7th, or only the 7th tergites modified, suranal plate short, weakly convex or emarginate, its posterior edge spinose or setose, cerci long and tapered or short and broad, always with distinct middle and terminal segments. Subgenital plate rather elongate, asymmetrical, the left style enlarged, the right reduced, the posterior border between the styles straight or slightly convex. Female suranal plate elongate, triangular. Egg cases carried horizontally. Princis (1959) records that the type of *P. conjunctum* could not be found in the British Museum (Natural History). He placed the species provisionally in *Ellipsidion*. In the Key to World genera (Princis 1951) *Parellipsidion* falls into the Pacific genus *Maretina* which Princis (pers. comm.) also considers a near relative. *Parellipsidion* differs from *Ellipsidion* and *Balta* in small details of the wing venation and in the well developed modifications to the male abdominal tergites. The simple form of the male subgenital plate also sharply distinguishes it from *Balta* and the Pacific Island genera *Maretina* and *Aneurinita*. The latter genera also have a well developed elongate, rounded male suranal plate in sharp contrast to the almost straight edge of *Parellipsidion*.

KEY TO THE SPECIES OF *Parellipsidion*

1a Fully winged, vertex dark, frons incompletely darkened, 12 distinct cercal segments ... ... *conjunctum*

1b Brachypterous, vertex pale, frons and clypeus with dark vertical band, 10 cercal segments, basal 2 fused... 2

2a Cerci robust, the terminal segment not longer than broad... *pachycercum*

2b Cerci thin, the terminal segment three times longer than broad *inaculeatum*

Parellipsidion conjunctum (Walker, 1868) **new combination**

Figs. 75, 78, 83, 86

Phyllodromia latipennis Brunner v. Watt., 1865, p.109 (in part).
Blatta conjuncta Walker, 1868, p.109.
Phyllodromia conjuncta: Tepper, 1893, p.43.
Allacta latipennis: Kirby, 1904, p.100 (in part).
Allacta conjuncta: Kirby, 1904, p.100.
Blatta conjuncta: Hutton, 1904.
Allacta latipennis: Caudell, 1927, p.17.
Ellipsidion conjunctum: Princis, 1959, p.138.

Length 12—14mm. *Colour*: always pale yellow-brown, slight markings on vertex, frons and pronotum, tegminal veins slightly darkened, terminal tergites and sternites with dark abdominal markings as in *Ellipsidion*. Tegmina and wings as in Figs. 83, 86. *Male*: 1st and 2nd abd. tergites each with a quite shallow median pit incompletely divided from the posterior by a median ridge, 7th tergite with deep circular depression with distinct median round knob, suranal plate (Fig. 78) short, not reaching beyond first joint of cerci, posterior edge slightly emarginate, covered with short spines that slant to the left, right side slightly swollen at the base of the cercus and the field of spines extends ventral to the cercus; cerci flexible, with twelve distinct segments, increasing in length distally, the last very elongate and thin, five times as long as broad; subgenital plate (Fig. 75) strongly asymmetrical, produced well beyond suranal plate and reaching almost to the fifth joint of the cercus on the left side, left style large, projecting laterally, right style small, projecting ventralwards, paranal plates much reduced (Fig. 78) left to a simple spine, right to a thin plate carrying several small teeth distally. *Female*: suranal plate long, regularly convex, reaching to the level of fifth cercal joint, subgenital plate single, broadly and regularly convex. Hebard (1943) has designated that the name *latipennis* be applied to the species *Phyllodromia latipennis* Brunner V. Watt. from Ceylon.

Distribution and Biology.

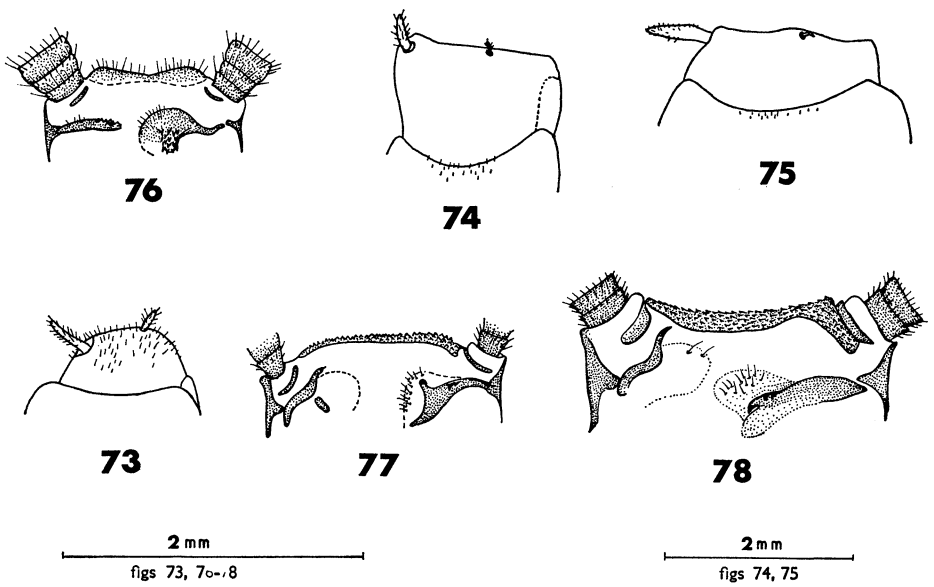
Widely distributed throughout the North Island and the northern part of the South Island this species is common under the bark of Kauri (*Agathis australis*), Totara (*Podocarpus totara*), Rimu (*Dacrydium cupressinum*), Matai (*Podocarpus spicatus*), Kohekohe (*Dysoxylum spectabile*) and Kanuka (*Leptospermum ericoides*) and the dead dry fronds of Tree-ferns (*Dicksonia* sp., *Cyathea* sp.), Kiekie (*Freycinetia banksii*), Nikau palm (*Rhopalostylus sapida*) and Flax (*Phormium tenax*). It is rarely found on the ground.

Material examined.

Figs. 75, 78, 83, 86 are drawn from specimens collected at Piha Gorge, Auckland under bark of Kanuka and Kauri, 11 January 1964, by the author. No Neotype is designated until a further search is made for Walker's type in the British Museum (N.H.).

Other records.

North Cape; Waipoua; Waipu; Titirangi; Waiuku; Hunua Range, Auckland; Little Barrier Island; Te Aroha; Cambridge; Rotorua; Pureora Forest; Marlborough Sounds; D'Urville Island; Irongate Stream, Kaikoura; (C.M.). Cape Reinga; Pahia; Poipoi; Clevedon; (Ent. Div. Auck.). Cape Reinga; Paremata; Wellington; (D.M.).



FIGS. 73-75. Male subgenital plate. 73. *P. inaculeatum* (holotype). 74. *P. pachycerceum* (holotype). 75. *P. conjunctum.*
FIGS. 76-78. Male suranal plate, (ventral view). 76. *P. inaculeatum* (holotype). 77. *P. pachycercum* (holotype). 78. *P. conjunctum.*

Parellipsidion pachycercum n. sp.

Figs. 17, 74, 77, 79

Length 8—9mm. *Colour*: variable, ranging from yellow-brown, through brown to greenish brown, often quite dark especially in southern forms, tissues when alive often blue-green; vertex, frons and clypeus with dark vertical band,

sides of face pale, pronotum with small dark markings (Fig. 79), the sides translucent; tegmina with costal areas translucent otherwise brown patterned by remnants of the venation; abdomen with a series of paired dark spots on each side dorsally and ventrally. Cerci relatively short, dark, the segments fused basally so there are only ten distinct segments, the terminal segment very small, a mere knob in male, a little larger in female, but never longer than broad. Middle femoral spination as in Fig. 17. Pulvilli, especially those of metatarsi much reduced, only hind metatarsi and 2nd and 3rd segments with lateral spinules. *Male*: (Fig. 79) abd. 1 pit very deep, abd. 2 with two small depressions at the $\frac{1}{4}$ and $\frac{3}{4}$ width positions, abd. 6 posterior margin not medially emarginate, abd. 7 with shallow median depression which has a central knob similar to that of *conjunctum*; suranal plate as in Fig 77, field of spinules not as well developed as in *P. conjunctum*; subgenital plate as in Fig. 74. *Female*: suranal plate triangular, reaching to the fourth cercal segment.

Distribution and Biology.

P. pachycercum is widely distributed in the wetter and cooler parts of the South Island; common south of Canterbury but localised north of this region. It extends into the subalpine zone and occasionally mixes with *P. inaculeatum*. The species is found under the bark of *Podocarpus totara* and *Dacrydium cupressinum* but is normally associated with *Metrosideros umbellata*, *Fuchsia excorticata*, *Leptospermum ericoides*, *Olearia* spp. and *Dracophyllum longifolium* and *D. traversii*. It is unrecorded from *Nothofagus* forests. Its presence on the subantarctic Auckland Islands may be due to its cartage there in flax (*Phormium tenax*) when an attempt was made to establish a flax-fibre industry there in the Nineteenth Century as the cockroach is known only from the immediate environs of the settlement on Ross Harbour.

Material Examined.

Holotype ♂, allotype ♀, paratypes 8 ♂♂, 19 ♀♀, 9 imm., (C.M.); paratypes 1 ♂, 1 ♀ (D.M.); paratypes 1 ♂, 1 ♀, (A.N.I.C.); paratypes 1 ♂, 1 ♀ (L.U.); paratypes 1 ♂, 1 ♀, (U.S.N.M.); paratypes 1 ♂, 1 ♀, (O.M.); Kelsey's Bush, Waimate, South Canterbury, grid. ref. N.Z.M.S. 1 sheet S118 (Hakataramea): 536145; on *Fuchsia excorticata* (J. R. & G. Forst.), 12 April 1963, P. M. & M. Johns.

Other records.

Boulder Lake, Nelson; Charwell Forks, Waiau; Jacks Pass, Hanmer; Banks Peninsula; Rakaia Gorge; Peel Forest; Fox's Peak; Claremont Bush, Timaru; Moeraki; Rock & Pillar Range; Dunedin; Balclutha; Bluff; Foveaux Strait Islands; Stewart Is. and offshore Islands; Ross Harbour, Auckland Islands; (C.M.). Banks Peninsula; Dunedin; Stewart Island and offshore Islands; (D.M.). Auckland Islands; (Bishop Museum, Honolulu).

Parellipsidion inaculeatum n. sp.

Figs. 73, 76, 80

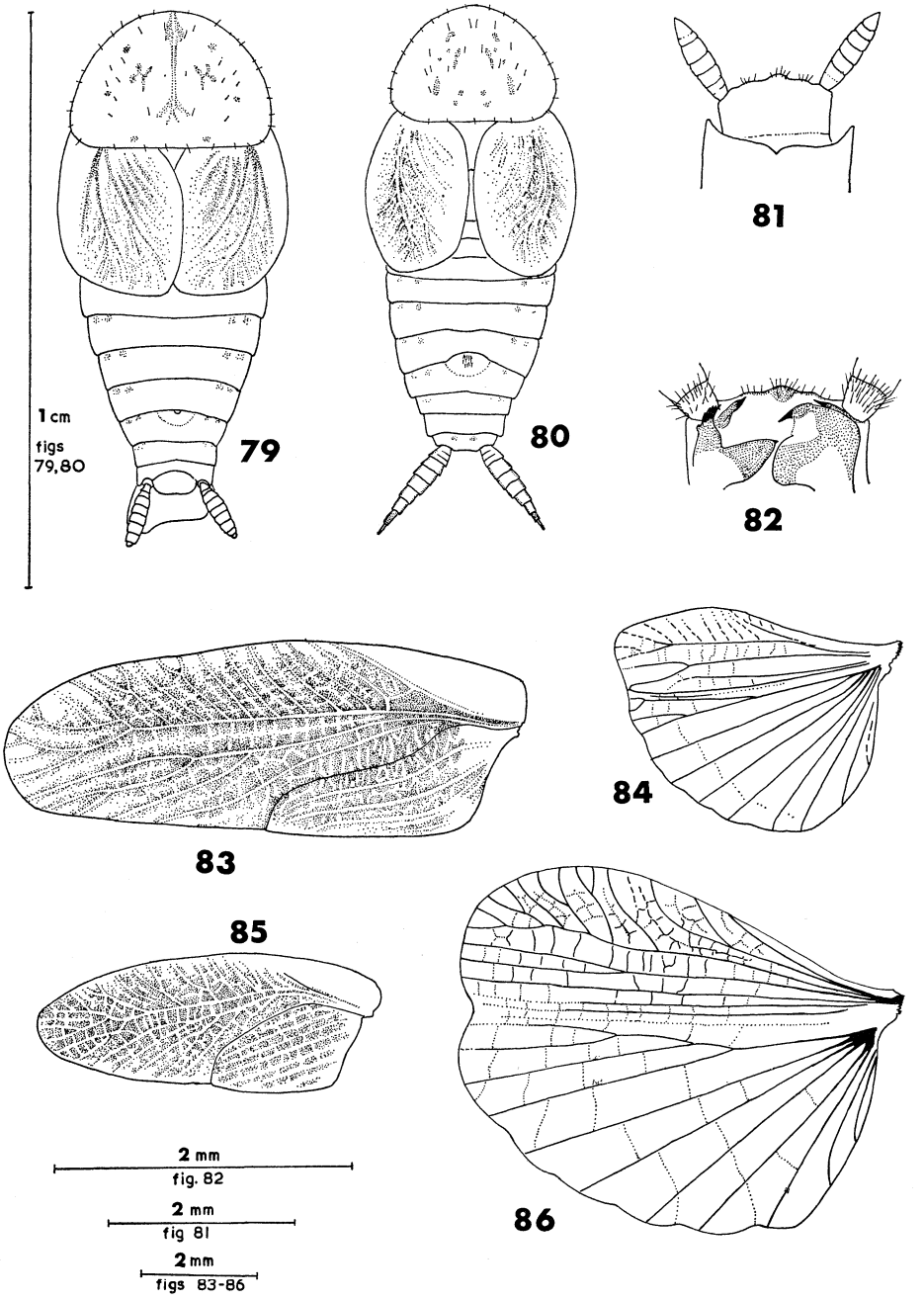
Length 7—9mm. *Colour*: pale yellow-brown, the tissues blue-green in life, median part of frons and clypeus distinctly dark brown, vertex pale but short band of dark brown on occiput, pronotum almost immaculate (Fig. 80), tegmina with remnants of veins outlined, abdomen with pale dorsal markings apart from two distinct spots on male suranal plate and two white patches and dark median band on female suranal plate; abdominal sternites with distinct dark lateral bands. Mid and hind femora each with one subapical prolateral ventral spine. *Male* (Fig. 80): 1st and 2nd abd. tergites unmodified, posterior margin of sixth tergite with distinct median emargination leaving the shallow depression of the 7th tergite uncovered, this depression without central knob but with scattered setae (Fig. 80); suranal plate (Fig. 76) short, but with setae; cerci with terminal segment at least three times as long as broad, the penultimate segment and lateral edges of basal segments quite dark, subgenital plate asymmetrical, styles subequal in size (Fig. 73) left paranal plate with large spinose knob (Fig. 76). *Female* with triangular suranal plate with two dark spots and median dark line.

There appears to be slight variation in the outline of the tegmina, those of the northern populations being larger and more rounded than those to the south. No variation is apparent in the form of the suranal and subgenital plates nor in the genitalia.

Distribution and Biology.

This species is the only alpine member of the genus and is confined to the alpine ranges of Canterbury and Otago. It is obviously extremely hardy, and juveniles, like those of many other alpine insects, are able to withstand freezing temperatures. At the type area, Fox's Peak, South Canterbury, a 3rd or 4th instar individual was found on a snow surface some yards from the edge of the snow-field. It is not known whether it walked or was blown there, but during the day and night immediately prior to collection there was little wind. This individual revived after a short while on the hand. Like all other endemic cockroaches it is cryptic during the day, but at night it freely wanders over the ground and vegetation. Again, at the type area at 4,000 ft, many specimens (see records) were taken on the ground amongst snow-tussock (*Chionochloa* spp.) during the period from 7 p.m. to 10 p.m. The night was slightly foggy and the temperature was probably below 7°C., yet these animals, especially the males, were extremely active and some were noticed *in copulo*. At the same place at 4,500 ft. several individuals were taken in a rock scree together with many oothecae which contained developing embryos. These were taken under rocks not more than one foot below the general scree surface. Snow drifts had only melted from this area within three weeks of the author's visit.

Its distribution is close to that shown by the alpine grasshopper *Sigaus australis* (Hutton) (Bigelow, pers. comm.).



FIGS. 79-86. 79. *Parellipsidion pachycercum* ♂. 80. *Parellipsidion inaculeatum* ♂. 81. *Ornatiblatta maori*, ♂ terminal segments. 82. *Ornatiblatta maori*, ♂ suranal plate (ventral view). 83. Left tegmen, *P. conjunctum*. 84. Left tegmen, *O. maori*. 85. Left wing, *O. maori*. 86. Left wing, *P. conjunctum*.

Material examined.

Holotype ♂, allotype ♀, paratypes 74 ♂♂, 12 ♀♀, 14 imm., (C.M.); paratypes 2 ♂♂, 1 ♀, (D.M.); paratypes 1 ♂, 1 ♀, (Ent. Div.); paratypes 1 ♂, 1 ♀, (A.N.I.C.); paratypes 1 ♂, 1 ♀, (U.S.N.M.); paratypes 1 ♂, 1 ♀, (L.U.); Fox's Peak, Two Thumb Range, South Canterbury, 21 October 1963, 4,000 ft. alt. at night on ground amongst snow-tussock, P M. Johns, R. S. Bigelow & D. Craig. Paratypes 9 ♂♂, 3 ♀♀, 2 imm., same locality at 4,000 ft. amongst tussock and *Celmisia*, 21 October 1963, P. M. Johns. Paratypes 3 ♂♂, 2 ♀♀; 1 imm. plus oothecae, same locality, at 4,500 ft. in rock scree, 21 October 1963, P. M. Johns.

Other records.

Craigieburn Range, 4,500 ft. scree; Cass, 1,800 ft., scree; Ashburton River Gorge, 1,200 ft, scree; Cameron Glacier, Mid-Canterbury, 4,800 ft., moraine; Cameron Valley, Mid-Canterbury, 3,000 ft., scree and tussock; Strone Schrubie Ridge, Rangitata Valley, 3,000-4,300 ft., scree; Fox's Peak, 2,000 ft., river-bed stones and at 3,000 ft. on *Dracophyllum longifolium* at night with *P. pachycercum*; Mackenzie Pass, 3,000-4,000 ft., scree; Mt. Kirkliston, Kirkliston Range, 6,000 ft. rocks; Crown Range, 3,200 ft., rocks by stream; Mt. Mangatua, Dunedin, 2,800 ft., *Celmisia* leaves; Rees Valley, Lake Wakatipu, 2,000-3,000 ft., tussock, scree and *Olearia*; near Homer Tunnel, scree and *Celmisia*; Harris Saddle; (C.M.)

Genus ORNATIBLATTA n. gen.

Type species *Ornatiblatta maori* (Rehn)

Ornatiblatta maori (Rehn, 1904) **new combination**

Figs. 16, 81, 82, 84, 85

Ectobius maori Rehn, 1904, p.541.
Supella supellectilium (Serville): Salmon, 1948. (not of Serville).

Length 8.5-10mm, females slightly larger than males. *Colour*: general ground colour amber, in life with ornate orange, red, and white markings on pronotum, tegmina and dorsum of abdomen, head pale with white markings lateral to and below antennal sockets in male, quite dark but with similar white markings in female, bright colours fade after death; venter of abdomen amber with white posterior borders to sternites; in general markings of female more sharply defined than those of male. Tegmina and wings as in Figs. 85, 84. Hind edges of mesonotum and metanotum produced medially as a broad tooth. Fore-femora with 2 (rarely 3) prolateral and 1 retrolateral apical ventral spines, other femora with 2-4 subapical ventral spines (Fig. 16). Metatarsal pulvilli and those of hind tarsal segments much reduced, all metatarsi and 2nd and 3rd segments with terminal spinules, arolia well developed, claws symmetrical. Cerci with 6-7 segments the basal 2 fused and often indistinct, terminal segment triangular, the

tip slightly rounded. *Male*: 6th tergite with deeply emarginate posterior edge, 7th with deep pit, its lateral parts unfolded, its surface with two posterior knobs set with fine hairs, posterior edge of 9th tergite emarginate (Fig. 81), suranal plate (Figs. 81, 82) weakly crenulate its edge sparsely setose; bases of both cerci with strong ventral spine (Fig. 82), paranal plates each with a strong spine (Fig. 82); subgenital plate triangular with narrow median cleft, the two sides almost overlapping, the styles present as sharp spines, left edge with five short spines not visible ventrally. *Female*: suranal plate short, triangular, with small median notch, subgenital plate braodly rounded its edge quite setose.

Owing to Salmon's (1948) misidentification of this species, *Supella supellectilium* (Serville) must be removed from the list of introduced cockroaches.

Distribution and Biology.

This species appears to be confined to low scrub on the eastern part of Auckland province and outlying islands. It appears to be the only endemic species that is active during the day, having been found often on *Leptospermum ericoides* at the Three Kings Islands. It is also active at night.

Material examined.

Three Kings Islands, (A.M., C.M., D.M.); North Cape region, (C.M., Ent. Div. Auck.); Auckland (various), (Ent. Div. Auck.); Tiri Tiri Island, (D.M.); Great Barrier Is., (D.M.).

Genus SHAWELLA Princis, 1951

Shawella couloniana (Saussure)

Methana sp: May, 1963, p.44., Fig. 3.

May (1963) recorded this species as *Methana* sp. (British Museum (N.H.) identification). It appears to be an established species as it is recorded for the years 1961, 1962 and 1964 near a timber yard in Auckland.

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