A SYSTEMATIC REVISION OF THE NEW ZEALAND POMPILIDAE (HYMENOPTERA) WITH STUDIES ON LARVAE, LIFE HISTORIES, DISTRIBUTION, VARIATION, PALEOGEOGRAPHY, HYBRID-ZONES, MIMICRY, AND ENVIRONMENTAL MELANISM.

ANTHONY CLIFFORD HARRIS

Thesis submitted for the degree of Master of Science with Honours in Zoology at Victoria University of Wellington.

1974.
This study is dedicated to my mother and to the memory of my father.
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ABSTRACT

Eleven species are recognised from New Zealand. They belong to two subfamilies, Pepsinae and Pompilinae, and to three genera—Priocnemis Schiodte, Cryptochelius Panzer, and Epipompilus Kohl. Chrysocurgus Haupt and Trichocurgus Haupt are removed from Townes’ (1957) synonomy with Chirodamus Haliday and resurrected as subgenera of Priocnemis Schiodte, and ten specific names are placed in new synonomy. The following taxa are described as new: Priocnemis (Chrysocurgus) nudopropodea, P. (Trichocurgus) ordishi, and P. (T.) crawi. The sexes are correctly associated for all species—most for the first time. All previously-known species are re-described, morphological structures are illustrated, and keys to species are given for both sexes. Taxonomic decisions are supported by biological, behavioural, and distributional data. Behaviour and nesting cycles are described for all species, life histories are given for six, and the final instar larvae of five species are described. Three species nest above ground, of which E.insularis oviposits on spiders in situ within the diurnal retreats, without making nests. P.(c.) fugax is a mud-dauber favouring beetle pupal chambers in trees, P.(T.) nitidiventris is a stenotope psammophile, while the other species make subterranean nests in diverse habitats; several making single-celled nests, some making multicellular ones, others being colonial. Geographical variation (including mimicry and parallel ecophenotypical colour variation) is described, and distributions of all species are shown,
and discussed in relation to contemporary geography and climate, and to paleogeography. Seven subspecies disjunct at sites of past and present physical barriers are described, but not named. Affinities of the New Zealand species are commented on. *Cryptocheilus australis* Guerin was introduced from Australia in the past three decades. *E. insularis* has strong Tasmanian affinities, while the remaining pompilids have affinities with South America and in particular with subgenus *Sphictostethus*. 
INTRODUCTION

This thesis is a first revision of the New Zealand Pompilidae. The family has long been in need of revision. Hitherto, descriptions have been based either on single specimens, or on very small series, and a number have been described without comparison with previously described species. As colour variation is very marked, involving both the body, and banding and infuscation on the wings, it is not surprising that there should be many synonyms.

Types of all New Zealand species (except nitida and brownii) are in the British Museum (Nat.Hist.) where Dr. M.C. Day has made comparisons between them and the plesiotypes described herein, which were sent to London. The holotype of Sphex nitida Fabricius 1775 has been lost, while the type of Gribodo's Agenia brownii is in Genoa where it is inaccessible to me as the Museo Civico di storia Naturale "G. Doria" is currently without an entomologist.

Behaviour, morphology, and niche are closely interrelated. In many cases behavioural studies enabled a more accurate taxonomic interpretation of morphology, especially where convergent evolution was involved.

Similarly, comparative larval morphology provided a check to the classification based on adults.

An understanding of the mimicry complexes provides an insight into some patterns of geographical variation. The facts that melanism varies clinally in four species from Spirits' Bay (lat. 34.50) to Port Pegasus (Stewart Island, lat. 47.3) in relation to climatic factors, that varying degrees of melanism can be induced in some
species (but not in others) by lowering temperatures experienced by the pupa, and that disruptions in the clines occur at the sites of past and present geographical barriers were invaluable to my assessment of the taxonomic standing of geographical isolates and colour forms, many of which had been named.
METHODS

Collecting:

From November to April of 1971-72, and in 1972-73, a collection of 5,245 pompilids was assembled by collecting throughout New Zealand. To these were added the few specimens contained in the country's main insect collections. Routes taken and major collecting stations are mapped in fig. 01 (Appendix).

Malaise traps made to Townes' 1972 specifications were run in patches of sunlight in insect flyways (fig. 02, Appendix). Smaller traps were placed over specific nesting sites. These were made to Oliver's specifications (fig. 03, Appendix) save that the sides and front were spray-painted black.

Plastic bags, of about 30 x 15 cm, were used to capture walking, or stationary wasps. Half-pint preserving jars were used in their place when wind prevented the use of plastic bags.

Wasp on wing were caught in 45 cm diameter sweep nets.

Rearing:

Larvae were reared in plastic pots measuring 5 cm (diameter) x 4 cm (height).

Parasitised spiders were placed in small depressions in compacted sterile earth and a small section of leaf, changed each day, was added to maintain the desired humidity.
Experimental crosses between allopatric populations were performed in 2m x 2m x 3m cages, lined with fine terylene sky-painted black.

Storage of material:

Adults were kept in 75% alcohol, and pinned on my return. Larvae and host spiders were fixed according to van Emdens' method (1942) and kept in 75% alcohol.

Examination of preserved material:

**Larvae:** Head capsules were removed and drawn with the aid of a squared lens graticule. They were then cleared in 10% KOH and drawn again. Skin and spiracle preparations were similarly cleared and mounted. Larvae of *Eupomphilus insularis*, *Priocnemis (c.) nitida*, *P.(C.) fugax*, and *P.(T.) carbonarius* were freeze-dried and examined with a Cambridge Mk2a scanning electron microscope.

**Adults:** Adults were examined with a Zeiss stereo-microscope and genitalia and subgenital plates were viewed with a Zeiss standard junior compound microscope.

Illustrations:

Line drawings were made, on paper squared to a one cm grid, with the aid of a squared lens graticule.

Study material:

Material from the following collections has been examined in this study; the abbreviations (which mostly follow the Union List of serials in New Zealand libraries) are those by which the collections are referred to in the text.

**Institutions:**

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<td>Auckland Institute and Museum</td>
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<tr>
<td>AU</td>
<td>University of Auckland Zoology Dept.</td>
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<tr>
<td>CMu</td>
<td>Canterbury Museum</td>
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<tr>
<td>CU</td>
<td>University of Canterbury Zoology Dept.</td>
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The latter will be placed in the Otago Museum. Many people gave specimens and a large collection especially assembled by Mr. R.C. Craw was invaluable.

A total of 6,342 adult New Zealand pompilids was examined. In addition, over 340 wasps representing 161 extra-limital species having affinities with the endemic species and genera were studied. Countries of origin included North and South America, England, Central and Southern Europe, Korea, Japan, and Australia. For these I must thank Drs. M.C. Day (British Museum, Nat.Hist.), H. Wolf (Plettenberg, Germany), E. Riek (C.S.I.R.O., Australia), R. Fisher (University of Michigan, U.S.A.), K. Chang-Whan (Korea University, Seoul, Korea), and Mr. R.C. Craw, who obtained a valuable collection of South American species.
GENERAL CHARACTERISTICS OF FAMILY POMPILIDAE

The family Pompilidae includes long-legged, solitary wasps that provision their cells with spiders. The females can often be seen during summer running rapidly over the ground, nervously flicking their folded wings as they search for prey. Many will cease their activities when a small cloud causes a shadow, for heliotaxis is a characteristic of the family. Pompilids characteristically use a single specimen of prey to provision a cell, the paralysed spider is dragged backwards across the ground, the female uses the apex of her abdomen as a trowel and as a hammer during preparation of the burrow and, usually, and in contrast to most other wasps, the prey is caught before the nest is prepared. However, one or another of the New Zealand species violates all of the last three traits.

While some overseas pompilids are said to be host specific, all of the New Zealand species take a range of prey species and hunt by habitat.

Adult pompilids are distinguished from all other wasps by the presence of a single, straight, transverse groove that divides the mesopleuron into upper and lower halves (fig. 13), while the larvae differ from all other solitary wasps in having the second pair of thoracic spiracles greatly reduced.

Structure and terminology: I; adults:

Salman (1929) provides a general discussion on the external morphology of an adult pompilid. A number of his interpretations, however, are incorrect and most later taxonomic studies have used additional terms, with the result that for many structures there has been
a considerable proliferation of names. For these reasons, a discussion of the morphological features used in the present study is given together with a list of synonyms in current use for the male genitalia.

Because sexual dimorphism is marked, many characters of taxonomic importance in females are not present on males, and vice versa.

**Head: (figs. 3, 4, 5):** Many important taxonomic characters are borne on the head. The mandibles have either one or two teeth on the inner margin - conditions termed unidentate and bidentate by Evans (1950) who, unlike other workers (e.g. Townes, 1957), does not consider the apex to be a "tooth". Both the clypeus and the labrum are variable and are useful taxonomically. In the case of the former, a ratio derived by dividing the breadth by the width is used at the species level. The eyes, ocelli, frons, and vertex provide useful characters, many expressing in the form of ratios. The ratio POL:OOL is widely used, the former term representing the distance of the posterior ocelli from one another (post-ocellar line) which is divided into the latter - this being the distance of one posterior ocellus from the nearest point of the compound eye (ocello-ocular line). Evans (1950) measures as well, the distance between the compound eyes at three places - the upper interocular distance (UID), the middle interocular distance, which is the distance between the eyes at their greatest emargination (MID), and the lower interocular distance (LID) between the eyes at their point of closest convergence below. The maximum breadth of the head is termed the transfacial distance (TFD), and the height
from clypeus to vertex is the facial distance (FD), the former being divided into the latter to give a ratio (fig. 5).

The malar-space is herein regarded as the shortest distance between the lowest part of the compound eye and the mandible and is often useful to distinguish between closely related species. (I have followed Evans (e.g. 1950, 1973) in dividing the malar-space measurement into the length of the second antennal segment. It occurred to me that it would be an improvement to divide the malar space into the width of the jaw at its base, because this last is unvariable in position, and is situated directly beneath the malar area. However, it is my wish that the descriptions of New Zealand Pompilidae should be readily comparable with those of Evans, who is working on, and has already described many of, the Pompilidae of the Southern Hemisphere.)

The labium and maxillae (fig. 9) of the New Zealand Pompilidae bear useful characters at the specific and subgeneric levels, such as the relative lengths of the segments of the maxillary palp, and the development of the premental bristles.

Male antennae have 13 segments, while females of all New Zealand species have 12. A useful characteristic of dead pompilids in collections is that the antennae of males are gently arched while those of females are more tightly curled.

Thorax: The transverse collar is separated from the rest of the pronotum by a sulcus, the streptaulus. The pronotal tubercle is close to the tegulae. Ventrally, the large pro-pleura faces the tempora and the prosternum
situated between the coxae is very reduced.

The mesothorax consists of a mesoscutum ("mesonotum" of Evans, 1950) and posterior scutellum with a flat or rounded discoidal area and declivous sides. Anteriorly, the prescutal sutures are minute or lacking. Parapsidal sutures extend half-way on either side of the mesoscutum, the area lateral to them being termed the parapsides. (In Epipompilus insularis, they extend the full length of the mesopleuron.)

A groove partially separates the mesepimeral and mesepisternal parts of the mesopleuron. The large mesopleurala meet mid-ventrally, the mesosternum having been lost.

The metathorax has a raised metanotum and a depressed metapostnotum, the latter continuous with the metapleurae.

The terminology of the thorax used herein is illustrated in figs. 1 and 3 (Epipompilus insularis) subfamily Pompilinae, and figs. 2 and 4, Priocnemis (Trichocurgus) conformis, subfamily Pepsinne).

Thorax and Propodeum: Students of Aculeate Hymenoptera usually consider the first abdominal segment in conjunction with the thorax. Thus Haupt (1938) proposes the term "holmus" for thorax and propodeum in Pompilidae, and Michener (1944) proposes the equivalent term "mesosoma" for bees. "Alitrunk" is often used for this region - especially for ants (e.g. by Bolton, 1973), and "truncus" is sometimes used as well (e.g. by Brown and Kempf 1969). In descriptions earlier then 1914, the entire region is usually termed "thorax".
"Mesosoma" is a term most widely used today, and it has been adopted herein.

(Mesosoma = "thorax" Holmus alitrunk truncus)

Wings: The wing venation of Hymenoptera is more removed from the generalised type than that of any other group of insects. It is possibly for this reason that, among contemporary pompilid systematists, a variety of wing and cell terminology are in current use. Many workers (e.g. Townes, 1957) use the Rowher and Gahan system (1916) which is a modification of the Jurine system constructed over a hundred years ago. Though simple, it makes no attempt to homologise the venation with that of other insects.

Some continental workers use a system devised especially for the Pompilidae by Haupt (e.g. explained in Haupt, 1962) which differs from most others mainly in that the cell is always named according to the vein directly above it.

Ross (1936) advances a system based on the research of workers in insect phylogeny, as well as on critical comparisons between the wings of Hymenoptera and Mecoptera. (Modern entomologists consider the Hymenoptera to have an ancient mecopteran origin, and to be the most primitive of the Panorpoid group (e.g. Malyshev, 1966). Ross's system is widely used today (e.g. by Evans (1950), Lanham (1951), Michener (1944), Richards (1956), Riegel (1949), and Riek (1970), and because it is probably the most valid of the existing systems and is "the most successful attempt to establish a universally applicable
system" (Richards, 1956) it has been used in the present study (Richards' 1956 interpretation). Its terminology is shown in figs. 6 and 7.

Legs: The legs are very long. Presence or absence of a tarsal comb is a useful character. Because it is subject to abrasion, taxonomists recognise its presence by a spine at the middle of the second tarsal segment of a similar length to the apical spine.

The claws are dentate of bifid, depending respectively on whether the single tooth is short and erect, or longer and parallel to the axis of the claw. The setulae on the pulvillar pad are numerous, and are used taxonomically.

Metasoma: The remaining abdominal segments are variously termed the abdomen, gaster, or metasoma. The last name is adopted herein.

The male metasoma consists of seven visible segments. The sixth is emarginated posteriorly, where it bears a pair of small processes on either side. The seventh apparent sternite, which is morphologically the ninth, forms the subgenital plate (fig. 11) and closes the genital chamber. It is taxonomically very useful at the species level. Across its basal part, and entirely within the abdomen, lies the basal sclerite which is the true eighth segment.

The male genitalia: structure and synonymy of terms:

The male genitalia have proved to be very useful, both for distinguishing between the New Zealand species, and as indicators of interspecific relationships. The external genitalia are attached to the hind margin of the ninth segment, and share a common plan with those of most Hymenopteran groups. However, the parts are known by an
extraordinary number of terms. Those of the early workers are partly listed in Boulange's (1924) work on the Symphyta. In 1941, Snodgrass devised a terminology which has been widely used because it provides the only survey of the structures in all families. However, Snodgrass, like most workers who have studied the development of the male genitalia, denies that it includes any abdominal appendages, claiming that its parts developed from the original penis by secondary sclerotization in its wall. Contrariwise, studies based on the comparative anatomy of genitalia of different orders conclude that the parts arose from abdominal appendages, and that only the inner part corresponds to the aedeagus (e.g. Michener (1944, 1944a), Peck (1932), Smith (1970). The fact that the controversy has yet to be settled probably accounts for the continued use of a great many terms. Because taxonomists working on Pompilidae over the past two decades have used up to eight different terms for the same structure, I have included a list of synonyms. In the present study, the terminology of Evans (1950) which is based on that of Snodgrass (1941) has been used, with minor modifications.

**Structure:** The most basal part of the genitalia consists of a short hollow cylinder - the basal ring. Posterior to it lies the remainder of the genitalia (fig. 10). The elongate aedeagus in the centre is attached to the phallobase by a pair of basal apodemes. On either side of the aedeagus are the parapenial lobes which are always devoid of setae. External to those structures are the volsellae of which the distal, elongate digitus volsellaris is very variable between the species both in
its general shape, and in the number and type of sensillae it bears. Its expanded proximal part often bears setae. The outermost appendages are the parameres. These frequently have a raised, heavily-pigmented area near the base. I have followed Evans (1950) in terming this area the "squama", though it should be noted that Townes (1957) uses this term for the entire paramere. A pair of laminae volsellarae lie ventrally between the basal plates, and are produced into one or two sclerotised spines which project towards the aedeagus.

List of terms in current use for the male genitalia of Pompilidae:

1. a. aedeagus (e.g. Evans, 1950)
   b. aedoeagus (e.g. Priesner, 1965, 1966)
   c. penis (e.g. Haupt, 1962; Arnold, 1950, 1951)
   d. spatha (e.g. Wolf, 1960; Smith, 1970 (in Tuxen))
   e. valve peniala (e.g. Scobiola, 1963)
   f. penis valve (e.g. Richards, 1956)

2. a. parapenial lobes (e.g. Evans, 1950; Richards 1956; Townes, 1957; Smith 1970)
   b. lobi parapeniales (e.g. Priesner, 1965, 1966)
   c. forcipes intermediae (e.g. Haupt, 1962)
   d. sagitta (e.g. Wolf, 1960)
   e. lobe dorsal (e.g. Scobiola, 1963)
   f. inner or dorsal arm of the stipes (e.g. Arnold 1950, 1951)
3.  
   a. digitus volsellaris (e.g. Evans, 1950)  
   b. parameres interiores (e.g. Priesner, 1965-66)  
   c. Forcipes exterioreis (e.g. Haupt, 1962)  
   d. volsella (e.g. Wolf, 1960)  
   e. digitus (e.g. Richards, 1956)  
   f. inner paramere (e.g. Arnold, 1950-51)  
   g. volselle (e.g. Scobiola, 1963)  

4.  
   a. parameres (e.g. Evans, 1950; Richards, 1956)  
   b. Squama (e.g. Townes, 1957)  
   c. parameres exterioreis (e.g. Priesner, 1965-66)  
   d. Gonopoden des a segmentes (e.g. Haupt, 1962)  
   e. stipes (e.g. Wolf, 1960)  
   f. outer, or central arm of the stipes (e.g. Arnold, 1950-51)  
   g. gonostyle (e.g. Scobiola, 1963; Smith, 1970)  

5.  
   a. basal hooklets (e.g. Evans, 1950)  
   b. lamina volsellaris (e.g. Richards, 1956)  

6.  
   a. Cardo (e.g. Evans, 1950)  
   b. gonobase (e.g. Scobiola, 1963; Smith, 1970)  
   c. basal ring (e.g. Snodgrass, 1941; Richards, 1956)  
   d. gonocardo (e.g. Priesner, 1965-66)  

7.  
   basis volsilaris (e.g. Evans, 1950)  

8.  
   a. gonocoxite (e.g. Scobiola, 1963)  
   b. basis paramere (e.g. Richards, 1956)


3. Head and mesosoma, dorsal, *Epipompilus insularis* ♀

4. Head and mesosoma, dorsal, *Priocnemis (Trichocurgus) conformis* ♀

5. Head ratios. *Priocnemis (Trichocurgus) conformis*

6. Wing vein and cell terminology adopted herein.

7. Ross' system (1936), Richards' 1956 interpretation.

- *Epipompilus insularis* ♀
8. *Priocnemis (Trichocurgus) nitidiventris* Smith ♀
   Habitus sketch

9. Labium and maxilla. *(P.(T.) carbonarius* Smith ♀

10. Male genitalia *P. (T.). carbonarius* Smith

11. Male subgenital plate *P.(T.) carbonarius* Smith.
THE NEW ZEALAND FAUNA

The following eleven species comprise the New Zealand Pompilid fauna. The seven races have not been named in this study.

Family: Pompilidae

Subfamily: Pepsinae

Tribe: Pepsini

Priocnemis (Chrysocurgus) nitida (Fabr.)
- Northland race
- Central and Southern North Island race
- South Island race

P. (C.) Fugax (Fabr.)
P. (C.) nudopropodea n.sp.

Priocnemis (Trichocurgus) monachus Smith
P. (T.) conformis Smith
- northern race "conformis"
- Southern race "diligens"

P. (T.) nitidiventris Smith
P. (T.) ordishi n.sp.
P. (T.) carbonarius Smith
P. (T.) crawi n.sp.

Cryptocheilus australis Guerin

Subfamily: Pompilinae

Tribe: Epipompilini

Epipompilus insularis Kohl
- Southern melanic race.
KEY TO THE NEW ZEALAND SPECIES OF POMPILIDAE (Adults)

1. Antenna with 13 segments. Apex of metasoma with a prominent subgenital plate below (e.g. figs. 24, 25) (male) .............................................. 12
   Antenna with 12 segments. Apex of metasoma without a prominent subgenital plate below, and with a sting which may be retracted (female) .................... 2

2. (1) Wings evenly tinted with yellow ...................... 3
   Wings clear hyaline, or lightly infuscated; never yellow .............................................. 8

WINGS TINTED WITH YELLOW

3. (2) Metasoma with a transverse groove on the second sternite, and a lateral suture on the first tergite (fig. 13) .............................................. 4
   Metasoma without a transverse groove on the second sternite; and without a lateral suture on the first tergite (fig. 12) ... Epipompilus insularis p.114

4. (3) Antenna (including entire flagellum), tibiae, and metasomal tergites except the first coloured bright yellow ochre ...... Cryptocheilus australis p.262
   Antenna, tibiae, and metasomal tergites not coloured bright yellow ochre ...................................... 5

5. (4) Forewing with 2nd radio-medial cross-vein almost vertical (within 10°) to the wing axis (fig. 15). Prementum with short erect setae (fig. 18).
       ........... Priocnemis (Trichocurgus) conformis p. 73
Forewing with 2nd radio-medial cross-vein notably oblique (over 24° from vertical) to the wing axis (fig. 14). Prementum with a fascicule of very long, apically-curved bristles (fig. 19) .......................... 6

6. (5) Hind tibia with 11 dorsal scales, nos 3-9 well-developed (fig. 20).
Propodeum with dense golden pubescence and a very large, somewhat flattened, dorsolateral tubercle behind the spiracle (fig. 30) .........

...... Priocnemis (Chrysocurgus) nitida p. 25

- Hind tibia without well-developed scales. Propodeum without a well-developed tubercle behind the spiracle (fig. 28) .......................... 7

7. (6) Propodeum with dense golden pubescence. Pygidium with a sharp, medial longitudinal carina below. Malar space very poorly developed (fig. 16) ....

............ Priocnemis (Chrysocurgus) fugax p. 39

- Propodeum without dense golden pubescence. Pygidium without a sharp, median, longitudinal carina below. Malar space very well developed. (fig. 17) ....

.... Priocnemis (Chrysocurgus) nudopropodea n.sp. p. 52

WINGS NOT YELLOW

8. (2) Body, especially head and antennal scape, densely covered with long black hairs. All pubescence, including the paraoccipital patch between eye and antennal socket, black. Hind tibia with a row of 12 very well developed scales. (fig. 22) ....

...... Priocnemis (Trichocurgus) monachus p. 65
- Body hair relatively sparse. Pubescence, including that on the front of the head, whitish ...................... 9

9. (8) Hind tibia with dorsal row of scales, nos.3-7 very well developed. Malar space absent to moderately well developed ......................... 10

- Hind tibia without well developed dorsal scales - these represented by small tubercles. Malar space always well developed. ................................. 11

10. (9) Malar space very small or absent. Hind tibia with dorsal scales narrow; usually with a single series of small scales basally ......................... p.101

- Malar space moderately well developed. Hind tibia with scales, very broad, semi-lunar; usually with a double series of small scales basally .......... p.110

11. (9) Front tarsus with an exceptionally well developed comb; its first segment bearing 5-6 long setae (slightly longer than the tarsal width), which project laterally on the outer side (fig. 23A). Hind tibia with a dorsal series of small, low, blunt tubercles. A stenotope psammophile of beach, dune, river, and stream sand .......... p. 86

- Front tarsus without an exceptionally well-developed comb; without an obvious row of long lateral setae. (fig. 23B).

Hind tibia with a dorsal series of small tubercles,
sharper, and more elevated than those of *nitidiventris*.
Non-psammophilous ........................................

............. **Priocnemis (Trichocurgus) ordishi** n.sp p.96

**MALES**

12. (1) Wings tinted with yellow ................................. 13
   - Wings not tinted with yellow ................................. 17

13. (12) Antennae (including entire flagellum), tibiae, and
metasomal tergites except the first, coloured bright
yellow ochre (bright chrome yellow when fresh)

............. **Cryptocheilus australis** p.262
   - Antennae, tibia, and metasomal tergites not tinted with
yellow ................................................................. 14

14. (13) Sixth metasomal sternite bearing medially a single,
prominent, sharp deltoid keel (fig. 25)

............. **Priocnemis (Chrysocurgus) fugax** p. 48
   - Sixth metasomal sternite without a prominent medial
keel ................................................................. 15

15. (14) Fifth metasomal sternite with a pair of large,
curved deltoid projections near the lateral margins
(fig. 24). Clypeus with a conspicuous rounded pale
yellow spot on either side ............

............. **Priocnemis (Chrysocurgus) nudopropodea** n.sp. p. 57
   - Metasoma without projections on the first 6 sternites

................................................................. 16

16. (15) First segment of metasoma very markedly petiolate,
the sides sub-basally concave when viewed from above.
(fig. 31) ... **Priocnemis (Chrysocurgus) nitida** p. 34
- First segment of metasoma not markedly petiolate, sub-basally convex when viewed from above, the tergite steeply declivous .............................................. ........................ Priocnemis (Trichocurgus) conformis p. 82

WINGS NOT TINTED WITH YELLOW

17. (12) Antenna crenulate in lateral profile (fig. 26).
   Front black, with a lemon yellow paraoccipital spot above the clypeus between the eye and antennal socket ........ Epipompilus insularis p.119
- Antenna not crenulate in lateral profile (e.g. fig. 27)
   Front without a yellow spot above the clypeus ... 18

18. (17) Body hair black, dense. Length of longest hairs on antennal scape at least 0.75 latter's maximum width. Pubescence sparse, black. First tergite of metasoma steeply declivous, produced medially into a strong, compressed tubercle .................
       ........ Priocnemis (Trichocurgus) monachus p. 70
- Antennal scape not densely covered with long black hairs. Pubescence silvery-white. First metasomal tergite rounded side in profile ....................... 19

19. (18) Apical part of subgenital plate very broad, with a fringe of long setae projecting well beyond its lateral margin .................................................... 21
- Apical part of subgenital plate narrower, sub-cuneiform, or deflected downwards; without a lateral fringe of long setae ............................................. 20
20. (19) Subgenital plate short, squat, apically-decurved, medially notched (fig. 38). Parameres in lateral profile evenly attenuated, without either a notch, or humps below (fig. 36). ................

..... Priocnemis (Trichocurgus) crawi n.sp. p.112

- Subgenital plate long, sub-cuneiform, rounded apically (fig. 37). Parameres massive in side view, with a semi-circular notch on ventral margin abutted on either side by prominent humps (fig. 35). .......

..... Priocnemis (Trichocurgus) carbonarius p.107

21. (19) Subgenital plate constricted, medially, hour-glass fashion (fig. 42). Detached genitalia in ventral views with the parameres slender, apically clavate; the sharp ventral ridge basally squamiform, rising to a thin, very prominent, deltoid ridge, (fig. 40). Not psammophilous ................

........ Priocnemis (Trichocurgus) ordishi n.sp. p. 99

- Subgenital plate never constricted medially, hour-glass fashion (fig. 41). Parameres (when not deflected outwards) with a broad flat ventral surface, rather parallel sided, never clavate apically; the basal keel short, oblique (fig. 39). A stenotope psammophile, (beach, dune, stream, river sand)...............

........ Priocnemis (Trichocurgus) nitidiventris p. 91
Illustrations for Key

12. *Epipompilus insularis* ♀ to show the absence of lateral crease and ventral groove on metasoma.

13. *Priocnemis (Chysocurgus) nitida* ♀ to show presence of lateral crease and ventral groove.

14. Wing of *P.(C.) nudopropodea* n.sp. to show slanting radiomedial cross-vein.


16. *P.(C.) fugax* ♀ head, to show small malar space.

17. *P.(C.) nudopropodea* n.sp. ♀, head to show well developed malar space.

18. *P.(T.) conformis* ♀, labium and maxilla to show short premental bristles.

19. *P.(C.) fugax* ♀, labium and maxilla - to show fasicule of long, apically curved bristles.

20. *P.(C.) nitida* ♀, hind tibia - to show scales.

21. *P.(T.) carbonarius* ♀, hind tibia, to show scales.

22. *P.(T.) monachus* ♀, hind tibia to show scales.
Illustrations for key

23A.  **P.(T.) nitidiventris**; first three tarsal segments of fore leg - to show well-developed tarsal comb of lateral bristles on outer margin.

23B.  **P.(T.) ordishi**; *n*.*sp.* first three tarsal segments of fore leg - to show ill-developed tarsal comb.

24.  **P.(C.) nudopropodea** *n*.*sp.* $0^*$. apex of metasoma, ventral, to show distinctive sub-lateral keels on fifth sternite.

25.  **P.(C.) fugax**, $0^*$, apex of metasoma, ventral to show absence of lateral keels and distinctive median keel on sixth sternite.

26.  **Epipompilus insularis** $0^*$, crenulate antenna (in side view).

27.  **P.(T.) nitidiventris** $0^*$, filiform antenna (in side view).

28.  **P.(C.) nudopropodea** *n*.*sp.* $Q$, propodeum, and petiole of metasoma: dorsal.

29.  **P.(C.) nudopropodea** *n*.*sp.* $0^*$, petiole of metasoma, dorsal.

30.  **P.(C.) nitida**, $Q$, propodeum with pubescence removed, and petiole of metasoma:dorsal. (Note laterodorsal tubercles on propodeum)

31.  **P.(C.) nitida** $0^*$, petiole of metasoma
Illustrations for key.

32. **P.(T.) carbonarius** ♂ genitalia
33. **P.(T.) nitidiventris** ♂ genitalia
34. **P.(T.) ordishi** n.sp. ♂ genitalia
35. **P.(T.) crawi** n.sp. ♂ lateral aspect of left paramere.
36. **P.(T.) carbonarius** ♂ lateral aspect of left paramere.
37. **P.(T.) crawi** n.sp. ♂ subgenital plate
38. **P.(T.) carbonarius** ♂ subgenital plate
39. **P.(T.) nitidiventris** ♂ left paramere, ventral
40. **P.(T.) ordishi** n.sp. ♂ left paramere, ventral
41. **P.(T.) nitidiventris** ♂ subgenital plate
42. **P.(T.) ordishi** n.sp. ♂ subgenital plate
N.B. If difficulty is experienced with a male identification, its genitalia and subgenital plate should be removed and compared with the illustrations (figs. 43-61) herein. These are highly distinctive for all species.

Subgenus Chrysocurgus Haupt.

Chrysocurgus Haupt, 1937, pp. 127, 134
Synonymised with Chirodamus Haliday by Townes, 1957; resurrected herein as a subgenus of Priocnemis Schiodte.
Type Species Sphex nitida fabr. 1775: original designation.

Diagnosis:

Wings subhyaline, always tinted with yellow, often with a transverse fascia; the second radio-medial cross-vein slanting obliquely at an angle greater than 24° from vertical (relative to the wing axis). First segment of metasoma never strongly declivous above, the tergum usually evenly or gently rounded when viewed from the side; usually petiolate or subpetiolate.
Propodeum with or without glistening golden pubescence.
Hind tibia of females moderately bristly, or smooth with only a few minute scattered bristles; its dorsal row of scales oblique, moderately well-developed or vestigal.
Fifth tarsal segment often without preapical ventral spines. Females with the clypeus unspecialised or specialised, the latter condition with the disc moderately vaulted forwards and with an enlarged flattened, arc-shaped rim apically, so that the apex appears very broad and blunt from below; labrum specialised, its apex sharply recurved to form a wide flat face at an angle of
from $84^\circ$ to $90^\circ$ to the disc; labium specialised, its submentum always with a fascicule of very long, apically curved bristles. Male genitalia with the digitus volsellaris complex, without sensillae basiconica on its outer 0.5. Male subgenital plate with a compressed lateral tubercle near its apical articulation with the 8th sternite.

Females employing mud architecture during nesting, or not, the former nesting above the ground. Females never readily digging firm, self-supporting nest burrows with compacted walls in the ground away from stones, roots, or other objects besides which naturally-occupying crevices form.

Nidification formula: $b+c+a+d+e+f+g$. (Alen's terminology 1948) Prey - nest - egg - closure. (Evan's and Eberhard's terminology, 1970). Nests apparently never multicelled, legs of spiders never amputated, prey dragged backwards by third coxa. Spiders stung by Chrysocurgus species remain in deep, permanent paralysis. Larva with sparse, very short setae on the head and thorax, the longest head seta above the labrum never longer than 0.30X the diameter of the antennal orbit. Clypeus without a median sulcus or impression. Labrum with the latero-apical angles somewhat angular, the lateral lobes subangulate, and the median lobe with the apical margin sub-rectilinear. Spicules on median epipharyngeal lobe small, uncrowned, blunt. Cells between ridges inside the spiracular atrium irregular, not elongated, some with short median, vertical extensions (pockets). Parietal bands very long (figs 114 - 134).
COMMENTS:

This group includes species with Auplopus-like, or Dipogon-like characters in adult morphology, behaviour and in the extremely thin-walled cocoon of fugax, although they are unrelated to overseas species of Auplopodini. Such similarities appear to have been acquired through convergent evolution with a reduction in, or the loss of, digging, their nesting above ground (two species), and the use of mud to seal nests (one species).

However, it should be stressed that the convergent evolution in Chrysocurgus towards tribe Auplopodini and genus Dipogon (Tribe Pepsini) is superficial. The produced petiole in Chrysocurgus does not closely resemble that of Auplopus, while Dipogon has comparatively short, rather stumpy legs. Chrysocurgus differs behaviourally as well. Its single-celled nests, failure to amputate legs of prey, and habit of transporting spiders backwards differ from the multicellular nests, leg amputation, and method of transportation—viz. straddling spiders held by the spinnerets and walking forwards (Auplopodini) and sideways (Dipogon).

The distinctive sparse, short head setae on fugax and nitida larvae contrast markedly with the numerous long head setae of Dipogon and Auplopus.

Subgenus Sphictostethus Kohl [1864, Pp. 37, 47]:

Chrysocurgus n.sg. is probably con-subgeneric with Sphictostethus as used by Townes, 1957, notwithstanding his placement of nitida in Chirodamus (p. 11). He synonymises Haupt's monotypic genera Chrysocurgus and Trichocurgus (nitida and monachus) in Chirodamus, stating (p. 11) that he has seen other New Zealand species which belong to the last genus. However, on page 81 (ibid) he states that he has examined some New Zealand Priocnemis species of the subgenus...
Sphictostethus. I conclude from that that males of nitida were not associated with the females when Townes examined the collections of the British Museum, because nitida males fit his concept of Sphictostethus as closely as any of the New Zealand species. All of the endemic Pepsinae have a number of Chirodamus-like features. In the subgenus Chrysocurgus the male genitalia has some resemblance to Chirodamus, the bilobed apically curved digitus volsellaris of nudopropodea and fugax, and the stout pegs on the parameres of fugax, resemble those of several South American Chirodamus species such as C. hirticeps (Guer.) (Chile) and C. fidanzae (Holmberg) (Argentina).

Janvier (1930) discusses the biology of two Chilean species of Haploneurion and one Sphictostethus. He describes H. minus as dragging spiders many metres up trees and putting them into holes of wood-boring beetles, and closing the cells somewhat hastily with frass. H. apogonum nests in the ground and closes cells more firmly. Both transport spiders backwards by a hind coxa and make single-celled nests. Their nesting behaviour thus closely resembles subgenus Chrysocurgus (fugax, nudopropodea, nitida).

Evans (1958) and Wilson (1971—quoting Evans, 1958) state that "Haploneurion" places spiders in beetle holes in trees and does not close its nests. They regard the nesting cycles ("prey-niche-egg") as comparatively primitive.

Townes (1957) places Haploneurion in the synonymy of Sphictostethus, which he regards as a subgenus of Priocnemis.

I have examined a number of Chilean Sphictostethus species, and as most of them possess a submental fascicule of bristles similar to those of the New Zealand Chrysocurgus group, I think they would have a similar function in transporting material for nest-closure. It is possible that the cited authors had not witnessed complete cycles, or that their species have achieved simplified nidification patterns through specialisation.
Sphictostethus is best represented in South America and several species, for example the Chilean P.(S.) xanthopus Spinola, are clearly related to subgenus Chrysocurgus. Thus the affinities of the three New Zealand species are with South America - the closest Australian representative being the apterous "ant-mimic-ing" genus Iridomius Evans 1970, which M.C. Day (pers. comm.) considers to be possibly Sphictostethus.

Priocnemis (Chrysocurgus) nitida (Fabr.) figs. 13, 43, 53, 65, 70, 72, 84, 91, 94.

Sphex nitida Fabricius, 1775, p.351, No. 28; Type locality: "Nova Hollandia" Location of type: "British Museum, Banks Coll" (lost before 1973); 1781, p.449, No. 39; 1787, p. 276, No.45;1793, p. 63; Christ, 1791, p.291; Gmelin, 1790, p.2731, No.66.

Pompilus nitida (Fabricius 1798) p.250, No.25; 1804, p.195, No.36.

Chrysocurgus nitida (Fabr.) Haupt. 1937, pp.127, 134.

Chirodamus nitida (Fabr.) Townes, 1957. p.11.

Pompilus fugax (Fabr.) Smith 1855, p.163, No.223.

Salius fugax (Fabr.) Sharell, 1971, plate 195.

Priocnemis wakefieldi Kirby, 1881, p.39, Type locality: "New Zealand" (South Is.) Location of type: British Museum, Banks Coll.

NEW SYNONOMY Waterhouse, 1884, plate 137.

Salius Wakefieldi (Kirby) Kohl, 1884, p.45; Dalla Tore, 1897, p.245; Cameron 1898, p.47; 1902, p.297; Hutton 1904, p.97; Hudson, 1914, p.121; Tillyard, 1926, p.292, pl.2, fig.20; Miller 1971, p.26, pl.4, fig.6.
Taxonomic notes:

The type specimen was collected by Banks and Sollander between 9.9.1769 and 30.3.1770. Unfortunately some mixing of material occurred during the voyage of the "Endeavour", resulting in a few New Zealand species being erroneously described as from South America or Australia and vice versa. Hence Fabricius listed Australia as the type locality for nitida, and Haupt, (1937) stated that it occurs in Queensland, New Zealand and the Fiji Islands. It does not actually occur outside New Zealand.

Fabricius' 1775 description is quite unambiguous. However Dr. M.C. Day of the British Museum informs me (Pers. comm) that the type has been lost - and that the specimen standing in the Banks collection is a female of P. conformis (Smith) which he has therefore labelled "specimen not type". I conclude that the type disappeared before 1855, because in that year Smith synonymised nitida with P. fugax Fabr. stating (p.163) that "On comparison, these insects in the Banksian collection will be found to be the same", and because Kirby (1881), though identifying fugax correctly, and recognising that Smith's synonomy was incorrect because Fabricius' names fugax and nitida represented different insects, nevertheless did not recognise some specimens of nitida sent to him by Wakefield for which he created the nominal species wakefieldi.

Dr. M.C. Day informs me (pers. comm) that P. wakefieldi is represented in the British Museum collections by a series of 47 specimens, of which 7 are old enough to have been seen by Kirby in 1881. Of these, two females and
and a male were presented by Wakefield, and are listed in
the accessions register as "Priocnemis fugax". Thus these
three specimens are syntypes of P. wakefieldi and a
lectotype designation is necessary.

I have found that in three areas, namely the South
Island, North Island south of Auckland, and Northland
north of Warkworth distinctive colour-forms easily
recognisable in 100% of the population in both sexes,
occur. I have decided against their formal recognition
as sub-species pending further experimentation.

**Diagnosis; **

**♀:**

Head, mesosoma, and metasoma always reddish brown.
Wings sub-hyaline, tinted with yellow, apically infuscated;
forewing variously spotted with infuscation between
Warkworth and Wellington, never with a transverse fascia;
third radio-medial cross-vein not notably bent. First
three antennal segments always reddish, the third
sometimes infuscated apically. Prementum with a well-
developed fasciule of very long, apically curved setae.
Hind femur with two small very stout peg spines and two
narrow ones very low on the outer side at the apex; mid
femur with one apical peg spine. Hind tibia with a dorsal
row of 11 scales, of which numbers 3-9 form prominent
oblique ridges (fig. 94 ) Fifth tarsal segments with
up to 13 well-developed subapical spines on the ventral
surfaces. Propodeum with dense golden pubescence;
produced dorso-laterally into a large, sub-depressed
tubercle that gives the propodeum a somewhat hexagonal
outline in dorsal view. Pygideum without a dorsal median
longitudinal carina.
Topotype of *P. wakefieldi* Kirby, South Island form.

**Description:** Length 16 mm, forewing 13.8 mm. **Colour** and vestiture: Head, mesosoma, and metasoma reddish-brown, nitid: palpi fulvous, labrum and proximal parts of mandibles castaneo-rufous, apical parts of mandibles infuscated, their apices black; antennal scape reddish-brown, flagellum increasingly infuscated distally; legs entirely light rufo-fulvous. Forewing hyaline tinged with light yellow amber, with a narrow apical infuscation (in maximum width less than \( \frac{1}{5} \) the length of cell 3Rs) on both wings, and extending along the anal margin on the hind pair; veins amber, translucent; stigma deep amber, sub-opaque. Distal part of mesepisternum, lateral portion of metasternum and propodeum thickly covered with long, fine, recumbent golden hair; pubescence aeneus, clypeus with long erect aeneus hairs, remainder of body very sparsely hairy except for the usual hairs on the abdominal apex.

**Structure:** Prementum with a fasciule of 32 long curved bristles, divided into left and right groups, of which the basal 6 pairs are longest, extending to the galea (fig. 91). Last 4 segments of maxillary palp in a ratio of about 1:1.3:1:1, segment 3 about 3.25 x as long as its maximum width, segment 4 about 5.83 x as long as its maximum width, 0.71 x as long as antennal segment 3; apical segment 1.24 x median length of clypeus. Clypeus 3.40 x as long as high, strongly emarginated apically, with a submarginal row of 23 stout, erect setae. Malar space 0.31 x antennal segment 2. Antennal segments
1-4 in a ratio of about 1:0.33:1.23: scape 2 x as long as wide, segment 3 about 4.08 x as long as wide, 0.72 x upper interocular distance. Head 1.20 x as wide as high; middle interocular distance 0.61 x width of head; upper interocular distance 0.79 x lower interocular distance. Ocellar triangle very compact, its front angle less than a right angle. POL: 00L as 7:3. Front nitid, closely covered with small punctures. Median frontal suture discontinuous, becoming obsolete shortly forward of the anterior ocellus, but deeply incised along its apical 0.6. Pronotum small, its posterior margin angulate. Thoracic dorsum with small punctures as on the front, pleurae with smaller close, indistinct punctures. Mesoscutum large, with prescutal and parapsidal sutures, median scutal line absent. Posterior margins of metanotum and metapostnotum straight. Propodeum (fig. 70) with a median impressed line; produced dorso-laterally behind the spiracle about midway into a large, somewhat flattened tubercle, giving the propodeum a more-or-less hexagonal outline from above. Front femora 3.85 x as long as wide, without spines, apex of mid femur with a small, blunt spine anteriorly, apex of hind femur with a series of 4 small spines anteriorly. Front tibia with the outer apical bristle vestigial. Hind tibia with a dorsal row of 11 scales, numbers 3-9 being well developed (fig. 94) Tarsi combed, fifth tarsal segment with stout, pre-apical, ventral spines, but only one pair towards the sides; claws dentate. Forewing (fig. 72) with stigma 0.39 x as long as total length of marginal cell - this removed from the wing tip by 0.48 x its own length. Submarginal cell 3 about 0.67 x as long as submarginal cell 2. Hind wing with cu-a joining at the M and Cu1 bifurcation. First
segment of metasoma not petiolate, the tergite convex when viewed above and quite steeply convex in lateral view. Pygideum unspecialised with the usual apical bristles and without modifications for manipulating mud.

**Variation:**
- **Size:** Length 8.5 mm - 22 mm. Forewing 7.5 mm - 19 mm.
- **Colouration and vestiture:** The colouration of the South Island form is virtually constant throughout, and specimens from Kinloch (beside Lake Wakatipu) are completely castaneo-rufous, with the first 3 antennal joints reddish. Unlike the other species in its subgenus, nitida shows no tendency towards southern melanism.

**Structural variation is minimal.**

**Races:** Three distinctive geographical forms occur.

1. **South Island form** (also present on d'Urville and Stephen's Islands in Cook Strait). This form always has the forewing without infuscation basal to the third radio-medial cross vein, the apical infuscation being very small. There is a deep median furrow on the frons immediately above the antennal sclerites. The disjunction between North and South Island forms involves 100% of wasps in all samples.

2. **Central and Southern North Island form** (Also present on Kapiti and Mana Islands in Cook Strait and on Great Barrier Island). This form is immediately recognisable by the infuscated forewing. Uneven darkening occurs on the marginal cell, the first, second and third submarginals, the first, second, and third medials, the cubito-anals, and the anal cells. The median frontal sulcus above the antennal sclerites is variable, being almost as well developed in some specimens as it is in South Island samples, while in others it is obsolete. This variation
is present in series taken at the same time and locality at Wellington sites, Kai Iwi and other North Island localities.

3. Northland form Above Warkworth, the fore wing is clear, as it is in the South Island form. In some areas, e.g. in the Puketi Forest, a small fascia is sometimes present on either side of the medial vein and the radial sector, similar to that in Central and Southern North Island males. There is not a furrow on the frons immediately above the antennal sclerites, and this feature readily distinguishes Northland forms from South Island forms, which are extremely similar.

Between the latitudes of Leigh (48 miles north of Auckland) and Auckland city forms intermediate between the Northland and Central and southern North Island forms occur, although at the latitude of Warkworth, most specimens are quite without infuscation other than the narrow apical band.

In experimental crosses between South Island forms (Nelson) and Central and Southern North Island forms (Wellington), intermediates similar to those in the 48 miles wide zone between Auckland and Warkworth were produced (appendix v). Mayr (1969, p. 194) presents a key for determining subspecies on the basis of geographical distribution and observed interbreeding. When it is applied to nitida three forms unequivocally key out as subspecies. However, to give subspecific names to any population imputes more than one can know about that population in a three year study, while adding yet another name to the profusion of names that clutter taxonomy, and because the variation accords well with recognised geographic zones and barriers (see below
"Zoogeography") it is more convenient to refer to them by name.

If, when I have carried out further experiments, subspecific - or even full species - names are then warranted, the names *wakefieldi*, *nitida* and *borealis* could be used for the South Island Central and southern North Island, and Northland forms respectively.

Other variations:

The apical femoral spines are variable. Abrasion can result in fewer spines. Sometimes there will be three very stout spines on the hind femur while in other, usually smaller specimens only one will be stout, the remaining spines being slender. The range of variation in 19 selected characters of 15 individuals from widely separated localities is shown in tables 1 and 2.

Teratological abnormality: Two specimens from Roxburgh, 2 - R-1970, 2900' on Old Man Range with the entire head capsule, thorax, coxae and trochanters, propodeum and basal parts of the metasoma deeply rugose.

Material examined:

570 females from the following localities: NORTH ISLAND: Northland Form: Kaitaia ACH; Manginangina Kauri Reserve (5), ACH; Paiaka, RAC; Trounton Park (7), ACH; Muir Park, Whangarei (6), ACH; Muriwai (9), ACH; Leigh (10), ACH; Waitakere Ranges (7) ACH; D.S.I.R.: Intermediates: Leigh (1), ACH; Mt.Wellington (1) D.S.I.R.: Waitakere Ranges (3) D.S.I.R. ACH; Owairaka (Auckland) (2), D.S.I.R. ACH; Bethel's Beach (Auckland) AMA;

Central and Southern North Island Form: Great Barrier Island (5) ACH; Waiheke Island (6), D.S.I.R. ACH; Titirangi (Auckland) D.S.I.R.; Omana Bay (Auckland )CU; Glen Eden
Table 1. *Priocnemis (Chrysocurges) nitida*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 15 females.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary palp ratio</th>
<th>Antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northland Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manginanginajauri Res.</td>
<td>1.12 : 1.29 : 1 : 1</td>
<td>0.94 : 0.34 : 1.22 : 1</td>
</tr>
<tr>
<td>Muir Pk., Whangarei</td>
<td>1.12 : 1.33 : 1 : 1</td>
<td>0.95 : 0.38 : 1.18 : 1</td>
</tr>
<tr>
<td>Mt. Wellington, Auckland</td>
<td>1.22 : 1.28 : 1.04 : 1</td>
<td>1.02 : 0.39 : 1.22 : 1</td>
</tr>
<tr>
<td>Central and Southern North Island Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whakaputiti Str.,</td>
<td>1.26 : 1.34 : 1.09 : 1</td>
<td>1.09 : 0.47 : 1.23 : 1</td>
</tr>
<tr>
<td>Mt. Ruapehu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Waikaremoana</td>
<td>1.16 : 1.27 : 0.96 : 1</td>
<td>1.14 : 0.44 : 1.21 : 1</td>
</tr>
<tr>
<td>Kai Iwi (Wanganui)</td>
<td>1.11 : 1.26 : 1.01 : 1</td>
<td>1.07 : 0.40 : 1.18 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua Rd.</td>
<td>1.13 : 1.34 : 1.04 : 1</td>
<td>1.13 : 0.37 : 1.28 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua Rd.</td>
<td>1.13 : 1.23 : 1 : 1</td>
<td>1.07 : 0.42 : 1.23 : 1</td>
</tr>
<tr>
<td>Linden, Wellington</td>
<td>1.17 : 1.27 : 1 : 1</td>
<td>1.05 : 0.40 : 1.17 : 1</td>
</tr>
<tr>
<td>South Island Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top House, Nelson</td>
<td>1.28 : 1.43 : 1.16 : 1</td>
<td>1 : 0.42 : 1.22 : 1</td>
</tr>
<tr>
<td>Ashley R. at State Highway1.05</td>
<td>1.14 : 1 : 1 : 1</td>
<td>1 : 0.39 : 1.22 : 1</td>
</tr>
<tr>
<td>Peraki Rd., Banks Peninsula</td>
<td>1.26 : 1.43 : 1.10 : 1</td>
<td>0.97 : 0.41 : 1.20 : 1</td>
</tr>
<tr>
<td>Karangarua R., South Westland</td>
<td>1.24 : 1.35 : 1.05 : 1</td>
<td>1.01 : 0.42 : 1.25 : 1</td>
</tr>
<tr>
<td>Roxborough</td>
<td>1.07 : 1.23 : 1 : 1</td>
<td>1 : 0.41 : 1.23 : 1</td>
</tr>
<tr>
<td>Kinlock</td>
<td>1.18 : 1.28 : 1 : 1</td>
<td>1.03 : 0.41 : 1.20 : 1</td>
</tr>
</tbody>
</table>
Table 2. *Priocnemis* (*Chrysocurges*) *nitida*: Range of dimensions for 6 South Island and 6 North Island females from localities given in Table 1, and 3 Spirits Bay specimens.

<table>
<thead>
<tr>
<th></th>
<th>South Island Females</th>
<th>North Island Females</th>
<th>Spirits Bay Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\bar{x})</td>
<td>range</td>
<td>(\bar{x})</td>
</tr>
<tr>
<td>max. plp. seg. 4 (\frac{1}{W})</td>
<td>6.95</td>
<td>6.41 - 7.42</td>
<td>6.70</td>
</tr>
<tr>
<td>max. plp. seg. 4 (\frac{1}{T})</td>
<td>0.75</td>
<td>0.70 - 0.82</td>
<td>0.75</td>
</tr>
<tr>
<td>ant. seg. 3 (\frac{1}{T})</td>
<td>1.10</td>
<td>0.99 - 1.20</td>
<td>1.02</td>
</tr>
<tr>
<td>clypeus (\frac{W}{H})</td>
<td>3.32</td>
<td>3.52 - 3.17</td>
<td>3.10</td>
</tr>
<tr>
<td>malar space ant. seg. 2 (\frac{1}{T})</td>
<td>0.20</td>
<td>0.17 - 0.27</td>
<td>0.13</td>
</tr>
<tr>
<td>scape (\frac{L}{W})</td>
<td>2.14</td>
<td>1.98 - 2.31</td>
<td>1.94</td>
</tr>
<tr>
<td>ant. seg. 3 (\frac{1}{W})</td>
<td>3.71</td>
<td>3.47 - 3.91</td>
<td>3.65</td>
</tr>
<tr>
<td>ant. seg. 3 (\frac{1}{T}) U.I.D.</td>
<td>0.75</td>
<td>0.70 - 0.83</td>
<td>0.74</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>1.24</td>
<td>1.15 - 1.29</td>
<td>1.21</td>
</tr>
<tr>
<td>F.D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.62</td>
<td>0.66 - 0.60</td>
<td>0.58</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.79</td>
<td>0.74 - 0.85</td>
<td>0.79</td>
</tr>
<tr>
<td>L.I.D.</td>
<td>0.48</td>
<td>0.42 - 0.54</td>
<td>0.49</td>
</tr>
<tr>
<td>P.O.L.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O.U.T.</td>
<td>3.90</td>
<td>3.56 - 4.17</td>
<td>3.90</td>
</tr>
<tr>
<td>front femur (\frac{L}{W})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stígma 1 marginal cell 1</td>
<td>0.42</td>
<td>0.40 - 0.44</td>
<td>0.46</td>
</tr>
<tr>
<td>d. from apex marginal cell 1</td>
<td>0.47</td>
<td>0.43 - 0.51</td>
<td>0.50</td>
</tr>
<tr>
<td>submarginal cell 3 1</td>
<td>1.56</td>
<td>1.44 - 1.76</td>
<td>1.45</td>
</tr>
</tbody>
</table>
(Auckland) (5), AU; Nihutupu (Auckland) ACH; Pureora, RoFo; Ranui, Waitemata AR; Minjwahangata Bush (2) AR; Port Charles (2) ACH; Mangawera R. (2), RoFo; Aniwaniwa (3), ACH; Mt. Te Aroha (2) D.S.I.R.: Tauranga CU; Mamaku Forest, RoFo; Rotorua (23), ACH; RoFo; Hiarau Ra, RoFo, Kuharoa, RoFo; Blowhard Bush, Taihape Rd. (2), CU; Lake Waikaremoana (3), ACH; RoFo; Urewera, D.S.I.R.; Hastings ACH; Waihohonu track, Mr. Ruapehu, AR; Taranaki Falls (National Park) (4), ACH; Mongahui Stm. (National Park), ACH; Horipito (2), CU; New Plymouth, ACH; Opunake, ACH; Kai Iwi (6), D.S.I.R.; Atene, Wanganui R. (5), ACH; Feilding, AR; Anzac Park, Palmerston North, RoFo; Avalanche Flats (Tararua Ra.) ACH; Donnoley's Flat (Tararua Ra.) (8), ACH; Renata hut (Tararua Ra.), (46), ACH; Smith Ck. (Tararua Ra.), (2), ACH; S. Waiotauru R. (Tararua Ra.), (3), ACH; Peka Peka Beach (Waikanai), ACH; Akatarawa Saddle (Wellington), (64), ACH; Paekakariki Foreshore (32), ACH; Silverstream (Hutt V.), ACH; Keith George Memorial Park, (Hutt V.), (4), ACH; Colonial Knob (Porirua), (2), ACH; Linden (Wellington), (11), ACH; Karori (Wellington), (5), ACH; Wilton's Bush (Wellington), (2), ACH; Wainui Ridge, (3), ACH; Wainuiomata, (6), ACH; Lowry Bay, (2), ACH; Kelburn (Wellington), (3), ACH; Botanical Gardens (Wellington) (16), ACH; Red Rocks (Wellington), ACH; SOUTH ISLAND: South Island Form: d'Urville Is. (7), D.S.I.R.; CU; Stephen's Island, (4), D.S.I.R.; Picton, ACH; Onekaka, ACH; Nelson, (5), D.S.I.R. ACH; Upper Maitai 2,000' (Nelson), (6), D.S.I.R. Whangamoa Saddle (Nelson), D.S.I.R., Golden Downs (Nelson) (5), RoFo; L. Rotoiti (2), CU; St. Arnaud Ra. (Nelson Lakes), CU; Takaka Hill, RoFo; Red Hill (Wairau Valley), (2), ACH; Mt. Riley, Richmond Ra,
ACH: Belgrave, D.S.I.R.; Granville (Nelson), RoFo; Mt. Algidus, 2000' ACH; Mt. Robert, ACH; Mt. Arthur (2), D.S.I.R.; Mt. Grey, D.S.I.R.; Oaro, CU; Kaikoura (2), ACH; Lake Taylor, ACH; Kelley Ck. (Otira), ACH; Eyrewell, RoFo; Cashmere (Christchurch) (3), CU; Kainga (Christchurch), ACH: Dallington (Christchurch) ACH; Puke Atua Bush (Banks Peninsula) (4), D.S.I.R.; Bealey-Waimakariri River Junction (8), ACH; Arthurs Pass, ACH; Mt. Cheseman, ACH; Sugarloaf 3,500 (Cass), CU; Mt. Misery, 3,500, (Cass), CU; Cass, (3) CU; Mt. Somers, ACH; Fog Peak, 4,500, CU; Ashley R., ACH; Ashburton Gorge, (2), CU; Mt. Binser 5,200, CU; Peel Forest, (16), ACH; Ranaitata R., (near Peel Forest) (2), ACH; Pleasant Point, ACH; Lion's "Bush" Temuka ACH; Kelsey's Bush (Waimate) (63) ACH; Lake Morakei (South Westland), (6), ACH; Port Jackson, (10), ACH; Martin's Bay (Fiordland) (2), ACH; Trotter's Gorge (Hampden), ACH; Lake Pukaki, CU; Beaumont Forest, RoFo; Balmoral, RoFo; Waipouri, ACH; Kinloch, ACH; Jordan R. ACH; Routeburn Track, ACH; Old Man Range, 2,500' ACH.

Number of females of each form:

Northland form 48
Intermediate 8
Central and Southern North Island 292
South Island form 222

Priocnemis (Trichocurgus) nitida (Fabr.); MALE

Diagnosis: Wings tinted yellow, metasoma very notably petiolate, the sides of its first segment subbasally concave when viewed from above. Venter of metasoma without obvious medial, or sub-lateral keels on the 6th apparent sternite (immediately basad to the genital segment).

The distinctive subgenital plate (fig. 43) usually projects sufficiently for an identification to be made on that character alone.
Male Riccarton Bush, Christchurch 5.3.72, A.C. Harris, Topotype of Wakefieldi, South Island Form.

Description: Length 10 mm., Forewing 9.5 mm.

Colour and vestiture: Very similar to the female, except that the antennae have segments 1 and 2 reddish brown and the remainder fuscous brown, rather than a gradual infusion towards the apex. Wings hyaline tinged with yellow, veings light amber translucent, stigma fuscous-amber, opaque, the apical infusion extending across the forewing at the level of the stigma. Front with decumbent aenous pubescence, vertex with a few erect infuscate setae.

Structure: Last 4 segments of maxillary palp in a ratio of about 1.05:1.10: 0.95: 1; Segment 4 about 4.78 x as long as its maximum width, 0.92 x as long as antennal segment 3; apical segment 1.33 x median length of clypeus. Clypeus 3.33 x as wide as high, its disc convex, apically emarginated, with a submarginal row of about 16 long erect setae. Malar space 0.25 x antennal segment 2. Antennal segments 1-4 in a ratio of about 0.89: 0.31: 0.93:1; scape 1.64 x as long as thick, segment 3 about 2.40 x as long as thick, 0.52 x upper interocular distance. Head 1.28 x as wide as high, middle interocular distance 0.61 x width of head; upper interocular distance 0.92 x lower interocular distance. Ocellar triangle compact, on a raised vertex, its front angle less than a right angle. POL: 00L 15:6. Frons sub-nitid, closely covered with indistinct punctures, frontal line deeply and broadly sulcate from the upper level of the antennal sockets to a point halfway to the median ocellus. Pronotum short, its posterior margin angulate. Postnotum and postmetanotum moderately long. Thoracic dorsum almost impuncate (though very small close, indistinct punctures are discernible under a magnification of 45x). Propodeum with the impressed median sulcus very broad on the disc, dorso-lateral tubercle smaller than in the female. Metasoma with petiole very well defined, its sides concave in dorsal and ventral outline. Tarsal claws bifid. * Forewing with the stigma 0.48 x as long as the
total length of the marginal cell, this being removed from wing tip by 0.30 x its own length; third submarginal cell 1.33 x as long as second. Hind wing with cua-a joining at the M and Cui bifurcation. Subgenital plate broad, notched apically and on either side medially, with a deep groove into which the eighth sternite fits (fig. 43). Genitalia: aedeagus simple; parapenial lobes simple, rod-like, apically decurved; digitus volsellaris with the apex clavate, inwardly curved, and bearing small, thick, sharply pointed setae. Paramers thin, simple, apical one third reduced, suggesting a twist at the point of reduction (fig. 53).

Variations: size: Length: 7.5 mm. - 15 mm.; forewing 7 mm. - 13 mm.

Subspecies and races:

Males also have recognisable forms in the same three areas as do the females. South Island males do not have a fascia on the forewing. Central and southern North Island males have a small fascia composed of darkened hairs on either side of the medial vein and radial sector. Northland forms lack the fascia on the forewing, and lack the median impression above the level of antennal sclerites present in South Island forms.

The range of variation in 19 selected characters of 10 individuals from widely separated localities is shown in tables 3 and 4.
Table 3. *Prioconemis (Chrysocurgus) nitida*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 10 males.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary palp ratio</th>
<th>Antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northland Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manginangina Kauri Res.</td>
<td>0.85 : 1.06 : 0.84 : 1</td>
<td>0.81 : 0.37 : 0.91 : 1</td>
</tr>
<tr>
<td><strong>North Island Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotorua</td>
<td>0.96 : 1.10 : 0.95 : 1</td>
<td>0.88 : 0.38 : 0.91 : 1</td>
</tr>
<tr>
<td>Kai Iwi (Manganui)</td>
<td>0.97 : 1.11 : 0.90 : 1</td>
<td>0.83 : 0.41 : 0.92 : 1</td>
</tr>
<tr>
<td>Linden, Wellington</td>
<td>0.96 : 1.09 : 0.93 : 1</td>
<td>0.85 : 0.41 : 0.95 : 1</td>
</tr>
<tr>
<td>Botanical Gardens, Wellington</td>
<td>1.01 : 1.15 : 0.91 : 1</td>
<td>0.93 : 0.38 : 0.94 : 1</td>
</tr>
<tr>
<td>Botanical Gardens, Wellington</td>
<td>0.92 : 1.11 : 0.90 : 1</td>
<td>0.87 : 0.42 : 0.88 : 1</td>
</tr>
<tr>
<td><strong>South Island Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cawthron Park, Nelson</td>
<td>1.07 : 1.38 : 1.09 : 1</td>
<td>0.82 : 0.45 : 0.87 : 1</td>
</tr>
<tr>
<td>L. Rotoiti, Nelson Lakes</td>
<td>1.02 : 1.20 : 0.93 : 1</td>
<td>0.94 : 0.42 : 0.98 : 1</td>
</tr>
<tr>
<td>Dean's Bush, Christchurch</td>
<td>1.04 : 1.17 : 0.93 : 1</td>
<td>0.96 : 0.39 : 0.94 : 1</td>
</tr>
<tr>
<td>Trotter's Gorge, Hampden</td>
<td>1 : 1.18 : 0.99 : 1</td>
<td>0.93 : 0.40 : 0.94 : 1</td>
</tr>
</tbody>
</table>
Table 4. *Priocnemis* (Chrysocurgus) nitida: Range of dimensions for 8 males from localities given in Table 3.

<table>
<thead>
<tr>
<th>ratio</th>
<th>South Island Males</th>
<th>Lower and Central North Island Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \bar{x} )</td>
<td>range</td>
</tr>
<tr>
<td>max.plp.seg.4 ( \frac{1}{w} )</td>
<td>7.55</td>
<td>6.45 - 8.51</td>
</tr>
<tr>
<td>max.plp.seg.4 ( \frac{1}{l} ) ant.seg. ( \frac{3}{l} )</td>
<td>1.04</td>
<td>0.94 - 1.15</td>
</tr>
<tr>
<td>max.plp.seg.6 ( \frac{1}{l} ) medium 1. clypeus</td>
<td>1.26</td>
<td>1.21 - 1.30</td>
</tr>
<tr>
<td>clypeus ( \frac{w}{h} )</td>
<td>2.75</td>
<td>2.56 - 2.93</td>
</tr>
<tr>
<td>malar space</td>
<td>0.16</td>
<td>0.13 - 0.19</td>
</tr>
<tr>
<td>ant.seg.2 ( \frac{1}{l} )</td>
<td>1.94</td>
<td>1.80 - 2.08</td>
</tr>
<tr>
<td>scape ( \frac{1}{w} )</td>
<td>3.02</td>
<td>2.75 - 3.33</td>
</tr>
<tr>
<td>ant.seg.3 ( \frac{1}{w} )</td>
<td>0.57</td>
<td>0.53 - 0.68</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.22</td>
<td>1.18 - 1.27</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.60</td>
<td>0.58 - 0.61</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.93</td>
<td>0.82 - 0.97</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.52</td>
<td>0.37 - 0.66</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>3.65</td>
<td>3.5 - 3.8</td>
</tr>
<tr>
<td>front femur ( \frac{l}{w} )</td>
<td>0.48</td>
<td>0.46 - 0.49</td>
</tr>
<tr>
<td>marginal cell ( \frac{1}{l} )</td>
<td>0.43</td>
<td>0.39 - 0.48</td>
</tr>
<tr>
<td>submarginal cell ( \frac{3}{l} )</td>
<td>1.42</td>
<td>1.36 - 1.47</td>
</tr>
<tr>
<td>submarginal cell ( \frac{2}{l} )</td>
<td>1.21 - 1.51</td>
<td></td>
</tr>
</tbody>
</table>
Material examined: 318 males from the following localities:

NORTH ISLAND: Northland form:

Trounton Park, ACH; Manginangina Kauri Reserve (7), ACH; Paiaka, RAC; Muir Park, Whangarei (3), ACH; Leigh (5), ACH; Waitakere Ranges (5), ACH;

Intermediates: Waitakere Ranges (1); Central and lower

North Island Form: Great Barrier Is. (5), ACH; Waiheke Is. (3), ACH; Titirangi (Auckland) CU; Omana Bay, (Auckland), CU; Pureora, RoFo; Mangowera R. (6), ACH; Aniwaniwa (3), * ACH; Mt. Te Aroha, CU; Tauranga, ACH; Mamuka Forests, RoFo; Rotorua (11), RoFo; Huiarau Ra, RoFo; Blowhard Bush, Taihape Rd. CU; Lake Waikaremoana (2), ACH; Hastings, ACH; Taranaki Falls, (National Park), (3), ACH; New Plymouth, ACH; Atene (Wanganui) ACH; Kai Iwi (2) D.S.I.R.; Anzac Park, Palmerston North, RoPo; Renata Hut (Tararua Ra.) (38), Akatararawa Saddle (Wellington) (39), ACH; Keith George Memorial Pk. (Hutt V.) (5), ACH; Colonial Knob (Porirua) (3) ACH; Linden (Wellington) (18), ACH; Karori (Wellington) (2), ACH; Wilton's Bush (Wellington) (3), ACH; Lowry Bay (Wellington) ACH; Botanical Gardens (Wellington) (37) ACH;

SOUTH ISLAND: South Island Form: Nelson (3) D.S.I.R.; Dun Mt. (Nelson) (5), D.S.I.R; Red Hill Plateau (Nelson) (2), RoFo; Mt. Robert (Nelson Lakes) (2), CU; Lakehead, (Nelson Lakes) (2), CU; Mt. Travers CU; Granville (Nelson) RoFo; Takaka Hill, RoFo; Mt. Owen, D.S.I.R.; Murchison, D.S.I.R.; Oaro, CU; Kaikoura, ACH; Upper Karamea R. D.S.I.R.; Lake Taylor, ACH; Kelley Ck. (Otira), ACH; Eyrewell, RoFo; Cashmere (Christchurch), CU; Puke Atua Bush (Banks Peninsula) (5) D.S.I.R.; Ashley R. ACH; Arthur's Pass, ACH; Bottom Hut, Mt. Chessman, ACH;
Ashburton Gorge (2), CU; Peel Forest (37), ACH; Lion's "Bush", Temuka (3), ACH; Kelsey's Bush (Waimate), (90), ACH; Lake Morakei, (S. Westland), (6), ACH; Port Jackson (8) ACH; Martin's Bay (Fiordland), (2) ACH; Trotter's Gorge (Hampden), ACH.

Number of males of each form:

<table>
<thead>
<tr>
<th>Form</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northland Form</td>
<td>22</td>
</tr>
<tr>
<td>Intermediates</td>
<td>1</td>
</tr>
<tr>
<td>Central and Southern North Island Form</td>
<td>212</td>
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<tr>
<td>South Island Form</td>
<td>183</td>
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</tbody>
</table>
Priocnemis (Chrysocurgus) fugax (Fabr.) figs. 16, 25, 44, 54, 64, 66, 67, 74, 82, 93, 96.


Pompilus fugax (Fabricius ,1798), p. 250, no. 24; 1804 p. 194, no. 35. Smith 1855, p. 163, no. 223; Hutton, 1874, p. 165.

Salius fugax (Fabr.) Dalla Torre 1897, p. 224; Cameron 1898, p. 48; 1902 p. 297; Hutton, 1904, p. 98; Miller, 1919, 1955, p.35, fig. 106; 1971, p.26; Vallentine 1967, p.1143.

Priocnemis maculipennis Smith 1876, p. 482, ♀ Type locality, Peel Forest. NEW SYNONOMY. Kirby, 1881, p.39, Hutton 1881, p. 108.

Pompilus maculipennis (Smith) Hutton 1881, p. 107.

Priocnemis huttoni Kirby, 1883, p.199, ♀♂. Type locality: New Zealand. NEW SYNONOMY. Waterhouse, 1803, plate 137.

Salius huttoni (Kirby) Kohl, 1884, p.45. Dalla Torre, 1897, p.228; Cameron, 1902, p.297; Hutton 1904, p.98.

Priocnemis xenos Kirby 1883, p.200, ♀♂. Type locality: New Zealand NEW SYNONOMY. Waterhouse, 1883, plate 137.


Salius brouni (Gribodo) Cameron, 1902, p. 297; Hutton 1904, p. 98

Taxonomic Note:

Most of the nominal species described were the result of limited collections, which concealed the clinal variations within fugax. Thus maculipennis is distinguished primarily by a very reduced fascia on the forewing - a characteristic of Peel Forest specimens which often lack a fascia altogether, and xenos and huttoni are southern melanics (see "variation" below). Gribodo's 1884 description of browni is quite unambiguous (e.g. cf. his references to golden pile on the head, and to the median epipygeal carina). He states that C.Brown sent him the specimen from Howick. Major Thomas Broun, the coleopterist, then held the rank of captain, and was stationed at the military barracks at Howick, Auckland. Cameron evidently recognized that Gribodo had misspelled Broun's name and in 1902 amended the original orthography to brouni. Cameron (e.g. 1898, p. 48) was confused by Gribodo's generic placement. That, however, undoubtedly reflected Gribodo's astute recognition of the many morphological modifications for mud-using, for fugax has evolved convergently towards the overseas mud-using tribe Auplopodini to which Agenia belongs (see below).

Diagnosis (♂)

Wings subhyaline, tinted with yellow, usually with a fascia of variable expression. Head and most of mesosoma with dense, decumbent, aenous pubescence - the face and propodeum glistening, golden. Prementum with a fascicule of very long, apically-curved bristles
Antennae, labial and maxillary palpi very long and slender. Malar space minute. All femora without apical spines. Hind tibia smooth, with very few setae, and the dorsal row of teeth reduced to 7 tiny oblique, indistinct swellings. Basal metasomal segment distinctly petiolate, its tergum rounded gently and evenly without a declivity, when viewed from the side. Epipygeum with a sharp, median longitudinal carina.

The median carina on the epipygeum readily distinguishes fugax from all other New Zealand Pompilids.

Plesiotype: O Renata, Tararua Rd., 3,000' 7.1.72, A.C. Harris.

Description: Length 11 mm; forewing 11.5 mm.

Colour and vestiture: Head with vertex and front black, clypeus reddish-brown, mandibles reddish-brown, their apices black; palpi light fulvous. Antennae with scape and segment 2 reddish-brown with the apical two thirds (and remainder of flagellum) infuscated. Tegulae light fulvous. Pronotum, epicnemium, and propleuron castaneo-rufous; remainder of thorax and propodeum black. Metasoma reddish-brown, legs entirely light fulvo-rufous. Forewing with basal 0.7 subhyaline, with a yellow tinge, apex lightly infuscated, a dark fascia crossing the wing at the level of the stigma, its apical border crossing cells 3 R1, 1Rs, 2M, and cula, and following their basal boundary, so that the fascia appears jagged, with a central tooth directed towards the apex; veins amber, translucent; stigma dark-fuscous, opaque. Hind wing hyaline, basal 0.4 with a flavascent tinge anteriorly, remainder very lightly infuscated. Head and thorax densely clothed with decumbent golden pubescence.
Clypeus, genae, and mandibles with long erect hairs. Remainder of body sparsely hairy except for the metasomal apex which, however, has the bristles above less dense than in the other New Zealand species.

Structure: Submentum with 16 very long stiff setae divided basally into left and right groups, forming a "mud basket" (fig. 93). The maxillae and labium resembling those of nitida, but with both pairs of palpi and the mental bristles very elongated.

Lengths of last 4 segments of maxillary palp in a ratio of about 1.25: 1.37: 0.96: 1. Segment 4 about 6.67 x as long as its maximum width, 0.70 x as long as antennal segment 3; apical segment 1.38 x median length of clypeus. Clypeus somewhat specialised, 2.81 x as wide as high, convex, vaulted forwards, and with the apical rim very swollen, forming a flattened surface below curved in an arc, and inclined towards the mentum. Labrum specialised, its apex sharply recurved to form a very wide flat face at an angle of about 90° to the disc. Mandibles unidentate, their inner surfaces smoothly and evenly excavated. Malar space minute, 0.1 x antennal segment 2. Antennae long and slender; lengths of segments 1-4 in a ratio of about 0.72: 0.32: 1; 11 : 1; segment 3 over 3 x as long as segment 2, scape 1.81 x as long as thick, third segment 4.30 x as long as thick, 0.91 x upper interocular distance. Head 1.18 x as wide as high, middle interocular distance 0.55 x width of head, middle interocular distance 0.72 x lower interocular distance. Front nitid, with small, shallow punctures, frontal line shallow extending from midway between the antennal sockets to the anterior ocellus, impressed
on its apical 0.7, obsolete above. Pronotum short, its posterior margin subangulate. Mesoscutum of moderate length, moderately nitid, prescutal sutures distinct, median scutal line absent. Propodeum sloping evenly, with a very indistinct median impression. Lateral swellings obtuse, with a pair of short longitudinal impressed lines (visible on removal of the pubescence - fig. 70). All femora without apical spines. Front femora 3.70 x as long as wide. All tibia with an apical series of small spines. Front tibia with the outer apical bristle vestigial. Hind tibia very smooth, lacking a distinct dorsal row of teeth (these represented basally by 7 vestigial, oblique, deeply-pigmented swellings); with only a few, minute, scattered spines. Fifth tarsal segment without pre-apical spines below, claws dentate. Forewing with stigma 0.43 as long as total length of marginal cell, the latter removed from the wing tip by 0.40 x its own length; submarginal cell 31.55 x as long as submarginal cell 2. First segment of metasoma very well defined, subpetiolate, the sides sub-basally concave when viewed from above, the tergum rounded gently and evenly, without a declivity, when viewed from the side. First segment with an epipleuro-tergal suture. Epipygeum with a sharp, median, longitudinal carina; hypopygeal ridge smaller, somewhat arcuate, pronounced only at the extreme apex.

Variation: length 8 - 15 mm.; forewing 7.5 - 14 mm.

Colour and vestiture: a. Forewing: the fascia is extremely variable in its expression. It can completely cross the wing as a distinct broad band, as a faint broad band, and as a very narrow band. Sometimes it stops just short of
the pre-axillary excision, extends only halfway across the wing, is present as a faint smudge near the stigma, or (rarely) is completely absent. It is variable even within very localised populations. The form in which a fascia is entirely wanting is commonest in the female and appears to be associated with a müllerian mimicry complex. There are two large areas in which most of the females lack a fascia; an area of several hundred square miles in mid Canterbury extending along the eastern side of the main divide (Southern Alps) and centred on Peel Forest (Lat. 44°) (near Ashburton); and a northern area of similar extent centred roughly on the Puketi Kauri Forest (Lat. 35-3°). In both areas, individuals occur in which a few small spots of infuscation occur on the wing in differing places in the region normally occupied by the fascia. Populations north and south of these two main areas of greatly reduced stigmal size show a gradual increase in its development.

In the South Island, forms with a fascia stopping halfway across the wing appear along the Hunter Hills, and most individuals south of the Hunters possess a distinct fascia. At Arthur's Pass, on the western boundary of the area in which the fascia is lacking, a complete range occurs, from individuals without a trace of a fascia to ones with a complete and unusually heavy band. Nevertheless the population there is bimodal. The fascia is unusually well developed throughout Westland and it seems reasonable to suppose that a mixing of eastern and western populations occurs at about Arthurs Pass, because suitable habitats occur on either side in the courses of the Otira and Bealey rivers, and along which
mostly Westland, and Peel Forest type populations (respectively) are soon encountered. In the Northland area, forms near Leigh and Warkworth vary from an incomplete fascia represented by a series of small smudges, through a range to ones extending halfway across the wing. Wasps from Spirits Bay are variable; although all have a recognisable fascia, it is usually narrow, or incomplete.

Comment: The variation in fascial-expression is paralleled by *nudopropodea* sp.n. Thus that species has a particularly heavy fascia on the South Island West Coast, a strong one in Southland - Stewart Island, and central and southern North Island, and a very weak fascia in mid Canterbury and mid Northland. These two species are associated with *nitida* which lacks entirely the heavy wing infuscation typical of central North Island females in those areas.

Body: Reddish wasps occur in the north, and melanics are found south of about the latitude of Dunedin. The colouration of the plesiotype is typical of forms occurring between the latitudes of Auckland and Christchurch. However, some specimens between Nelson and Christchurch have varying amounts of reddish brown on the metanotum, metapostnotum, and metasoma, the occasional one having these parts entirely reddish-brown. North of Auckland, this last form predominates. The vertex and front of the head remain black throughout to Cape Reinga and Spirits Bay.

At Owaka, Piano Flat, Queenstown, Leith Saddle (Dunedin), and Oban (Stewart Island), females are black with a reddish tinge on the apical margins of most metasomal sternites, have the second tergite entirely red, and have the remaining tergites black. The
palpi are infuscated. The legs are castaneous on the tibiae and black on the coxae, trochanters, fore femora, and basal third of the hind femur. A few specimens from these localities have almost no red on the metasoma. Specimens from Port Pegasus and below in the south of Stewart Island have the hind femora black and the middle femora lightly-infuscated-castaneous. The metasoma has tinges of reddish brown laterally on the first and second segments.

The golden pubescence remains unchanged throughout. The gradually increasing melanism, which is positively correlated with latitude, is paralleled in other New Zealand pompiled species, and is discussed below in the context of parallel ecophenotypical colour variation.

Structure: External morphology is relatively constant. The range of variation in 19 characters of 31 individuals in tables 5 and 6. The maxillary palp becomes regularly and progressively shorter with increasing latitude. This may reflect a reduction in surface area in relation to decreasing mean annual temperature.

Teratological abnormality: A specimen from Trotter's Gorge (Hampden), 17.1.1973 A.C. Harris has the entire front and vertex very deeply rugose. The labrum is exserted, its disc concave, densely covered with short, peg sensillae.
Table 5. *Priocnemis* (*Chrysocurcns*) *fugax*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 31 females.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary Palp Ratio</th>
<th>Antennal Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirits' Bay</td>
<td>1.19 : 1.36 : 0.93 : 1</td>
<td>0.7 : 0.29 : 1.03 : 1</td>
</tr>
<tr>
<td>Dargaville</td>
<td>1.36 : 1.52 : 0.95 : 1</td>
<td>0.7 : 0.27 : 1.03 : 1</td>
</tr>
<tr>
<td>Manginangina</td>
<td>1.30 : 1.46 : 1.01 : 1</td>
<td>0.68 : 0.28 : 1.05 : 1</td>
</tr>
<tr>
<td>Kauri Forest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Titirangi, Auckland</td>
<td>1.22 : 1.35 : 0.92 : 1</td>
<td>0.71 : 0.29 : 1.03 : 1</td>
</tr>
<tr>
<td>Colonial Knob, Wellington</td>
<td>1.09 : 1.44 : 1 : 1</td>
<td>0.66 : 0.32 : 1.02 : 1</td>
</tr>
<tr>
<td>Colonial Knob, Wellington</td>
<td>1.25 : 1.37 : 0.91 : 1</td>
<td>0.69 : 0.32 : 1.03 : 1</td>
</tr>
<tr>
<td>Dun Mt., Nelson</td>
<td>1.28 : 1.44 : 0.95 : 1</td>
<td>0.71 : 0.29 : 1.05 : 1</td>
</tr>
<tr>
<td>Rough Ck., Arthur's Pass</td>
<td>1.35 : 1.50 : 1.06 : 1</td>
<td>0.64 : 0.32 : 1 : 1</td>
</tr>
<tr>
<td>Rough Ck., Arthur's Pass</td>
<td></td>
<td>0.77 : 0.34 : 1.01 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>1.24 : 1.33 : 0.98 : 1</td>
<td>0.69 : 0.27 : 1.03 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>1.21 : 1.36 : 0.89 : 1</td>
<td>0.73 : 0.29 : 1.1 : 1</td>
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<tr>
<td>Peel Forest</td>
<td>1.26 : 1.32 : 0.92 : 1</td>
<td>0.67 : 0.32 : 1.05 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>1.25 : 1.44 : 0.99 : 1</td>
<td>0.74 : 0.33 : 1.07 : 1</td>
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<tr>
<td>Peel Forest</td>
<td>1.24 : 1.43 : 0.99 : 1</td>
<td>0.71 : 0.28 : 1.03 : 1</td>
</tr>
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<td>Peel Forest</td>
<td>1.24 : 1.41 : 0.96 : 1</td>
<td>0.75 : 0.34 : 1.06 : 1</td>
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<tr>
<td>Peel Forest</td>
<td>1.24 : 1.38 : 0.94 : 1</td>
<td>0.68 : 0.33 : 1.04 : 1</td>
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<tr>
<td>Peel Forest</td>
<td>1.19 : 1.33 : 0.95 : 1</td>
<td>0.81 : 0.32 : 1.05 : 1</td>
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<td>Peel Forest</td>
<td>1.14 : 1.42 : 0.95 : 1</td>
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<td>Peel Forest</td>
<td>1.27 : 1.36 : 0.99 : 1</td>
<td>0.67 : 0.30 : 1.02 : 1</td>
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<td>Mt. Nimrod</td>
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<td>0.76 : 0.34 : 1.09 : 1</td>
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<td>Trotter's Gorge, Hampden</td>
<td>1.25 : 1.37 : 1.08 : 1</td>
<td>0.67 : 0.31 : 1.11 : 1</td>
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<td>Trotter's Gorge, Hampden</td>
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<td>0.64 : 0.32 : 1.05 : 1</td>
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<td>Trotter's Gorge, Hampden</td>
<td>1.26 : 1.31 : 0.91 : 1</td>
<td>0.7 : 0.31 : 1.05 : 1</td>
</tr>
<tr>
<td>Trotter's Gorge, Hampden</td>
<td>1.25 : 1.43 : 0.96 : 1</td>
<td>0.7 : 0.27 : 1.04 : 1</td>
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<tr>
<td>Trotter's Gorge, Hampden</td>
<td>1.30 : 1.42 : 0.97 : 1</td>
<td>0.76 : 0.30 : 1.03 : 1</td>
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<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.23 : 1.35 : 0.96 : 1</td>
<td>0.69 : 0.35 : 1.05 : 1</td>
</tr>
<tr>
<td>L. Manapouri</td>
<td>1.22 : 1.49 : 1.06 : 1</td>
<td>0.74 : 0.36 : 1.04 : 1</td>
</tr>
<tr>
<td>Ocean Beach, Stewart Is.</td>
<td>1.23 : 1.36 : 0.92 : 1</td>
<td></td>
</tr>
</tbody>
</table>
Table 6. *Priocnemis* (Chrysocurges) *fugax*: Range of dimensions for 31 females from localities given in Table 5.

<table>
<thead>
<tr>
<th>ratio</th>
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<th>range</th>
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<tr>
<td>max.plp.seg.4 $\frac{1}{W}$</td>
<td>8.18</td>
<td>7.0</td>
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<tr>
<td>max.plp.seg.4 $\frac{1}{L}$</td>
<td>0.75</td>
<td>0.70</td>
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<tr>
<td>ant.seg.3 $\frac{1}{L}$</td>
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<tr>
<td>medium 1. clypeus</td>
<td>0.94</td>
<td>0.84</td>
</tr>
<tr>
<td>clypeus $\frac{W}{H}$</td>
<td>2.49</td>
<td>2.13</td>
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<tr>
<td>malar space</td>
<td>0.11</td>
<td>0.03</td>
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<tr>
<td>ant.seg.2 $\frac{1}{L}$</td>
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<td></td>
</tr>
<tr>
<td>scape $\frac{1}{W}$</td>
<td>1.79</td>
<td>1.67</td>
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<tr>
<td>ant.seg.3 $\frac{1}{W}$</td>
<td>4.52</td>
<td>4.30</td>
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<tr>
<td>ant.seg.3 $\frac{1}{L}$</td>
<td>0.84</td>
<td>0.73</td>
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<tr>
<td>U.I.D.</td>
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<td></td>
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<tr>
<td>T.F.D.</td>
<td>1.19</td>
<td>1.12</td>
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<tr>
<td>F.D.</td>
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<td>M.I.D.</td>
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<td>0.54</td>
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<tr>
<td>T.F.D.</td>
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<td>U.I.D.</td>
<td>0.81</td>
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<td>P.O.L.</td>
<td>0.61</td>
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<td>front femur $\frac{1}{W}$</td>
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<tr>
<td>stigma $\frac{1}{L}$</td>
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<td>0.42</td>
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<tr>
<td>I. marginal cell</td>
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<tr>
<td>d. from apex</td>
<td>0.39</td>
<td>0.36</td>
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<tr>
<td>T. marginal cell</td>
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<td></td>
</tr>
<tr>
<td>I. sub.marg. cell 3</td>
<td>1.48</td>
<td>1.44</td>
</tr>
</tbody>
</table>
Material examined: 348 females from the following localities:

NORTH ISLAND: Mt Uniwhaio (Spirits Bay), (8), ACH; Manginangina Kauri Reserve (7), ACH; Muir Park (Whangarei), (12), ACH; Coronation Park (Whangarei), (6), ACH; Dargaville (2), ACH; Trounson Park, ACH; Kaiwaka, ACH; Leigh (10), ACH; Rangitoto Is. W. Mu: Titirangi, D.S.I.R.; Mt. Hikurangi, CU; Aniwaniwa (2), ACH; Lake Waikaremoana (2), ACH; Pureora: RoFo; Gisborne ACH; Atene (Wanganui R.) (6), ACH; Renata Hut (S.TararuaRd) (32), ACH; Mt. Holdsworth track, 1,800' Tararua Ra. (29), ACH; Kaitoke, ACH; Akatarawa Saddle (Wellington) (14), ACH; Paekakariki fore dunce (2), ACH; Orongorongo R. 9 miles from wuth (2), ACH; Colonial knob (Porirua) (6), ACH; Linden (Wellington) (4), ACH; Wainui Ridge (Wellington) (6), ACH; Botanical Gardens (Wellington), (39), ACH; Wainuiomata (6), ACH; SOUTH ISLAND: Dun Mt. (Nelson) (5), D.S.I.R.; Crown Hut, Karamea R. (2), D.S.I.R.; Aickens (Otira), Rough Ck. Arthurs Pass, ACH; (8), Puke Atua Bush (Banks Peninsula), (2), D.S.I.R.; Peel Forest, (53), ACH; Mt. Nimrod (Hunter Hills), (4), ACH; Kelsey's Bush (Waimate), (17), ACH; Trotter's Gorge (Hampden) (8), ACH; Leith Saddle (Dunedin), (22), ACH; Pleasant flat (Haast R.), (6), ACH; Haast R. mouth (3), ACH; Glitter burn - Haast R. junction (2), ACH; Lake Morakei (S. Westland) (4), ACH; Queenstown, D.S.I.R.; Piano Flat (5), ACH; Lake Manapouri (4), ACH; STEWART ISLAND: Ocean beach (2), ACH; Port Pegasus (2), W. Mn.
Priocnemis (Chrysocurgus) fugax (Fabr.) MALE

Diagnosis: Wings lightly tinted with yellow, usually with at least some trace of a fascia at the level of the stigma. First segment of metasoma defined, subpetiolate. Venter of sixth metasomal sternite bearing medially a single prominent sharp deltoid keel (fig. 25). Parameres very broad, expanded outwards, with peg setae on their outer margin (fig. 54A).

Specimen: O Tararua Rd., 3,000' 7.1.72; A.C. Harris

Description: Length 9 mm, forewing 8.5 mm.

Colour and vestiture: (Head and mesosoma similar to ♀ metasoma black-tipped); Head with vertex, front, and genae black; clypeus and mandibles castaneous, latter infuscated apically, their extreme apices black; palpi light fulvous; antennal scape castaneous, second segment fuscous, remainder of flagellum dusky-black. Pronotum mainly reddish-brown, infuscated on the collar and immediately behind it; propleuron fuscous; tegulae light fulvous; remainder of thorax and propodeum black. Legs castaneous, except for basal parts of coxae and the fifth tarsal segments and claws, which are black on all pairs. Metasoma with apical part of first segment, entire second segment, and the basal part of segment 3 castaneo-rufous; petiole and remainder of metasoma black. Forewings hyaline, their basal 0.7 having a light flavescent tinge, remainder very lightly infuscated. Fascia becoming lighter towards the anal margin, crossing the wing at the level of the stigma, and having a sharp projection directed towards the apex situated at the bottom of the second marginal cell; veins amber, transulcent; stigma dark-fuscous, opaque. Hind wing sub-hyaline, anterior-basal 0.4 with
a flavescent tinge, remainder very lightly infuscated. Head and thorax thickly covered with aenous pubescence. Clypeus genae and mandibles with long erect hairs; propodeum with scattered fine, erect hairs, remainder of body sparsely hairy, mesosoma with short, scattered aenous pubescence.

Structure: Last 4 segments of maxillary palp in a ratio of about 1.06 : 1.36 : 0.88 : 1; segment 4 about 7.67 x as long as its maximum width, 1.05 x as long as antennal segment 3; apical segment 1.21 x median length of clypeus. Apex of labrum always visible, its apical margin straight. Clypeus convex, vaulted forwards, emarginated, its apex concave. Malar space 0.10 x as long as antennal segment 2. Antennal segments 1-4 in a ratio of about 0.74 : 0.39 : 0.85 : 1 (viewed sideways), scape 1.58 x as long as thick, third segment 2.75 x as long as thick, 0.56 x upper interocular distance. Head 1.24 x as wide as high; middle interocular distance 0.50 x width of head; upper interocular distance 0.93 x lower interocular distance. Front angle of ocellar triangle less than a right angle; POL: OOL 11:7. Front closely covered with small punctures, sub-nitid; median frontal line between antennal sockets and anterior ocellus with its apical half moderately incised. Pronotum short, its posterior margin broadly angulate; mesoscutum large, prescutal sutures present; metanotum and metapostnotum comparatively wide, the latter having prominent transverse rugae; remainder of thoracic dorsum with very small, close punctures; nitid. Propodeum sloping evenly, with a median sulcus. Front femora 3.33 x as long as wide. Apices of all tibiae with a series of small spines; front tibia with the outer
tibial spur vestigial; tarsal claws dentate. Forewing with stigma 0.51 x as long as total length of marginal cell, the latter removed from the wing tip by 0.32 x its own length; third sub-marginal cell 1.70 x longer than submarginal cell 2. First segment of metasoma defined, subpetiolate, its tergite curved gently and evenly (in lateral view). Sixth metasomal sternite bearing medially a single prominent, sharp, deltoid keel (fig. 25). Subgenital plate broadly rounded at the apex, its basal portion with a complex groove for the reception of the eighth sternite, and a longitudinal compressed tooth (fig. 44). Genitalia with the aedeagus simple, parapenial lobes simple, apically 90° decurved. Digitus volsellaris folded back on itself through 90° at the apex and level with (and pointing towards) the apex of the aedeagus; apex of former with long narrow trichiod sensillae; parameres very broad, with an outer median lobe bearing very stout, truncated, pegs (fig. 53). The pegs on the parameres appear to be very similar in form and position to those of South American Chirodamus species described and illustrated by Evans, 1968.

Variation:
Size; length 6.7 - 9.6 mm.; forewing 6.5 - 9.3 mm.

Colour and vestiture: Variation in the wing parallels that of the female. The body colour of the male described above is typical of forms occurring between the latitudes of Thames and Christchurch. Notwithstanding this, specimens occur between Nelson and Christchurch with varying amounts of reddish brown on the metanotum, metaphostnotum and propodeum, the occasional one having those parts entirely reddish brown. Specimens with the
apical 4 segments of the metasoma black occur as far north as Pureora. Fully melanic males occur at lower latitudes than do females. Thus of 12 Leith Saddle (Dunedin) specimens, 9 are not reddish on the body (excluding its appendages). Antenna, palpi, coxae, trochanters, and to a varying extent, the bases of the femora are black on all 12 specimens. Stewart Island specimens have all femora black, and the tibiae and tarsi infuscated.

**Structure:** External morphology is relatively constant. The range of variation in 19 selected characters in 6 individuals from Wellington and Dunedin is shown in table 7 and 8.

**Material examined:** 188 males from the following localities:

**NORTH ISLAND:** Mt.Uniwhaio (Spirits' Bay), (3), ACH; Manginangina Kauri Reserve (2), ACH; Muir Park (Whangarei), (3), ACH; Coronation Park (Whangarei), (5), ACH; Mt. Hikurangi, ACH; Leigh (4) ACH; Pureora ACH; Aniwaniwa, ACH; Mamaka (Rotorua), RoFo; Atene (Wanganui R.) ACH; Renata hut (Taranaki Ra.) (17), ACH; Mt. Holdsworth track (Taranaki Ra.) (12), ACH; Colonial Knob (Porirua), (3), ACH; Orongorongo R., 9 miles from mouth (2), ACH; Wainui Ridge (Wellington) (7), ACH; Botanical Gardens (Wellington), (19), ACH; **SOUTH ISLAND:** Dun Mt. (Nelson) (7), D.S.I.R.; Crown Hut, Karamea R. D.S.I.R.: Maruia Springs, CU; Aickens (Otira) (5), ACH; Peel Forest (42), ACH; Kelsey's Bush (Waimate) (14), ACH; Trotter's Gorge (Hampden) (2), ACH; Leith Saddle (Dunedin), (12), ACH; Lake Morake (S.Westland), (5), ACH; Lake Manapouri (4), ACH;

**STEWART ISLAND:** Ocean Beach ACH; Port Pegasas W.Mu.
Table 7. *Priocnemis (Chrysocuronus) fugax*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 5 males.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary Palp Ratio</th>
<th>Antennal Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renata hut, Tararu Ra.</td>
<td>1.06 : 1.36 : 0.88 : 1</td>
<td>0.74 : 0.39 : 0.85 : 1</td>
</tr>
<tr>
<td>Renata hut, Tararu Ra.</td>
<td>1.04 : 1.34 : 0.88 : 1</td>
<td>0.73 : 0.38 : 0.85 : 1</td>
</tr>
<tr>
<td>Botanical Gardens, Wellington</td>
<td>0.98 : 1.25 : 0.87 : 1</td>
<td>0.74 : 0.36 : 0.89 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.07 : 1.20 : 0.91 : 1</td>
<td>0.79 : 0.40 : 0.90 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.05 : 1.26 : 0.85 : 1</td>
<td>0.79 : 0.42 : 0.88 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.05 : 1.27 : 0.87 : 1</td>
<td>0.77 : 0.34 : 0.91 : 1</td>
</tr>
</tbody>
</table>
Table 8. *Priocnemis* (Chrysocurges) *fugax*: Range of dimensions for 6 males from Wellington and Dunedin.

<table>
<thead>
<tr>
<th>ratio</th>
<th>Total $\bar{x}$</th>
<th>3 Wellington Males</th>
<th>3 Dunedin Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}$</td>
<td>range</td>
<td>$\bar{x}$</td>
</tr>
<tr>
<td>max.plp.seg.4 $\frac{1}{W}$</td>
<td>7.85</td>
<td>7.81</td>
<td>7.67</td>
</tr>
<tr>
<td>max.plp.seg.4</td>
<td>1.08</td>
<td>1.05</td>
<td>1.10</td>
</tr>
<tr>
<td>ant.seg.3 $\frac{1}{W}$</td>
<td>1.28</td>
<td>1.35</td>
<td>1.21</td>
</tr>
<tr>
<td>max.plp.seg.6 $\frac{1}{h}$</td>
<td>2.85</td>
<td>2.99</td>
<td>2.98</td>
</tr>
<tr>
<td>malar space</td>
<td>0.12</td>
<td>0.11</td>
<td>0.10</td>
</tr>
<tr>
<td>ant.seg.2 $\frac{1}{W}$</td>
<td>1.69</td>
<td>1.65</td>
<td>1.58</td>
</tr>
<tr>
<td>scape $\frac{1}{W}$</td>
<td>2.80</td>
<td>2.69</td>
<td>2.63</td>
</tr>
<tr>
<td>ant.seg.3 $\frac{1}{W}$</td>
<td>0.56</td>
<td>0.59</td>
<td>0.56</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.22</td>
<td>1.23</td>
<td>1.21</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.60</td>
<td>0.59</td>
<td>0.59</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.93</td>
<td>0.92</td>
<td>0.91</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.61</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>0.52</td>
<td>0.53</td>
<td>0.51</td>
</tr>
<tr>
<td>stigma 1.</td>
<td>0.37</td>
<td>0.36</td>
<td>0.35</td>
</tr>
<tr>
<td>t.marg.cell 2</td>
<td>1.48</td>
<td>1.57</td>
<td>1.44</td>
</tr>
<tr>
<td>t.s.m.cell 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Priocnemis (Chrysocurgus) nudopropodea, sp.n.

figs. 14, 17, 24, 45A, B, C, D, E, 55, 68, 69, 73, 83, 92, 95.

Etymology: Latin nudo to make bare, + propodeum, first abdominal segment of Aculeate Hymenoptera (Latin podium), referring to absence of golden pubescence on propodeum.

Holotype: ♀ Poulter River, Canterbury, 1.1.1972 A.C. Harris.

Comment: The type shows a lesser degree of melanism than is usual for that latitude.

Paratype series: All listed specimens followed by the initials "ACH" have been designated paratypes.

Diagnosis: ♀ Hind tibia with a dorsal row of minute, thorn-like setae, its 7 vestigial scales only slightly larger than those of fugax (fig. 95). 2. Malar space very well developed. 3. Prementum with a fascicule of a long, stiff apically curved bristles (fig. 92).

4. Propodeum never golden. 5. Epipygeum without a sharp, median, longitudinal carina. 6. Forewing usually with a broad dark fascia which does not follow the outlines of the basal boundaries of cells 3 Rl, 1Rs, @m, and Cula, and as a consequence does not usually appear "toothed".

Dark wing setae restricted to the apical infuscation and fascia; remainder of forewing with orange setae which cause the outlines of the fascia and apical infuscation to appear crisper than in fugax. Cells C and R usually with orange setae -even on melanic Stewart Island specimens (In fugax, dark setae normally extend the entire lengths of cells C and R, and extend beyond margins of membrane infuscation of the fascia and apical cloud).
Characters 1 - 6 at once distinguishes nudopropodea from any other New Zealand pompilid, and from fugax, in particular, with which it has been confused in the past.

Holotype ♀ Poulter River (and Waimakariri Tributary, Canterbury Province), 1.1.1972 A.C. Harris.

**Description:** Length 8.5 mm., forewing 9 mm.

**Colour and vestiture:** Head and mesosoma mostly dark brown; metasoma castaneo-rufous; apical 0.5 of clypeus castaneous, basally infuscated; palpi light fulvous; mandibles dull castaneous, their apical 0.2 infuscated; antennal scape brownish-castaneous, remainder infuscate, light brown on the inner side. Prothorax with neck and collar castaneous, tegulae testaceous, remainder of mesosoma dark brown grading to castaneous on the borders of sclerites. Coxae castaneous, infuscated basally; fore, mid, and hind tarsi respectively with ultimate, last 2, and last 3 segments infuscate, remainder of legs light, bright castaneous. Forewing subhyaline, tinted with amber, a broad fascia not markedly toothed crossing at the level of the stigma, continuous behind with the apical infuscation which extends almost to the marginal cell, the fascia and apical infuscation thus form a dark, U-shaped area. Stigma dark brown, opaque; all veins translucent, yellowish, brown in infuscated portions. Hind wing subhyaline, with a fascia between the base of Rs and the apex, remainder (including the extreme apex) tinted with amber. Pubescence aenous, very sparse on the propodeum which does not appear golden.
Structure: Submentum and fasicule of bristles very similar to those of *fugax*, but with only 4 pairs of very long, stout, apically hooked basal bristles. Last 4 segments of maxillary palp in a ratio of about 0.9 : 0.4 : 1.1 : 1. Segment 4 about 5.75 x as long as its maximum width, 0.80 x as long as antennal segment 3; apical segment 0.89 x median length of clypeus. Clypeus specialised, 2.74 x as wide as high, convex, its apex very swollen, flattened and arc-shaped below, the flattened area inclined towards the mentum. Labrum specialised, its apex sharply recurved to form a very wide, flat face, at approximately a right angle to the disc. Malar space very well developed; 0.40 x as long as antennal segment 2. Antennal segments 1-4 in a ratio of about 0.88: 0.44: 1.10: 1; segment 3 always less than 3 x length of segment 2; scape 1.70 x as long as thick, third segment 3.84 x as long as thick, 0.69 x upper interocular distance. Head 1.07 x as wide as high; middle interocular distance 0.59 x width of head; upper interocular distance 0.83 x lower interocular distance. Front angle of ocellar triangle approximately a right angle; POL: OOL 1:2. Front somewhat swollen. Pronotum of moderate length, its posterior margin subangulate. Thorax covered with small, indistinct punctures. Propodeum sloping evenly; globate, finely and densely rugulose-punctate; without a distinct median impression. All femora without apical spines. Front femora 3.6 x as long as wide. Apex of fore tibia with a series of small spines; apical spines larger on mid tibia. Hind tibia dorsally with a vestigial scale row, its setae minute thorns, but arising from prominent protuberances. (Seven minute transverse ridges correspond in position and arrangement to those of *fugax* and...
to the scales of nitida).

Fifth tarsal segment without spines below.

Forewing with the stigma 0.52 x as long as the total length of the submarginal cell, the latter removed from the wing-tip by 0.45 x its own length; second submarginal cell 1.72 x as long as submarginal cell 3. First segment of metasoma well-rounded, not noticeably petiolate, sub-basally convex when viewed from the side. Pygidium without a prominent sharp, dorsal, longitudinal keel.

**Variation:** Length: 9 - 14.5 mm.; forewing: 8.2 - 13 mm.

**Colour:** North of Timaru the metasoma is reddish and the mesosoma variable. The latter may be entirely reddish or have varying degrees of infuscation - often in a variegated pattern, or it may be almost black. Considerable variation occurs even within small populations. For example, of 6 specimens captured on 17.2.72 in a 10'x20' forest clearing in the southern Tararua Ranges near Renata Hut, 2 had large red spots on either side of the oblique mesepisternal suture, one had the lower spot considerably reduced, another had only the upper spot, and 2 had the mesepisternum uniformly dark. Peel Forest specimens have the metasoma reddish, but the propodeum shows all degrees of infuscation from entire redness to complete blackness. South of Timaru, the metasoma usually has varying amounts of infuscation.

Specimens from Trotter's Gorge (near Hampden) and Leith Saddle, Dunedin, are very variable (see plate 21; A,B,E). All southern West Coast specimens from Lake Morakei, Haast, and Jackson Bay have the head and mesosoma black, and the metasoma reddish - except for the base of the first segment, which is black. Between Milton and southern Stewart Island, the head, mesosoma and metasoma are black -
except for the second tergite of the metasoma, which is quite characteristically red. The legs are bright castaneous with the bases of the coxae and the apices of the tarsi infuscated.

**Forewing fascia:** In females the fascia would appear always to be present and shows only minor variation. In some (Nelson and most Christchurch and Central Northland (latitude 35.5°) specimens, it is very narrow. It is darkest in Fiordland and West Coast specimens. (It is in these wet localities that nudopropodea is most abundant).

**Structure:** There is little structural variation. The range of variation in 19 selected characters of 11 individuals from widely separated localities is given in tables 9 and 10.

**Material examined:** 208 females from the following localities:

**NORTH ISLAND:** Manginangina Kauri Forest (Okaihau), (3), ACH; Aniwaniwa, (2), ACH; Rotorua, RoFo; Pokaka, ACH; Renata Hut (Tararua Ra.) (7), ACH; Akatarawa Saddle (Wellington), (5), ACH; Wainui Ridge (Wellington), (2), ACH.

**SOUTH ISLAND:** Puhi Puhi Res. (Nelson), (3), D.S.I.R.; Aikens (Otira), (5), ACH; Poulter River, CU; Riccarton Bush (Christchurch), (5), D.S.I.R.; ACH; Waiho, ACH; Peel Forest (74), ACH; Kelsey's Bush (Waimate) (33), ACH; Trotter's Gorge (Hampden), (6), ACH; Leith Saddle (Dunedin) (11), A H; Pleasant Flat, Haast R. (8), ACH; Haast R. Mouth (3) ACH; Lake Morakei (S. Westland), (16), ACH; Port Jackson (14), ACH; Martin's Bay (Fiordland) ACH; Owaka, ACH.

**STEWART ISLAND:** Thule, ACH; Horseshoe Bay ACH; Rakeahua V., ACH; Port Pegasus, ACH.
<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary palp ratio</th>
<th>Antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aniwaniwa</td>
<td>1.07 : 1.30 : 1 : 1</td>
<td>0.88 : 0.42 : 1.09 : 1</td>
</tr>
<tr>
<td>Renata hut, Tararua R.</td>
<td>1.16 : 1.36 : 1 : 1</td>
<td>0.80 : 0.39 : 1.08 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua R.</td>
<td>1.05 : 1.26 : 1.04 : 1</td>
<td>0.84 : 0.45 : 1.03 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua R.</td>
<td>1.16 : 1.32 : 1.03 : 1</td>
<td>0.87 : 0.42 : 1.07 : 1</td>
</tr>
<tr>
<td>Akatarawa, Wellington</td>
<td>1.09 : 1.29 : 1 : 1</td>
<td>1.02 : 0.42 : 1.09 : 1</td>
</tr>
<tr>
<td>Puhupuhi Res., Nelson</td>
<td>1.14 : 1.25 : 1.09 : 1</td>
<td>0.91 : 0.37 : 1.11 : 1</td>
</tr>
<tr>
<td>Maruia sp., Lewis Pass</td>
<td>1.12 : 1.22 : 1.09 : 1</td>
<td>0.96 : 0.41 : 1.10 : 1</td>
</tr>
<tr>
<td>Waiho, Westland</td>
<td>1.09 : 1.23 : 1.04 : 1</td>
<td>0.91 : 0.37 : 1.12 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>1.13 : 1.31 : 1.06 : 1</td>
<td>0.87 : 0.36 : 1.10 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>1.14 : 1.31 : 1.06 : 1</td>
<td>0.88 : 0.38 : 1.13 : 1</td>
</tr>
<tr>
<td>Poulter R. (Waimakariri Trib.)</td>
<td>1.12 : 1.35 : 1.06 : 1</td>
<td>0.88 : 0.44 : 1.10 : 1</td>
</tr>
<tr>
<td>Trotter's Gorge, Herbert</td>
<td>1.10 : 1.28 : 1.09 : 1</td>
<td>0.9  : 0.43 : 1.16 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.14 : 1.35 : 1.04 : 1</td>
<td>0.76 : 0.37 : 1.09 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.13 : 1.34 : 1.04 : 1</td>
<td>0.89 : 0.41 : 1.16 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.13 : 1.35 : 1.06 : 1</td>
<td>0.91 : 0.39 : 1.13 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>1.17 : 1.35 : 1.08 : 1</td>
<td>0.91 : 0.42 : 1.13 : 1</td>
</tr>
<tr>
<td>Stewart Island</td>
<td>1.04 : 1.25 : 1.06 : 1</td>
<td>0.87 : 0.38 : 1.10 : 1</td>
</tr>
<tr>
<td>Stewart Island</td>
<td>1.05 : 1.26 : 1.04 : 1</td>
<td>0.90 : 0.40 : 1.13 : 1</td>
</tr>
</tbody>
</table>
Table 10. *Priocnemis* (Chrysocurgus) *nudopropodea* n.sp.: Range of dimensions for 11 females from localities given in Table 9.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4 $\frac{l}{w}$</td>
<td>7.20</td>
<td>6.21</td>
</tr>
<tr>
<td>max.plp.seg.4 $\frac{l}{1}$</td>
<td>1.02</td>
<td>0.91</td>
</tr>
<tr>
<td>ant.seg.3 $\frac{l}{1}$</td>
<td>1.21</td>
<td>1.14</td>
</tr>
<tr>
<td>max.plp.seg.6 $\frac{l}{1}$</td>
<td></td>
<td>1.43</td>
</tr>
<tr>
<td>medium $l$. clypeus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>clypeus $\frac{w}{h}$</td>
<td>3.10</td>
<td>2.69</td>
</tr>
<tr>
<td>malar space</td>
<td>0.34</td>
<td>0.29</td>
</tr>
<tr>
<td>ant.seg.2 $\frac{l}{1}$</td>
<td>1.67</td>
<td>1.59</td>
</tr>
<tr>
<td>scape $\frac{l}{w}$</td>
<td>2.54</td>
<td>2.36</td>
</tr>
<tr>
<td>ant.seg.3 $\frac{l}{w}$</td>
<td>0.53</td>
<td>0.49</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.22</td>
<td>1.16</td>
</tr>
<tr>
<td>T.F.D.</td>
<td></td>
<td>1.26</td>
</tr>
<tr>
<td>F.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.58</td>
<td>0.57</td>
</tr>
<tr>
<td>T.F.D.</td>
<td></td>
<td>0.60</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.93</td>
<td>0.90</td>
</tr>
<tr>
<td>L.I.D.</td>
<td></td>
<td>0.96</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>0.55</td>
<td>0.45</td>
</tr>
<tr>
<td>O.O.L.</td>
<td></td>
<td>0.64</td>
</tr>
<tr>
<td>front femur $\frac{l}{w}$</td>
<td>3.32</td>
<td>2.89</td>
</tr>
<tr>
<td>stigma $l$.</td>
<td>0.54</td>
<td>0.52</td>
</tr>
<tr>
<td>marginal cell $l$.</td>
<td></td>
<td>0.57</td>
</tr>
<tr>
<td>d. from apex</td>
<td>0.37</td>
<td>0.36</td>
</tr>
<tr>
<td>marginal cell $l$.</td>
<td></td>
<td>0.40</td>
</tr>
<tr>
<td>submarginal cell 3 $l$.</td>
<td>1.52</td>
<td>1.44</td>
</tr>
<tr>
<td>submarginal cell 2 $l$.</td>
<td></td>
<td>1.63</td>
</tr>
</tbody>
</table>
Priocnemis (Chrysocurgus) nudopropodea sp.n. MALE

Diagnosis:

Clypeus with a large, pale, lemon-yellow spot on either side.

Propodeum very rounded - almost globate - never golden.

Sixth metasomal sternite with a pair of large deltoid projections, near the lateral margins (fig. 24). Paramere with a pronounced, quadrate, lateral extension 0.43 from the base (usually visible in dead specimens even with the genitalia retracted.) Digitus volsellaris complex, bilobed, having a thin translucent laminate extension rising from its inner margin, strengthened apically, and produced into a point.

This species can be recognised immediately by any one of the characters listed above.


Description: Length 10 mm.; forewing 10.6 mm.

Colour and vestiture: Head with vertex, front, and genae black, clypeus brownish-fuscous, with a large round yellow spot on either side. Mandibles castaneo-fulvous, basally infuscated; palpi mostly fulvous; antennal scape fulvous, infuscated above, pedicel fuscous, flagellum uniformly fuliginous. Pronotum, tegulae, metapostnotum, and hind part of propodeum castaneous, remainder of mesosoma black, with profuse castaneous variegation. Legs with bases of coxae and fifth tarsal segments black, otherwise bright castaneous. Metasoma bright rufo-castaneous with the base of the first segment and the apex infuscated. Wings sub-hyaline tinted with yellow; forewing with a dark apical infuscation which merges evenly with a dark, non-toothed fascia. Stigma dark-brown, opaque; veins light brown, semi-
translucent. Apical 0.16 of hind wing clear, its fascia extending to the base of vein RS. Pubescence aenous. Front with short aenous setae, mesosoma with decumbent aenous hairs becoming sparse dorsally - particularly on the propodeum which does not appear golden.

Structure: Last 4 segments of maxillary palp in a ratio of about 0.96:1.32 : 1: 1; segment 4 about 7.5 x as long as its maximum width, 1.02 x as long as antennal segment 3; apical segment 1.14 x median length of clypeus. Clypeus 2.95 x as wide as high, convex, its apical margin concave. Malar space well developed, 0.33 x length of antennal segment 2. Antennal segments 1-4 a ratio at about 0.78: 0.44 : 0.87: 1, scape 1.59 x as long as thick. Third antennal segment 2.42 x as long as thick, 0.55 x upper interocular distance. Head 1.24 x as wide as high, middle interocular distance 0.58 x width of head, upper interocular distance 0.89 x lower interocular distance. Front angle of ocellar triangle close to a right angle; POL:OOL as 3:5. Front moderately nitid, closely covered with distinct small punctures; medially with a shallow sulcus between the anterior ocellus and the antennal sclerites. Pronotum of moderate length, its posterior margin angulate, entire thorax with small, close, indistinct punctures. Propodeum sloping evenly, almost globate, its entire surface minutely rugulose - punctate, with a shallow median sulcus on its anterior 0.6. First segment of metasoma not as petiolate as in fugax and nitida males, its tergite sub-anguloarly arcuate when viewed from the side.(fig. 69). Sixth metasomal sternite with a paired, very distinct deltoid projection towards the side (fig. 24). Front femora 3.38 x as long as wide, with apical spines
in a compact row above, widely spaced on the sides. Tarsal claws dentate. Forewing with the stigma 0.55 x as long as total length of marginal cell; latter removed from wing-tip by 0.36 x its own length; third submarginal cell 1.44 x submarginal cell 2. Subgenital plate with an apically rounded, spatulate triangular section arising from a broad base. Genitalia with parapenial lobes apically decurved, and similar to (fig. 45 a, b, c, d, e) to those of *fugax*; digitus volsellarsi complex, bilobed, bent inwards at 90° as in *fugax* and *nitida*, with a thin, translucent, laminate extension rising from the inner margin, and apically strengthened and produced into a point. (A finger-like extension of the lumen of the digitus enters this region and is shown in fig. 55). Paramere very slender, twisted as in *nitida*, but with a pronounced, quadrate, lateral projection 0.43 from base; 2 basal hooklets; apex of aedegus attaining to approximately the same level as the parapenial lobes and digitus volsellarsi. General design similar to *fugax* (fig. 55).

**Variation:**

**Size length:** 7-8.5 mm.; forewing 7.2 - 8.3 mm.

**Colour and vestiture:** The colouration of the head and antennae are virtually constant throughout its range; although the clypeus can be brownish-fuscous in non-melanics. The large, pale, lemon-yellow spot on either side of the clypeus is present in both reddish and melanic forms, and in forms in which the fascia on the forewing fuses almost completely; (and sometimes completely) with the apical infuscation. North of the latitude of Christchurch, the metasoma is usually reddish with an infuscated band on the lower part of its fifth tergite. Even in the north
the colour is very variable, there being varying amounts of black and reddish—often in variegated patterns. In some Rotorua specimens, the propodeum, and thorax except the pronotum, are black, although the metasoma is mostly red. The single specimen I have from Mt.Egmont (3,300') is melanic, except for a small castaneous area on the second metasomal tergum. Northland specimens are almost entirely reddish, with the exception of the head which is black, and the occasional black spots near the sides of the scutum, scutellum, notum and postnotum.

Melanic forms occur below the latitude of Timaru. A typical Leith Saddle (Dunedin) melanic has the head, mesosoma, metasoma, coxae, trochanters, and femora shining black; antennae and palpi black, hind tibia fuscous, and the hind tarsus fuscous, grading to pitchy black apically. (Notwithstanding this, it retains the large yellow spots on the clypeus). In the Dunedin area, the colour of the metasoma is variable. All males I have seen from localities south of Dunedin have the body fully melanic. However, there is considerable variation in the degree of infuscation of the legs. Unlike *conformis*, this species appears to produce melanics in direct relation to lowered temperatures experienced by immature stages, especially the early pupa. (See section on parallel ecophenotypical colour variation below, and plate 21, C, D,).

Forewing: Some individuals lack a fascia; instead a single large cloud extends from halfway along the first medial cell (well based to the pre-axillary excision) to the wing apex. Others are similar, save for a small lighter area near the centre of the cloud. Such individuals are relatively common in areas, and at times, when *P.conformis*
is the most abundant wasp species (e.g. in the variety of Renata-Kapakaponui in the Southern Tararua Ranges, and on the Wainui Ridge, Wellington). Sympatric fugax males show a similar tendency and the phenomenon is discussed in the section on mimicry below.

Structure: Variation is minor. Okaihau (North Auckland) males differ from the type in having the upper half of the median frontal line impressed, and the lower half raised. Genitalia from Okaihau, Wellington, Nelson Lakes, Riccarton Bush, Peel Forest, and Dunedin are almost indistinguishable. The subgenital plate, however, is subject to minor variation. Specimens from Nelson to Dunedin show a fairly regular increase in the length of the digital process of the plate relative to the basal part. Between Peel Forest and Dunedin the apex is truncated and notched in the middle.

Comment: Pale yellow clypeal spots: There is some evidence that these highly distinctive markings function as a pre-reproductive isolating mechanism, effective when males approach females prior to courtship. They are constant in the 182 specimens examined from Okaihau (North Auckland) to Stewart Island and both on specimens in which the clypeus is castaneous, and on those in which it is black. However, in 12 out of 52 Peel Forest specimens the spots are larger than usual, and converge mesally. In the areas of Peel Forest in which nudopropodea occurs, fugax is the most abundant species of Pompilidae. (This unusual condition possibly results from the unusually large number of Psepholax barbifrons pupal chambers in trees for fugax to use as nests - a result of snow-damage to trees following the unusually heavy snow falls that occur there on average once every 20 years (Dr. Molloy - pers. comm.).
In this area, *fugax* males show varying degrees of infuscation on the clypeus and some specimens have the clypeus dark - except for highly variable castaneous spots. *Fugax* undergoes a southward clinal increase in melanism, and it is at around the latitude of Peel Forest that the clypeus, fulvous-red in northern areas, changes to black. It is possible that the larger area of pale yellow in some *nudopropodea* males heightens the distinctiveness of the pale-yellow area on the clypeus, of selective advantage if a females was to mate with *fugax* males with castaneous clypeal marking.

The range of variation in 19 selected characters of individuals from widely separated localities is given in tables 11 and 12.

Material examined: 187 males from the following localities:

**NORTH ISLAND:** Manginangina Kauri Forest (Okaihau), (2), ACH; Aniwaniwa, ACH; Rotorua, RoFo; Pokaka ACH; Northern Kaimanawa Range, ACH; Dawson Falls, ACH; Renata Hut (Taranua Ra.), (5), ACH; Akatarawa Saddle (Wellington). (6) ACH; Wainui Ridge (Wellington) (5) ACH;

**SOUTH ISLAND:** PuhiPuhi Res. (Nelson) (3), D.S.I.R.; ACH; St. Arnaud Range, RoFo;

Aickens (Otira), (2) ACH; Otira, ACH; Riccarton Bush (Christchurch), (3), D.S.I.R.; Waiho, ACH; Peel Forest (52), ACH; Kelsey's Bush (Waimate), (32), ACH; Trotter's Gorge (Hampden), (4), ACH; Leith Saddle (Dunedin), (10), ACH;

Waitati, AR; Pleasant Flat, Haast R. (4), ACH; Haast R. Mouth (3), ACH; Lake Morakei (S. Westland), (23), ACH; Port Jackson (19), ACH; Martin's Bay (Fiordland), ACH; Owaka ACH;

**STEWART ISLAND:** Thule, ACH; Horseshoe Box CU; Rakeahua V., ACH; Port Pegasus, ACH.
Table 11. *Priocnemis (Chrysocurges) nudopropodea* n.sp.: Percentage ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 11 males.

<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manginangina Kauri Reserve, Northland</td>
<td>1.05 : 1.27 : 1.01 : 1</td>
<td>0.79 : 0.43 : 0.87 : 1</td>
</tr>
<tr>
<td>Northern Kaimanawa Rd.</td>
<td>1.03 : 1.29 : 1 : 1</td>
<td>0.77 : 0.45 : 0.84 : 1</td>
</tr>
<tr>
<td>Wellington</td>
<td>1.01 : 1.17 : 0.98 : 1</td>
<td>0.78 : 0.46 : 0.90 : 1</td>
</tr>
<tr>
<td>Speargrass (Nelson)</td>
<td>0.94 : 1.32 : 1 : 1</td>
<td>0.82 : 0.41 : 0.87 : 1</td>
</tr>
<tr>
<td>St. Arnaud Rd. (Nelson)</td>
<td>0.96 : 1.32 : 1 : 1</td>
<td>0.78 : 0.44 : 0.87 : 1</td>
</tr>
<tr>
<td>Dean's Bush, Christchurch</td>
<td>1 : 1.37 : 1.08 : 1</td>
<td>0.81 : 0.44 : 0.86 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>1.05 : 1.46 : 1.14 : 1</td>
<td>0.78 : 0.39 : 0.84 : 1</td>
</tr>
<tr>
<td>Trotter's Gorge, Hampden</td>
<td>1.02 : 1.41 : 1.10 : 1</td>
<td>0.79 : 0.40 : 0.87 : 1</td>
</tr>
<tr>
<td>Dunedin</td>
<td>0.99 : 1.27 : 0.99 : 1</td>
<td>0.89 : 0.44 : 0.88 : 1</td>
</tr>
<tr>
<td>Dunedin</td>
<td>1.10 : 1.42 : 1.10 : 1</td>
<td>0.84 : 0.44 : 0.88 : 1</td>
</tr>
</tbody>
</table>
Table 12. *Priocnemis* (*Chrysocurgus*) nudopropodea n.sp.: Range of dimensions for 10 males from localities given in Table 11.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4 1/w</td>
<td>7.20</td>
<td>6.21</td>
</tr>
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<td>max.plp.seg.4/w</td>
<td>1.02</td>
<td>1.09</td>
</tr>
<tr>
<td>ant.seg.3 1</td>
<td>1.21</td>
<td>1.14</td>
</tr>
<tr>
<td>max.plp.seg.6/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>3.10</td>
<td>2.69</td>
</tr>
<tr>
<td>malar space 1</td>
<td>0.34</td>
<td>0.29</td>
</tr>
<tr>
<td>ant.seg.2 1</td>
<td>1.67</td>
<td>1.59</td>
</tr>
<tr>
<td>scape 1</td>
<td>2.54</td>
<td>2.36</td>
</tr>
<tr>
<td>ant.seg.3 1/w</td>
<td>0.53</td>
<td>0.49</td>
</tr>
<tr>
<td>ant.seg.3 1/w</td>
<td>0.53</td>
<td>0.49</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.22</td>
<td>1.16</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.58</td>
<td>0.57</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.93</td>
<td>0.90</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.55</td>
<td>0.45</td>
</tr>
<tr>
<td>L.I.D.</td>
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<td></td>
</tr>
<tr>
<td>P.O.L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O.P.L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>front femur 1</td>
<td>3.32</td>
<td>2.89</td>
</tr>
<tr>
<td>sigm.a 1.</td>
<td>0.54</td>
<td>0.52</td>
</tr>
<tr>
<td>marginal cell 1</td>
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<td></td>
</tr>
<tr>
<td>d. from apex</td>
<td>0.37</td>
<td>0.36</td>
</tr>
<tr>
<td>marginal cell 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>submarginal cell 3. 1.</td>
<td>1.52</td>
<td>1.44</td>
</tr>
<tr>
<td>submarginal cell 2. 1.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Subgenus Trichocurgus Haupt. (synonomised with Chirodamus Haliday by Townes, 1957, reserected herein as a subgenus of Priocnemis Schidte.

Trichocurgus Haupt, 1937, pp. 127, 134.

Type Species Pompilus monachus, Smith, 1855, original designation.

Diagnosis: Wings hyaline or subhyaline,; usually clear, or lightly tinted with fuscous, in one species evenly tinted with yellow; the second radio-medial cross-vein more-or-less vertical, never slanting at an angle greater than 10° from vertical to the wing axis. Anal lobe of hind wing elliptical. First segment of metasoma usually declivous above (strongly so in females), never petiolate. Dorsal comb-scales of female hind tibia very well developed, reduced, or absent. Fifth tarsal segment always with sub-apical spines below. Females with clypeus and labrum unspecialised, with sharp, "spadelike" apices. Female labium unspecialised, never with a fascicule of long, apically-curved bristles. Male genitalia with digitus volsellaris simple, apex, inwardly-barbed, apical 0.5 usually with sensillae basiconica on the outer margin. Male subgenital plate broadly ligulate. Females always ground-nesting, capable of digging firm, self-supporting nest-burrows with compacted walls.

Larvae with moderately-long setae on the vertex and temples of the head, and on the thorax. Clypeus usually with a median impression. Labrum with the latero-apical angles very broadly rounded. Spinules on the median epipharyngeal lobe sharp. Parietal bands of moderate length - shorter than those of subgenus Chrysocurgus, never extending beyond the lower levels of the antennal orbits (figs. 135, 144).
First thoracic spiracle with cells between the atrial ridges more or less regular, even, elongate, without median vertical extensions.

Nidification formula: \( b + c + a + d + e + f + g, \) and \( a + b + c + d + e + f + g \) (Aren's classification of 1948).


Nests single, or multi-celled. Nest sharing in some species.

Spiders paralysed by Trichocurgus species often recover sufficiently after sixteen hours to move feebly.

Comments:

The basic similarity of a great many characters in this subgenus suggests a high degree of kinship amongst its members (e.g. cf. male genitalia (e.g. the shape of the digitus, its sensillae basiconica, parameres, base, etc.) male subgenital plate, apical femoral spines of females, and most aspects of the female head and propodeum, and the wing venation). Of all the New Zealand Pompilids, carbonarius most clearly resembles Priocnemis (P.) exalta Fab., the type species of the genus. This is reflected in such characters as the form of the marginal and sub-marginal cells, the extent to which the nervulus exceeds the basal vein and the form of the dorsal row of scales on the hind tibia and so on. When regarded in this light, monachus is somewhat specialised. This view conflicts directly with that of H. Townes, who in 1957 assigned monachus to Chirodamus and stated (p.12) "The genus Chirodamus appears to be one of the most primitive of the family, as evidenced by the lack of specialisation in the venation and leg bristles, and by the general scolioid habitus." He regarded the Albopilosus group as
the most primitive in Chirodamus, stating (p.14) "The species included are the Nearctic albopilosis and fortis. The New Zealand Pompilus monachus Smith 1855 seems the nearest relative of this species group". This reflects the confused state of current pompilid systematics.

**Priocnemis (Trichocurgus) monachus** (Smith)

Figs. 47, 60, 62, 76, 86, 90, 98.

**Pompilus monachus** Smith 1855, p.164, Q Type locality:

New Zealand. Location of Type: Banks Collection, British Museum (Attributed to White in Error).

Hutton, 1881, p.107.

**Pompilus monarchus** Smith: Hutton, 1874, p. 165.

**Priocnemis monachus** Smith: Kirby, 1881, p.38 Waterhouse, 1883, pl. 137.


**Trichocurgus monachus,** (Smith) Haupt, 1937, p.134.

**Chirodamus monachus** (Smith) Townes 1957, pp.11, 14.

**Salius triangularis** Cameron 1898,p.48 Q, NEW SYNONOMY.

Type locality, Greymouth. Location of type: Banks Coll., British Museum; Cameron 1902, p.297; Hutton, 1904, p.97.

**Diagnosis Q:**

Body shiny, black; wings subhyaline, unevenly tinged with fuscous shot with mauve and blue irridescence. Veins and stigma black, opaque. Body - especially head and antennal scape - densely covered with long black hairs. All pubescence - including the paraoccipital patch between
eye antennal sclerite and fronto-clypeal suture - infuscate.

Declivity of first metasomal tergum very steep, hairy.

Mid femur with 2 apical spines; hind femur with 4 small apical spines low on the outer side. Hind tibia with a dorsal row of 12 scales, of which nos. 3-12 are uniformly very well developed.

Monachus is the largest endemic species.


Description: Colour and vestiture: Nitid, black, apical halves of mandibles and tarsal claws rufous. Wings subhyaline, unevenly tinged with fuscous (particularly near the veins), shot with amparo purple and ultramarine blue irridescence. Veins dark brownish-black, opaque; stigma black, opaque. Body densely covered with long black hairs particularly on the head, antennal scape, coxae, trochanters, and femora. Mesosomal hairs dense, but shorter than the foregoing. Metasoma with dense hairs on the apical 4 segments and on the declivity of the first tergite, more sparsely hairy elsewhere. Pubescence very fine, scattered, entirely infuscate; on the head confined to paraoccular patches between the eye, antennal sclerite and fronto-clypeal suture.

Structure: Labium unspecialised, submental bristles short, straight. Last 4 segments of maxillary palp in a ratio of about 0.9 : 1.12 : 0.97 : 1, segment 4 about 5.58 x as long as thick, 0.56 x as long as antennal segment 3, apical segment noticeably bowed, and 1.02 x median length of clypeus. Mandibles basically unidentate, though with an incipient second tooth. First 4 antennal segments in a ratio of about 0.8 : 0.31 : 1.09 : 1, antennal scape
1.91 x longer than wide, third antennal segment 3.79 x longer than wide. Head 1.33 x wider than high; lower interocellar distance exceeding upper interocellar distance by 0.97 x. Lower part of the face broad, not narrowed by an incurve of the eyes. Malar space well developed, 0.29 x length of antennal segment 2. Clypeus unspecialised, 3.22 x wider than high; front nitid, with scattered large punctures at the hair bases and dense small punctures between. Median frontal sulcus deep, continuous between ocellus and antennal sclerites. Front angle of ocellar triangle approximately a right angle, each hind ocellus bordered laterally by a deep sulcus. POL:OOL 7.5:17.2, (0.43). Pronotum comparatively small, its hind margin widely angulate. Propodium without a median sulcus, its disc raised near the middle, and with a prominent lateral tumescence behind the spiracles. Fore femur 3.72 x longer than thick, without apical spines. Mid femur with 2 minute peg spines apically, hind femur with 4 small apical spines grouped close together low on the outsides. Hind tibia with a dorsal row of 12 scales, entire, all but the basal 2 uniformly very well developed (fig. 98). Tarsi combed, fifth segments with ventral bristles, claws dentate. Forewing with the stigma 0.42 x the total length of the marginal cell, this removed from the wing tip by 0.65 its length. Third submarginal cell 1.27 x longer than second, both cells elongated parallel to the wing axis; second radio-medial cross-vein vertical, straight.
Variation:

Size: length 12-26 mm.; forewing 11 - 22.5 mm.

Colour and vestiture: The body and appendages are almost constant. Wing infuscation is variable to a limited extent (not broadly related to latitude). Southern forms, however, have often fewer hairs on for example, the costal vein and stigma, while the membrane tint is of a lighter tone.

Structure: There is some variation in proportions. For example, some Akatarawa Saddle specimens have the penultimate maxillary palp segment shorter than the last, while in others the usual, reversed, condition ensues.

The apical spines on the middle and hind femora are variable - smaller individuals frequently having fewer than 3 and 4 respectively. Old individuals often lose one or two, probably as a result of digging. The range of variation of 19 selected characters of 16 females from widely separated localities is shown in tables 13 and 14.

Teratological abnormalities:

1. Trotter's Gorge (Hampden) 17.1.73, No. 1; Propodeum rugose.

2. Trotter's Gorge (Hampden) 17.1.73, No. 2 mutant forewing;
a. Medial vein extending almost to wing margin;
b. an additional longitudinal vein present, running from the middle of the third radio-medial cross-vein towards the wing margin. Face: Median frontal sulcus abnormally shallow, obsolete medially.
Comment: (addendum)

Kirby, 1884, notes that a number of New Zealand insects were "named, but not described by Adam White, which, though quoted by Walker as about to appear in the 'Voyage of the Erebus and Terror' were never published in that work". This would account for Smith's (1855) attributing authorship of *monachus* to White.

Kirby, W.F., 1884, Notes on the Diptera of New Zealand, supplementary to Prof. Hutton's last catalogue of 1881.

Table 13. *Priocnemis (Trichocurgus) monachus*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 16 females.

<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirits Bay</td>
<td>0.89 : 1.08 : 1 : 1</td>
<td>0.90 : 0.32 : 1.16 : 1</td>
</tr>
<tr>
<td>Kaikohe, Northland</td>
<td>0.91 : 1.12 : 0.97 : 1</td>
<td>0.90 : 0.37 : 0.98 : 1</td>
</tr>
<tr>
<td>Leigh, Northland</td>
<td>0.97 : 1.25 : 1.03 : 1</td>
<td>0.79 : 0.24 : 1.07 : 1</td>
</tr>
<tr>
<td>Mt. Ruapehu</td>
<td>0.95 : 1.14 : 1 : 1</td>
<td>0.93 : 0.36 : 1.16 : 1</td>
</tr>
<tr>
<td>Porirua</td>
<td>0.97 : 1.22 : 0.96 : 1</td>
<td>0.79 : 0.31 : 1.11 : 1</td>
</tr>
<tr>
<td>Porirua</td>
<td>0.96 : 1.24 : 1.02 : 1</td>
<td>0.86 : 0.33 : 1.13 : 1</td>
</tr>
<tr>
<td>Porirua</td>
<td>0.90 : 1.12 : 0.97 : 1</td>
<td>0.80 : 0.31 : 1.09 : 1</td>
</tr>
<tr>
<td>Akatarawa (Wellington)</td>
<td>0.91 : 1.12 : 0.96 : 1</td>
<td>0.84 : 0.39 : 1 : 1</td>
</tr>
<tr>
<td>Linden (Wellington)</td>
<td>0.98 : 1.29 : 1.05 : 1</td>
<td>0.88 : 0.34 : 1.23 : 1</td>
</tr>
<tr>
<td>Nelson</td>
<td>0.95 : 1.22 : 1.06 : 1</td>
<td>0.69 : 0.28 : 1.11 : 1</td>
</tr>
<tr>
<td>Stillwater, Greymouth</td>
<td>1 : 1.20 : 1.05 : 1</td>
<td>0.81 : 0.35 : 1.08 : 1</td>
</tr>
<tr>
<td>Cashmere, Christchurch</td>
<td>1 : 1.22 : 1.01 : 1</td>
<td>0.93 : 0.36 : 1.14 : 1</td>
</tr>
<tr>
<td>Mt. Evans, Banks Peninsula</td>
<td>1.03 : 1.23 : 1.07 : 1</td>
<td>0.96 : 0.35 : 1.21 : 1</td>
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<tr>
<td>Trotter's Gorge, Hampden</td>
<td>0.93 : 1.23 : 0.98 : 1</td>
<td>0.99 : 0.38 : 1.15 : 1</td>
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<tr>
<td>Rakeahua V., Stewart Is.</td>
<td>0.9 : 1.15 : 1.01 : 1</td>
<td>0.88 : 0.31 : 1.11 : 1</td>
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Table 14. *Priocnemis (Trichocurcus) monachus*: Range of dimensions for 16 females from localities given in Table 13.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. plp. seg. 4 $\frac{l}{w}$</td>
<td>5.81</td>
<td>5.20 6.65</td>
</tr>
<tr>
<td>max. plp. seg. 4 $\frac{l}{l}$ 3 $\frac{1}{1}$</td>
<td>0.63</td>
<td>0.56 0.72</td>
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<tr>
<td>max. plp. seg. 6 $\frac{l}{w}$</td>
<td>1.01</td>
<td>0.90 1.15</td>
</tr>
<tr>
<td>medium T. clypeus $\frac{w}{h}$</td>
<td>3.17</td>
<td>2.41 3.55</td>
</tr>
<tr>
<td>malar space ant. seg. 2 $\frac{l}{T}$</td>
<td>0.34</td>
<td>0.24 0.41</td>
</tr>
<tr>
<td>scape $\frac{1}{w}$</td>
<td>1.98</td>
<td>1.45 2.18</td>
</tr>
<tr>
<td>ant. seg. 3 $\frac{l}{w}$</td>
<td>3.83</td>
<td>3.29 4.23</td>
</tr>
<tr>
<td>ant. seg. 3, 1. U.I.D.</td>
<td>0.76</td>
<td>0.67 0.92</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>1.26</td>
<td>1.18 1.37</td>
</tr>
<tr>
<td>F.D.</td>
<td>0.60</td>
<td>0.55 0.77</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.82</td>
<td>0.63 0.97</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.46</td>
<td>0.40 0.53</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>4.23</td>
<td>3.70 6.49</td>
</tr>
<tr>
<td>L.I.D.</td>
<td>0.42</td>
<td>0.38 0.46</td>
</tr>
<tr>
<td>0.O.L.</td>
<td>0.62</td>
<td>0.53 0.65</td>
</tr>
<tr>
<td>front femur $\frac{L}{w}$</td>
<td>1.34</td>
<td>1.25 1.45</td>
</tr>
</tbody>
</table>
Material Examined: 178 females from the following localities:

NORTH ISLAND: Spirits Bay (a), ACH; Houhora, ACH; Kaikohe, ACH; Leigh ACH; Titirangi D.S.I.R.; Mt. Albert ACH; Gisborne ACH; Lake Waikaremoana, ACH; Kaimanawa Ra. RoFo; Hastings, D.S.I.R.; Taurewa, ACH; Rotorua (3) RoFo; Mt. Ruapehu A.R; Mt. Egmont, 8,260' K.A. Fox; Porri, (6) D.S.I.R.; Palmerston North (2), ACH, RAC; Mt. Holdsworth Track 1,500' (8) ACH; Wellington; Akatarawa Saddle (27) ACH; Renata Hut (11) ACH; Porirua (5) ACH; Linden (3) ACH; Colonial Knob (4), ACH; SOUTH ISLAND: Nelson (9) ACH, D.S.I.R.; Golden Downs, RoFo; Mt. Owen CU; Reefton RoFo; Aickens (Otira) (6), ACH; Christchurch (1) ACH; Cashmere (1) CU; Lincoln (2) LiAg; Porters Pass CU; Arthur's Pass (2) ACH; Mt. Evans (Banks Peninsula) (8), ACH, CU; Kennedy Bush Rd. CU; Peel Forest (9) ACH; Timaru CU; Kelsey's Bush (Waimate) (6) ACH; Hook Bush (Waimate) (3) ACH; Trotter's Gorge (Hampden) (5), ACH; Lake Parina D.S.I.R.; Lake Morakei (11) ACH; Becks Central Otago ACH; Alexandra, ACH; Queens-town (2) D.S.I.R.; Milburn ACH; Port Jackson, (S. Westland) (5), ACH; Piano Flat, ACH; Balmoral (2) RoFo, Doubtful Sound.

STEWART ISLAND: Ocean Beach (6) ACH, CU; Port Pegasus (2) D.S.I.R., CU; Rakeahua V. ACH; Port Adventure, W. Ma; Port Pegasus (2) D.S.I.R., CU; Ernest Island CU.

Priocnemis (Trichocurgus) monachus (Smith) MALE

Diagnosis: Body shiny black. Head, scape, mesosoma, and first segment of metasoma densely covered with long black hairs. Antennal scape with some hairs at least three quarters as long as its maximum width. Front very shiny, without pubescence. Pubescence infuscate, very sparse, mostly confined to appendages. Wings subhyaline, unevenly tinted with fuscous, shot with mauve and steel-blue.
irridescence. Hind ocelli borded laterally by distinct sulci. Middle and hind femora each with 2 small, very stout apical bristles. First tergum of metasoma very steeply declivous in front, produced medially into a strong, compressed tubercle.

Specimen, O^4, Colonial Knob, Wellington, 4.3.71 A.C. Harris.

Description: Length 12.4 mm. Forewing 13 mm.

Colour and vestiture: Nitid, black, apical halves of mandibles and tarsal claws rufous. Wings subhyaline, unevenly tinted with fuscous (particularly near the veins), shot with irridescent mauve and steel-blue. Veins dark brownish -black, opaque; stigma black, opaque. Pubescence almost confined to the appendages. Body densely covered with long black hairs - especially the front, clypeus, and genae of the head, and the antennal scape above. Dense but shorter hair covers the mesosoma, coxae, and first metasomal segment - particularly the tergite's declivous basal half. Epipygeal hairs very dense.

Structure: Last 4 segments of maxillary palp in a ratio of about 0.87 : 0.96 : 0.85 : 1; segment 4 about 5.26 x as long as its maximum width, 0.65 x as long as antennal segment 3, apical segment very noticeably bowed, and 1.17 x median length of clypeus. First 4 antennal segments in a ratio of about 0.85 : 0.38 : 0.98 : 1; scape 1.78 x longer than thick, third antennal segment 3.14 x longer than thick. Mandibles basically unidentate, though with an incipient second tooth. Malar space 0.27 x length of second antennal segment, clypeus 2.9 x wider than high. Head 1.21 x wider than high, middle interocular distance 0.60 x width of head, upper interocular distance 0.89 x lower interocular distance.
0.89 x lower interocellar distance. Front angle of ocellar triangle approximately a right angle; POL:00L 7.8 : 15 (0.52); hind ocelli bounded laterally be a distinct sulcus. Front very shiny, with distinct, comparatively widely-spaced, punctures. Pronotum moderately small, its posterior margin widely arcuate. Propodeum with a longitudinal tumescence behind the spiracle; without median carina or distinct sculpture. Fore femora 3.57 x longer than wide. Middle and hind femora each with 2 apical spines; hind tibia lacking obvious teeth or scales, claws dentate. Forewing with the stigma 0.42 x total length of marginal cell which is removed from the wing tip by 0.53 x its own length. Third submarginal cell 1.35 x as long as second — both cells elongated parallel to the wing axis, second ratio medial cross-vein vertical, straight. First tergite of metasoma very sharply declivous, produced medially into a well-developed tubercle. Subgenital plate (fig. 47) long, ligulate, subrectilinear, with long straight bristles. Genitalia simple (fig. 60), paramere rod-like, bearing long setae, and with a strong transverse basal ridge. Digitus volsellaris apically narrowed, barbed inwardly, and bearing sensillae basiconica on its outer apical 0.2. Aedeagus, parapenial lobes, and paramers attaining to an approximately equal distance. Basal hooklets double.

Variation:

Size: Length: 9.6 - 19.1 mm.; forewing 8.5 - 17 mm.

Colour and vestiture: Body colour is constant. The intensity of the fuscous wing tint varies slightly, but is not positively correlated with latitude - in general, South Island specimens examined had lighter wings than North Island ones.
Table 15. *Priocnemis (Trichocurgus) monachus*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 6 males.

<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaikohe, Northland</td>
<td>0.91 : 1.12 : 0.97 : 1</td>
<td>1.23 : 0.37 : 0.98 : 1</td>
</tr>
<tr>
<td>Wellington</td>
<td>0.87 : 0.96 : 0.85 : 1</td>
<td>0.85 : 0.38 : 0.98 : 1</td>
</tr>
<tr>
<td>Maitai Res., Nelson</td>
<td>0.98 : 1.09 : 1.05 : 1</td>
<td>0.91 : 0.36 : 1 : 1</td>
</tr>
<tr>
<td>L. Paringa, Westland</td>
<td>0.85 : 1.13 : 0.98 : 1</td>
<td>0.87 : 0.38 : 1 : 1</td>
</tr>
<tr>
<td>Hellfire Bend, Stewart Island</td>
<td>1.19 : 1.56 : 1.35 : 1</td>
<td>0.88 : 0.46 : 0.92 : 1</td>
</tr>
<tr>
<td>Port Pegasus, Stewart Island</td>
<td>1.01 : 1.24 : 1.08 : 1</td>
<td>0.95 : 0.38 : 0.97 : 1</td>
</tr>
</tbody>
</table>
Table 16. Priocnemis (Trichocurgus) monachus: Range of dimensions for 6 males from localities given in Table 15.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4 $\frac{1}{W}$</td>
<td>5.50</td>
<td>5.0</td>
</tr>
<tr>
<td>max.plp.seg.4, 1. ant.seg.3, 1.</td>
<td>0.79</td>
<td>0.65</td>
</tr>
<tr>
<td>max.plp.seg.6 1. medium $\frac{1}{W}$, clypeus clypeus $\frac{1}{W}$</td>
<td>1.03</td>
<td>0.79</td>
</tr>
<tr>
<td>malar space ant.seg.2, 1. scape $\frac{1}{W}$.</td>
<td>0.25</td>
<td>0.22</td>
</tr>
<tr>
<td>ant.seg.3 $\frac{1}{W}$.</td>
<td>2.02</td>
<td>1.78</td>
</tr>
<tr>
<td>ant.seg.3, 1. U.I.D.</td>
<td>2.93</td>
<td>2.67</td>
</tr>
<tr>
<td>T.F.D. T.F.D.</td>
<td>0.58</td>
<td>0.50</td>
</tr>
<tr>
<td>M.I.D. T.F.D.</td>
<td>1.25</td>
<td>1.21</td>
</tr>
<tr>
<td>U.I.D. L.I.D.</td>
<td>0.60</td>
<td>0.59</td>
</tr>
<tr>
<td>P.O.L. O.O.L.</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>front femur $\frac{1}{W}$</td>
<td>0.49</td>
<td>0.45</td>
</tr>
<tr>
<td>stigma 1. marginal cell 1.</td>
<td>3.65</td>
<td>3.37</td>
</tr>
<tr>
<td>d. from apex marginal cell 1.</td>
<td>0.43</td>
<td>0.42</td>
</tr>
<tr>
<td>submarginal cell 3, 1. submarginal cell 2, 1.</td>
<td>0.53</td>
<td>0.46</td>
</tr>
<tr>
<td>submarginal cell 3, 1. submarginal cell 2, 1.</td>
<td>1.31</td>
<td>1.17</td>
</tr>
</tbody>
</table>
Structure: The genitalia and subgenital plate show little variation. Fewer than 2 apical spines on the mid and hind femora are frequently encountered. Abrasion accounts for their absence in some (but not all) specimens. The range of variation of 19 selected characters of males from widely separated localities is shown in tables 15 and 16.

Material examined: 51 males from the following localities:

NORTH ISLAND: Kaikohe, ACH; Houhora, ACH; Mt. Egmont 8,260' A.J. Fox; Mt. Holdsworth Track 1,500' (3) ACH; Akatarawa Saddle (Wellington) (12), ACH; Colonial Knob (Porirua) (4) ACH;

SOUTH ISLAND: Nelson (4) D.S.I.R.; Kaituna (Banks Peninsula) (2) CU; Peel Forest (6) ACH; Kelsey's Bush (Waimate) (3), ACH; Trotters Gorge (Hampden) (2) ACH;

Lake Paringa (S. Westland), D.S.I.R.; Lake Morakei (S. Westland) (4), ACH; Port Jackson, ACH; Piano Flat, ACH;

STEWART ISLAND: Ocean Beach, CU; Rakeahua V. ACH; Port Adventure, W. Mu; Port Pegasus, W. Mu; Ernest Is. CU.

Priocnemis (Trichocurgus) conformis (Smith)

figs. 15, 48, A, B, 59 A, B, 63, 75, 85, 88, 99; plate 20, A-E.

Priocnemis conformis Smith, 1876, p. 482. Type locality:

Peel Forest. Location of type: Banks Collection, British Museum. Hutton, 1881, p.107; Kirby 1881, p. 39, Waterhouse, 1883, pl. 137.

Salius conformis (Smith) Kohl 1884, p.45; Dalla Torre, 1897, p. 817; Cameron, 1902, p.297, Hutton, 1904, p.97.
Priocnemis diligens Smith, 1876, p. 483, {q} pl. IV, fig. 3.
Type locality: Peel Forest. Location of type:
Banks Collection, British Museum. NEW SYNONOMY.
Kirby, 1881, p. 38; Hutton, 1881, p. 108.
Salius diligens (Smith) Kohl, 1884; p. 45; Dalla Torre, 1897, p. 219; Cameron, 1902, p. 297; Hutton 1904, p. 97;
Tillyard, 1926, p. 292.

Priocnemis marginatus Smith, 1876, p. 483, {q} O^a, pl. IV, fig. 2. Type locality: West Coast South Island.
Location of type: Banks Collection, British Museum.
NEW SYNONOMY, Kirby, 1881, p. 39; Hutton, 1881, p. 108, {q} O^a.
Salius marginatus (Smith) Kohl, 1884, p. 45; Dalla Torre, 1897, p. 281; Cameron, 1902, p. 297; 1898, p. 47;
Hutton, 1904, P. 97; Tillyard, 1926, p. 292.

Synonomy: Larger collections from Peel Forest would have revealed a complete range of intermediate between the reddish conformis and diligens, its southern melanic form. In fact Smith (1876) described a "diligens, type B - the abdomen with irregular ferruginous stains", from Peel Forest and stated (op. cit.) that the type had "the extreme apex of the abdomen ferruginous". Their relatedness has not hitherto been suspected. The position of the hybrid band, the low number of intermediates in it, and experiments I have conducted suggest conformis and diligens may be subspecies dating from glacial separation, and interglacial convergence in the area of a pre-glacial cline. The situation is discussed more fully in the section on parallel ecogenotypical colour variation, and zoogeography.
Priocnemis (Trichocurgus) conformis (Smith) ♀

**Diagnosis:**

Wings subhyaline, tinted with yellow. Head always with vertex, front, and genae, black. All fifth tarsal segments invariably black. Colour of metasoma variable; reddish above latitude $43.7^\circ$, black below latitude $45.5^\circ$, and between these latitudes black, reddish or banded or spotted in a great variety of ways with reddish and black.

Reddish specimens with bronzy-aenous pubescence on head and metasoma. Mentum unspecialised, with short, erect bristles. Hind tibia comparatively smooth, setae reduced in size and number, dorsal comb row reduced to a series of minute, obtuse, rounded swellings. Second and third femora with 3, minute, peg-like, apical spines. First tergite of metasoma with a very steep, hairy basal declivity.

Small melanics have a very superficial resemblance to *Epipompilus insularis* ♀ ♀, but can at once be distinguished by the transverse furrow on the second sternite of the metasoma, and the lateral groove on the first tergite.

**Plesiotype** ♀ Kapakapanui 3,000' (Tararua Ra.) 28.1.72, A.C. Harris.

Length of body 12.5 mm.; length of forewing 11 mm.

**Description**: Colouration and vestiture: Head with clypeus and basal two thirds of mandibles rufo-castaneous, remainder of head and apex of mandibles black. Metasoma with pronotum, tegulae and metapleuron rufo-castaneous, the rest black. Metasoma rufo-castaneous. Legs rufo-castaneous with all coxal bases, fifth tarsal segments and claws infuscate,
the apices of the claws rufous. Wings subhyaline, tinted with amber, apical 0.29 infuscate. Veins amber, infuscate in apical .25 of wing, translucent. Stigma amber, translucent. Head (including clypeus and basal third of mandibles) pronotum, mesepisterum, metapleuron, and propodeum densely covered with decumbent bronzy-golden pubescence. Moderately spaced erect, fuscous hairs cover the face, vertex, genae, mesosoma, and coxae. Apical hair tuft of metasoma confined to the last two segments.

Structure:

Last 4 segments of maxillary palp in a ratio of about 0.96 : 1.37 : 1.12 : 1; segment 4 about 6.47 x as long as its maximum width, 0.91 x as long as antennal segment 3; apical segment 1.01 x median length of clypeus. Labrum unspecialised. Labium unspecialised, with short, erect bristles on the prementum. Clypeus 3.39 x as wide as high. Malar space 0.21 x as long as antennal segment 2. Antennal segments 1-4 in a ratio of about 1.15 : 0.44 : 1.10 : 1; scape 2.03 x as long as thick, third segment 3.21 x as long as thick, 0.55 x upper interocular distance. Head 1.27 x as wide as high, middle interocular distance 0.62 x width of head, upper interocular distance 0.82 x lower interocular distance. Front angle of ocellar triangle less than a right angle, POL:OOL exactly 1 : 2.

Face with a median swelling extending to the somewhat elevated antennal sclerites. Median frontal sulcus continuous between antennal sclerites and median ocellus, deeply encised. Mandibles partially bidentate, the incipient second tooth more developed than in any other New Zealand species. Head and mesosoma pitted with small, contiguous
punctures. Pronotum short, its posterior margin sub-arcuate. Propodeum sloping evenly, its median carina obsolete, confined to the middle of the disc. Stigma-furrows prominent; lateral tumescence obtuse, long, extending above and behind the stigma almost to the posterior rim. Front femur 3.53 x as long as wide, without apical spines. Middle and hind femora each with 3 small, stout, peg-like spines, surrounded by hairs, and grouped in the corners of a triangle, very low on the outer side at the apex. Hind tibia without teeth but with small rounded swellings at the bases of dorsal setae (fig. 99). Fifth tarsal segment with weak ventral spines, 3 medially, and two lateral ones; claws dentate. Forewing with the stigma small, 3.53 x as long as total length of marginal cell, the latter removed from the wing-tip by 0.76 x its own length (this ratio exceeding that of all other species with yellow-tinted wings); third submarginal cell 1.54 x as long as submarginal cell 2. First tergite of metasoma with a very steep basal declivity.

**Variation** length: 7.5 - 19 mm.; forewing: 6.5 - 14.5 mm.
*(Both extremes had the metasoma red)*

**Colouration and vestiture:**

Forewing: the stigma can be very pale testaceous and semi-translucent, fulvous and semi-translucent, opaque black, or intermediate between any of these. There is no direct relationship between stigmal colouration and the extent of wing infuscation, and all forms occur on both reddish specimens and melanics,*(di ligens)*. The apical infuscation is also very variable. Although the size of the infuscated area is, in a general way, positively correlated with increasing latitude, most samples of over 30 specimens south
of Auckland contain some individuals with the infuscation terminating well above the level of the stigma and others in which it extends basad to it. In Northland, the infuscation is often confined to the extreme apex, although in some from Spirits Bay it extends almost to the stigma. No two individuals are alike even in a sample of 45 specimens taken in an area of 50 square metres. Notwithstanding this, a collection from an area of that size will be readily distinguishable from a similar collection taken a few miles away - for example, individuals in Wellington samples from Wainui Ridge, Karori, and Akatarawa Saddle are distinguishable. Very distinctive, and highly localised forms occur frequently. For example, out of 22 females taken at Trotter's Gorge on 17.1.73, 18 had more than twice the usual amount of infuscation. This had a distinctive pattern (plate 4, G); it covered the entire costal cell and extended along the subcostal margin of the radial cell to its base. Infuscation extended over the entire medial cell and all cells with bases distal to the median cell's base.

I have seen but a single specimen of this form outside Trotter's Gorge. This occurred in a Hook Bush sample, out of a total of 134 wasps from Hook Bush and Kelsey's Bush, Waimate. (Trotter's Gorge and Waimate are roughly 38 kilometres apart in a direct line).

Another highly-distinctive form occurs in southern Southland (plate 4,H). Twenty specimens from Colac Bay and Waipati River mouth have a distinct fascia across the wing at the level of the cubito-anal vein, resulting from infuscation of both the membrane and the wing setae. It is variable, and in some specimens the wing membrane at the site of the fascia is incompletely infuscated.
Body: The head is always black, with the exception of the clypeus, which is at least partly red, and the mandibles which are castaneous, and infuscated apically, on all North Island specimens examined. The antennal flagellum is black, and the scape and pedicel castaneous, on all North Island females. All fifth tarsal segments are invariably infuscated throughout New Zealand. Below the latitude of Auckland, the propodeum is black. Although the mesosoma is typically black, the thorax can have small reddish areas on it as far south as Christchurch. The mesosoma of Northland specimens is typically variegated with usually a majority of areas black, and the remainder rufo-castaneous. A specimen typical of the Spirits Bay sample has the head, thorax, and propodeum black except for the clypeus, posterior pronotal disc, and the pronotal tubercle, which are reddish. The largest and most enigmatic range of variation within small populations occurs between latitudes $43.3^\circ$ and $45.5^\circ$ east of the main divide of the Southern Alps. There, a typical sample will often consist mostly of reddish and blackish specimens in roughly equal numbers, and a very small number of intermediates. Small pockets of mostly black and mostly reddish wasp occur as well. The black form has the head and all its appendages, the mesosoma, the coxae, trochanters, and the metasoma, black. Pubescence is sparse and is always completely infuscate. The "Red" form has the metasoma, trochanters, and most of the coxae reddish. Patches of fulvous-red occur on the antennal scape, the clypeus, and the thorax, while the pubescence is bronzy-aenous. The infrequent intermediate types have the metasoma banded or spotted with black and reddish in a great variety of ways, and the pygideum is
sometimes castaneo-rufous. The pubescence can be bronzy-aenous, or black. The general pattern there suggest secondary intergradation following disruption of part of a cline - this impression being quite striking when my 1,458 specimens (0° + QQ) are viewed, arranged latitudinally in each of a series of 8 store boxes. (The situation is discussed more fully below under "parallel ecophenotypical colour variation"). South of latitude 45.5° all specimens lack both reddish pigment, and bronzy-aenous pubescence. The proportion of black on the legs increases with latitude, so that Colac Bay and Stewart Island specimens typically have the femora mostly black. Structural variation: The apical spines on the middle and hind femora vary in number from 0 to 3. The presence of fewer than 3 can usually be ascribed to abrasion.

The range of variation of 19 characters of 11 specimens from widely separated localities is shown in tables 17 and 18.

Teratological abnormalities: Specimen from Cashmere (Christchurch) 20 : 11 : 72 with an additional longitudinal vein projection into the third submarginal cell from the middle of the third radio-medial cross-vein.

Material examined: 864 females from the following localities:
NORTH ISLAND: Mt.Uniwhaio (Spirits Bay) (9), ACH; Pukepoto (Kaitaia), (7), ACH; Manginangina Kauri Reserve (5), ACH; Muir Park Whangarei (3), ACH; Coronation Park Whangarei (6), ACH; Leigh, (12), ACH; D.S.I.R.; Great Barrier Island, W.Mu; Pureora (4), ACH; Te Aroha ACH; Ohakune (5), ACH; D.S.I.R.; Huirau Range, RoFo; Mt.Tongariro (5), ACH;
Table 17. *Priocnemis (Trichocurges)* conformis: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 11 females.

<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirits Bay</td>
<td>0.93 : 1.39 : 1.19 : 1</td>
<td>0.85 : 0.28 : 1 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua Ra.</td>
<td>0.95 : 1.27 : 1.10 : 1</td>
<td>0.90 : 0.38 : 1.05 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua Ra.</td>
<td>1.10 : 1.44 : 1.19 : 1</td>
<td>0.94 : 0.34 : 1 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua Ra.</td>
<td>0.96 : 1.37 : 1.12 : 1</td>
<td>1.15 : 0.44 : 1.10 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua Ra.</td>
<td>0.92 : 1.20 : 1.01 : 1</td>
<td>1.05 : 0.36 : 1.07 : 1</td>
</tr>
<tr>
<td>Wainui Ridge, Wellington</td>
<td>0.89 : 1.18 : 1 : 1</td>
<td>1.08 : 0.46 : 0.98 : 1</td>
</tr>
<tr>
<td>Wainui Ridge, Wellington</td>
<td>0.85 : 1.24 : 1 : 1</td>
<td>1.11 : 0.45 : 0.95 : 1</td>
</tr>
<tr>
<td>Port Hills, Christchurch</td>
<td>1.30 : 1.41 : 1.20 : 1</td>
<td>0.97 : 0.37 : 1.13 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>1 : 1.36 : 1.18 : 1</td>
<td>0.88 : 0.31 : 1.03 : 1</td>
</tr>
<tr>
<td>melanic form (diligens)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peel Forest</td>
<td>0.91 : 1.27 : 1.12 : 1</td>
<td>0.83 : 0.42 : 1.11 : 1</td>
</tr>
<tr>
<td>Piano Flat</td>
<td>0.92 : 1.20 : 1.07 : 1</td>
<td>1 : 0.34 : 1.02 : 1</td>
</tr>
</tbody>
</table>
Table 18. Picrocnemis (Trichocurgus) conformis: Range of dimensions for 10 females from localities given in Table 17.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4, l</td>
<td>5.92</td>
<td>5.29 - 7.48</td>
</tr>
<tr>
<td>ant.leg.3, l</td>
<td>0.77</td>
<td>0.67 - 0.96</td>
</tr>
<tr>
<td>max.plp.seg.6, l</td>
<td>1.03</td>
<td>0.88 - 1.22</td>
</tr>
<tr>
<td>medium l. clypeus</td>
<td>3.85</td>
<td>2.87 - 4.19</td>
</tr>
<tr>
<td>malar_space</td>
<td>0.20</td>
<td>0.16 - 0.25</td>
</tr>
<tr>
<td>ant.leg.2, l</td>
<td>1.85</td>
<td>1.86 - 2.08</td>
</tr>
<tr>
<td>scape</td>
<td>2.89</td>
<td>1.56 - 3.65</td>
</tr>
<tr>
<td>ant.leg.3, l</td>
<td>0.61</td>
<td>0.41 - 0.79</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.27</td>
<td>1.18 - 1.34</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.61</td>
<td>0.58 - 0.63</td>
</tr>
<tr>
<td>F.D.</td>
<td>0.85</td>
<td>0.80 - 0.99</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.85</td>
<td>0.80 - 0.99</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.61</td>
<td>0.47 - 0.69</td>
</tr>
<tr>
<td>L.I.D.</td>
<td>3.59</td>
<td>3.39 - 3.86</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>0.48</td>
<td>0.43 - 0.53</td>
</tr>
<tr>
<td>O.O.L.</td>
<td>0.76</td>
<td>0.61 - 0.91</td>
</tr>
<tr>
<td>front femur</td>
<td>1.30</td>
<td>1.20 - 1.54</td>
</tr>
</tbody>
</table>
Gisborne

Atene (Wanganui R.), (6), ACH; Mt. Holdsworth Track 1,500' (18), ACH; Renata Hut (Tararua Ra.) (59), ACH;
Kapakapanui, Tararua Ra. (31), ACH; Akatarawa Saddle (Wellington) (47), ACH; Botanical Gardens (Wellington), (23), ACH;
Wainui Ridge, (Wellington) (29), ACH; Linden (Wellington), (3), ACH; Red Rocks (Wellington), ACH;

Mt. Johnson, RoFo; Mt. Arthur 3,000' (2), D.S.I.R.;
Speargrass Hill, 5,500'; RoFo; Mt. Fred, RoFo; Mt. Robert (Nelson Lakes), (2), CU; Cupola Basin (Nelson Lakes) RoFo;
Flora River, D.S.I.R.; Lewis Pass (3), CU; Ada Pass, K. J. Fox; Eyreswell (4), ACH; Cashmere (Christchurch), CU;
Little River, ACH; Puke Atua Bush (Port Hills), D.S.I.R.;
Tikao Bay (Banks Peninsula) (2), ACH; Arthur's Pass (3), ACH;
Punchbowl, RoFo; Mt. Summers, (2), ACH; Salisbury, D.S.I.R.;
Lake Morakei (S. Westland), (7), ACH; Peel Forest (97) ACH;

Bush Reserve, Geraldine (67), ACH; Kelsey's Bush (Waimate), (83), ACH; Hook Bush (Waimate), (51), ACH; Tauhai (4), ACH;
Mt. Nimrod (Cave) (17), ACH; Trotter's Gorge (Herbert) (22), ACH; Beaumont, RoFo; Maungatua Mt. D.S.I.R.; Flagstaff (3), ACH;
Leith Saddle (Dunedin), (12), ACH; Piano Flat (86), ACH;
Garvie Mountains (42), ACH; Becks (Central Otago), ACH;
Alexandra, (Central Otago), (3), ACH; Naseby compd., RoFo;
Pukerau comp. RoFo; Owaka (6), ACH; Obelisk Ra. 4,500' (Otago), (12) ACH; Waipati R. (Southland) (2), CU; Colac Bay (Southland), (18), ACH; Cu; Remarkables (Queenstown), 6,000' (3), ACH;

STEWART ISLAND: Oban (3), ACH; Rakeahua V. (2), D.S.I.R.; Thule D.S.I.R.; Ocean Beach (3), CU; Masons' Bay

CU; Port Pegasus (3), ACH, D.S.I.R., WMu.
Priocnemis (Trichocurgus) conformis (Smith) MALE

Diagnosis: Colouration variable; wings subhyaline, yellow-tinted, metasoma castaneo-rufous above latitude 43.7°, black below latitude 45.5°, and between these latitudes black, reddish, or banded or spotted in a great variety of ways with red or black. Reddish specimens with bronzy-aenous pubescence on head and mesosoma. First segment of metasoma short, not petiolate, its tergum with a steep basal declivity. All metasomal sternites without carinae, or other raised structures. Genitalia with the paramere sinuous when viewed from below.

O° Kapakapanui 3,000' Tararua Ra., 10.1.72, A.C. Harris.

Description: Length 9 mm., forewing 8.7 mm.

Colouration and vestiture: Head and mesosoma black, except mandibles, which are castaneous but with the basal quarter black and the teeth fusco-rufous. Maxillary palpi with segments 12 and 6 infuscate, 3 and 4 fulvous; antennae black, tegulae fulvous. Metasoma rufo-castaneous, base of first segment black; legs light castaneo-rufous, tarsal segments and coxae black, the apices of the last castaneo-rufous. Head, mesosoma except metapostnotum and coxae covered with decumbent bronzy-aenous pubescence, metasoma with finer, more sparse [Decumbent bronzy-aenous pubescence dense on the head, mesosoma except metapostnotum, and coxae; much finer and more sparse on the metasoma. Head well covered with long, erect fuscous setae, these being shorter, finer and more sparse on the mesosoma, and finer though fairly dense on the basal declivity of the first tergite of the metasoma. Wings subhyaline tinted with yellow, apical third of forewing infuscated; veins amber, translucent, but grey, translucent in apical third. Stigma black, opaque.
Structure: Last 4 segments of maxillary palp in a ratio of about 0.81 : 1.15 : 0.97 : 1; fourth segment 7.13 x as long as its maximum width, 1.03 x as long as antennal segment 3; apical segment 1.19 x median length of clypeus. Clypeus 2.73 x as wide as high. Malar space 0.09 x as long as antennal segment 2. Antennal segments 1-4 in a ratio of about 0.93 : 0.44 : 0.89 : 1; scape 1.16 x as long as thick, third segment 2.80 x as long as thick, 0.51 x upper interocular distance. Head 1.22 x as wide as high, middle interocular distance 0.58 x width of head, upper interocular distance 0.96 x lower interocular distance. Front angle of antennal triangle slightly less than a right angle, POL:OOL 7 : 14 : 3 (0.49). Median frontal sulcus shallow, entire from antennal sclerites to median ocellus. Head and mesosoma with small, contiguous punctures. Pronotum moderately short, its hind margin broadly subangulate. Metapostnotum comparatively wide, sloping evenly, without a median sulcus. Stigma furrow prominent. Lateral tumescence obtuse, slanting obliquely above and behind the stigma. First tergum of metasoma short, with a steep basal declivity. Metasomal sternites smooth, without carinae or other relief. Front femora 3.9 x as long as wide. All femora without spines. Apices of all tibiae with apical spines; hind tibiae smooth. Claws dentate. Forewing with the stigma of moderate length, 0.58 x as long as total length of submarginal cell, latter removed from the wing tip by 0.75 x its own length; third submarginal cell 1.20 x as long as submarginal cell 2. First segment of metasoma short, not petiolate, its tergum with a very steep basal declivity. All metasomal sternites smooth, without carinae or other
relief before the genital opening. Subgenital plate broadly ligulate, apically truncated, its bristles of moderate length (fig. 59 A,B). Genitalia (fig. 48 A,B) with apices of aedeagus, digitus, parapenial lobes and parameres attaining an approximately equal distance. Paramere sinuous in dorsal view; aedeagus and remaining valves very similar to the other members of the Trichocurgus sub-genus e.g. digitus simple, inwardly-barbed at its apex, and bearing small sensillae basiconica on its outer apical eighth.

Variation:

Size: length 5 - 14 mm.; forewing 4.5 - 12 mm. (both extremes with the metasoma red.)

Colour and vestiture: Changes in wing infuscation and body colour are very similar to, and parallel those of the females. However, the apical infuscation of the forewing is proportionately larger in North Island males than in females. Nevertheless, the characteristic wing-types of distinctive local forms, such as those from Trotter's Gorge, and Colac Bay - Waipati River, are common to both sexes. The apical 4 segments of the metasoma can be black even in Spirits Bay specimens. In others they are rufo-castaneous. Below latitude 43.3° all males have at least the apical 4 segments of the metasoma infuscate.

Structure:

(a) Median frontal sulcus: variable. It is deep medially but becomes obsolete and vanishes well above the antennal sclerites in Pureora specimens. In those from Spirits Bay it is obsolete medially and resumes just apical of midway as a very distinct, narrow scratch between the antennal sclerites. Nelson specimens are similar, save that the frontal area carrying the groove is raised just
below midway. On specimens from Stewart Island the median sulcus is continuous but becomes fine where it crosses (at 0.5) a small, very rounded, medially-placed tumescence. Specimens from the Remarkables are similar, except that the depressed tubercle is smaller, and situated lower on the face, at 0.63 from the ocellus. The frons bulges out on the ocellar 0.6 of its length. On Beaumont specimens, the continuous sulcus is surrounded on either side by frontal swellings.

(b) The range of dimensions of 10 specimens from widely separated localities is shown in tables 19 and 20. As in monachus the maxillary palp becomes regularly shorter with increasing latitude. This may indicate a reduction in surface area in relation to decreasing mean annual temperature. The ratios $\frac{TFD}{FD}$ and $\frac{MID}{TFD}$ also decreases southwards in a regular manner.

Material examined: 594 males from the following localities:
NORTH ISLAND: Mt.Uniwhaeo ( Spirits Bay), (5), ACH; Pukepoto (Kaitaia), (3), ACH; Manginangina Kauri Reserve (7), ACH; Muir Park Whangarei (2), ACH; Coronation Park, Whangarei (5), ACH; Leigh (9), ACH; Pureora (2), ACH; Mt.Tongariro (3), ACH; Atene (Wanganui R.) (2), ACH; Mt.Holdsworth, Tararua Ra. (6), ACH; Renata Hut Tararua Ra. (38), ACH; Kapakapanui, Tararua Ra. (16), ACH; Akatarawa Saddle (Wellington), (17), ACH; Wainui Ridge (Wellington) (18), ACH; Botanical Gardens, Wellington (3), ACH; Linden, Wellington ACH; Karori ACH; Red Rocks, Wellington ACH; SOUTH ISLAND: Nelson (3), D.S.I.R.; Blue Ck. RoFo; Mt.Chrome, (2), RoFo; Mt.Robert (Nelson Lakes) CU; Speargrass Ck. 5,200' RoFo; Cascade Ck. RoFo; Cupola Basin (Nelson Lakes) RoFo; Mt.Fred; RoFo;
Table 19. *Priocnemis* (Trichocurgus) conformis: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 10 males.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary palp ratio</th>
<th>Antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirits Bay</td>
<td>0.74 : 1.12 : 0.95 : 1</td>
<td>0.94 : 0.42 : 0.93 : 1</td>
</tr>
<tr>
<td>Manginangina Kauri Res., Northland</td>
<td>0.87 : 1.09 : 1 : 1</td>
<td>0.94 : 0.48 : 0.84 : 1</td>
</tr>
<tr>
<td>Kapakapanui, Tararua Ra.</td>
<td>0.81 : 1.15 : 0.97 : 1</td>
<td>0.93 : 0.44 : 0.89 : 1</td>
</tr>
<tr>
<td>Upper Maitai, Nelson</td>
<td>0.86 : 1.23 : 1.04 : 1</td>
<td>0.84 : 0.44 : 0.88 : 1</td>
</tr>
<tr>
<td>Upper Maitai, Nelson</td>
<td>0.87 : 1.29 : 1 : 1</td>
<td>1 : 0.49 : 1 : 1</td>
</tr>
<tr>
<td>Mt. Chrome, 5,000'</td>
<td>0.79 : 1.14 : 0.97 : 1</td>
<td>0.93 : 0.46 : 0.85 : 1</td>
</tr>
<tr>
<td>Cashmere, Christchurch</td>
<td>0.88 : 1.23 : 1.10 : 1</td>
<td>0.96 : 0.46 : 0.87 : 1</td>
</tr>
<tr>
<td>Melanic form (diligens)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beaumont Forest, Otago</td>
<td>0.92 : 1.26 : 1.14 : 1</td>
<td>0.97 : 0.42 : 1.01 : 1</td>
</tr>
<tr>
<td>Remarkable Ra., 6,000'</td>
<td>0.81 : 1.08 : 1 : 1</td>
<td>0.98 : 0.46 : 0.96 : 1</td>
</tr>
<tr>
<td>Oban, Stewart Island</td>
<td>0.81 : 1.09 : 1 : 1</td>
<td>1 : 0.49 : 0.88 : 1</td>
</tr>
</tbody>
</table>
Table 20. *Priocranemis (Trichocurgus) conformis*: Range of dimensions for 5 males from localities given in Table 19.

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Mean (X)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. plp. seg. 4 / w.</td>
<td>6.75</td>
<td>6.82</td>
</tr>
<tr>
<td>max. plp. seg. 4, 1</td>
<td>1.01</td>
<td>0.96</td>
</tr>
<tr>
<td>ant. seg. 3, 1</td>
<td></td>
<td>1.07</td>
</tr>
<tr>
<td>max. plp. seg. 6, 1</td>
<td>1.22</td>
<td>1.17</td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>2.82</td>
<td>2.73</td>
</tr>
<tr>
<td>max. Qle. seg. 4</td>
<td></td>
<td>2.92</td>
</tr>
<tr>
<td>max. Qle. seg. 4, 1</td>
<td>1.01</td>
<td>0.96</td>
</tr>
<tr>
<td>ant. seg. 3, 1</td>
<td>1.07</td>
<td>1.29</td>
</tr>
<tr>
<td>clypeus w.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>1.01</td>
<td>0.96</td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>2.82</td>
<td>2.73</td>
</tr>
<tr>
<td>max. Qle. seg. 4</td>
<td></td>
<td>2.92</td>
</tr>
<tr>
<td>max. Qle. seg. 4, 1</td>
<td>1.01</td>
<td>0.96</td>
</tr>
<tr>
<td>ant. seg. 3, 1</td>
<td>1.07</td>
<td>1.29</td>
</tr>
<tr>
<td>malar space</td>
<td>0.13</td>
<td>0.08</td>
</tr>
<tr>
<td>ant. seg. 2, 1</td>
<td>1.84</td>
<td>1.16</td>
</tr>
<tr>
<td>scape w.</td>
<td></td>
<td>2.21</td>
</tr>
<tr>
<td>ant. seg. 3, 1</td>
<td>2.56</td>
<td>1.82</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.50</td>
<td>0.44</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>1.22</td>
<td>1.17</td>
</tr>
<tr>
<td>F.D.</td>
<td></td>
<td>1.26</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.60</td>
<td>0.57</td>
</tr>
<tr>
<td>T.F.D.</td>
<td></td>
<td>0.63</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.97</td>
<td>0.92</td>
</tr>
<tr>
<td>L.I.D.</td>
<td></td>
<td>1.01</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>0.54</td>
<td>0.49</td>
</tr>
<tr>
<td>O.O.L.</td>
<td></td>
<td>0.60</td>
</tr>
<tr>
<td>front femur w.</td>
<td>3.63</td>
<td>3.46</td>
</tr>
<tr>
<td>stigma 1.</td>
<td>0.55</td>
<td>0.51</td>
</tr>
<tr>
<td>marginal cell 1</td>
<td></td>
<td>0.61</td>
</tr>
<tr>
<td>d. from apex</td>
<td>0.70</td>
<td>0.61</td>
</tr>
<tr>
<td>marginal cell 1</td>
<td></td>
<td>0.75</td>
</tr>
<tr>
<td>submarginal cell 3, 1</td>
<td>1.15</td>
<td>1.10</td>
</tr>
<tr>
<td>submarginal cell 2, 1</td>
<td></td>
<td>1.20</td>
</tr>
</tbody>
</table>
Little River D.S.I.R.; Mamatia, ACH; Eyreswell (4), ACH; Lincold LiAg; Cashmere, Christchurch (5), CU; Puke Atu Bush; Port Hills (3), D.S.I.R.; Lake Paringa ACH; Lake Morakei (4), ACH; Peel Forest, (98), ACH; Bush Reserve, Geraldine (61), ACH; Kelsey's Bush, Waimate (127), ACH; Hook Bush, Waimate, (86), ACH; Mt. Nimrod (Cave), (12), ACH; Trotter's Gorge (Hampden), (15), ACH; Mt. Maungatua ACH; Leith Saddle (Dunedin) (9), ACH; Piano Flat (12), ACH; Remarkable 7,000' (Queenstown) (3), ACH; Owaka, ACH; Obelisk Ra. (Central Otago) (7), ACH; STEWART ISLAND: Oban (5), D.S.I.R., CU; Port Pegasus (2), WMu, ACH.

Nitidiventris species group

**Priocnemis (Trichocurgus) nitidiventris** (Smith)

*figs. 23A, 27, 39, 50, 57, 78.*

*Priocnemis nitidiventris* Smith 1878, p. 6 (Q) Type locality: Otago. Location of type: Banks Collection, British Museum. Kirby 1881, p. 38; Hutton 1881, p. 109.

*Salius nitidiventris* (Smith) Kohl, 1884, p. 45; Dalla Torre 1897, p. 233; Cameron, 1902, p. 297, Hutton, 1904 p. 97; Tillyard, 1926, p. 292; Miller 1971, p. 26.

*Salius carbonarius* (Smith) Cameron, 1898, p. 49 (Double misidentification).

*Agenia huttoni* Cameron, 1898, p. 49 (Q) Type Locality: Greymouth. Location of type: Banks Collection, British Museum. NEW SYNONOMY.

*Pseudagenia huttoni* (Cameron 1902) p. 297; Hutton 1904, p. 97.
Diagnosis: Medium sized (90 6-14 mm) black; wings hyaline, or lightly tinted with pale fuscous. Malar space well developed. Front tarsus with a very well-developed comb, its first segment bearing 5-6 long setae (slightly longer than the tarsal width) which project laterally on the outer side. Dorsal row of teeth on hind tibia vestigal, comprised of 7 small tubercles, none of which is squamiform. Mid femur with one apical spine; hind femur with one, rarely two, apical spines. A stenotope psammophile - the common black pompilid of sandy beaches, dunes, and sandy scrolls in streams and rivers. The ♀ of a new species - ordishii is very similar. It is not usually found on sand and has slightly larger teeth on the hind tibia, but differs most in lacking the row of unusually long lateral setae on the outer side of the front tarsus.

Priocnemis (Trichocurgus) nitidiventris (Smith) ♀
Plesiotype ♀ Paekakariki Foredune: 0.12.71, A.C. Harris.
Description: Length 8.9 mm, forewing 8.9 mm.
Colour and vestiture: nitid; black, apical 0.5 of mandibles and tarsal claws rufous. Wings hyaline, without fuscous tinting; stigma; costal, radio-subcostal, anal, and medio-cubital veins black, opaque; remaining veins light fuscous-black, translucent. Head, mesosoma, fore coxae, and metasomal sternite moderately covered with erect, white hairs; declivity of basal metasomal segment with very few hairs; epipygeal tuft comparatively sparse. Head with a patch of dense, silvery-white pubescence between the eye, antennal sclerite, and fronto-clypeal suture. Finer, more sparse white pubescence on mesosoma, legs, and metasoma except pygideum, where it is pale ferruginous.
Structure: last 4 segments of maxillary palpi in a ratio of about 1.35 : 1.13 : 1 : 1; segment 4 about 4.86 x as long as its maximum width, 0.64 x as long as antennal segment 3; apical segment 0.82 x median length of clypeus. Mentum unspecialised, submental bristles short, erect; clypeus 2.67 x as wide as high, malar space 0.39 x antennal segment 2. Antennal segments 1-4 in a ratio of about 0.85 : 0.38 : 1.04 : 1; scape 2.67 x as long as thick, third segment 3.84 x as long as thick, 0.71 x upper interocular distance. Head 1.22 x as wide as high; middle interocular distance 0.57 x width of head, upper interocular distance 0.77 x lower interocular distance. Front angle of ocellar triangle acute; POL:OOL exactly 1:5. Mandibles with incipient second tooth obsolete. Median impressed frontal line indistinct at about midway. Vertex closely covered with small distinct punctures which are contiguous on the clypeus and apical half of the front. Large punctures from which arise the erect hairs widely spaced on the head. Clypeus weakly emarginate, with a sub-apical series of 28 coarse uneven punctures bearing erect setae. Pronotum 75 x as wide as medium length of thorax, posterior margin of the former widely angulate. Propodeum evenly rounded, covered with small, contiguous punctures. Stigma prominent; disc with a wide median impression at about its centre, lateral tumescence behind stigma; extremely obtuse, bounded in front and behind by 2 oblique impressions. Front femur 4.01 x as long as wide, middle and hind femora with one apical spine. All tibia with spines laterally and above. Dorsal row of teeth on hind tibia reduced to a series of 8 small tubercles (each immediately behind its associated seta), diminishing
apically, the most basal one being the largest.
(Nevertheless, even the first 4 are rounded - none is squamiform); tarsus with a well-developed comb, its first segment bearing 5-6 long setae (slightly longer than the tarsal width which projects laterally on the outer side). Ventral spines on apical tarsal segments irregular, 3 median, and 2 lateral pairs beneath on apical tarsal segment of hind leg. Forewing with the stigma 0.38 x as long as total width of marginal cell, this removed from the wing-tip by 0.60 x its own length; third submarginal cell 0.86 x as long as submarginal cell 2. Declivity of first metasomal tergum with a deep median longitudinal impression on its basal 0.9. Epipygeum rugose-punctate, hypopygeum longitudinally concave.

Variation:

Size: length 6.8 - 12 mm.; forewing 6 - 11.3 mm.

Colour and vestiture: (a) In most samples throughout the country, about 55% of either sex have the wings clear hyaline. The wings of the remainder are to a varying extent tinted with pale fuscous. Such tinting affects the membrane in the centres of the cells, and leaves a clear margin near the vein.

(b) The density of both hairs and pubescence is variable - particularly on the frons. Differential abrasion and age possibly account for some of the variation in pubescence.

Structure: The malar space is noticeably wider in some localities. In specimens from the Bealey-Waimakariri Rivers junction, it is slightly incurved below. The clypeus of some specimens bears two pairs of symmetrical, semi-lunar impressions. This character is common in the south-western Tararua Ranges. The metapostnotum is variable in its
sculpture. For example specimens from Ahipara Bay, Kaitaia, have 3 transverse carinae across the middle, Paekakariki specimens have 2, and Waiotaura River specimens (Otaki Forks, Tararua Ranges) have 1. Most individuals have only one apical spine on the hind femur. In those that have 2, both the position and shape of the spines varies. The range of variation in 19 selected characters of 22 individuals from widely separated localities is shown in tables 21 and 22.

**Teratological abnormalities:** two ♀♀ from Ruapehu 5,000' (18.11.71) have the face very wrinkled. Deep rugae occur on the thorax and propodeum as well. One ♀ from S, Waiotauru Ck, Tararua Ra., (30.12.73) had deep rugae on the head and mesosoma.

**Material examined:** 503 females from the following localities:

**NORTH ISLAND:** Sand, Cape Reinga (9),ACH,RAC; Spirits Bay (4),ACH; Cape Maria (North Cape)A.Mu; Ahipara Bay (Kaitaia), (5),ACH; Cascades, Waitakere Rg. (Auckland), (3),ACH; Bethell's Beach (5),A.Mu, ACH; Wattie Bay, (Manakau),ACH; Mt.Messenger ACH; Rotorua (2),RoFo; Waioeka Gorge,ACH; Taranaki Falls (National Park) (5),ACH; Oeo Beach (Taranaki),ACH; Castlecliff Beach (53),ACH; S. Waioturu R. (Tararua Ra.) (18), ACH; Marchant Str. (Tararua Ra), (2),ACH; Paekakariki Fore- shore (32),ACH; Orongorongo R. (9 miles from mouth), (17), ACH; SOUTH ISLAND: Tahunanui Beach (Nelson), (18),D.S.I.R.; ACH; Wairau R. (nr. Rapaura), (3),ACH; Upper Karamea D.I.S.R.; L.Rotoiti D.S.I.R.; Mt.Algidus 2,000', D.S.I.R.; Lewis Pass 3,500' D.S.I.R. (2), New River (2),D.S.I.R.; Sand Kelley's Ck., (Otira), (12),ACH; Lake Taylor, ACH; Pines Beach (Christchurch), (15),ACH; Broken River (Christchurch) CU; Wilberforce R. (nr.Bristed Stm.), CU; Kairaki, ACH; Gillespies
<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bethell's Bay, Auckland</td>
<td>0.81: 1.03 : 1 : 1</td>
<td>0.84 : 0.36 : 1.14 : 1</td>
</tr>
<tr>
<td>Ruapehu, 5,000'</td>
<td>0.85: 1 : 0.88 : 1</td>
<td>0.79 : 0.33 : 1.10 : 1</td>
</tr>
<tr>
<td>Oeo Beach, Taranaki</td>
<td>0.85: 1.04 : 0.94 : 1</td>
<td>0.88 : 0.36 : 1.11 : 1</td>
</tr>
<tr>
<td>Castlecliff Beach</td>
<td>0.92: 1.16 : 1.03 : 1</td>
<td>0.85 : 0.37 : 1.18 : 1</td>
</tr>
<tr>
<td>Paekakariki Beach</td>
<td>0.94: 1.13 : 1 : 1</td>
<td>0.85 : 0.38 : 1.04 : 1</td>
</tr>
<tr>
<td>S. Waiohau R., Tararua Rd.</td>
<td>0.95: 1.07 : 0.96 : 1</td>
<td>0.87 : 0.36 : 1.03 : 1</td>
</tr>
<tr>
<td>Orongorongo R., 9 miles from mouth</td>
<td>0.95: 1.12 : 0.95 : 1</td>
<td>0.73 : 0.32 : 1.09 : 1</td>
</tr>
<tr>
<td>Tahananui Beach, Nelson</td>
<td>0.88: 1.02 : 0.93 : 1</td>
<td>0.74 : 0.30 : 0.97 : 1</td>
</tr>
<tr>
<td>Kelley's Ck., Otira</td>
<td>0.94: 1.10 : 0.99 : 1</td>
<td>0.8 : 0.32 : 1.07 : 1</td>
</tr>
<tr>
<td>Waimakariri R.-Bealey R. Junction</td>
<td>0.82: 1.03 : 0.92 : 1</td>
<td>0.81 : 0.31 : 1.13 : 1</td>
</tr>
<tr>
<td>Pines' Beach, Christchurch</td>
<td>0.90: 1.19 : 1.07 : 1</td>
<td>0.81 : 0.34 : 1.08 : 1</td>
</tr>
<tr>
<td>Rangitata R., Peel Forest</td>
<td>0.92: 1.10 : 1 : 1</td>
<td>0.83 : 0.34 : 1.11 : 1</td>
</tr>
<tr>
<td>Taeiri Mouth, Dunedin</td>
<td>0.86: 1.04 : 0.92 : 1</td>
<td>0.84 : 0.34 : 1.10 : 1</td>
</tr>
<tr>
<td>Whitcombe Ck., nr. Piano Flat</td>
<td>0.88: 1.06 : 0.95 : 1</td>
<td>0.72 : 0.31 : 1.04 : 1</td>
</tr>
<tr>
<td>Wanaka</td>
<td>0.91: 1.06 : 1 : 1</td>
<td>0.79 : 0.32 : 1.05 : 1</td>
</tr>
<tr>
<td>Pipsen's Ck., Makarora</td>
<td>0.89: 0.95 : 0.87 : 1</td>
<td>0.81 : 0.31 : 1.04 : 1</td>
</tr>
<tr>
<td>Pleasant Flat, Haast R.</td>
<td>0.94: 1 : 0.88 : 1</td>
<td>0.80 : 0.32 : 1.07 : 1</td>
</tr>
<tr>
<td>Beach, Old Haast township</td>
<td>0.82: 0.98 : 0.94 : 1</td>
<td>0.76 : 0.33 : 1.05 : 1</td>
</tr>
<tr>
<td>Lower Turnbull Rd., Haast</td>
<td>0.93: 1.13 : 0.86 : 1</td>
<td>0.90 : 0.38 : 1.04 : 1</td>
</tr>
<tr>
<td>Gillespie's Beach, Westland</td>
<td>0.97: 1.16 : 0.97 : 1</td>
<td>0.77 : 0.31 : 1.07 : 1</td>
</tr>
<tr>
<td>Martin's Bay, Fiordland</td>
<td>1 : 1.09 : 1.05 : 1</td>
<td>0.82 : 0.33 : 1 : 1</td>
</tr>
<tr>
<td>Stewart Island</td>
<td>0.78: 0.98 : 0.89 : 1</td>
<td>0.78 : 0.33 : 0.97 : 1</td>
</tr>
</tbody>
</table>
Table 22. *Priocnemis (Trichocuragus) nitidiventris*: Range of dimensions for 22 females from localities given in Table 21.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. plp. seg. 4 l. w.</td>
<td>4.52</td>
<td>3.97</td>
</tr>
<tr>
<td>max. plp. seg. 4, l.</td>
<td>0.53</td>
<td>0.46</td>
</tr>
<tr>
<td>ant. seg. 3, l.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>max. plp. seg. 6, l.</td>
<td>0.79</td>
<td>0.68</td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>2.67</td>
<td>2.50</td>
</tr>
<tr>
<td>malar space</td>
<td>0.31</td>
<td>0.26</td>
</tr>
<tr>
<td>ant. seg. 2, l.</td>
<td>1.90</td>
<td>1.77</td>
</tr>
<tr>
<td>scape l. w.</td>
<td>4.06</td>
<td>3.13</td>
</tr>
<tr>
<td>ant. seg. 3 l. w.</td>
<td>0.81</td>
<td>0.67</td>
</tr>
<tr>
<td>ant. seg. 3, 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.19</td>
<td>1.12</td>
</tr>
<tr>
<td>T.F.D: F.D.</td>
<td>0.56</td>
<td>0.50</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.78</td>
<td>0.65</td>
</tr>
<tr>
<td>T.F.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.72</td>
<td>0.50</td>
</tr>
<tr>
<td>L.I.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.O.L.</td>
<td>4.13</td>
<td>0.78</td>
</tr>
<tr>
<td>O.O.L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>front femur l. w.</td>
<td>0.47</td>
<td>0.38</td>
</tr>
<tr>
<td>stigma 1. marginal cell 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. from apex marginal cell 1.</td>
<td>0.57</td>
<td>0.52</td>
</tr>
<tr>
<td>submarginal cell 3, 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>submarginal cell 2, 1.</td>
<td>1.02</td>
<td>0.92</td>
</tr>
</tbody>
</table>
Beach, (9), ACH; L.Tekapo, CU; Arthur's Pass (4), CU, ACH; sand, Bealey-Waimakariri R. Junction (15), ACH; Rough Ck. - Bealey R. Junction (2), ACH; Kaituna V., CU; sand, Opahi R. (Temuka), (8), ACH; Kea Point Walk, Mt.Cook National Park (2), CU; sand, Rangitata R. (Peel Forest) (35), ACH; Foredune, Ship's Ch. Mouth (S.Westland), (3), ACH; Foreshore, Old Haast Township, (12), ACH; gravel, Lower Turnbull Rd. (Haast) (9), ACH; sand blow-out in forest, Orua R. (Haast), (62), ACH; Jackson's Bay, ACH; Martin's Bay, (3), ACH; sand, Haast R. Pleasant Flat (33), ACH; sand, Pipson's Ck. (at road bridge Makarora), (16), ACH; sand, Motatapu R., (Wanaka), (27), ACH; sand, Whitcombe Ck. (Old Man Range) (4), sand, Taieri Mouth (Dunedin) (23), ACH; Knob's Flat, Eglington V. (5), ACH; Colac Bay (Southland), (3), CU; STEWART ISLAND: Mason Bay (4), D.S.I.R., CU; Ocean Beach (3), CU, ACH; Codfish Is. D.S.I.R.

Priocnemis (Trichocurgus) nitidiventris (Smith) MALE

Diagnosis: Black, wings hyaline, or lightly tinted with pale fuscous. Malar space well developed. Subgenital plate never constricted medially, hour-glass fashion; fringed with long setae - somewhat shorter than those of ordishi n.sp. Parameres ventrally with the basal squaliform keel moderately short - never a thin, high keel as in ordishi. When the genitalia are detached and viewed directly from beneath, the paramere appears stout, rather parallel-sided, and never clavate, apically. The ventral surface appears broad and flat, and this characteristic always distinguishes this species from ordishi.

Description: length 6.8 mm.; forewing 6.4 mm.

Colour and vestiture: body and appendages black, nitid, tending to dark blackish-brown. Apical 0.5 of mandibles fusco-rufous. Wings hyaline, in certain lights with light russet-vinaceous, and bright red and green irridescence. Costal, radio-subcostal, medio-cubital, and medial veins black, opaque; remaining veins brown, translucent. Stigma fuscous, faintly translucent. Head and thorax with erect hoary hairs. Propodeum with sparse, erect, fine white hairs mostly on the sides. Metasoma with erect fine white hairs beneath, grading to pale ferruginous on the pygideum. Dense silvery-white pubescence between the eye, antennal sclerite, and on the clypeus and gena, abraded on the vertex. Finer white pubescence elsewhere on the legs and body except the metapostnotum. Dense white pubescence on thorax beneath. Pubescence on metasomal tergites silvery decumbent, aligned with body axis except on decurved, apical 0.14 of each segment, where it is sharply inclined laterally and the pubescence more dense. This lends to the metasoma a characteristic cinereous banding when viewed dorsally with the unaided eye.

Structure: last 4 segments of maxillary palp in a ratio of about 0.93 : 0.43 : 0.84 : 1, segment 4 about 4.06 x as long as its maximum width, 0.83 x as long as antennal segment 3; apical segment 0.99 x median length of clypeus. Clypeus 2.81 x as wide as high. Malar space 0.26 x length of antennal segment 2. Antennal segments 1-4 in a ratio of about 0.93 : 0.43 : 0.84 : 1; scape 1.91 as long as thick, third segment 2.57 x as long as thick, 0.56 x upper inter-ocular distance. Head 1.08 x as wide as high; middle inter-
ocular distance 0.56 x width of head; upper interocular distance 0.83 x lower interocular distance. Front angle of ocellar triangle just under a right angle, POL:0OL 10:16.2 (0.62). Front moderately nitid with small contiguous punctures, and larger scattered punctures at the bases of the erect hairs; median frontal sulcus entire; posterior margin of pronotum with a shallow emargination, subangulate; propodeum evenly rounded, without a median impressed line, stigma prominent, lateral tumescence behind the stigma very depressed, although slightly more defined than in the \( Q \). Front femur 3.52 x as long as wide, middle and hind femora (only) each with a single, sub-apical, lateral spine. Apices of all tibiae with spines laterally and above. Fifth tarsal segments without pre-apical spines; claws dentate. Forewing with the stigma 0.43 x as long as total length of marginal cell, latter removed from wing-tip by 0.65 x its own length; third submarginal cell 0.76 x as long as submarginal cell 2. First segment of metasoma with the dorsal declivity moderately steep. Sixth sternite with, apically, a pair of very faint carinae; apex of subgenital plate, in situ, projecting as a distinctive very broadly ligulate structure bordered with setae which are well below three quarters the maximum width of the plate; other setae are very much smaller. Subgenital plate (detached) with its outline not constricted medially, hourglass fashion (fig. 50). Genitalia (fig. 57) with aedeagus, parapenial lobe, and digitus of roughly equal length, parame\( \text{e} \)s projecting much further. Apex of digitus volsellaris barbed inwardly, bearing laterally on its apical quarter comparatively large sensillae basiconica. Parameres broad, rather parallel-sided in ventral aspect, not clavate apically,
basal oblique squaliform keel moderately short (not a huge sail-like projection as in ordishi); the paramere appears to have a broad, flat, horizontal ventral surface when the genitalia are removed and viewed directly from beneath.

**Variation:**

**Size:** length 4.5 - 9 mm.; forewing: 3.8 - 8 mm.

**Colour and vestiture:** Differences in tinting of the wing membrane, vestiture and hairs, as for **♀**. 

**Structure:** For most characters, nitidiventris shows little variation. The subgenital plate is comparatively constant, as compared with the digitus volsellaris and the paramere of the genitalia which are somewhat variable. The paramere always presents a broad, flat, almost horizontal ventral surface when the genitalia are removed and viewed directly from below. It usually appears parallel-sided below with a blunt apex, however on the central east coast of the South Island its ventral outline is somewhat wedge-shaped, though flat. The digitus volsellaris is variable in the extent to which it is barbed. In Whitcombe Ck., south eastern Old Man Range, the apex is curiously rounded, with almost no barb. The barb becomes progressively larger and more normal in appearance at Wanaka, Makarora, Haast Pass, Pleasant Flat, Haast river mouth, Ship Creek, and Gillespie's Beach. North of Gillespie's Beach, it has the typical form. The normal form occurs throughout the North Island and Stewart Island and on the east coast of the South Island from where it extends up the braided rivers to the eastern parts of the Southern Alps. For example, on specimens from Mt. Cook National Park, the digitus and paramere are very similar to forms from Pines Beach, Christchurch.
Table 23. *Priocnemis (Trichocurgus) nitidiventris*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 9 males.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary Palp Ratio</th>
<th>Antennal Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Reinga</td>
<td>0.78 : 1 : 0.99 : 1</td>
<td>0.85 : 0.41 : 0.98 : 1</td>
</tr>
<tr>
<td>Taranaki Falls, National Park</td>
<td>0.84 : 1 : 0.90 : 1</td>
<td>0.77 : 0.48 : 0.95 : 1</td>
</tr>
<tr>
<td>Castlecliff Beach</td>
<td>0.84 : 1.06 : 1 : 1</td>
<td>0.78 : 0.38 : 0.95 : 1</td>
</tr>
<tr>
<td>Paekakariki Beach</td>
<td>0.89 : 1.10 : 0.95 : 1</td>
<td>0.93 : 0.43 : 0.84 : 1</td>
</tr>
<tr>
<td>Tahananui Beach, Nelson</td>
<td>0.75 : 0.99 : 0.90 : 1</td>
<td>0.89 : 0.42 : 0.92 : 1</td>
</tr>
<tr>
<td>Gillespie's Beach, Westland</td>
<td>0.79 : 0.96 : 0.90 : 1</td>
<td>0.87 : 0.45 : 0.97 : 1</td>
</tr>
<tr>
<td>Pines' Beach, Christchurch</td>
<td>0.74 : 1 : 0.95 : 1</td>
<td>0.88 : 0.43 : 0.97 : 1</td>
</tr>
<tr>
<td>Taieri Mouth, Dunedin</td>
<td>0.89 : 1.11 : 1.05 : 1</td>
<td>0.84 : 0.41 : 0.95 : 1</td>
</tr>
<tr>
<td>Stewart Island</td>
<td>0.76 : 0.98 : 0.88 : 1</td>
<td>0.93 : 0.46 : 0.92 : 1</td>
</tr>
</tbody>
</table>
Table 24. *Priocnemis* (Trichocurgus) nitidiventris: Range of dimensions for 9 males from localities given in Table 23.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4, 1.</td>
<td>4.33</td>
<td>3.90</td>
</tr>
<tr>
<td>max.plp.seg.4, 1.</td>
<td>0.74</td>
<td>0.64</td>
</tr>
<tr>
<td>ant.seg.3, 1.</td>
<td>1.02</td>
<td>0.89</td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>2.82</td>
<td>2.53</td>
</tr>
<tr>
<td>malar space</td>
<td>0.29</td>
<td>0.21</td>
</tr>
<tr>
<td>ant.seg.2, 1.</td>
<td>1.76</td>
<td>1.52</td>
</tr>
<tr>
<td>scape</td>
<td>2.76</td>
<td>2.50</td>
</tr>
<tr>
<td>ant.seg.3, 1.</td>
<td>0.57</td>
<td>0.50</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.17</td>
<td>1.08</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.57</td>
<td>0.54</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.91</td>
<td>0.83</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>0.75</td>
<td>0.62</td>
</tr>
<tr>
<td>L.I.D.</td>
<td>3.41</td>
<td>3.03</td>
</tr>
<tr>
<td>stigma 1.</td>
<td>0.50</td>
<td>0.43</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td>0.54</td>
<td>0.50</td>
</tr>
<tr>
<td>submarginal cell 3, 1.</td>
<td>0.93</td>
<td>0.76</td>
</tr>
<tr>
<td>submarginal cell 2, 1.</td>
<td></td>
<td>1.08</td>
</tr>
</tbody>
</table>
Teratological abnormalities: 0° from S. Waiotaueru Ck.
Tararua Ra., (30.12.73) with deeply rugose head and mesosoma.

Material examined: 559 males from the following localities:
NORTH ISLAND: Sand, Cape Reinga (4), ACH, RAC; Spirits Bay (2), ACH; Cape Maria (North Cape) ACH; Ahipara Bay (Kaitaia) (6), ACH; Bethel's Beach (Auckland) ACH; Taranaki Falls (National Park), (3), ACH; Castlecliff Beach (42), ACH; Marchant St., (Tararua Ra.), (3), ACH; S. Waioturu R. (Tararua Ra.) (11), ACH; Paekakariki foreshore (53), ACH; Orongorongo R. (9 miles from mouth), (29), ACH; SOUTH ISLAND: Tahunanui Beach (Nelson), (5), D.S.I.R., ACH; Wairau R. (Nr. Rapaura), (6), ACH; sand, Kelley's Ck. (Otira), (16), ACH; New River, D.S.I.R.:
Pines Beach (Christchurch) (5), ACH; Gillespies Beach (Westland) (3), ACH; sand, Bealey-Waimakariri R. junction (16), ACH; Rough Ck. - Bealey R. junction (9), ACH; sand Opahi R. (Temuka), (17), ACH; Kea Point Walk, Mt. Cook National Park (4), CU; sand, Rangitata R. (Peel Forest), (54), ACH; foreshore old Haast township, (14), ACH; gravel, Lower Turnbull Rd. (Haast), (23), ACH; sand blow out in forest, Orua R. (Haast), (89); Martin's Bay, ACH; sand, Haast R. Pleasant Flat, (42), ACH; sand, Pipson's Ck. (at Rodd Bridge Makaroa), (31), ACH; sand, Motatapu R. (Wanaka), (56), ACH; sand, Whitcombe Ck. (Old Man Range) (5), ACH; sand Taieri Mouth (Dunedin), (5), ACH; Knob's Flat, Eglington V. (2), ACH;

Habitat
Nitidiventris is a stenotopic psammophile, being the common black pompilid in the supra-littoral fringe of sandy beaches, on exposed parts of sand dunes, and on scrolls and areas of fine sand in inland streams and river courses.
Comment:

The distinctive long, lateral bristles on the outer side of the fore tarsus which readily distinguish nitidiventris females from ordishi n.sp. are characteristic of psammophiles and are used during burrowing in sand. Such combs occur convergently in unrelated, sand-dwelling pompilids. Thus Richards and Hamm (1939), in their generic summary of Pompilus Fabr. state, "Most of the species have well-developed tarsal combs in the female and these species are largely restricted to very sandy soil; P. spissus Schiodte and its allies, however, lack the comb and seem to be found mainly on heavier soils." (p.74); of Episyron runfipes (p.101): "On sand, commons and dunes in the south of England this is a common wasp. The female has very well developed tarsal combs for burrowing in loose sand". In their generic summary of Priocnemis, Richards and Hamm (ibid., pp. 60-61) state: "The absence of a fore tarsal comb in the female may be one reason why the species do not often nest in exposed sandy places."

Priocnemis (Trichocurgus) ordishi sp.n.

figs. 23B, 40, 58, 77.

Etymology: Patronymic honouring Mr. R. Ordish.


A.C. Harris.

Paratype series: All listed specimens followed by the initials "ACH" have been designated paratypes.

Diagnosis: ♀

Black, medium-sized (7 - 12 mm.); wings subhyaline, lightly tinted with fuscous; malar space well developed, hind
tibia with a reduced dorsal tooth-row. Female very similar to *nitidiventris*. However, the front tarsus never has a row of long, lateral bristles. Many of the 21 ratios of body dimensions taken fall outside the range for *nitidiventris*, although the high extremes for one species usually overlap the low extremes of the other. The dorsal row of teeth on the hind tibia is slightly more prominent, and the basal teeth are often squamiform, whereas they take the form of minute tubercles in *nitidiventris*. The thorax is slightly more narrow. All specimens I have seen had the wings lightly tinted with fuscous, whereas in *nitidiventris*, roughly 55% have the wings clear hyaline. The habitat difference between these forms is a clear-cut and striking one and is the reason for their recognition, here, as distinct species. Unlike *nitidiventris*, ordishi is not associated with sand on beaches, dunes, and river beds.

The males are readily distinguishable.


Description: Length 8.6 mm.; forewing 8 mm.

Colour and vestiture: as for *nitidiventris* except that the wings are tinted with light fuscous, and less pubescence is present on the hind tibia.

Structure: Last 4 segments of maxillary palp in a ratio of about 0.92 : 1.16 : 1.01 : 1. Segment 4 about 4.73 x as long as its maximum width, 0.71 x as long as antennal segment 3; apical segment 0.83 x median length of clypeus. Mentum unspecialised. Clypeus 2.40 x as wide as high, malar space 0.29 x antennal segment 2. Antennal segments 1-4 in a ratio of about 0.96 : 0.39 : 1.03 : 1. Scape 2.22 x as long as thick, third antennal segment 3.35 x as long as thick, 0.69 x upper interocular distance.
Head 0.19 x as wide as high; middle interocular distance 0.57 x width of head, upper interocular distance 0.57 x lower interocular distance. Front angle of ocellar triangle acute; POL:OOL 7:12 (0.58). Median impressed frontal line fine, entire between antennae and ocellus. Posterior ocelli bounded on either side by longitudinal sulci. Vertex, front, and clypeus covered with small, deep, contiguous punctures. Large punctures which bear erect hairs widely spaced upon the head. Clypeus not emarginate, with a sub-apical row of coarse, uneven punctures. Thorax more narrow than in nitidiventris the greatest pronotal width 0.71 x median length of thorax; pronotum and scutum minutely rugose-punctate; hind margin of pronotum sub-angulate. Propodeum as for nitidiventris, except for the rugose-punctate microsculpture. Front femur 3.87 x as long as wide, middle femur with one apical spine, hind femur with 2 widely separated apical spines, one basal to the other.

Dorsal row of teeth on hind tibia similar to nitidiventris, but the teeth very slightly larger, and the basal ones somewhat squamiform; nos. 2-6 deltoid, nos. 4-6 with one of the 7 dorsal setae arising from the base of the tooth's vertical apical face, its basally directed hind slope being rounded and steep. Front tarsus without an obvious row of long lateral setae. Apical tarsal segment of hind leg with 3 medial, and 2 lateral pairs of spines beneath. Forewing with the stigma 0.42 x as long as total width of marginal cell, this removed from the wing-tip by 0.71 x its own length; third submarginal cell 1.04 x as long as submarginal cell 2.
Table 25. Priocnemis (Trichocurges) ordishii n.sp.: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 7 females.

<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirits Bay</td>
<td>0.83 : 1.06 : 0.93 : 1</td>
<td>0.81 : 0.35 :1</td>
</tr>
<tr>
<td>Rotorua</td>
<td>0.93 : 1.16 : 1.04 : 1</td>
<td>0.89 : 0.38 :1.04</td>
</tr>
<tr>
<td>Akatarawa, Wellington</td>
<td>0.91 : 1.15 : 1.01 : 1</td>
<td>0.96 : 0.39 :1.03</td>
</tr>
<tr>
<td>Riwaka, Motueka</td>
<td>0.89 : 1.15 : 0.98 : 1</td>
<td>0.98 : 0.39 :1.04</td>
</tr>
<tr>
<td>Wilberforce R.</td>
<td>0.86 : 1.11 : 1.0 : 1</td>
<td>0.87 : 0.34 :1.07</td>
</tr>
<tr>
<td>Kai tuna V., Christchurch</td>
<td>0.81 : 1.09 : 0.97 : 1</td>
<td>1.05 : 0.49 :1</td>
</tr>
<tr>
<td>Obelisk Range, Central Otago</td>
<td>0.91 : 1.19 : 1.03 : 1</td>
<td>0.91 : 0.32 :1.12</td>
</tr>
</tbody>
</table>
Table 26. Priocnemis (Trichocurpus) ordishi n.sp.: Range of dimensions for 7 females from localities given in Table 25.

<table>
<thead>
<tr>
<th>ratio</th>
<th>( \bar{x} )</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. plp. seg. 4 _ w.</td>
<td>5.15</td>
<td>4.67</td>
</tr>
<tr>
<td>max. plp. seg. 4, l.</td>
<td>0.67</td>
<td>0.60</td>
</tr>
<tr>
<td>ant. seg. 3, l.</td>
<td>0.86</td>
<td>0.80</td>
</tr>
<tr>
<td>medium l. clypeus clypeus w. h.</td>
<td>2.64</td>
<td>2.33</td>
</tr>
<tr>
<td>malar space ant. seg. 2, l.</td>
<td>0.30</td>
<td>1.18</td>
</tr>
<tr>
<td>scape w.</td>
<td>2.03</td>
<td>1.85</td>
</tr>
<tr>
<td>ant. seg. 3 l. w.</td>
<td>3.45</td>
<td>4.05</td>
</tr>
<tr>
<td>ant. seg. 3, l. U.I.D.</td>
<td>0.71</td>
<td>0.62</td>
</tr>
<tr>
<td>T.F.D. F.D.</td>
<td>1.22</td>
<td>1.17</td>
</tr>
<tr>
<td>M.I.D. T.I.D.</td>
<td>0.55</td>
<td>0.53</td>
</tr>
<tr>
<td>U.I.D. L.I.D.</td>
<td>0.78</td>
<td>0.74</td>
</tr>
<tr>
<td>P.O.L. O.O.L.</td>
<td>0.60</td>
<td>0.44</td>
</tr>
<tr>
<td>front femur f. w</td>
<td>3.82</td>
<td>3.52</td>
</tr>
<tr>
<td>stigma l. marginal cell 1.</td>
<td>0.42</td>
<td>0.38</td>
</tr>
<tr>
<td>d. from apex marginal cell 1.</td>
<td>0.65</td>
<td>0.55</td>
</tr>
<tr>
<td>submarginal cell 3, l.</td>
<td>0.94</td>
<td>0.82</td>
</tr>
<tr>
<td>submarginal cell 2, l.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Epipygeum rugose-punctate, hypopygeum longitudinally concave.

Variation: Length: 7 - 12 mm.; forewing 6.4 - 11.3 mm.

The range of variation in 19 selected characters of 7 individuals from widely separated localities is shown in tables 25 and 26.

Material examined: 99 females from the following localities:
NORTH ISLAND: Mt.Uniwhaio (Spirits Bay),(2),ACH; Mt.Albert (Auckland) (2),D.S.I.R.: Rotorua (8),RoFo, ACH; Renata Hut (Tararua Ra.) (6),ACH; Akatarawa Saddle (Wellington) (14), ACH; SOUTH ISLAND: Riwaka (Motueka), (2),ACH; Mt.Algidus D.S.I.R.; Mt.Lumsden, RoFo; Cashmere (Christchurch) (2), CU; Kaituna V. (Banks Peninsula) (3),ACH; Omarama, ACH; Rees Valley, ACH; Leith Saddle (Dunedin) (6),ACH; Obelisk Ra. (Central Otago) (51),ACH.

Priocnemis (Trichocurgus) ordishi sp.n. MALE

Diagnosis:
Black, wings subhyaline, lightly tinted with fuscous; eyes separated from the jaw by a moderately large malar space; subgenital plate, constricted medially, hour-glass fashion, and fringed with long curved setae - these last being visible without dissection. Genitalia with the parameres much more slender than in nitidiventris, apically clavate when viewed from below, and with the ventral ridge basally squamiform, rising to a thin, very prominent, deltoid ridge. The form of the subgenital plate and the parameres readily distinguish this species from nitidiventris to which it is very closely related. Nitidiventris is relatively constant on all 3 main islands, and the terminalia of ordishi show little change from Mt.Uniwhaio (Spirits
Bay) to Banks Peninsula. In the Otaki Forks region
(Tararua Ranges), nitidiventris occurs on sandy scrolls
in the Waioturu River, while only ordishi is found on
clay and loam in the forested areas and in clearings
above the river systems.

Renata Hut, Tararua Ra., 17.3.72, A.C. Harris.

Description: Length 6.7 mm.; forewing 6 mm.
Colour and vestiture: very similar to nitidiventris

Structure: Last 4 segments of maxillary palpi in a ratio
of about 0.87 : 1.09 : 1.03 : 1; segment 4 about 4.35 x
as long as its maximum width, 0.85 x as long as antennal
segment 3; apical segment 0.99 x median length of clypeus.

Clypeus 2.73 x as wide as high. Malar space 0.24 x
antennal segment 2. First 4 antennal segments in a ratio
of about 0.9 : 0.48 : 0.87 : 1; scape 1.92 x as long as
thick, third segment 2.81 x as long as thick, 0.50 x
upper interocular distance. Head 1.16 x as wide as high;
middle interocular distance 0.58 x width of head, upper
interocular distance 0.89 x lower interocular distance.

Front angle of ocellar triangle acute, POL:OOL 11:
18.7 (0.89). Vertex with small contiguous punctures, front
minutely rugose-punctate. An impunctate, shining, mid-
frontal line between the ocellus and the antennal sclerites
is not incised. Posterior margin of pronotum subangulate,
without emargination. Propodeum similar to that of
nitidiventris. Front femur 3.38 x as long as wide, without
apical spines; mid femur with one, and hind femur with
2 apical spines, one based to the other by a distance
similar to its length. Forewing with the stigma 0.39 x
as long as total length of marginal cell, latter removed
from wing-tip by 0.6 x its own length; third submarginal
Table 27. *Priocnemis* (*Trichocurgus*) ordishi n.sp.: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 4 males.

<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotorua</td>
<td>0.79 : 1.17 : 0.93 : 1</td>
<td>0.91 : 0.39 : 0.89 : 1</td>
</tr>
<tr>
<td>Renata hut, Tararua Ra.</td>
<td>0.88 : 1.09 : 1.03 : 1</td>
<td>0.90 : 0.48 : 0.86 : 1</td>
</tr>
<tr>
<td>Kaituna V., Christchurch</td>
<td>0.77 : 1.02 : 0.95 : 1</td>
<td>1.03 : 0.47 : 0.88 : 1</td>
</tr>
<tr>
<td>Leith Saddle, Dunedin</td>
<td>0.90 : 1.07 : 0.91 : 1</td>
<td>0.94 : 0.53 : 0.94 : 1</td>
</tr>
</tbody>
</table>
Table 28. *Priocnemis (Trichocurgus) ordishi* n.sp.: Range of dimensions for 4 males from localities given in Table 27.

<table>
<thead>
<tr>
<th>ratio</th>
<th>( \bar{x} )</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4 ( \frac{1}{w} )</td>
<td>4.60</td>
<td>3.84</td>
</tr>
<tr>
<td>max.plp.seg.4, l.</td>
<td>0.89</td>
<td>0.84</td>
</tr>
<tr>
<td>ant.seg.3, l.</td>
<td>1.09</td>
<td>1.26</td>
</tr>
<tr>
<td>max.plp.seg.6, l.</td>
<td>2.81</td>
<td>2.50</td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>0.24</td>
<td>0.18</td>
</tr>
<tr>
<td>clypeus ( \frac{w}{h} )</td>
<td>1.86</td>
<td>1.56</td>
</tr>
<tr>
<td>malar space</td>
<td>2.45</td>
<td>2.08</td>
</tr>
<tr>
<td>ant.seg.2, l.</td>
<td>0.53</td>
<td>0.46</td>
</tr>
<tr>
<td>scape ( \frac{1}{w} )</td>
<td>0.57</td>
<td>0.57</td>
</tr>
<tr>
<td>ant.seg.3 ( \frac{1}{w} )</td>
<td>0.89</td>
<td>0.80</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>3.22</td>
<td>2.85</td>
</tr>
<tr>
<td>F.D.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>L.I.D.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>0.O.L.</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>front femur ( \frac{1}{w} )</td>
<td>0.42</td>
<td>0.32</td>
</tr>
<tr>
<td>stigma 1.</td>
<td>0.73</td>
<td>0.61</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td>0.90</td>
<td>0.75</td>
</tr>
<tr>
<td>d. from apex</td>
<td>0.75</td>
<td>1.02</td>
</tr>
</tbody>
</table>
cell 0.86 x as long as submarginal cell 2. Metasomal sternites without projections. Subgenital plate spatulate, constricted medially, fringed with a row of long, curved bristles (fig. 49). Genitalia very similar to _nitidiventris_, but with the parameres much more slender, apically bulbous when seen from below, without a broad flat surface beneath, and with the ventral ridge basally squamose, rising to a thin, very prominent ridge.

Variation:
Size: Length: 6 - 8.3 mm.; forewing 5.5 - 7.6 mm.
The range of variation in 19 selected characters in 4 individuals from widely separated localities is shown in tables 27 and 28.

Material examined: 56 males from the following localities:
NORTH ISLAND: Mt.Uniwhaio (Spirits Bay),(2),ACH; Mt.Albert, (Auckland) D.S.I.R.; Rotorua (2),RoFo; Renata Hut (Tararua Ra.)(5),ACH; Akatarawa Saddle (Wellington) (12),ACH;
SOUTH ISLAND: Mt.Algidus, D.S.I.R.; Mt.Lumsden, RoFo; Cass, CU; Puke Atua Bush (Banks Peninsula ) (3),D.S.I.R.; Kaituna V. (Banks Peninsula) (3),CU; Omarama,ACH; Leith Saddle (Dunedin),(5),ACH; Obelisk Ra. (Central Otago), (19),ACH.

_Priocnemis_(Trichocurgus) _carbonarius_ (Smith)

_Pompilus carbonarius_ Smith 1885, p.162, No. 218 (♀)

Type Locality: Auckland (Bolton). Location of type: Banks Collection, British Museum, Kirby, 1881, p.38.
Priocnemis carbonarius (Smith) Kirby, 1884, p.68, No.16.
Salius carbonarius (Smith) Kohl, 1884, p.45; Dalla Torre, 1897, p.216; Cameron 1902, p.297; Hutton, 1904, p.97; Tillyard 1926, p.297.
Salius nitidiventris (Smith) Cameron, 1898, p.42, (double misidentification).
(Pending personal examination of the type)

Carbonarius species group (♀)

Diagnosis: Small to medium sized (5-10 mm.), black, Wings hyaline, or lightly tinted with fuscous. Malar space varying from moderately large to completely absent, so that in the latter extreme the eye below overhangs the base of the jaw. Females: mid and hind femora with respectively 1 and 2 minute spines - the latter 2 very close together low on the outer side at the extreme apex. Hind tibia with a dorsal row of well-developed squamiform teeth which vary considerably in number, position, relative size; and in whether the small basal scales from 2 rows, or comprise a single linear series. Males with the frons gibbous; the genitalia with the paramere crescentic, tapering apically, in ventral aspect, at the digitus volsellaris without sensillae basiconica of the apex.

Comments: This complex is extremely variable. It may consist of up to 4 species, with some forming a rassenkreiss. My samples are small, and because of the large amounts of variation in all of them, it is not possible yet, to delineate distinct species with absolute certainty. Two distinctive forms which are probably valid species can readily be recognised. The male of one has the malar space minute or absent, and a linear series of narrow scales on the hind tibia. ("Form A"). Another has a
moderately large malar space, and broad scales on the hind tibia, with 3 small basal scales forming an asynchronous row parallel to the others. A third type has a moderately large malar space which is sharply incurved, and the scales of the hind tibia moderately narrow. In addition, there are forms intermediate to these types, although they occur very much less frequently. The females of type A are always associated with males having a short subgenital plate, and a paramere which appears broad with two ventral lumps, when viewed from the side. Females of type B invariably are associated with males having a very short, broad subgenital plate, and a paramere which lacks marginal lumps. The problem will only be resolved when I have long series of females and males which are associable. I shall therefore reserve judgement on carbonarius until I have a lot more material.

Comment:
I have reared 10 larvae of one form (type A) and because I have described its final instar larva, it seemed essential that it should be related to the correct adult form. For this reason, I have given full descriptions of this, and a second form, both of which are distinguishable in both sexes in the three main islands.

Priocnemis (Trichocurgus) carbonarius Smith Type A.
Figs. 36, 52, 56, 80, 87, 89, 97.

Diagnose: ♀♀ Small to medium sized, black. Wings hyaline or lightly tinted with pale fuscous. Malar space absent or minute, so that the eye below is very close to the base of the jaw. Hind tibia with a single row of 10 dorsal scale-like teeth, nos. 3-7 very large, the others reduced.

Description: Length 7.9 mm.; forewing 7 mm.

Colour and vestiture: Body nitid, black, tending to blackish-carmine where the integument is thin; first tergite of metasoma with a large, oval, brick-red spot between its lateral margin and the lateral crease. Antennae blackish-carmine; apical half of mandibles and apices of tarsal claws rufous. Dense, silvery, decumbent pubescence forming paraoccipital patches between the compound eyes and antennal sclerites, and on the clypeus. Pubescence finer elsewhere, bronzy on the remainder of the front and vertex, the pronotum and scutum, while grading to silvery on the rest of the mesosoma including the scutum and the propodeum. Whitish on metasternites and declivity of tergum 1, grading to pale bronze on the metasomal dorsum. Erect hair sparse, restricted on the head to mandibles, gena, a sub-apical series on the clypeus, and a row on the vertex and front fringing the eye. Elsewhere on the coxae, trochanters, propleuron, thoracic dorsum and apex of metasoma. Declivity of first metasomal tergite without hair. Wings almost hyaline, with a very faint fuscous tint, and a longitudinal fuscous band through the submarginal cells to the wing apex. Stigma and costal, radio-subcostal, medio-cubital, and basal quarter of anal vein black, opaque; remaining veins light fuscous, translucent.

Structure: Last 4 segments of maxillary palp in a ratio of about 1 : 1.22 : 1 : 1, segment 4 about 5.90 x as long as its maximum width, 0.63 x as long as antennal segment 3; apical segment 0.82 x medium length of clypeus. Clypeus 2.53 x as wide as high, malar space minute,
0.02 x length of antennal segment 2, so that the eye below is little removed from the base of the jaw. Antennal segments 1-4 in a ratio of about 0.81 : 0.41 : 1 : 1, scape 1.89 x as long as thick, third segment 3.83 x as long as thick, 0.77 x upper interocular distance. Head 1.21 x as wide as high, middle interocular distance 0.53 x width of head; upper interocular distance 0.81 x lower interocular distance. Front angle of ocellar triangle less than a right angle. POL:OOL 7.4 : 10 (0.74).

Front and vertex with small, contiguous, comparatively deeply impressed punctures. Larger punctures absent. Median frontal line moderately impressed, entire, lying in a shallow median longitudinal impression which is deeper apically on the frons near the antennal sclerites.

Posterior margin of pronotum widely angulate. Metasoma, particularly the thoracic dorsum; with small, contiguous, deeply impressed punctures. Pronotum rounded, with a wide impression in the centre of the disc; without a median impressed line; lateral tumescence very obtuse; the associated oblique furrows in front of it, and behind, obsolete.

Front femur 3.76 x as long as wide; without apical spines. Mid and hind femora with respectively 1 and 2 minute spines low on the outer side of the extreme apex. Tibia with apical spines discontinuous above. Hind tibia with dorsal row of 10 prominent very squamiform teeth, the first 3 minute, without bristles. Teeth 4-10 as somewhat triangular scales, nos. 7 and 8 being the largest. The scales appear longer than wide (fig. 97.) Fifth tarsal segment beneath with only 3, very reduced spines medially—occasionally with a minute sub-lateral pair; and 4 at the
apex. Claws dentate, the tooth more apical in position than in *nitidiventris*. Forewing with the stigma 0.52 x as long as total length of the marginal cell, latter removed from the wing tip by 0.92 x its own length, third sub-marginal cell 0.89 x as long as the second. First tergite of metasoma with the declivity moderately steep, a median sulcus on its basal 0.8.

Variation:

**Size:** Length: 6.5 - 9.8 mm.; forewing: 5.8 - 9 mm.

**Structure:** The malar space varies from being completely absent (the eye below overhanging the base of the mandible), to 0.10 x the length of antennal segment 2, when a small malar space is present. The scales on the hind tibia are somewhat variable, numbers 8-10 being more reduced in some individuals than in others.

The range of variation in 19 selected characters of 7 individuals from widely separated localities is shown in tables 29 and 30.

**Teratological abnormalities:** (a) A specimen from Dunn Mountain, Nelson, 2.1.72 has the submarginal cell subdivided by an additional vein connecting the second radial sector and the third radio-medial cross-vein.

(b) One specimen from Akatarawa Saddle, Wellington, 11.12.1971 is strongly rugose on the head and mesosoma.

**Material examined:** 55 females from the following localities:

**NORTH ISLAND:** Mt.Uniwhaio (Spirits Bay) (6),ACH; Paiaka (4),RAC; Leigh (3),ACH; Mamaku Forest, RoFo; Rangatana, RoFo; New Plymouth ACH; Opunake,ACH; Akatarawa Saddle (Wellington) (12),ACH; Linden (5),ACH; Karori (2)ACH; Porirua, ACH; Wainuiomata (2),ACH. **SOUTH ISLAND:** Nelson, ACH; Colwyn,ACH; Ashley River, at Highway 1, ACH;
Table 29. *Priocnemis (Trichocurgus) carbonarius*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 7 females.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary Palp Ratio</th>
<th>Antennal Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirits Bay</td>
<td>0.90 : 1.25 : 1 : 1</td>
<td>0.81 : 0.42 : 1 : 1</td>
</tr>
<tr>
<td>Paiaka, Northland</td>
<td>1.05 : 1.28 : 1.03 : 1</td>
<td>1.01 : 0.35 : 0.98 : 1</td>
</tr>
<tr>
<td>Opunake</td>
<td>1.03 : 1.22 : 1 : 1</td>
<td>0.84 : 0.39 : 1 : 1</td>
</tr>
<tr>
<td>Akatarawa, Wellington</td>
<td>1 : 1.22 : 1 : 1</td>
<td>0.81 : 0.41 : 1 : 1</td>
</tr>
<tr>
<td>Conway</td>
<td>1 : 1.22 : 1 : 1</td>
<td>1.77 : 0.34 : 1 : 1</td>
</tr>
<tr>
<td>Christchurch</td>
<td>1.02 : 1.11 : 1.03 : 1</td>
<td>0.81 : 0.34 : 0.99 : 1</td>
</tr>
<tr>
<td>Trotter's Gorge, Herbert</td>
<td>0.93 : 1.04 : 0.95 : 1</td>
<td>0.89 : 0.43 : 1 : 1</td>
</tr>
</tbody>
</table>
Table 30. *Priocnemis (Trichocurgrus) carbonarius*: Range of dimensions for 7 females from localities given in Table 29.

<table>
<thead>
<tr>
<th>ratio</th>
<th>( \bar{x} )</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4 ( \frac{1}{w} )</td>
<td>5.33</td>
<td>4.70</td>
</tr>
<tr>
<td>max.plp.seg.4, l.</td>
<td>0.64</td>
<td>0.62</td>
</tr>
<tr>
<td>ant.seg.3, l.</td>
<td>0.88</td>
<td>0.79</td>
</tr>
<tr>
<td>max.plp.seg.6, l.</td>
<td>2.78</td>
<td>2.53</td>
</tr>
<tr>
<td>medium l. clypeus</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>max.( \frac{e}{w} )</td>
<td>1.06</td>
<td>0.64</td>
</tr>
<tr>
<td>max.( \frac{m}{w} )</td>
<td>1.89</td>
<td>1.77</td>
</tr>
<tr>
<td>malar space</td>
<td>3.61</td>
<td>3.37</td>
</tr>
<tr>
<td>ant.seg.2, l.</td>
<td>0.72</td>
<td>0.64</td>
</tr>
<tr>
<td>scape ( \frac{1}{w} )</td>
<td>1.21</td>
<td>1.19</td>
</tr>
<tr>
<td>ant.seg.3 ( \frac{1}{w} )</td>
<td>0.53</td>
<td>0.52</td>
</tr>
<tr>
<td>ant.seg.3, l.</td>
<td>0.82</td>
<td>0.81</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.66</td>
<td>0.53</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>3.68</td>
<td>3.20</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.52</td>
<td>0.50</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>0.90</td>
<td>0.79</td>
</tr>
<tr>
<td>O.O.L.</td>
<td>0.83</td>
<td>0.72</td>
</tr>
</tbody>
</table>
Kelley Creek, Otira ACH; Eyreswell, ACH; Balmoral Forest (2), Rofo; Christchurch City ACH; Dallington (Christchurch), D.S.I.R.; Lincoln (3), ACH; Lions Bush, Temuka, ACH; Pleasant Point, ACH; Tara Hills, ACH; Omarama, ACH; Kelsey's Bush (Waimate), ACH; Trotter's Gorge (Hampden), ACH.

**Priocnemis (Trichocurgus) carbonarius** (Smith) Type A MALE

**Diagnosis:** Body black, wings hyaline, or very lightly tinted with pale fuscous. Malar space extremely short, only 0.07 x the length of antennal segment 2. Hairs very sparse, pale golden, infuscated around eyes. Pubescence mostly silvery white. Front not grossly swollen above and around the antennal sclerites. Subgenital plate (fig. 52) long, subcuneiform, the apex broadly and evenly rounded. Paramere (fig. 36) when viewed from the side short, massive, with a median constriction and swelling below and above, at about its apical third.


**Description:** length 5.1 mm.; forewing 4.8 mm.

**Colour and vestiture:** Black, moderately nitid, tending to blackish-brown where the integument is thin; apical quarter of mandibles and tarsal claws rufous, palpi blackish-brown, antennae dark blackish-carmine. Vestiture similar to the male. Dense decumbent, silvery pubescence forming paraoccipital patches between the compound eyes and the antennal sclerites, and on the clypeus. Pubescence finer elsewhere, whitish, except on the vertex, pronotum, scutum, tegulae, and apical 4 metasomal tergites, where it is a pale bronze. Erect hairs fine, pale aenous, very sparse, restricted to the front, where about 6 border the eyes, a sub-apical series on the clypeus the labrum,
a few on the mandibles, genae, pronotum, coxae and on the genital terminalia. Wings hyaline, almost clear, faintly tinted with very light fuscous, and with a light fuscous streak longitudinally through the submarginal cells to the wing apex. Stigma and veins light fuscous, translucent.

**Structure:** Last 4 segments of maxillary palp in a ratio of about 1.03 : 1.25 : 1.02 : 1. segment 4 about 6.23 x as long as its maximum width, 0.76 x as long as antennal segment 3; apical segment 0.92 x median length of clypeus. Clypeus 2.76 x as wide as high. Malar space minute, 0.07 x antennal segment 3, so that the eyes below are scarcely separated from the jaw. Antennal segment 1-4 in a ratio of about 0.84 : 0.47 : 0.89 : 1. Scape 1.93 x as long as thick, 0.57 x upper interoc~ular distance.

Head 1.16 x as wide as high, middle interoc~ular distance 0.58 x width of head, upper interoc~ular distance 0.89 x lower interoc~ular distance. Front angle of ocellar triangle less than a right angle, POL:OOL 10.7 : 16 (0.67). Head with small, contiguous, well impressed punctures. Median frontal impressed line entire between ocellus and antennal sclerites, lying in a wide longitudinal impression that deepens on the apical third. Front not as swollen as in *crawi* sp.n., antennal sclerites projecting well above the surface of the front all round, separated from each other by a wide sulcus. Thorax covered with small, well impressed, contiguous punctures - these somewhat more shallow on the propodeum. Pronotal disc with its left and right sides sloping evenly and gently to form a median ridge. Propodeum with an ill-defined declivity at its posterior third. A broad shallow
median furrow runs its length, with an impressed line in its apical two thirds, and a ridge that broadens posteriorly behind. Lateral tubercles obtusely rounded. Front femur 3.82 x as long as wide, mid and hind femora with minute apical spines low on the outer side. Hind tibia with a dorsal row of 9 small squamiform teeth, of which the basal 2 are not associated with bristles. Apices of all tibia with small spines. Forewing with the stigma 0.54 x as long as total length of marginal cell, the latter removed from the wing tip by 0.88 its own length; third sub-marginal cell 0.75 x as long as the second, Subgenital plate (fig. 52) long, broadly sub-cuneiform, the truncated apex widely rounded. Genitalia (fig. 56) with the apices of the parapenial lobe and the digitus volsellaris roughly level, the aedagus reaching well short, and the paramere projecting much beyond them. Apex of digitus volsellaris forming a large, inwardly-directed hook, without sensillae basiconica; paramere in ventral view broad, cuneiform, the apical quarter curved inwards. When viewed from the side, the paramere appears short and massive, with a prominent rounded projection slightly basal of mid-way on its ventral margin.

Variation:

Size: Length: 5 - 7.4 mm.; forewing: 4 - 6.5 mm.

Material examined: 18 males from the following localities:
NORTH ISLAND: Mt.Uniwhaio (Spirits Bay), (2), ACH; Paiaka, RAC; Leigh, ACH; New Plymouth, ACH; Atene (Wanganui R.) (2), ACH; Akatarawa Saddle (Wellington), (4), ACH; Wainuiomata, ACH; Central Park (Wellington), ACH; SOUTH ISLAND: Mt. Robert (Nelson Lakes), ACH; Dallington (Christchurch), ACH; Lion's Bush, Temuka, ACH; Trotter's Gorge (Hampden) (2), ACH.
Priocnemis (Trichocuragus) crawi sp.n.
figs. 35, 51A, B, C; 79.

Etymology: Patronymic honouring Mr. R.C. Craw.


Paratype series: All listed specimens followed by the initials "ACH" have been designated paratypes.

Diagnosis: very similar to carbonarius, but with the malar space of moderate size (0.15 x to 0.22 x the length of the second antennal segment) so that the eye below is well separated from the base of the jaw. Scales 4 to 8 on the hind tibia very broad and semilunar. There are frequently two rows of small scales of equal development at the base on the hind tibia.

Description of Holotype: ♀ Length: 7.9 mm.; forewing 7 mm. Colour and vestiture: as for carbonarius.

Structure: Last 4 segments of maxillary palp i in a ratio of about 0.84 : 1.11 : 0.98 : 1, segment 4 about 5.33 x as long as its maximum width, 0.73 x as long as antennal segment 3; apical segment 1.03 x median length of clypeus. Clypeus 2.90 x as wide as high, being more narrow than in carbonarius. Malar space of moderate size, 0.20 x length of antennal segment 2, so that the eye below is well separated from the base of the jaw. Antennal segments 1-4 in a ratio of about 0.92 : 0.41 : 1 : 1, scape 2.0 x as long as thick, third segment 3.44 x as long as thick, 0.62 x upper interocellar distance. Head 1.19 x as wide as high, middle interocellar distance 0.54 x width of head; upper interocellar 0.88 x lower interocellar distance. Front angle of ocellar triangle acute; POL:OOL as 4 : 10.5 (0.38). Front and vertex covered with small shallow
contiguous punctures. Scattered larger punctures absent. Front somewhat swollen. Median frontal line impressed on its lower 0.47, remainder obsolete, apart from a short, deep sulcus which projects from the base of the median ocellus. The frontal line is not contained within a median frontal depression. Posterior margin of pronotum angulate. Thoracic dorsum with small, distinct, contiguous punctures. Propodeum with indistinct punctures, otherwise as for *carbonarius*. Front femur without apical spines, 3.45 x as long as wide. Mid and hind femur as for *carbonarius*. Hind tibia with 15 scales of which 10 are in a dorsal row, the others at the base in a second row asynchronous with the others and extending to between the fifth and sixth scales in the main series. Scales 4-8 very large, semilunar, each inclined obliquely across the tibia. Forewing with the stigma 0.55 x as long as total length of marginal cell, latter removed from wing-tip by 0.84 x its own length, third submarginal cell 0.95 x as long as the second.

**Variation:**

**Size:** Length: 5 - 11 mm.; forewing 4.2 - 10 mm.

**Material examined:** 116 females from the following localities:

**NORTH ISLAND:** Renata Hut (Tararua Ra.), (25), ACH; Akatarawa Saddle (Wellington) (7), ACH; SOUTH ISLAND: Mt. Arthur D.S.I.R.; Homer Tunnel, ACH; Trotter's Gorge (Hampden), ACH; Obelisk Ra., 4,800' (39), ACH; Glitter burn, Haast R. ACH; Pleasant Flat, Haast R. (4), ACH; Routeburn Huts, CU; Lake Monk (S. Fiordland), O. Mu., STEWART ISLAND: Mt. Anglem, ACH.
Table 31. *Priocnemis* (*Trichocurpus*) *crawi*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 7 females.

<table>
<thead>
<tr>
<th>locality</th>
<th>maxillary palp ratio</th>
<th>antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renata hut, Tararua Ra.</td>
<td>0.84 : 1.11 : 0.98 : 1</td>
<td>0.92 : 0.41 : 1 : 1</td>
</tr>
<tr>
<td>Mt. Arthur</td>
<td>0.83 : 1.11 : 0.93 : 1</td>
<td>0.98 : 0.45 : 1 : 1</td>
</tr>
<tr>
<td>Lake Mahinerangi</td>
<td>0.92 : 1.08 : 0.95 : 1</td>
<td>0.95 : 0.40 : 1.04 : 1</td>
</tr>
<tr>
<td>Homer Tunnel</td>
<td>0.83 : 1.15 : 0.94 : 1</td>
<td>1 : 0.38 : 1.05 : 1</td>
</tr>
<tr>
<td>Obelisk Ra., Otago</td>
<td>0.90 : 1.09 : 0.95 : 1</td>
<td>1 : 0.47 : 0.97 : 1</td>
</tr>
<tr>
<td>Glitterburn, Haast R. Valley</td>
<td>0.92 : 1.13 : 0.84 : 1</td>
<td>0.94 : 0.44 : 0.99 : 1</td>
</tr>
<tr>
<td>Stewart Island</td>
<td>0.93 : 0.38 : 1 : 1</td>
<td></td>
</tr>
</tbody>
</table>
Table 32. Priocnemis (Trichocurgus) crawi: Range of dimensions for 7 females from localities given in Table 31.

<table>
<thead>
<tr>
<th>ratio</th>
<th>( \bar{x} )</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4 ( \frac{1}{w} )</td>
<td>4.99</td>
<td>4.36</td>
</tr>
<tr>
<td>max.plp.seg.4, 1.</td>
<td>0.72</td>
<td>0.69</td>
</tr>
<tr>
<td>ant.seg.3, 1.</td>
<td>0.98</td>
<td>0.95</td>
</tr>
<tr>
<td>max.plp.seg.6, 1.</td>
<td>3.04</td>
<td>2.89</td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td>0.19</td>
<td>0.15</td>
</tr>
<tr>
<td>clypeus ( \frac{w}{h} )</td>
<td>1.95</td>
<td>1.75</td>
</tr>
<tr>
<td>malar space</td>
<td>3.24</td>
<td>2.90</td>
</tr>
<tr>
<td>ant.seg.2, 1.</td>
<td>0.57</td>
<td>0.48</td>
</tr>
<tr>
<td>scape ( \frac{1}{w} )</td>
<td>1.22</td>
<td>1.19</td>
</tr>
<tr>
<td>ant.seg.3 ( \frac{1}{w} )</td>
<td>0.56</td>
<td>0.52</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.86</td>
<td>0.80</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.40</td>
<td>0.38</td>
</tr>
<tr>
<td>F.D.</td>
<td>3.36</td>
<td>3.10</td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.51</td>
<td>0.47</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>0.90</td>
<td>0.84</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.97</td>
<td>0.80</td>
</tr>
<tr>
<td>L.I.D.</td>
<td>0.40</td>
<td>0.38</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>3.36</td>
<td>3.10</td>
</tr>
<tr>
<td>O.O.L.</td>
<td>0.58</td>
<td>0.52</td>
</tr>
<tr>
<td>front femur ( \frac{L}{w} )</td>
<td>0.86</td>
<td>0.80</td>
</tr>
<tr>
<td>stigma 1.</td>
<td>0.40</td>
<td>0.38</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td>3.36</td>
<td>3.10</td>
</tr>
<tr>
<td>d. from apex</td>
<td>0.51</td>
<td>0.47</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td>0.90</td>
<td>0.84</td>
</tr>
<tr>
<td>submarginal cell 3, 1.</td>
<td>0.97</td>
<td>0.80</td>
</tr>
<tr>
<td>submarginal cell 2, 1.</td>
<td>3.36</td>
<td>3.10</td>
</tr>
</tbody>
</table>
Priocnemis (Trichocuragus) crawi sp.n. MALE

**Diagnosis:** Body black, wings hyaline, or lightly tinted with fuscous. Front notably swollen on its apical 0.5, rising medially to a point beyond the antennal sclerites. Front never depressed into a deep wide sulcus in the middle, between them. This gives the face a distinctive, bulging appearance. Subgenital plate (figs. 51B, 51C) short, squat, very broad, apically decurved, and notched medially. Genitalia in ventral aspect very similar to those of carbonarius. The paramere, however, when viewed from the side is much more slender, lacking midway on the ventral margin the notch and prominent hump.

An unequivocal identification can always be made on any one of the more bulging front, the subgenital plate, or the shape of the paramere.

O° Mt.Kapakapanui, 3,200', Tararua Range, 28.1.72; A.C. Harris.

**Description:** Length: 5 mm.; forewing: 5 mm.

Colouration and vestiture: Apical 0.5 of mandibles and tarsal claws rufous. Remainder of body, including palpi and antennae, completely black, nitid. Pubescence sparse, pale bronzv-fuscous. Erect hairs very sparse, pale bronzv-fuscous, to black, their distribution similar to those of carbonarius. Wings as for carbonarius.

**Structure:** Last 4 segments of maxillary palp in a ratio of about 0.67 : 1.06 : 0.92 : 1, segment 4 about 5.38 x as long as its maximum width, 0.91 x as long as antennal segment 3; apical segment 1.35 x median length of clypeus. Clypeus 3.29 x as wide as high. Malar space of moderate size, 0.13 x length of antennal segment 2. Antennal segments 1-4 in a ratio of about 0.92 : 0.48 : 0.88 : 1, scape 2.03 x as long as thick, third segment 2.84 x as
long as thick, 0.51 x upper interocclusal distance. Head 1.17 x as wide as high; middle interocclusal distance 0.58 x width of head, upper interocclusal distance 0.95 x lower interocclusal distance. Front angle of ocellar triangle acute, POL:OOL 8.5 : 17 (0.5). Front notably swollen, particularly the apical 0.5, which projects medially beyond the antennal sclerites, the entire front bulging forward over the clypeus. The surface of the front is nowhere far removed from the highest parts of the antennal sclerites, nor is it depressed into a deep, wide sulcus medially, between them. Mid frontal line impressed for a short distance at about its mid point, elsewhere obsolete. Front with small shallow contiguous punctures which become indistinct on the vertex. Posterior margin of pronotum widely angulate. Thorax with small, shallow, contiguous punctures, without a median furrow or impressed line. Front femur 3.08 x as long as wide, mid and hind femora with minute apical spines low on the outer side. Apices of all tibia with small spines. Forewing with the stigma 0.54 x as long as total length of marginal cell, the latter removed from the wing-tip by 0.88 x its own length; third submarginal cell 0.75 x as long as the second. Subgenital plate (fig. 51B, 51C) short, squat, very broad, apically decurved and notched medially. Genitalia very similar to those of carbonarius, but with the paramere, when viewed from the side, much more slender, and lacking midway on the ventral margin the notch and prominent hump.
Dimensions of a specimen from Dun Mountain, Nelson, 2.1.1972, A.C. Harris.

Last 4 segs. of maxillary palp as 1 : 1.14 : 1.04 : 1;
ratio of 1st 4 antennal segs. as 0.94 : 0.43 : 1 : 1.

max.plp.seg.4/w. = 4.56; antennal seg.3/ max.plp.seg.4 = 0.69;

median l. clypeus/ max.plp.seg.6 = 1.03; clypeus h./w. = 3.41; antennal seg.2/ malar space = 0.8

scape W/ L = 2.0; ant seg.3 W/ L = 3.37; U.I.D./ ant seg.3 = 0.62;

F.D./ T.F.D. = 1.22; T.F.D. = 0.56; L.I.D. = 0.86; P.O.L. = 0.58

(10 : 17.2); 1.marginal cell/ stigma = 0.51; 1.marginal cell/ distance from apex = 0.93;

1.submarginal cell 2/ 1.submarginal cell 3 = 0.80

Variation:

Size; length: 3.5 - 7mm; forewing: 2.8 - 6.2mm

Material examined: 43 males from the following localities:

NORTH ISLAND: Renata Hut (Tararua Ra.)(5), ACH; Akatarawa Saddle (Wellington), (7), ACH;
SOUTH ISLAND: Mt. Arthur, D.S.I.R.; Obelisk Ra., (26), ACH; Pleasant Flat, Haast R.
Subfamily Pompilinae:

Adults with a pocket in the lower basal corner of the second medial cell (fig. 6), and without either a transverse groove on the second metasomal sternite, or lateral crease on the first tergite (fig. 12).

Larvae: with very long head setae, and without spicules on the thorax and abdomen.

Tribe Epipompilini

Genus Epipompilus Kohl


Generic characters:

Adults: Labrum very strongly exerted, broad, and short. Head broader than high, the frons very convex and swollen, malar space large, maxillary palpi long. Veins Rs, M, Cuia, Culb of forewing reaching the outer margin, vein M + Cul of hind wing leaves 1A at a sharp angle, Cu - a comparatively long. Females with front femora incrassate, streptaulus absent on weak, legs without the usual spines and spurs. Males with crenulate antennae, genitalia having basal hooklets double, aedeagus of simple structure.

Larvae: To date, no other larvae have been described for this genus. It is suggested that the following characters of insularis may be of generic value. Body fusiform, pleural lobes well developed. Spiracles circular in surface outline, without atrial or colar spines. Mandibles with 3 or 4 teeth, but with only one tooth at the apex, spines on prothoracic dorsum and pleurae large, head spines unusually large, so that the ratio LS/OD is unusually high (e.g. LS/OD = 90 in insularis, a much
higher figure than that attaining for any of the species described by Evans, 1966). Second thoracic segment with a dorsal organ.

Nidification cycle: primitively simple, spiders being paralysed and oviposited on in situ, in the diurnal retreat, b - c - f in the terminology of Arens 1948, and occupying the bottom and second to bottom rungs on a scale of increasing complexity, from solitary-nesting to socially nesting species, developed by Evans and Eberhard, 1970 (prey - egg).

Taxonomic note: The genus Epipompilus has a contorted taxonomic history. Its first two species were described by Kohl in 1884, viz. maximiliani Kohl, a Mexican species, and insularis Kohl, from New Zealand, the former being the type for the genus. In 1902 Ashmead revised Epipompilus and described a related genus, Aulostethus, with bifasciatus Ashmead, as type. Haupt (1930) erected the Tribe Epipompilini for these two genera and several others as well. Both Ashmead and Haupt separated Aulostethus and Epipompilus on whether or not the eyes were hairy, Epipompilus supposedly having non-hairy eyes. Evans (1961) showed that Aulostethus was a junior synonym of Epipompilus and that the eyes of maximiliani were hairy. However, Evans (op.cit.) erected a new genus, Epipompiloides, for insularis Kohl, stating that it should be placed next to Epipompilus in the tribe Aporini. In 1962, after examining some Australian species, Evans synonymised Epipompiloides with the older generic name, but retained the former as a subgenus with three included species, of which insularis Kohl was the type. The other two species were Tasmanian. Males of the subgenus Epipompiloides -
were distinguished from the subgenus *Epipompilus* by having a broad subgenital plate, tapering to a rounded apex. Evans had not seen males of the type and in fact, the subgenital plate is in the form of a "slender process arising from a broad base", as is found in Australian species of the subgenus *Epipompilus*. Nor is the propodeum "wholly covered with strong reticulate sculpturing". In a later paper, Evans (1972), while "not abandoning his subgeneric name entirely", pointed out that it was difficult to place known males into his sub-genera. Evans (op.cit.) still unfamiliar with the male of the type, now predicted that some *Epipompiloides* males should have 2 sub-marginal cells, unlike *Epipompilus*, which has 3. (The New Zealand species, in fact, has 3 submarginal cells). He considered that males should have a slender, pointed subgenital plate, the reverse of his 1962 prediction, and probably a correct one, if the subgenus is retained. *Insularis* has a subgenital plate of this last type, and indeed is very similar in a number of features to Tasmanian males of Evans' 1972 *Epipompiloides* group - and in particular to *E.bushi* Evans. The shapes of the aedeagus, parapenial lobe, digitus, and paramere are very similar, save that in *bushi* the last is much shorter in relation to the other lobes than in *insularis*. Both the paramere and digitus have very long, apically hooked setae similar to those of *insularis*. The remainder of the external structure of *bushi* bears a close resemblance to *insularis* and the colouration is almost identical. The relationship with the Tasmanian fauna is further discussed below in the section on Zoogeography.
E. insularis Kohl.

figs. 12, 26, 46A, B, C, 61, 81.


E. insularis is the smallest New Zealand Pompilid. Females have yellowish black-tipped wings, a black body, a somewhat compressed form, and rather short stout legs. They are immediately distinguishable from the females of all other New Zealand pompilids by the absence of both the lateral crease on the first metasomal tergite, and the transverse groove on the second metasomal sternite (fig. 12). The head is projected forwards in an unusual Bethylid-like manner. Evans (1962) gave an adequate description of a female collected in Nelson in 1926. Because the species varies geographically in colouration and in the ratios he used, the major patterns are summarised below. Generally, population becomes proportionately darker, and the apical infuscation of the wing increases in extent, with increasing latitude (correlated with decreasing temperature, isolation and global radiation, and increasing cloudiness).

Variation: Size: length: 6 - 8.8 mm.; forewing 5.5 - 7.8 mm. Colour: Specimens north of about latitude 36 have the body mostly black, but with castaneous margins on many thoracic sutures, and a broad orange-castaneous band occupying most of the pronotal disc. The scutellum is often entirely orange-castaneous (e.g. on 5 specimens from Mangimuka Range, and 2 from Pukepoto. However in the 3 Spirits Bay specimens, it is black.) Forewing infuscation in the north is restricted to the extreme apical margin (i.e. the apical 0.03). Legs and antennal scape are entirely bright orange-castaneous, the palpi
orange-fulvous. The antennal flagellum is brown above, light brown below. South of latitude 36 (near Dargaville) the scutellum is black. The orange band on the pronotum though often faintly perceptible to about latitude 42, becomes greatly reduced south of about Rotorua. In the 8 Rotorua specimens, it is very distinct, though reduced, crossing the pronotal disc at about its middle. Legs and palpi are entirely orange on all North Island specimens examined. Nelson specimens show considerable variation, some having the fore coxae completely black, while in others it is entirely bright-orange - testaceous. The antennal scape south of Auckland is very variable, ranging from bright orange castaneous to black. On the southern side of Cook Strait, the forewing infuscation suddenly increases from the apical 0.07 - 0.1 of the wing to its apical 0.3. In all specimens between Christchurch and Dunedin, it extends to just above the level of the stigma, and it extends to just below it in southern melanics. Between Christchurch and Dunedin all coxae can be castaneous or black, the remainder of the legs castaneous except for the front femur, which sometimes has a black spot of very variable size. Coxal infuscation affects first the fore, then the middle, then the hind pair. In this last area (which includes Arthur's Pass) the palpi range between straw-coloured and fulvous, while between Timaru and Dunedin, they can be fulvous, or lightly infuscated. At a boundary somewhere north of Haast pass, Pleasant Flat (Haast River), Lake Morakei (South Westland), Haast, and Port Jackson, full melanics are suddenly encountered. These have the body (including clypeus and labrum), palpi, and all parts of the legs entirely black.
Table 33. *Epipompilus insularis*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 9 females.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary palp ratio</th>
<th>Antennal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirits Bay</td>
<td>0.72 : 1.05 : 0.80 : 1</td>
<td>1.06 : 0.41 : 0.78 : 1</td>
</tr>
<tr>
<td>Paiaka, Northland</td>
<td>0.76 : 1 : 0.86 : 1</td>
<td>0.91 : 0.42 : 0.72 : 1</td>
</tr>
<tr>
<td>Wellington</td>
<td>0.84 : 1.19 : 0.96 : 1</td>
<td>1.06 : 0.44 : 0.71 : 1</td>
</tr>
<tr>
<td>Puhipuhu Res., Nelson</td>
<td>0.91 : 1.32 : 0.93 : 1</td>
<td>1 : 0.42 : 0.74 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>0.84 : 1.12 : 0.95 : 1</td>
<td>0.97 : 0.47 : 0.76 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>0.95 : 1.27 : 1.01 : 1</td>
<td>1.04 : 0.42 : 0.73 : 1</td>
</tr>
<tr>
<td>Kelsey's Bush, Waimate</td>
<td>0.78 : 1.16 : 0.86 : 1</td>
<td>0.99 : 0.48 : 0.74 : 1</td>
</tr>
<tr>
<td>Pleasant Flat, Haast R.</td>
<td>0.83 : 1.09 : 0.84 : 1</td>
<td>0.97 : 0.37 : 0.70 : 1</td>
</tr>
<tr>
<td>Stewart Island</td>
<td>0.67 : 1.15 : 0.89 : 1</td>
<td>1 : 0.45 : 0.62 : 1</td>
</tr>
<tr>
<td>ratio</td>
<td>$\bar{x}$</td>
<td>range</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td>max.plp.seg.4 $\frac{1}{w.}$</td>
<td>4.86</td>
<td>5.51</td>
</tr>
<tr>
<td>max.plp.seg.4, 1.</td>
<td>0.99</td>
<td>0.92</td>
</tr>
<tr>
<td>ant.seg.3, 1.</td>
<td>4.30</td>
<td></td>
</tr>
<tr>
<td>max.plp.seg.6, 1.</td>
<td>0.98</td>
<td>0.80</td>
</tr>
<tr>
<td>medium 1. clypeus w.</td>
<td>2.68</td>
<td>2.47</td>
</tr>
<tr>
<td>malar space</td>
<td>0.58</td>
<td>0.50</td>
</tr>
<tr>
<td>ant.seg.2, 1.</td>
<td>0.99</td>
<td>0.92</td>
</tr>
<tr>
<td>scape 1. w.</td>
<td>1.63</td>
<td>1.50</td>
</tr>
<tr>
<td>ant.seg.3 1. w.</td>
<td>1.79</td>
<td>1.42</td>
</tr>
<tr>
<td>ant.seg.3, 1. U.I.D.</td>
<td>0.42</td>
<td>0.36</td>
</tr>
<tr>
<td>T.F.D.</td>
<td>1.24</td>
<td>1.17</td>
</tr>
<tr>
<td>F.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.65</td>
<td>0.63</td>
</tr>
<tr>
<td>T.F.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.81</td>
<td>0.77</td>
</tr>
<tr>
<td>L.I.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.O.L.</td>
<td>1.42</td>
<td>1.20</td>
</tr>
<tr>
<td>O.O.L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>front femur $\frac{1}{w}$</td>
<td>2.47</td>
<td>2.27</td>
</tr>
<tr>
<td>stigma 1.</td>
<td>0.66</td>
<td>0.62</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. from apex</td>
<td>0.67</td>
<td>0.59</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>submarginal cell 3, 1.</td>
<td>1.08</td>
<td>0.96</td>
</tr>
<tr>
<td>submarginal cell 2, 1.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Structure: Variation is minor. Some Pleasant Flat specimens have an obsolete median carina and a pair of shallow, V-shaped impressions on the hind slope of the propodeum absent from most others. The section of M+Cul between Cu-a and the Cu 1 and M bifurcation on the hind wing is longer in Pleasant Flat melanics than in most others, however it is always very variable in length. The range of variation in 19 selected characters of 9 individuals from widely-separated localities is shown in tables 35 and 36.

Material examined: 124 females from the following localities:
NORTH ISLAND: Mt.Uniwhaio (Spirits Bay),(6),ACH; Paiaka (3),RAC; Pupekoto (Kaitaia),(2),ACH; Mangamuka (5),ACH; Muir Park (Whangarei),(3),ACH;Tokoroa, RoFo; Rotorua, RoFo; Opunake,ACH; Marton ACH; Renata Hut (Tararua Ra.), ACH; Wainui Ridge (Wellington),(6),ACH; Akatarawa Saddle (Wellington)(3),ACH; Orongorongo R. (Wellington),ACH; Botanical Garden, Wellington,ACH; SOUTH ISLAND: DunnMt. (Nelson),D.S.I.R.; Kaikoura (4),ACH; Rough Ck. (Arthur's Pass) (2),CU; Mt.Wakefield, RoFo; Mt.Cook, D.S.I.R.; Peel Forest (24),ACH; Kelsey's Bush (Waimate),(36),ACH; Hook Bush (Waimate),(2),ACH; Pleasant Flat (Haast R.)(6), ACH; Alexandra, ACH; Port Jackson, ACH; Martin's Bay,ACH; Queenstown (2),ACH; Te Anau (2),ACH; Leith Saddle (Dunedin), (3),ACH; Tapanui, RoFo; Bluff,ACH; STEWART ISLAND; Ocean Beach, ACH; Oban,ACH; Rakeahua V. ACH.

Epipompilus insularis Kohl, MALE
Diagnosis: Body black, front with a lemon-yellow para-occipital spot above the clypeus between the eye and antennal socket. Wings clear hyaline. Antennae crenulate in side profile. Subgenital plate in outline shaped like
a fountain pen nib, bordered with very long, apically-hooked setae. Digitus and paramere of the genitalia also with extremely long, apically-hooked setae.


**Description:** Length: 5.2 mm.; forewing 3.7 mm.

**Colour and vestiture:** Head and mesosoma black, face with a lemon-yellow paraoccipital spot bounded by the eye, antennal socket, and fronto-clypeal suture. Labrum, apical 0.5 of mandibles, palpi, and legs, except tarsi, dull blackish-brown, tarsi dull brown. Metasoma dark brown tinged with fuscous. Wings entirely clear hyaline. Stigma and veins dark brown, some translucent (e.g. 1rm, 2rm, 3rm, and 2 mcu on forewing). Pubescence silvery, grading into light brown above on metasoma. Ventral surfaces of coxae, epicnemium, and episternum covered with thicker silvery pubescence, becoming sparse laterally. Front with short erect hairs. Remainder of body very sparsely hairy. Metasoma with a few scattered stiff bristles below.

**Structure:** last 4 segments of maxillary palp in a ratio of about 0.62 : 0.88 : 0.78 : 1; segment 4 about 4 x as long as its maximum width, 0.89 x as long as antennal segment 3; apical segment 1.08 x median length of clypeus. Labrum strongly exserted, its apical margin less rounded than in the female. Clypeus 2.92 x as wide as high, its apical margin concave. Malar space 0.54 x as long as second antennal segment, antennal segments 1-4 in a ratio of about 0.87 : 0.52 : 0.9 : 1; scape 1.18 x as long as thick, third segment 1.4 x as long as thick, 0.31 x upper inter-ocular distance. Head 1.11 x as wide as high; middle
interocular distance 0.64 x width of head; upper interocular distance 1.05 x lower interocular distance. Front angle of ocellar triangle greater than a right angle (about 100°) POL:00L 23:8. Front less forward-produced than in the female; moderately nitid, closely covered with minute punctures; vertex gibbous. Posterior margin of pronotum subangulate. Mesosoma covered with minute punctures above. Front femur 1.82 x as long as wide. Forewing (fig. 8) with the stigma 0.62 x as long as total length of marginal cell, the latter removed from the wing-tip by 0.93 x its length. Third submarginal cell 1.03 x as long as second. Hind wing with tranverse median vein oblique, more curved than in the female, meeting median vein basad of cubital fork by 0.5 its own length; last 0.8 of cu evanescent. Scattered dots of pigment trace the outline of the anal vein to the margin. Subgenital plate (fig. 46) in outline suggestive of a fountain pen nib, with a long, narrow, attenuated distal portion arising from a broad base, the entire structure covered with very long, apically hooked setae. Genitalia (fig. 61) with parameres far exceeding the parapenial lobes, and bearing long, apically hooked setae. Parapenial lobes simple, blunt, rod-like, also bearing long hooked setae; digitus volsellaris simple, blunt-ended prong-shaped, aedeagus simple, its apex at roughly the same level as those of the 2 innermost paired structures.

Variation:

Size: length: 3.5 - 7.8 mm.; forewing 2.9 - 7 mm.

Structure: All specimens examined are very similar - the subgenital plates of Kelsey's Bush (Waimate) specimens being almost indistinguishable from those from Auckland. There is
a slight tendency for the attenuated apical part to lengthen relative to the base south of Christchurch. The range of variation of 19 selected characters of 5 males from widely separated localities is shown in tables 35 and 36.

Material examined: 45 males from the following localities:
NORTH ISLAND: Owairaka (Auckland) ACH; L.Waikaremoana, ACH; Opunake, ACH; Wainui Ridge (Wellington) ACH;
SOUTH ISLAND: Brook's Ck. (Nelson), ACH; Dunn Mt. (Nelson) ACH; Kaikoura (2), ACH; Eyreswell (3) ACH; RoFo; Peel Forest (11), ACH; Kelsey's Bush, (Waimate), (23), ACH.
Table 35. *Epipompilus insularis*: Ratios of last 4 segments of maxillary palp, and first 4 antennal segments, of 5 males.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Maxillary Palp Ratio</th>
<th>Antennal Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland</td>
<td>0.76 : 0.99 : 0.85 : 1</td>
<td>0.89 : 0.54 : 0.93 : 1</td>
</tr>
<tr>
<td>Opunake</td>
<td>0.78 : 1.14 : 0.95 : 1</td>
<td>0.83 : 0.53 : 0.86 : 1</td>
</tr>
<tr>
<td>Eyrewell (nr. Christchurch)</td>
<td>0.74 : 0.97 : 0.82 : 1</td>
<td>0.88 : 0.54 : 0.87 : 1</td>
</tr>
<tr>
<td>Peel Forest</td>
<td>0.66 : 1 : 0.82 : 1</td>
<td>0.95 : 0.50 : 0.91 : 1</td>
</tr>
<tr>
<td>Kelsey's Bush, Waimate</td>
<td>0.68 : 1.05 : 0.79 : 1</td>
<td>0.84 : 0.51 : 0.86 : 1</td>
</tr>
</tbody>
</table>
Table 36. *Epipompilus insularis*: Range of dimensions for 5 males from localities given in Table 35.

<table>
<thead>
<tr>
<th>ratio</th>
<th>$\bar{x}$</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.plp.seg.4 $\frac{1}{w}$</td>
<td>5.40</td>
<td>4.96</td>
</tr>
<tr>
<td>max.plp.seg.4, 1.</td>
<td>1.0</td>
<td>0.92</td>
</tr>
<tr>
<td>ant.seg.3, 1.</td>
<td>0.96</td>
<td>0.85</td>
</tr>
<tr>
<td>max.plp.seg.6, 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>medium 1. clypeus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>clypeus $\frac{w}{h}$</td>
<td>2.34</td>
<td>2.13</td>
</tr>
<tr>
<td>malar space</td>
<td>0.55</td>
<td>0.39</td>
</tr>
<tr>
<td>ant.seg.2, 1.</td>
<td>1.45</td>
<td>1.35</td>
</tr>
<tr>
<td>scape $\frac{1}{w}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ant.seg.3 $\frac{1}{w}$</td>
<td>1.60</td>
<td>1.51</td>
</tr>
<tr>
<td>ant.seg.3, 1.</td>
<td>0.40</td>
<td>0.33</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>1.18</td>
<td>1.13</td>
</tr>
<tr>
<td>T.F.D.</td>
<td></td>
<td>1.23</td>
</tr>
<tr>
<td>F.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.I.D.</td>
<td>0.61</td>
<td>0.60</td>
</tr>
<tr>
<td>T.F.D.</td>
<td></td>
<td>0.63</td>
</tr>
<tr>
<td>U.I.D.</td>
<td>0.95</td>
<td>0.90</td>
</tr>
<tr>
<td>L.I.D.</td>
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<td>1.04</td>
</tr>
<tr>
<td>P.O.L.</td>
<td>1.63</td>
<td>1.38</td>
</tr>
<tr>
<td>O.O.L.</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>front femur $\frac{L}{w}$</td>
<td>2.63</td>
<td>2.42</td>
</tr>
<tr>
<td>stigma 1.</td>
<td>0.80</td>
<td>0.75</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. from apex</td>
<td>0.55</td>
<td>0.52</td>
</tr>
<tr>
<td>marginal cell 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>submarginal cell 3, 1.</td>
<td>1.01</td>
<td>0.95</td>
</tr>
<tr>
<td>submarginal cell 2, 1.</td>
<td></td>
<td>1.09</td>
</tr>
</tbody>
</table>
43 - 46 Male subgenital plates.

43. Priocnemis (Chrysocurgus) nitida, Renata (Wellington) specimen.

44. Priocnemis (Chrysocurgus) fugax, Wellington

45. A,B,C,D,E; Priocnemis (Chrysocurgus) nudopropodea sp.n.

45A. Leith Saddle, Dunedin

45B. Dean's Bush, Christchurch

45C. Arnaud Range, Nelson Lakes.

45D. Akatarawa, Wellington

45E. Manginangina Kauri Reserve, Okaihau.

46 - A,B,C. Epipompilus insularis

46A. Hagley Park, Christchurch.

46B. Dun Mountain, Nelson

46C. Kaikoura

Scale line equals 188 microns
47-52: Male subgenital plates

47. Priocnemis (Trichocurgus) monachus (Renata, Wellington)

48, A-B Priocnemis (Trichocurgus) conformis

48A. Queenstown (diligens)

48B. Upper Maitai, Nelson. (conformis)

49. Priocnemis (Trichocurgus) ordishi sp.n. (Renata, Wellington).

50. Priocnemis (Trichocurgus) nitidiventris (Paekakariki beach, Wellington)

51 - A,B,C Priocnemis (Trichocurgus) crawi sp.n.

51A. New River, Greymouth

51B. Rock and Pillar Range, Otago

51C. Rock and Pillar Range, Otago.

52. Priocnemis (Trichocurgus) carbonarius
Dun Mountain, 2,000' ; Nelson.

Scale line equals 188 microns
53 - 56  Male genitalia

53.  **Priocnemis (Chrysocurgus) nitida** (Akatarawa, Wellington)

54.  **Priocnemis (Chrysocurgus) fugax** (Upper Maitai, Nelson). 54a: peg setae from paramere.

55.  **Priocnemis (Chrysocurgus) nudopropodea** sp.n. Arnaud Range, Nelson Lakes).

56.  **Priocnemis (Trichocurgus) carbonarius** (Dun Mountain, 2,000' Nelson).

Scale line equals 188 microns
57 - 61 Male genitalia

57. **Priocnemis (Trichocurgus) nitidiventris.**
   (Paekakariki Beach).

58. **Priocnemis (Trichocurgus) ordishi, sp.n.**
   (Akatarawa, Wellington).

59.A,B. **Priocnemis (Trichocurgus) conformis**

59A. Upper Maitai, Nelson, *(conformis)*

59B. Remarkable Range, 7,000' *(diligens)*
**Priocnemis (Trichocurgus) conformis (diligens)**

60. **Priocnemis (Trichocurgus) monachus** (Maitai Reserve, Nelson).

61. **Epipompilus insularis** (Brook's Creek, Nelson)

   Scale line equals 188 microns.
62 - 71 Aspects of the propodeum and base of the metasoma. All specimens from Renata, Wellington.

62. *Priocnemis (Trichocurgus) monachus* ♀

63. *Priocnemis (Trichocurgus) conformis* ♀

64. *Priocnemis (Chrysocurgus) fugax* ♀

65. *Priocnemis (Chrysocurgus) nitida* ♀

66. *Priocnemis (Chrysocurgus) fugax* ♀

67. *Priocnemis (Chrysocurgus) fugax* ♂

68. *Priocnemis (Chrysocurgus) nudopropodea* ♀

69. *Priocnemis (Chrysocurgus) nudopropodea* ♂

70. *Priocnemis (Chrysocurgus) nitida* ♀

71. *Priocnemis (Chrysocurgus) nitida* ♂
72. *Priocnemis (Chrysocurgus) nitida* ♀
   (Akatarawa, Wellington, specimen). Forewing.

73. *Priocnemis (Chrysocurgus) nudopropodea* sp.n.
   (Stewart Island specimen). Wings

74. *Priocnemis (Chrysocurgus) fugax* ♀
   Spirits' Bay specimen), Forewing

75. *Priocnemis (Trichocurgus) conformis* ♀
   Akatarawa, Wellington specimen). Forewing

76. *Priocnemis (Trichocurgus) monachus* ♀
   (Stewart Island, Rakehua Valley, specimen)
   Forewing.

77. *Priocnemis (Trichocurgus) ordishi* sp.n. ♀
   (Akatarawa, Wellington), Forewing.

78. *Priocnemis (Trichocurgus) nitidiventris* ♀
   (Paekakariki Beach specimen) Forewing.

79. *Priocnemis (Trichocurgus) crawi* sp.n. ♀
   (Renata, Wellington specimen) Forewing

80. *Priocnemis (Trichocurgus) carbonarius* ♀
   (Dallington, Christchurch specimen), Forewing

81. *Epipompilus insularis* ♀ (Kelsey's Bush,
   Waimate specimen) Wings.

82 - 87: Internal aspect of right mandible to show
   incipient second tooth on some specimens
   (females). All are females from Akatarawa,
   Wellington, except for *carbonarius*, which
   is a female from Obelisk Range, 4500'.

82. Priocnemis (Chrysocurgus) fugax n.sp.

83. Priocnemis (Chrysocurgus) nudopropodea

84. Priocnemis (Chrysocurgus) nitida

85. Priocnemis (Trichocurgus) conformis

86. Priocnemis (Trichocurgus) monachus

87. Priocnemis (Trichocurgus) carbonarius
Labium and maxilla ventral, in situ, to show difference in the development of the premental setae in *Trichocurgus* (88 - 90) and *Chrysocurgus* (91 - 93). All except *carbonarius*, which was taken at 4,500' on Obelisk Range, are from Renata, Wellington.

88. *Priocnemis (Trichocurgus) conformis* ♀

89. *Priocnemis (Trichocurgus) carbonarius* ♀

90. *Priocnemis (Trichocurgus) monachus* ♀

91. *Priocnemis (Trichocurgus) nitida* ♀

92. *Priocnemis (Trichocurgus) nudopropodca* ♀

93. *Priocnemis (Trichocurgus) fugax* ♀
Hind tibiae, to show varying development of the dorsal row of scales (All are from females from Akatarawa, Wellington).

94. Priocnemis (Chrysocurgus) nitida

95. Priocnemis (Chrysocurgus) nudopropodea, sp.n.

96. Priocnemis (Chrysocurgus) fugax

97. Priocnemis (Trichocurgus) carbonarius

98. Priocnemis (Trichocurgus) monachus

99. Priocnemis (Trichocurgus) conformis
Fig. 100

- Northland form
- intermediates
- central & southern North Island form
- South Island form
- measured adult
- measured larva

Priocnemis (C.) nitida (Fabr) distribution
**Fig. 101**

- Measured adult
- Measured larva
- Type locality: Agenia browni Gribodo
- Type locality: Maculipennis Smith

**Priocnemis (C.) fugax (Fabr.) distribution**

**Fig. 102**

- Measured adult
- Type locality

**Priocnemis (C.) nudopropodea sp.n. distribution**
Fig. 103

\[ M: \text{measured adult} \]
\[ I: \text{measured larva} \]
\[ P: \text{plesiotype locality} \]
\[ n: \text{type locality nitidiventris Smith} \]
\[ h: \text{type locality huttoni Cameron} \]

Priocnemis(T.) nitidiventris Smith distribution

Fig. 104

\[ M: \text{measured adult} \]
\[ T: \text{type locality} \]

Priocnemis(T.) ordishi sp.n. distribution
Fig. 105

M: measured adult
L: measured larva
P: plesiotype locality
t: type locality triangularis Cameron

Fig. 106

M: measured adult
L: measured larva
P: plesiotype locality
c: type locality conformis Smith
d: type locality diligens Smith
m: type locality marginatus Smith

"WestCoast"

distribution
Fig. 107

M: measured adult
T: type locality carbonarius Smith
I: measured larva
p: plesiotype locality

Priocnemis (T.) carbonarius Smith

Fig. 108

M: measured adult
T: type locality

Priocnemis (T) crawi, n. sp.
Fig. 109

(symbols as for conformis)

Epipomphilus insularis Kohl distribution
Plate 1.

A. - G. Priocnemis (Chrysocurgus) fugax QO

Forewings; to show geographical variation in the development of the fascia.

A. Manginangina Kauri Reserve, Kaiwaka.
B. Dargaville
C. Colonial Knob, Porirua
D. Colonial Knob, Porirua.
E. Dun Mt., Nelson.
F. Rough Creek, Arthur's Pass
G. Rough Creek, Arthur's Pass.

There are two areas in New Zealand where the majority of specimens of fugax lack a fascia on the forewing - namely Central Northland, about the latitude of Kaiwaka (35.3°) and East of the Southern Alps in mid-Canterbury (latitude 44°). North and south of these centres, the fascia gradually increases in development. At Spirits Bay and North Cape, the fascia is incomplete, similar to the Dargaville condition. Around latitude 35.3° in the Pukete Kauri Forest and Manginangina Kauri Reserve, it is almost lacking - on some specimens, there is not a trace. The fascia is incomplete at latitude 36° and increases in development until at Auckland it is entire. Throughout South Auckland and central and southern North Island areas to Wellington, the fascia is well-developed. It is very
well developed throughout the West Coast of the South Island. At Arthur's Pass, West Coast specimens cross the Alps via the Otira River Valley and intermingle with Canterbury forms, which have hardly a trace of fascia and which extend along the Waimakariri River Valley giving rise to a bimodal population around Arthur's Pass township.
Plate 2.

H. - M. *Priocnemis (C.) fugax* QQ

Geographical variation in the development of the forewing fascia, continued.

H. Peel Forest
I. Peel Forest
J. Mt. Nimrod, Hunter Hills (30 miles east of Timaru.)
K. Leith Saddle, Dunedin.
L. Lake Manapouri
M. Ocean Beach, Stewart Island.

Note that the fascia gradually increases until at latitude 46.5° it is complete. Its greatest reduction is on the eastern side of the Southern Alps, on latitude 44° where most specimens lack a fascia. West of the Alps, throughout the West Coast, *fugax* has a particularly well-developed fascia. This form extends throughout Fiordland to Stewart Island where the fascia though entire, is somewhat fainter on cell 2M as a result of the East Coast influence.

Thus, *maculipennis*, a nominal species from Peel Forest distinguished by its reduced fascia is shown to be a synonymy.
In some North Island localities (e.g. Kapakapanui, 3000' Tararua Range, Dawson's Falls, Mt. Egmont, the fascia on the forewing of the male converges entirely with the apical infuscation.
Plate 3.

A. - E. *Priocnemis* (Chrysocurgus) nitida

A. ♀, Northland form (from Manginangina Kauri Reserve). Note small fascia, similar to that of central and southern North Island males.

B. ♀, central and southern North Island form. (Botanical Gardens, Wellington).

C. ♀, South Island form.

D. ♂, South Island form (Note lack of small infuscated area on medial vein and radial sector)

E. ♂, Central and southern North Island form. Note small fascia on medial vein and radial sector, similar to that on forewing of Northland females. Northland males lack this fascia, and resemble the South Island form.

F. - H. *Priocnemis* (Chrysocurgus) nudopropodea n.sp.

F. Forewing, ♀, showing typical development of fascia. (Ocean Beach, Stewart Island specimen).

G. Forewing, ♀, showing reduced fascia typical of some Canterbury forms. (Deans Bush, Christchurch).

H. Forewing ♂, (Mill's Bush, Peel Forest)

Note how the fascia converge with the apical infuscation below, forming a v-shaped infuscation which is quite characteristic of this species. (term added)
Plate 4.

A. - H. *Priocnemis (Trichocurgus) conformis* QQ

Forewing, to show individual and geographical variation.

A. Spirits Bay, Northland. Note reduced apical infuscation.

B. Renata, Tararua Ranges.

C. Cashmere, Christchurch

D. Peel Forest

E. Peel Forest. Note translucent stigma which was coloured pale testaceous.

F. Piano Flat, Otago

G. Trotter's Gorge, Hampden. Note basal extension of apical infuscation along costal cell.

H. Colac Bay. Note fascia at level of cubito-anal cross vein.

There is a general southward increase in the size of the apical infuscation. The Trotter's Gorge specimen (G.) and the Colac Bay wing (H.) represent local populations, the former being typical of individuals in a 60 mile radius of Trotter's Gorge, and the latter being typical of lower Southland populations. The stigma is variable in all populations.
Plate 5.

1. **Priocnemis (Trichocurgus) conformis** ♀
   Forewing, Port Hills, Christchurch.

A. - E. **Epipompilus insularis** ♀♀
   Forewings. To show geographical variation.

   A. Mt.Uniwhaeo, Spirits Bay
   B. Paiaka, Bay of Islands
   C. Wainui Ridge, Wainuiomata.
   D. Peel Forest
   E. Puipui Reserve, Nelson

Note: There is a general southward increase in the extent of the apical infuscation. It shows a very marked increase in size on the southern side of Cook Strait.
FINAL INSTAR LARVAE:

Structure and Terminology:

Evans (1950) describes the general characteristics of final-instar pompilid larvae. The following account, based on the work of Evans, Michener (1953), Short (1953), and my own studies is given in order to clarify the terminology used herein.

Body: The body is white, almost fusiform, somewhat flattened ventrally, with segmental pleural lobes, and a dorsal crease on each segment except the ultimate one, dividing the dorsum of each into a pair of annules. The integument bears setae of varying sizes on the dorsum and pleural regions and, in the Pepsinae, minute spicules on the venter.

Ten pairs of spiracles are present, those on the second segment being very reduced. All are of a complex structure (figs. 110 and 112, nitida prothoracic spiracle). The primary tracheal opening lies between the bowl-shaped atrium and the sub-atrium, which is often thrown into a large number of tubercles, and extends proximally to a constriction in the trachea. Internally, the walls of the atrium are lined with small ridges, many of which bear minute, blunt spines. The basal region of the atrium surrounding the primary tracheal opening, is termed collar, and atrial ridges in this part frequently bear larger collar spines. Spines are often born by the internal walls of the distal part of the sub-atrium as well. The walls of the atrium protrude slightly above the general body surface to form a rim, from which a very narrow, transparent annulus, the peritreme, constricts slightly the atrial opening (fig. 112, nitida).

Head: (Fig. 113, nitida): The head is broader than high,
giving it a sub-circular outline in anterior view. The epistomal suture is very indistinct, while the coronal suture appears to be absent. On the front of the head capsule, on either side lie a pair of pigmented lines, the parietal bands (Michener, Evans ibid.) termed "ocular" lines by Short (ibid). A short antennal papilla, tipped by three sensory cones, arises from the unsclerotised, almost circular antennal orbits. The anterior tentorial arms are visible as thick pigmented lines on either side of the clypeus, and are continuous with thickenings of the integument above the mandibular bases, the pleurostomal thickenings, which themselves are continuous with the hypostomal thickenings, which extend back from the posterior articulation of the mandible to the posterior tentorial arms. Head setae vary greatly in length and distribution.

Mouthparts - The labrum has two large lateral lobes and a smaller median lobe and on the disc bears a marginal row of prominent sensory cones, a transverse band of setae, and non-setigerous punctures. The undersurface of the labrum, termed the epipharynx is spinulose. The mandibles are strong, not more than twice as long as their maximum width, heavily sclerotised apically, have one or two setae, and usually bear three teeth. The maxillae (fig. 113) have setae, and spicules on their lacinial areas, which extend towards the middle. Anteriorly are born a pair of blunt papillose projections of roughly the same size, the inner ones being the galeae and the outer ones the maxillary palpi.

The labium comprises a large postmentum and a smaller prementum. The latter bears the spinneret (or silk press) and lateral to it, the labial palpi.
Characteristic groups of setae on either side of the spinnerets are termed "spinneret setae".

The following ratios are used in the descriptions:

- HW/HH; which is the head width divided by the head height (the latter measured without the labrum because this is extensible);
- ML/MW; being the mandibular length divided by its maximum width; and
- LS/OD; the length of the longest head setae divided by the maximum diameter of the antennal orbit.
110. Prothoracic spiracle \( P.(C.) \text{nitida} \)

111. Head \( P.(C.) \text{nitida} \)

112. Prothoracic spiracle \( P.(C.)\text{nitida} \) transverse section

113. \( P.(T.) \text{nitida} \) mature, pre-diapausing larva; labium and maxilla.
Key to the Known Final Instar Larvae of New Zealand

Pompilidae.

1. Mandible without 2 teeth very close together at the apex (fig. 161) Epipompilus insularis p.139

2. (1) Parietal bands extending beyond the most apical part of the antennal orbits. Clypeus without a median sulcus or impression. Median lobe of labrum with the apical margin sub-rectilinear. Cells between atrial ridges of prothoracic spiracle notably irregular, some with vertical protrusions

3. (2) Labrum with a transverse band of 16 to 18 setae. Prothoracic spiracle with small but distinct blunt-ending spines on the atrial ridges. Prionemis (Chrysocurgus) nitida p.128
--- Labrum with a transverse band of 10 to 12 setae.

Prothoracic spiracle with the atrial ridges apparently without spines.

................. Priocnemis (Chrysocurgus) fugax. p.131

4. (2) Antennal papilla short (0.15 x as long as the maximum diameter of the antennal orbit). Labrum with a transverse band of 16 setae, and 14 apical pigmented sensory cones. Priocnemis (Trichocurgus) conformis. p.136

--- Antennal papilla long (0.20 x as long as the maximum diameter of the antennal orbit). Labrum with a transverse band of 10 to 12 setae, and 8 apical pigmented sensory cones.

.............. Priocnemis (Trichocurgus) carbonarius. p.133
Table 37. Diagnostic characters of the final instar larvae of 5 New Zealand species of Pompilidae.

<table>
<thead>
<tr>
<th>Sub family</th>
<th>Pompilinae</th>
<th>Pepsinae</th>
<th>Pepsinae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insularis</td>
<td>fugax</td>
<td>nitida</td>
</tr>
<tr>
<td>Sub genus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>dorsal organ on mesothorax</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>apical mandibular teeth very close together</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>setae on thorax and abdomen</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>spines on vertex and temples</td>
<td>(L)</td>
<td>(S)</td>
</tr>
<tr>
<td></td>
<td>LS/OD</td>
<td>0.81</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>labral setae</td>
<td>10-12</td>
<td>10-12</td>
</tr>
<tr>
<td></td>
<td>labral cones</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>lateral lobes of labrum</td>
<td>rounded</td>
<td>sub-rectangular</td>
</tr>
<tr>
<td></td>
<td>median clypeal sulcus or impression</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>parietal bands</td>
<td>N</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>antennal papilla</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>a.p./a.o.</td>
<td>0.24</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>atrial cells between ridges of prothorax spiracle</td>
<td>regular</td>
<td>irregular</td>
</tr>
<tr>
<td></td>
<td>presence/absence of pockets on atrial cells</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>spines on atrial ridges of prothoracic spiracle</td>
<td>-</td>
<td>S+</td>
</tr>
<tr>
<td></td>
<td>spines on spiracular collar</td>
<td>-</td>
<td>S+</td>
</tr>
</tbody>
</table>

(): very much; +: present; -: absent;

B: extending beyond antennal orbit; N: not extending beyond antennal orbit;
L: long; S: short; M: of moderate length;
LS/OD: longest head seta (length)/antennal orbit;
a.p./a.o.: antennal papilla (length)/antennal orbit
Priocnemis (Chrysocurgus) nitida (Fabr.) final instar larva. (Figs. 114-123, plate 7A - H.)

Diagnosis: Head with setae on the vertex and temples sparse, minute. Clypeus without a median sulcus or impression. Labrum sub-angulate, with 16-18 setae, 14 submarginal, pigmented sensory cones. Median lobe of labrum with the apical margin sub-rectilinear. Median lobe of epipharynx with widely-spaced, small blunt spinules. Prothoracic spiracle with irregular atrial ridges lined with small blunt teeth.

A ground-dwelling larva.

Description:
This description is based on two final instar larvae reared from eggs laid in Wellington on Miturga frenata, one in the Botanical Gardens on 1.12.1971, the other near the Akatarawa Saddle on 12.2.1972. Both were laid on spiders placed in abandoned cicada pupal chambers. Further comparisons were made with 5 out of a total of 64 diapausing, pre-pupae dug up from the foredune of the beach behind Queen Elizabeth Park on 28.2.1972. (The others could not be examined, as they were used in experiments).

Description:

Body: Length 17 mm.; maximum width 4 mm. (fig. 115). Fusiform, body much swollen posterior to the middle. Prothorax forming a distinct neck. Pleural lobes moderately large, not strongly protruberant. Prothorax with small dorsal setae, and ventral setae ranging from small (38 µ) to minute (2 µ), the ventral ones arising from circular bases of similar diameter to the larger ones. Venter
sparsely scattered with minute spinules, \( \approx 2 \mu \) long, these being more narrow than those of most known Pepsinae (fig. 120). **Spiracles** small, pale-yellow, circular. Prothoracic spiracle (fig. 119) \( 85\mu \) in diameter. Anastomosing ridges lining the atrial interior with small, nodular spines. Cells bounded by the ridges irregular, some with a vertical protrusion. Collar with small, aciculate spines. Subatrium with grouped, well-developed teeth. **Head** (fig. 114): Height (excluding clypeus) 1.08 mm., maximum width 1.56 mm. HW/HH : 1.44. Parietal bands very long (839\( \mu \)), heavily pigmented, extending for 119\( \mu \) beyond the antennal orbit. **Head setae** sparse, those of the vertex and temples very small, the largest 35\( \mu \) long. LS/OP 0.26. Four shallow depressions, each approximately 150\( \mu \) wide by 300\( \mu \) high, transversely between the parietal bands, just above the level of the antennal orbits. **Antennal papilla** long, 36\( \mu \) in length (excluding the 8\( \mu \) long apical sensillae), sixteen\( \mu \) wide at midway. Largest diameter of antennal orbits 136\( \mu \). **Clypeus** with 8 unequal setae; without a median sulcus or impression. **Labrum** (fig. 117): Median height 136\( \mu \); width 527\( \mu \) (The labrum is usually contracted—in this specimen resulting in an apparent height of 68\( \mu \)); 16-18 transverse setae, 14 pigmented, submarginal sensory cones—the arrangement of both cones and setae asymmetrical—with the three outermost cones arranged in a row on the right lateral lobe, and the origin of the second seta below those of the remaining setae. Third sensory cone of the left lobe directly below the second, the second seta originating from a higher position that the remaining setae. Lateral lobes of labrum well separated medially, each lobe sub-rectangular in outline,
its apex very slightly concave in the middle. Outer apical angle of lateral lobes subangulate, the margin unevenly rounded. Median lobe well developed, the apical margin, though gently and evenly convex, appearing unusually straight-edged. Epipharynx (fig. 118) with irregular rows of apically-convex scales basally on a central raised area, surrounded on either side by uneven rows of scales, each with 4-6 apical points. Apical, middle lobe of epipharynx with simple, uncrowded spinules. Twelve mesal sensillae are borne, 6 on each lateral lobe, the 2 most apical pairs arising from a single oval plate 28μ long; the basal sensillae separate. Mandibles (fig. 123) maximum length 663μ maximum width 374μ ML/MW 1.77. Two lateral setae present. Basal tooth broad, the edge rectilinear (c.f. fugax, where it is serrated). Maxilla with the lacinial area produced, bearing simple spinules. Maxillary palpi 81μ long, 51μ wide at base; galeae 78 μ long, 36 μ wide at base. Labial palpi 42μ long, 26μ wide at the base, spinneret 280 σ wide, faintly emarginate apically, with two setae on either side. A pair of ducts are distinct on either side. Labial palp with a series of 3 setae of a similar height to the palp basad to it, and 2 other somewhat further apart, more apical, and another basal and mesal to them.

Variation: Five of the 64 diapausing prepupae dug up from 15 cm. in the foredune of the beach behind Queen Elizabeth Park, Paekakariki, on 28.2.1972, had 18 labral setae, 9 to each lateral lobe. These were arranged in triplets, with the middle series on each lobe set back from the others (plate 7; E,F,). It is probably that the number of setae borne by the labrum is to a limited
131.

degree, variable, and related to size, which varies greatly in nitida.

Priochnemis (Chrysocurgus) fugax (Fabr.)

Final instar larva: (figs. 124-134; plate 8, A-H.)

Diagnosis: Head with setae on the vertex and temples sparse, minute. Clypeus without a median sulcus, or impression. Labrum subangulate, with 11-12 setae; 14 pigmented, submarginal sensory cones; median lobe with the apical margin sub-rectilinear. Median lobe of epipharynx with widely-spaced, small blunt spinules. Prothoracic spiracle with irregular atrial ridges. Atrium without spines.

Larvae always above the ground, commonly in abandoned coleopterous pupal chambers, usually in standing tiber, and always behind a sealing plug of mud.

Description: This description is based on four final instar larvae reared from eggs laid at Peel Forest on 17.1.1973.

Specimen 1:

Body: Length 17 mm.; maximum width 3.2 mm. (fig. 126).
Fusiform body more swollen posterior to the middle. Pleural lobes moderately well developed. A single transverse row of setae occurs on both the thoracic and abdominal segments (fig. 129). There are very sparsely scattered setae elsewhere - particularly on the pleural lobes. Abdominal spicules, about \( 2 \mu m \) long, are thinly scattered, especially on the ventral surfaces and on the pyræ (fig. 130). Spicules on the thoracic venter about \( 5.5 \mu m \) long.

Spiracles small, pale yellow, circular. Prothoracic spiracle (fig. 131a) \( 54 \mu m \) in diameter; its organisation and general appearance very similar to that of nitida, but with the ridges in the inside of the atrium mostly without spines, and slightly more regular. Outermost ridges with minute,
aciculate spines. Cells between atrial ridges irregular, not elongated, some with a short median vertical extension. Collar with small, scattered spines. Subatrium with grouped teeth. Second thoracic spiracle (fig. 131b) very reduced, 37μ in diameter (0.67 x as wide as the first spiracle) its atrium connecting to the trachia via 132μ of narrow tissue not thickened or lined with taenidia.

Head (fig. 124): Height: (excluding clypeus) 1.27 mm. maximum width 1.47 mm., HW/HH: 1.16. Parietal bands long, similar to those of nitida approximately 0.71 mm. long extending well beyond the lower level of the antennal orbit. Head setae sparse, very small, the largest 25μ long (on the clypeus), largest diameter of antennal orbit 137.2μ (inner diameter 94μ) LS/OD ).19. Four shallow depressions occur between the parietal bands, just above the level of the antennal orbits. Antennal papillae long 43μ in length 0.29 x outer diameter of antennal orbits. Clypeus with 6 setae, without a median impression.

Labrum: (fig. 127) Medium height 0.17 mm.; width 0.41 mm.; with 10 transverse setae and 14 pigmented, submarginal sensory cones. Lateral lobes well separated medially, by a sulcus, each lobe sub-rectangular in outline, its apex gently convex; the latero-apical angle sharply rounded through 90°. Median lobe moderately well developed, the apex very gently and unevenly convex, though appearing unusually straight-edged. The overall shape of the labrum is similar to that of nitida. Mandibles: 0.48 mm. long, 0.31 mm. in maximum width, with one lateral seta; 1.55 x as long as wide.

Epipharynx (fig. 128) with 6 or 7 aciculate spinules on the outer lateral margins, and broad scales with 5-8
apical points on most of the disc except the median lobe, where there are small, simple, uncrowded, blunt-ended spinules. Thirteen sensillae basiconica are present on the lateral lobes close to the epipharyngeal centre, the most apical pair on round basal plates. The epipharynx has a general similarity to that of nitida. Galeae and maxillary palpi (fig. 125) subequal in size and shape. Galeae very much narrower and attenuated on their apical 0.7; 88μ long, 52μ wide at base. Maxillary palpi evenly constricted, truncated cones, 88μ long, 59μ wide at the base. Lacinial areas spinulose, not ably produced. Labial palpi 34μ long, 29μ wide at base, spinneret transverse, very concave medially (plate 8,8), 0.42 mm. wide. A characteristic row of 3 setae extend on either side behind the palpi to the sides of the spinneret.

Variation:
The number of labral setae varied, 1 specimen having 11, and two having 12.

Dimensions of second Peel Forest Larva:
Length 16.8 mm., maximum width 3.19 mm. Longest head seta 26 mm. (excluding those on labrum). Antennal papilla 36 long, outer diameter of antennal orbit 130 longest head seta 0.20 x as long as outer diameter of antennal orbit. Antennal papilla 0.29 x as long as outer diameter of antennal orbit. Features essentially as in the first larva.

Priocnemis (Trichocurgus) carbonarius Smith
Final instar larva. (Figs. 144-152; Plate 6, A-H).
Diagnosis: Head with setae on the vertex and temples of moderate size. Clypeus with a shallow median impression and 6 setae. Antennal papilla long 0.2 x as long as the maximum diameter of the antennal orbit. Labrum with 10-12
setae and only 8 submarginal, pigmented sensory cones; lateral lobes very much rounded in outline; median lobe moderately convex. Epipharynx with the spinules on the apical, median lobe small. Spiracle with the anastomosing atrial ridges more or less regular, the enclosed cells elongate, without vertical extensions.

A ground-dwelling larva, commonly in compound nests in clay at the base of cylindrical burrows made by other insects such as cicindel id larvae and alkali bees.

The following description is based on 5 specimens all reared on Clubiona hirsutus females similar in size, and paralysed by the same female which placed them in a compound nest at Karori, Wellington on 1.1.1971.

First specimen: final instar larva:

Body: length 10 mm., maximum width 3.5 mm. Rather slender, fusiform, pleural lobes gently and evenly rounded.

Spiracles: circular. Prothoracic spiracle (fig. 150) 80μ in diameter. Atrium with the anastomosing ridges almost regular, apical ones with minute, acicular spines. Cells enclosed by ridges elongate, without vertical extensions. Collar spines prominent. Subatrium with prominent, grouped teeth. The spiracles are similar in basic organisation to those of conformis. Prothoracic pleurae with sparse, scattered, small setae, 16μ long. Prothoracic venter with spicules (fig. 149) ranging in size from 6μ long, 3μ wide at base to 10μ long, 5.2μ wide at base, though mostly in the order of 8μ long - 4μ wide at the base. The slender shape and irregular arrangement contrasts with the close regular arrangement on the prothoracic venter of conformis.
Head: (fig. 144) width 1.11 mm., maximum height (excluding labrum) 0.90 mm., with 4 weak rectangular impressions lying transversely on the frons between the parietal bands, above the level of the antennal orbits. Parietal bands 365 μ in length, very weakly pigmented; moderately short, not extending beyond the lower limits of the antennal orbits. Antennal papilla (fig. 151) long, length (excluding the 3 apical sensillae) 27 μ, basal width 14 μ, terminal sensillae 4 μ long. Entire antennal papilla 0.20 x maximum diameter of antennal orbit. Greatest diameter of antennal orbit 161 μ. Vertex and temples with the setae moderately long. Length of longest head seta 35 μ; LS/OD 0.31.

Mandibles: (fig. 152) bidentate (Townes' 1957 terminology) length 425 μ, width 281 μ, ML/MW - 1.51, with one lateral seta. Clypeus with a shallow, wide, median impression, and 6 setae arranged medially on either side in an evenly spaced group of 3. Labrum (fig. 147): width 319 μ, median height 85 μ; with 9 setae and 8 submarginal, pigmented sensory cones. Lateral lobes well separated medially by a wide, entire, culcus; very rounded in outline, each lateral lobe concave at the middle of its apical margin from which it curves around in a wide angle to the base on either side. Outer apical margins with projecting spicules. Median lobe evenly convex. Epipharynx (fig. 148) with the scales entirely single-pointed or apically convex from base to apex in the mesal region; multi-pointed scales on the sides mostly with 2 apical points. Spicules of median lobe small, dense, aciculate. Rounded sensillae indistinct, their shape and position similar to those of conformis. Maxillary palp 79 μ long,
37\mu\text{m} \text{wide at base}; \text{galea } 68\mu\text{m} \text{long, } 31\mu\text{m} \text{wide at base.}

Lacinial area of maxilla spinulose, strongly, angularly produced. Spinneret 110\mu\text{m} \text{wide, labial palp } 21\mu\text{m} \text{long.}

Two setae posterior and mesal to the labial palp probably qualify as "spinneret setae" as described by Evans, 1959.

Variation: Labral setae: Of 5 larvae taken from a single compound nest at Karori on 10.1.72 and reared to the final instar, 2 bore 12 setae on the labrum, one had 11, and the other had 10 (the remaining specimen being that described above, with 9). The bases of broken setae could not be located under the optical microscope, or on the specimen (with 12 setae) that was examined under the scanning electron microscope.

Clypeal setae also were variable; the specimen observed with the s.e.m. had only 4. This may have been the result of damage from the electron beam, which was observed to cause setae to bend. The s.e.m. revealed dense, minute triangular micro-spinules on the prothoracic pleurae each about 0.44\mu\text{m} \text{long, and as wide at the base as high.}

Priocnemis (Trichocurgus) (conformis) diligens Smith.

Final instar larva. (Figs. 135-143).

Diagnosis: Head with setae of the vertex and temples moderately long. Parietal bands not extending beyond the lower limits of the antennal orbits. Antennal papillae shorter than in any other (known) New Zealand Pompilid, only 0.15 x as long as the maximum diameter of the antennal orbits. Labrum with 16-18 setae, its median lobe very convex. Middle lobe of epipharynx with dense, long, regularly-arranged, sharply aciculate spinules which project well beyond its apical margin. First thoracic spiracles
with comparatively large collar spines.

A ground dwelling larva, the first 4 instars being unusual in their position transversely across the dorsal disc of the host's opisthoma.

The following description is drawn from four specimens reared from eggs to final instar larvae at Piano Flat in March, 1972.

**Body:** Length 11 mm.; maximum width 3.3 mm. (fig. 137); much swollen posteriorly, pleural lobes small.

In all specimens examined, the posterior part of the head capsule was withdrawn into the prothorax, the mandibles mostly hidden behind the large labrum, and the labium and maxillae were projected well forward.

**Prothorax** dorsally with small setae 28-48μ long. Venter with spinules, 10μ wide at base, 6μ high, closely and regularly arranged (fig. 139). **Spiracles** pale yellow, circular. Prothoracic spiracle (figs. 140, 141) 54μ in diameter, the most apical atrial ridges with minute, acicular spines, the others apparently without spines. Atrial cells between anastomosing ridges more or less even, elongate. Atrial collar ovoid, 29μ in maximum width, unevenly lined with collar spines, some of which being long (6μ), and truncated or bifurcated apically, others smaller and acicular, though arising from broad bases. Subatrium hemi-spherical, its distal portion lined internally with heavy, grouped spines.

**Head:** (fig. 135) Maximum width 1.28 mm; height (excluding labrum) 1.0 mm.; HW/HH 1.28. The face with a somewhat rectangular outline, 4 shallow depressions lying transversely between the parietal bands. **Parietal bands** moderately
short, yellow, weakly pigmented, 429\( \mu \) long, not extending beyond the lower level of the antennal orbits.

Antennal papillae unusually short, 21\( \mu \) long, 18\( \mu \) wide; only 0.15 x as long as the maximum diameter of the antennal orbits. Maximum diameter of antennal orbits 144\( \mu \). Setae of the vertex and temples moderately long; longest head seta 57\( \mu \); LS/OD 0.33. Clypeus with a shallow median impression and 6 setae, arranged in evenly-spaced rows of 3 on either side. Labrum (fig. 138, right side) 493\( \mu \) wide, 93\( \mu \) in median height, with 16-18 setae, and 14 large, pigmented sensory cones. Lateral lobes well separated medially, their outer apical angles very broadly rounded. Median lobe very sharply convex, the projecting aciculate spicules of the median epipharyngeal lobe visible from above. Apical margins of lateral lobes very markedly spinulose. Epipharynx (fig. 138, left side) with a very large median lobe. Scales with more than one point restricted to the sides, these mostly with 2 points, never more than 3. Sensillae ill-defined. Median lobe at the apex densely covered with long, aciculate spicules, very evenly arranged, which become finer, longer, and sharper towards the apex, and project well beyond it. Spicules scale-like elsewhere on the epipharynx.

Mandibles: with 2 apical teeth, 561\( \mu \) long, 416\( \mu \) in maximum width, ML/MW = 1.35, with a single seta.

Spinneret 187\( \mu \) wide; labial palp 50\( \mu \) long, 134\( \mu \) wide at base; maxillary palp 85\( \mu \) long, 51\( \mu \) wide at base, galeae 80\( \mu \) long, 38\( \mu \) wide at base.
Epipompilus insularis Kohl. Final instar larva.

Figs. 153-161, plate 9, A-H.)

Diagnosis: Head with setae of the vertex and temples unusually large - 0.9 x as long as the maximum diameter of the antennal orbit. Parietal bands well defined, moderately short. Antennal papilla long, 0.196 x as long as the maximum diameter of the antennal orbit. Labrum with 10-12 setae; 10 submarginal, pigmented sensory cones; the median lobe small. Epipharynx without sharply-aciculate spicules on its median lobe. Mandibles with 3 or 4 teeth, and lacking closely paired teeth at the apex. Labium ventrally, at the base of the palp, with a single seta. Body with very long setae - particularly on the thorax - and without spicules (other than those on the head). Spiracles round, without atrial or collar spines. Second thoracic segment with a rounded sulcate structure near the centre, dorsally. Larva always above the ground, in small concealed space, within a spider's silken diurnal retreat, without a sealing plug of mud, or evidence of any form of nest closure.

Note:

The absence of spinules on the body, very long setae, spiracles with a complete absence of spines apical to the subatrium, and mandibles with 3 or 4 teeth, and without paired apical teeth of approximately equal development readily distinguished this larva from all other New Zealand pompilids.

Description: This description is based on a final instar larva collected at Dean's Bush, Christchurch, on 14.4.1972. It was corroborated by a study of 26 final instar larvae and diapausing prepupae collected at Whangarei (23.11.1972),

Body: Length: 5.5 mm.; (fig. 155), lobes sharply-produced, supra-anal lobe well developed, protruberant.

Integument with setae, some long (e.g. 84 μ), others much smaller (e.g. 8 μ). Setae of different sizes occur together, fig. 160, showing a typical selection from a 1 mm. square section close to the prothoracic spiracle. Spicules absent. Mesothorax dorsally with an asymmetrical structure revealing under transmitted light a central sulcus, a lateral sulcus on either side, and 4 teeth (fig. 157, plate 9, C.D.).

Spiracles circular. Prothoracic spiracles (fig. 154) 60 μ in diameter, with more-or-less regularly anastomosing ridges. Atrium and collar without spines. Mesothoracic spiracle reduced, 40 μ in diameter, otherwise very similar to the prothoracic spiracle, and having similar anastomosing ridges.

Head: (fig. 153) height 902 μ; maximum width 825 μ, HW/HH 1.16. Parietal bands well defined, moderately short, 374 μ long. Antennal orbits 85 μ in diameter (inner ring 68 μ wide). Outer rim of antennal orbit round, the rim sharply raised above the surface of the front width. Antennal papilla (fig. 158 plate 9,B) long; length 20 μ, width (at midway 12 μ). Head setae unusually long, the longest 76 μ. LS/OD; 0.81. Clypeus with a deep, median longitudinal sulcus, widest and deepest basally, with a central transverse row of 6, evenly-spaced setae.

Labrum (fig. 156); 17.2 μ wide, 76 μ in median height, with 10 setae and 10 submarginal, pigmented sensory cones. Outer sides of labrum converging towards the centre at about 24°, so that the base is much wider than the apex.
Outer apical angle of lateral lobes sharply angulate. Apical margin concave. Median lobe very small, notably convex, the median labral sulcus small. Epipharynx (fig. 156) with grouped scales (each having 4-6 apical points) on most of the disc, and at the base. Median lobe at the apex with small, blunt spicules. Lateral lobes with 12 mesal sensillae, the paired apical ones close together on either side rising from round, basal plates. Mandibles (fig. 161 a, b, d) 319 μ long, 198 μ in maximum width, with one small seta. Only 1 "tooth" at the apex. Three to four subapical teeth. Apical 0.5 deeply pigmented, remainder creamy white. Maxillae (fig. 159) with long setae. Lacinal area with both compound and simple spinules. Palpi 44 μ long, terminating with a large sensory cone surrounded by 5-7 smaller cones. Galeae 44 μ long, much more narrow than the maxillary palp, terminating in two large sensory cones of equal size. Prementum of labrum broad; palpi squat - 8 μ long, 6 μ wide at base, spinneret 15 μ wide, usually with only 1 seta on either side.

There is usually only 1 seta on either side that would qualify as a "spinneret seta" as described by Evans 1959. However, distortion can bring the seta on the innermost side of the palp down into this position.

Variation: Most specimens had 12 labral setae. The total length of 27 final instar larvae ranged from 3.9 mm. to 11 mm., with a mean of 6.2 mm. All possessed the rounded dorsal structures on the mesothorax. Its shape was more-or-less constant.
Priocnemis (Chrysocurgus) nitida:
final instar larva (Botanic Gardens, Wellington, specimen).

114. Head, front view

115. Habitus sketch

116. Labium and maxilla, adoral aspect

117. Clypeus and labrum (latter partly retracted)

118. Epipharynx

119. Prothoracic spiracle. Inset: t.s. wall of subatrium, to show spines.

120 - 122. Features of prothoracic pleura, below the level of the spiracle.

120. Spicules

121. Seta

122. minute sensilla

123. Right mandible, ventral aspect
124 - 134: *Priocnemis* (Chrysocurgus) *fugax*:

final instar larva (Peel Forest specimen).

124. Head, front view

125. Labium and maxilla, adoral aspect

126. Habitus sketch

127. Clypeus and labrum

128. Epipharynx

129. Section of venter and left pleuron of second abdominal segment to show spicules, and transverse row of setae.

130. Spicules on prothoracic venter

131. a. Prothoracic spiracle

131.b. Reduced mesothoracic spiracle (all spiracles drawn to the same scale).

132. Fourth abdominal spiracle, to show absence of collar teeth and presence of subatrial teeth.

133. T.S. third abdominal spiracle, to show ridges lining interior of atrium.

134. Second abdominal spiracle, to show absence of collar teeth, and folded wall of exterior of subatrium.
135 - 143 *Priocnemis* (Trichocurgus) *conformis* (diligens)  
final instar larva (Piano Flat, Southland specimen.)

135. Head, front view

136. Labium and maxilla, adoral aspect

137. Habitus sketch

138. Clypeus, labrum, and epipharynx (the last on the left half of the diagram).

139. Spicules on prothoracic venter

140. Left prothoracic spiracle

141. Right prothoracic spiracle - to show collar spines.

142. Left mandible

143. Right antennal papilla
144 - 152: Priocnemis (Trichocurgus) carbonarius
final instar larva (Karori, Wellington, specimen)

144. Head, front view

145. Labium and maxilla, adoral aspect

146. Habitus sketch

147. Clypeus and labrum

148. Epipharynx

149. Spicules on prothoracic venter

150. Prothoracic spiracle

151. Right antennal papilla

152. Left mandible, ventral aspect
153 - 161. Epipompilus insularis: final instar larva (Brooke's Creek, Nelson, specimen)

153. Head, front view

154. Prothoracic spiracle

155. Habitus sketch

156. Clypeus, labium, and epipharynx (last on left side of diagram).

157. Dorsal structure of prothorax

158. Right antennal papilla

159. Labium and maxilla, adoral aspect

160. Setae from prothoracic pleuron

161a. Left mandible, ventral aspect

161b. Left mandible, dorsal aspect

161c. Left mandible, dorsal aspect, of another specimen to illustrate the usual condition.
Plate 6.

A. - H. Priocnemis (Trichocurgus) carbonarius
Final instar larva. (Karori, Wellington, specimen).

A. Setae on left gena, at about the level of the antennal papilla.

B. Right antennal papilla

C. Spinneret. (There are four setae below the labial palp.)

D. Head seta from right gena.

E. Labial palp

F. Labrum and apex of left mandible

G. Head, front view

H. Clypeus and labrum
Plate 7.

A. - H. Priocnemis (Chrysocurgus) nitida
   Early diapausing prepupa. (Paekakariki specimen).

A. Pleural fold, first abdominal segment.

B. Left galea and maxiallary palp.

C. Setae below labial palp.

D. Left antennal papilla. (This suffered damage while under observation and became detached not long after this electron micrograph was taken).

E. and F. Labrum. Note the large number of setae. (9 on the right lobe (F.))

G. Sensory cone from apex of left lobe of labrum (spherical bodies are probably bacteria)

H. Head, front view.
Plate 8.

A. - H. Priocnemis (Chrysocurgus) fugax
   Final instar larva (Peel Forest specimen)
A. Right labial palp
B. Labium. Note the concave spinneret.
C. Left labial palp. Note the row of 3 setae.
D. Left maxilla. (Lateral papilla is the maxillary palp, mesal one is the galea).
E. Apex of labrum
F. Labium and maxillae
G. Head
H. Clypeus and labrum
Plate 9.

A. - H. *Epipompilus insularis*

Early diapausing prepupa. (Brooke's Creek, Nelson).

A. Head setae, near vertex. (Note unusual length)

B. Left antennal papilla

C. Thorax, dorsal view. Note the "dorsal organ" on the second segment

D. Dorsal "organ", on dorsum of second thoracic segment.

E. Labium and maxillae

F. Right lobe of labrum

G. Clypeus and labrum

H. Head
DISCUSSION

Larval taxonomy:

Although the larvae of all species are not yet known, the examples I have examined fully support the classification based on adult characters, including the erection of two *Priocnemis* sub-genera.

In a pioneering paper on pompilid larvae, Evans (1959) describes a total of 24 final instar larvae, of which 8 are Pepsinae and the remainder Pompilinae. The only previous adequate descriptions of pompilid larvae are those of Grandi (1926, 1939) and Maneval (1936, 1939), which are discussed by Evans in the light of his own findings. Evans (ibid) tentatively suggests that the subfamilies Pompilinae and Pepsinae (which are not recognised in Europe) are distinguishable by the absence of body spicules in the former (present on the thorax and abdomen of Pepsinae) and by the longer head setae of Pompilinae. The limited New Zealand fauna fully supports these conclusions.

In the Sphecidae (Evans and Lin, 1958) and Apidae (Michener, 1953) there is a progressive reduction in the number of mandibular teeth from primitive species to advanced ones. Evans (1959) regards the mandibles of *Pepsis* larvae (Pompilidae) as being "as primitive as any" and concludes that the primitive condition was characterised by "rather elongate mandibles, with a weak ventral concavity, and the three teeth in nearly the same plane."

His drawing of the mandible of *P. thisbe* has certain similarities with that of *Epipompilus insularis*. With from 5 to 6 teeth, *Epipompilus* presumably has a very primitive mandible. It is interesting to notice that,
whereas the New Zealand Pepsine larvae have paired teeth at the apex of the mandible, the mandible of E.insularis terminates in a single tooth. It has a very weak ventral concavity.

In many other respects, the E.insularis larva is highly derived, and shows features consistent with its supra-terrestrial niche. Thus the spiracles completely lack spines in the atrium, the atrial collar, or the sub-atrium, and are round in outline. Those of primitive pompilid larvae are considered to be elliptical (Evans, 1959), while spines are present in larvae of primitive bees (Michener, 1953), Sphecidae (Evans and Lin, 1958), and Pompilidae (Evans, 1959).

The features of the spiracle, and the long body setae, long antennal papilla, fusiform shape, and prominent, thick supra-anal lobe resemble those of Auplopus and Dipogon. Evans (1959) comments on the similarities of those structures in Auplopus (Tribe: Auplopodini) and Dipogon (Tribe: Pepsini) and because both nest above ground in closed cells, considers that they are specialisations for such habitats and represent convergence.

The two larvae of the new sub-genus, Chrysocurgus (nitida and fugax), and those of the other new subgenus, Trichocurgus, form two readily distinguishable groups. (See table 37).

Thus both conformis (diligens) and carbonarius have (i) moderately long head setae, (ii) very rounded lateral lobes of the labrum, (iii) a convex apical margin to the median labral lobe, (iv) crowded, notably acicular spicules on the apical, mesal part of the epipharynx, (v) parietal bands that do not extend beyond the antennal orbits, (vi) median sulci on the clypeus, and (vii) spiracles of
much the same appearance, with rather-regularly-anastomosing ridges, which are not produced into pockets in a vertical plane. In almost all respects, the Trichocurgus larvae conform to Evans' (1959) descriptions and drawings of Priocnemis. The spiracular collar-spines of Priocnemis minorata - illustrated by Evans are very much larger than those of the New Zealand species. (Evans regards large collar-spines as a primitive trait.)

The Chrysocurgus group (nitida and fugax) is similarly distinctive - its species are very similar. This is the more surprising when the habitat difference is considered for nitida is subterranean, while fugax larvae live well above ground level in beetle pupal chambers plugged up with mud. In both, the spiracles are very similar in general organisation - the atrial ridges on the inside are irregular and the cells they form have vertical pockets. (i) The parietal bands are very long and extend beyond the antennal orbits. (ii) The shape of the labrum is very similar in both - the lateral lobes being sub-rectangular. (iii) and the apical margin of the median lobe subrectilinear, appearing very straight-edged. (iv) The sensilla on the epipharynx are similar in their arrangement and position, as are the epipharyngeal spicules. The spicules on the apical, median part of the epipharynx are short, and uncrowded. (v) The labium on the adoral surface bears a characteristic row of three setae, immediately basad to the palp. (vi) Perhaps the most striking similarity is the very short head setae common to both fugax and nitida. (vii) Many of these features were unexpected. For example Evans (1959) shows that completely unrelated genera which nest above ground, in cells sealed
with mud (like fugax) have numerous, long head setae (e.g. Auplopus Tribe Auplopodini, Dipogon, Tribe Pepsini) this feature contrasting markedly with fugax. Similarly, the plural lobes are well developed, and the larva of fusiform shape with protruberant lateral lobes. They resemble nitida and fugax, however, in the long parietal bands and long antennal papillae.

Fugax resembles genus Auplopus in having a transverse series of small setae on the thoracic and abdominal segments (described by Grandi (1926, 1939) for European species, and Evans (1959) for American forms.) Evans (ibid) considers the transverse setae diagnostic of Auplopodini - but in the light of convergences in a great many other characters, they have undoubtedly been acquired through convergent evolution in fugax. Like Auplopus, fugax has a transverse spinneret which is very concave medially.

Another characteristic of larvae adapted for life in closed cells above ground is an absence of spines in the spiracles (Evans, 1959), large spines in the atrium, atrial collar and subatrium being thought primitive in bees (Michener 1953), Sphecids (Evans, 1958), and Pompilidae (Evans, 1959). In fugax, I could not see any spines on the atrial ridges, and very minute ones in the collar region only in the prothoracic spiracles. In nitida, small blunt spines line the atrial ridges, and slightly larger ones line the atrial collar. Nevertheless, they are still extremely reduced as compared with Evans' (1959) drawing of Priocnemis minorata. Thus nitida's larger spiricular spines, and its absence of the transverse rows of small setae on body segments probably reflect its subterranean nesting.
Thus the reduced (and absent) spiracular spines, non-protruberant median labral lobe, long antennal papillae, and somewhat protruberant anal lobe, long parietal bands, and the transverse, segmental, rows of body setae are related to this group's way of life. My reasons for expecting some traces of them in nitida as well - despite its being a ground-nester - are explained in subsequent discussions on behaviour and affinities, where parallels are drawn between genus Dipogon and Tribe Auplopodini, and it is suggested that Chrysocurgus is consubgeneric with Sphictostethus, which evidently has somewhat similar nesting habits. Completely unexpected were the unusually-short head-setae - evidently this feature is not necessarily a concomitant of supra-terrestrial existence in closed nests, as Evans (1959) supposed.
Cocoons:

Pompilid cocoons vary according to habitat. Mud-using, supra-terrestrial nesters usually have very thin, pale buff, faintly translucent cocoons, while those that nest beneath the ground commonly construct thicker, rigid, rich brown, opaque ones.

Characteristics of the cocoons of 6 endemic species from diverse habitats are given in table 38, and illustrated on plate 10, A-D.

Cocoons of the following species were examined:
E. insularis, \( P. (C.) \) nitida, \( P. (C.) \) fugax, \( P. (T.) \) nitidiventris, \( P. (T.) \) carbondrius, \( P. (T.) \) ordishi.

Specimens were embedded in wax, sectioned on a Cambridge rocking microtome, and photographed in black and white with a Zeiss model II photomicroscope fitted with Nomarski differential interference contrast.

Comments:
Structure: E. insularis cocoons differ structurally from examined pepsine cocoons.

In E. insularis cocoons fibres in the outer layers are very loose, and are not fused in any way. Fibres in the pepsine cocoons are all fused to some extent, both in fugax cocoons and those of the ground nesting species. There is a matrix between some fibres in pepsine cocoons as well.

The structure of the cocoons of \( P. (C.) \) fugax and \( P. (C.) \) nitida are very similar, notwithstanding the extreme thinness of the former.

All cocoons possess a tightly consolidated inner wall.

Colour:

\( P. (T.) \) nitidiventris cocoons from sand are lighter than those of species nesting in heavier soil. The latter
TABLE 38
Characteristics of the cocoons of six pompilid species

<table>
<thead>
<tr>
<th>Species</th>
<th>niche</th>
<th>shape</th>
<th>colour</th>
<th>number examined</th>
<th>Length range</th>
<th>$\bar{x}$</th>
<th>Average thickness of wall</th>
<th>Thickness of wall &amp; cocoon</th>
<th>中枢</th>
</tr>
</thead>
<tbody>
<tr>
<td>P. (C.) nitida</td>
<td>subterranean</td>
<td>sub-pyriform, truncate at the narrow end rigid opaque</td>
<td>burnt sienna to raw umber</td>
<td>48</td>
<td>16-28mm</td>
<td>18.6mm</td>
<td>.06mm</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>P. (C.) fugax</td>
<td>above ground in abandoned insect galleries in wood.</td>
<td>sub-pyriform, truncate at the narrow end non-rigid, faintly translucent</td>
<td>pale cartridge buff</td>
<td>33</td>
<td>9-19mm</td>
<td>13mm</td>
<td>.01mm</td>
<td>.002</td>
<td></td>
</tr>
<tr>
<td>P. (T.) nitidiventris</td>
<td>subterranean, in sand</td>
<td>sub-pyriform rigid opaque</td>
<td>light ochraceous tawny</td>
<td>5</td>
<td>6.5-9.2mm</td>
<td>8.6mm</td>
<td>.059mm</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>P. (T.) ordishi</td>
<td>subterranean, in heavy soil</td>
<td>sub-pyriform opaque, rigid</td>
<td>cinnamon-brown</td>
<td>4</td>
<td>8-10mm</td>
<td>9mm</td>
<td>.06mm</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>P. (T.) carbonarius</td>
<td>subterranean, in heavy soil</td>
<td>sub-pyriform opaque, rigid</td>
<td>cinnamon-brown</td>
<td>3</td>
<td>7-9.5mm</td>
<td>8.5mm</td>
<td>.059mm</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>E. insularis</td>
<td>above ground, in spiders' diurnal retreats</td>
<td>Pyriform, often rounded at either end, sometimes truncate at the meconial end.</td>
<td>pale cartridge buff to very light buff</td>
<td>43</td>
<td>6-12mm</td>
<td>8.7mm</td>
<td>.12mm</td>
<td>.056</td>
<td></td>
</tr>
</tbody>
</table>
are often of a terracotta colour, varying from tawny to cinnamon brown.

Supra-terrestrial cocoons are all very pallid, parchment-coloured.

This habitat — difference in colouration of pompilid cocoons is well-known (e.g. Williams, 1919, Evans, 1966, 1973, Richards and Hamm, 1939).

Width of Walls of cocoon:

The walls of _fugax_ cocoons are very thin, the prepupa frequently being faintly-visible. Walls of all subterranean cocoons are much thicker and opaque — including those of the related _P._ (C.) _nitida_. Auplopodini cocoons are said by Evans (1966, America) Evans and Matthews (1973 – Australia), Williams (1919 Philippines), and Richards and Hamm (1939, Europe) to be very thin, and pale buff-coloured. Evans (1973) states that those of the Australian _Fabriogenia canberra_ and _F. dilga_ are so thin the pupa is faintly visible within. The fact that _nitida_ cocoons, while showing a structural similarity, are comparable in all respects to the characteristic subterranean cocoons of Pompilidae suggest that those of _fugax_ merely reflect convergent evolution towards the Auplopodini in making mud-sealed nests above ground level.

The cocoons of _E. insularis_ resemble those of typical supra-terrestrial nesting species in colour. There the resemblance ends. The cocoons are exceptionally thick walled, the outer layers consisting of very loosely-spun threads. Because _E. insularis_ oviposits on spiders in situ, without making nests, or sealing its egg, it is possible that the trapped air within the cocoon's outer layers insulates the prepupa from extremes of temperature (and humidity) during its winter diapause. This would not be so necessary in those species that seal their nests.
Photographs taken with Nomaski interference.
The black and white photography has lessened the clarity of the interference colours produced.)
Plate 10.

A. - E. Cocoons of some New Zealand Pompilids

A. Left to right: P.(T.) nitidiventris; P.(T.) Carbonarius; P.(C.) nitida; P.(C.) fugax; Epipompilus insularis. Note that the diaphanous fugax cocoon and thick E.insularis cocoon, are both buff coloured - as is typical of species that nest above ground level, while the cocoons of the ground-nesting species are a terracotta brown.

B. T.S. Epipompilus insularis cocoon.

C. T.S. P.(C.) nitida cocoon

D. T.S. P.(C.) fugax cocoon

E. Scale for B, C, and D. a gradation=0.01mm. Note that the fugax cocoon is extremely thin - typical of supra-terrestrial, mud-daubing pompilids. The E.insularis cocoon is surprisingly thick, and is constructed differently from the cocoons of the other New Zealand species. Note how the fibres criss-cross one another.

F. T.S. E.insularis cocoon

G. T.S. P.(C.) nitida cocoon

H. T.S. P.(C.) fugax cocoon

I. Scale for F. G., and H. 1 gradation = 0.01 mm.