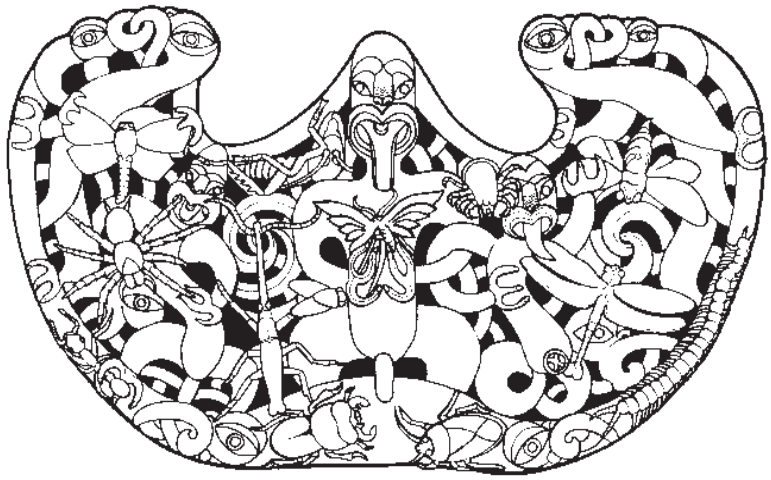

Fauna of New Zealand

Ko te Aitanga Pepeke o Aotearoa

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Fanniidae
(Insecta: Diptera)

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Front cover: *Fannia triregum* new species, male, Three Kings Islands, Great Island, Castaway Camp (Photographer: Katherine Child).

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POPULAR SUMMARY **HE WHAKARĀPOPOTOTANGA**

Class **Insecta**
Order **Diptera**
Family **Fanniidae**

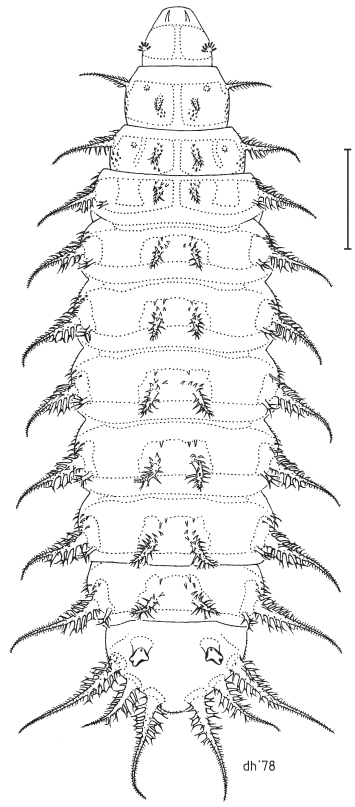


Illustration / Whakaahua: Larva of *Fannia mercurialis* new species (Illustrator / Kaiwhakaahua: Des W. Helmore).

Fanniid flies

Fanniids are a small family of flies that are known mainly because many of the species are associated with humans and are of medical and forensic importance. Most of the species of Fanniidae have been described from the Holarctic region, but recently many new species have been described from the Neotropical region. The Fanniidae are inhabitants of forested areas, and are relatively rare in open landscapes. Males of almost all species form swarms in shaded areas and females may be attracted to decaying organic matter and excrement. Fanniidae can be most readily distinguished from other calyptrate flies found in New Zealand by the shape of the subcostal vein, which runs straight in its apical half, without any sinuous bend.

Contributor **M. Cecilia Domínguez** was born in British Columbia, Canada. She has been living in Argentina since 1985, where she studied biology and later completed a Doctorate at the Universidad Nacional de Córdoba on the taxonomy, systematics, and biogeography of the southern South American species of the genus *Fannia* (Fanniidae). While completing her thesis she spent nine months at the Oxford University Museum of Natural History, in Oxford, U.K. This allowed her to complete a cladistic and biogeographic analysis of the Fanniidae, which included representatives of this family from other regions of the world including the as yet undescribed species from New Zealand. From 2006 to 2008, Domínguez worked as a postdoctoral associate at IADIZA (Instituto Argentino de Investigaciones de Zonas Áridas), CCT (Centro Científico Tecnológico) Mendoza, in Mendoza Argentina, where she began with the taxonomic revision of other genera within

(continued overleaf)

Ngā ngaro Fanniid

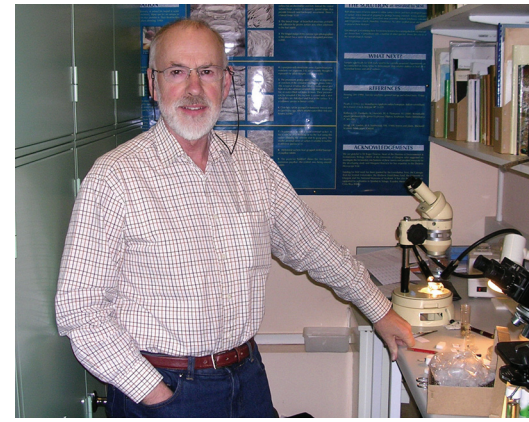
Ko ngā Fanniid he wehenga iti nō te whānau ngaro, e tino mōhiotia ana nā te mea nō mua iho e piri ana ēnei ngaro ki te tangata i tēnei ao, nā reira ka āta tirohia i ētahi wā ā rātou mahi e te ao tākuta me ao whakawā hara. Ko te nuinga o ngā momo Fanniidae kua oti te whakaahua e ngā kaipūtaiao i takea mai i te rohe Holarctic, engari tērā ētahi momo hou maha kua whakaahuatia i takea mai i te rohe Neotropical. Noho ai ngā Fanniidae i ngā takiwā ngahere o te ao, ā, me uaua ka kitea i ngā pākihi me ngā pārae. Karamuimui ai te mea toa i ngā wāhi taumarumaru, ā, ka kumea mai te uha e te munamuna parahanga, tūtae hoki. Ka taea ngā Fanniidae te tautohu kia tū kē i ētahi atu ngaro calyptrate i Aotearoa nā te āhua o te iaia subcostal, e rere tōtika nei i tōna haurua whakarunga, kāore he kokinga o taua iaia.

Translation by **Piripi Walker**
Whakatiki

Fanniidae. Currently she is working as a researcher for the CONICET (National Council for Scientific and Technological Research) of Argentina. Her main interests are the systematics and biogeography of Fanniidae, biogeographic studies of Earth history and of other groups of insects (especially from Patagonia or southern South America) as well as the role of the Fanniidae in forensic entomology.

Contributor **Adrian C. Pont** was born in the U.K., where he has lived all his life. He began collecting and studying flies of the family Muscidae (which at the time also included the Fanniidae) as a teenager. After graduating in Modern Languages at the University of Oxford, he was able to convert an obsession into a profession by joining the staff of the then British Museum (Natural History) in London where he worked on the Diptera section for 25 years, rising to become head of section and a Principal Scientific Officer. In 1988 he resigned from the Museum and since then has been working as an independent dipterist. For the past 25 years he has been an Honorary Associate Curator at the Oxford University Museum of Natural History, and in 1994 obtained the degree of Doctor of Science from Oxford University on the basis of his published work. He is also a Scientific Associate of the Natural History Museum, London, and an Associate in Research of the B.P. Bishop Museum, Honolulu, Hawai'i, U.S.A. He has authored or co-authored over 270 papers and books on Fanniidae, Muscidae, Sepsidae, and historical aspects of dipterology. Although now formally retired, he remains active as a taxonomist and has no plans to give up work.

Cecilia Domínguez



Adrian Pont

ABSTRACT

The New Zealand species of the family Fanniidae are revised, and eleven valid species are recognized for this region: three adventive species (*Euryomma peregrinum* (Meigen), *Fannia albitarsis* Stein, *Fannia canicularis* (Linnaeus)), seven new species of the genus *Fannia* (*Fannia anthracinalis* n. sp., *Fannia hollowayae* n. sp., *Fannia laqueorum* n. sp., *Fannia magnicornis* n. sp., *Fannia mangerensis* n. sp., *Fannia mercurialis* n. sp., *Fannia triregum* n. sp.), and a monotypic new genus with the new species (*Zealandofannia mystacina* n. gen. and n. sp.). All new taxa are endemic to New Zealand and its surrounding islands. Descriptions and terminalia illustrations are provided for both sexes of all the species, where known. Keys for the New Zealand genera and species of adults and inmature stages of Fanniidae are given, and their geographic distribution is illustrated on maps.

Keywords: Diptera, Fanniidae, taxonomy, new genus, new species, key

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CHECKLIST OF TAXA

CONTENTS

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We are grateful to Trevor Crosby for his assistance and advice with the preparation of the distribution maps, and Zhi-Qiang Zhang for expediting the processing of the manuscript. We also acknowledge the detailed and substantial reviews of three anonymous referees which have led to considerable improvements to our script. Finally, we thank Katherine Child (Oxford University Museum of Natural History, U.K.) for her excellent colour photographs of these small and often rather drab flies.

INTRODUCTION

The Fanniidae Schnabl, 1911 (1888) is a small family of the Muscoidea (Diptera) with over 360 described species. Fanniids are found predominantly in temperate zones, with the majority of the species occurring in the Holarctic, although there is a considerable Neotropical element (Carvalho *et al.* 2003; Domínguez 2007; Grisales *et al.* 2012; Grisales *et al.* 2012a, b). However, the family has a worldwide distribution (Rozkošný *et al*. 1997).

The medical and hygienic importance of the widely distributed species of *Fannia* Robineau-Desvoidy, such as *Fannia canicularis* (Linnaeus), *Fannia femoralis* (Stein)*, Fannia incisurata* (Zetterstedt)*, Fannia pusio* (Wiedemann), and *Fannia scalaris* (Fabricius), is well known. *Fannia canicularis* and *F. scalaris* have been reared from a variety of decaying organic materials. Moreover, the larvae of *F. scalaris* are frequent in cesspools, latrines, and dunghills, having also been reared together with *F. canicularis* from human faeces. Some of the most abundant species occur regularly in agricultural pens used for breeding pigs, cattle, horses, and poultry, and in fur farms, where the larvae apparently develop in animal droppings and dung (Rozkošný *et al*. 1997).

The Fanniidae are basically inhabitants of forests, and are relatively rare in open landscapes and wetlands (Rozkošný *et al*. 1997). For example, species of the *Fannia anthracina* (Walker) species-group show distributions linked to the *Notophagus* forests endemic to Argentinian and Chilean Patagonia (Pont & Carvalho 1994; Domínguez 2007). However, the Neotropical *Fannia fusconotata* (Rondani) and *Fannia heydenii* (Wiedemann) have been found in open arid shrublands and open woodlands of *Prosopis* (Domínguez 2007), whilst in the Palaearctic region the widespread *Fannia postica* (Stein) is one of very few species to be found regularly above the tree-line in montane meadows (Pont 2009).

Males of almost all species form swarms under the branches of trees and along forest paths, with individuals following defined horizontal trajectories and frequently sparring with other individuals (Rozkošný *et al.* 1997). The exact significance of this energetic activity is not clear. Females are to be found in the ground vegetation and may be attracted to decaying organic matter and excrement, but a few so-called secretophagous species attack cattle in pastures as well as perspiring people in summer (Chillcott 1961).

Seven endemic species of Fanniidae have been described from Australia, including Norfolk and Lord Howe islands (Pont 1977a). Miller (1950) listed 4 species of *Fannia* from New Zealand, but Pont (1977a) found that 3 of these belong to the genus *Spilogona*

Schnabl (Muscidae). Pont (1977a) recorded 2 almost cosmopolitan species, *F. canicularis* (Linnaeus) and *Euryomma peregrinum* (Meigen), as being the only fanniids occurring in New Zealand, and later (Pont 1989) also listed *Fannia albitarsis* Stein, based on Holloway's (1985) work on the larvae. The most recent list (Macfarlane *et al.* 2010) included these three together with *F. scalaris* (Fabricius) with a question mark and several species known only as larvae. We have not seen any specimens of *F. scalaris* from New Zealand, and know of no published records of this species from New Zealand.

Holloway (1985) described the larvae of 9 species of Fanniidae occurring in New Zealand, 5 of them endemic. The others were *F. canicularis*, originally from Europe and now almost cosmopolitan; the pantropical *E. peregrinum*; *F. albitarsis*, a widespread South American species introduced into a number of Old World southern hemisphere localities; and a second, apparently undescribed, South American species (according to Holloway 1985). At the time, Holloway was working only with the larvae and puparia, and the associated adults were sent for study to A. C. Pont in the 1980s. These adults, together with subsequently collected material and comparison of the localities where adults and larvae were collected, have enabled us to identify Holloway's species as follows:

sp. 1 *Zealandofannia mystacina* Domínguez & Pont, new genus, new species

sp. 2 Unidentified, and no adults associated with this larva found in our material

sp. 3 *Fannia mercurialis* Domínguez & Pont, new species

sp. 4 *Fannia hollowayae* Domínguez & Pont, new species

sp. 5 *Fannia anthracinalis* Domínguez & Pont, new species

sp. 6 *Fannia laqueorum* Domínguez & Pont, new species

Holloway's sp. 2 was known only from Tarahiki Island (Shag Rock), off Waiheke Island (AK) from the lining of burrows of the grey-faced petrel (*Pterodroma macroptera gouldi* (Hutton)). We have not seen adults either from this locality or reared from the nest of this bird, but Holloway (1985: 252) also recorded her *Fannia* sp. 3 (our *Fannia mercurialis* n. sp.) from Tarahiki Island.

In the northern hemisphere, mushrooms and related basydiomycetous fungi together with the nests and burrows of birds, mammals, and insects, provide the most common larval habitats (Chillcott 1961; Rozkošný *et al*. 1997), but the principal food resource for the larvae of the endemic New Zealand species is the dung or carrion of indigenous seabirds and mammals (seals and bats) (Holloway 1985).

The results of a cladistic analysis of the family Fanniidae carried out by Domínguez & Roig-Juñent (2008) showed that the sister-groups of New Zealand and Australian species of *Fannia* were to be found among the southern South American species of *Fannia*. The new genus described here has a basal position in the family and appears to be the sister-group of the genus *Fannia*, preceded by the remaining genera of Fanniidae (Domínguez & Roig-Juñent 2008).

The purpose of the present study is to revise the New Zealand species of the family Fanniidae; to provide a key to the genera and species, both as adults and as larvae/puparia, together with descriptions and illustrations; and to provide distribution records.

PHYLOGENY AND BIOGEOGRAPHY

Chillcott (1961) and Hennig (1965) proposed the centre of origin of the family to be in the Holarctic Region, where the largest number of Fanniidae species occurs. Their hypothesis agrees with the "holarcticist theory" which was accepted as a paradigm during the resurgence of Darwinism. Darlington (1965) defended this theory to explain the origin of the austral faunas, proposing that the centre of origin of many austral taxa had been in the large Holarctic landmasses. He postulated that, through dispersal, the most evolved Holarctic groups could have independently invaded the Austral regions.

The biogeographic proposals for the family Fanniidae made by Chillcott (1961) and Hennig (1965) were mostly based on dispersal, with an emphasis on the biogeographic history of the Holarctic species and Chillcott's classification of the family. The more recent phylogenetic hypothesis for the family Fanniidae (Domínguez & Roig-Juñent 2008) incorporated newly described or poorly known species of the family from Africa, the Neotropics, Patagonia, Australia, and New Zealand, showing that, as Hennig (1965) suggested, the Neotropical and Patagonian species of Fanniidae do not form a monophyletic unit. But contrary to Hennig's (1965) hypothesis, they appear to be more closely related to species of other austral regions of the world than to the Holarctic species of the family. This could indicate a more complex biogeographic history than the one proposed by Chillcott (1961) and Hennig (1965), and where vicariance should be taken into consideration.

Domínguez & Roig-Juñent (2011) presented a hypothesis of the biogeographic history of the family Fan-

niidae that attempted to explain the distribution patterns of the family and especially those of the Neotropical, African, Australian, and New Zealand species of Fanniidae which had not been included in Chillcott's (1961) and Hennig's (1965) earlier hypotheses because many of them were described after these studies. The authors performed a dispersal-vicariance analysis (DIVA) (Ronquist 1996; 1997) on the phylogenetic hypothesis of the family Fanniidae proposed by Domínguez & Roig-Juñent (2008). This cladistic analysis was based on morphological characters and included 78 species representing the four genera of Fanniidae and all the species-groups within the genus *Fannia*, except for the *admirabilis*-group proposed by Albuquerque *et al*. (1981) and the *setifer*-subgroup proposed by Chillcott (1961). Domínguez & Roig-Juñent (2008) also included six of the species from New Zealand that are described herein. The species *Fannia* sp. 1 in Domínguez & Roig (2008), which is recognised here as *Zealandofannia mystacina* new genus, new species, appeared as the sister taxon of the genus *Fannia*, preceded by the remaining genera of the family, providing support for its recognition as a new genus for the family (Fig. 1). The remaining species from New Zealand appeared in a clade containing Neotropical, Patagonian, and Australian species of *Fannia* and were referred to in this biogeographic analysis as the Gondwanic clade (Fig. 2). Althought recent literature on Diptera evolution supports the hypothesis that Schizophora radiation occurred during the Coenozoic, another example of higher Diptera that could be placed within this time frame is the genus *Coenosopsia* Malloch (Anthomyiidae). In a taxonomic, cladistic, and biogeographic analysis of this genus, Nihei & Carvalho (2004) considered that a Gondwanan origin could be a competing hypothesis, along with the north to south dispersal proposed by Michelsen (1991), to explain the origin of the family Anthomyiidae. Nevertheless, in a re-analysis of Dominguez & Roig's (2011) data, Löwenberg *et al*. (2012) suggested that the Fanniidae originated in the Palaeogene and that they were affected by a few events of vicariance and several expansions during the Coenozoic. Recent molecular work has assigned the explosive radiation of the Diptera Schizophora to the early Palaeogene (Wiegmann *et al.* 2011), and has also confirmed the monophyly of the Fanniidae (Kutty *et al.* 2008) and recognised the family as sister taxon to the remaining Calyptratae (excluding Hippoboscoidea) (Kutty *et al.* 2010).

MORPHOLOGY

ADULTS

Head. The head is semicircular and concave posteriorly in males, ovoid and convex in females. Males holoptic (Fig. 3, 4); females of the genus *Fannia*, both sexes of the species of *Euryomma*, *Australofannia* Pont, *Zealandofannia* new genus, some *Piezura* Rondani, and two of the newly described species of *Fannia* from New Zealand have the head dichoptic with the eyes well separated (Fig. 5). The eyes are mostly bare, but are sparsely to densely setulose in a few species.

On the **frons**, the eyes are bordered by a relatively narrow or broad **fronto-orbital plate** (Fig. 3). The fronto-orbital plate and the frontal vitta (interfrontalia) occupy the central line of the head, between the ocellar triangle and the lunula. In males of the genus *Fannia,* this area is generally narrow to very narrow, so that the eyes appear almost to touch for part of their length (Fig. 3). Usually the female fronto-orbital plates have a convex inner median margin, which is an autapomorphic character of the family (Hennig 1965; McAlpine 1989) (Fig. 5). The fronto-orbital plates in males and females have a row of frontal setae that vary in number, length, and strength (Fig. 3, 5). Females of the genus *Fannia*, and both sexes of *Australofannia*, *Zealandofannnia*, *Euryomma*, and some *Piezura* have 1 upper reclinate and 1 lower exclinate orbital setae (autapomorphy), as well as a variable number of rows of setulae along the whole length of the fronto-orbital plates (Fig. 5). Males of the *canicularis*-group of the genus *Fannia* and some species of *Piezura* have the upper (reclinate) orbital seta strongly developed.

The **ocellar triangle** on the vertex is very distinct and all three ocelli are developed. On either side of the ocellar triangle are the outer and inner vertical setae, best developed in females, followed by a row of post-ocular setulae which is generally simple (Fig. 4), but can be double or irregular in arrangement.

The **face** is the part of the head, below the antenna. It is separated from the eye margins by a parafacial (Fig. 3). The parafacial is generally bare, but it may have rows of setulae (as in females of the groups of *canicularis*) or rarely a row of setae. The mouth margin is produced anteriorly only in the *Fannia mollissima*-subgroup (Chillcott 1961; Pont 1965; Wang *et al.* 2008). At the side of the lower part of the face, a pair of strong and usually crossed setae is present at the vibrissal angle. The gena is generally narrow, with the width below lowest eye-margin less than twice the width of postpedicel, but it may be broad as in the species from New Zealand that

have a broad frontal vitta. The **antenna** consists of two short basal segments (scape and pedicel) and a third longer segment, the postpedicel which is almost always shorter than the face (Fig. 4, 5). The antenna may vary in colour from black or brown to yellow. The postpedicel bears an arista in the usual dorsal position. The arista is bare or short-pubescent, but may be plumose, as in the genus *Piezura*, or sub-plumose, as in *Australofannia* and the South American *Fannia admirabilis*-group (Chillcott 1961; Pont 1977a; Albuquerque *et al.* 1981).

The **mouthparts** consist of a sucking type of proboscis (Fig. 4). The short tubular part of the proboscis is formed from the sclerotised labium. The prementum may be conspicuously shining or dusted on the ventral side. The apical part of the proboscis terminates in two labella. The maxillary palpi are usually well developed but may be strongly reduced in size, and may be filiform to expanded and spatulate in shape. They vary in colour from dark brown to yellow, and in the New Zealand species there is a slight variation in shape from slender to weakly spatulate.

Thorax. The thorax is as in most calyptrate Diptera.

The **postpronotum** is well developed and is closely associated with the mesonotum (scutum); its posterolateral margins form the postpronotal lobes (Fig. 6). This lobe in Fanniidae has three setae (two strong and one weaker) and a variable number of setulae.

Laterally the **propleuron** is divided into an anterior portion, the **proepisternum**, and a smaller posterior portion, the **proepimeron** (Fig. 6). These two sclerites form an arch over the anterior coxa, being placed below the anterior spiracle. The proepisternum has 2 setae and the proepimeron 1 seta, each with a variable number of setulae.

The **scutum** is provided with a variable number of longitudinal rows of acrostichal setulae (Fig. 7). The number of rows is usually constant in the different species groups. Five pairs of dorsocentral setae (Fig. 7), two in front and three behind the transverse suture (Fig. 6), apparently belong to the ground-plan of the family. Only *Fannia abnormis* (Stein) lacks the presutural dorsocentral setae (Stein 1911), and in *Euryomma* and *Zealandofannia* the anterior presutural dorsocentral is reduced. Lateral to the dorsocentral rows are the intraalar setae (Fig. 7), of which there are usually one presutural and two postsutural pairs, but there is only one postsutural pair in *Zealandofanni*a. The postalar and supraalar (presutural and postsutural) setae are usually distinct (Fig. 7).

Behind the lateral margin of the transverse suture and in the anteromedial region of the notal alar process is the **prealar area** (Fig. 7). Here are the prealar setulae, which are of great toxonomic importance. The name 'prealar' was introduced by Stein (1898: 164) to designate the first and second supraalar setae/setulae immediately behind the suture. In Fanniidae the setulae may be absent or reduced or duplicated. Their position may also vary, as they may be closer to the supraalar seta or to the suture.

The **scutellum** (Fig. 6), placed posterior to the scutum, bears two pairs of strong and one to two pairs of fine marginal setae, a pair of discals before the tip, and a few to several additional discal setulae. The lateral margins below the strong setae and the ventral surface are bare.

The **mesopleuron** is divided by the pleural suture into an anterior episternum and a posterior epimeron. The **episternum** is transversely divided by a suture into a superior area, the anepisternum, and an inferior area, the katepisternum (Fig. 6). Anepisternal setulae cover the greater part of the anepisternum, and usually form a row of setae along its posterior margin. The katepisternum usually has two strong setae in addition to some fine setulae, but there is a second (lower) posterior seta in *Zealandofannia*. Similarly, the **epimeron** is transversely divided into an anepimeron and a katepimeron, which are always bare in Fanniidae (Fig. 6). Below them is the **meron**, which is also bare in Fanniidae (Fig. 6).

The **wing** has a conspicuously uniform venation in virtually all species. The shape of the subcosta and of the first and second anal wing veins are apomorphies of the family (Fig. 8). The **subcosta** runs straight in its apical half, without any sinuous bend. The **first anal vein** is remarkably shortened, and the **second anal vein** is fine and bow-shaped. In *Euryomma* the second anal vein is longer, but its imaginary extension would still intercept an imaginary extension of the first anal vein before the wing margin. The wings may vary in colour, from translucent to heavily smoky. The membrane is always completely covered with tiny microtrichia. The **calypters** are mostly of the same size, so that the outer margin of the lower one is clearly visible. However, the lower calypter may vary in its shape, from rounded as in *Euryomma* and the *Fannia canicularis*-group, to slightly oval as in the majority of the species of *Fannia*; or it may be very narrow and almost strip–like, as in *Australofannia* and the *Fannia serena*-group, or elongated and tongue-like, as in *Fannia australis* Malloch. The calypters are generally white, but may be brown on the outer margin. The **halteres** (Fig. 6) are mostly yellowish-white, but are brownish to blackish in males of some groups.

The **legs** provide a series of valuable diagnostic characters, with some striking structural modifications in males as well as variable arrangements of setae and hairs.

Fore leg. The **fore femur** may be slender or swollen, generally bare on the anterior surface and with a vari-

able number of rows of setae on posterodorsal, posterior, and posteroventral surfaces. The **fore tibia** has a preapical posterodorsal seta, and apical setae on ventral and posteroventral surfaces; and some species have a short seta or a row of short setae on the anterodorsal surface; a few males have a submedian posterior seta, or fine setae on the posteroventral surface. The **fore tarsomeres** are usually dark and normal in shape, but can be strikingly modified in shape and colour in a few males, as in the *Fannia anthracina*-group where they are flattened and expanded and partially to totally whitish-yellow (Fig. 9, 10); in males of a few species they are ornamented with fine hairs.

Mid leg. The **mid femur** in males does not show great variation in shape although it may be slightly curved or indented in the apical part. Distinct rows of anteroventral and posteroventral setae are usually present, and may be thickened and/or duplicated in males; sometimes a preapical comb of setulae is formed. In males, the swelling of the **mid tibia** in its apical portion (except in the *Fannia canicularis*-group) and the pubescence on the ventral surface are apomorphies for the family (Chillcott 1961; Hennig 1965; McAlpine 1989). The male mid tibia can also be indented twice in its basal half, as in the *Fannia anthracina*-group. The disposition of the setae is rather uniform, but the anterior, anterodorsal and posterodorsal setae may be doubled or tripled in some species; the females of some species have anteroventral and posteroventral setae. On the **mid tarsomeres** the basal tarsomere may be armed in some males with a ventral hook-like or rod-shaped spine or a group of short and dense setulae forming a crest at its base (Fig. 11).

Hind leg. The **hind coxa** is bare or bears 1–3 short setae on its posterior inner margin (Fig. 12). The **hind femur** may vary in shape from slender to swollen, and it may have a preapical ventral swelling (Fig. 9, 13, 14). Rows of anteroventral and posteroventral setae in the males may be developed or reduced to a varying extent, or they can be completely absent. The **hind tibia** does not show variation in shape in New Zealand species. The hind tibia has a submedian seta on the true dorsal surface, in line with the apical dorsal seta, which is an apomorphy for the family (Fig. 15). There are varying numbers of anterodorsal, anteroventral, and sometimes also posteroventral setae and setulae; some setae are occasionally elongated and hair-like or are grouped in various ways in the males (Fig. 14).

Abdomen. The abdomen is mostly uniform in structure except for the terminal segments (Fig. 16). In dorsal view the five main segments are visible (Fig. 16). In the males it is broadest at the level of segment 2, but at the level of segment 4 in the *Fannia mollissima*-subgroup. A more or less distinct pattern is usually present on the dusted dorsal surface of the male abdomen, in the form of a dark middle line or of dark triangular markings on each tergite, rarely of symmetrical lateral patches; the female abdomen is usually uniformly dark, with some exceptions. **Sternite 1** is broad and densely setulose, especially in males. **Sternite 5** (Fig. 17) differs from the preceding sternites, and is usually broadened and with stronger setae along the posterior margin, but often with other species-specific modifications.

The **male terminalia** includes the postabdominal segments and the hypopygium. The cerci are fused into a median **cercal plate** which is extremely variable and is frequently species-specific in shape (Fig. 18). The **epandrium** is hemispherical in form and has a pair of surstyli on its posteroapical margin (Fig. 18). The **surstyli** are frequently species-specific in shape and may be stout, slender, bent, bifid, etc., but they are rather uniform in the *Fannia canicularis*-group. The slender, sabre-shaped, or spirally-coiled paired bacilliform sclerites usually originate on the inner basal part of the cercal plate (Fig. 18, 19). The **hypandrium** is semicircular, connected with the aedeagal base by means of a sclerotised bridge (Fig. 19, 20). The pregonite (gonopod) is absent in the family, and the narrow postgonite (paramere) is closely attached to the phallus. The **phallus** itself is mostly membraneous, more sclerotised in some species (*Piezura, Euryomma*, and some species of *Fannia*).

The **female terminalia** (Fig. 21, 22, 23) is in the form of an elongate and telescopic **oviscapt**, without specialised structures; only in *Australofannia* and *Fannia capitalis* Pont (Australia) is the oviscapt remarkably shortened. It consists of the 6th to 9th abdominal segments, sheathed within the 5th segment (Fig. 21, 22). The tergites and sternites are sclerotised to a variable extent. The cerci and the two anal plates (the dorsal **epiproct** and the ventral **hypoproct**) are mostly simple, covered with fine setulae; the hypoproct has a pair of short lingulae in each anterior corner. Some distinguishing characters are to be found in the position of the two pairs of postabdominal **spiracles** (Fig. 21), and in the number and shape of the **spermathecae** which may be two or three, spherical, pear-shaped or elongated in form, with a smooth or sculptured surface (Fig. 23).

LARVAE

Larvae of fanniid flies are the most easily recognised maggots of any family of the so-called higher Diptera (Roback 1951). All three instars, and therefore the puparia too, have conspicuous feathery, forked, tufted, or button-like processes distributed in 4 or 6 longitudinal rows over most of the dorsal surface of the body, and the posterior spiracles are on a pair of stalks that

are always widely separated. As well as being diagnostic at the family level, the larval morphology is distinctive for each species. Indeed, for the non-specialist, fanniid species are easier to identify as third instar larvae or puparia than as adults.

The **body** is somewhat dorsoventrally flattened, cream or brown, and ranges in length from 0.9 mm in first instar larvae to 10 mm in third instar larvae. The **head** is very small and is usually concealed inside the thorax in preserved specimens. Holloway (1985) did not study this character, which is not an important diagnostic feature, and nor did we. The 3 thoracic and 8 abdominal segments bear conspicuous integumental outgrowths referred to as paired segmental processes.

Paired segmental processes (Fig. 24–41**,** 43–60). Consisting of either a stalk bearing lateral projections or a cluster of very short projections, the processes are continuous with the integumental surface and contain soft tissue (Fig. 34, 39). They are not fully extended in first and early second and third instar larvae (Fig. 40). In older second and third instar larvae they open out and remain flexible (Fig. 41). At pupariation they harden and usually darken. The terminology applied to the processes largely follows Lyneborg (1970).

In most species the dorsal surface of all but the first thoracic and last abdominal segments bears 3 pairs of processes (Fig. 24): the **laterodorsals** on the lateral margin; the **dorsomedians** on either side of the midline; and the **dorsolaterals** which are between the other 2 series but are usually close to the laterodorsals. There are 3 similar but less conspicuous series on the ventral surface (Fig. 25): the lateroventrals on the lateral margin; the ventrolaterals which are mesad to the lateroventrals; and the ventromedians which consist of 1 or 2 pairs of very small processes on either side of the midline. The ventromedians may be arranged in a transverse row near the posterior margin of each segment or be grouped as an anterior pair and a posterior pair.

The **first thoracic segment** (Fig. 24) has a pair of simple, forwardly directed anterior processes dorsally, close to the anterior margin. Each anterior process has a conspicuous, elongate sensillum embedded in its dorsal wall. There are 1 or 2 minute, lateral processes near the base of the anterior spiracle (Fig. 35, 37, 52–60). They consist of a ring of simple projections enclosing a circular, integumental sensillum (Fig. 24).

The **last abdominal segment** or anal division (Fig. 26, 36, 38) has 3 pairs of marginal processes, referred to as laterals (anteriormost pair), sublaterals (following pair), and subapicals (terminal pair). On its ventral surface (Fig. 27) this segment has a single pair of ventrolateral processes and a median anal slit.

Several small, pointed projections and 1 or 2 round sensilla are present on the integumental surface immediately anterior to the base of each laterodorsal and there are similar projections between the laterodorsals and lateroventrals. The dorsomedians have several associated, conspicuous, round sensilla in the integument anterior to their base and at least 1 such sensillum in their stalk (Fig. 24**,** 28). The dorsolaterals are often much smaller and quite different in form from the other dorsal processes. On the second and third thoracic segments they are near the anterior margin and are closely associated with a conspicuous, circular, integumental sensillum. On the abdominal segments they are closer to the posterior margin and widely separated from the corresponding sensillum (Fig. 24). *Euryomma peregrinum* is unusual in lacking abdominal dorsolaterals (Fig. 43). In some species the dorsolaterals of the second and third thoracic segments consist merely of a ring of small projections surrounding a circular sensillum, but the abdominal dorsolaterals always have a distinct stalk bearing at least 3 projections and containing a circular sensillum (Fig. 34, 39). The sensillum in the stalk is probably homologous with that surrounded by a ring of projections on the thoracic segments.

The **lateroventrals** of the third thoracic and the abdominal segments are similar in shape to the laterodorsals, but are shorter. In *F. albitarsis* the second thoracic segment has a small, but distinct, lateroventral process composed of several concentric rings of pointed projections on a low callus, enclosing a circular sensillum (Fig. 25, 33). In the other New Zealand species these projections are absent and the lateroventral of this segment is represented by a conspicuous, round sensillum which is usually on a distinct callus.

The **ventrolateral processes** of the second and third thoracic segments are filiform in *E. peregrinum,* composed of a ring or tuft of small projections in *F. canicularis* and *F. hollowayae* and represented only by integumental sensilla lacking associated projections in *F. albitarsis* (Fig. 25, 29) and the remaining New Zealand species. Depending upon the species, the abdominal ventrolaterals may be tufted, stalked, filiform, or rosette-shaped.

The **ventromedians** are small and difficult to study. In most of the New Zealand species they are represented by 2 pairs of processes. Each process consists of a ring or several concentric rings of short projections surrounding a circular sensillum (Fig. 25, 31, 32). The pos-

terior ventromedians of the thoracic segments usually lack projections and are represented only by sensilla (Fig. 25, 30). It is not unusual for the projections to be absent from 1 of the 4 ventromedians of any abdominal segment. The manner in which the projections originate from the integument and eventually surround a sensillum, forming progressively more complex ventromedians and other processes in *F. albitarsis*, is depicted in Fig. 30–33. The sensilla incorporated in the stalked processes of various species (Fig. 28, 34, 39) are probably homologous with simple surface sensilla, and have changed their position as the processes have become more complex.

Anterior spiracles (Fig. 24, 25, 37, 52–60). It was not possible to determine with the light microscope whether anterior spiracles occur in first instar larvae (Fig. 35), but recent SEM images of *F. canicularis* show that an anterior spiracle is indeed present on each side as a simple respiratory aperture (Grzywacz 2011). In second and third instar larvae they are lateral near the middle of the first thoracic segment and consist of a number of finger-like lobes (4–20 in the New Zealand species) arranged in a semi-circle. Each lobe has an apical spiracular opening. The length of the lobes is constant for each species but the number varies, sometimes even between the right and left spiracles of the same specimen. In general, the length of the lobes is inversely proportional to their number in the New Zealand species (compare Fig. 52–60). The presence of up to 20 lobes in *Fannia laqueorum* from The Snares Islands is exceptional and the number considerably exceeds the greatest (12) recorded for northern hemisphere fanniids (Chillcott 1961, Lyneborg 1970).

Posterior spiracles (Fig. 26, 36, 38, 61–69). These are on the dorsal surface of the last abdominal segment or anal division. Each consists of a stalk bearing 2 or 3 spiracular apertures at its apex. In first instar larvae (Fig. 36) the stalk is conical, massive in relation to the size of the segment, and has 2, partially contiguous, minute apertures. Second (Fig. 38) and third (Fig. 26) instar larvae have a more cylindrical stalk with 3 spiracular apertures distributed on a distinct spiracular plate. Chillcott (1961) considered second instar larvae of Fanniidae to have only 2 apertures on the posterior spiracle, but the second instar larvae of New Zealand species (7 species, including *F. canicularis*) all have 3 spiracular openings and a scar. A trilobed spiracular plate has, in the past, been regarded as a diagnostic character for Fanniidae (Roback 1951), but 3 species occurring in New Zealand have a plate that lacks lobes (Fig. 62, 64, 67). The circular plate with a typically cyclorrhaphous arrangement of apertures which occurs in *Z. mystacina* (Fig. 62) is primitive for the family, and no similar structure is known in other fanniids. In 3 of the endemic species the surface of the plate is composed of small, raised, polygonal elements and has several conspicuous circular sensilla (Fig. 65, 68, 69).

Integumental sculpture (Fig. 70–78). This is most strongly developed in third instar larvae and puparia and is always more apparent on the dorsal surface. The integument is broken up into numerous small, circular or polygonal elements which are sometimes grouped in larger polygonal areas or on plates (Fig. 70, 71), or coalesce to form irregular crescents and rings (Fig. 74, 75). Some of the elements may be produced into domes (Fig. 76) or spiny processes (Fig. 78). Conspicuous round sensilla, indicated in the figures by black circles and ovals, are present among the polygonal elements in all species studied.

Cephaloskeleton (Fig. 79–87). This comprises the mouth-hooks and associated sclerites. In Fanniidae, the mouth-hooks are completely separated from one another and the pharyngeal sclerites do not spread apart vertically (Roback 1951). The dorsal and ventral arms of the pharyngeal sclerites are developed differently in the various species. Roback (1951) and Chillcott (1961) considered the pharyngeal arms of fanniids to lack windows, but weakly sclerotised areas, undoubtedly vestigial ventral windows, are present in all the New Zealand species, and 2 of the species have membranous dorsal windows (Fig. 80, 87).

MATERIAL AND METHODS

The material used in this study is located in the following museums:

ANIC	Australian National Insect Collection, Canberra, Australia
BMNH	Natural History Museum, London, United Kingdom
CNC	Canadian National Collection, Ottawa, Canada
CMC	Canterbury Museum, Christchurch, New Zealand
IADIZA	Laboratorio de Entomología, Instituto Argentino de Investigaciones de Zonas Áridas, CCT-Mendoza, Mendoza, Argentina
LSL	Linnean Society, London, United Kingdom
LUNZ	Lincoln University, Lincoln, New Zealand
NMW	Naturhistorisches Museum, Vienna, Austria

NZAC	New Zealand Arthropod Collection, Auckland, New Zealand
NMNZ	Museum of New Zealand (formerly National Museum), Wellington, New Zealand
OUMNH	Oxford University Museum of Natural History, Oxford, United Kingdom
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany
SMT	Staatliches Museum für Tierkunde, Dresden, Germany

Synonymy and literature are given only insofar as they refer to the New Zealand species.

Label data of primary types are presented verbatim and are enclosed within quotation marks, with a forward slash (/) used to indicate a change of line and a semicolon (;) a change in label.

Species distributions are based on examined material and reliable published records. Countries and localities are given in full. Abbreviations for the regions of New Zealand follow the area codes of Crosby *et al.* (1998) as follows: AK—Auckland; BP—Bay of Plenty; HB—Hawke's Bay; KA—Kaikoura; MB—Marlborough; MC—Mid Canterbury; ND—Northland; NN—Nelson; SD—Marlborough Sounds; SL—Southland; TO—Taupo; WN—Wellington; WO—Waikato; AU—Auckland Islands; CA—Campbell Island; CH—Chatham Islands; SN—Snares Islands; TH—Three Kings Islands.

Adult morphological terminology mainly follows McAlpine (1981), with the exception of the following genitalic terms: pregonite and postgonite (paramere and gonopod of McAlpine). Postpedicel is used for antennal flagellomere 1 (or 3rd antennal segment) (Stuckenberg 1999), and oviscapt is used for ovipositor (following contemporary practice). Morphological terminology for the larvae is based on Holloway (1985).

Measurements are expressed as follows:

body length: anterior margin of head (frons), excluding antenna, to apex of abdomen;

frontal width: narrowest distance between eye margins;

vitta width: measured at uppermost pair of frontal setae;

parafacial width: relative to width of postpedicel at its base;

shape of postpedicel: length/width;

shape of fore femur: length/width;

length of ventral pubescence of mid tibia: relative to tibial width;

shape of hind femur: length/width.

For examination of the terminalia, the abdomen was removed from a dry specimen and left soaking overnight in 10% KOH. The male postabdominal structures were separated from the rest of the abdomen, and the female oviscapt was extended with a fine pin. The abdomen and dissected parts were then transferred to ethanol, and then to glycerine. Examination and illustration of genitalic structures was made using a compound microscope and squared eyepiece. After examination, the terminalia and the rest of the abdomen were placed in glycerine in a plastic microvial and pinned directly under the source specimen. Other illustrations were made using a stereomicroscope combined with a camera lucida. Scales are indicated in each drawing, except when scales were absent in the original illustration. Other illustrations were made using a stereomicroscope.

KEY TO THE NEW ZEALAND GENERA OF FANNIIDAE—ADULTS

1 Only 1 postsutural intraalar seta (Fig. 7). Lower posterior katepisternal seta present and well-developed (Fig. 6) ..... …(p. 40)… ***Zealandofannia*** **Domínguez & Pont, new genus**

—2 postsutural intraalar setae (Fig. 7). Only a single posterior katepisternal seta present (Fig. 6) 2

2 1 pair of strong presutural dorsocentral setae, the anterior one hardly distinct from the clothing setulae (Fig. 7). Imaginary extensions of first (A1+CuA2) and second (A2) anal veins meeting shortly before wing margin (Fig. 8) .....(p. 16)… ***Euryomma*** **Stein**

—2 pairs of strong presutural dorsocentral setae (Fig. 7). Wing with second anal vein (A2) thin and bow-shaped, strongly curved so as to intersect an imaginary extension of first anal vein (A1+CuA2) well before wing margin (Fig. 8) …(p. 18).. ....***Fannia*** **Robineau-Desvoidy**

KEY TO THE NEW ZEALAND GENERA OF FANNIIDAE—LARVAE
(instars 2 and 3 and puparia)

1 Dorsolaterals absent on abdominal segments; posterior spiracular stalks arising very close to lateral margin, projecting well beyond margin of terminal segment (Fig. 43) ..... …(p. 17)… ***Euryomma*** **Stein**

—Dorsolaterals present on abdominal segments; posterior spiracular stalks not arising very close to lateral margin, not projecting beyond margin of terminal segment (Fig. 44–51) 2

2 Posterior spiracular plate almost circular in outline, not divided into lobes; apertures of posterior spiracle large, not marginal, arranged obliquely in typical cyclorrhaphous manner (Fig. 62); dorsolaterals of 2nd thoracic segment similar to abdominal dorsolaterals (Fig. 44) ..... …(p. 42)… .....***Zealandofannia*** **Domínguez & Pont, new genus**

—Posterior spiracular plate not circular in outline, but triangular or oval or divided into 3 distinct lobes; apertures of posterior spiracle small, at least 2 marginal, not arranged obliquely in typical cyclorrhaphous manner (Fig. 63–69); dorsolaterals of 2nd thoracic segment not similar to abdominal dorsolaterals (Fig. 45–51) .....…(p. 22)… ***Fannia*** **Robineau-Desvoidy**

Genus *Euryomma* Stein

Euryomma Stein, 1899: 19.

Type-species: *Euryomma hispaniense* Stein, 1899 (= *Anthomyia preregrina* Meigen, 1826), by monotypy.

Diagnosis. Head dichoptic in both sexes, without sexual dimorphism. 1 strong presutural dorsocentral, the anterior one hardly distinct from the clothing setulae. Hind coxa setulose on postero-apical margin. Imaginary extensions of first (A1+CuA2) and second (A2) anal veins meeting shortly before wing margin. Male terminalia with bacilliform sclerite absent and aedeagus sclerotised; female oviscapt with two spermathecae.

Remarks. The genus *Euryomma* contains one species that is an uncommon but widespread pantropical species, and almost twenty Neotropical species (Grisales *et al.* 2012; Grisales *et al*. 2012a).

The genus is close to the base of the Fanniidae, and the following relationship is revealed in the phylogenetic analysis by Domínguez & Roig-Juñent (2008) (Fig. 1): (*Australofannia* + (*Piezura* + (*Euryomma* + remaining Fanniidae))).

Euryomma peregrinum (Meigen)

Fig. 43, 52, 61, 70, 79, 88

Anthomyia peregrinum Meigen, 1826: 187.

Euryomma peregrinum; Stein 1919: 133; Séguy 1937: 180; Harrison 1953a: 9; Hennig 1955: 26, Plate 1 Fig. 3, Plate 3 Fig. 61; Chillcott 1961: 224, Fig. 150, 217, 259; Pont 1977a: 12, Fig. 2, 26–31; Pont 1989: 700; Holloway 1985: 249, Fig. 20, 29, 38, 47, 56; Macfarlane *et al.* 2010: 449.

Euryomma hispaniense Stein, 1899: 20.

Diagnosis. *E. peregrinum* is easily separated from the other species of the genus by the yellow palpus and legs; fore tibia with 1 apical and 1 short submedian anterodorsal seta. It is very similar to *E. americanum* Chillcott, found only in the USA, from which it can separated by the black arista and dark postpronotal lobe.

Description. **Adult**. **Male** (Fig. 88). Body length 3.8–4.1 mm.

Head*:* Frontal vitta light grey to yellow near lunula, at narrowest point 2.8× width of the anterior ocellus. Frontoorbital plate silvery-grey pruinose, at uppermost frontal seta 2.2× width of anterior ocellus. 2 long frontal setae, with several interstitials. Eye bare. One row of post-ocular setulae. Face grey. Parafacial yellow, at base of postpedicel 0.9× width of postpedicel and bare. Gena slender, the width below lowest eye-margin less than width of postpedicel. Scape and pedicel yellow; postpedicel dark grey, 1.9× as long as broad. Arista dark brown and short-pubescent,

longest individual hairs hardly as long as basal width of arista. Palpus yellow, slightly spatulate.

Thorax: Ground-colour black; wholly grey to yellowish-grey dusted. In posterior view, scutum with very faint traces of 3 brownish vittae along dorsocentral and acrostichal rows, these more conspicuous anteriorly than posteriorly. Scutellum yellow at tip. Acrostichal setulae triserial throughout. 1 strong presutural dorsocentral, the anterior one hardly distinct from the clothing setulae. Postpronotal lobe with 2 setae, inner one less than half as long as outer one. 1 strong prealar near the suture and another weaker next to the supraalar, prealar area otherwise bare. Proepimeron with 1–2 setulae adjacent to the seta.

Legs*:* Yellow except for black tarsomeres (Fig. 88). Fore femur length/width = 4.6; posterodorsal row strong, posterior rows weak; 1 row of posteroventrals, very short throughout except for 2 longer setae at apex. Fore tibia with 1 preapical posterodorsal, 1 apical ventral and 1 apical posteroventral; with 1 short submedian and 1 apical anterodorsal. Mid femur hardly narrowed at apex; with 1 row of short anteroventrals, sparse near base but denser and more comb-like in apical 1/3rd; with 1 row of short posteroventrals, but these less evenly developed than row of anteroventrals and partially duplicated in apical 1/3rd. Mid tibia hardly narrowed on basal half; ventral pubescence poorly developed and thin, 0.3× width of tibia, semi-decumbent and more conspicuous in apical 1/2 than near base of tibia. Hind coxa setulose on postero-apical margin. Hind femur length/width = 5.2; without a preapical swelling on ventral surface; with 1 row of very short anteroventrals and 2 longer preapical anteroventrals; posteroventral surface bare (Fig. 88). Hind tibia with 1 strong submedian dorsal; 1 anterodorsal, slightly basad of the submedian dorsal and 1 anteroventral.

Wing: Clear to yellowish, basicosta and tegula yellow, wing veins very lightly yellowish. Imaginary extensions of first (A1+CuA2) and second (A2) anal veins meeting just before wing margin. Calypters small and white, lower one well-developed, oval in shape, projecting slightly beyond upper one. Knob of haltere dark yellow.

Abdomen: Ground-colour mostly black; hind margins of tergites and/or sides of syntergite 1+2, tergite 3 and/or corners of tergite 4 sometimes yellow. Sternite 1 setulose. Sternite 5 divided, with setae covering posterior margin.

Postabdomen: See Pont (1977a: Fig. 26–28). Cercal plate fused, elongated and terminating in two spines. Bacilliform sclerite absent. Surstylus simple and shorter than epandrium, tapering at apex. Aedeagus sclerotised, basally broad, tapering toward apex and curving dorsally.

Female. Body length 3.5–4.0 mm. Differs from the male as follows:

Legs: Mid femur ventrally bare, except for a fine antero-ventral at base and 1–2 short anteroventrals beyond it. Mid tibia bare ventrally.

Abdomen: Ground-colour as in male or wholly orange; dusting grey to yellowish-grey, with a poorly developed dark median vitta on tergites 3–5. **Postabdomen**. See Pont (1977a: Fig. 29–31). Sternite 6 reduced to two small plates bearing short spines. Spiracles situated on tergite 6. Two cup-shaped spermathecae.

Third instar larva (Fig. 43, 52, 61, 70, 79).

Dorsal aspect (Fig. 43): First thoracic segment (T1) (Fig. 43, 52) with very long, slender anterior processes; 1 minute lateral process immediately in front of anterior spiracle, a cluster of minute projections on lateral margin in front of spiracles; anterior spiracle with 5–9 very long lobes. Second thoracic segment (T2) with very long, slender laterodorsals, with minute projections; dorsolaterals very short, filiform, with minute projections; dorsomedians filiform, about 3× as long as dorsolaterals, with minute projections. Third thoracic to seventh abdominal segments (T3–A7) with rather short, filiform laterodorsals, with small, fine projections, except for 1 or 2 large, simple or bifurcate projections at base on posteromedial edge; dorsolaterals represented by sensilla lacking associated processes; dorsomedians filiform, short, but becoming progressively longer towards caudal end of body, their projections short, fine, except for several large projections near base. Eighth abdominal segment (A8) with laterals and subapicals about equal in length, about twice as long as sublaterals and preceding laterodorsals; all processes with several long, simple or bifurcate projections basally, projections elsewhere slightly longer than corresponding ones on preceding laterodorsals; posterior spiracular stalks long, originating close to margin, strongly divergent, extending beyond margin of segment; spiracular lobes (Fig. 61) truncate, rather short, medial and posterolateral lobes almost parallel, at right angles to anterolateral process; spiracular apertures small, oval, marginal. Integument (Fig. 70) moderately coarsely but evenly granulate, some elements grouped in irregular polygons; most elements of second and third thoracic segments (T2, T3), and on anterior margin of first to seventh abdominal segments (Al–A7), with small spinulose projections; intersegmental membrane covered with fine, dense, convex elements devoid of projections.

Ventral aspect: Second thoracic segment (T2) with a minute filiform process close to base of laterodorsals, about 0.1× as long as their length; lateroventrals represented by a large sensillum devoid of projections, on low callus; ventrolaterals filiform, very small; anterior ventromedians

aligned with and similar to ventrolaterals; posterior ventromedians represented by a small sensillum lacking associated processes. Third thoracic segment (T3) with lateroventrals, ventrolaterals, and ventromedians as on second thoracic segment. First to seventh abdominal segments (A1–A7) with lateroventrals as on third thoracic segment (T3) but slightly larger; ventrolaterals slightly smaller than on third thoracic segment (T3); each segment with 1 pair of ventromedians resembling anterior ventromedians of third thoracic segment (T3), but slightly smaller, near posterior margin of segment in line with and mesad to pair of naked sensilla representing second pair of ventromedians. Eighth abdominal segment (A8) with ventrolaterals about twice size of preceding pair. Integument with finer, denser elements than on dorsal surface; second to seventh abdominal segments (A2–A7) with transverse row of spinulose projections near middle of sternite, and less distinct anterior row.

Cephaloskeleton: as in Fig. 79.

Lengths: L3, 4.7 mm; puparia, 4.5–5.1 mm.

Material examined. **Type material**. ***Anthomyia peregrinum***. **Holotype** ♀ in NMW. Labelled "Holotype ♀ peregrina / Coll. Winthem; peregrina ♀; Euryomma / hispaniense / ♀ / Stein; Holotype ♀ / Anthomyia / peregrina Mg. / det. A.C. Pont 1981" (see Pont 1986b: 237). ***Euryomma hispaniense***. **Lectotype** ♂ in SDEI. Labelled "Algeciras / 31 5 98; Euryomma / hispaniensis [sic] / Stein" (designated by Rohlfien & Ewald 1974: 116) (see also Pont & Werner 2006:10; Pont 2013: 48).

New Zealand material. **North Island**. **AK**. Lynfield, Auckland, on window inside house, 11 Oct 1983, B. A. Holloway, 1♂ (NZAC); Owairaka, ex *Macrocystis* compost, 26 Jul 1948, E. C. S. Little, 7♂ 3♀ (1♂ OUMNH, rest NZAC); Owairaka, bred from pupae from *Macrocystis* compost, em. 4 Aug 1948, R. A. Harrison, 1♂ 1♀ (NZAC); same data but em. 5 Aug 1948, 1♀ (NZAC). **HB**. Hastings, bred from skins and hides, Apr 1947, Collin, 3♂ 1♀ (NZAC). **WN**. Wellington, larvae found infesting salted sausage skins, 6 May 1946, em. 21 Jul 1946, Wellington Health Department, 4♂ 1♀ (LUNZ); same data, em. 10 Jun 1946, 1♀ (LUNZ). **South Island**. **MC**. Christchurch, in shed, ex salted hide, 18 Jun 1968, Christchurch Health Inspector, 1♀ (NZAC).

Also recorded by Harrison (1953a: 9) from Owairaka (AK) from *Macrocystis* compost, and from Hastings (HB) from skins and hides.

Distribution. Occurs worldwide in warm areas, but apparently never abundant. Neotropical (Carvalho *et al.* 2003: 6), Nearctic (Chillcott 1961: 225; Huckett 1965: 898), southern Palaearctic (Pont 1986a: 42), sporadically in the Afrotropical (Pont 1980: 719; Pont 2006: 318) and Oriental (Pont 1977b: 447) regions. In the Australasian/Oceanian region from Australia including Norfolk Island, Fiji, and Hawai'i (Pont 1989: 700). **New Zealand**: known from the North and South islands. Apparently introduced into New Zealand in about 1946 and established, but rare in collections.

AK, HB, WN / MC / —

Biology and immature stages. Larvae have been found in salted hides, salted sausage skins, and *Macrocystis* compost. They have been collected in June and August (Holloway 1985: 249).

Genus *Fannia* Robineau-Desvoidy

Fannia Robineau-Desvoidy, 1830: 567.

Type-species: *Fannia saltatrix* Robineau-Desvoidy, 1830 (= *Musca scalaris* Fabricius, 1794), by monotypy.

Homalomyia Bouché, 1834: 89. Type-species, *Musca canicularis* Linnaeus, 1761, designation by Westwood (1840: 143).

Diagnosis. First presutural dorsocentral seta over half as long as the second. Lower katepisternal seta absent. Male mid tibia usually expanded apically. Wing with second anal vein (A1+CuA2) strongly curved so as to intersect an imaginary extension of first anal vein (A2) well before wing margin. Male terminalia usually with a distinct bacilliform sclerite; female oviscapt with 2 or 3 spermathecae.

Remarks. *Fannia* is by far the largest genus of the family, and has been divided into a number of species-groups (Chillcott 1961; Rozkošný *et al.* 1997; Domínguez & Roig-Juñent 2008), althought only one of these, the *anthracina* species-group, was recovered as monophyletic in Domínguez & Roig-Juñent's (2008) analysis.

KEY TO NEW ZEALAND SPECIES OF *FANNIA* ROBINEAU-DESVOIDY

Key to adults—males

1 Hind coxa setulose on postero-apical margin (Fig. 12) 2

—Hind coxa bare on postero-apical margin 6

2 Scape, pedicel, palpus, basicosta, and legs (except knees) black 3

—Scape, pedicel, palpus, basicosta and most of legs yellow 5

3 Hind tibia with several anterodorsal setulae above and below the strong seta (Fig. 15). Only 1 setula adjacent to the proepimeral seta (Fig. 6). Knees and base of fore tibia yellow …(p. 26)…..... ..... ***F. canicularis*** **(Linnaeus)**

—Hind tibia with a single anterodorsal seta. Some 4 setulae adjacent to the proepimeral seta. Legs wholly black 4

4 Head holoptic. Acrostichal setulae 2- to 3-serial. Hind femur with long rather dense anteroventral setae on all but basal quarter …(p. 36)..... ..... ***F. mercurialis*** **Domínguez & Pont, new species**

—Head dichoptic. Acrostichal setulae 3- to 4-serial. Hind femur with the anteroventral setae short, about half femoral width, but with 2 longer ones before apex … (p. 38)…..... ..... ***F. triregum*** **Domínguez & Pont, new species**

5 Thorax mostly yellow, scutum with a broad brown vitta along acrostichal rows. 1–2 fine setulae adjacent to the proepimeral seta. Hind coxa with only 1 setula on postero-apical margin. Abdomen entirely brown. [Male not known; characters taken from the female.] …(p. 34)…..... .... ***F. magnicornis*** **Domínguez & Pont, new species**

—Thorax brown, scutum without a brown vitta. 5–6 strong setulae adjacent to the proepimeral seta. Hind coxa with 3 setulae on postero-apical margin. Abdomen yellow laterally on the first two segments .....… (p. 30)…..... ..... ***F. hollowayae*** **Domínguez & Pont, new species**

6 Fore tarsomeres partially white and with a broad leaf-like spine on posteroventral edge of tarsomere 1 (Fig. 10). Mid tarsomere 1 with a basal ventral crest (Fig. 11). Hind femur with a very strong preapical ventral swelling, and the row of posteroventral setae forming a long dense tuft on the swelling (Fig. 13). Prealar weak, hardly distinct from the clothing setulae ..(p. 21)…..... ..... ***F. albitarsis*** **Stein**

—Fore tarsomeres dark brown, and without a spine on posteroventral edge of tarsomere 1. Mid metatarsus 1 without a basal ventral crest. Hind femur with a weak preapical swelling, the row of posteroventral setae weak and forming at most a short tuft on the preapical swelling (Fig. 14). Prealar strong and stout, at least 1/3rd as long as 2nd notopleural seta and usually longer 7

7 Calypters brown. Abdomen with a median linear vitta that is not expanded laterally on each tergite behind. Scutum dark brown throughout. Wing infuscated … (p. 35)…..... ...***F. mangerensis*** **Domínguez & Pont, new species**

—Calypters yellow. Abdomen with a median triangular dark mark on each of syntergite 1+2 and tergites 3 and 4. Scutum grey dusted, with brown vittae on acrostichal and dorsocentral regions. Wing yellowish, especially at base 8

8 Frons broad, at narrowest point at least twice as wide as width of postpedicel. Fronto-orbital plate on lower half with a row or partial row of short proclinate setulae outside the frontal setae. Gena broad, width below lowest eye-margin greater than length of postpedicel. Hind trochanter without short erect setulae. Hind femur without a swelling on ventral surface … (p. 32)…..... ..... ***F. laqueorum*** **Domínguez & Pont, new species**

—Frons narrow, at narrowest point only a little broader than width of postpedicel. Fronto-orbital plate bare apart from the frontal setae. Gena narrower, width below lowest eye-margin equal to width of postpedicel. Hind trochanter with a series of 7–9 short erect setulae on inner ventral surface. Hind femur with a weak but distinct swelling at apical third on ventral surface (as in Fig. 14) …(p. 24)… ....***F. anthracinalis*** **Domínguez & Pont, new species**

Key to adults—females

1 Antenna and palpus yellow 2

—Antenna and palpus dark 3

2 Postpedicel broad and short, 1.3× as long as broad. Thorax mostly brown but pleura, postpronotal lobe and supraalar area yellow. At least 4 setulae adjacent to the proepimeral seta. Mid tibia with an anteroventral seta. Femora wholly yellow …(p. 30)… ....***F. hollowayae*** **Domínguez & Pont, new species**

—Postpedicel very long, 2.3× as long as broad. Thorax yellow with a broad brown vitta along acrostichal rows. Only 1–2 setulae adjacent to the proepimeral seta. Mid tibia without an anteroventral seta. Mid and hind femora with brown tips …(p. 34)… ....***F. magnicornis*** **Domínguez & Pont, new species**

3 Hind coxa setulose on postero-apical margin. 1 row of setulae below lower orbital seta 4

—Hind coxa bare on postero-apical margin. More than 1 row of setulae below lower orbital seta 6

4 Row of setulae below lower orbital seta extending on to upper quarter of parafacial. Only 1 setula adjacent to the proepimeral seta. Hind tibia with 1 strong and several shorter anterodorsal setae. Prealar setulae short and placed close to the supraalar. Abdomen generally partly yellow on syntergite 1+2 and tergite 3 ..... …(p. 27)… ***F. canicularis*** **(Linnaeus)**

—Row of setulae below lower orbital seta not extending on to parafacial. At least 4 setulae adjacent to the proepimeral seta. Hind tibia with only 1 anterodorsal seta. First prealar long, half as long as 2nd notopleural seta and close to suture, second prealar short and close to the supraalar. Abdomen uniformly dark brown 5

5 Lower orbital seta closer to margin of fronto-orbital plate than to eye-margin. Fronto-orbital plate broad, opposite lower orbital over half width of frontal vitta. Upper parafacial with a conspicuous dark matt patch opposite pedicel. Prementum of proboscis densely grey dusted …(p. 37)… ....***F. mercurialis*** **Domínguez & Pont, new species**

—Lower orbital seta closer to eye-margin than to margin of fronto-orbital plate. Fronto-orbital plate narrow, opposite lower orbital 1/3rd width of frontal vitta. Upper parafacial without a dark matt patch. Prementum of proboscis thinly dusted, subshining …(p. 39)… ***F. triregum*** **Domínguez & Pont, new species**

6 Wing smoky. Calypters and haltere brown …(p. 36)… .....***F. mangerensis*** **Domínguez & Pont, new species**

—Wing clear, yellowish at base. Calypters and haltere yellow to white 7

7 Prealar reduced, only slightly stronger than the adjacent clothing setulae ..... …(p. 22)… ***F. albitarsis*** **Stein**

—Prealar strong, at least half as long as posterior notopleural seta 8

8 Presutural acrostichal setulae in 2 rows. Hind femur with the anteroventral row strong throughout, though shorter in basal half. Fore tibia with a submedian posterior seta. Hind tibia with 2–3 anteroventrals. Gena below eye equal to width of postpedicel …(p. 24)… ....***F. anthracinalis*** **Domínguez & Pont, new species**

—Presutural acrostichal setulae in 3 rows. Hind femur with the anteroventral row very short in basal 1/2 and with 5 strong setae in apical 1/3rd. Fore tibia without a submedian posterior seta. Hind tibia with 1 anteroventral. Gena below eye equal to length of postpedicel …(p. 33)… ....***F. laqueorum*** **Domínguez & Pont, new species**

Key to larvae (instars 2 and 3) and puparia

1 Abdominal dorsolaterals similar in form to laterodorsals and about half their length (Fig. 46, 49) 2

—Abdominal dorsolaterals dissimilar in form to laterodorsals and less than 1/2 their length (Fig. 45, 47, 48, 50, 51) 3

2 Abdominal dorsomedians similar in form to dorsolaterals and at least as long (Fig. 46): posterior spiracular plate elongate-oval, much longer than wide (Fig. 64) …(p. 40)…..... ***Fannia*** **sp. 2 of Holloway**, known only from larvae

—Abdominal dorsomedians dissimilar in form to dorsolaterals and much shorter (Fig. 49): posterior spiracular plate almost triangular, wider than long (Fig. 67) …(p. 31)… ....***F. hollowayae*** **Domínguez & Pont, new species**

3 Dorsomedians of 7th abdominal segment at least 1.5× as long as preceding pair, with long, rat-tailed tip (Fig. 45) …(p. 27)…..... ..... ***F. canicularis*** **(Linnaeus)**

—Dorsomedians of 7th abdominal segment less than 1.5× as long as preceding pair, not rat-tailed (Fig. 47, 48, 50, 51) 4

4 Marginals of 8th abdominal segment with at least as many forked as unforked projections on their basal half (Fig. 47) …(p. 37)… ....***F. mercurialis*** **Domínguez & Pont, new species**

—Marginals of 8th abdominal segment with fewer forked than unforked projections on their basal 1/2 (Fig. 48, 50, 51) 5

5 Projections of dorsolaterals arranged in a star-shape (Fig. 48); surface of spiracular plate uniformly smooth (Fig. 66) …(p. 22)…..... ***F. albitarsis*** **Stein**

—Projections of dorsolaterals not arranged in a star-shape, instead originating more or less in pairs on either side of stalk (Fig. 50, 51); surface of spiracular plate uneven, of convex, polygonal elements (Fig. 68, 69) 6

6 Integumental surface between dorsomedians and dorsolaterals lacking spiniform projections (Fig. 50); anterior spiracle with 8–12 lobes (Fig. 59); posterior spiracular plate about 1.5× as wide as long (Fig. 68) …(p. 25)… ....***F. anthracinalis*** **Domínguez & Pont, new species**

—Integumental surface between dorsomedians and dorsolaterals with some elongate, curved, spiny projections (Fig. 51); anterior spiracle with 12–20 lobes (Fig. 60); posterior spiracular plate about as wide as long (Fig. 69) …(p. 39)… .... ***F. laqueorum*** **Domínguez & Pont, new species**

Fannia albitarsis Stein

Fig. 9–11, 13, 16–34, 48, 57, 66, 75, 84

Fannia albitarsis Stein, 1911: 105.

Fannia albitarsis; Stein 1919: 131; Séguy 1937: 164; Pont 1989: 700; Holloway 1985: 253, Fig. 1–11, 25, 34, 43, 52, 61; Carvalho *et al.* 2003: 7; Macfarlane *et al.* 2010: 449.

Diagnosis. The male can be easily recognised by the modifications to the fore and hind legs: fore tarsomere 1 flattened and expanded, partially whitish-yellow and with a broad leaf-like spine at the tip of posterior surface, fore tarsomere 2 almost completely whitish-yellow, fore tarsomeres 3 and 4 as wide as long, partially yellowish-white (Fig. 9, 10); hind femur with a very prominent preapical protuberance on ventral to posteroventral surfaces and with a preapical tuft of long hair-like posteroventrals, 1.5× as long as femoral width (Fig. 13). The female has hind coxa bare postero-apically, palpus and antenna black, calypters white, prealar very weak, and scutum with a conspicuous pattern of dusted vittae and only a narrow median part of scutellum undusted (Fig. 16).

Description. **Adult**. **Male** (Fig. 9–11, 13, 17–20): Body length 5.0–6.0 mm.

Head: Frons narrow. Frontal vitta dark brown to black, at narrowest point 2.7× width of anterior ocellus. Fronto-orbital plate silvery below, becoming grey above, at uppermost pair of frontal setae slightly narrower than anterior ocellus. Up to 16 long frontals. Eye distinctly short-haired, upper inner facets larger than the rest. 1 row of post-ocular setulae of irregular length in first quarter. Parafacial silvery, face light grey; parafacial at base of postpedicel 0.9× width of postpedicel and bare. Antenna black; postpedicel 2.2× as long as broad and covered with light grey pruinosity. Arista black, almost bare, the individual hairs shorter than basal aristal diameter. Prementum of proboscis dusted brownish-grey. Palpus dark brown, slightly clavate, the apex 1.5× the basal width.

Thorax: Ground-colour black. Scutum with the dusting grey, almost bluish, and forming vittae that run along the acrostichal, dorsocentral and intraalar lines, the dorsocentral vittae continued broadly on to scutellum, the dorsocentral and acrostichal vittae merging behind to form a broad prescutellar patch; postpronotal lobe and notopleuron whitish dusted, pleura thinly grey. Acrostichal setulae in 3–4 rows; postpronotal lobe with 3 setae, the inner one fine. Prealar very short, with an even shorter setula behind it that is very close to supraalar. 2 proepimeral setae surrounded by numerous hair-like setulae**.**

Legs: Black, knees yellowish. Fore femur length/width = 7.1, with 1 row of posterodorsals as long as femoral width, with 5–6 rows of short hair-like posterior and 1 row of posteroventrals slightly longer than femoral width. Fore tibia with 1 strong preapical dorsal, 1 apical ventral and posteroventral, apical anterodorsal very short; without submedian setae. Fore tarsomere 1 flattened and expanded, partially yellowish-white and with a broad leaf-like spine at the tip of posterior surface; tarsomeres 2 and 5 yellowish-white with a dark dot at tip; tarsomeres 3 and 4 as wide as long, basal half yellowish white, apical half dark (Fig. 10). Mid femur conspicuously narrowed in apical third; with a complete row of short anterodorsals and a row of short anterior setae; anteroventral row complete, the setae long, strong and well-spaced in basal 2/3rd, becoming short, stout and comb-like in apical third; a complete row of hair-like posteroventrals on basal 2/3rd and a partially double row of short, stout, comb-like setulae in apical third; 1 row of hair-like posterior setae at base, stouter and ventrally directed at apex. Mid tibia constricted at base and with a conspicuous flattened excavation at basal third; ventral pubescence short, 0.3× tibial width; with 1 anterodorsal and 1 posterodorsal at middle, and a strong dorsal preapical set well back from tibial apex; at apex anteroventral and posteroventral setae strong and curved, otherwise with only short weak setae at apex. Mid tarsomere 1 with a basal ventral crest, followed by short strong seta (Fig. 11). Hind coxa bare at apex of postero-apical surface. Hind femur length/width = 10; with a very prominent preapical tubercle on ventral to posteroventral surfaces; 1 row of anterodorsals, longer and dorsally directed towards apex; anteroventral row very short, becoming longer towards apex, longest on the tubercle and followed by 1 short seta; with a preapical tuft of dense, hair-like, curled posteroventrals, 1.5× as long as femoral width (Fig. 13). Hind tibia with 1 long submedian and 1 shorter preapical dorsal seta, half length of submedian dorsal; 1 submedian anterodorsal, without additional setulae; 2 median and 1 apical anteroventral; ventral and posteroventral surfaces with a weak ctenidium at apex.

Wing: Clear. Veins yellowish-brown. Basicosta yellow, tegula black. Calypters white, lower one slightly projecting beyond upper one. Knob of haltere yellowish-brown, dark brown at base.

Abdomen: Narrowing behind, syntergite 1+2 2× width of tergite 5. Ground-colour black, covered with light grey, almost bluish, pruinosity, with a narrow black undusted median vitta running along all tergites and, on tergites 3 and 4, with broad shifting areas of darker dust on each side of the median vitta. Sternite 1 densely setulose. Posterior margin of sternite 5 deeply indented and covered with setae (Fig. 17). Hypopygium not protruding.

Postabdomen: Hypandrium thin, parameres inconspicuous; posterior margin of epandrium broadened, bell-shaped; cercal plate fused and tapering at apex; bacilliform

sclerite corkscrew-shaped; surstylus simple and long, slightly clavate (Fig. 18–20).

Female (Fig. 16): Body length 5.0–5.7 mm. Differs from male as follows:

Head: Frons and frontal vitta broad, the distance between eye margins more than 0.33 of head-width. Frontal triangle short, not reaching halfway from its base to lunula. 4–5 strong frontals and with 6–7 long setulae between them, half as long as the setae. Lower orbital placed closer to eye-margin than to margin of fronto-orbital plate; with 2–3 rows of fronto-orbital setulae. Parafacial bare, with a matt spot opposite pedicel.

Thorax: Scutal pattern as in Fig. 16.

Legs: Fore femur with 1 row of posterior setae, as long as femoral width; 1 or 2 rows of short posteroventrals. Fore tibia with a short anterodorsal in apical half. Fore tarsus dark brown to black, simple in structure and without the modifications of the male. Mid femur simple in structure, without ventral setae. Mid tibia simple in structure, ventral pubescence absent. Mid tarsomere 1 without the basal ventral crest and seta. Hind femur simple in shape, without the ventral tubercle; bare ventrally except for 2–3 anteroventrals in apical third.

Abdomen: Heart-shaped, this shape much more pronounced than in male, syntergite 1+2 2× the width of tergite 5; uniformly grey dusted, without pattern. Sternite 1 bare.

Postabdomen: Cerci normal, short; hypoproct longer than broad and uniformly covered with setulae; sternite 8 reduced to an anterior pair of circular plates bearing two setae and four to five setulae; postabdominal spiracles 7 and 8 on tergite 6 (Fig. 21, 22). Two pear-shaped spermathecae, slightly grooved, with partially sclerotized ducts (Fig. 23).

Third instar larva (Fig. 24–34, 48, 57, 66, 75, 84).

Dorsal aspect (Fig. 48): First thoracic segment (T1) (Fig. 24, 48, 57) with short, slender anterior processes; 2 minute lateral processes immediately in front of and partly concealed by each anterior spiracle; anterior spiracle with 6–9 moderately long lobes. Second thoracic segment (T2) with moderately long laterodorsals bearing short, fine projections apically, longer, coarser projections elsewhere; dorsolaterals each a ring of short projections enclosing sensillum; dorsomedians moderately long, with small, rather coarse projections at tip, longer, coarser projections towards base and on integument immediately anterior to base; conspicuous sensillum, devoid of processes, in integument anterior to base of each dorsomedian, similar sensillum mesad to each dorsolateral. Third thoracic segment to seventh abdominal segment (T3–A7) with long laterodorsals bearing unbranched projections, those at apex short, fine, remainder coarser, longer; dorsolaterals (Fig. 34) small but conspicuous, each a moderately long stalk bearing 3–6 (usually 4 or 5) simple projections, all about equal in length, arranged in star-shape; dorsolaterals of third thoracic segment (T3) about midway between laterodorsals and dorsomedians, with associated conspicuous, naked sensillum anterior to base; dorsolaterals of first to seventh abdominal segments (Al–A7) near posterior margin of each segment, close to laterodorsals; dorsomedians (Fig. 28) becoming very slightly longer towards caudal end of body, with coarse projections which are shorter towards apex, associated large projections on integument anterior to base, conspicuous integumental sensillum laterally. Eighth abdominal segment (A8) (Fig. 26, 48) with marginals similar to laterodorsals; laterals about same length as subapicals and preceding laterodorsals, about 1.3× as long as sublaterals: posterior spiracular stalks short, divergent, bases about equidistant from midline and lateral margin; spiracular lobes (Fig. 66) short, truncate, not tapering, separated by distinct notches; spiracular apertures small, oval, apical. Integumental elements (Fig. 52) large, completely or incompletely coalesced to form crescents or irregular rings; intersegmental membrane coarsely, moderately densely granulate, some elements bearing short, pointed projections.

Ventral aspect: Second thoracic segment (T2) (Fig. 25) with small lateroventrals, each a sensillum surrounded by several concentric rings of projections (Fig. 33), near anterior margin of callus; small process near base of laterodorsals in some other species represented by inconspicuous sensillum devoid of projections; ventrolaterals and posterior ventromedians each represented by sensillum lacking projections (Fig. 29, 30); anterior ventromedians present as sensillum surrounded by very short projections (Fig. 31). Third thoracic segment (T3) with lateroventrals similar to laterodorsals, about 0.4 of their length; ventrolaterals similar to laterodorsals, about 0.4 of their length; ventrolaterals and posterior ventromedians each represented by sensillum lacking projections; anterior ventromedians close to anterior margin, each a sensillum surrounded by minute projections. First to seventh abdominal segments (Al–A7) with lateroventrals similar to laterodorsals but shorter; ventrolaterals like those on T2 but slightly larger; both pairs of ventromedians aligned near posterior margin, each ventromedian a sensillum surrounded by ring of short projections (Fig. 32). Eighth abdominal segment (A8) (Fig. 27) with short, tapering ventrolaterals bearing long, coarse projections. Integumental pattern similar to that of dorsal surface; irregular transverse row of spinulose projections extending between each pair of ventrolaterals on second to eighth abdominal segments (A2–A8).

Cephaloskeleton: as in Fig. 84.

Lengths: L2, 1.4–3.9 mm; L3, 2.8–10.0 mm; puparia, 5.3–7.5 mm.

Material examined. **Type material**. **Lectotype** ♂ in SMT. Labelled "Chile / 22.IX.02 / Guayacan", collected by W. Schnuse, labelled as lectotype by A. C. Pont (designated by Pont & Carvalho 1994: 232; see also Pont 2001: 459-460; Pont 2013: 45).

New Zealand material. **North Island**. **AK**. [Auckland, Westfield,] city abattoir, ex sheep dung, em. 26 Mar 1976, N. A. Martin, 1♀ (NZAC); same data, em. 25 Jun 1976, 3♂ 1♀ (2♂ NZAC, 1♂ BMNH); same data, em. 29 Jun 1976, 2♂ 2♀ (NZAC); same data, em. 14 Jul 1976, 1♂ (NZAC); Auckland University, City Campus, clock tower east wing, windows, 8 Dec 2006, S. E. Thorpe, 1♀ (NZAC); Kumeu, Malaise trap, 20 Oct 1989, J. Clearwater, 2♂ 1♀ (NZAC); Kumeu, sweeping pasture, 19 Jan 1976, R. L. Hill, 1♀ (NZAC); Lynfield, Tropicana Drive, em. 14 Nov 1976 from soil under blackbird, died 25 Sep 1976, B. A. Holloway, 1♀; same data, em. 19 Nov 1976, 1♂ (NZAC); Lynfield, Tropicana Drive, taking nectar of *Lobularia maritima*, 28 Nov 1976, B. A. Holloway, 1♀ (NZAC); Lynfield, ex accumulated dog manure, em. 16 Nov 1987, B. A. Holloway, 1♂ (NZAC); same data, em. 19 Nov 1987, 2♂ 1♀ (NZAC); Lynfield, in garden, 5 Jul 1977, B. A. Holloway, 1♀ (NZAC); Lynfield, in porch, 24 Jul 1985, B. A. Holloway, 1♀ (NZAC); Mangere, [Oxidation] Ponds, 14 Mar 1959, R. A. Harrison, 1♂ (NZAC); Mangere, Auckland, 30 Jan 1950, K. P. Lamb, 1♀ (NZAC); Otara, artichoke foliage, 1 Nov 1976, M. J. Snyder, 1♀ (NZAC); Papakura, ex starling nest, 19 Nov 1972, R. Veitch, 7♂ 5♀ (NZAC); Pukekohe, sweeping *Solanum aviculare*, 5 Apr 1977, N. A. Martin, 3♀ (NZAC); Pukekohe, swept vegetation, 7 Feb 1978, N. A. Martin, 1♂ (NZAC); Wattle Bay, on dead Stingray, 23 Feb 1977, G. Kuschel, 2♂ (NZAC); same data, 23 Mar 1977, 1♂ (NZAC); same locality, ex dead stingray, em. 7 Mar 1977, B. A. Holloway, 5♂ 1♀ (NZAC); Wattle Bay, Lynfield, kingfisher nest, 30 Jan 1980, B. A. Holloway, 11♂ 12♀ (NZAC); same data, reared from kingfisher nest, 18 Feb 1980, 9♂ 5♀. **WO**. Waharoa, Gordon Gow Scenic Reserve, carrion traps, 23–29 Mar 1978 (S. B. Peck), 1♀ (NZAC). **TO**, Taupo, 17 Dec 1957, J. S. Armstrong, 1♀ (NZAC). **HB**. Hastings, Aug 1983, B. A. Holloway, 2♀ (NZAC); Hastings, ex poultry manure, Aug 1983, B. A. Holloway, 2♂ 1♀ (NZAC); Haumoana, ex dead cat, pupated 10 Oct 1979, em. 28 Oct 1979, T. H. Davies, 1♀ (NZAC); Twyford, poultry manure, 21 Oct 1976, B. A. Holloway, 2♂ 3♀ (NZAC); Twyford, from poultry manure collected 21 Oct 1976, em. 4 Nov 1976, B. A. Holloway, 1♀ (NZAC); same data, em. 15 Nov 1976, 3♂ 3♀ (NZAC); same data, em. 18 Nov 1976, 20♂ 18♀ (2♂ 2♀ OUMNH, 1♂ 1♀ BMNH, rest NZAC); same data, em. 15 Nov 1976, 2♂ 3♀ (2♂ 2♀ NZAC, 1♀ BMNH); same data, em. 17 Dec 1976, 3♂ 6♀ (NZAC); Twyford school, 21 Oct 1976, B. A. Holloway, 1♂ 1♀ (NZAC). **South Island**. **NN**. Nelson, 7 Apr 1958, E. S. Gourlay, 6♂ (NZAC); Nelson, 29 Jan 1971, E. W. Valentine, 1♀ (NZAC); Nelson South, 23 Dec 1965, D. A. Craig, 1♂♀ (CNC); [Nelson] without data, A. Parrott, 1♂ 1♀ (NZAC). **MC**. Christchurch, 2 Dec 1973, R. L. C. Pilgrim, 1♂ (NZAC); Christchurch, 10–14 Jan 1974, G. E. Shewell, 1♀ (CNC); Lincoln, 24 Oct 1990 & 7 Feb 1991, R. P. Macfarlane) 2♀ (NZAC); Lincoln, ex blowfly trap, 29 Dec 1991, H. van den Ende, 1♀ (NZAC); same data, 10 Jan 1992, 1♀ (NZAC); same data, 8 Mar 1992, R. P. Macfarlane, 1♀ (NZAC); same data, 19 Mar 1992 1♀ (NZAC); Lincoln, ex nest of *Bombus ruderatus*, 6 Mar 1975, R. P. Macfarlane, 1♀ (NZAC); Lincoln College, swept orchard, 24 Mar 1969, M. G. McPherson, 1♀ (NZAC); Lincoln College, ex light trap, 24–28 Dec 1965, M. C. Blakemore, 1♀ (NZAC); Lincoln College, ex pasture, 12 Apr 1971, J. E. Fenwick, 1♀ (NZAC); Woodend, 13 May 1968, J. W. Boyes, 2♂ (CNC).

Distribution. Widespread in the Neotropical region (Carvalho *et al.* 2003: 7), and introduced, probably through commerce, into South Africa (Pont 1980: 719), Amsterdam Island (Pont 2006: 318), Tristan da Cunha archipelago (Hänel & Pont 2008: 215), Australia (Pont 1989: 700), and Fiji (seen by A.C.P.). The earliest specimens from New Zealand date from summer 1950.

At present the species is restricted to the North and South Islands of New Zealand, from the north of the North Island to about 43.00°S at the centre of the South Island. Recorded by Holloway (1985: 253) from Auckland, Hawkes Bay, and Nelson.

AK, WO, TO, HB / NN, MC / —

Fannia albitarsis was not known to occur in Australia when A.C.P. revised the Australian Fanniidae (Pont 1977a), and the later records from New South Wales and Victoria (Pont 1989) are based on the following material: **Australia**, New South Wales: Sydney, 20 Nov 1966 (R. Pilfrey), 1♂ (CNC); Forest Lodge, 28 Aug 1965 (R. Pilfrey), 1♂ (CNC). Victoria: Bundoora, suction trap, 28 Dec 1979 and 21 Mar 1980 (P.W. Savage), 2♂ (ANIC).

Biology and immature stages. Holloway (1985: 253) has given an excellent account of the biology and immature stages of this species. Larvae have been collected throughout the year in New Zealand, from the following substrates: nest material of various birds (New Zealand kingfisher, *Todiramphus sanctus* (Vigors & Horsfield); European starling, *Sturnus vulgaris* Linnaeus; southern black-backed gull, *Larus dominicanus* Lichtenstein,; *Bombus* nest; poultry, dog, and sheep dung; and the carcasses

of a stingray, catfish, and birds. Adults have been found in Malaise traps, blowfly traps, and attracted to light. Two species of pteromalid parasitoids (Hymenoptera), *Spalangia endius* Walker and *Muscidifurax uniraptor* Kogan & Legner, have been reared from puparia in New Zealand (Holloway 1985: 253).

Relationships. See below under *Fannia anthracinalis*.

Fannia anthracinalis Domínguez & Pont, new species

Fig. 35–41, 50, 59, 68, 77, 85, 89–95, map 1

Fannia sp. 5 of Holloway, 1985: 254, Fig. 12–18, 27, 36, 45, 54, 63.

Fannia sp. 4 of Domínguez & Roig-Juñent, 2008: 573.

Diagnosis. Hind coxa bare postero-apically. Scutum with 4 brown vittae. Hind tibia with 2–3 anteroventral setae. Male hind trochanter with a comb of short erect setulae on inner ventral surface; mid tibia weakly curved at middle on dorsal surface; hind femur with a weak preapical swelling on ventral surface (Fig. 90). Female fore tibia usually with a short posterior seta; fronto-orbital setulae exclinate.

Description. **Adult**. **Male** (Fig. 89–93): Body length 4.8–6.5 mm.

Head: Ground-colour black. Frons narrow, at narrowest point broader than the width of postpedicel. Frontal vitta matt black, silvery pruinose when viewed from below, at narrowest point 2.2× width of anterior ocellus. Fronto-orbital plate silvery pruinose, more grey above, at the uppermost pair of frontal setae broader than anterior ocellus. 14 strong frontal setae. Eye with very short sparse hairs. One row of post-ocular setulae of regular length. Parafacial silvery pruinose, face and gena light grey. Parafacial at base of postpedicel 0.5× width of postpedicel, bare. Antenna black, postpedicel 1.7× as long as broad. Arista brown, almost bare, the individual hairs shorter than basal aristal diameter. Gena rather broad, the width below lowest eye-margin subequal to width of postpedicel, the face thus appearing rather short; gena sharply turned up towards vibrissa. Vibrissal area with a black pruinose patch at base of the setae and setulae. Prementum of proboscis brown dusted. Palpus weakly spatulate, dark brown.

Thorax: Ground-colour black, with grey, almost bluish, dust. Scutum with a pair of thin brown vittae between acrostichals and dorsocentrals, and a pair of broader vittae between dorsocentrals and intraalars, interrupted at suture. Pleura and scutellum grey, scutellum brown dusted medially. Presutural acrostichal setulae biserial, in 3 or even 4 rows postsuturally. Postpronotal lobe with 2 setae. One stout prealar close to suture, half length of 2nd notopleural, and a second weaker one closer to supraalar. 9–10 setulae adjacent to proepimeral seta.

Legs: Black. Fore femur length/width = 4.75; with 4 rows of short hair-like posterior and a row of strong posterodorsal setae; 1 row of posteroventrals, very long at apex, shorter towards base. Fore tibia with 1 long preapical dorsal, and a short apical ventral and posteroventral; with a short anterodorsal in apical half. Mid femur emarginate in apical quarter; with a row of anteroventrals that become shorter, stouter and comb-like in apical 1/3; with a double row of posteroventrals, as long as femoral width, becoming shorter and more comb-like towards apex; above this, from posteroventral to dorsal surface with only short clothing setulae. Mid tibia weakly curved at middle, ventrally strongly narrowed and excavated in basal half, swollen in apical half; ventral pubescence covering entire surface but denser in apical half where it is 0.7× width of tibia; 1 anterodorsal and 1 posterodorsal in apical fifth. Mid tarsomere 1 without a basal ventral crest. Hind coxa bare on postero-apical margin. Hind trochanter with a series of 7–9 short erect setulae on inner ventral surface. Hind femur (Fig. 90) length/width = 5.2; with a weak but conspicuous preapical swelling at apical third on ventral surface; with a row of anteroventral setae the longest of which are on the swelling and at that point are twice the regular femoral width; with a row of dense hair-like posterior setae on basal 2/3rd that merge with a cluster of long strong posteroventral setae on the swollen part (Fig. 90). Hind tibia with the submedian and preapical dorsal setae very long, subequal in length; 1 anterodorsal, slightly apicad of the submedian dorsal, and 2(–3) anteroventrals.

Wing: Yellowish, intensely so at base, veins yellow. Basicosta brownish, tegula black. Calypters yellowish-white, margins yellow, lower one projecting beyond upper one. Knob of haltere yellow.

Abdomen: Ground-colour black, densely light blue-grey dusted, with a brownish-black central triangular marking on each of syntergite 1+2 and tergites 3, 4 and 5. Sternite 1 densely setulose. Posterior margin of sternite 5 bilobate, broadly covered with setae (Fig. 91).

Postabdomen: Cercal plate fused; bacilliform sclerite corkscrew-shaped; surstylus simple, plate-like, not as long as epandrium, tapering at apex; epandrium densely setose on lower posterior margin; aedeagus membraneous (Fig. 92, 93).

Female (Fig. 94, 95): Body length 5.0–5.4 mm. Differs from the male as follows:

Head: Frons broad, at middle of head the distance between eyes more than 1/3rd of head-width. Fronto-orbital plate light grey pruinose, opposite lower orbital 2.5× diameter of anterior ocellus and slightly narrower than frontal vitta.

Frontal triangle very short, reaching a little beyond level of upper orbital. 7–10 frontal setae with a few short interstitials. Lower orbital placed slightly closer to margin of fronto-orbital plate than to eye-margin. Setulae on fronto-orbital plate in two rows below lower orbital, rarely in one row, rather strong and mostly exclinate. Parafacial bare, with a matt spot opposite postpedicel.

Thorax: Scutal pattern more sharply defined, the paramedian dark vittae often reaching only to 2nd postsutural dorsocentral.

Legs: Fore tibia usually with a submedian posterior seta, but sometimes without. Mid femur simple in structure; with a row of anteroventral setae on basal half, posteroventral surface with an even row of setulae some of which are half femoral width. Mid tibia simple in structure, without ventral pubescence, without ventral setae. Hind trochanter without the erect setulae. Hind femur simple in structure; with a row of anteroventral setae on apical 2/3, becoming longer towards apex, bare on posteroventral surface.

Abdomen*:* Shorter and broader than in male; completely light grey subshining, without any dark markings.

Postabdomen: Sternite 8 reduced to 2 small setulose square plates and a small slender plate anteriorly; spiracles situated in tergite 6. Two large and one smaller spermathecae, elongated, pear-shaped and with a smooth surface (Fig. 94, 95).

Third instar larva (Fig. 35–41, 50, 59, 68, 77, 86).

Dorsal aspect (Fig. 50): First thoracic segment (T1) (Fig. 50, 59) with short anterior processes; 1 minute lateral process immediately in front of anterior spiracle and cluster of projections in membrane near base of this spiracle; anterior spiracle with 8–12 short lobes. Second thoracic segment (T2) with moderately long laterodorsals bearing short, coarse projections basally, finer ones apically; dorsolaterals developed as small rosette of coarse projections; dorsomedians about 0.2 as long as laterodorsals, tapering, covered with short, coarse projections. Third thoracic segment (T3) with laterodorsals as on second thoracic segment (T2) but with coarser, longer, basal projections; dorsolaterals and dorsomedians as on T2 but slightly larger. First to seventh abdominal segments (A1–A7) with laterodorsals as on third thoracic segment (T3) but with larger, sometimes bifurcate, basal projections, with processes increasing slightly in size towards caudal end of body; dorsolaterals about 0.15 as long as laterodorsals, each a short stalk with 5–8 tapering projections mostly in opposite pairs, never extending outwards to produce star-shaped structure; dorsomedians short, tapering, about 0.3 as long as corresponding laterodorsals, covered with coarse, curved projections similar to those on integument immediately anterior to dorsomedians. Eighth abdominal segment (A8) with marginals similar to preceding laterodorsals; laterals about equal in length to subapicals, 1.4× as long as sublaterals, about 1.2× as long as preceding laterodorsals; spiracular stalks short, slightly divergent, bases about equidistant from midline and lateral margin; surface of spiracular plate (Fig. 69) uneven, of convex polygonal elements, bearing 2 very conspicuous circular sensilla; spiracular lobes short, broad, medial lobe separated from posterolateral lobe by obtuse angle, 2 lateral lobes separated by small notch; spiracular apertures minute, oval, on edge of plate. Integumental pattern (Fig. 77) of small, discrete elements, some grouped on weakly defined polygonal plates; pattern on first to third thoracic segments (T1–T3) and between each pair of dorsomedians partly obscured by thickening and darkening of cuticle; intersegmental membrane with fine, discrete elements, some bearing low, spiniform projections.

Ventral aspect: Second thoracic segment (T2) with slender, digitate process close to base of laterodorsal, about 0.2× as long as this process; lateroventrals represented by sensillum devoid of processes, on low callus; ventromedians and ventrolaterals represented by naked sensilla. Third thoracic segment (T3) with tapering lateroventrals similar to corresponding laterodorsals, about 0.3 of their length; sensilla of ventrolaterals and ventromedians lacking associated projections. First to seventh abdominal segments (A1–A7) with lateroventrals about 0.8 as long as laterodorsals, resembling laterodorsals but lacking bifurcate projections; ventrolaterals about 0.1 as long as lateroventrals, each a very short stalk covered with rather coarse projections; each pair of ventrolaterals connected by broad transverse band of spinules; members of 1 pair of ventromedians represented by sensillum surrounded by oval ring of projections, other ventromedians lacking these projections. Eighth abdominal segment (A8) with ventrolaterals slightly longer than those on seventh abdominal segment (A7), connected by broad, spinulose band. Integumental elements fine, dense, those of first to third thoracic segment (T1–T3) in rings and crescents; intersegmental membrane with fine, dense, elements, most bearing short, pointed projections.

Cephaloskeleton: as in Fig. 86.

Lengths: L1, 0.9–1.9 mm; L2, 1.5–3.9 mm; L3, 3.2–9.5 mm; puparia, 5.2–6.0 mm.

Material examined. Type series only.

Type material. **Holotype** ♂, **New Zealand**: **CH**. : "14. ii. 67 / cliffs ; Pt Weeding / Waitangi ; Chatham I. / Exp.Feb 1967 / J. S. Dugdale ; HOLOTYPE ♂ / Fannia / anthracinalis / Domínguez & Pont" (NZAC). **Paratypes**, 12♂

23♀: **TH**. Three Kings Islands, Great Island, Castaway Camp, nest 70/227, 28 Nov 1970, J. C. Watt, 1♀ (NZAC); same locality, Sep 1970, DSIR Expedition, 1♀ (NZAC). **CH**. Chatham Islands, Chatham Island, 1♀ same data as holotype (NZAC); Chatham Islands, Chatham Island, Owenga, 25 Feb 1967, J. S. Dugdale, Chatham I Exp, 1♀ (NZAC); Chatham Islands, Chatham Island, mouth of Tuku Valley, 21 Feb 1967, J. S. Dugdale, Chatham I Exp, 1♂ 7♀ (1♀ each BMNH & OUMNH, 1♂ 5♀ NZAC); Chatham Islands, Mangere Island, bird guano, 18 Nov 1970, J. I. Townsend), 1♂ (NZAC); Chatham Islands, Pitt Island, Glory Bay, 28 Feb 1967, J. S. Dugdale, Chatham I Exp,, 1♀ (NZAC); Chatham Islands, Pitt Island, Tipuangi Gully, 29 Feb 1967, J. S. Dugdale, Chatham I Exp, 3♀ (NZAC). **AU**. Auckland Islands, Enderby Island, debris around and below shag colony on cliffs near Sandy Bay, 26 Feb 1973, J. S. Dugdale, 8♂ 8♀ (1♂1♀ IADIZA, 1♂ each BMNH & OUMNH, rest NZAC); Auckland Islands, Enderby Island, Derry Castle Reef, supra-littoral, 25 Feb 1973, J. S. Dugdale, 1♂ (NZAC).**CA**. Campbell Islands, Campbell Island, Mt Yvon Villarceau, 20 m above h.w.m, 3 Dec 1975, puparia under stone in *Eudyptes chrysocome* rookery, em. 13 Dec 1975, B. M. May, 1♂ (NZAC).

Distribution (Map 1). **New Zealand**: Chatham Islands (Chatham, Mangere, Pitt), Auckland Islands (Auckland, Enderby, French, Rose, Ocean, Ewing), Campbell Islands, Three Kings Islands (Great Island).

TH /—/—/ CH, AU, CA

Etymology. The species name alludes to its affinity and resemblance to the *Fannia anthracina*-species group of southern South America (see Fig. 2).

Biology and immature stages. This is sp. 5 of Holloway (1985: 254–255, Fig. 12–18, 27, 36, 45, 54, 63). She listed the associations of this species as nest material of the red-billed gull (*Chroicocephalus novaehollandiae* (Stephens)), Auckland Islands shag (*Phalacrocorax colensoi* Buller) and rockhopper penguin (*Eudyptes chrysocome (*J.R. Forster)); and carcasses of the yellow-eyed penguin (*Megadyptes antipodes* (Hombron & Jacquinot)) and white-headed petrel (*Pterodroma lessonii* (Garnot)). Larvae were collected in December, January, and February. Our material includes adults collected on bird guano and on the debris associated with a shag colony.

Remarks. Even in undissected specimens it is possible to see the flattened, blade-like surstyli and the cluster of setae at the lower posterior corner of the epandrium. Smaller females tend to lack the posterior seta on fore tibia, namely 2♀ from Waitangi, 2♀ (of 3) from Tipuangi Gully, 6♀ from Enderby Island, and 1♀ from Three Kings Island.

Relationships. In the phylogenetic analysis by Domínguez & Roig-Juñent (2008), *F. anthracinalis*, together with *F. mangerensis* and *F. laqueorum*, is revealed near the base of a clade that contains the six species of the Neotropical *Fannia anthracina*-group (including *F. albitarsis*), six other Neotropical species, and three Australian species (Fig. 1).

Fannia canicularis (Linnaeus, 1761)

Fig. 12, 15, 45, 54, 63, 72, 81, 96

Musca lateralis Linnaeus, 1758: 597. Suppressed by I.C.Z.N. (1969), Opinion 884.

Musca canicularis Linnaeus, 1761: 454. Replacement name for *Musca lateralis* Linnaeus, 1758.

Homalomyia canicularis; Hutton 1901: 73; Hutton 1904: 350.

Fannia canicularis; Miller 1910: 233; Miller 1921: 321 ff; Miller 1922: 335; Malloch 1923: 605; Tillyard 1926: 374; Malloch 1930: 305; Séguy 1937: 165; Miller 1939: 21, 24, plate 1 fig.8; James 1947: 8, 129, Fig. 71–72; Miller 1950: 119, 144–146; Laird 1951: 14, 19; Harrison 1953b: 270; Harrison 1954: 78, 79; Harrison 1955: 209; Hennig 1955: 26; Chillcott 1961: 188; Hennig 1965: Fig. 6; Helson 1971: 63; Pont 1977a: 43, Fig. 8–12, 87–93; Subba Rao 1978: 69; Holloway 1985: 250, Fig. 22, 31, 40, 49, 58; Rozkošný *et al*. 1997: 37; Macfarlane *et al.* 2010: 449.

Homalomyia fraxinea Hutton, 1901: 75. Synonymised with *Fannia canicularis* by Malloch (1930: 305).

Homalomyia fraxinea; Hutton 1902: 172; Hutton 1904: 127; Lamb 1909: 126; Miller 1910: 234.

Limnophora fraxinea; Stein 1919: 135; Séguy 1937: 263.

Diagnosis. Hind coxa with 2 setulae on postero-apical surface. Only 1 setula adjacent to proepimeral seta. Antenna, palpus and most of legs black. Hind tibia with several short setae above and below the strong anterodorsal seta (Fig. 15). Abdomen usually partly yellow on basal segments. Male with a distinct reclinate orbital seta present; mid tibia simple in structure, with short fine ventral pubescence. Female with setulae on fronto-orbital plate continuing down on to parafacial.

Description. **Adult**. **Male** (Fig. 12, 15, 96): Body length 4.5–7.0 mm.

Head: Frons narrow. Frontal vitta dark brown to black, at narrowest point as wide as anterior ocellus. Fronto-orbital plate silvery pruinose, at uppermost pair of frontal setae 0.9× width of anterior ocellus. Up to 13 pairs of long frontal setae. Upper orbital seta present and reclinate. Eye bare, upper inner facets larger than the rest. Post-ocular setulae in one row above. Parafacial silvery pruinose, face light grey; parafacial at base of postpedicel 0.6× width of postpedicel and bare. Gena dark grey to black. Scape and pedicel black, postpedicel black, 2× as long as broad and covered with grey pruinosity. Arista black, almost bare, the individual hairs shorter than basal aristal diameter. Lower oral margin light grey. Prementum of proboscis brownish dusted. Palpus black, straight, the apex as wide as base.

Thorax: Ground-colour black. Scutum grey to brownish-grey dusted, with more or less well-marked dark brown vittae running along the acrostichal, dorsocentral and intraalar lines from neck almost to scutellum; postpronotal lobe and notopleuron whitish dusted; pleura grey; scutellum grey on at least apical half. Acrostichal setulae in 3–4 rows. Postpronotal lobe with 3 setae, the inner one weak. 1–2 very short prealars near supraalar. 2 proepimeral setae, without any adjacent setulae.

Legs: Dark brown to black, knees yellow, fore tibia yellow on basal quarter. Fore femur length/width = 6; with 1 row of posterodorsal setae; 2 rows of posterior setae; 1 basal posteroventral and a row of posteroventrals in apical 3/4. Fore tibia with 1 strong preapical dorsal; 1 apical ventral and posteroventral, apical anterodorsal very short; 2 short, setulose anterodorsals in apical half. Fore tarsomere 1 0.5× length of tibia; tarsomeres 4 and 5 short, as wide as long. Mid femur with a complete row of anterodorsal setae; 2 rows of very short anterior setae; anteroventral row short and fine in basal third, becoming stouter and comb-like in apical third; posteroventral row strong, as long as femoral width, becoming short, stout and comb-like in apical quarter; posterior row fine at base, becoming longer and stronger and with 5–6 stronger setae in apical quarter. Mid tibia simple in structure, weakly constricted at base, ventral pubescence very short, 0.25× width of tibia; with 1 anterodorsal and 1 posterodorsal in apical half; dorsal, anterior and anteroventral preapical setae strong, otherwise with only short weak setae at apex. Hind coxa with 2 setulae at apex of postero-apical surface (Fig. 12). Hind femur simple in structure, length/width = 6.25; with a row of anterodorsals, the apical 4–5 setae stouter and dorsally directed; anteroventral row very short, only 3–4 setae in apical third as long as femoral width; posteroventral surface with only short fine setae, half femoral width. Hind tibia with submedian and preapical dorsal setae subequal; 1 strong median anterodorsal and 3–8 short setae above and below this seta, apical anterodorsal well developed; 2–3 median anteroventrals and 1 apical anteroventral; apex of ventral and posteroventral surfaces with a short ctenidium (Fig. 15), and with a short posteroventral apical seta.

Wing: Clear; veins yellowish-brown; basicosta yellow, tegula orange to brown. Calypters white, creamy on margins, lower one projecting beyond upper one. Knob of haltere yellowish-white, light brown at base.

Abdomen: Elongated, syntergite 1+2 and tergites 3–4 uniform in width. Ground-colour black, but syntergite 1+2 and tergites 3 and 4 narrowly to broadly yellow especially at sides, rarely wholly black. Tergites light grey pruinose, with a narrow black undusted median vitta running along all tergites, the dark areas expanding behind on syntergite 1+2 and tergites 3–4 to form triangular markings, these sometimes less well defined on tergite 4. Sternite 1 densely setulose. Posterior margin of sternite 5 straight, with setae forming a central longitudinal line.

Postabdomen: See Pont (1977a: Fig. 87–89). Hypandrium broad, strongly sclerotized, hypandrial arms directed inwards; parameres horn-shaped, strongly sclerotized, surrounding the membraneous aedeagus. Cercal plate small and fused; bacilliform sclerite absent; surstylus formed by a flattened, parallel-sided, principal process and a ventral, lateral, smaller and depressed process that bears a group of setulae at apex, each surstylus directly and broadly connected to the hypandrium.

Female. Body length 4.8–5.2 mm. Differs from the male as follows:

Head: Frons and frontal vitta broad, at middle of head the distance between eyes 1/3rd of head-width at this point. Fronto-orbital plate grey pruinose. Frontal triangle very short, not reaching to level of lower orbital seta. 7–8 pairs of frontal setae, of which 3 are strong. Lower orbital more or less midway between eye-margin and margin of fronto-orbital plate or slightly closer to the plate. Fronto-orbital setulae in several rows above, in one row below and continued down on to parafacial beyond level of base of postpedicel.

Thorax: The brown vittae usually broader and more diffuse.

Legs: Colour as in male, hind trochanter yellow. Mid femur with a few short and fine anteroventrals in basal fourth; 1 posteroventral at base, otherwise with only setulae on ventral surfaces. Mid tibia with ventral pubescence absent. Hind femur bare ventrally except for 2–3 strong anteroventral setae in apical quarter.

Abdomen: Heart-shaped, tergite 4 approximately half as wide as tergite 3. Mainly dark in ground-colour, with some yellow at base and often on sides also of tergites 3 and 4. Dusting grey, with traces of the dark median vitta visible on all tergites.

Postabdomen: See Pont (1977a: Fig. 91–93). Cerci normal, short; hypoproct slightly broader than long, uniformly covered with setae; sternite 8 reduced to an anterior pair of plates covered with setulae and two posterior bare plates slightly larger than the anterior plates; postabdominal spiracles 7 and 8 on tergite 6. Two rounded spherical soft surfaced spermathecae, with unsclerotized ducts.

Third instar larva (Fig. 45, 54, 63, 72, 81).

Dorsal aspect (Fig. 45): First thoracic segment (T1) (Fig. 45, 54) with long, slender anterior processes; 1 pair of minute lateral processes approximately midway between anterior spiracle and anterior process; anterior spiracle

with 6–8 moderately long lobes. Second thoracic segment (T2) with long, slender laterodorsals covered with very fine, short projections; dorsolaterals very small, tapering, with short, coarse projections; dorsomedians almost 0.5× as long as laterodorsals, their projections at tip very fine, those at base and on integument anterior to base rather coarse. Third thoracic to seventh abdominal segments (T3–A7) with long, slender laterodorsals which have fine, simple projections on apical half and coarser, longer, rarely bifurcate projections basally; dorsolaterals very small, each a very short stalk bearing 2–4 simple projections of varying length, not forming star-shape; dorsomedians longer towards caudal end of body (but those on third thoracic segment (T3) shorter than those on second (T2)), those on seventh abdominal segment (A7) very much longer than preceding pair, all with short, fine projections apically, short coarse projections at base and on integument just anterior to base. Eighth abdominal segment (A8) with marginals similar to laterodorsals; laterals about 1.2× as long as preceding laterodorsals, about 2.0× as long as sublaterals, about 1.3× as long as subapicals; posterior spiracular stalks long, strongly divergent, arising closer to lateral margin than to midline; spiracular lobes (Fig. 63) moderately long and tapering, posterolateral lobe separated from medial lobe by obtuse angle, from anterolateral lobe by acute angle; spiracular apertures small, oval, apical. Integument of second to eighth abdominal segments (A2–A8) (Fig. 72) mainly densely granulate, elements grouped in irregular polygons separated by depressed, fine lines (fine broken lines in Fig. 72); integumental pattern of remaining tergites and between each pair of dorsomedians more or less obscured by uniformly smooth, dark areas; intersegmental membrane coarsely, densely granulate, most elements bearing a short, pointed projection.

Ventral aspect: Second thoracic segment (T2) with minute, filiform process near anterior margin, short distance from base of laterodorsal; lateroventrals represented by sensillum devoid of processes, on callus; ventrolaterals represented by sensillum surrounded by small ring of short projections; anterior and posterior ventromedians each represented by sensillum apparently lacking projections. Third thoracic segment (T3) with lateroventrals about 0.3× as long as corresponding laterodorsals, filiform, with fine projections on apical half, coarser projections basally; ventrolaterals consisting of small tuft of projections on anterior margin midway between lateroventrals and ventromedians; anterior ventromedians with form of sensillum enclosed by ring of very short projections, close to anterior margin; posterior ventromedians only slightly posterior to anterior pair, each a sensillum surrounded by minute, transparent projections. First to seventh abdominal segments (A1–A7) with lateroventrals similar to laterodorsals but slightly shorter, devoid of bifurcate projections; ventrolaterals as on third thoracic segment (T3) but slightly larger; both pairs of ventromedians aligned transversely near posterior margin, similar to anterior pair on third thoracic segment (T3). Eighth abdominal segment (A8) with ventrolaterals slightly longer than those on seventh abdominal segment (A7). Integumental surface mainly coarsely granulate; on second and eighth abdominal segments (A2–A8), elements anterior to level of ventrolaterals each with short, spiniform projection; on first to seventh abdominal segments (Al–A7), irregular row of simple projections extending laterally from outer ventromedians, outermost larger, loosely grouped around sensillum.

Cephaloskeleton: as in Fig. 81.

Lengths: L1, 1.1–1.6 mm; L2, 1.8–3.3 mm; L3, 2.9–9.4 mm; puparia, 5.4–6.4 mm.

Material examined. Type material. ***Musca lateralis*** (and ***Musca canicularis***). **Syntypes** 2♂, in LSL (Pont 1981: 170). One is labelled by Linnaeus "lateralis / 60", to which has been added in pencil "Sys. Nat X". The other has a typed tag "no label".

Homalomyia fraxinea. **Lectotype** ♂ (CMC), designated by Pont (1977a: 45). Labelled simply "Christchurch". Type-series examined by A.C.P. in 1966 and again in 1979.

New Zealand material. **North Island**. **ND**. Kerikeri saddle, 488 m, litter, 21 Oct 1976, J. S. Dugdale, 1♀ (NZAC); Onerahi, 12 Jan 1955, 1♂ (NZAC). **AK**. Auckland city abattoir, ex sheep dung, em. 26 Mar 1976, N. A. Martin, 4♂ (NZAC); same data, em. 25 Jun 1976, 5♂ 1♀ (NZAC); same data, em. 29 Jun 1976, 1♂ 1♀ (NZAC); Auckland University, City Campus, clock tower, east wing, windows, 17 Oct 2006, S. E. Thorpe, 1♂ (NZAC); Avondale, indoors, 23 Feb 1948, 2♂ 2♀ (NZAC); Avondale, 20 Aug 1950, R. A. Harrison, 1♂ (NZAC); Browns Bay, 23 Aug 1949, R. A. Harrison, 1♀ (NZAC); same data, Sep 1949, 1♂ (NZAC); Auckland, Greenlane, 16 Oct 1949, K. P. Lamb, 1♂ (NZAC); same data, at lampshade, 26 Jun 1949, 1♂ 1♀ (NZAC); Henderson, 41 Rhinevale Close, 21 Oct 2006, S. E. Thorpe, 1♂ (NZAC); Lynfield, Tropicana Drive, ex guinea pig dung, em. 1 Sep 1976, B. A. Holloway, 2♂ 6♀ (NZAC); same data, em. 2 Sep 1976, 2♀ (NZAC); same data, em. 6 Sep 1976, 1♂ 2♀ (NZAC); same data, em. 21 Sep 1976, 2♂ (NZAC); Lynfield, ex guinea pig den material, em. 27 Feb 1978, B. A. Holloway, 2♀; Lynfield, at guinea pig den in garden, 28 Sep 1978, B. A. Holloway), 1♂; Lynfield, inside house, 25 Jul 1984, B. A. Holloway, 1♂ (NZAC); Lynfield, in house, 13 Oct 1983, B. A. Holloway, 1♂ (NZAC); Lynfield, 27 Jul 1984, B. A. Holloway, 1♀ (NZAC); Lynfield, in porch, 13 Apr 1986, B. A. Holloway, 1♀ (NZAC); Lynfield, on window, 28 Mar 1979, G. Kuschel,

1♀ (NZAC); no locality [Owairaka], bred from pupae in *Macrocystis* compost, 2 Aug 1948 (C. Little), 1♂ 2♀ (NZAC); Owairaka, bred ex soil glasshouse, em. 8 Nov 1948, D. McKenzie, 1♂ 2♀ (NZAC); Owairaka, bred ex *Macrocystis* compost, 11 Aug 1948, C. Little, 2♀ (NZAC); Owairaka, 2 Apr 1940, D. Spiller, 2♂ (NZAC); Owairaka, ex rotten celery, 8 Jul 1940, D. Spiller, 1♀ (NZAC); Point Chevalier, reared ex rotting nectarine, 24 Feb 1989, D. Gardiner, 1♂ 4♀ (NZAC); Ranui, Henderson, larvae ex poultry droppings tray, 17 Mar 1956, K. A. J. Wise, 1♂ 1♀ (NZAC); Wattle Bay, Lynfield, ex kingfisher nest, 18 Feb 1980, B. A. Holloway, 5♂ 3♀ (NZAC). **TO**. Taupo, 12 Jan 1932, J. S. Armstrong, 1♂ (NZAC); same locality, bred, 4 Mar 1937, 1♂ 3♀ (NZAC); same locality, bred, 6 Mar 1937, 2♂ (NZAC); same locality, bred, 1 Mar 1937, 2♀ (NZAC); same locality, 23 Jan 1944, 1♀ (NZAC); same locality, at light, 18 Apr 1936, 1♀ (NZAC); same locality, garden, 2 Dec 1931, 1♀ (NZAC); same locality, window, 21 Feb 1935, 1♀ (NZAC); same locality, bred ex onions, 22 Feb 1958, 1♀ (NZAC). **HB**. Hastings, Aug 1983, B. A. Holloway, 2♂ 4♀ (NZAC); the same, em. ex poultry manure, 5♂ 6♀ (NZAC); Hatuma, 19 Sep 1962, J. S. Armstrong, 1♂ (NZAC); Havelock North, in house, 29 Jun 1983, B. A. Holloway, 5♂ 1♀ (NZAC); Twyford, ex poultry manure, em. 21 Oct 1976, B. A. Holloway, 3♂ 2♀ (NZAC); Twyford, ex poultry manure collected 21 Oct 1976, em. 15 Nov 1976, B. A. Holloway, 8♂ 4♀ (NZAC); same data, em. 17 Dec 1976, 1♂ (NZAC); Twyford School, 21 Oct 1976, B. A. Holloway, 25♂ 10♀ (NZAC). **WN**. Weraroa, carrion, 3 Apr 1922, 3♀ (NZAC); Karori, Park, 16 Nov 1935, J. T. Salmon, 1♂ (LUNZ); Plimmerton, 20 Sep 1924, 1♂ (LUNZ); Wellington, 17 Jun 1921, Miller, 2♂ 1♀ (NZAC); Wellington, 21 Apr 1924, 1♀ (LUNZ); same locality, 18 Aug 1924, 1♀ (LUNZ); same locality, 16 Nov 1923, 1♂ (LUNZ); same locality, 25 Nov 1923, 1♀ (LUNZ); Wellington, in potato tuber, 17 Mar 1942, 1♂ (NZAC); Wellington, Island Bay, 16 Jun 1921, 5♂ (NZAC); Wellington, Kilbirnie, Nov 1951, G. Ramsay, 1♂ (LUNZ); Wellington, Lyall Bay, 10 Jan 1922, Miller, 3♂ 4♀ (NZAC). **South Island**. **NN**. Nelson, 6 Feb 1929, E. S. Gourlay, 3♂ (NZAC); same data, 13 Jan 1949, 1♀ (NZAC); Nelson, 29 Jan 1971, E. W. Valentine, 9♂ 1♀ (NZAC); Nelson, Nov 1961, A. Parrott, 1♂ (NZAC). **MB**. Blenheim, Teschenmachen [?], em. May 1922, Miller, 1♂ (NZAC). **MC**. Arthurs Pass NP, Halpin Creek, 29 Nov 1977, E. Schlinger, 1♂ (NZAC); **DN**. Christchurch ex "Waikouaiti", rotten Chinese beetroot, May 1922, Miller, 2♂ (NZAC); the same, 26 May 1922, 2♂ 5♀ (NZAC). **SL** West Plains, Oct 1929, 1♂ (NZAC). **CH**. **Chatham Islands**, Chatham Island, Waitangi, at light after 11 pm, 9 Feb 1967 (Chatham Islands Expedition), 1♂ (NZAC). **AU**. **Auckland Islands**, Auckland Island**,** Mt Durville, 639 m, mossy mats, 4 Jan 1973, (J. Farrell), 1♀ (NZAC). **Interceptions**. ex bulbs from Holland, 7 Apr 1922, Miller, 3♂ 1♀ (NZAC); ex bulbs from Holland, 3 Jan 1924, Dallas, 2♂ 1♀ (NZAC);

Previously recorded from New Zealand by Hutton (1901, 1904), Miller (1910), Malloch (1923, 1930), James (1947), Tillyard (1926), Helson (1971), and Pont (1977a); from Auckland Islands and Antipodes Islands by Hutton (1902), Lamb (1909), Miller (1950), and Harrison (1953b, 1954, 1955). Intercepted on an aircraft from Australia (Laird 1951).

Distribution. Cosmopolitan. In **New Zealand** from most regions, including Chatham Island and Auckland Island.

ND, AK, TO, HB, WN / NN, MB, MC, DN, SL / CH, AU

Biology and immature stages. The immature stages have been described by Lyneborg (1970: 19–20, Fig. 1f, 11) and in detail by Holloway (1985: 250–251, Fig. 22, 31, 40, 49, 58). The larvae are known to breed in all kinds of decaying organic matter. New Zealand records from the material listed above and from Holloway (*l.c.*) are: from imported bulbs, onions, potato tuber, rotten celery, rotting nectarine, rotting pumpkin, rotting Chinese beetroot, decaying citrus leaves, *Macrocystis* compost, glasshouse soil, carcasses of stingray and hedgehog, sheep dung, guinea pig dung, guinea pig den material, poultry droppings and poultry manure, nest material of birds (New Zealand kingfisher (*Todiramphus sanctus* (Vigors & Horsfield, 1827)) and European starling (*Sturnus vulgaris* Linnaeus, 1758)), and pigeon cages. It is also known as a secondary sheep maggot-fly, reared from wool (Miller 1921: 321; 1922: 335; 1939: 21, 24). Larvae in New Zealand are parasitised by *Tachinaephagus zealandicus* Ashmead (Hymenoptera: Encyrtidae) (Subba Rao 1978), and by *Spalangia endius* Walker and *Muscidifurax uniraptor* Kogan & Legner (Hymenoptera: Pteromalidae) (Holloway 1985). In New Zealand both adults and larvae have been collected throughout the year.

Relationships. In the phylogenetic analysis by Domínguez & Roig-Juñent (2008) (Fig. 1), the species of the *Fannia canicularis*-group are revealed rather close to the base of the Fanniidae but the group itself was not revealed as monophyletic.

Fannia hollowayae Domínguez & Pont, new species

Fig. 49, 58, 67, 76, 85, 97–103, map 2
Fannia sp. 4 of Holloway, 1985: 254, Fig. 26, 35, 44, 53, 62.
Fannia sp. 2 of Domínguez & Roig-Juñent, 2008: 573.

Diagnosis. Hind coxa setulose. Antenna and palpus yellow. Frontal vitta and frons of male very narrow; male abdomen yellow on margins of syntergite 1+2 and tergite 3. Female mid tibia with a short anteroventral seta.

Description. **Adult**. **Male** (Fig. 97–101): Body length 4.7–5.3 mm.

Head: Ground-colour black, anterior areas paler in fresh specimens. Frons narrow, at narrowest point 2× diameter of anterior ocellus, and at this point each plate and the frontal vitta 0.6× width of anterior ocellus. Fronto-orbital plate, parafacial and gena silvery-white pruinose, occiput grey. 11–13 long frontal setae, the upper 1–2 pairs more reclinate but apparently not true orbitals. Eye bare. One row of post-ocular setulae of irregular length. Parafacial slender, bare, at base of postpedicel 0.37× width of postpedicel, tapering strongly below. Gena very slender, the width below lowest eye-margin less than half the width of postpedicel. Antenna orange-yellow, the postpedicel partly darkened in specimens not fully hardened; postpedicel 1.9× as long as broad. Arista light brown, the longest hairs less than its basal diameter. Prementum of proboscis dusted. Palpus slender, pale yellow.

Thorax: Ground-colour black. Scutum brown dusted, with indistinct grey markings as follows: a pair of vittae between acrostichals and dorsocentrals, from neck almost to 2nd postsutural dorsocentral, a pair of vittae between dorsocentrals and intraalars, and the whole prealar area; postpronotal lobes white dusted. Scutellum brown dusted, pleura grey. Presutural acrostichal setulae 3-serial, postsuturally 3- to 5-serial. Postpronotal lobe covered with short setulae. One long prealar, half length of 2nd notopleural, closer to suture than to supraalar, with 1–2 setulae behind it. 6–10 fine setulae surrounding proepimeral seta.

Legs: Entirely yellow, except for black tarsomeres. Fore femur length/width = 5.2; with 2 rows of posterior setae as long as femoral width; posteroventrals long, fine and sparse at base, stronger and denser near apex. Fore tibia with 1 preapical dorsal; 1 apical ventral and 1 apical posteroventral, both short. Mid femur slightly emarginate at apex of anteroventral surface; basally with 6 or 7 well-spaced anteroventrals, the row becoming denser, shorter and more spinose in distal 1/3; posteroventral surface with a row of setae that are long and fine in basal half, becoming denser and spinose in apical third opposite the anteroventrals. Mid tibia narrowed in basal half; ventral pubescence covering entire ventral surface, 0.44× width of tibia; 1 anterodorsal and 1 posterodorsal. Mid tarsomere 1 without a basal ventral crest. Hind coxa with 3 setulae on postero-apical margin. Hind femur length/width = 5.8; bare ventrally except for 2–3 anteroventral setae in apical third, at most equal to femoral width (Fig. 97, 98). Hind tibia with the submedian and preapical dorsal setae subequal in length; 1 anterodorsal, slightly below or slightly above submedian dorsal seta, and 1 anteroventral (Fig. 98).

Wing: Clear, wing veins light brown. Basicosta and tegula yellow. Calypters creamy, margins yellow, lower one well-developed, oval in shape, projecting slightly beyond upper one. Knob of haltere yellow.

Abdomen: Ground-colour dark brown, subshining; yellow on lateral parts of syntergite 1+2 and tergite 3, leaving "triangulated" dark patches. In posterior view with some grey dust on tergites 4 and 5 leaving the usual dark triangular median markings undusted. Sternite 1 with numerous hair-like setulae. Anterior margin of sternite 5 weakly bilobate, with a broad row of setae (Fig. 99).

Postabdomen: Cercal plate fused, broad at tip; bacilliform sclerite corkscrew-shaped. Surstylus simple, long and very broad, tapering at apex; aedeagus membraneous (Fig. 100, 101).

Female (Fig. 102, 103): Body length 4.0–4.2 mm. Differs from male as follows:

Head: Eyes separated by about 1/3rd of head-width at middle of frons. Fronto-orbital plate brownish-grey pruinose, opposite lower orbital seta 3× diameter of anterior ocellus and half width of frontal vitta. Frontal vitta orange. 9 frontals including interstitials, and a partially double row of setulae below lower orbital. Upper orbital seta reclinate, lower orbital exclinate. Lower orbital closer to eye-margin than to margin of fronto-orbital plate. Antenna broader and shorter than in male, postpedicel 1.3× as long as broad, extensively darkened. Palpus weakly spatulate.

Thorax: Some of pleura (mainly anepisternum and anepimeron), postpronotal lobe, supraalar area and much of scutellum yellow. Grey markings very indistinct, the paramedian ones obsolete. Sometimes with a second prealar next to supraalar.

Legs: Mid femur bare ventrally. Mid tibia usually with 1 short anteroventral. Hind tibia with the anterodorsal above the level of the submedian dorsal seta.

Wing: Calypters often yellow. Knob of haltere often orange.

Abdomen*:* Ground-colour entirely black. Shorter and broader than in male. With some dark greyish-brown dust, but subshining from most angles.

Postabdomen: Sternite 8 reduced to 2 small plates; spira-

cles situated in tergite 6; Two pear-shaped and smooth surfaced spermathecae (Fig. 102, 103).

Third instar larva (Fig. 49, 58, 67, 76, 85):
Dorsal aspect (Fig. 49): First thoracic segment (T1) (Fig. 49, 58) with moderately long anterior processes with coarse projections on their basal half; 2 minute lateral processes in front of, and partly concealed by, each anterior spiracle; anterior spiracle with 9–11 very short lobes. Second thoracic segment (T2) with short laterodorsals bearing relatively long, unbranched projections; dorsolaterals distant from anterior margin, each a ring of minute projections enclosing sensillum; dorsomedians each a small rosette of minute projections. Third thoracic segment (T3) with laterodorsals and dorsomedians slightly longer than those of second (T2), their projections unbranched, very long, dense; dorsolaterals similar to those of second thoracic segment (T2) but further from anterior margin. First to seventh abdominal segments (A1–A7) with laterodorsals similar to those of third thoracic segment (T3), plumose, increasing in length towards caudal end of body, with bifurcate as well as simple projections, bifurcate projections more numerous on posteromedial edge of process; dorsolaterals relatively long, with similar plumose form to laterodorsals but slightly shorter; dorsomedians very much shorter than dorsolaterals, each a rosette of projections on distinct stalk. Eighth abdominal segment (A8) with marginals similar to laterodorsals; subapicals longest, about 1.6× as long as preceding laterodorsals; laterals about 0.8× as long as subapicals; sublaterals about 0.9× as long as laterals; posterior spiracular stalks very short, broad, slightly divergent, arising slightly closer to midline than to lateral margin; spiracular plate (Fig. 67) subtriangular with small, oval spiracular apertures near points of triangle, anterolateral aperture dorsal, medial and posterolateral apertures marginal. Integumental pattern (Fig. 76) of irregularly shaped polygonal plates, those of first to third thoracic segments (T1–T3) each with low, rounded dome, elsewhere with very low relief except that on second to seventh abdominal segments (A2–A7) some plates near anterior margin and those immediately posterior to dorsomedians have large, conical projections; intersegmental membrane finely granulate, some elements fused to form narrow bands.

Ventral aspect: Second thoracic segment (T2) with very small, tufted process at anterolateral angle, near base of laterodorsal; lateroventrals represented by sensillum devoid of processes, on low callus; ventrolaterals each a sensillum surrounded by ring of minute projections; anterior ventromedians similar to ventrolaterals; posterior ventromedians represented by minute, naked sensillum. Third thoracic to seventh abdominal segments (T3–A7) with lateroventrals similar to laterodorsals but slightly shorter; ventrolaterals small, those on third thoracic segment (T3) and first abdominal segment (A1) each a sensillum surrounded by several concentric rings of very small projections, those on second to seventh abdominal segments (A2–A7) digitiform, bearing moderately long, slender projections, all processes slightly longer towards caudal end of body; anterior and posterior ventromedians as on second thoracic segment (T2). Eighth abdominal segment (A8) with ventrolaterals about 3× as long as those on seventh abdominal segment (A7). Integumental pattern of small, irregularly shaped polygonal plates with low relief.

Cephaloskeleton: as in Fig. 85.

Lengths: L2, 1.8–1.9 mm; L3, 5.4–5.5 mm.

Material examined. **Type material**. **Holotype** ♂, **New Zealand**: **AK**, "ex soil under / lamb died / 20 Jul 1976 ; Lynfield, AK /Tropicana Dr. / em 1 Nov 1976 / B. A. Holloway ; HOLOTYPE ♂ / Fannia / hollowayae / Domínguez & Pont" (NZAC). **Paratypes** 4 ♂ 36♀: **North Island**. **AK**. same data as holotype but em. 20 Jul 1976, G. Kuschel, 1♀ (NZAC); same locality as holotype, but ex soil under dead lamb, em. 20 Sep 1976, 1♂ 2♀ (NZAC); same data as holotype but em. 20 Sep 1976, G. Kuschel, 1♂ 1♀ (NZAC); same data as holotype, but em. 30 Sep 1976, G. Kuschel, 1♀ (NZAC); same locality, but ex soil under dead lamb, em. 20 Sep 1976, B. A. Holloway, 1♀ (NZAC); Otara, 4 Dec 1949, R. A. Harrison, 1♀ (LUNZ); Titirangi, ex light trap, 16 Jan 1953, C. R. Thomas, 1♀ (NZAC); Wattle Bay, on dead sting ray above high water mark, 20 Feb 1977, B. A. Holloway), 1♀ (NZAC). **BP**. Mamaku Plateau, Galaxy Road, 500 m, carrion traps, 25–29 Mar 1978, S. B. Peck, 1♀ (NZAC). **WN**. Eastbourne, Jan 1960, G. W. Gibbs, 2♀ (NZAC); Levin, Kimberly Reserve, 30 m, carrion traps, 8–10 Mar 1978, S. & J. Peck, 1♀ (NZAC); Orongorongo, carrion, 4 Sep 1921, D. Miller, 1♂ 1♀ (NZAC); Tararua Ranges, Dundas Hut, 14 Feb 1985, B. A. Holloway, 1♀ (NZAC); same locality, vicinity of toilet, 10 Feb 1985, 7♀ (1 each BMNH & OUMNH, 5 NZAC); on outside walls of toilet, 1250 m, 10 Feb 1985, 1♀ (NZAC); Tararua Ranges, Field's Hut, 7 Dec 1952, B. A. Holloway, 4♀ (LUNZ); same locality but 9 Dec 1952, 7♀ (NZAC). **South Island**. **NN**. Aniseed Valley, 29 Dec 1953, E. S. Gourlay, 1♀ (ANIC). **KA**. Oaro, sweep ex grass, 13 Mar 1971, J. Navabhinon, 1♂ (NZAC). Uncertain locality: Kailawa, 12 Dec 1922, 1♀ (LUNZ).

Not paratypes (condition too poor): **North Island** . **AK**. Titirangi, ex light trap, 10 Dec 1953, C. R. Thomas, 1♀ (NZAC); **South Island**. **NN**. Rotoroa, carrion traps, 3–7 Feb 1978 (S. & J. Peck), 1♂ [terminalia only, specimen lost], (NZAC).

Distribution. **New Zealand**, from North Island (Auck-

land, Bay of Plenty) and South Island (Nelson, Kaikoura).

AK, BP / NN, KA / —

Etymology. The species name is a patronym in honour of Dr Beverley A. Holloway, to whom it is dedicated for her ground-breaking work with the larvae of New Zealand Fanniidae.

Biology and immature stages. Holloway (1985: 254) found five larvae in August and September in soil under a dead lamb. Our specimens have been collected on a dead sting ray and in carrion traps.

Relationships. In the phylogenetic analysis by Domínguez & Roig-Juñent (2008), *F. hollowayae* and *F. triregum*, with the hind coxa bearing setulae on the postero-apical surface, are revealed in a different clade from *F. anthracinalis*, *F. laqueorum* and *F. mangerensis*, which have the hind coxa bare on postero-apical surface. These two species group with 2 Holarctic species and 4 Neotropical species (Fig. 2).

Fannia laqueorum Domínguez & Pont, new species

Fig. 42, 51, 60, 69, 78, 87, 104–111, map 3
Fannia sp. 6 of Holloway, 1985: 255, Fig. 19, 28, 37, 46, 55, 64.
Fannia sp. 6 of Domínguez & Roig-Juñent, 2008: 573.

Diagnosis. Hind coxa bare on postero-apical margin. Head, thorax, legs, and abdomen black. Gena very broad, the width below lowest eye-margin greater than length of postpedicel. Male with the frons very broad, at narrowest point at least twice as wide as width of postpedicel; fronto-orbital plate on lower half with a row of proclinate setulae outside the frontal setae.

Description. **Adult**. **Male** (Fig. 104–108): Body length: 6.0–6.7 mm.

Head: Ground-colour black. Frons broad, at narrowest point twice width of postpedicel. Frontal vitta matt black, silvery when viewed from below; very broad, at narrowest point 3.3× width of anterior ocellus or broader than width of postpedicel. Fronto-orbital plate silvery pruinose, becoming grey above, at the uppermost pair of frontal setae almost twice width of anterior ocellus. 9–11 frontal setae, with several interstitials; outside them with a row of short proclinate setulae on lower half of fronto-orbital plate. Eye bare. 1 row of post-ocular setulae of irregular length. Parafacial light grey or silvery, with a matt patch at lunula; face light grey, gena grey. Parafacial at base of postpedicel 0.6× width of postpedicel and bare. Antenna black, postpedicel 1.3× as long as broad. Arista dark brown, almost bare, the longest individual hairs shorter than basal aristal width. In lateral view, facial edge projecting forward beyond level of profrons. Gena broad, the width below lowest eye-margin greater than length of postpedicel. Proboscis slender, prementum brown dusted. Palpus weakly spatulate, dark brown.

Thorax: Ground-colour black, with grey, almost bluish, dust. Scutum with a pair of thin brown vittae between acrostichal and dorsocentral rows, reaching to level of 2nd postsutural dorsocentral, and a pair of broader vittae between dorsocentral and intraalar rows, interrupted at suture. Postpronotal lobe and notopleuron whitish dusted. Pleura and scutellum grey, the latter with a more or less darker brown median line. Presutural acrostichal setulae triserial, 4-serial after suture. Postpronotal lobe with 2 setae. One strong prealar near the suture, about half as long as 2nd notopleural, and a much weaker one near supraalar. 4–9 setulae adjacent to proepimeral seta.

Legs: Black. Fore femur length/width = 4.3; with several rows of short posterior setae, and a row of strong posterodorsals; posteroventral row short at base, almost as long as femoral width. Fore tibia with 1 preapical posterodorsal, without apical ventral and posteroventral setae, and without anterodorsal or submedian posterior setae. Mid femur weakly emarginate in apical third; with 1 row of short anteroventrals, becoming shorter, denser, more spinose and comb-like in apical third; posteroventral surface with a complete double row of short, stout setulae; 1 row of short and fine posterior setae except for 3–4 strong setae at apex. Mid tibia ventrally narrowed and excavated in basal 2/5, swollen in apical 3/5th; ventral pubescence short and dense, 0.3× width of swollen part of tibia, covering entire surface; 1 very short anterodorsal and 1 posterodorsal in apical half. Mid tarsomere 1 without a basal ventral crest. Hind coxa bare on postero-apical margin. Hind femur length/width = 4.75; with a row of anteroventral setae, short and setulose in basal half, becoming longer apicad and with 3–5 in apical third as long as femoral width (Fig. 104, 105); posteroventral surface only with setulae but a few of these in apical half often quite long and erect. Hind tibia with the submedian and preapical dorsal setae subequal in length; 1 anterodorsal, slightly apicad of submedian dorsal; anterodorsal preapical very short; 1–2 anteroventrals (Fig. 105).

Wing: Yellowish, especially at base, veins brown. Basicosta orange, tegula black. Calypters and margins creamy, lower one projecting beyond upper one. Haltere yellow.

Abdomen: Ground-colour black. Densely light grey dusted at sides of syntergite 1+2 and tergite 3, otherwise grey, almost bluish dusted with dark brown triangular markings on each of syntergite 1+2 and tergites 3 to 5, these often indistinct or virtually absent. Sternite 1 densely setulose. Posterior margin of sternite 5 with two striking projections and very densely setose on posterior margin (Fig. 106).

Postabdomen: Cercal plate fused; bacilliform sclerite very short and thorn-like; surstylus simple, shorter than epandrium, tapering at apex; aedeagus membraneous (Fig. 107, 108).

Female (Fig. 109, 110, 111): Body length 5.6–5.9 mm. Differs from the male as follows:

Head: Frons broad, at middle of head the distance between eyes more than 1/3rd of head-width. Fronto-orbital plate light grey pruinose, opposite lower orbital 3× diameter of anterior ocellus, and slightly narrower than frontal vitta. Frontal triangle very short, reaching a little beyond level of upper orbital. 7–9 frontal setae with a few short interstitials. Lower orbital variable in position, closer to eye-margin than to margin of fronto-orbital plate, or midway between the two, or closer to fronto-orbital plate. Setulae on fronto-orbital plate in 1–2 irregular rows, short and proclinate. Parafacial light grey to silvery.

Legs: Fore tibia with a short anterodorsal at apical quarter. Mid femur setulose ventrally, without setae, but the anteroventral setulae rather erect and almost half femoral width. Hind femur bare ventrally, with only 3–5 anteroventral setae in apical half. Hind tibia with 1 anteroventral seta.

Wing: Sometimes veins weakly seamed with brownish.

Abdomen: Completely grey dusted, with at most traces of a light brown vitta on tergites 4 and 5.

Postabdomen: Sternite 8 reduced to a single fused plate with several stout setulae, and a broad and short plate before this (Fig. 109). Epiproct very enlarged, cerci and hypoproct consequently directed ventrad (Fig. 111). Spiracles situated in tergite 6. Two large and one reduced elongate spermathecae (Fig. 109, 110, 111).

Third instar larva (Fig. 42, 51, 60, 69, 78, 87):

Dorsal aspect (Fig. 51): First thoracic segment (T1) (Fig. 51, 60) with very short, thick anterior processes; 1 minute lateral process immediately in front of anterior spiracle; anterior spiracle with 12–20 very short lobes. Second thoracic segment (T2) with moderately short laterodorsals covered with short, fine projections, those towards apex extremely fine; dorsolaterals each a tuft of short, coarse projections; dorsomedians very short, about 0.3× as long as laterodorsals, bearing coarse, relatively long projections. Third thoracic segment (T3) with laterodorsals resembling those of second thoracic segment (T2) but slightly longer, with longer, coarser, but never bifurcate projections on basal half; dorsolaterals and dorsomedians as on second thoracic segment (T2) except larger. First to seventh abdominal segments (A1–A7) with laterodorsals all rather short, similar to those on third thoracic segment (T3) except that some projections may be bifurcate; dorsolaterals each an extremely short stalk bearing 5–8 elongate processes at tip, processes rarely bifurcate, not radiating into star-shape; dorsomedians resembling those on third thoracic segment (T3), all short, not increasing much in length towards caudal end of body. Eighth abdominal segment (A8) with marginals similar to preceding laterodorsals but much larger projections at base; laterals about 1.4× as long as sublaterals and preceding laterodorsals, about 1.3× as long as subapicals; spiracular stalks short, parallel, their bases closer to midline than to lateral margin; surface of spiracular plate (Fig. 69) very uneven, of convex, polygonal elements, 2 very conspicuous sensilla; spiracular lobes very short, broad, medial and posterolateral lobes not very divergent, 2 lateral lobes separated by small notch; spiracular apertures minute, oval, marginal. Integumental pattern (Fig. 78) of irregularly shaped elements of various sizes, some in bands and crescents, some bearing long, spiniform projections; projections mainly near anterior margin of second and third thoracic segments (T2 and T3), on first to seventh abdominal segments (A1–A7) projections confined to broad transverse band on middle third of segment, elements of eighth abdominal segment (A8) mainly devoid of projections; intersegmental membrane with dense, relatively coarse elements, many bearing spiniform projections.

Ventral aspect: Second thoracic segment (T2) with minute, digitate process near anteromedial edge of laterodorsal; each ventrolateral represented by small, naked sensillum on low callus; ventromedian and ventrolateral sensilla devoid of associated projections. Third thoracic segment (T3) with tapering lateroventrals resembling corresponding laterodorsals, about 0.3× their length; sensilla of ventrolaterals and ventromedians lacking projections. First to seventh (A1–A7) with lateroventrals similar to corresponding laterodorsals, only slightly shorter; ventrolaterals each a very short stalk, about 0.2× as long as that of corresponding lateroventrals, with rather coarse, unbranched projections; each pair of ventrolaterals joined by transverse band of spinulose elements; each sternite with irregular band of spiniform projections on posterior margin, projections arranged in large, oval cluster around each ventromedian sensillum. Eighth abdominal segment (A8) with ventrolaterals very slightly longer than those of seventh abdominal segment (A7), connected by broad, transverse spinulose band. Integumental elements fine, dense, those of first to third thoracic segments (T1–T3) in rings and crescents; intersegmental membrane with very fine, dense elements, mostly lacking projections.

Cephaloskeleton: as in Fig. 87.

Lengths: L2, 2.2 mm; L3, 2.7–9.2 mm; puparia, 7.3–8.3 mm.

Material examined. **Type series only**. **Holotype** ♂, **New Zealand**: **SN**. "Rima Inlet, / Western Chain, / Snares Is.,

N. Z. / 21.xi.76 / J. W. Early ; on rock around / Diomedea salvini / colony, 80 m. ; HOLOTYPE ♂ / Fannia / laqueorum / Domínguez & Pont" (NZAC). **Paratypes** 28♂ 38♀: **SN**. same data as holotype, 1♂ 4♀ (NZAC); Snares Islands, Western Chain Islands, Rima Islet, under stones on mud and near nests of *Diomedea cauta salvini*, 80 m, 21 Nov 1976, J. W. Early, 11♂ 21♀ (1♂ 1♀ each in IADIZA, BMNH & OUMNH, rest NZAC), all with puparia; Snares Islands, Western Chain Islands, Rima Islet, larvae in carcass of *Diomedea cauta salvini*, P76-31, 21 Nov 1976, D. S. Horning, 14♂ 9♀, many with puparia (1♂ 1♀ each in BMNH & OUMNH, rest NZAC); Snares Islands, Main Island, Penguin Creek, feeding on flowers of *Hebe elliptica* [Shore Hebe, Shore Koromiko], P76-19, 4 Jan 1977, D. S. Horning, 1♀ (NZAC); Snares Islands, Main Island, Sinkhole Gut, supra-littoral rocks, 14 Nov 1976, J. W. Early, 2♂ (NZAC); the same, 5 Jan 1977, 1♀; Snares Islands, Main Island, Station Cove, rotting *Durvillea* and seal dung on supra-littoral rocks, 9 Jan 1977, J. W. Early, 2♀ (NZAC).

Distribution (map 3). **New Zealand**: Snares Islands.
— /—/ SN

Etymology. The Latin for "a snare" is *laqueus*, and *laqueorum* (genitive plural) is a pun on the name of the Snares Islands, where the type series was collected. The name was suggested by Dr Beverley Holloway.

Biology and immature stages. This is sp. 6 of Holloway (1975: 255–256, Fig. 19, 28, 37, 46, 55, 64). She recorded larvae from penguin rookeries and the carcasses of seabirds and seals; larvae were collected from January to April, inclusive. Our material indicates associations with rotting *Durvillea* (a large species of kelp), seal dung. and the nests of the shy mollymawk or Salvin's albatross (*Thalassarche salvini* (Rothschild)).

Relationships. See above under *Fannia anthracinalis*.

Fannia magnicornis Domínguez & Pont, new species

Fig. 112–114, map 4

Diagnosis. Antenna and palpus yellow; postpedicel very large, 2.3× as long as broad. Scutum yellow, with a single brown vitta along acrostichal rows.

Description. **Adult**. **Female** (male unknown): Body length 3.9–4.5 mm.

Head. Ground-colour mainly orange. Frons broad, at middle about 1/3rd of head-width at this point. Frontal vitta orange to orange-brown, at narrowest point 7× width of anterior ocellus and 4× width of a fronto-orbital plate at this point. Fronto-orbital plate grey to orange-yellow pruinose, at the uppermost pair of frontal setae 2× width of anterior ocellus. 6–7 frontal setae. Upper reclinate and lower reclinate or exclinate orbitals present, with 1 row of setulae on fronto-orbital plate below lower orbital seta. Lower orbital closer to eye-margin than to margin of fronto-orbital plate. Eye bare. 1 row of post-ocular setulae of regular length. Face, parafacial and gena yellow. Parafacial at base of postpedicel 0.3× width of postpedicel, narrowing below, bare. Gena narrow, the width below lowest eye-margin less than width of postpedicel. Antenna yellow; postpedicel dark on outer surface and at tip, sometimes mainly dark, very long, 2.3× as long as broad. Arista brown, the hairs hardly as long as its basal diameter. Prementum of proboscis dusted. Palpus rather spatulate and yellow.

Thorax: Ground-colour yellow; scutum with a single brown vitta along acrostichal rows that continues on to disc of scutellum; pleura yellow, except for brown katepisternum and (usually) meron; metatergite partly to mainly dark brown. Presutural acrostichal setulae 3- to 4-serial, postsuturally 4- to multiserial. Postpronotal lobe with very few short setulae. 1 very strong prealar near the suture, almost half as long as 2nd notopleural, and in some specimens with another weaker prealar near supraalar, hardly distinguishable from clothing setulae. 1–2 weak setulae near the proepimeral seta.

Legs: Entirely yellow, except for black tarsomeres, brown tips of mid and hind femora, and brownish base of hind tibia. Fore femur normal, length/width = 5.6; 2 rows of short posterior setae; 1 row of posteroventrals, very short at base, longer at apex. Fore tibia with 1 preapical dorsal seta; 1 apical ventral and 1 apical posteroventral seta, both short. Mid femur with only setulae on anteroventral and posteroventral surfaces. Mid tibia with 0–1 anterodorsal and 1 posterodorsal. Hind coxa with 1 setula on posteroapical margin. Hind femur normal, length/width = 4.9; with 2 anteroventrals in apical third, otherwise bare on ventral surfaces. Hind tibia with the submedian and preapical dorsal setae relatively short; 1 anterodorsal, above the level of submedian dorsal seta, and 1 weak anteroventral.

Wing*:* Clear, veins brown. Basicosta and tegula yellow. Calypters yellowish, lower one rounded, weakly projecting beyond upper one. Knob of haltere yellow.

Abdomen: Yellow at base of syntergite 1+2, otherwise dark brown and covered with even grey dust. Sternite 1 with only a few setulae.

Postabdomen: Sternite 8 reduced to two small plates bearing short spines; spiracles situated on tergite 6; two large and one reduced spermathecae, elongated and rugose (Fig. 113, 114).

Material examined. **Type series only**. **Holotype** ♀, **New Zealand: ND**. "NEW ZEALAND, ND / Waipoua State Forest, / Te Matua Ngahere, / 370m, carrion traps, / 16-20. iii.1978 S & J Peck ; HOLOTYPE ♂ / Fannia / magnicornis / Domínguez & Pont" (NZAC). **Paratypes** 5♀: North Island. ND. same data as holotype, 5♀ (1 BMNH, 4 NZAC).

Te Matua Ngahere is the name of one of the most notable New Zealand kauri trees, the largest by girth and the second largest by volume.

Distribution (map 4). **New Zealand**: Northland region.
ND /— /—

Etymology. The species name refers to the very large antennae.

Biology. Adults were found in carrion traps, but otherwise nothing is known about the biology and immature stages.

Relationships. This species was not included in the phylogenetic analysis by Domínguez & Roig-Juñent (2008) because only females were (and still are) available and the majority of characters used in the analysis were those of the male sex. However, its similarity to *F. hollowayae* suggests that its relationships are with that species.

Fannia mangerensis Domínguez & Pont, new species

Fig. 115–121, map 5
Fannia sp. 5 of Domínguez & Roig-Juñent, 2008: 573.

Diagnosis. A very dark species with body and legs black, wing dark smoky and calypters dark brown. Hind coxa bare on postero-apical margin. Male with frons and parafacial narrow, and hind femur with a weak preapical swelling on anteroventral surface.

Description. **Adult**. **Male** (Fig. 115–119): Body length: 5.0–5.3 mm.

Head: Ground-colour black. Frons narrow, at narrowest point not quite as broad as width of postpedicel. Frontal vitta matt black, brown pruinose when viewed from below, at narrowest point 1.6× width of anterior ocellus. Fronto-orbital plate silvery pruinose below but grey above, at uppermost frontal seta half as broad as anterior ocellus. 12–14 strong frontal setae. Eye bare. One row of post-ocular setulae of regular length. Parafacial silvery pruinose above, matt grey below, face and gena dark brownish-grey. Parafacial at base of postpedicel 0.6× width of postpedicel and bare. Antenna black, postpedicel short and broad, 1.3× as long as broad. Arista dark brown, almost bare, the individual hairs shorter than basal aristal diameter. Gena rather broad, the width below lowest eye-margin equal at least to width of postpedicel, the face thus appearing rather short; gena sharply turned up towards vibrissa. Prementum of proboscis brown dusted. Palpus slender, dark brown.

Thorax: Ground-colour black. Virtually undusted except on scutum, which has a pair of weak brown-dusted vittae outside presutural dorsocentrals and brown dust on postpronotal lobe and notopleuron. Acrostichal setulae 2- to 3-serial before and after suture. Postpronotal lobe with 3 setae. One stout prealar close to suture, over half as long as 2nd notopleural, and a second slightly weaker one closer to supraalar. 9–10 hair-like setulae adjacent to proepimeral seta.

Legs: Entirely black. Fore femur length/width = 5.6; with several rows of hair-like posterior setae and a row of long posterodorsals (Fig. 115); 1 row of long hair-like posteroventrals, much longer than femoral width; some fine anteroventrals in basal quarter. Fore tibia with 1 long preapical dorsal; 1 apical ventral and 1 posteroventral, both short; without submedian posterior setae, and without or rarely with a short anterodorsal. Mid femur narrowed in apical quarter but not emarginate; with a row of long strong anteroventrals, shorter and more spinose in apical third, the last few weak; posteroventral surface with a row of longer finer setae, longer than femoral width, shorter towards apex and in apical half with a finer row ventrad of it; with a full row of short fine posterior setae. Mid tibia weakly curved at middle, ventrally strongly narrowed and excavated in basal half, swollen in apical half; ventral pubescence covering entire ventral surface, but denser in apical half where it is 0.5× width of tibia; 1 anterodorsal and 1 posterodorsal in apical fifth. Mid tarsomere 1 without a basal ventral crest. Hind coxa bare on postero-apical margin. Hind trochanter without a short row of erect setulae. Hind femur length/width = 6.5; with a weak preapical swelling on anteroventral surface; 1 row of long anteroventrals, twice femoral width before preapical swelling; with 1 row of long hair-like posterior setae that become multiserial and more posteroventral and ventral on the swollen part of the femur; posterior surface otherwise with several rows of short fine setae, curled at tips (Fig. 116). Hind tibia with the submedian and preapical dorsal setae very long, almost subequal in length; 1 anterodorsal, at the same level as the submedian dorsal seta, and 1 preapical anterodorsal; 1–2 anteroventrals (Fig. 116).

Wing: Very dark and smoky, veins dark brown. Basicosta and tegula dark brown. Calypters brown, margin of lower one or of both dark brown; lower one projecting beyond upper one. Knob of haltere brown.

Abdomen*:* Ground-colour black, brown dusted, with a subshining central triangular marking on each of syntergite 1+2 and tergites 3 and 4, and a median line on tergite 5. Sternite 1 densely setulose. Posterior margin of sternite 5 weakly indented, with setae covering posterior half (Fig. 117).

Postabdomen: Cercal plate fused; bacilliform sclerite corkscrew-shaped; surstylus simple, broad, as long as epandrium, tapering at apex; aedeagus membraneous (Fig. 118, 119).

Female (Fig. 120, 121): Body length 5.0–5.5 mm. Differs from the male as follows:

Head: Frons broad, at middle of head the distance between eyes more than 1/3rd of head-width. Fronto-orbital plate brown pruinose, subshining from some angles, opposite lower orbital 3× diameter of anterior ocellus and much narrower than frontal vitta. Parafacial also more brownish pruinose. Rarely with a second row of post-ocular setulae beginning at vertex. Frontal triangle indistinct, reaching a little beyond level of upper orbital seta. 9–10 frontal setae with a few short interstitials. Lower orbital placed distinctly closer to eye-margin than to inner margin of fronto-orbital plate. Setulae on fronto-orbital plate in two rows below lower orbital, fine and proclinate. Parafacial bare, without a matt spot opposite postpedicel.

Legs: Fore femur with the rows of posteroventral and posterior setae shorter. Fore tibia with a short anterodorsal in apical quarter. Mid femur with 1 row of short sparse anteroventrals in basal half, as long as femoral width, and 2–3 short posteroventrals in basal quarter; posterior surface without setae, except in apical quarter. Mid tibia simple in structure, without ventral pubescence, without ventral setae. Hind femur simple in structure; with a row of anteroventral setae, longest on third quarter and longer than femoral width; without posteroventrals. Hind tibia usually with only 1 anteroventral.

Abdomen: Shorter and broader than in male, thinly dusted and, in posterior view, mostly subshining black.

Postabdomen: Sternite 8 reduced to two small plates with short setulae, and a small anterior plate; spiracles situated in tergite 6. Two large and one reduced spermathecae, round and smooth surfaced (Fig. 120, 121).

Immature stages. Unknown.

Material examined. **Type series only**. **Holotype** ♂, **New Zealand**, **CH**. : "N.Z. CHATHAM IS: / S.E.Island, flowers / of Myosotidium, / 2.xi.1970 J. I. Townsend / HOLOTYPE ♂ / Fannia / mangerensis / Domínguez & Pont" (NZAC). **Paratypes** 11♂ 49♀: **Chatham Islands**. **CH**. same data as holotype, 10♂ 8♀ (1♂ each IADIZA, BMNH, OUMNH, rest NZAC); same locality, 2 Nov 1970, 1♀ (NZAC); same locality, 3 Nov 1970, 1♂ (NZAC); same locality, 9 Nov 1970, 1♀ (NZAC); Chatham Islands, Mangere Island, bird guano, 18 Nov 1970, J. I. Townsend, 40♀ (1 IADIZA, 2 each BMNH & OUMNH, rest in NZAC).

Distribution (map 5). **New Zealand**: Chatham Islands (Mangere and South East).

— /— / CH

Etymology. The species name refers to Mangere Island in the Chatham Islands where much of the type-series was collected.

Biology and immature stages. Not known. However, the capture of a long series of females on bird guano suggests that this is the larval pabulum.

Relationships. See above under *Fannia anthracinalis*.

Fannia mercurialis Domínguez & Pont, new species

Fig. 47, 56, 65, 74, 83, 122–129, map 6

Fannia sp. 3 of Holloway, 1985: 252, Fig. (24, 33, 42, 51, 60).

Diagnosis. A dark species with black legs, antenna and palpus. Hind coxa with a single short seta on postero-apical margin. Hind tibia with a single anterodorsal seta, placed well apicad of the submedian dorsal seta. Male head holoptic. Female with a conspicuous dark matt patch on parafacial at level of pedicel.

Description. **Adult**. **Male** (Fig. 122–126): Body length 4.5–4.8 mm.

Head: Ground-colour probably black when fully hardened. Frons narrow, at narrowest point not quite as broad as width of postpedicel. Frontal vitta orange-red, at narrowest point probably as broad as width of anterior ocellus. Fronto-orbital plate silvery pruinose, at uppermost frontal seta as broad as anterior ocellus. 12–14 pairs of frontal setae, including several interstitials. Eye bare. One row of post-ocular setulae of regular length. Parafacial silvery pruinose, matt grey below, face and gena also matt grey. Parafacial narrow, linear below (because the head is not fully expanded and hardened). Antenna black, postpedicel short and broad, 1.3× as long as broad. Arista dark brown, almost bare, the individual hairs shorter than basal aristal diameter. Gena rather broad, the width below lowest eye-margin equal to length of postpedicel, the face thus appearing rather short; gena sharply turned up towards vibrissa. Prementum of proboscis dusted light grey. Palpus slender, dark brown.

Thorax (Fig. 122): Ground-colour black. Scutum light grey, almost bluish dusted, with dark markings as follows: a pair of narrow brownish vittae between the acrostichal and dorsocentral rows, running from neck midway to scutellum; a brown presutural spot between supraalar, intraalar and dorsocentrals; and an elongate brown postsutural spot between intraalars and dorsocentrals. Postpronotal lobe and notopleuron whitish dusted, pleura grey, scutellum light grey like scutum. Acrostichal setulae mostly 2-serial before suture, regularly 3-serial after 2nd postsutural dorsocentral. Postpronotal lobe with 3 setae. 2 prealar setulae, anterior one rather stout, close to suture, and almost half length of 2nd notopleural; posterior one

shorter and weaker, close to supraalar. 6–7 hair-like setulae adjacent to the proepimeral seta.

Legs: Not fully hardened, and twisted. Entirely black. Fore femur with 2–3 rows of fine posterior setae and a row of strong posterodorsals; posteroventral row fine, absent on basal quarter of femur. Fore tibia with 1 long preapical dorsal seta, and a short apical anteroventral and posteroventral; without submedian posterior seta or anterodorsal setulae. Mid femur narrowed in apical third but not emarginate; with a row of anteroventral setae, those on third quarter shorter and more spinulose; posteroventral surface with a full row of setae, none as long as femoral width, becoming denser and stouter in apical third; with a full row of short fine posterior setae. Mid tibia excavated ventrally in basal half, ventral pubescence covering entire length of tibia, longest and densest in apical half where it is half width of tibia; 1 anterodorsal and 1 posterodorsal, both at apical fifth and both short. Mid tarsomere 1 without a basal ventral crest. Hind coxa with 1 short, inconspicuous seta on postero-apical margin, usually difficult to see. Hind femur not modified in shape; with a row of strong anteroventrals most of which are longer than femoral width; with a row of finer posteroventrals, many of which are also longer than femoral width, and above them with several incomplete rows of fine posterior setae. Hind tibia with the submedian and preapical dorsal setae long and strong, the preapical seta longer than the submedian one; 1 anterodorsal, well apicad of the subnmedian dorsal, and 1 preapical anterodorsal; 2 anteroventral setae.

Wing: Clear, yellowish tinged especially towards base. Basicosta black, tegula orange. Calypters white with yellowish margins; lower one projecting beyond upper one. Knob of haltere yellow.

Abdomen (Fig. 123): Ground-colour black, light grey dusted and with a broad triangular black marking on each of syntergite 1+2 and tergites 3–5. Sternite 1 densely setulose. Posterior margin of sternite 5 weakly bilobate, broadly covered with setae (Fig. 124).

Postabdomen: Cercal plate fused; bacilliform sclerite corkscrew-shaped; surstylus simple, plate-like, half as long as epandrium, tapering at apex; epandrium with a cluster of dense short setae on lower posterior margin; aedeagus membraneous (Fig. 125, 126).

Female (Fig. 127–129): Body length 4.8–5.2 mm. Differs from the male as follows:

Head: Frons broad, at middle of head the distance between eyes a little over 1/3rd of head-width. Fronto-orbital plate grey pruinose, opposite lower orbital 3× diameter of anterior ocellus and only a little narrower than frontal vitta. Frontal vitta orange. Parafacial silvery. Frontal triangle indistinct, hardly reaching to level of upper orbital. 8–9 frontals, including a few short interstitials. Lower orbital placed closer to margin of fronto-orbital plate than to eye-margin. Setulae on fronto-orbital plate in one row except below, short and proclinate. Parafacial narrow, bare, with a large dark matt spot opposite pedicel.

Thorax: Postpronotal lobe with 2 setae. Posterior prealar sometimes absent. Sometimes as few as 3 setulae around proepimeral seta.

Legs: Fore femur with the rows of posterior and posteroventral setae shorter. Fore tibia with a very short anterodorsal in apical quarter. Mid femur bare ventrally except for 1–2 short anteroventrals near base; a row of rather strong posterior setulae in apical half that end as several setae near apex. Mid tibia simple in structure, without ventral pubescence, without ventral setae. Hind femur in apical half with some stronger anteroventral setulae and 1–2 strong setae before apex, bare on posteroventral and posterior surfaces. Hind tibia with only 1 anteroventral.

Abdomen: Shorter and broader than in male. Entirely grey dusted, without any dark markings.

Postabdomen: Sternite 8 reduced to 2 small setulose plates and a small slender plate anteriorly; spiracles situated in tergite 6. Two large and 1 smaller spermathecae, elongated, pear-shaped and smooth-surfaced (Fig. 127–129).

Third instar larva (Fig. 47, 56, 65, 74, 83):

Dorsal aspect (Fig. 47): First thoracic segment (T1) (Fig. 47, 56) with moderately long, slender anterior processes; 1 minute lateral process immediately in front of anterior spiracle, another in membrane adjacent to this spiracle; anterior spiracle with 6–8 moderately long lobes. Second thoracic segment (T2) with long, slender laterodorsals covered with fine projections; dorsolaterals in form of minute rosettes with conspicuous associated sensillum in integument immediately anterior to base; dorsomedians short, tapering, about 0.25× as long as laterodorsals, clothed with coarse projections, with cluster of 3–7 coarse projections and conspicuous circular sensillum immediately anterior to base, similar projections posteriorly. Third thoracic segment (T3) with laterodorsals as on second thoracic segment (T2) except apical projections minute, those on basal half long, coarse, tips may be bifurcate; dorsolaterals and dorsomedians as on second thoracic segment (T2) except larger. First to seventh abdominal segments (A1–A7) with laterodorsals as on third thoracic segment (T3) except most basal projections bifurcate; dorsolaterals distinctly increasing in length towards caudal end of body, each a short stalk bearing 4–7 moderately long, simple or bifurcate projections more or less in opposite pairs, never opening out into definite star-shape; dorsomedians larger towards caudal end of body, similar to those on third thoracic segment (T3), up to 6 projections immediately anterior to base, none

posteriorly. Eighth abdominal segment (A8) with marginals similar to preceding laterodorsals; laterals about 1.2× as long as subapicals and preceding laterodorsals, about 1.5× as long as sublaterals; spiracular stalks short, slightly divergent, arising slightly closer to midline than to lateral margin; spiracular plate (Fig. 65) of irregularly-shaped polygonal elements, lobes short, medial lobe separated from posterolateral by shallow, obtuse angle, lateral lobes separated by shallow indentation; spiracular apertures small, oval, marginal. Integumental pattern (Fig. 74) of fine granular elements mostly in complete or incomplete rings or crescents; surface pattern between bases of dorsomedians of second to seventh abdominal segments (A2–A7) and between bases of dorsolaterals and laterodorsals of each segment completely obliterated by uniformly smooth, dark cuticle: intersegmental membrane with fine, dense elements lacking distinct spinules.

Ventral aspect: Second thoracic segment (T2) with minute digitate process near base of laterodorsal; lateroventrals represented by conspicuous sensillum devoid of processes, on apex of large callus; no processes associated with ventromedian and ventrolateral sensilla. Third thoracic segment (T3) with lateroventrals bearing simple projections, about 0.3× as long as corresponding laterodorsals; no processes associated with ventromedian and ventrolateral sensilla. First to seventh abdominal segments (Al–A7) with lateroventrals about 0.5× as long as laterodorsals, similar to laterodorsals except no more than 3 long, bifurcate projections; ventrolaterals very small, rosette-shaped, each pair connected by transverse row of spinulose projections; sensilla of outer pair of ventromedians devoid of projections, those of inner pair enclosed by ring of small projections. Eighth abdominal segment (A8) with ventrolaterals and connecting row of spinules similar to those on seventh abdominal segment (A7). Integumental pattern of fine, dense elements in rings or crescents; intersegmental membrane with finer elements.

Cephaloskeleton: as in Fig. 83.

Lengths: L1, 0.9–1.5 mm; L2, 1.4–3.3 mm; L3 2.9–8.3 mm; puparia, 5.5–6.0 mm.

Material examined. **Type series only**. **Holotype** ♂, **New Zealand**, **CL**. "NEW ZEALAND CL / Mercury Is. / Korapuki I. / em. 15 Feb 88 / coll. G. Hall ; from nest material / Eudyptula minor / coll. 14 Dec 1987 ; Fannia sp.3 ♂ / Holloway, 1984 / det. B. A. Holloway 1988 ; HOLOTYPE ♂ / Fannia / mercurialis / Domínguez & Pont" (NZAC). **Paratypes** 2♂ 11♀: **North Island**. **CL**. data as for holotype, 1♂ 6♀ (1♀ BMNH, rest NZAC); the same but emerged 2 Feb 1988, 1♀ (NZAC); the same but emerged 12 Feb 1988, 1♀ (NZAC); Mercury Islands, Korapuki Island, emerged 28 Jan 1988 from burrow material of *Puffinus gavia*, collected 14 Dec 1987, G. Hall, 1♂ 2♀ (NZAC); Mercury Islands, Koropuki Island, Blue Penguin nest material, larva left material 16 Dec 1987, adult emerged 8 Jan 1988, G. Hall, 1♀ (NZAC).

The type-series consists of reared specimens that are not fully hardened, with shrivelled heads and legs, the latter mostly twisted.

Distribution (map 6). **New Zealand**, known from Korapuki Island in the Mercury Islands off the north-east coast of North Island (type-series), and also recorded by Holloway (1985: 252) from Tarahiki Island, a small islet east of Waiheke Island and offshore from Auckland. She also alluded to localities in Marlborough Sounds, Kaikoura, and Dunedin.

CL /— /—

Etymology. The species name is the Latin adjective formed from Mercury, the winged messenger god of classical Roman mythology, and here refers to the type-locality, the Mercury Islands to the northeast of New Zealand's North Island.

Biology and immature stages. According to our material, the species has been reared from nest material of the little or blue penguin (*Eudyptula minor* (J.R. Forster)) and from burrow material of the fluttering shearwater (*Puffinus gavia* (Forster)). The larva was described by Holloway (1985: 252, Fig. 24, 33, 42, 51, 60, as *Fannia* sp. 3), who also found larvae in nest material of the australasian gannet (*Sula bassana serrator* Gray) and of the spotted shag (*Stictocarbo punctatus* Sparrman). Larvae were collected in November and December.

Relationships. This species was not included in the phylogenetic analysis by Domínguez & Roig-Juñent (2008) because it had not at the time been recognised. However, the presence of setulae on the postero-apical margin of the hind coxa together with its other characters suggest that its relationships are with *F. triregum*.

Fannia triregum Domínguez & Pont, new species

Fig. 130–137, map 7

Fannia sp. 3 of Domínguez & Roig-Juñent, 2008: 573.

Diagnosis. Hind coxa setulose on postero-apical margin. Wing slightly smoky. Male frons and frontal vitta very broad; both orbital setae present; mid tibia weakly narrowed in basal half.

Description. **Adult**. **Male** (Fig. 130–134): Body length 3.8–4.1 mm.

Head. Frontal vitta dark brown, orange near lunula in some specimens; very broad, at narrowest point 5× width of anterior ocellus and twice as wide as a fronto-orbital plate at this point. Fronto-orbital plate dark grey pruinose and

broad, partly subshining from some angles, at uppermost pair of frontal setae 2× width of anterior ocellus. 7–9 frontal setae, including several interstitials. Upper reclinate and lower exclinate orbitals present, strong, with 1 irregular row of setulae below lower orbital. Lower orbital closer to eye-margin than to margin of fronto-orbital plate. Eye bare. One row of post-ocular setulae of regular length. Face grey dusted. Parafacial and gena dull grey pruinose. Parafacial at base of postpedicel 0.34× width of parafacial and bare. Gena broad, below lowest eye-margin as deep as width of postpedicel. Pedicel and scape dark brown, postpedicel light grey dusted and 1.7× as long as broad (Fig. 130). Arista light brown, virtually bare, the hairs shorter than its basal diameter. Prementum of proboscis thinly dusted. Palpus slightly spatulate, dark brown.

Thorax: Ground-colour black. Scutum dark greyish-brown to grey pruinose, with no discernible pattern of markings; postpronotal lobe and notopleuron whitish, pleura grey, and disc of scutellum brownish. Presutural acrostichal setulae 2- to 3-serial, postsuturally 3- to 4-serial. Postpronotal lobe covered with short setulae. One short prealar near the suture and usually another weaker one near supraalar, neither as long as a ground-setula. 3–4 short setulae adjacent to proepimeral seta.

Legs: Entirely black. Fore femur length/width = 4.5; with 1 long and 2 short rows of posterior setae; 1 row of posteroventrals, as long as femoral width throughout. Fore tibia with 1 preapical dorsal; 1 apical ventral and 1 apical posteroventral, both short. Mid femur slightly emarginate at apex of anteroventral edge, with 1 row of anteroventrals that are denser and shorter in distal third; with 1 row of posteroventrals, as long as femoral width, becoming shorter towards apex and tripled in apical half. Mid tibia weakly narrowed in basal half; ventral pubescence covering entire ventral surface, very short and even, 0.3× width of tibia; with 1 anterodorsal and 1 posterodorsal. Mid tarsomere 1 without a basal ventral crest. Hind coxa with 2–3 setulae on postero-apical margin. Hind femur normal, length/width = 5.6; with a row of very short anteroventrals in basal half and 2–3 preapical anteroventrals slightly longer than femoral width; 1 row of very short posteroventrals (Fig. 130, 131). Hind tibia with the preapical and submedian dorsal setae subequal in length; 1 anterodorsal, slightly above submedian dorsal seta, and 1 anteroventral (Fig. 131).

Wing: Weakly smoky, veins brown. Basicosta black, tegula orange. Calypters creamy, the margins deep yellow, lower one well developed, oval in shape, projecting beyond upper one. Knob of haltere dark yellow.

Abdomen: Ground-colour black, covered with grey dust and with ill-defined dark areas medially on each tergite. Sternite 1 setulose. Anterior margin of sternite 5 weakly bilobate and covered with setae and setulae (Fig. 132).

Postabdomen: Cercal plate fused; bacilliform sclerite large, corkscrew-shaped; surstylus simple, shorter than epandrium, tapering at apex; aedeagus membraneous (Fig. 133, 134).

Female: Body length 3.9–4.3 mm. Differs from the male as follows:

Head: Distance between eyes more than 1/3rd of head-width. Fronto-orbital plate grey pruinose, opposite lower orbital twice the diameter of anterior ocellus and about 1/3rd width of frontal vitta. Frontal vitta partly or wholly orange. 7–9 frontal setae and interstitials, with a row of setulae below lower orbital seta.

Legs: Mid femur bare on anteroventral and posteroventral surfaces. Hind femur without ventral setae except for 1–2 anteroventrals before apex.

Wing: Calypters yellow.

Abdomen: Shorter and broader than in male, grey dusted and with weakly indicated dark areas on tergites as in male.

Postabdomen: Sternite 8 absent. Spiracles situated in tergite 6. Two pear-shaped and smooth surfaced spermathecae (Fig. 135–137).

Immature stages. Unknown.

Material examined. **Type series only**. **Holotype** ♂, **New Zealand**, **TH**. "NEW ZEALAND: / Three Kings Islands, / Great Island / Castaway Camp, / xi. 1970, DSIR Exped. ; HOLOTYPE ♂/ Fannia triregum / Domínguez & Pont" (NZAC). **Paratypes** 7♂ 4♀: **Three Kings**. **TH**. data as for holotype, 1♂ 2♀ (NZAC); Three Kings Islands, Great Island, Castaway Camp, at light, Nov 1970, N.Z. Ent.Div. Expedition, J. McBurney, 2♂ (BMNH & NZAC); same data, at light, *Leptospermum ericoides* and *Coprosma*, 2♂ 2♀ (NZAC). **South Island**. **SD**. Stephens Island, Cook Strait, 1 Dec 1953, B. A Holloway, 1♂ (LUNZ); the same, 15–19 Dec 1954, G. Ramsay, 1♂ (LUNZ).

The holotype appears to have been retrieved from alcohol and so the colour of many body parts is paler than in wild-caught specimens, e.g. the calypters are white and the frontal vitta is orange.

Distribution (map 7). **New Zealand**: Three Kings Islands and Stephens Island, to the north and south of New Zealand's North Island, respectively.

TH / — / SD /—

Etymology. The species name is formed from the Latin *tres* ("three", modified to *tri-* in compounds) and *rex* ("king", genitive plural *regum*), and is a noun in apposition referring to the Three Kings Islands where the holotype was collected.

Biology. Nothing is known about the habits or biology of this species. The immature stages are not known.

Relationships. See above under *Fannia hollowayae*.

Fannia sp. 2 of Holloway, 1985

Fig. 46, 55, 64, 73, 82
Fannia sp. 2 of Holloway, 1985: 251, Fig. 23, 32, 41, 50, 59.

This species is known only from the larval stage, and is included here (and in the keys to *Fannia* species above) for the sake of completeness.

Third instar larva (Fig. 46, 55, 64, 73, 82):
Dorsal aspect (Fig. 46): First thoracic segment (T1) (Fig. 46, 55) with very short, thick anterior processes; 1 minute lateral process immediately in front of anterior spiracle; anterior spiracle with 6–7 moderately long lobes. Second thoracic segment (T2) with well developed laterodorsals covered with long, slightly curved projections; dorsolaterals present as sensillum surrounded by small ring of minute projections; dorsomedians minute, each a short stalk bearing few lateral projections. Third thoracic segment (T3) and first abdominal segment (A1) with long laterodorsals with elongate, strongly curved, unbranched projections; dorsolaterals of third thoracic segment (T3) represented by sensillum lacking associated projections, those of first abdominal segment (Al) similar to corresponding laterodorsals but only 0.5× as long; dorsomedians as on second thoracic segment (T2) except slightly larger. Second to seventh abdominal segments (A2–A7) with laterodorsals, dorsolaterals, and dorsomedians very similar, large, somewhat plumose, each a strong shaft with relatively long, strongly curved, unbranched projections arising almost at right-angles, spaced more or less evenly over entire surface; laterodorsals with 4 or 5 projections much longer than rest, distributed about evenly along proximal three-fifths of posteromedial edge, projections on apical one-fifth very short, fine; dorsolaterals about 0.5× as long as laterodorsals, with apical projections not markedly shorter than others; dorsomedians about 0.8× as long as laterodorsals, with projections about equal in size except at extreme apex where distinctly shorter, finer. Eighth abdominal segment (A8) with marginals similar to laterodorsals; laterals about 1.2× as long as preceding laterodorsals; sublaterals and subapicals about same length as preceding laterodorsals; posterior spiracular stalks long, almost parallel, arising closer to midline than to lateral margin; spiracular plate (Fig. 64) elongate-oval, not divided into lobes; spiracular apertures minute, circular, close together at apex of plate. Integumental pattern of first thoracic to first abdominal (T1 –Al) of dense, moderately large, convex, polygonal plates; of second to eighth abdominal segments (A2–A8) (Fig. 73) of weakly defined, small, widely spaced elements, those of A8 slightly denser; intersegmental membrane with small, moderately dense elements bearing short spinules.

Ventral aspect: Second thoracic segment (T2) with very small, filiform lateral process, about 0.2× as long as adjacent laterodorsal; lateroventrals represented by sensillum on low callus, lacking projections; ventrolateral and ventromedian sensilla lacking projections. Third thoracic segment (T3) with lateroventrals similar to laterodorsals, about 0.3× their length; ventrolaterals and ventromedians as on second thoracic segment (T2). First to seventh abdominal segments (Al–A7) with lateroventrals similar to corresponding laterodorsals but only about 0.6× their length; ventrolaterals very small, but increasing in size towards caudal end of body, each a loose rosette of projections, each pair of rosettes connected by irregular row of spinulose elements; 1 pair of ventromedians present, each a sensillum surrounded by 2 or 3 concentric rings of very small, simple projections. A8 with ventrolaterals similar to preceding lateroventrals, about 0.25 of their length. Integumental surface with finer, denser elements than on dorsal surface; intersegmental membrane as on dorsal surface.

Cephaloskeleton: as in Fig. 82.

Lengths: L3, 5.8–6.1 mm.

Distribution. Known only from **New Zealand**, **North Island**. AK, Tarahiki Island (Shag Rock) off Waiheke Island, where 2 larvae were found in the lining of burrows of the grey-faced petrel (*Pterodroma macroptera gouldi* (Hutton)) (Holloway 1985: 252).

AK /—/ —

Genus *Zealandofannia* Domínguez & Pont, new genus

Type-species *Zealandofannia mystacina* Domínguez & Pont, new species

A small dark fly (Fig. 138) with a dichoptic head in both sexes (Fig. 139).

Diagnosis. Anterior presutural dorsocentral very short. Posterior postsutural intraalar absent. Katepisternum with a third, ventral, seta, close to the posterior seta. Parafacial very slender, at base of postpedicel 0.3× width of postpedicel and bare, tapering sharply from lunula and virtually obsolete from level of arista downwards. Postpedicel very long and covered with grey pruinosity, 2.3× as long as broad and reaching mouth margin.

Relationships. This new genus is erected for a single species known only from New Zealand (Codfish Island) and associated with the guano of the endemic New Zealand bat *Mystacina tuberculata* Gray, 1843. The genus is close to the base of the Fanniidae, and the following relationship is revealed in the phylogenetic analysis by Domínguez &

Roig-Juñent (2008), where *Zealandofannia mystacina* is listed as "*Fannia* sp. 1" (see also Fig. 1):

(*Australofannia* + (*Piezura* + (*Euryomma* + (*Zealandofannia* + remaining Fanniidae))))

Zealandofannia has a number of the ground-plan character states (symplesiomorphies) of the family Fanniidae: Aristal hairs shorter than basal aristal diameter; ♂ frons broad, as in ♀; hind coxa bare on postero-apical margin; tibial setae simple, i.e. mid tibia with 1 anterodorsal and 1 posterodorsal and ♀ without anteroventral or posteroventral setae, and hind tibia with 1 anterodorsal and 1 anteroventral; vein A1+CuA2 short, an imaginary extension of it intersecting an imaginary extension of vein A2 well before wing margin; lower calypter well developed and projecting beyond upper one; ♂ sternite 1 with few setulae; ♂ bacilliform sclerite absent.

The genus also has a number of autapomorphies which justify the erection of a new genus: ♂ with only 1 reclinate (upper) orbital seta, lower orbital absent (autapomorphy); parafacial linear; anterior presutural dorsocentral short, half as long as posterior presutural dorsocentral (shared with *Euryomma*); only 1 postsutural intraalar, the posterior seta absent (autapomorphy); prealar well developed, at least half as long as 2nd notopleural in ♂, subequal to 2nd notopleural in ♀ (autapomorphy); lower posterior katepisternal seta present, almost as long as anterior katepisternal (autapomorphy); ♀ sternite 8 absent (shared, in New Zealand, with *Fannia triregum*); ♀ spiracle 7 on the intersegmental membrane between segments 6 and 7.

Zealandofannia mystacina Domínguez & Pont, new species

Fig. 44, 53, 62, 71, 80, 138–146

Fannia sp. 1 of Holloway, 1985: 250, Fig. 21, 30, 39, 48, 57.
Fannia sp. 1 of Domínguez & Roig-Juñent, 2008: 573.

Diagnosis. As for the genus.

Description. **Adult**. **Male** (Fig. 138, 140–143): Body length 3.32–3.5 mm.

Head: Ground-colour black. Frons short and broad, at middle just over 1/3rd of head-width at this point. Frontoorbital plate dark brown pruinose, at uppermost pair of frontal setae almost twice width of anterior ocellus and half width of frontal vitta. 4 strong frontals, with several short interstitials. Upper orbital seta present, with an additional row of very short setulae below; lower orbital absent. Eye bare, antero-internal eye facets slightly larger than remaining. Post-ocular setulae short and of regular length, in 1 row. Face, parafacial and gena grey pruinose. Parafacial very slender, at base of postpedicel 0.3× width of postpedicel and bare, tapering sharply from lunula and virtually obsolete from level of arista downwards. Scape, pedicel and postpedicel dark brown; postpedicel very large and long, grey pruinose, 2.3× as long as broad and reaching mouth margin (Fig. 138). Arista dark brown, the hairs shorter than its basal diameter. Gena narrow, the width below lowest eye-margin less than half width of postpedicel. Prementum of proboscis dusted. Palpus dark brown and slightly spatulate.

Thorax: Ground-colour black. Scutum dark brown dusted; from notopleuron over presutural supraalar area to level of presutural dorsocentral light brown dusted; postpronotal lobe grey dusted. Scutellum dark brown dusted. Pleura thinly grey dusted. Acrostichals triserial throughout. 2+3 dorsocentrals, anterior presutural dorsocentral very short and hardly half as long as posterior dorsocentral. Postpronotal lobe with numerous short setulae. 1 postsutural intraalar, the posterior one absent. 1 strong prealar near supraalar, almost or quite as long as 2nd notopleural, otherwise prealar area bare. 2–3 weak setulae surrounding proepimeral seta. Katepisternum with a third seta, close to posterior seta and almost as long as anterior seta.

Legs: Black. Fore femur with 1 row of posterodorsals; 1 row of posterior setae, doubled in middle by a second shorter row; the posteroventral row absent on basal third, thereafter short and only the setae on apical third as long as femoral width. Fore tibia with 1 preapical dorsal; 1 apical ventral and 1 apical posteroventral, both short. Mid femur emarginate ventrally on apical fifth; anteroventral and posteroventral surfaces each with a row of setulae which become denser and more spine-like towards apex. Mid tibia with ventral pubescence very weak and short, 0.4× width of tibia; 1 anterodorsal and 1 posterodorsal. Mid tarsomere 1 without a basal ventral crest. Hind coxa bare at apex of posterior margin. Hind femur length/width = 4.2, without a preapical ventral swelling; anteroventral surface with only setulae, except on apical third where there are 2–3 short and 1 longer setae; without posteroventral setae (Fig. 140). Hind tibia with 1 submedian and 1 preapical dorsal setae; 1 anterodorsal, above the level of the submedian dorsal, and l anteroventral (Fig. 140).

Wing (Fig. 138): Clear. Wing veins yellowish. Basicosta black, tegula mainly orange. Calypters yellow, lower calypter rounded and projecting slightly beyond upper one. Knob of haltere yellow.

Abdomen*:* Black. Dark grey dusted, subshining from some angles, without any discernible pattern or with only weak indications of broad darker triangular markings on the tergites. Sternite 1 with 1–2 setulae. Posterior margin of sternite 5 indented, with a conspicuous row of stout teeth (Fig. 141).

Postabdomen: Bacilliform sclerite absent; surstylus formed by 2 processes and shorter than epandrium; parameres very large, covering the basal portion of the aedeagus; aedeagus sclerotized (Fig. 142, 143).

Female (Fig. 139, 144–146): Body length 2.8–3.5 mm. Differs from the male as follows:

Head (Fig. 139): Distance between eyes at middle of head 0.38 of head-width. Fronto-orbital plate opposite lower orbital seta 1/3rd as wide as frontal vitta and 3× diameter of anterior ocellus. 4–5 strong frontals, with a few interstitials. 2 orbitals, both reclinate and slightly exclinate. Lower orbital slightly closer to eye-margin than to margin of fronto-orbital plate. Postpedicel shorter, 2.0× as long as wide.

Thorax: Prealar strong, usually as long as 2nd notopleural.

Legs: Mid femur bare on anteroventral surface, with a row of fine posteroventrals on basal 2/3rd that are slightly shorter than femoral width.

Abdomen: Shorter and broader than in male. Brownish-grey dusted and subshining from some angles, without any pattern.

Postabdomen: Sternite 8 absent. Spiracle 6 on tergite 6, spiracle 7 on the intersegmental membrane between segments 6 and 7. Three spermathecae (Fig. 144–146).

Third instar larva (Fig. 44, 53, 62, 71, 80):

Dorsal aspect (Fig. 44): First thoracic segment (T1) (Fig. 44, 53) with short, moderately slender anterior processes; 1 minute lateral process immediately in front of anterior spiracle, another near ventrolateral edge of spiracle; anterior spiracle with 4–7 moderately long lobes. Second thoracic segment (T2) with filiform dorsomedians, dorsolaterals, and laterodorsals, all about equal in length and covered with short, fine projections. Third thoracic to seventh abdominal segments (T3–A7) with relatively long, tapering dorsomedians and laterodorsals; dorsomedians about 0.75× as long as laterodorsals; both series with large, simple projections towards base and on integument immediately anterior to base, very fine projections elsewhere; dorsolaterals about 0.3× as long as laterodorsals, covered with fine projections except on short, smooth basal section. Eighth abdominal segment (A8) with marginals similar to laterodorsals; laterals about equal in length to subapicals and preceding laterodorsals, about 1.3× as long as sublaterals; bases of subapicals very widely separated; posterior spiracular stalks long, thick, scarcely tapering, only slightly divergent, about equidistant from midline and lateral margin; spiracular plate (Fig. 62) flattened, approximately circular, not divided into lobes; spiracular apertures elongate, arranged radially on plate, as in typical cyclorrhaphous larvae. Integumental elements (Fig. 71) very small, discrete, with low relief, grouped on irregularly shaped polygonal plates; intersegmental membrane covered with fine, dense, convex elements which are devoid of projections.

Ventral aspect: Second thoracic segment (T2) with all sensilla lacking associated processes; no callus associated with lateroventral sensillum. Third thoracic segment (T3) with filiform lateroventrals about 0.5× as long as corresponding laterodorsals, covered with very small projections; other sensilla devoid of processes. First to seventh abdominal segments (Al–A7) with lateroventrals similar to corresponding laterodorsals, about 0.6× their length; ventrolaterals developed as minute, transparent rosettes, each pair connected by narrow band of spinulose projections; 1 pair of ventromedians on each segment developed as minute ring of transparent projections surrounding sensillum, sensilla of other pair lacking projections. Eighth abdominal segment (A8) with ventrolaterals about 0.25× as long as sublaterals, covered with moderately long projections, connected by transverse band of spinulose projections. Integumental pattern of first to third thoracic segments (T1–T3) as for dorsal surface, of first to eighth abdominal segments (Al–A8) with elements arranged in rows rather than polygons; intersegmental membrane covered with fine elements bearing spiny projections.

Cephaloskeleton: as in Fig. 80.

Lengths: L1, 1.1–1.4 mm; L2, 1.4–2.6 mm; L3, 2.3–6.3 mm; puparium, 2.8–5.0 mm.

Material examined.**Type series only**. **Holotype** ♂, **New Zealand**, **SI** : "NEW ZEALAND SI / Codfish I. em / 7 Jun 1982 ex / Mystacina guano / E. Kennedy ; HOLOTYPE ♂ / Zealandofannia / mystacina / Domínguez & Pont" (NZAC). **Paratypes** 27♂ 36♀: **SI**. same data as holotype, 17♂ 19♀ (1♂ 1♀ each BMNH & OUMNH, rest NZAC); same data, but em. 6–9 Jun 1982, 10♂ 10♀ (NZAC); Codfish Island, em. from guano in first *Mystacina* colony, 2 Dec 1979, M. J. Daniel, 7♀ (1 BMNH, 6 NZAC).

Distribution. New Zealand*:* Codfish Island (type-series), off the southern tip of South Island, and also recorded from Little Barrier Island, off the north-east coast of North Island, by Holloway (1985: 250).

CL / SI / —

Etymology. The species name refers to the endemic New Zealand bat genus and species *Mystacina tuberculata* Gray, 1843, from the guano of which the original type specimens were reared, and it is a noun in apposition.

Biology and immature stages. The species has been reared from guano of the short-tailed bat, *Mystacina tuberculata* Gray, 1843. Larvae were found in May, November, and December (Holloway 1985: 250).

Relationships See above under the genus.

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ILLUSTRATIONS

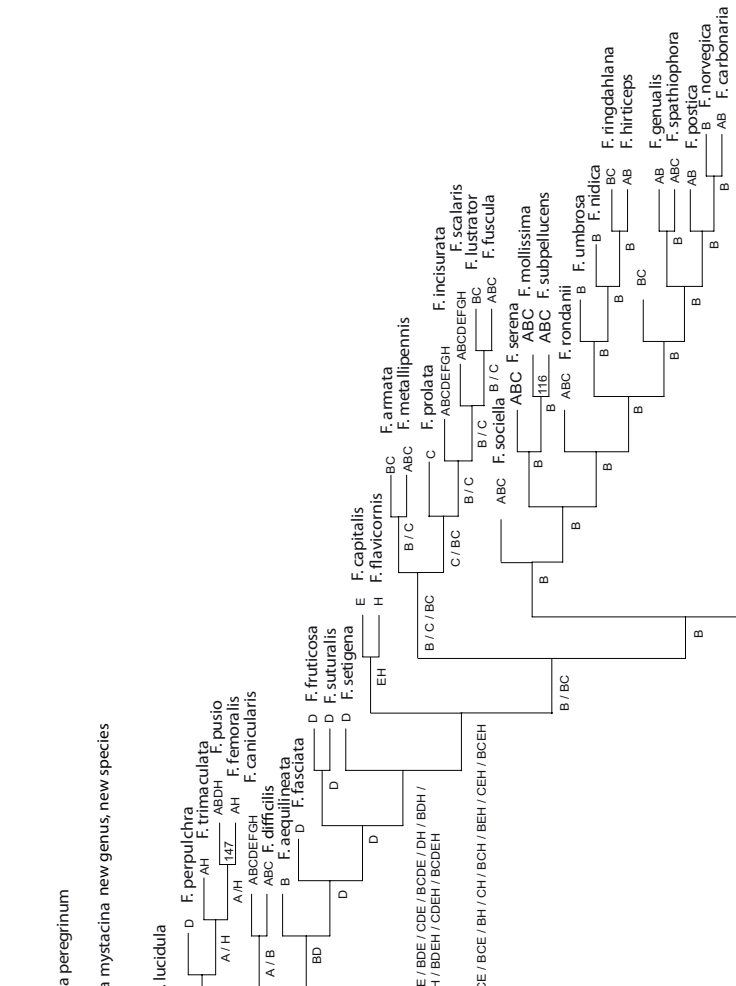


Fig. 1 Basal nodes of tree obtained by Domínguez & Roig (2008) with a summary of optimal geographic reconstructions of ancestral distributions from Domínguez & Roig (2011). When more than one reconstruction is possible, alternative distributions are separated with "/".

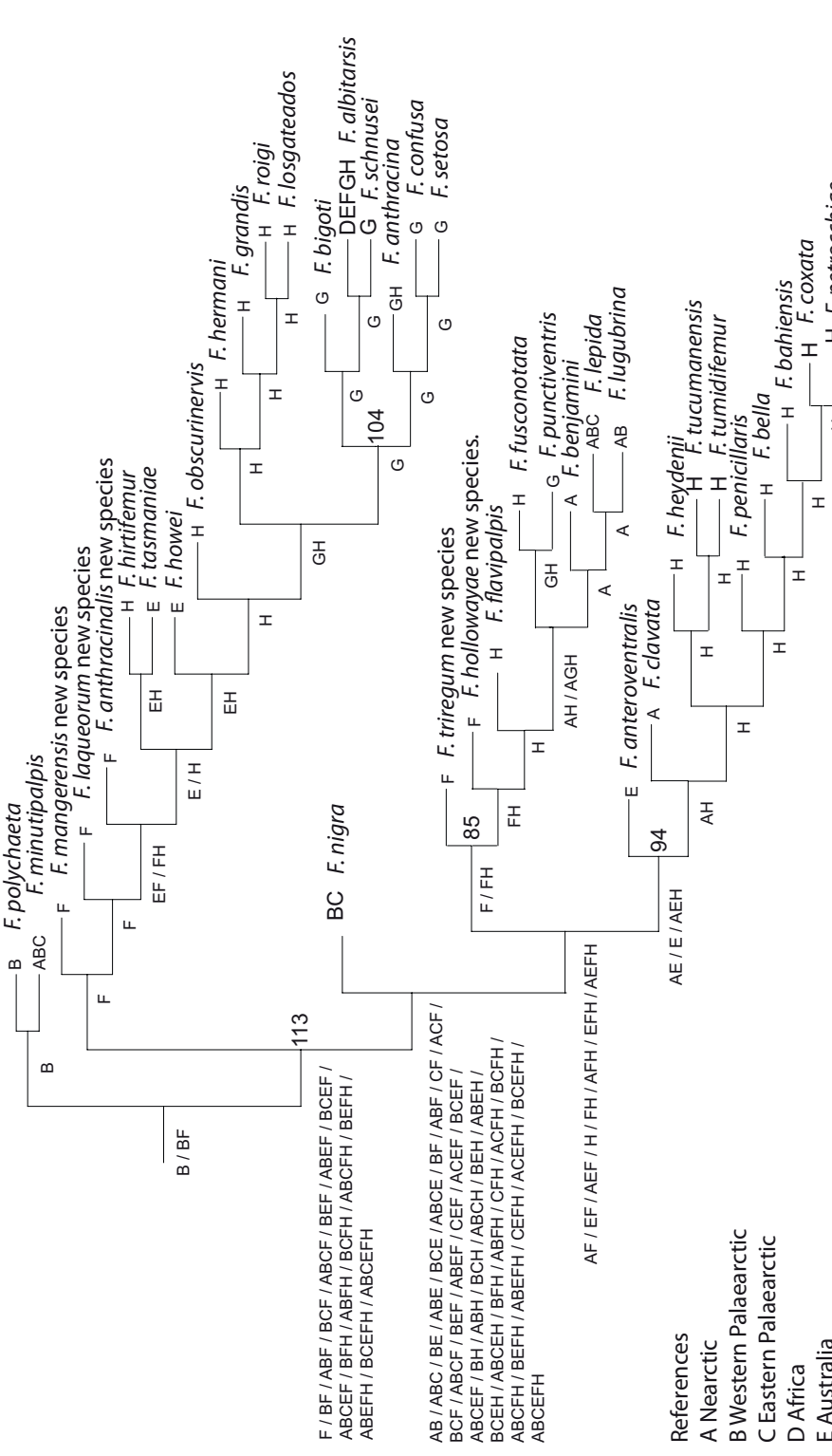


Fig. 2 Apical nodes of tree obtained by Domínguez & Roig (2008) with a summary of optimal geographic reconstructions of ancestral distributions from Domínguez & Roig (2011). When more than one reconstruction is possible, alternative distributions are separated with "/".

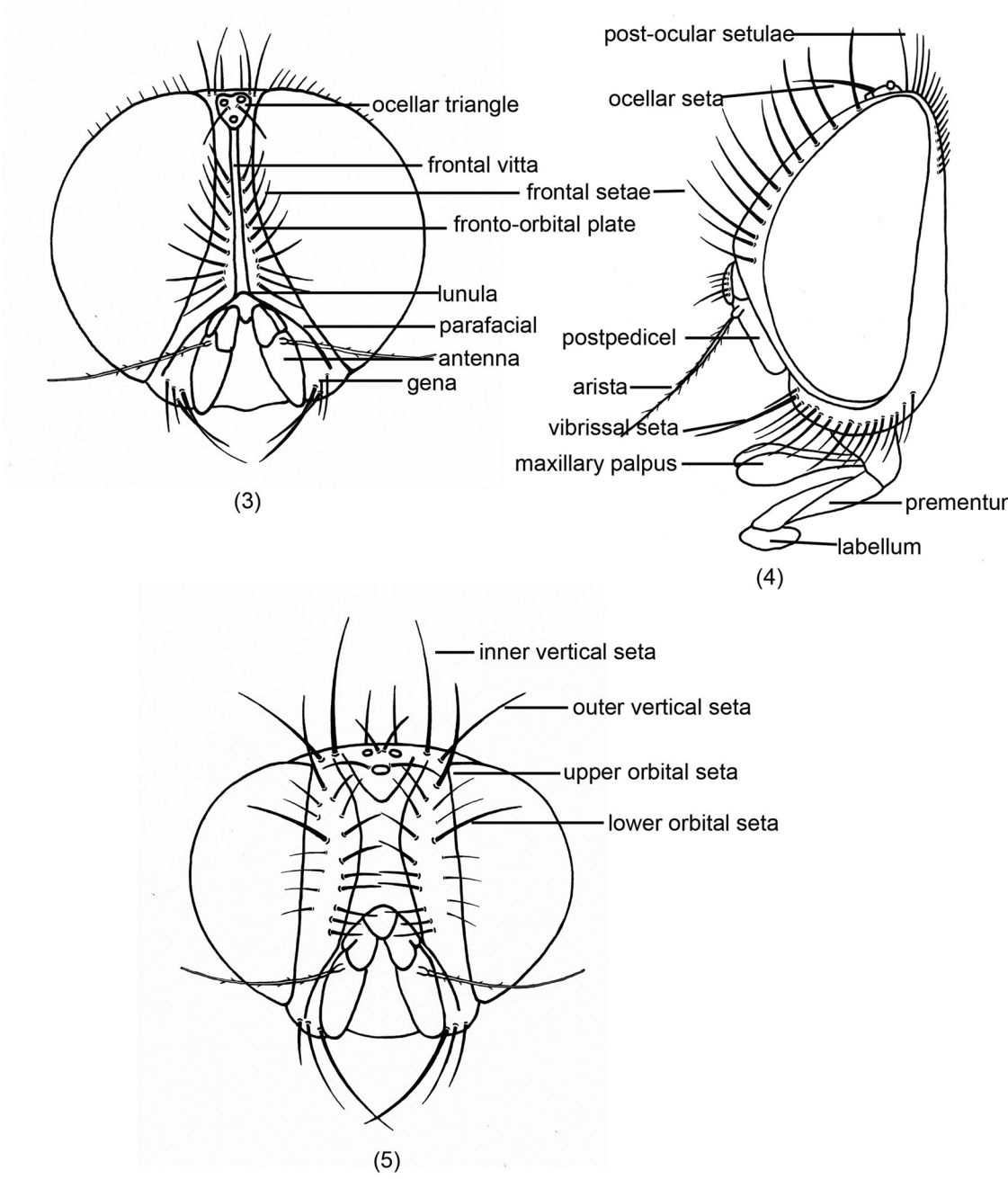
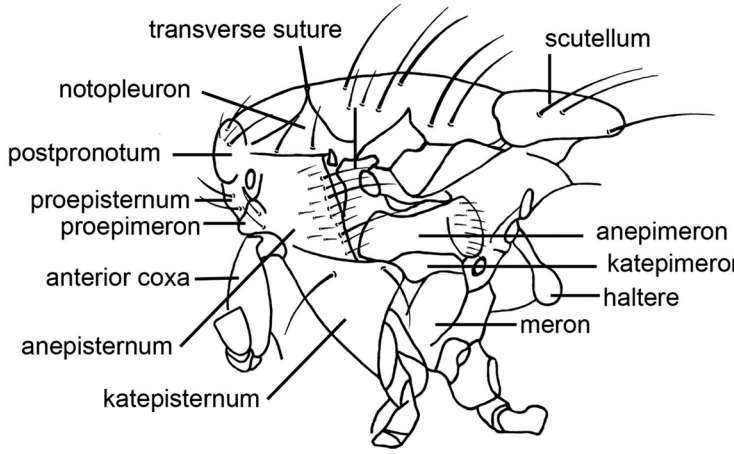


Fig. 3–5 Anterior and lateral view of head, male (3, 4); anterior view of head, female (5). Modified from Rozkošný *et al.* (1997).



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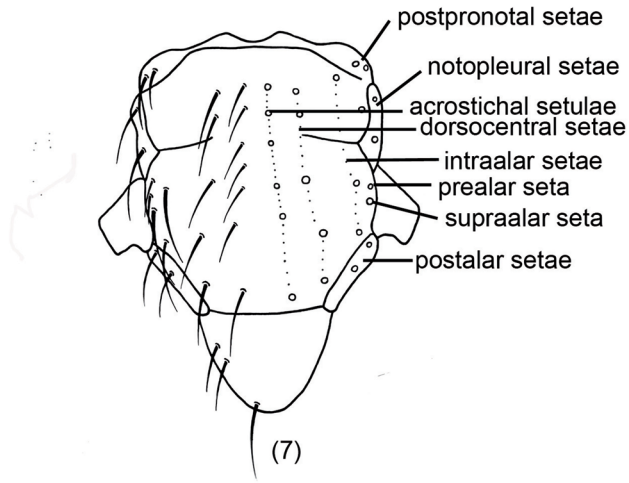

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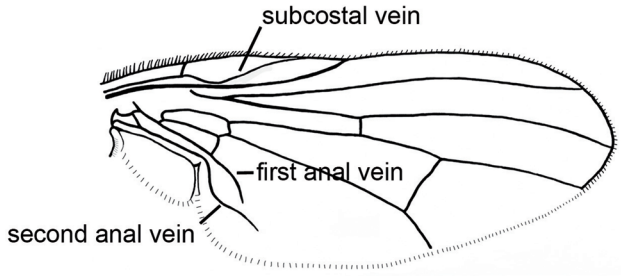
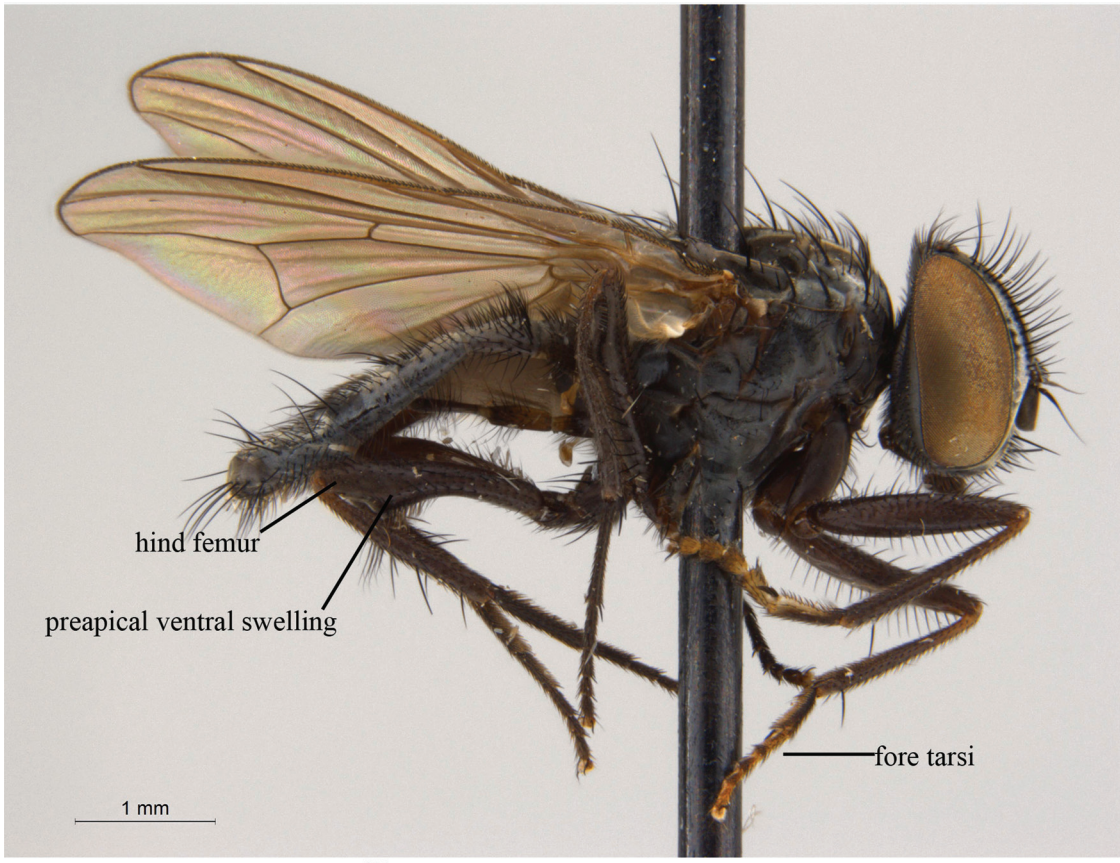


(8)

Fig. 6–8 Lateral and dorsal view of thorax (6, 7), modified from Rozkošný *et al.* (1997); wing (8).



(9)

Fig. 9 *Fannia albitarsis* Stein, male. MC, Christchurch, 2 Dec 1973, R. L. C. Pilgrim (in NZAC).

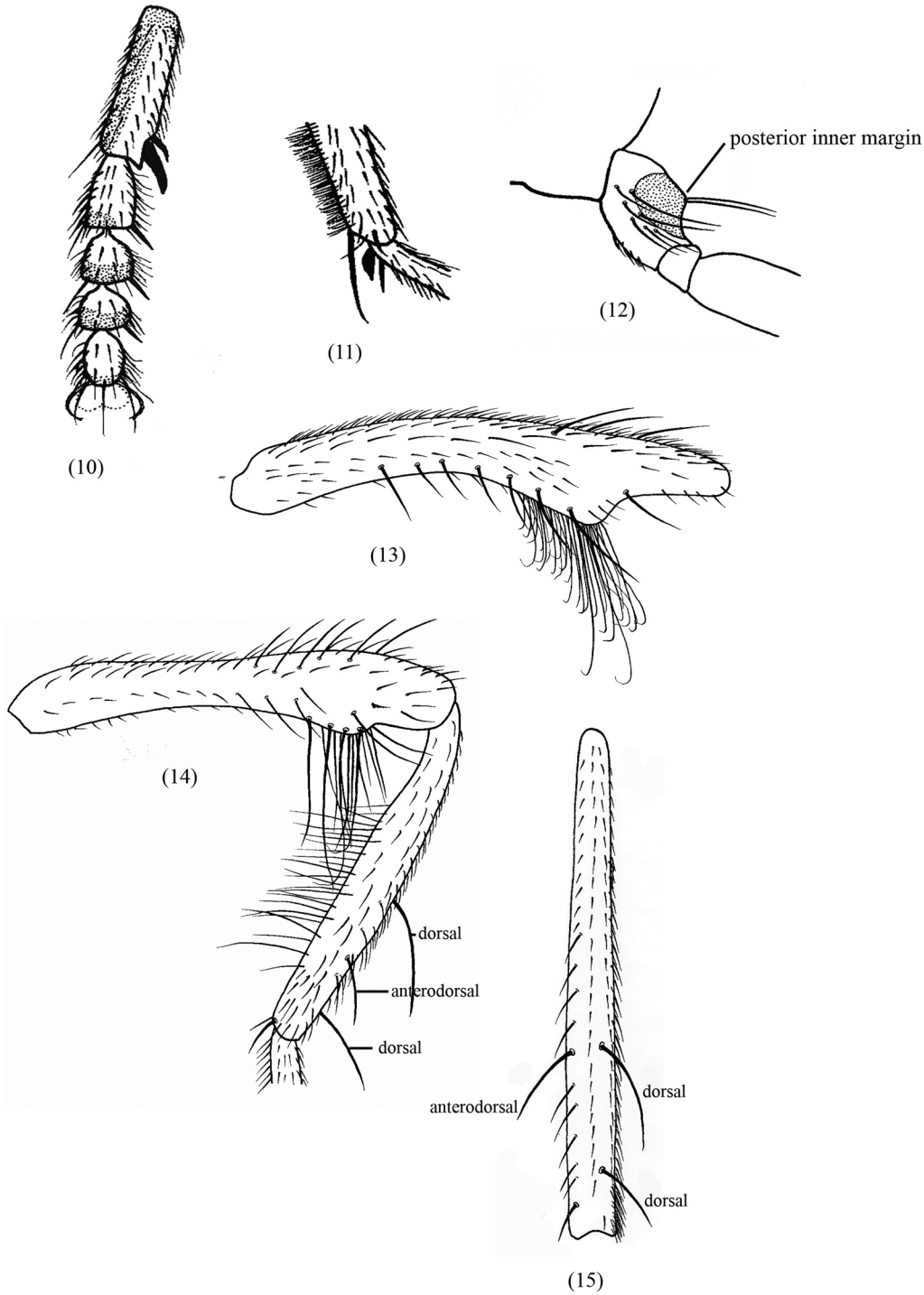


Fig. 10–15 *Fannia albitarsis* Stein: male fore tarsomere (anterior) (10); male mid basal tarsomere and apex of mid tibia (anterior) (11); *Fannia canicularis* (Linnaeus): male hind coxa (anterior) (12); *Fannia albitarsis*: male hind femur (anterior) (13); *Fannia pusio* (Wiedemann): male hind femur and tibia (anterior) (14); *Fannia canicularis*: male hind tibia (dorsal) (15).

(16)

Fig. 16 *Fannia albitarsis* Stein, female. AK, Lynfield, em. 19 Nov 1987 ex accum. dog manure (B. A. Holloway) (in NZAC).

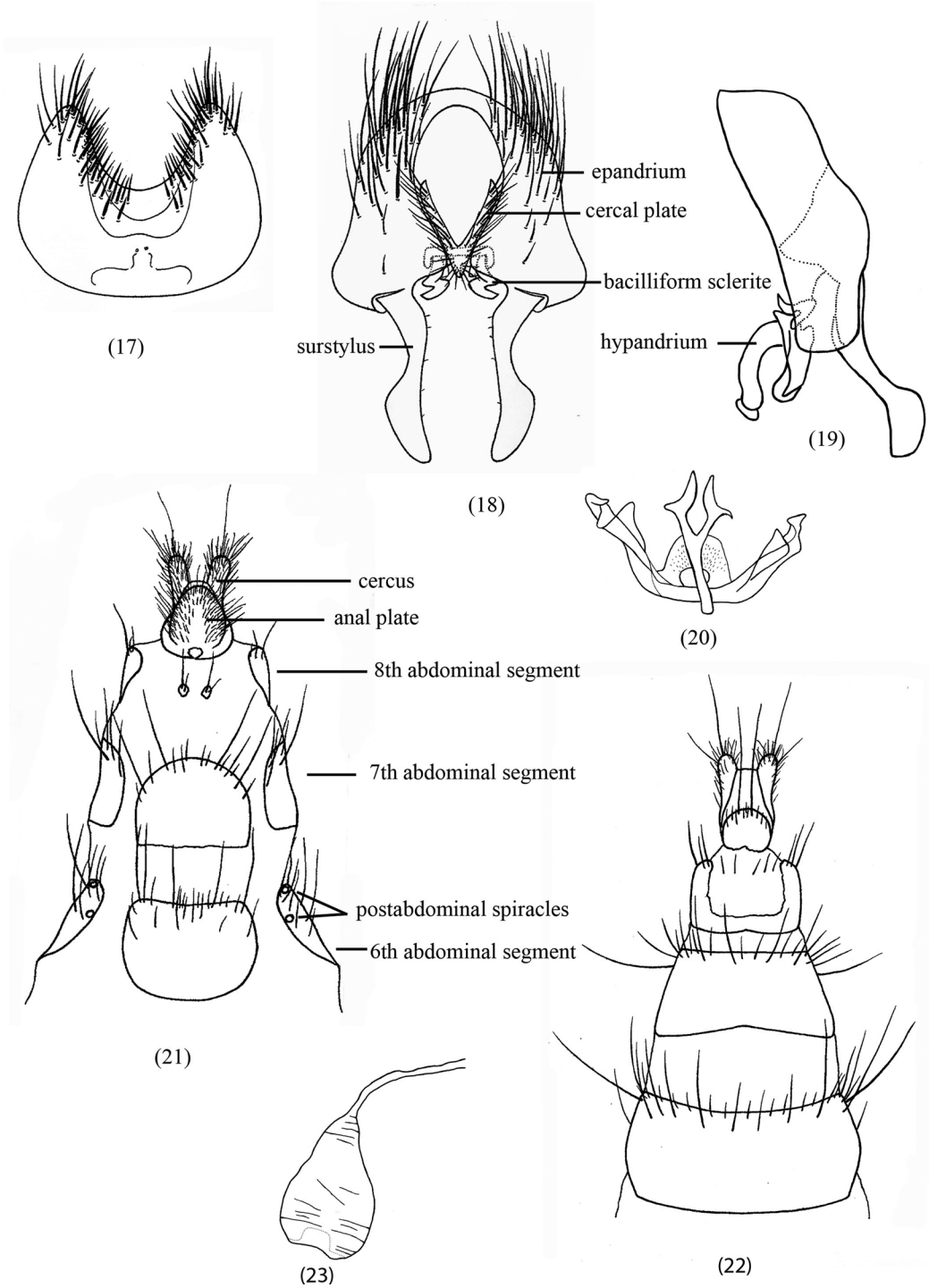


Fig. 17–23 *Fannia albitarsis* Stein: male sternite 5 (17); male hypopygium (ventral) (18); male hypopygium (lateral) (19); male hypandrium (20); female oviscapt (ventral) (21); female oviscapt (dorsal) (22); female spermatheca (23).

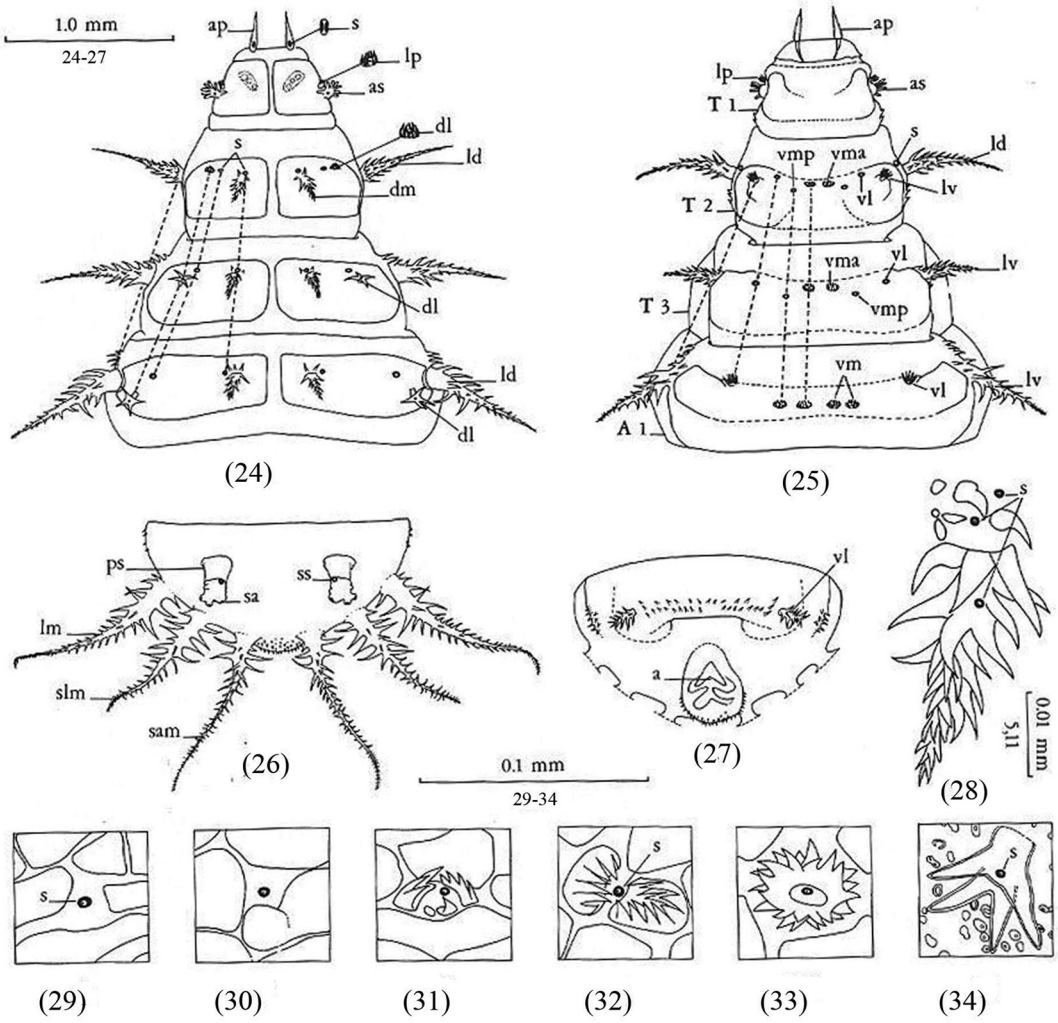


Fig. 24–34 Third instar larva of *Fannia albitarsis* Stein: thoracic and first abdominal segments (dorsal) (24); thoracic and first abdominal segments (ventral, laterodorsals of third thoracic and first abdominal segments omitted) (25); eighth abdominal segment (dorsal) (26); eighth abdominal segment (ventral, bases only of marginals shown) (27); dorsomedian process of second abdominal segment of an early larva (28); ventrolateral sensillum of second thoracic segment (29); posterior ventromedian sensillum of second thoracic segment (30); anterior ventromedian sensillum and associated integumental projections of second thoracic segment (31); ventromedian sensillum and associated integumental projections of first abdominal segment (32); lateroventral sensillum and associated integumental projections of second thoracic segment (33); dorsolateral process of third abdominal segment (34). Serially homologous structures are connected by broken lines. [From Holloway (1985)].

ABBREVIATIONS a, anal slit; A1, first abdominal segment; ap, anterior process; as, anterior spiracle; dl, dorsolateral process; dm, dorsomedian process; ld, laterodorsal process; lm, lateral marginal process; lp, lateral process; lv, lateroventral process; ps, posterior spiracular stalk; s, sensillum; sa, spiracular aperture; sam, subapical marginal process; slm, sublateral marginal process; sp, spiracular lobe; ss, spiracular scar; TI,T2, T3, first, second, and third thoracic segments; vl, ventrolateral sensillum or process; vm, ventromedian process; vma, anterior ventromedian process; vmp, posterior ventromedian sensillum or process,

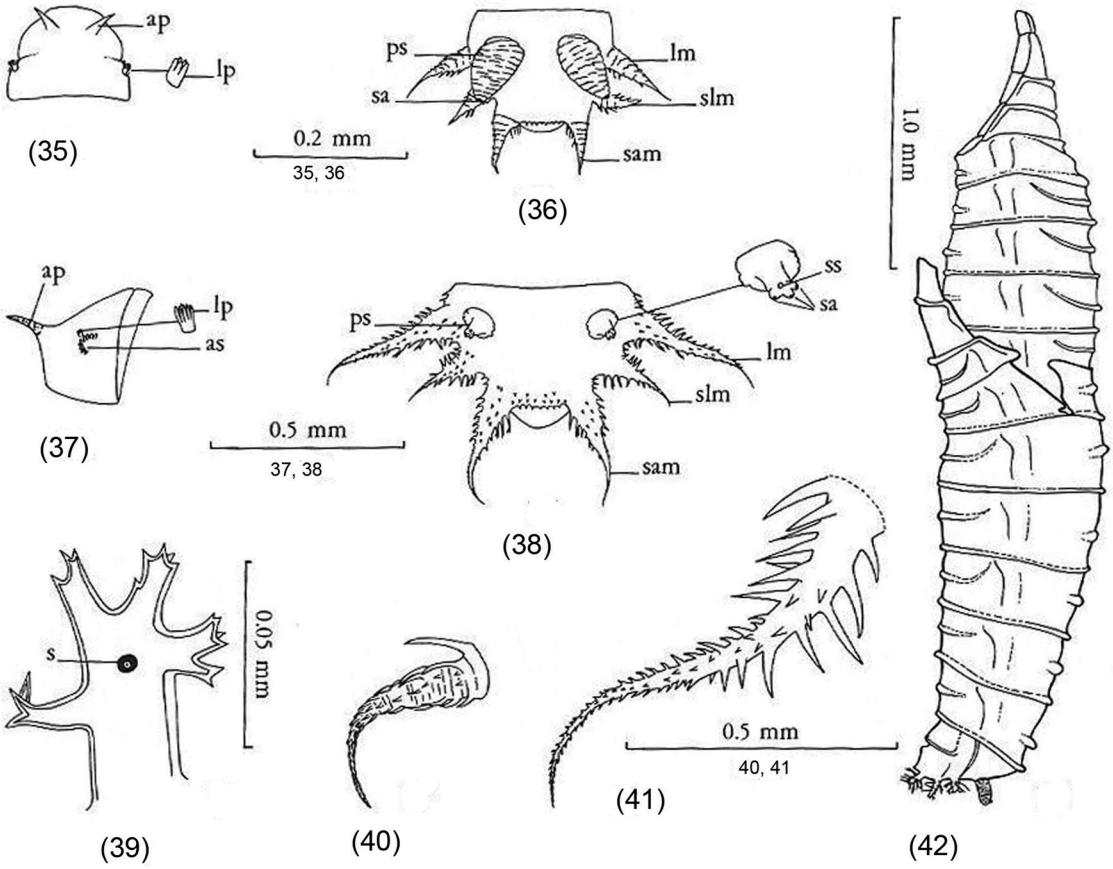


Fig. 35–42 *Fannia anthracinalis* new species: first thoracic segment of first instar larva (dorsal) (35); eighth abdominal segment of first instar larva (dorsal) (36); first thoracic segment of late second instar larva (lateral) (37); eighth abdominal segment of late second instar larva (dorsal) (38); dorsolateral process of second abdominal segment of late second instar larva (39); laterodorsal process of sixth abdominal segment of early (length 4.2 mm) third instar larva (40); 18, laterodorsal process of sixth abdominal segment of late (length 7.5 mm) third instar larva (41); *Fannia laqueorum* new species: double puparia (pupariation inside an empty puparium—most integumental processes omitted) (42). [From Holloway (1985), abbreviations as in Fig. 24–34].

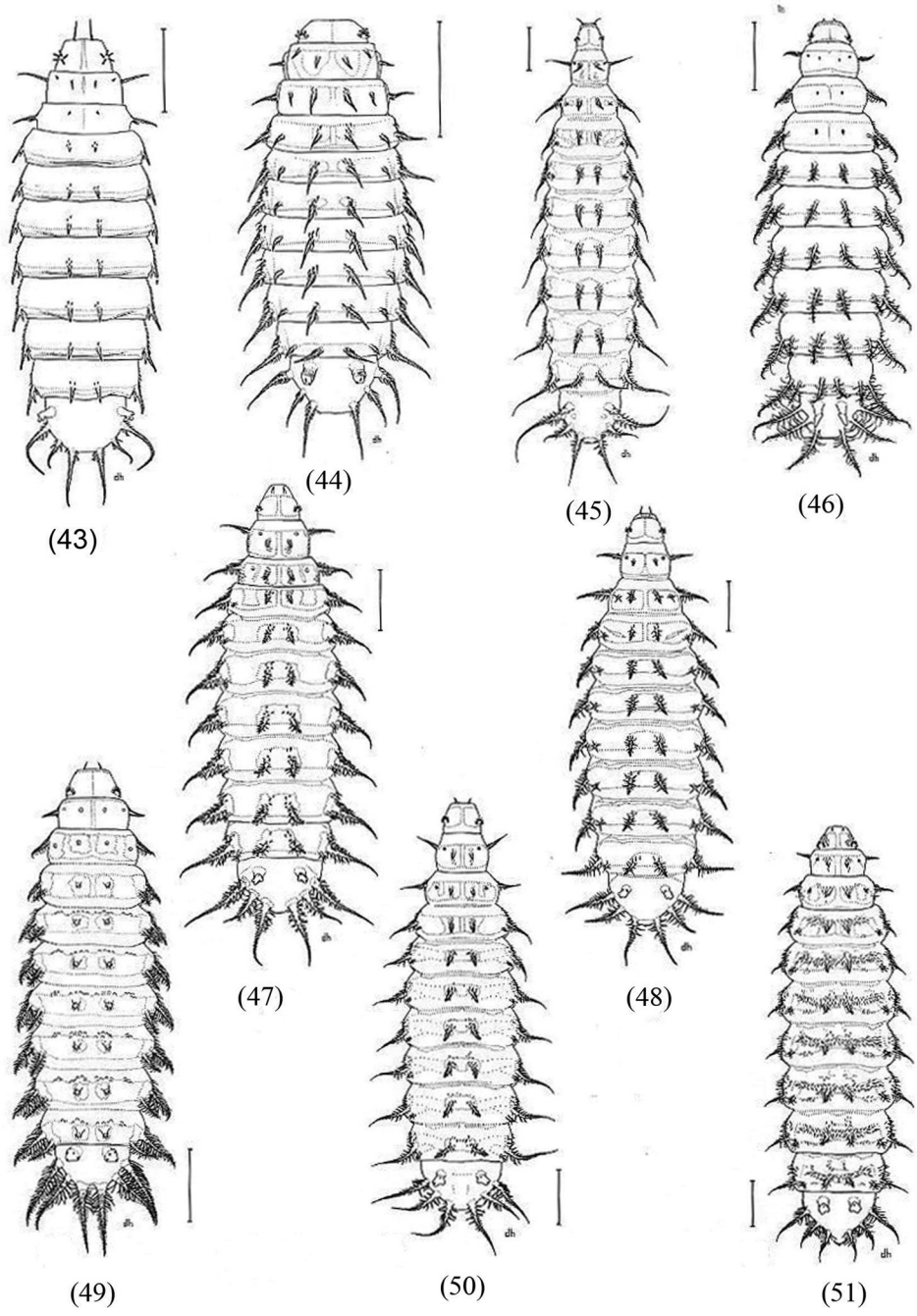


Fig. 43–51 Third instar larvae (dorsal, no ventral processes shown): *Euryomma peregrinum* (Meigen) (43); *Zealandofannia mystacina* new genus and new species (dehisced puparium) (44); *Fannia canicularis* (Linnaeus) (45); *Fannia* sp. 2 [in Holloway (1985)], not known as an adult (46); *Fannia mercurialis* new species (47); *Fannia albitarsis* Stein (48); *Fannia hollowayae* new species (49); *Fannia anthracinalis* new species (50); *Fannia laqueorum* new species (51). Scale bars=1.0 mm. [From Holloway (1985)].

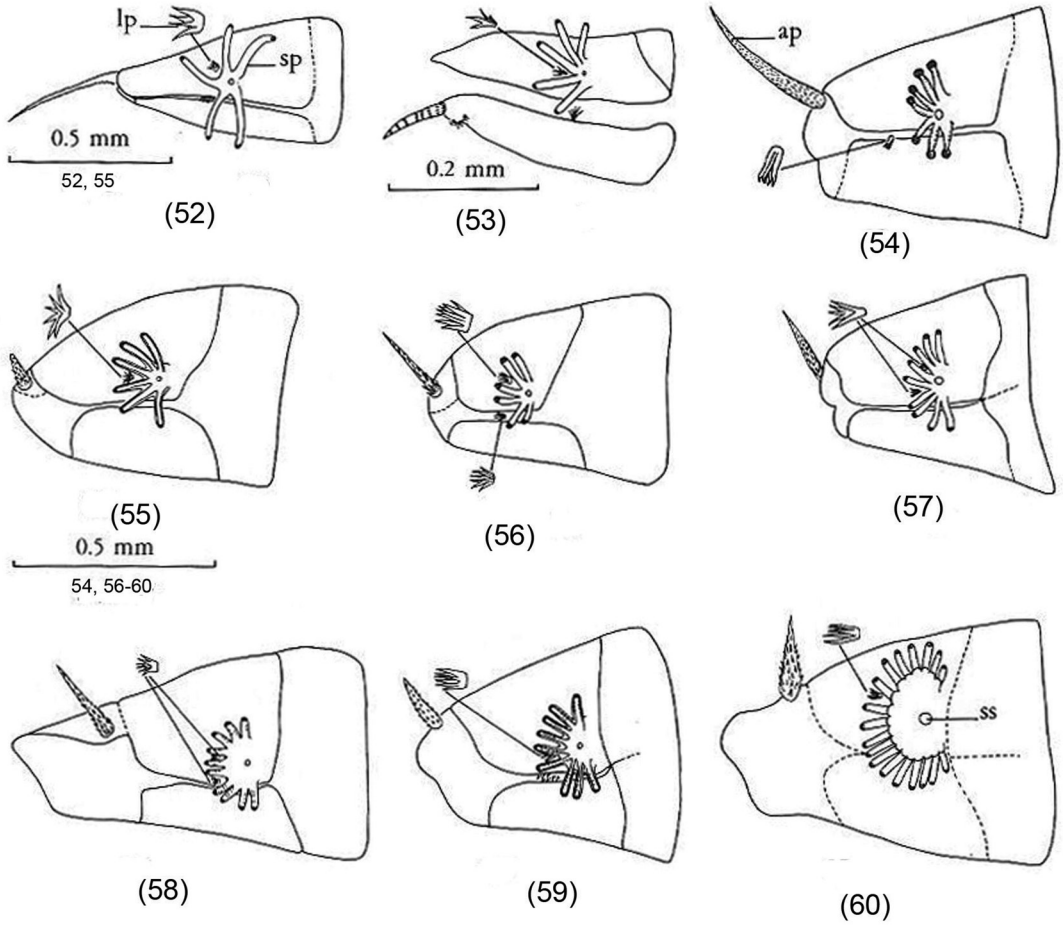


Fig. 52–60 First thoracic segment of third instar larvae: *Euryomma peregrinum* (Meigen) (52); *Zealandofannia mystacina* new genus and new species (dehisced puparium) (53); *Fannia canicularis* (Linnaeus) (54); *Fannia* sp. 2 [in Holloway (1985), not known as an adult] (55); *Fannia mercurialis* new species (56); *Fannia albitarsis* Stein (57), *Fannia hollowayae* new species (58); *Fannia anthracinalis* new species (59); *Fannia laqueorum* new species (60). [From Holloway (1985), abbreviations as in Fig. 24–34].

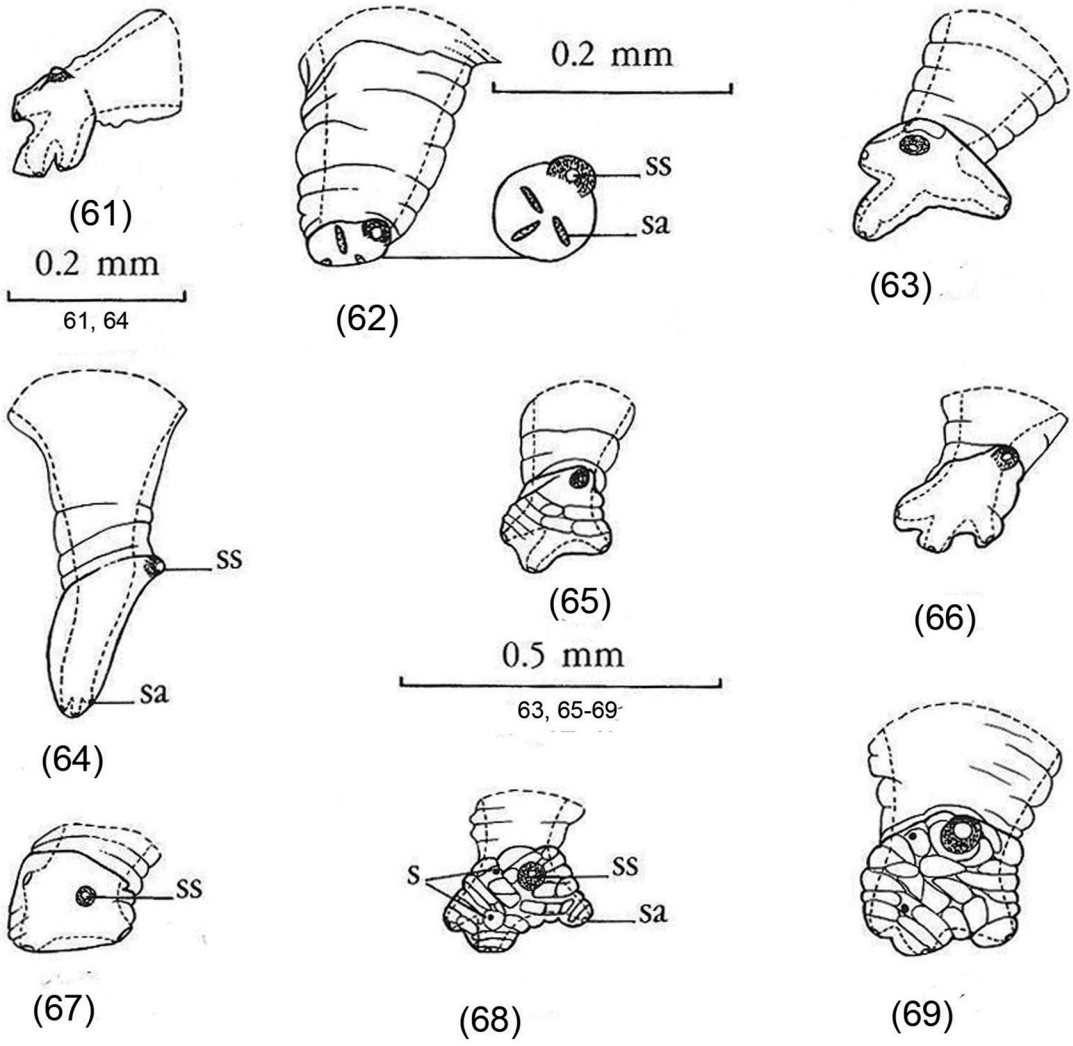


Fig. 61–69 Left posterior spiracle of third instar larvae: *Euryomma peregrinum* (Meigen) (61); *Zealandofannia mystacina* new genus and new species (dehisced puparium) (62); *Fannia canicularis* (Linnaeus) (63); *Fannia* sp. 2 [in Holloway (1985), not known as an adult] (64); *Fannia mercurialis* new species (65); *Fannia albitarsis* Stein (66); *Fannia hollowayae* new species (67); *Fannia anthracinalis* new species (68); *Fannia laqueorum* new species (69). The area around the spiracular scar is stippled. [From Holloway (1985), abbreviations as in Fig. 24–34].

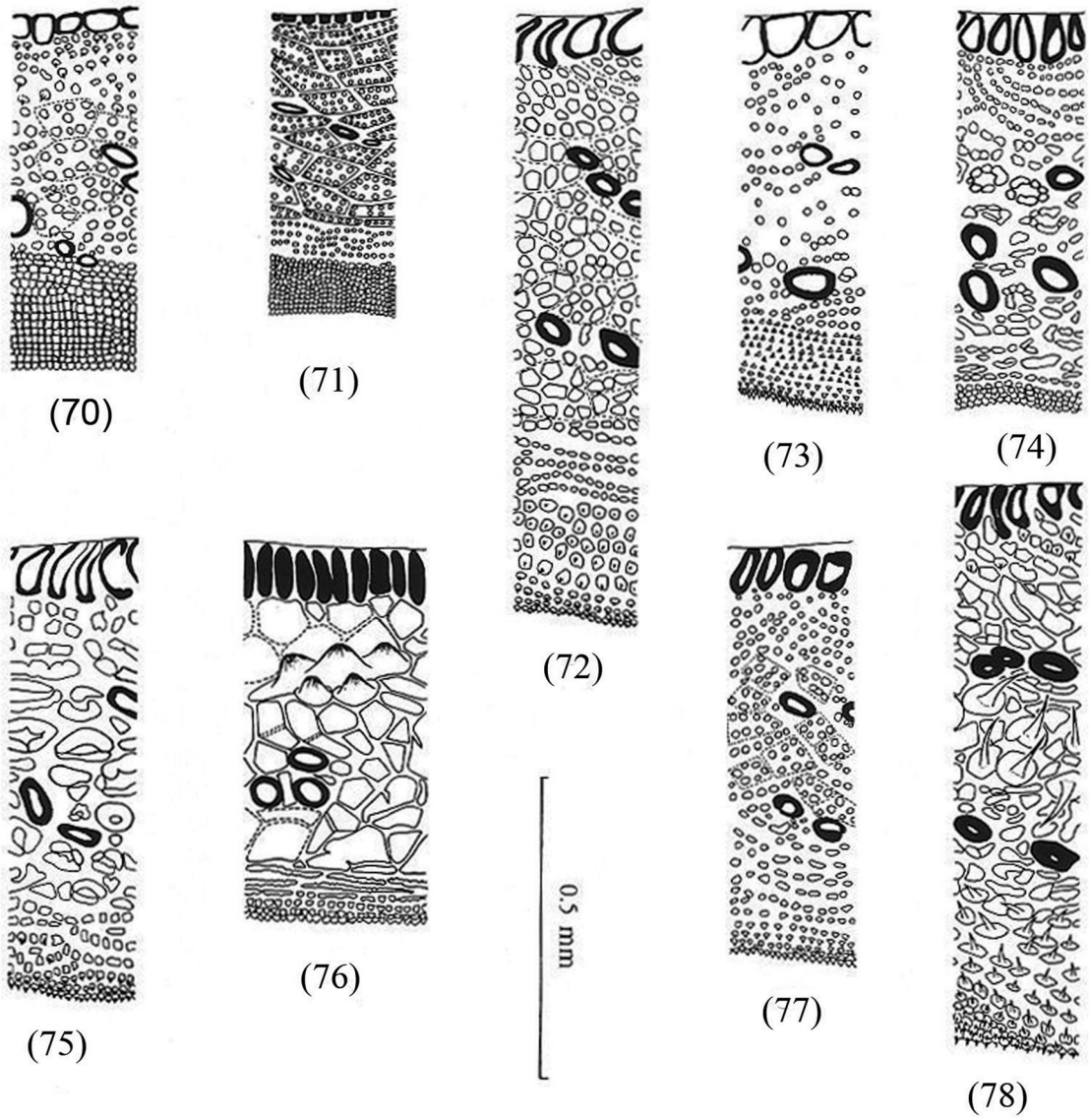


Fig. 70–78 Integumental sculpture of sixth abdominal tergite of third instar larvae: *Euryomma peregrinum* (Meigen) (70); *Zealandofannia mystacina* new genus and new species (dehisced puparium)((71); *Fannia canicularis* (Linnaeus) (72); *Fannia* sp. 2 [in Holloway (1985), not known as an adult] (73); *Fannia mercurialis* new species (74); *Fannia albitarsis* Stein (75); *Fannia hollowayae* new species (76); *Fannia anthracinalis* new species (77); *Fannia laqueorum* new species (78). Figures are of a longitudinal strip midway between the left dorsomedian and left dorsolateral processes. [From Holloway (1985)].

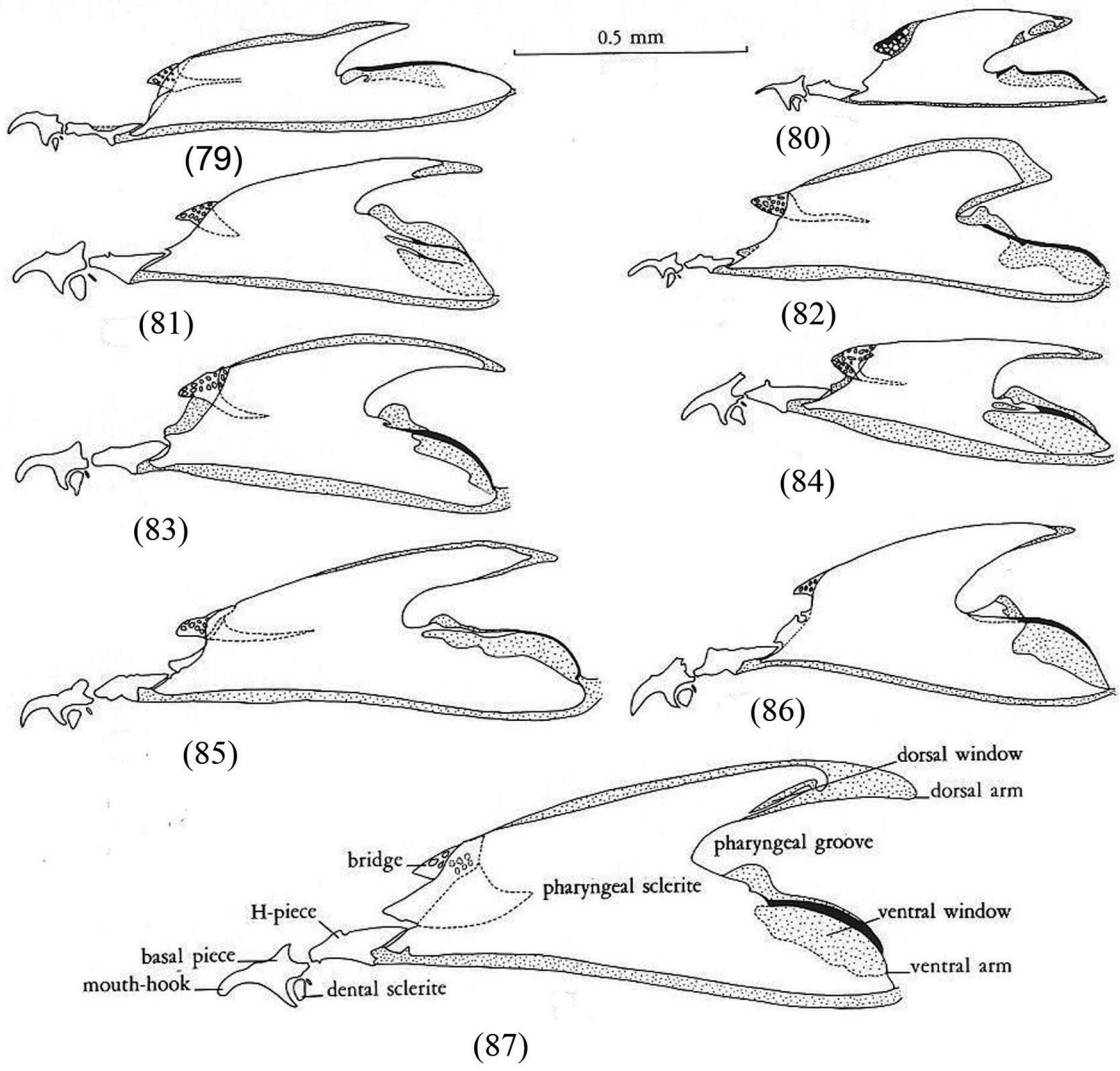


Fig. 79–87 Cephaloskeleton of third instar larvae (lateral): *Euryomma peregrinum* (Meigen) (79); *Zealandofannia mystacina* new genus and new species (80); *Fannia canicularis* (Linnaeus) (81); *Fannia* sp. 2 [in Holloway (1985), not known as an adult] (82); *Fannia mercurialis* new species (83); *Fannia albitarsis* Stein (84); *Fannia hollowayae* new species (85); *Fannia anthracinalis* new species (86); *Fannia laqueorum* new species (87). Membraneous or very pale areas are stippled. [From Holloway (1985)].

(88)

Fig. 88 *Euryomma peregrinum* (Meigen), male. AK, Lynfield, Auckland, on window inside house, 11 Oct 1983 (B. A. Holloway) (in NZAC).

(89)

Fig. 89 *Fannia anthracinalis* new species, male. Chatham Island, Point Weeding, Waitangi, cliffs, 14 Feb 1967 (J. S. Dugdale, Chatham Islands Expedition) (holotype, in NZAC).

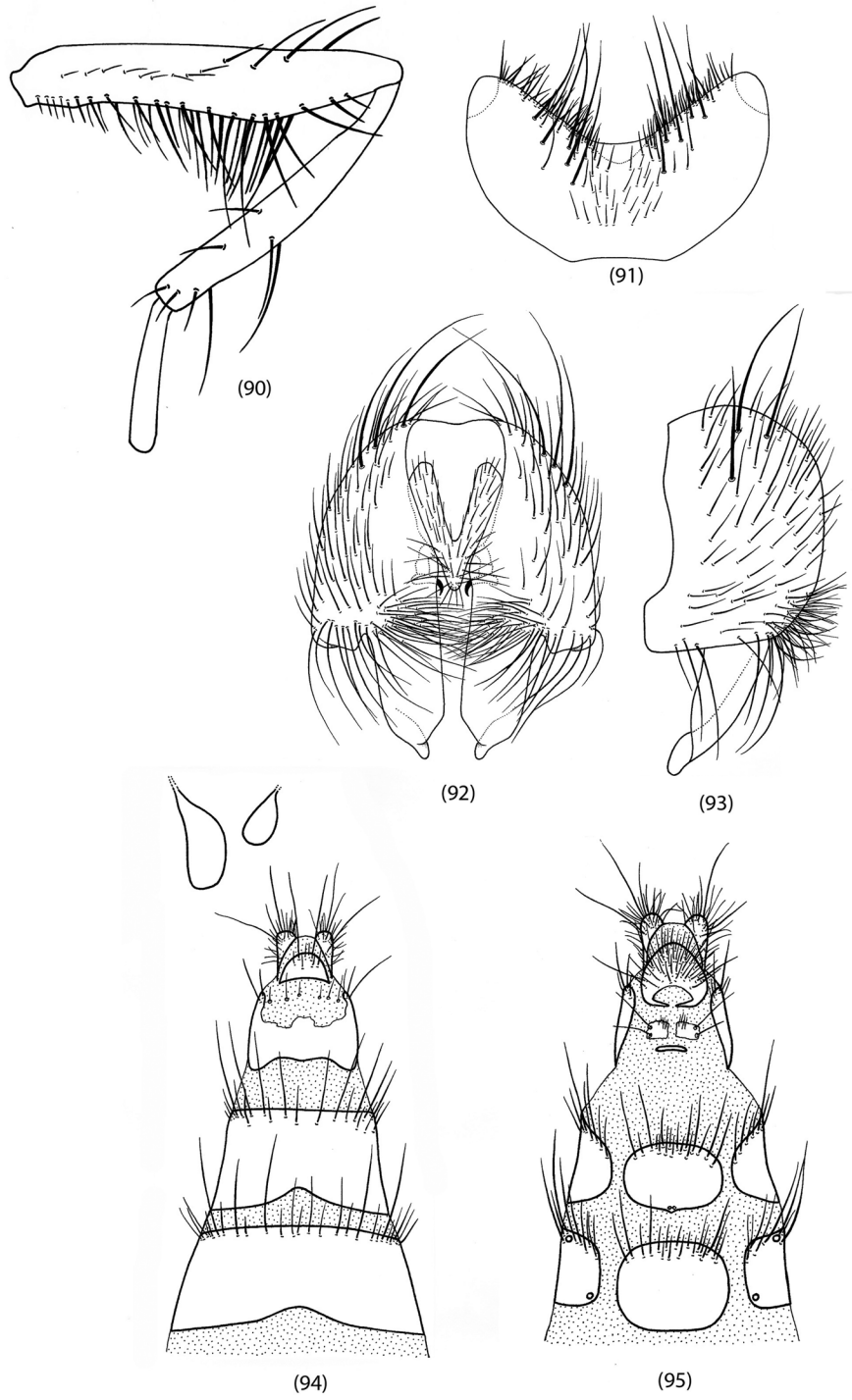


Fig. 90–95 *Fannia anthracinalis* new species: male hind femur and tibia (anterior) (90); male sternite 5 (91); male hypopygium (ventral) (92); male hypopygium (lateral) (93); female oviscapt (dorsal) and spermathecae (94); female oviscapt (ventral) (95).

(96)

Fig. 96 *Fannia canicularis* (Linnaeus), male. NN, Nelson, 29 Jan 1971 (E. W. Valentine) (in NZAC).

(97)

Fig. 97 *Fannia hollowayae* new species, male. AK, Lynfield, Tropicana Drive, ex soil under lamb died 20 Jul 1976, em. 1 Nov 1976 (B. A. Holloway) (holotype, in NZAC).

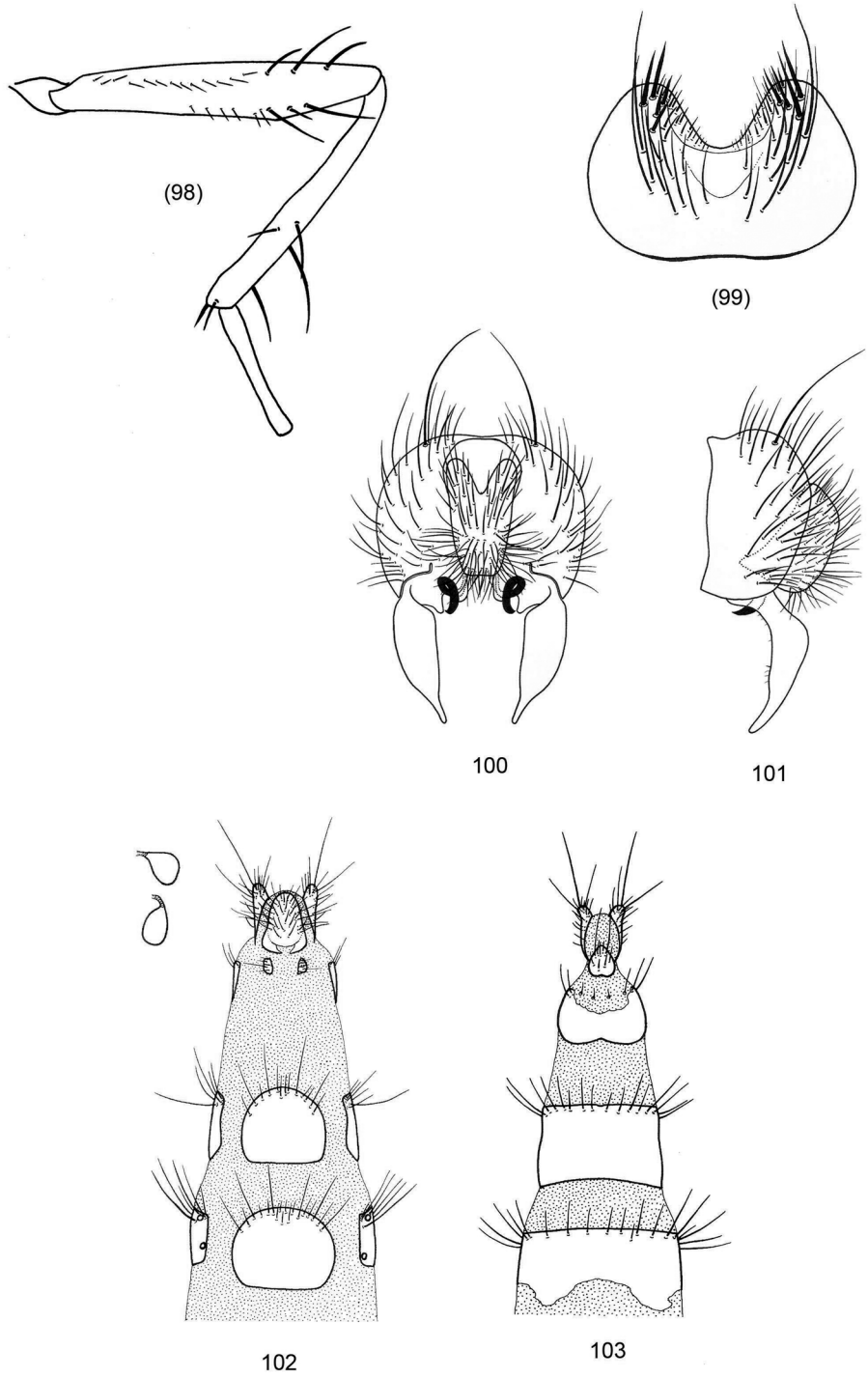


Fig. 98–103 *Fannia hollowayae* new species: male hind femur and tibia (anterior) (98); male sternite 5 (99); male hypopygium (ventral) (100); male hypopygium (lateral) (101); female oviscapt (ventral) and spermathecae (102); female oviscapt (dorsal) (103).

(104)

Fig. 104 *Fannia laqueorum* new species, male. Snares Islands, Western Chain Islands, Rima Islet, under stones on mud near nests of *Diomedea cauta salvini*, 80 m, 21 Nov 1976 (J. W. Early) (paratype, in NZAC).

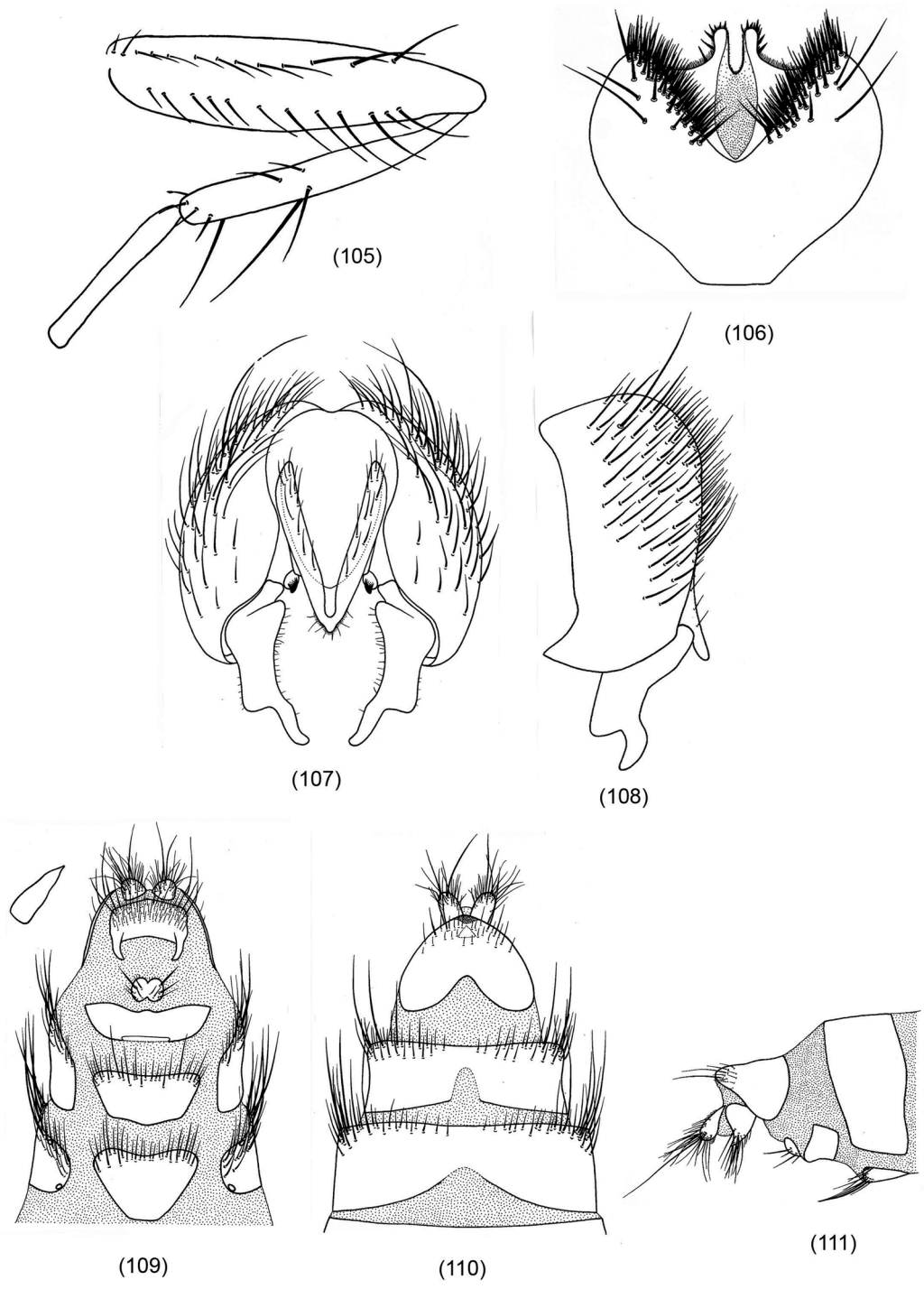
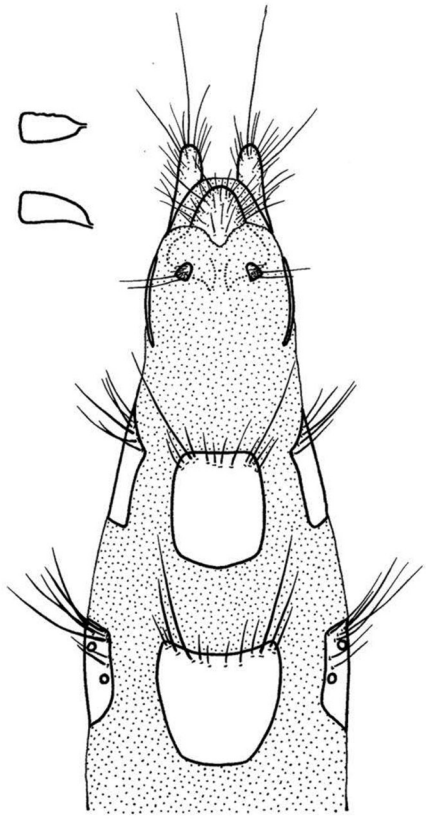


Fig. 105–111 *Fannia laqueorum* new species: male hind femur and tibia (anterior) (105); male sternite 5 (106); male hypopygium (ventral) (107); male hypopygium (lateral) (108); female oviscapt (ventral) and spermatheca (109); female oviscapt (dorsal) (110); apical segments of female oviscapt (lateral) (111).

(112)

Fig. 112 *Fannia magnicornis* new species, female. ND, Waipoua State Forest, Te Matua Ngahere, 370 m, carrion traps, 16–20 Mar 1978 (S. & J. Peck) (holotype, in NZAC).



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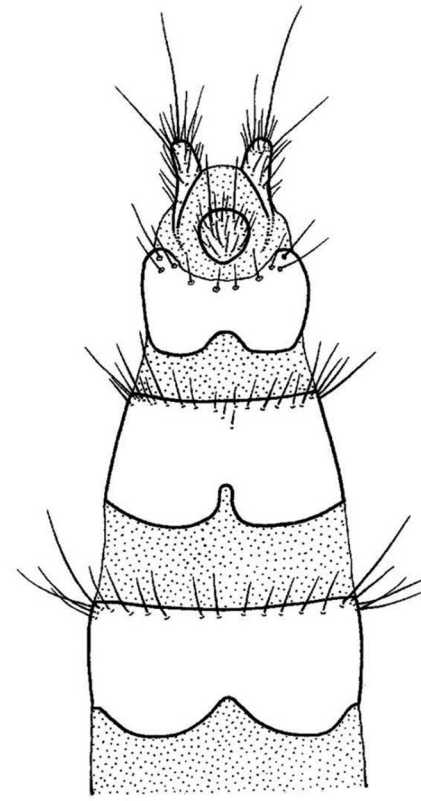


(114)

Fig. 113, 114 *Fannia magnicornis* new species: female oviscapt (ventral) and spermathecae (113); oviscapt (dorsal) (114).

(115)

Fig. 115 *Fannia mangerensis* new species, male. Chatham Islands, SE Island, flowers of *Myosotidium*, 2 Nov 1970 (J. I. Townsend) (holotype, in NZAC).

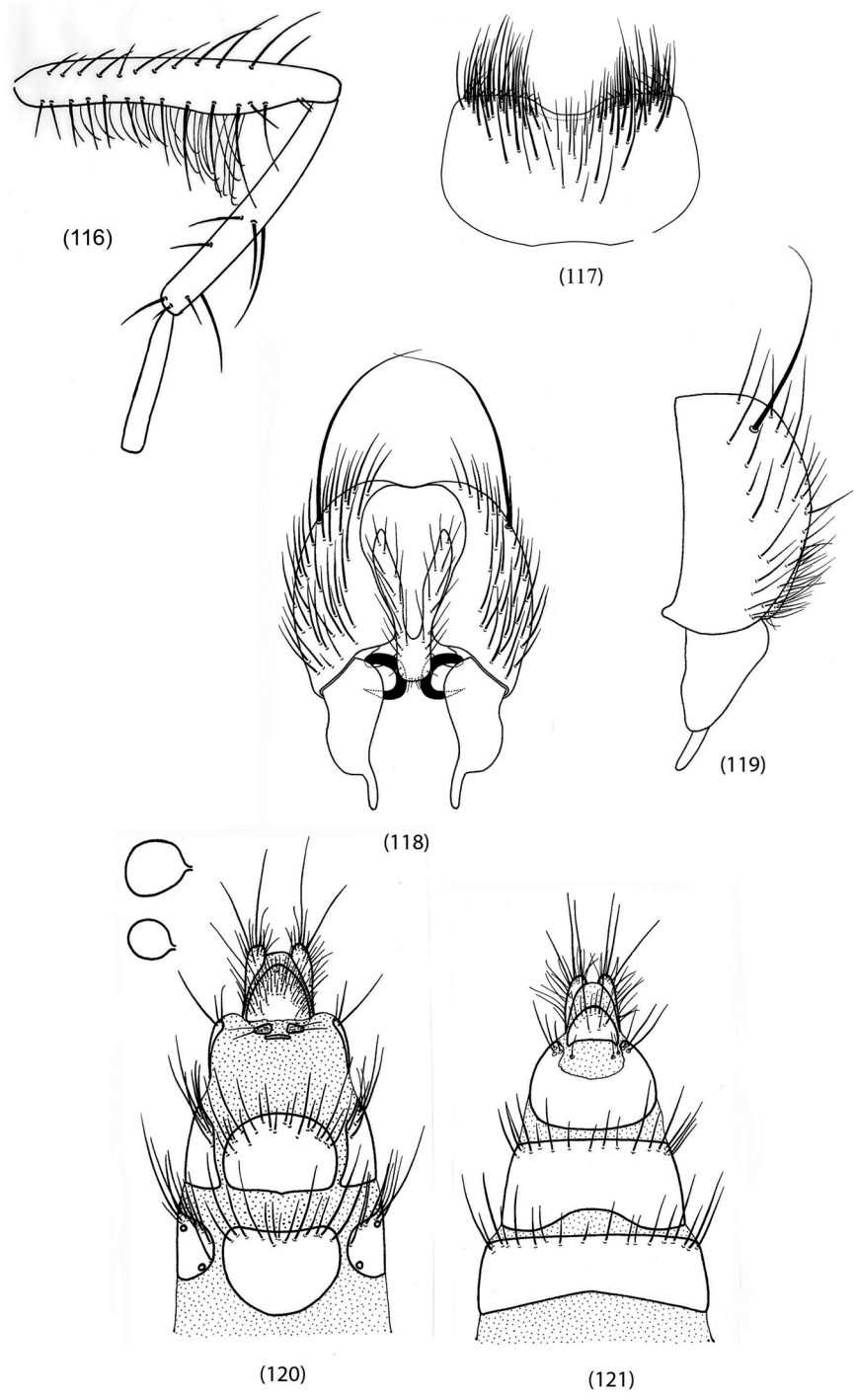
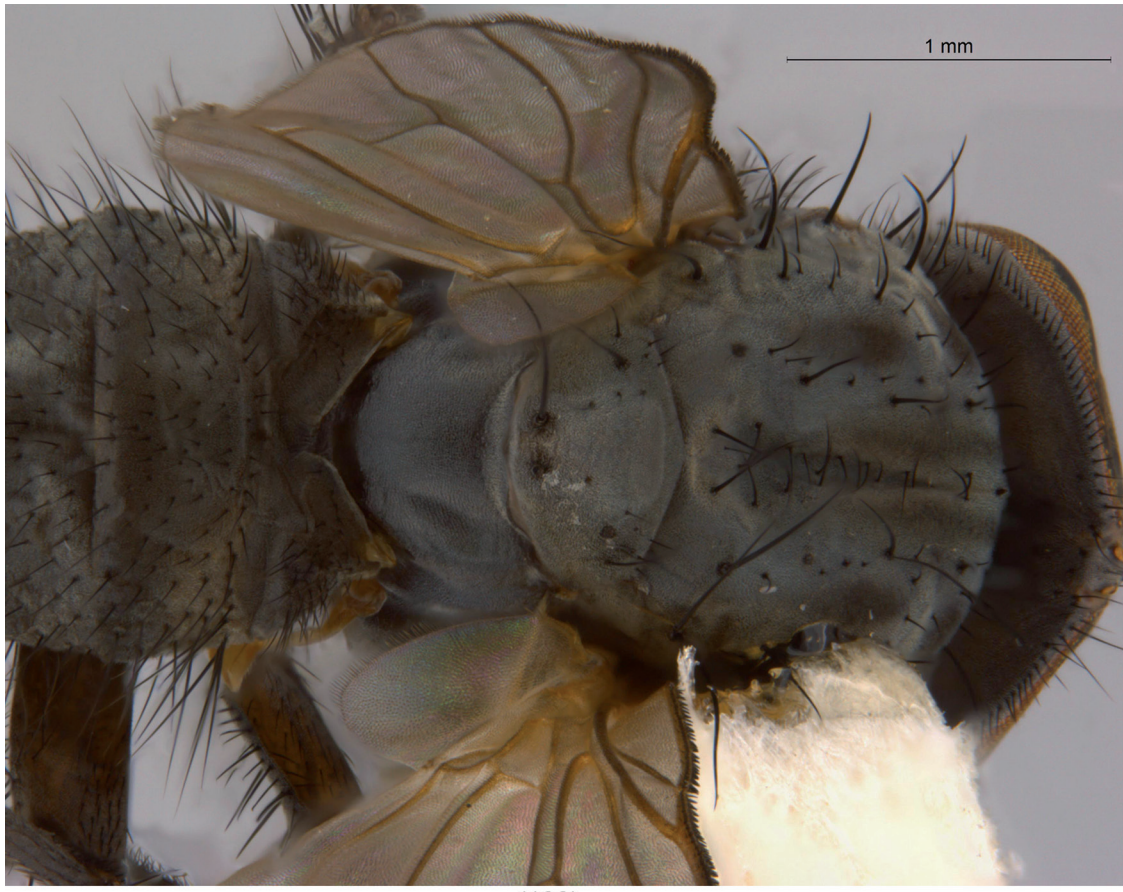


Fig. 116–121 *Fannia mangerensis* new species: male hind femur and tibia (anterior) (116); male sternite 5 (117); male hypopygium (ventral) (118); male hypopygium (lateral) (119); female (ventral) oviscapt and spermathecae (120); female oviscapt (dorsal) (121).

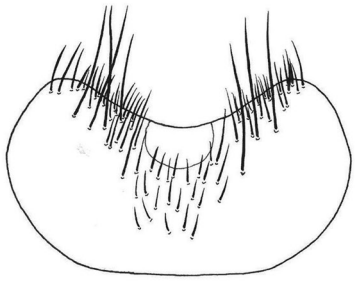


(122)

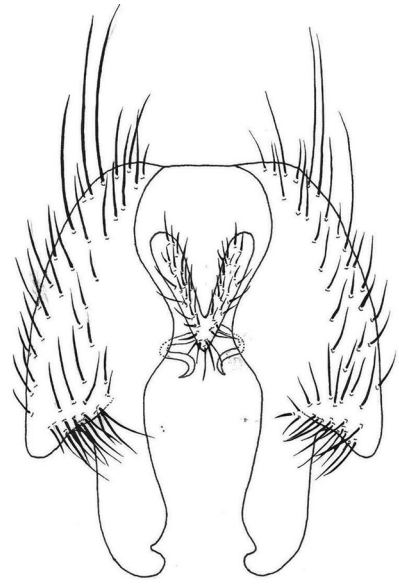
Fig. 122 *Fannia mercurialis* new species: male scutum. Mercury Islands, Karapuki I., from nest material of *Eudyptula minor*, coll. 14 Dec 1987, em. 15 Feb 1988 (G. Hall) (holotype, in NZAC).

(123)

Fig. 123 *Fannia mercurialis* new species: male abdomen. Mercury Islands, Karapuki I., from nest material of *Eudyptula minor*, coll. 14 Dec 1987, em. 15 Feb 1988 (G. Hall) (holotype, in NZAC).

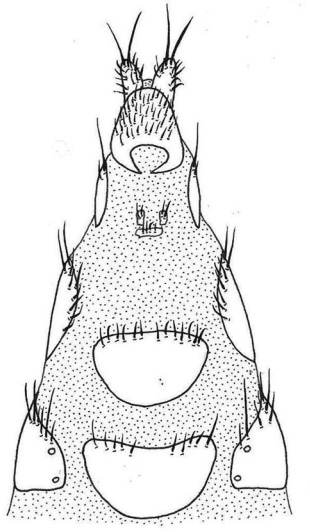


(124)



(125)

(126)



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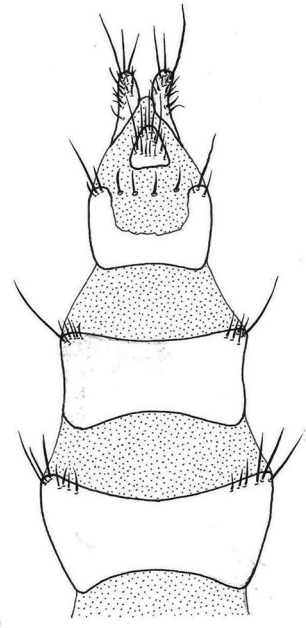

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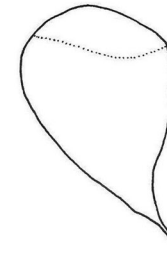


(129)

Fig. 124–129 *Fannia mercurialis* new species: male sternite 5 (124); male hypopygium (ventral) (125); male hypopygium (lateral) (126); female oviscapt (ventral) (127); female oviscapt (dorsal) (128); female spermatheca (129).

(130)

Fig. 130 *Fannia triregum* new species, male. Three Kings Islands, Great Island, Castaway Camp, Nov 1970 (DSIR Expedition) (holotype, in NZAC).

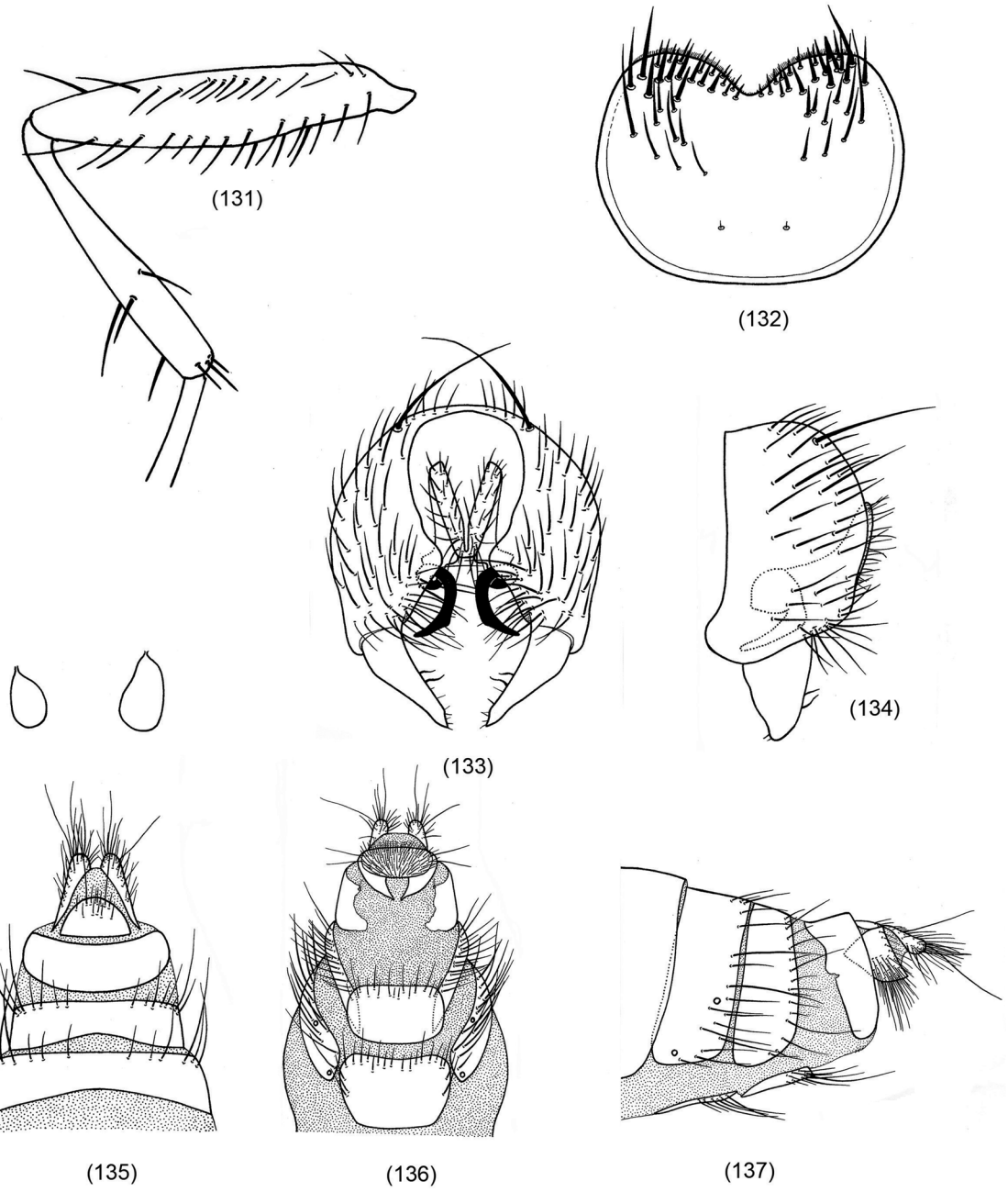


Fig. 131–137 *Fannia triregum* new species: male hind femur and tibia (anterior) (131); male sternite 5 (132); male hypopygium (ventral) (133); male hypopygium (lateral) (134); female oviscapt (dorsal) and spermathecae (135); female oviscapt (ventral) (136); female oviscapt (lateral) (137).

(138)

Fig. 138 *Zealandofannia mystacina* new genus and new species, male. SI, Codfish Island, ex. *Mystacina* guano, em. 7 Jun 1982 (E. Kennedy) (holotype, in NZAC).

(139)

Fig. 139 *Zealandofannia mystacina* new genus and new species, female. SI, Codfish Island, em. from guano in first *Mystacina* colony, 2 Dec 1979 (M. J. Daniel) (paratype, in NZAC).

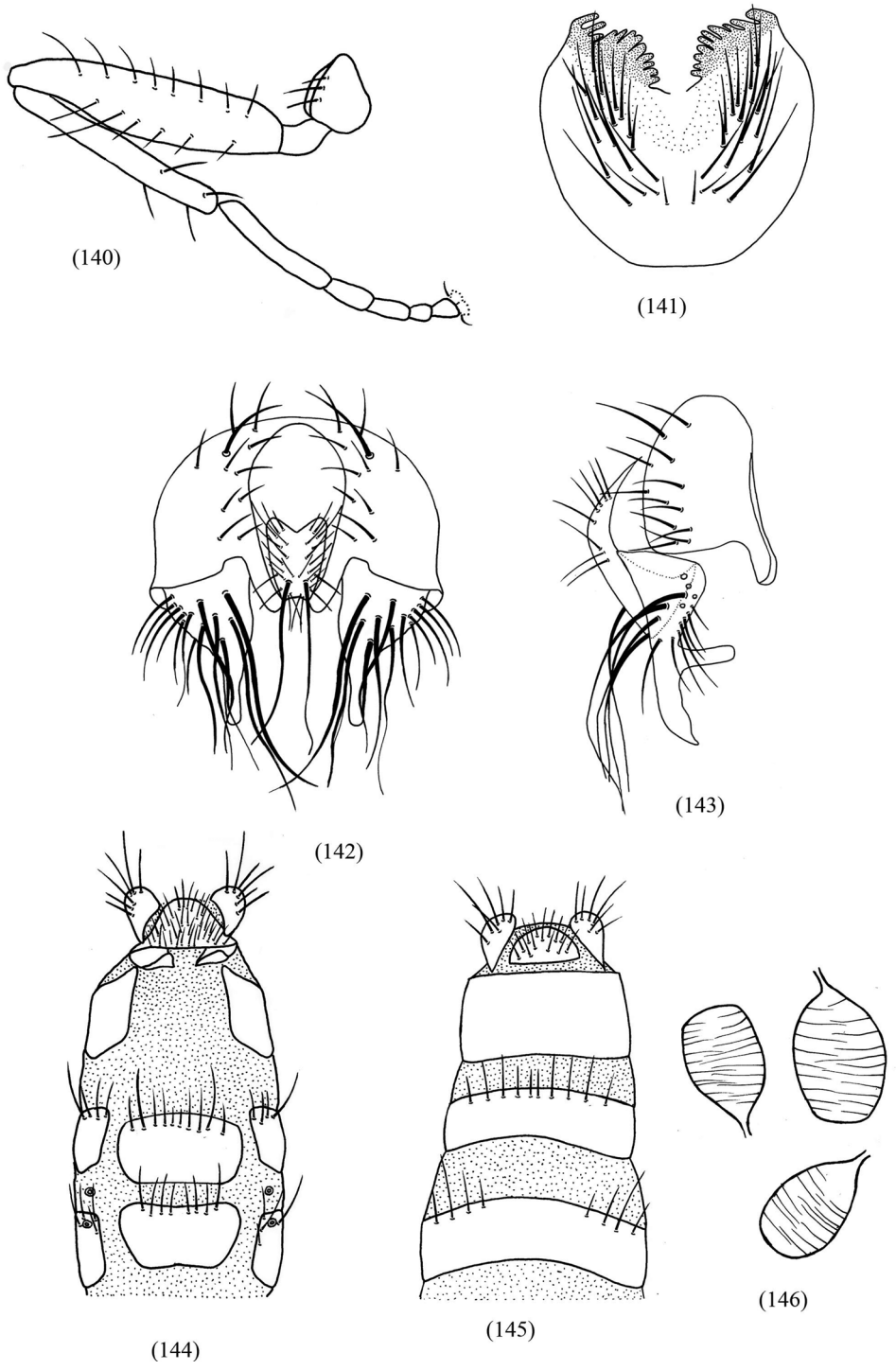
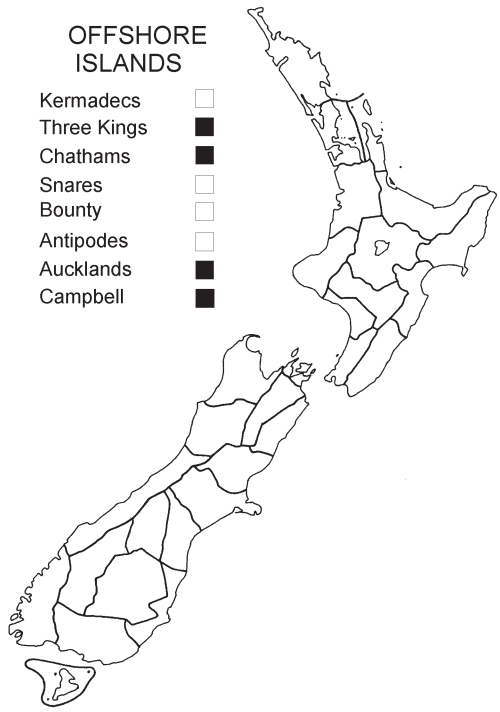
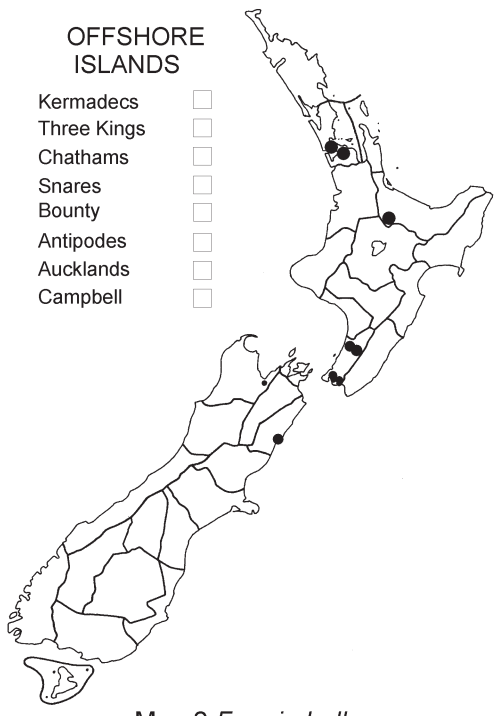


Fig. 140–146 *Zealandofannia mystacina* new genus and new species: male hind femur and tibia (anterior) (140); male sternite 5 (141); male hypopygium (ventral) (142); male hypopygium (lateral) (143); female oviscapt (ventral) (144); female oviscapt (dorsal) (145); female spermathecae (146).

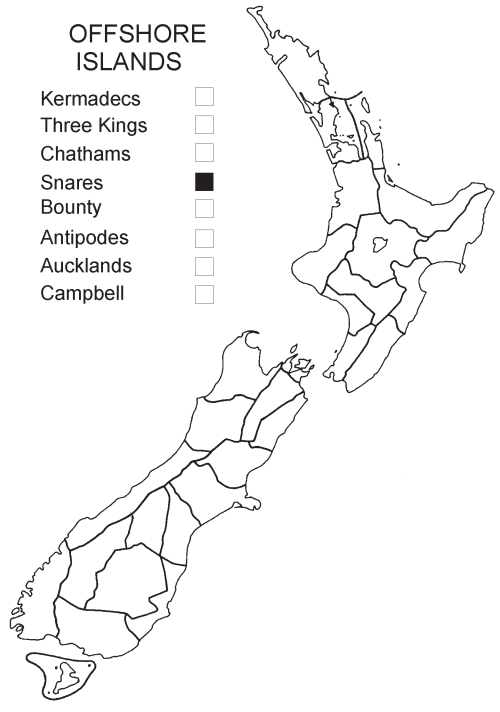
DISTRIBUTION MAPS for new species



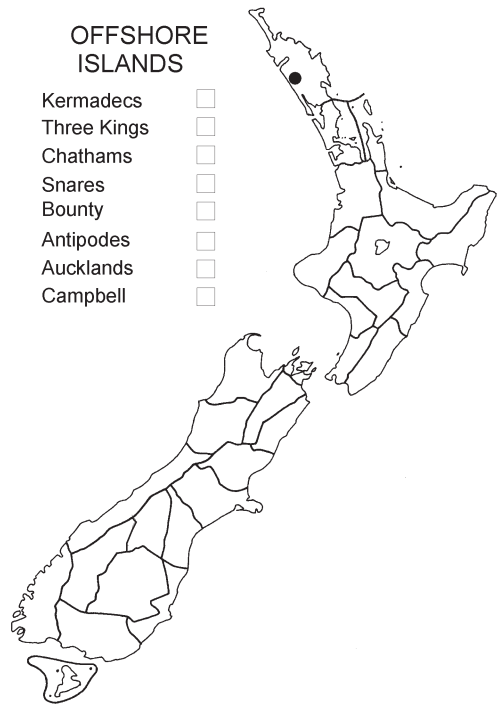
Map 1 *Fannia anthracinalis*



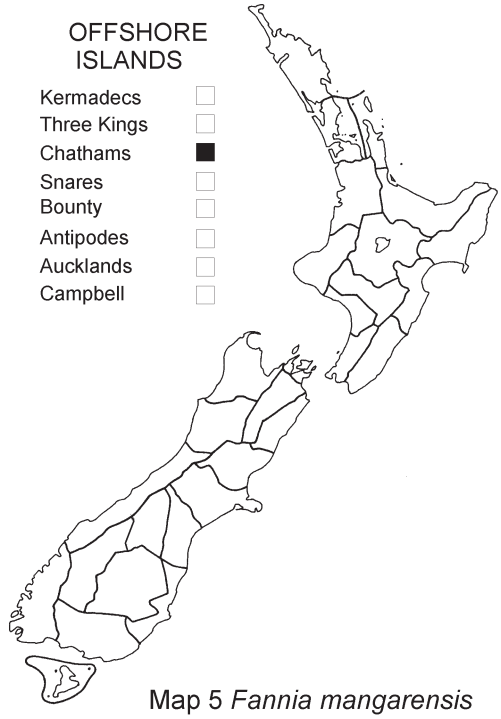
Map 2 *Fannia hollowayae*



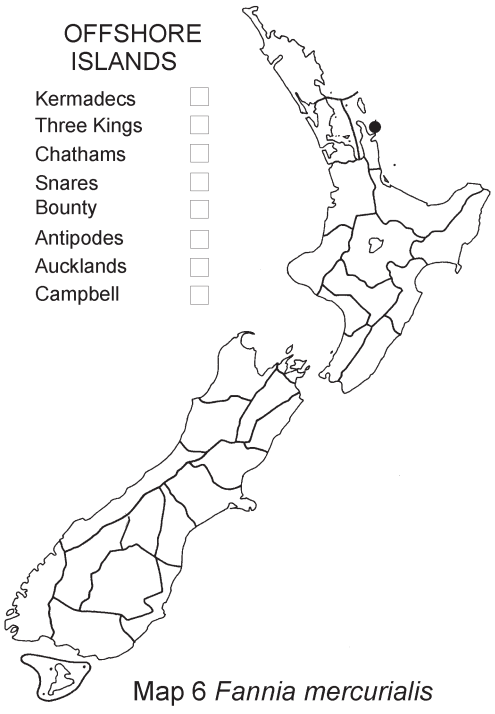
Map 3 *Fannia laqueorum*



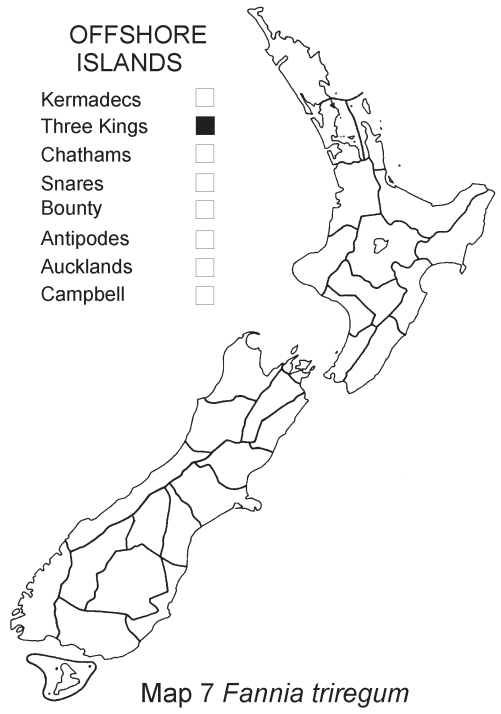
Map 4 *Fannia magnicornis*



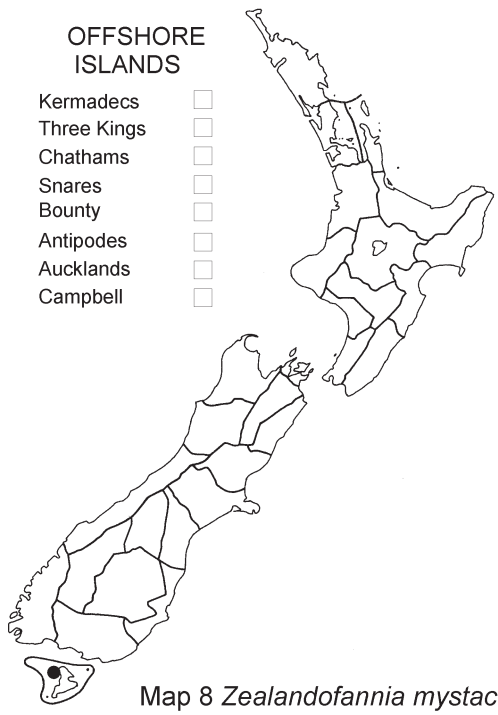
Map 5 *Fannia mangarensis*



Map 6 *Fannia mercurialis*



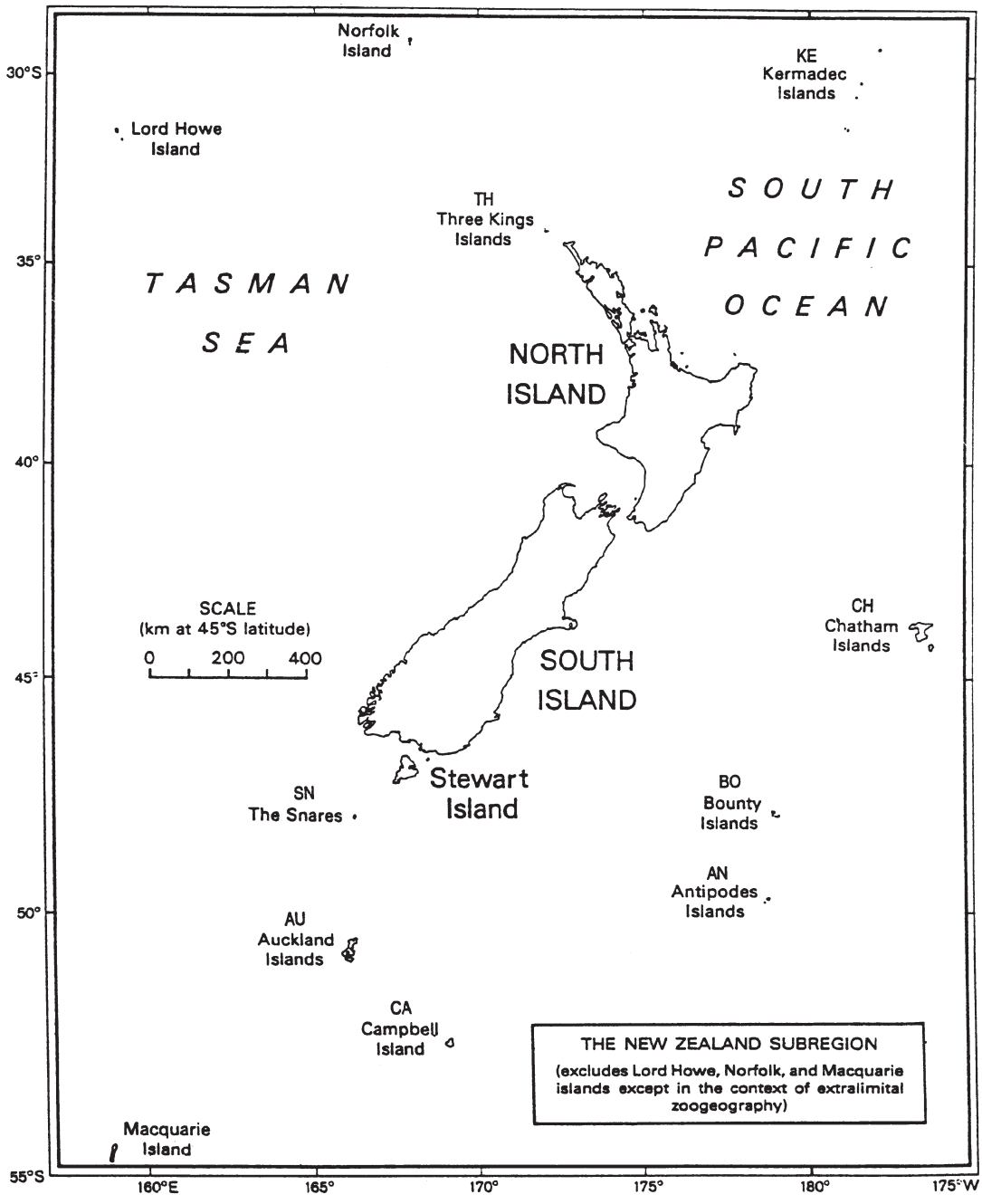
Map 7 *Fannia triregum*

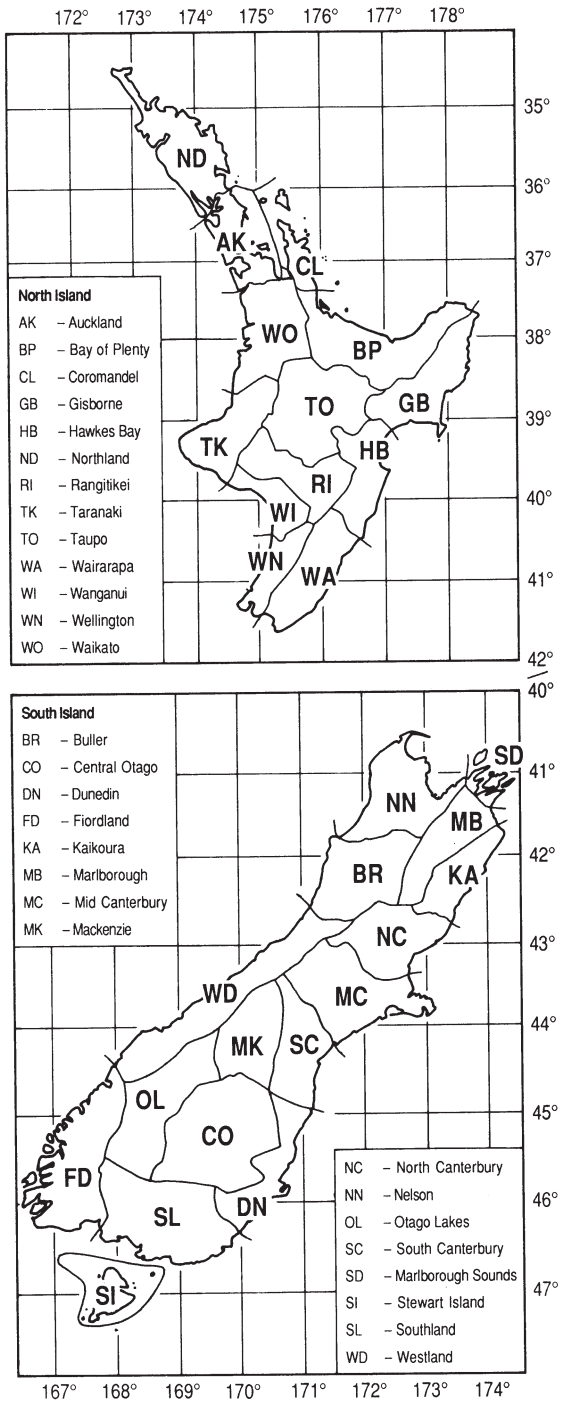


Map 8 *Zealandofannia mystacina*

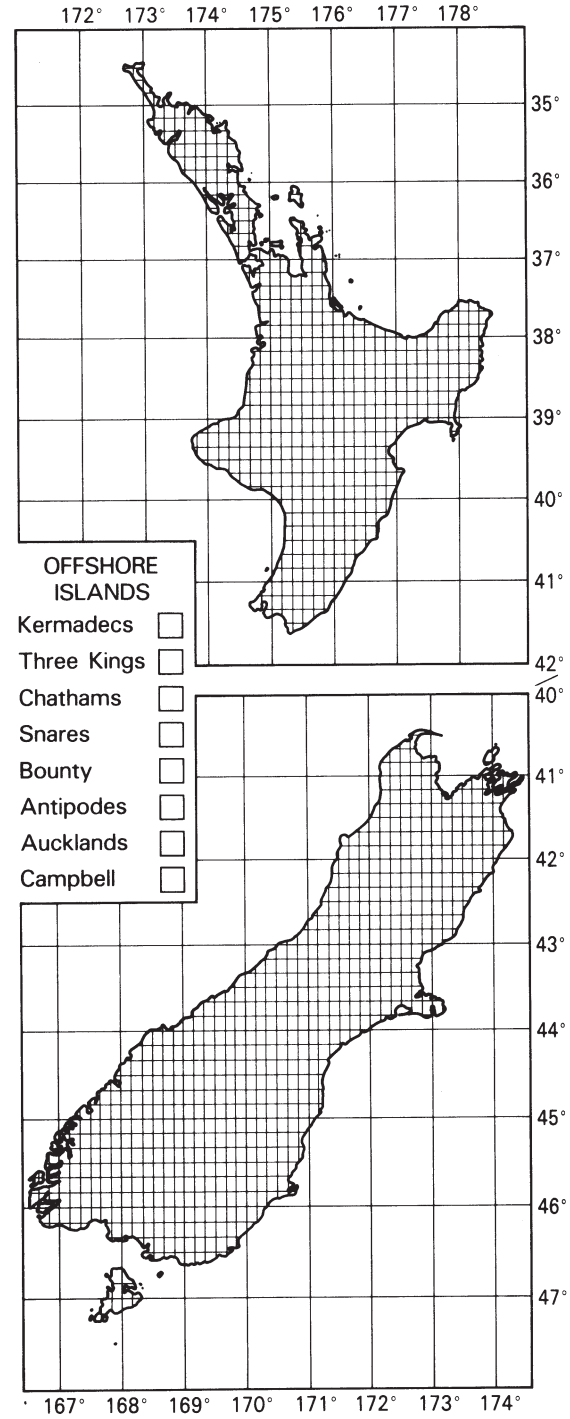
TAXONOMIC INDEX

Page numbers in **bold** type denote a description, and in italic type illustrations. A suffixed letter 'k' indicates a key, and 'm' a map.


Norfolk Island
KE Kermadec Islands
Lord Howe Island
TH Three Kings Islands
SOUTH PACIFIC OCEAN
TASMAN SEA
NORTH ISLAND
SOUTH ISLAND
SCALE (km at 45°S latitude)
0 200 400
CH Chatham Islands
Stewart Island
SN The Snares
BO Bounty Islands
AN Antipodes Islands
AU Auckland Islands
CA Campbell Island
THE NEW ZEALAND SUBREGION
(excludes Lord Howe, Norfolk, and Macquarie islands except in the context of extralimital zoogeography)
Macquarie Island
30°S
35°
40°
45°
50°
55°S
160°E
165°
170°
175°
180°
175°W



Area codes and boundaries used to categorise specimen locality data (after Crosby *et al.* 1976)



Base-map for plotting collection localities; this may be photocopied without copyright release

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Ka āhei te tangata ki te **whakauru tuhituhinga** mehemea kei a ia ngā tohungatanga me ngā rauemi e tutuki pai ai tana mahi. Heoi anō, e wātea ana te Kohinga Angawaho o Aotearoa hei āta tirotiro mā te tangata mehemea he āwhina kei reira.

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