

THE CALYPTRATE DIPTERA OF NEW ZEALAND

PART I.

By J. R. MALLOCH.

INTRODUCTION.

It is my intention to present in a series of short papers a revision of the Calyptrate Diptera of New Zealand, based upon material which I have examined, this including many of the type specimens of species described by Hutton, and examples from certain public institutions and private individuals. It is very evident to me that the species available to me comprise but a portion of those that occur in the country, and that the present papers must be looked upon therefore as merely introductory to the study of the native fauna. I hope, however, that they will suffice to provide anyone sufficiently interested in the group with data upon the most recent methods in use for the classification of these insects, and thus prompt at least some of those who may use the papers to more complete personal studies, which will eventually result in a complete survey of the native flies. This series may be taken in conjunction with that on the Acalyptrate Diptera commenced by Mr. A. Tonnoir and the present writer, and which is still in process of completion.

To distinguish the insects contained in the Calyptrate Diptera the following characters may be utilised:—Auxiliary wing vein always complete, and separated from the first vein; anal cell and sixth vein present, the latter usually incomplete; spiracles of the second to fifth abdominal segments situated in the tergites; second antennal segment with a longitudinal cleft on upper outer side; tibiae with preapical dorsal bristle, and at least one of the pairs of tibiae with one or more submedian bristles; calyptrae well developed, the lower one usually larger than the upper.

The major group is generally divided into several families, according to the ideas of the specialists who may be treating of them, but for our present purpose it may be sufficient to state that this paper covers only the Muscidae, or more properly a part of that family, and that this family is distinguished from the others by the lack of strong bristles in a vertical series below the posterior thoracic spiracle. There are a few species of Muscidae which have fine hairs on the same pleural sclerite (usually referred to as the hypopleura), but in no case are there strong bristles.

The subfamilies at present known to me which occur in New Zealand are:—Muscinae, Phaoniinae, Fanniinae, Anthomyiinae

and Stomoxydinae. This paper deals with some genera in the first four. Below I present a key to the subfamilies listed above.

Key to the Subfamilies.

1. Sixth wing vein attaining margin of wing; basal segment of hind tarsus with a well developed bristle near base on ventral surface; lower calypter very little, if any, larger than the upper one ANTHOMYIINAE
- Sixth wing vein not attaining margin of wing; basal segment of hind tarsus without a well developed ventral bristle near base on ventral surface; lower calypter usually very noticeably larger than the upper one 2
2. Proboscis heavily chitinized, swollen at base and tapered to apex, rigid, and projecting straight in front; arista with long hairs above, bare, or almost so, below — STOMOXYDINAE
- Proboscis usually stout and short, not prominently protruded in front, and not appreciably tapered to apex; arista never noticeably longer haired above than below 3
3. Hind coxae with some hairs at apices above bases of femora FANNIINAE
- Hind coxae bare at apices above bases of femora 4
4. Lower calypter widened behind, subtransverse, its inner margin lying close against lateral edge of the scutellum; fourth wing vein always very conspicuously curved forward about middle of its apical section so that the first posterior cell is much narrowed at apex MUSCINAE
- Lower calypter never widened behind, narrowly rounded at apex, its inner margin never lying close against lateral edge of the scutellum; fourth wing vein usually straight or slightly deflected backwards apically, curved forward only in *Muscina* PHAONIINAE

Subfamily ANTHOMYIINAE.

Up to the present I have seen but one genus of this subfamily from New Zealand, which I deal with below. It is remarkable that this subfamily is very poorly represented in regions south of the equator in both hemispheres. There are about half a dozen species known to me from Australia, the two listed below being amongst them.

Genus HYLEMYIA Robineau-Desvoidy.

A number of the species of this genus are known to attack cultivated crops, the maggots feeding on the roots and doing considerable damage, the well known "Onion Fly" being one of these (*Hylemyia antiqua* Meigen), and the "Cabbage Fly" another (*H. brassicae* Bouche).

Corn Root Maggot

***Hylemyia cilicrura* Rendani.**

This species is known as the "Corn-root Maggot" in North America, because of the fact that its larvae are frequently injurious to sprouting maize. It also attacks sprouting beans and some other plants.

The male may be readily distinguished from any other species occurring in New Zealand by its slender shape, brownish grey colour, hyaline wings, black legs, and the following structural characters; fore tibia with a rather long slightly curved blunt-tipped spur at apex on posterior, or outer side; hind tibia with the anteroventral and a portion of the posteroventral surface fringed with very short fine hairs, which stand at right angles to the surface; and the fifth sternite of the male has a pair of short stout bristles at apex of each of the two lateral processes.

Length, 5-6 mm.

Locality: Nelson, 7.iii.1922 (A. Tonnoir).

I have examined the type specimens of *Homalomyia rava* Hutton, and *Phorbia novae-zealandia* Hutton, both described by Hutton in his paper in the Transactions of the New Zealand Institute in 1900, pp. 74 and 76 respectively, and find that they are this species. Both were described from Christchurch, so that the species is of rather long standing in the local fauna. It is of almost cosmopolitan occurrence.

***Hylemyia deceptiva* Malloch.**

Of the same habitus as the foregoing species, but readily distinguished from it by the presence of three broad brown vittae on the mesonotum, and four dark brown spots on the wings arranged as follows: on the base of second vein, at apex of subcostal cell, on inner cross vein, and on outer cross vein, the latter usually in two sections, one on each extremity of the vein. The male has a straight sharp pointed bristle at apex of fore tibia on its outer side, and the hind tibia without short fine erect hairs on anteroventral and posteroventral surfaces; the processes of the fifth abdominal sternite are broader than in *cilicrura*, lack the short stout apical bristles, and have very fine marginal hairs which are longest at apices.

Length, 5-6 mm.

Locality: Nelson, 7. iii. 1922 (A. Tonnoir).

I described this species in the Annals and Magazine of Natural History, series 9, volume 7, page 428, 1921, and the material came from a number of localities in both New Zealand and Australia, so that it is strange that it did not occur in Hutton's material.

Nothing is known of the habits of the species.

Syn. *H. omalomyia* rava Hutt.
Phorbia novae-zealandia Hutt.

Subfamily PHAONIINAE.

I am not prepared to offer at this time a generic synopsis of this subfamily. In New Zealand it is the predominant one of the family, but it may be worth mention that the great bulk of the species seem to have had a common origin, their general habitus and markings indicating derivation from the group ranked as a subfamily by Schnabl and Dziedzicki under the name *Limnophorinae*. To the best of my knowledge this group is of aquatic habits, most of the species which I have met with being found in the vicinity of streams and other bodies of water, difficulty being frequently experienced in obtaining specimens because of their predilection for settling on stones projecting from the bed of a stream. In other cases I have found species settling on vertical rock surfaces, especially where such were damp. Certain of the species, especially those in which the general colour is pale grey, and in which the males have the eyes widely separated above, affect the shores of lakes and the sea shore, where they are not at all readily distinguished on the pale sands. Nothing is known to me of the habits of the New Zealand species.

I have already published a synopsis of the species of the genus *Millerina* with descriptions of several species*, and though I ranked it as a subgenus of *Melanochelia* Rondani in my paper, I now consider it entitled to generic rank, and present herein a key to the species, and also a synopsis of the generic characters.

One other genus, *Limnohelina* novum, is dealt with in full in this paper. This genus is evidently not distantly related to *Rhabdoptera* Stein, a South American genus, but it has the lower calypter larger, and differs in certain other respects, so that I have decided it ought to be kept separate until a comparison on the genotypes is made by some competent authority. Straining a point or two to bring the two groups together, even with a knowledge of the tendency to consider there is a strong affinity between the faunae of the two regions under discussion, is not a course that I feel justified in taking in this case.

Genus MILLERINA Malloch.

Frons in male almost as wide as in female, the latter never over one-third of the head width ; each frontal orbit in both sexes with a series of rather long, strong incurved bristles, which extends well above middle, the upper bristle on each orbit curved outward, and rarely a much shorter and weaker outwardly curved bristle in front of the latter ; male with the fourth segment of fore tarsus compressed, its apex projecting downward on ventral surface ; hind tibia with two long strong bristles on anterodorsal surface, and a similar bristle about one-third from base on the posterodorsal sur-

**Ann. Mag. Nat. Hist.*, ser. 9, vol. 15, p. 138, 1925.

face ; hypopleura and prosternum bare ; no hairs at base of third wing vein.

Genotype, *Millerina pennata* Malloch.

KEY TO THE SPECIES.

1. Mesonotum with three pairs of postsutural dorsocentral bristles ; femora, apical segment of fore and mid tarsi, and all of hind tarsi, blackish, remainder of legs tawny yellow ; third and fourth segments of fore tarsi of male slightly compressed, apical segment of mid tarsus densely fringed with black hairs along each side, the hairs as long as the slightly broadened segment *limpida* Hutton
- Thorax with four pairs of postsutural dorsocentral bristles 2
2. Apical segment of male fringed as in that of *limpida* ; legs similarly coloured, but the hind tarsi not as dark ; fourth segment of fore tarsus conspicuously compressed, and much produced ventrally at apex, fifth slender and about twice as long as fourth segment *pennata* Malloch
- Apical segment of mid tarsus of male not fringed as above 3
3. Femora black, with dense grey dusting *nigrifemur* Malloch
- Femora tawny yellow, sometimes greyish apically *hudsoni* Malloch

+ **Millerina limpida** (Hutton).

Trichopticus limpidus Hutton, *Trans. N.Z. Inst.*, 1900, p. 71.

I have examined the type specimen of this species, and base my characterisation upon this and other specimens. For a full description see my paper in which the genus was described.

Localities, Christchurch (type), Dunedin. Two recent specimens submitted by Mr. A. Tonnoir from Christchurch, the others, except type, submitted by British Museum.

+ **Millerina hudsoni** Malloch.

Localities : Ruapehu and Otago. Type in author's collection, paratypes in the collection of the Deutsches Entomologisches Museum. One paratype will be sent to the Canterbury Museum through the kindness of Dr. Walther Horn.

+ **Millerina nigrifemur** Malloch.

Localities : Ohakune and Greymouth. Type submitted by Mr. A. Tonnoir. Paratype in collection of Deutsches Entomologisches Museum.

+ **Millerina pennata** Malloch.

This species was described from a single male submitted by Dr. David Miller and without locality, bearing only the number " 3 " in pencil.

+ **Millerina** (?) **rapax** Hutton.

This species appears to be referable here on account of the frontal, sternopleural, and hind tibial bristling in both sexes, but the male before me lacks most of the legs, including the diagnostic segment of the fore tarsi, so that I am not including it in the foregoing key to the species. Should it really be referable here it will run down to the group with four pairs of postsutural dorsocentral bristles, and it is distinguished from any other species therein by the fuscous femora and tarsi of all legs, and the grey dusted immaculate disc of the scutellum. The male type has had the abdomen glued on, and provided the one now attached is correctly associated, the lack of strong bristles, and the presence of more abundant rather long bristly hairs on the fifth visible tergite should suffice to distinguish this sex apart from any tarsal characters which perfect examples may disclose.

Length, 9-10 mm.

Originally described from Christchurch. In addition to the type series of one male and three females I have before me a specimen belonging to the British Museum without more definite locality than New Zealand (Clark).

The ventral surfaces of the femora are furnished with some short stout bristles much as in some species of *Exsul* Hutton.

X **Genus LIMNOHELINA novum.**

This genus is distinguished from any other occurring in New Zealand by the very wide frons in both sexes, which is never less than one-third of the width of the head, and has the sides not straight, but slightly emarginate at or slightly in front of the middle; ocellars strong; two uppermost orbitals reclinate or sloping slightly out over eyes; outer verticals very small, not over one-third as long as the inner pair; cheeks usually about half as high as eye, the latter microscopically haired or bare, and usually with the facets enlarged on the angular anterior portion opposite bases of antennae; palpi quite noticeably dilated at apices; anterior pair of presutural dorsocentrals very much smaller than second pair, sometimes undeveloped; anterior intra-alar on the presutural area very small or lacking; males all with two or more strong and long fasciculate bristles near apex of the mesosternum amongst the finer long bristles; in no species are there strong posterodorsal bristles on the hind tibia; prosternum and hypopleura bare.

Genotype, *Cordylura debilis* Hutton.

I present below a key to the species at present known to me. I know nothing of the immature stages of the species nor the habits of the adults. *Coenosia rubriceps* Hutton, which is unknown to me, may belong here.

KEY TO THE SPECIES.

1. Mesonotum with four pairs of well developed postsutural dorso-central bristles 2
- Mesonotum with three pairs of well developed postsutural dorso-central bristles 5
2. Legs entirely black, grey dusted 3
- Legs with the tibiae at least tawny yellow 4
3. Mesonotum with a broad chocolate brown central mark, which is divided by a central pale grey dusted vitta that is less distinct in front, and the sides pale grey ; frons deep black behind, becoming yellow in front ; claws of fore tarsi of male simple
bivittata, n.sp.
- Mesonotum dull grey dusted, with traces of five interrupted brown vittae ; frons olive-grey or brownish, slightly paler in front ; claws of fore tarsi of male bifid at apices (Fig. 2)
uniformis, n.sp.
4. Antennae entirely black ; femora of male entirely dark, densely grey dusted, mid and hind pairs with rather closely placed fine short bristly hairs on apical half of posteroventral surface ; tibiae testaceous yellow *huttoni*, n.sp.
- Second antennal segment testaceous yellow, third black ; femora and tibiae tawny yellow, with a dark grey dusted stripe along posterodorsal surface of fore, and at least a portion of anterodorsal surface of mid and hind femora, the two latter pairs with short stout bristles on a portion of the posteroventral surfaces near apices *spinipes* Walker
5. Thorax and abdomen black, dorsum of both densely lead-grey dusted, and without any well defined darker markings ; legs fuscous, tibiae not noticeably paler than femora ; wings greyish hyaline, cross veins not clouded *grisea* n.sp.
- Thorax, and usually also the abdomen, with dark markings on the dorsum ; tibiae usually paler than femora ; cross veins of wings always more or less distinctly clouded with fuscous 6
6. Tibiae fuscous, not appreciably paler than femora 7
- Tibiae testaceous yellow, conspicuously paler than femora 9
7. Mesonotum with two conspicuous black-brown vittae, which extend over its entire length and on sides of the scutellum, separated throughout by a central yellow, or pale grey, dusted vitta, which is very narrow in front, and gradually widened to posterior extremity, lateral margins greyish white dusted ; dust on abdominal tergites grey, becoming yellowish on sides, the brown or fuscous paired spots faint but distinguishable ; mid tibia with one or two anteroventral bristles beyond middle *dorsovittata* n.sp.
- Mesonotum grey dusted, with either five brown vittae on disc, or the latter broadly rufous brown, and without a conspicuous pale central vitta 8

8. Mid tibia with one or two anteroventral bristles beyond middle ; mesonotum grey dusted, with the disc except prealar lateral margins rufous brown, and a faint greyish vitta along each series of dorsocentral bristles, the brown colour becoming darker behind, sometimes almost black on disc of scutellum ; abdomen pale grey dusted, becoming yellowish on lateral curves of tergites, and without distinguishable dark paired dorsal spots *smithii* Hutton
- Mid tibia without well-developed anteroventral bristles beyond middle ; mesonotum lead-grey dusted, with five interrupted brown vittae, the central three fused behind suture, disc of scutellum brown, the margin grey ; abdomen pale grey dusted, not at all yellowish on sides, and with a pair of quite conspicuous sub-triangular brown spots on each visible tergite from first to fourth inclusive *nigripes* n. sp.
9. Mid tibia with at least one distinct submedian anteroventral bristle ; male without short stout bristles on apical half of posteroventral surface of mid femur ; mesonotum with the disc broadly brown, with five interrupted darker brown vittae, and the lateral margins pale grey ; hind tibia with one or two short anteroventral bristles beyond middle *debilis* Hutton
- Mid tibia without anteroventral bristles beyond middle ; male with short stout bristles on apical half of posteroventral surface of mid femur ; mesonotum brownish grey on disc, with five interrupted dull brown vittae, and the lateral margins not conspicuously paler grey dusted ; hind tibia without anteroventral bristles *nelsoni* n. sp.

~~+~~ ***Limnohelina huttoni* n. sp.**

Male.—Dull black species with dense lead-grey dust, the thoracic and abdominal dorsa with dark markings. Frons dull dark brown to below middle, the anterior portion, face, and cheeks, densely yellow dusted, occiput densely grey dusted ; antennae and aristae black ; palpi testaceous yellow. Thoracic dorsum with the usual five vittae brown, all broken at suture, the central one lacking for a third of its length behind suture, the posterior portion rather broad, and connecting with the dark spot at base of each of the second pair of the postsutural bristles, the submedian vittae ceasing anterior to that point, and the sublateral pair fading out before the hind margin ; the surface also with dark dots at bases of the bristles ; a brown mark on upper half of the mesopleura, and one on each side of the scutellum at base. Abdomen with the usual subtriangular paired tergal spots black-brown, very large, fused centrally, present on visible tergites 1 to 4 inclusive, and in addition to these there are dark dots at bases of many of the hairs and bristles. Legs fuscous, femora grey dusted, tibiae testaceous yellow. Wings hyaline, both cross veins slightly clouded with fuscous, the whitish areas on third

vein on each side of the cross veins so noticeable in some of the other species hardly distinguishable. Calyptrae yellowish white. Halteres yellow.

Frons at vertex a little less than one-half of the head width, interfrontalia bare; head in profile as Fig. 1. Thorax with 2+4 dorsocentrals, the anterior presutural pair about one-third as long as the second pair; anterior presutural intra-alar quite well developed for this genus; sternopleurals 1+2. Fore tibia with one median posterior bristle; mid and hind femora with the apical portion of the posteroventral surface finely bristled but not combed; mid tibia with an anterodorsal and two posterior submedian bristles; hind tibia with three anterodorsal bristles, the preapical dorsal bristle moderately long, and no anteroventral bristle; tarsi normal. Inner cross vein about three-sevenths from apex of discal cell.

Female unknown.

Length, 5 mm.

Type: Ruapehu, January, 1922 (M. N. Watt).

In author's collection, but will eventually be sent to Canterbury Museum.

+ ***Limnohelina spinipes*** (Walker).

Coenosia spinipes Walker, List of Dipt. Ins. in Brit. Mus., pt. 4, p. 969 (1849).

Male and female.—In addition to the characters listed in the foregoing synoptic key this species differs from *huttoni* in having the second antennal segment yellowish, the central brown vitta on mesonotum wider in front, not interrupted at suture, narrower behind, and not connected with the dark spots at bases of the second pair of postsutural dorsocentrals, and the paired spots on the abdominal tergites paler, and quite widely separated by a grey stripe centrally.

Structurally the male differs in having the bristles of the mid and hind femora on the apical portion of the posteroventral surfaces much stronger, and in the form of rather blunt-tipped spines, rather closely placed, almost comb-like, those of the hind femora in more than a single series, the anteroventral surface of same pair with a double series of bristles apically.

The female has one or two anteroventral bristles on the hind tibia, and no stout short femoral bristles.

Length, 5-7 mm.

Originally described from New Zealand without definite locality, and unknown to Hutton. I have seen specimens from the following localities:—Otira (J. W. Campbell); Ohakune (T. Harris); Purau (without collector's name); Kaituna, Maitai Valley, and Nelson (A. Tonnoir).

Specimens will be returned to Canterbury Museum ; specimens from the three first mentioned localities are in the collection of the United States National Museum.

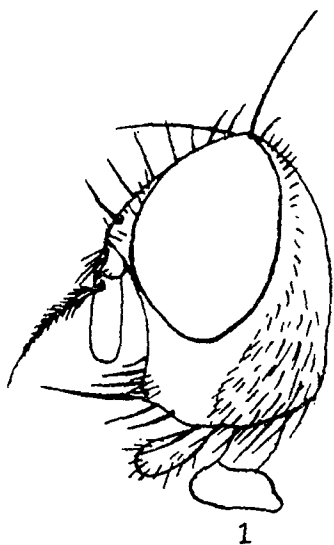


Fig. 1, Head of *Limnohelina spinipes* Walker, from the side.

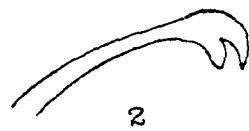


Fig. 2, Claw of fore tarsus of male of *Limnohelina uniformis* n. sp.

† ***Limnohelina bivittata*** n. sp.

Male.—This species is strikingly different from all the other three species in the group with four pairs of postsutural dorsocentral bristles in having two broad opaque black-brown vittae on the mesonotum, which are divided by a paler central vitta that is pale brown in front, and gradually merges into grey behind, the presutural section showing a narrow dark brown vitta on each side ; entire lateral margins of mesonotum densely greyish-white dusted. Upper third of frons velvety black, merging into brown at anterior ocellus, head otherwise much as in *huttoni*, but the second antennal segment yellowish at apex. Pleura grey dusted, mesopleura brownish, darkest at upper margin ; scutellum brown. Abdomen densely grey dusted, without evident paired dark dorsal spots. Legs black, grey dusted. Wings slightly infumated, with dark clouds over both cross veins, and whitish at base, in costal cell, and on third vein on both sides of the cross veins. Calyptrae whitish yellow. Halteres yellow.

Structurally very similar to *huttoni* ; the anterior presutural pair of dorsocentrals longer, the fore tibia with a weaker submedian posterior bristle, the mid and hind femora armed almost as in male of *spinipes*, the mid tibia with two anterodorsal and two or three posterior bristles, the hind tibia with some rather prominent bristly hairs on the posterodorsal surface, and with three fine anterodorsal bristles. In other respects similar to *huttoni*.

Female unknown.

Length, 5.5 mm.

Type and one paratype, Wellington, October 19th, 1920 (no collector's name).

This and one other species of this genus (*dorsovittata*), because of the conspicuously bivittate mesonotum, remind one strongly of the sapromyzid species *Poecilohaeterella bivittata* (Hutton). ***Bilineata***

† ***Limnohelina uniformis*** n. sp.

Male and female.—Black, densely lead-grey dusted. Frons quite uniformly olive-brown dusted, paler in the female, and with the orbits and triangle in that sex slightly paler than the remainder of surface; antennae and aristae black; face greyish yellow dusted, brighter in the male, becoming whitish along eyes, cheeks concolorous with face, becoming whitish above and behind; entire occiput whitish grey dusted; palpi testaceous yellow. Mesonotum with five partial brown vittae, broader and more distinct in the male. Abdomen with a pair of fuscous marks on each visible tergite from first to fourth inclusive, least distinct in female, but in neither sex sharply defined. Legs black, grey dusted. Wings hyaline, cross veins slightly clouded. Calyptrae yellowish white. Halteres yellow.

Aristae distinctly pubescent; anterior pair of presutural dorso-central bristles and anterior presutural intra-alar (posthumeral) small but distinct; postsutural dorso-centrals four pairs; sternopleurals 1 + 2, lower posterior one weak. Fore tibia with one posterior submedian bristle; mid and hind femora in neither sex with stout comb-like spines on ventral surfaces apically; mid tibia with one anterodorsal, and two or three posterior bristles; hind tibia with about three anterodorsal and anteroventral bristles; claws of the male as usual much larger than those of the female, those of the fore pair longest and peculiarly formed (Fig. 2), the other pairs simple. Inner cross vein of wing about two-fifths from apex of discal cell.

Length.—Male, 5 mm.; female, 6.5 mm.

Type: Female, Nelson, September 29th, 1922 (A. Tonnoir); allotype, Ohakune, February, 1922 (T. Harris).

Type to be returned to Canterbury Museum, allotype in collection of United States National Museum.

The peculiar fore tarsal claws of the male readily serve to distinguish this species from any other known to me. I have long looked for the occurrence of toothed or bifid claws in this family from any section of the world, and in this species found the first example. This feature is symmetrically present on all four claws of the fore tarsi, so that it is extremely improbable that it is either an individual variation or an accidental malformation.

† ***Limnohelina grisea*** n. sp.

Female.—A dull lead-grey dusted species, without anything but very faint traces of a pair of darker submedian darker grey

vittae present on the thorax, and with no dark marks on the uniformly densely grey dusted dorsum of the abdomen. Frons with all but the anterior margin of the interfrontalia yellowish brown dusted; antennae black; face whitish grey dusted, cheeks in some lights brassy coloured; palpi testaceous yellow, with a whitish sheen apically. Legs fuscous, grey dusted. Wings greyish hyaline, whitish at bases and in costal cell, the veins yellowish basally, the usual white marks on third vein almost indistinguishable. Calyptrae yellowish white. Halteres yellow.

Structurally similar to *spinipes* female, but the anterior presutural intra-alar bristle is lacking in the type specimen, and the postsutural dorsocentrals are three pairs. The hind tibia has one anteroventral bristle beyond the middle, and the mid tibia has an anterodorsal bristle.

Length, 6.25 mm.

Type: Kaituna, December 24th, 1914 (Fenwick). In author's collection, but will be sent later to Canterbury Museum.

This, as well as the other species with three pairs of postsutural dorsocentral bristles, has the lower calypter comparatively smaller than in the group in which the species have four pairs of postsuturals, but I have not emphasised the character in my key because of the difficulty in accurately estimating the size of these organs, especially in examples which have the wings spread.

+ ***Limnohelina dorsovittata*** n. sp.

Male and female.—Quite similar in general appearance to *bivittata*, but the pale central vitta on the mesonotum is entire, much narrower in front than behind, and extends over disc of the scutellum. As in *bivittata*, the frons is black-brown behind and connects with a similarly wide central stripe of same colour on occiput, but there is a more gradual merging into yellow anteriorly, the antennae and legs are entirely black, and there are faint but evident paired dark dorsal spots on visible tergites 1 to 4 inclusive, at least in the male. The wings are as in *bivittata*, but the costal cell is not so noticeably whitish, and the clouds on the cross veins are less intense.

Structurally different from *bivittata* in having three pairs of postsutural dorsocentral bristles, the anterior presutural pair of dorsocentrals very small, the anterior presutural intra-alar usually lacking, the mid and hind tibiae in both sexes with at least one short anteroventral bristle beyond middle, and the male with only fine, rather irregular, bristly hairs, instead of short stout comb-like spines on the apical portions of the posteroventral surface of the mid and hind femora. In other respects quite similar to *bivittata*.

Length, 5.5-6.5mm.

Type, male, and allotype, Waiho, January 18, 1922 ; paratypes, Mt. Arthur, December 17, 1921 (A. Tonnoir) ; Kumara, May 11, 1929 (J. W. Campbell) ; Ohakune (T. Harris) ; and Otago (Osten-Sacken collection).

The type will be sent to Canterbury Museum, paratypes are in the collections of the United States National Museum and the Deutsches Entomologisches Museum.

+ **Limnohelina nigripes** n. sp.

Male and female.—Similar in general coloration to *smithii*, but the frons merging into yellow anteriorly, the thoracic dorsum lead-grey dusted with five brown vittae, which are interrupted at suture and the central and submedian fused behind suture, the scutellum brown on disc and grey on apical and lateral margins, the mesopleura less extensively yellow dusted, no yellow dust on the sternopleura, and the first four visible tergites of the abdomen each with a pair of subtriangular fuscous discal spots, and no yellow dust on sides. Wings more greyish hyaline, cross veins clouded. Calyptrae white. Halteres yellow.

Structurally similar to *dorsovittata*, but the anterior presutural intra-alar present, though short, the mid tibia in neither sex with anteroventral bristles, the female with one anterodorsal bristle and the male with none on the mid tibia (two in each sex in *dorsovittata*), the hind tibia with one minute anteroventral bristle in the female which is lacking in the male, and no setulae or bristly hairs on the posterodorsal surface ; mid and hind femora of male without comb-like apical posteroventral spines.

Length, 5mm.

Type, male, allotype, and one defective female paratype, Mt. Arthur, 4,500-5,000 feet, December 21-23, 1921 (A. Tonnoir). Type to be deposited later in Canterbury Museum.

+ **Limnohelina smithii** (Hutton).

Coenosia smithii Hutton, *Trans. N.Z. Inst.*, 1900, p. 77.

Male and female.—Head similar in general colour to that of *dorsovittata*, but the brown colour of the frons extending to, or almost to, anterior margin of frons and over orbits, except narrowly on outer margin of anterior half, and no black central stripe on occiput ; antennae black ; palpi testaceous yellow. Thoracic dorsum dark brown except for the lateral margins in front of wings, which are whitish grey, dusted, and behind that point where they are dark grey dusted, the brown discal portion with a subshining greyish or fuscous vitta along the lines of dorsocentrals, traces of a dark brown vitta on each side of these, and dark dots at bases of the hairs and bristles ; scutellum brown, sometimes darkened on disc ;

pleura grey dusted, mesopleura and upper portion of sternopleura yellow dusted. Abdomen densely grey dusted, becoming yellow dusted on sides of tergites, and without dark paired spots. Legs black, grey dusted. Wings as in *dorsovittata*, yellowish at bases, and slightly so along costa, cross veins slightly dark clouded. Calyptrae yellowish white. Halteres yellow.

Structurally similar to *dorsovittata*, the anterior pair of pre-sutural dorsocentrals about one-third as long as the second pair, anterior presutural intra-alars usually lacking, postsutural dorsocentrals three pairs. Both sexes with a submedian posterior bristle on fore tibia, at least one anteroventral bristle on mid and hind tibia, the latter in male with some setulose hairs, one or more of which are almost strong enough to be ranked as bristles in the female; mid and hind femora of male without comb of short stout bristles on apical portion of posteroventral surface.

Length, 5.5-6.5mm.

Type locality, Ashburton. Specimens before me include the type female, and a number from Horseshoe Lake, November 23, 1924 (J. W. Campbell).

A species very similar to *debilis* in appearance, but distinguished from it by the colour of the tibiae and markings on the dorsum of the abdomen, as well as some structural characters.

The female type specimen before me is of the form in which the disc of the scutellum is black-brown.

***Limnohelina debilis* (Hutton).**

Cordylura debilis Hutton, *Trans. N.Z. Inst.*, 1900, p. 79.

Male and female.—A species much the same in appearance as *smithii*, but distinguished from it by the more noticeable dark vittae on the brown mesonotal area as well as the characters listed in the foregoing synopsis and under the preceding species. In all other respects the two species agree very closely.

Length, 5-6.5mm.

Type locality, Christchurch. Material before me is from the following localities:—Otira, Kaikoura, Waiho, Wairakei, Maitai Valley (Tonnoir), Ruapehu (Watt), and Kumara (Campbell).

I have not seen the type specimen of this species, but the examples before me agree well with Hutton's description, and some of them bear Tonnoir's identification label with the name *debilis*.

I selected this species as the genotype because it appears to be the commonest and most widely distributed of the genus on the basis of the material before me.

+ *Limnohelina nelsoni* n. sp.

Male and female.—A greyer-coloured species than *debilis*, with the thoracic vittae more pronounced, the dorsal spots on abdomen larger and darker, and the armature of the mid and hind femora and tibiae of the male distinguished as stated in the foregoing synoptic key. The lateral margins of the mesonotum in front of the wing bases are much less conspicuously whitish grey dusted in *nelsoni* than in *debilis*, the distinction being evident to the unaided eye.

Length, 5-6mm.

Type, male, Nelson, March 4, 1922, allotype, Mt. Arthur, December 21, 1921; paratypes, Reefton, January 1, 1922; Dun Mt., 3,000 feet, January 6-7, 1922, and Aniseed Valley, March 21, 1922 (A. Tonnoir).

The type will be sent to Canterbury Museum and paratypes retained by author.

+ Genus IDIOHELINA Malloch.

This genus was erected some years ago for the reception of a New Zealand species, *nubeculosa* Malloch, to which were added at different times two others, all being included in a single paper in 1929*.

For the convenience of New Zealand students of the family I present below a key for the identification of the three species. For generic characters see below key.

KEY TO THE SPECIES.

- | | | | | | | | |
|-----------|----|----|----|----|----|----|---|
| 1. Males | .. | .. | .. | .. | .. | .. | 2 |
| — Females | .. | .. | .. | .. | .. | .. | 4 |
2. Fore tarsi slightly thickened, a little more evidently so apically, and entirely yellow; palpi slender, with short stiff hairs above; cheek with a single series of black hairs which are much shorter than the long vibrissae; wings without dark clouds on cross veins or at apices .. *setifemur* Malloch
- Fore tarsi with apex of first segment and all of second to fourth segments conspicuously widened, and largely black below; palpi quite distinctly spatulate, with fine hairs below and no short stiff hairs above; cheek densely black bristled below, the bristles mostly as long as the undifferentiated vibrissae; wings with dark clouds over cross veins and at apices .. 3

* *Ann. Mag. Nat. His.*, ser. 10, vol. 3, p. 261.

3. Basal segment of fore tarsus with an elongate callosity or widening of its anterior edge at apex, but without a distinct point; mid tibia without fine ventral hairs; hind tibia without short fine posteroventral hairs .. *nubeculosa* Malloch
- Basal segment of fore tarsus with a triangular dilation of anterior edge at apex which terminates in a sharp point; mid tibia with a group of short fine hairs near middle of ventral surfaces; hind tibia with a complete series of short, erect, slightly curled, fine hairs on posteroventral surface .. *nelsoni* Malloch
4. Neither the cross veins nor the apices of wings distinctly clouded; hind femur without a preapical anteroventral bristle; frons at vertex less than one-third of the head width—
setifemur Malloch
- At least the cross veins quite evidently clouded; hind femur with a preapical anteroventral bristle; frons at vertex over one-third of the head width 5
5. Inner cross vein of wing at about two-fifths from apex of discal cell *nubeculosa* Malloch
- Inner cross vein very close to middle of discal cell—
nelsoni Malloch

All of the included species are testaceous yellow in colour, and thus readily distinguished from any other genus of the subfamily but one occurring in New Zealand. From this other yellow genus *Idiohelina* may be readily distinguished by the presence of a group of very fine hairs on the ventral surface of scutellum at apex, the much longer haired aristae, the lack of well-developed bristles on the posteroventral surface of the hind tibia, and the much smaller lower calypter, besides a few other characters.

† ***Idiohelina nubeculosa*** Malloch

This species is the genotype. Localities, Wanganui and Otago.

† ***Idiohelina nelsoni*** Malloch

Recorded only from Nelson.

† ***Idiohelina setifemur*** Malloch.

Wanganui and Nelson.

† *Genus* TRICHOPTICUS Rondani.

Although a number of New Zealand species were placed in this genus by Hutton, not one of them belongs to it. The genus is strictly one of northern and mountainous regions north of the equator.

† *Genus* LIMNOPHORA Robineau-Desvoidy.

This genus does not occur in New Zealand, as far as my present material shows, and none of the species referred to the genus by

Hutton are correctly placed. The nearest locality for typical *Limnophora* species known to me is Tasmania. Several species occur in Australia, and northward they increase in numbers.

Genus COENOSIA Meigen.

I have seen no New Zealand species that can be properly referred to this genus.

Subfamily FANNIINAE.

Genus FANNIA Robineau-Desvoidy.

I have given as the distinguishing character of this subfamily in my key one which applies to the only species of this genus at present known to me from this country, and which is not applicable to all the species even of the genus *Fannia*. However, it is a very readily distinguished character, and unless some other species possessing the hind coxal hairs, and as yet unknown to me, occurs in the country, or some of the species of *Fannia* which lack these should turn up here, there is no reason to suppose that confusion should result from the use of the key.

Only one of the species referred to, *Homalomyia* (*Fannia*) by Hutton is referable here, and it was described under two different names.

+ ***Fannia canicularis*** Linné.

Homalomyia fraxinea Hutton, *Trans. N.Z. Inst.*, 1900, p. 75. — ?

I have seen this from a number of localities, and assume that it is generally distributed.

Subfamily MUSCINAE.

I have seen but two genera of this subfamily from New Zealand, and deal with them below.

Genus MUSCA Linné.

+ ***Musca domestica*** Linné.

This species is distinguished from others usually placed in the same genus by the presence of hairs on the central portion of the propleura above the propleural bristles and below those on the humeral callus.

Generally distributed.

+ *Genus* CALLIPHOROIDES novum.

I erect this genus for the reception of an already described New Zealand species. It is distinguished from *Musca* by the broadly rounded bend of the fourth wing vein, the lack of hairs on the stem vein and third vein of the wings, and the much shorter haired

aristae. It is not necessary at this time to list the characters by means of which it can be distinguished from other genera that do not occur within the scope of the present paper, as it will be included in my key to the genera of Muscidae of the world.

Genotype, *Calliphora antennatis* Hutton.

+ **Calliphoroides antennatis** (Hutton).

I have seen only the type specimen of this species, a female, though Hutton had also at least one male before him when he described the species. It may be readily distinguished from any calliphorid by the lack of hypopleural bristles. The parafacials are bare, and there are no hairs on the lower calypter nor the centre of the propleura, and the hind tibia has no distinct posterodorsal bristles. The bright orange-red third antennal segment and the similarly coloured mark on the parafacials opposite the bases of the antennae should provide a ready means of identification for the species.

Recorded from Christchurch and Dunedin, and listed as rare by Hutton.

+ *Genus* MUSCINA Robineau-Desvoidy.

This genus belongs to the preceding subfamily.

THE CALYPTRATE DIPTERA OF NEW ZEALAND.

PART II.

By J. R. MALLOCH.

Family TACHINIDAE.

For about ten years I have had in my possession a small series of New Zealand Tachinidae, and from time to time I have obtained additional material, until now I possess a fair representation of the family, including all of the Hutton types, which have been kindly lent to me by Professor Speight of the Canterbury Museum for examination in connection with my work on the family. I also have the assurance of Dr. David Miller that he will this year send me all his material in the family, and when this is received I hope to be able to publish a revision of the New Zealand species.

With my first acquisitions I discovered that the New Zealand species were likely to prove even more difficult to systemize by the use of the accepted generic and specific criteria than those of any other faunal region known to me, a condition which I earlier found to exist in the Muscidae of this country also. I hope, however, ultimately to be able to present a dependable method for their identification, but in the meantime merely offer the description of two species belonging to two widely separated genera in order to reduce the final treatment of the family somewhat in bulk. I have already dealt with some New Zealand genera in a series of papers appearing in the Proceedings of the Linnean Society of New South Wales from 1923 to date.

Tribe PHASIINI.

This tribe has not previously been correctly recorded from New Zealand, the species of *Campbellia* having been placed in the subfamily Gymnosoninae, and the species recorded as *Phania verrucunda* Hutton, belonging to the tribe Cyldromyiini.

The characters upon which the tribe may be distinguished from its allies are as follows:—Abdomen without strong dorsal bristles, even those at apices of tergites laterally being quite inconspicuous; postscutellum very large; lower calypter much larger than upper one, almost transverse on posterior margin; the small round knob-like projection below base of wing much larger than usual in this family, projecting distinctly beyond the upper marginal elevation; no hairs below the lower calypter.

+ Genus *HYALOMYIA* Robineau-Desvoidy.

Campbellia Miller, *Trans. N.Z. Inst.*, vol. 54, p. 432 (1923).

This genus as I accept it is very widely distributed, occurring in Europe, North America, Australia, and New Zealand. Besides the synonym listed above, I have placed under it *Phoranthia* Rondani, *Alophora* Robineau-Desvoidy, and *Syntomogaster* Macquart. Not one of the group is entitled to distinction from *Hyalomyia*, in my opinion, as the differentiating characters cited by various authors are both trivial and variable. Miller has described the genus very fully in his paper above referred to, and taken in conjunction with the data given above, it should be possible for anyone interested in the family to recognise it.

There is considerable difference between the sexes, the male having the hypopygium bent forward under the apex of the abdomen, and the female the genital organs projecting backward below the apex, and sometimes extending to beyond it, with a sharp central piercer or ovipositor, on each side of which there is a shining black sheath.

I have before me the sexes of one species, which is evidently distinct from the two described by Miller, and below I give a synopsis of the three based on the species now described, and the descriptions by Miller, which I hope will enable students to identify them should they be taken in the field.

As far as we know the species are parasitic upon Hemiptera, but there are no records of the larval habits given for any of the New Zealand species.

KEY TO THE SPECIES.

1. Small species, not over 5 mm. in length ; thoracic dorsum with two shining black sublateral vittae, the broad area between these grey dusted in female, yellow dusted behind suture, and grey dusted before it in male ; abdomen in male with the exposed dorsal surface of the basal two visible tergites purple, the third and fourth tergites bronzy ; entire dorsal exposure of abdomen of female glossy black *lancifer* n. sp.
- Larger species, 7 mm. or over in length 2
2. Abdomen tawny, fuscous apically ; scutellum black, apex golden *campbelli* Miller
- Abdomen deep purplish-blue on the basal two segments, the others rather cupreous, and dusted with brownish pollen ; scutellum unicolorous bronzy black *cockaynei* Miller

+ *Hyalomyia campbelli* (Miller).

Described from a single male collected at Blackball. The very distinct coloration of the thorax and abdomen readily distinguishes the species from the two next dealt with, at least in the male sex.

It is possible that the female has the abdomen black, but this sex is as yet unknown. The mesopleura has lanceolate hairs as in *lancifer*, but this is also a male character.

+ ***Hyalomyia cockaynei*** (Miller).

Described from a single male collected at Day's Bay, Wellington, the type specimen being in the British Museum.

The general coloration of the thorax and abdomen is similar to that of the new species described below, but the length is greater than that of the latter, and, as in *campbelli*, the wings have a broad infuscation on the costal halves, which in this species appears to begin at or very close to the base, and extends to beyond the inner cross vein, and almost to apex of submarginal cell. The presutural grey dusted central vitta of the mesonotum is also divided into three parts by the presence of two narrow black vittae, while in *lancifer* it is entire.

+ ***Hyalomyia lancifer*** n. sp.

Male.—Similar to *cockaynei* in general coloration, differing as noted above, and in having the wings whitish hyaline, with a pale brown infuscation on the costa, which extends from beyond the humeral cross vein to the apex of first vein, and less distinctly over the field of the wing to or slightly beyond the stem of second and third veins, but falls much short of reaching the inner cross vein, and in addition to this dark mark there is a narrow brownish margin to the apex of the wing, which extends from slightly proximad of apex of second to just beyond apex of third vein, but in type unconnected with the basal clouding. Epistome shining testaceous yellow. Calyptrae shining fuscous, junction whitish, legs black.

Structurally similar to *campbelli*, the epistome projecting even farther beyond the anterior level of frons than in the Australian species; frons in front of anterior ocellus narrower than width across posterior ocelli. Thorax with lanceolate bristles on upper and posterior margins of mesopleura, which are black in colour, notopleural margin with some similarly shaped bristles, humeral region with lanceolate bristles, those above black, the lower group yellowish, scutellum with about six or eight fine erect bristly hairs in a curved line at some distance from apex; postscutellum very large, projecting well beyond apex of scutellum, but not prominently raised. Abdomen flattened on dorsum, the tergites transversely striate, more pronouncedly so apically, the hypopygium with the inner central portion ending in two yellowish clawlike processes which curve upward. Legs rather stout, without exceptional armature, except that the mid and hind femora have at bases of their posterior surfaces many fine white hairs; tarsal claws long, and curved only close to apices. Wings broad, venation almost as in Miller's figure of *cockaynei*, one or two microscopic hairs at base of third vein below, none above.

Female.—Similar in general appearance to the male, but the wings are without any fuscous marks, the abdomen is unicolorous, black above, the calyptrae are not at all infuscated, and there are no white hairs at bases of the femora.

Structurally it differs, as is usual in this group, in having the frons distinctly narrower and the eye facets larger above and in front than in the male. The dorsum of the abdomen lacks transverse striae, the thorax has no lanceolate bristles, and the genitalia project backwards almost to apex of abdomen. The wings are smaller and narrower, with the outer cross vein farther from the bend of fourth vein and not longer than the apical section of third vein.

Length, 4.5-5mm.

Type, male, and allotype, Kennedy's Bush, January 29, 1925 (A. L. Tonnoir).

Type returned to New Zealand.

+ Genus *TRUPHIA* novum.

This genus is distinguished from any known to me from New Zealand by the incomplete fourth wing vein, this being discontinued at the point where it ought to bend forward towards third. There are a number of genera with this same character occurring in various sections of the world, but in no case does the third vein end as close to the extreme tip of the wing and the cephalic structure agree with the present one. For a comprehensive discussion of the structures see species description below.

Genotype, *Truphia grisea*, n. sp.

+ *Truphia grisea* n. sp.

Male.—Entirely black, including the antennae, palpi, legs, and knobs of the halteres, the head, thorax, and abdomen densely pale grey dusted, so that the ground colour is obscured and without distinct gloss. Thoracic dorsum with three pale brown vittae behind suture, which do not extend to posterior margin, and three vittae of a darker grey colour than the ground in front of suture. Abdomen appearing unicolorous grey unless when viewed from behind, low down, when there is a trace of a central dark grey vitta. Wings hyaline. Calyptrae white.

Head in profile as Fig. 1 ; frons in front of ocelli not as wide as third antennal segment, the orbits continuous and with fine setulose hairs, not obliterating the interfrontalia ; ocellars minute, postverticals hardly differentiated from the other hairs ; arista without distinct hairs ; other characters as in Figure. Thorax with 2+3 pairs of fine dorsocentrals, the acrostichals hairlike, biseriate presuturally, irregularly quadriseriate postsuturally ; prelar lacking ;

sternopleurals 3 ; pteropleura almost bare, with one or two very minute hairs ; scutellum with six marginal bristles, the disc bare except for a few hairs close to the bases of the bristles ; postscutellum moderately well developed. Abdomen cylindrical, tapered apically, with the first and second visible tergites subequal in length, third about one-third shorter than second, fourth reduced to a narrow strip, all except fourth with distinct preapical central bristles and no discals. Wing venation as Fig. 2. Legs normal, mid tibia with a strong submedian ventral bristle ; hind tibia with about two anterodorsal and posterodorsal bristles, the anteroventral surface with but one. Lower calypter about twice as large as upper one, broadly rounded at apex.

Length, 3mm.

Type, Kennedy's Bush, January 29, 1925 (A. L. Tonnoir).

There are no visible hairs at the base of the third wing vein in the type, but there may normally be some in the species, especially in the females.

Type returned to New Zealand.

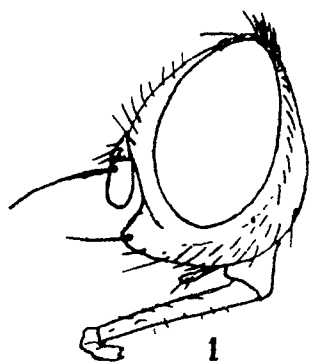


Fig. 1, Head of *Truphia grisea*, lateral view.

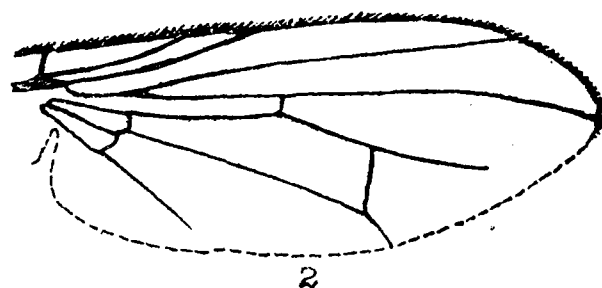


Fig. 2, Wing of *Truphia grisea*.

THE CALYPTRATE DIPTERA OF NEW ZEALAND.

PART III.

By J. R. MALLOCH.

Family CALLIPHORIDAE.

In 1924 I published a short paper dealing with the recorded species of this family then known to me.*

Since publishing that paper I have acquired more material, and have now sufficient basis for a revision of the family, exclusive of the Sarcophaginae, of which I have but one species. I accordingly present below keys for the identification of the material now before me, in the hope that they may form the basis for a more extensive treatment by some resident entomologist at some future time.

The family is one of considerable economic importance, and a ready means of identification of the included species is very desirable for that reason alone.

The most closely related family is Tachinidae, but in all cases the members of the latter may be distinguished from Calliphoridae by the presence of a well-developed postscutellum, consisting of a convex portion immediately below the scutellum, which sometimes projects even beyond the hind margin of the latter in some genera, and is always well distinguished from the lower portion of the metanotum. In all but one of the New Zealand calliphorid species the aristae are long-haired, and because of the absence of the tachinid tribe Dexiini from New Zealand, there are no other species of the family which can be confused with Tachinidae on the basis of this character alone. The Muscidae (incl. Anthomyiidae auct.) lack hypopleural bristles, and can not be confused with either Calliphoridae or Tachinidae, in which there is usually a vertical series of strong bristles on the hypopleura below the metathoracic spiracle. In all Calliphoridae the lower calypter is much larger than the upper one, and the bend of the fourth wing vein is usually angular, much as in *Musca domestica* Linné.

Below I present a key to the New Zealand genera.

KEY TO THE GENERA.

1. Base of stem vein (R) of wing with setulae on upper posterior side; lower calypter haired above on disc, its outer posterior angle quite sharp; the small knoblike protuberance immediately below base of wing with quite dense erect short hairs—
Chrysomyia Robineau-Desvoidy
- Base of stem vein of wing bare above; lower calypter haired or bare, its outer posterior angle normally rounded; the small knob-like protuberance immediately below base of wing bare or downy, not distinctly haired 2

* *Trans. N.Z. Inst.*, vol. 55, p. 638.

2. Lower calypter with distinct hairs on at least a part of its upper surface 3
- Lower calypter without hairs on upper surface except those on margin 5
3. Lower calypter haired only on a part of its upper surface, the hind margin more or less broadly bare, the hairs erect and rather long ; eyes of the male much closer together on frons than in female, and never with forwardly directed outer orbital bristles *Calliphora* Robineau-Desvoidy
- Lower calypter haired to apex, the hairs short and decumbent ; frons of male either narrow or about one-third of the head width, and about equally as wide as that of female 4
4. Frons of male narrow, not over one-fourth of the head width and without forwardly directed outer bristles ; that of the female fully one-third of the head width and with one or two outwardly directed outer bristles on upper half ; fourth visible tergite of abdomen of female with a longitudinal suture or cleft in the chitinous portion which extends almost to anterior margin *Ptilonesia* Bezzi
- Frons of male as wide as that of female and similarly armed, with one or two strong proclinate outer orbitals on upper half ; fourth visible abdominal tergite of female normal, entire
Xenocalliphora Malloch
5. Propleura centrally with a number of fine hairs ; a chitinous strip above lower calypter, broken in centre, with numerous setulose hairs ; prosternum haired on sides—
Lucilia Robineau-Desvoidy
- Propleura and prosternum bare ; no setulose chitinous strip above lower calypter 6
6. Aristae bare or with a few hairs near base ; female lacking proclinate outer orbital bristles ; anterior sternopleural bristle usually lacking ; female with the dorsocentral bristles arranged 2 + 1, the acrostichals 1 + 0, the male sometimes with an additional pair of fine dorsocentrals in front of the prescutellar pair, and the acrostichals 2 + 1 *Huttonophasia* Curran
- Aristae plumose ; female with one or two strong proclinate outer orbital bristles on upper half of each orbit ; anterior sternopleural bristle present and usually strong, sometimes duplicated ; both sexes with three pairs of strong postsutural dorsocentrals and usually the same number of weaker postsutural acrostichals *Pollenia* Robineau-Desvoidy

Subfamily CHRYSOMYIINAE.

There is but one genus of this subfamily recorded from New Zealand, and the one species known to occur has probably been introduced from Australia.

Genus CHRYSOMYIA Robineau-Desvoidy.

There is considerable confusion in the literature of this group regarding the identities of the species, and final decision must await careful examination of types and elucidation of points regarding the variation within species by rearing from known parents. Meanwhile we may accept tentatively the name below as that of the New Zealand species.

Chrysomyia albiceps (Wiedemann).

This is the name applied to the commonest species of the genus and amongst the material which I have is one example which agrees perfectly with Australian specimens that I refer here. The specimen is a female, and was sent to me by Dr. M. N. Watt several years ago, from Wanganui.

In my first paper on the family referred to previously herein I listed this as *rufufacies* Macquart, and suggested that it might be possible that another species, referred to as *dux* Eschscholz, but now known as *megacephala* Fabricius, would be found also. Up to the present I have seen no additional material, so that I have nothing to add to my already published data but the synonymy now given.

Subfamily CALLIPHORINAE.

Tribe CALLIPHORINI.

This tribe contains the well-known blow-flies, some of which are of great economic importance in Australia and New Zealand.

Genus CALLIPHORA Robineau-Desvoidy.

With the removal of the species contained now in *Ptilonesia* and *Xenocalliphora*, there remain but three species of this genus in the material now before me, though it is possible that one or two more species may yet be reported from this country. I give below a key for the identification of the available species.

KEY TO THE SPECIES.

1. Eyes rather densely haired; abdomen brilliant metallic blue, with more or less pronounced violet tinge on parts, and absolutely without grey or yellow dust; legs black; basal scale of wing and a small knoblike elevation just in front of wing bright golden yellow; calyptrae entirely fuscous—
sacra (Fabricius)
- Eyes practically bare; abdomen not brilliant metallic blue, if approaching that colour then the tergites have quite conspicuous grey dusting; basal scale of costa testaceous, the small knoblike protuberance in front of wing base not golden haired 2

2. Legs entirely black ; body without golden yellow hairs ; abdomen metallic blue, with greyish or whitish dusting, forming changeable checkerings ; lower calypter fuscous, with white posterior margin ; all bristles black *erythrocephala* Meigen
- Legs fulvous yellow, tarsi fuscous ; pleura, venter of thorax and of abdomen with golden yellow hairs ; abdomen olivaceous, with brassy dust forming checkerings ; both calyptrae fulvous yellow ; bristles of legs in part fulvous—
stygia (Fabricius)

Calliphora sacra (Fabricius)

This is a species previously referred to as *quadrinaculatus* Swederus. It was redescribed as *cockaynei* by Hutton, as pointed out in my previous paper on the family. I have examined the type specimen of Hutton's species, and have seen recent examples from Wanganui (Watt), and Aniseed Valley (Tonnoir).

Calliphora erythrocephala Meigen.

This common European species has found its way into most faunal regions, and is not uncommon in Australia and New Zealand. I have seen it from Wanganui.

Calliphora stygia (Fabricius).

A common Australian species, which is responsible for economic loss in sheep. It was no doubt introduced from there into New Zealand, where it is reported as well distributed and common. I have seen examples from Ruapehu and Wanganui sent me several years ago by Dr. M. N. Watt.

Genus PTILONESIA Bezzi.

There is but one species of this genus known to me.

Ptilonesia aureonotata (Macquart).

This species occurs in Australia as well as New Zealand. I have seen recent examples of the species from Wanganui (Watt) and Nelson (Tonnoir).

Genus XENOCALLIPHORA Malloch.

This genus is confined to the New Zealand region as far as I at present know. The four known species may be distinguished as below.

KEY TO THE SPECIES.

1. Two pairs of strong postsutural intra-alars ; fore tibia with one strong submedian posterior bristle ; postsutural acrostichals three pairs ; posterior sublateral bristle present, the sublateral area with five bristles ; legs black, abdomen uniformly bright metallic blue *hortona* (Walker)
- Only one pair of strong postsutural intra-alars present ; fore tibia almost invariably with two posterior bristles, which are most frequently transversely placed near middle, and quite close together 2
2. Postsutural acrostichals three pairs ; legs black, tibiae not or very little paler than femora ; lateral area of thorax with four or five bristles, the posterior sublateral one present ; abdomen metallic blue-green, with slight even grey dusting and a central dark line, most evident when the abdomen is seen from behind, on second visible tergite *antipodei* (Hutton) ^a
- Postsutural acrostichals one or two pairs ; legs yellow, coxae and femora, except apices, black 3
3. Lateral area of thorax with but four bristles, the posterior sublateral one lacking ; postsutural acrostichals evidently one pair ; abdomen bright metallic blue-green, with faint dusting as in *antipodei* *viridiventris* n. sp.
- Lateral area of thorax with five bristles, the posterior sublateral one present ; postsutural acrostichals two pairs, both long, the anterior pair closer to suture than to the posterior pair ; abdomen black, with a purplish or bronzy tinge above, the tergites slightly and evenly dusted, usually with a dark central line when seen from behind *eudypti* (Hutton)

Xenocalliphora hortona (Walker).

Musca hortona Walker, Cat. Ins., Brit. Mus., Diptera, p. 894 (1849).

Apparently a widely distributed species in New Zealand. It has much the appearance of *Calliphora sacra* Fabricius, and *Ptilonesia aureonotata* Macquart, but the bare eyes, and the wide frons in the male, readily separate it from both.

Patton has sunk *icela* Walker as a synonym of this species.

I have seen recent examples from Wanganui (Watt), Hilltop, Okarahia, and Lake Moana (Tonnoir).

Xenocalliphora antipodei (Hutton).

I have seen only the type specimens of this species from the Antipodes Islands collected by Hutton.

Xenocalliphora eudypiti (Hutton).

This species was originally recorded from Snares, Auckland Islands, and Campbell Island. Before me there are examples of both sexes from the first mentioned locality, and these I accept as the types. The two females from Campbell Island, labelled as a part of the original type series, are not of the same species, being described below under the new name *viridiventris*.

The characters in the foregoing specific key, taken in conjunction with those given in the original description, will readily suffice for the identification of the species.

I have seen besides the type specimens several recently collected examples taken in the original locality by G. Archey, March, 1923, and submitted by A. L. Tonnoir.

Xenocalliphora viridiventris n. sp.

Female.—Very similar to the next preceding species, but readily distinguished from it by the colour and structural characters listed in the foregoing key. Hutton appears to have had some misgivings about the placing of the Campbell Island specimens with those from the Snares, but beyond stating that the legs in the former were somewhat darker with blacker femora he did not mention any characters for their separation. I do not notice any particular distinction between the species in the matter of leg coloration, however. It is evident that Hutton's description was drawn from a series of both species, as his description of the colour of the abdomen cannot be in any case known to me applied to *eudypiti*.

In suggesting the closest relatives Hutton was in error in naming *tibialis* Macquart as one, as the latter is a true *Calliphora*, and resembles *eudypiti* and the present species only in the colour of the legs, and in this not very closely so.

Length, 9-10 mm.

Type and one paratype, Campbell Island.

Tribe POLLENIINI.

There are but two genera known to me which are referable here, both being represented in recent material received by me, and by types from the Hutton material kindly submitted for examination by Professor R. Speight of the Canterbury Museum.

Genus POLLENIA Robineau-Desvoidy.

I have accepted as belonging to this genus the species described under the generic name *Sepimentum* Hutton, though there are some differences between this concept and the genotype of *Pollenia*, which occurs in Europe and North America. The New Zealand

species are extremely difficult to elucidate, and below I present a tentative arrangement of them on the basis of the specimens in hand.

KEY TO THE SPECIES.

1. Males 2
- Females 6
2. Calyptrae black, or fuscous with the edges of lower one black ; legs entirely black 3
- Calyptrae yellow or greyish, becoming darker near margin of lower one, but the extreme edge never black ; legs largely, or at least partly, yellow or fulvous 4
3. Antennae and palpi entirely black ; first posterior cell of wing open *nigrisquama* n. sp.
- Third antennal segment largely, palpi entirely, fulvous yellow ; first posterior cell of wing closed and short petiolate—
nigripes n. sp.
4. Femora black ; wings blackened basally, gradually becoming greyish hyaline from near bases to apices ; hind femur without any well developed preapical posteroventral bristles
atrifemur n. sp.
- Femora tawny to testaceous yellow, not darker than the tibiae ; wings not at all blackened, yellowish, basally, the veins fulvous yellow at bases, becoming dark apically 5
5. Tarsi concolorous with remainder of legs, testaceous to tawny yellow, the apical segment of tarsi somewhat darker ; abdomen metallic dark blue-green, duller on the two tergites of basal half, without distinct grey dusting .. *demissa* (Hutton)
- Tarsi fuscous, much darker than the tawny yellow femora and tibiae ; abdomen black, suffused with an olive tinge, dull, and not metallic, seen from behind with slightly changeable whitish dust, and with a faint dark dorsocentral line—
fumosa (Hutton)
6. Tarsi blackish or fuscous, much darker than the femora and tibiae *fumosa* (Hutton)
- Tarsi not darker than the tawny yellow tibiae, except usually the fifth or fourth and fifth segments, which are brownish.

***Pollenia nigrisquama* n. sp.**

Male.—Head, including antennae and palpi, black ; frontal orbits hardly dusted, parafacials dull black, cheeks with the raised portion glossy black ; all cephalic hairs and bristles black. Thorax deep black, mesonotum with a deep green tinge, humeri and the anterior margins of three vittae grey dusted, the vittae not dusted beyond suture, distinguishable beyond that point only by a deeper tone of the ground colour. Abdomen deep metallic blue, with irregular green shading on tergites, the basal half rather dull cen-

trally, the apical two visible tergites more polished and without traces of dusting; all hairs and bristles on thorax and abdomen black. Legs entirely black. Wings fuscous, darker costally, and practically black basally. Calyptrae deep black, with black fringes. Halteres fuscous.

Frons reduced to a mere line in front of ocelli, but wider than that of *fumosa*, orbital hairs on anterior two-thirds, ocellars hairlike but distinct, verticals not differentiated; parafacials wider than third antennal segment, vibrissal angle rather more produced than usual, its anterior level in line with outer extremity of second antennal segment, the aristae separated by fully as great a distance as either is from eye; parafacial hairs numerous, continued to lower level of eye; palpi long and but little dilated apically. Thorax with the normal bristles, the dorsocentrals and acrostichals normally 2+3; posterior sublateral bristle present; sternopleurals 1+1, apical pair of scutellars but little shorter than the preapical, discal pair long and fine. Abdomen narrowly ovate, second to fourth visible tergites with posterior marginal series of bristles, shortest on second, the third and fourth with some discals. Fore tibia with two posterior bristles; mid tibia with a ventral and anterodorsal bristle near middle; hind tibia with about three or four anterodorsal and posterodorsal bristles, the one just beyond middle longest. First posterior cell of wing open.

Length, 7mm.

Type, Kumara, December 14, 1929 (J. W. Campbell). In United States National Museum.

The darkest coloured species as yet known to me.

***Pollenia nigripes* n. sp.**

Male.—Similar to the next preceding species in general coloration, but the wings are not distinctly blackened, possibly because of the partly teneral nature of the type specimen, the palpi and most of the third antennal segment are fulvous yellow, the cheeks are brownish yellow below, becoming darker above, the thorax is deep black without metallic lustre on dorsum and without evident grey dusted vittae anteriorly, while the abdomen is glossy aeneous black with the greater portion of the basal two visible tergites dull black centrally. The calyptrae are not as deep coloured as in the last species, but possibly this is due to the immaturity of the specimen.

Smaller than the last species, with the frons even narrower in front of the ocelli, the vibrissae not as widely separated, the posterior sublateral bristle lacking, and the first posterior cell closed at some distance from the margin of the wing.

Length, 5mm.

Type, Kumara, November 14, 1929 (J. W. Campbell). In United States National Museum.

It must be noted that the character of the open or closed first posterior cell of the wing is apparently not very dependable in this genus and some others in New Zealand, and that it requires to be checked up in the present instance to discover if it does not vary here as elsewhere from open to short petiolate.

***Pollenia atrifemur* n. sp.**

Male.—Not so deep in colour as the two preceding species, owing to the presence of brownish grey dust on the head and thorax and grey dust on abdomen, but the wings are infuscated, more noticeably so costally and basally, and the tibiae of the mid and hind legs are brownish, noticeably paler than the femora and tarsi. The frontal orbits, parafacials, and cheeks are densely brownish grey dusted; the second antennal segment and base of third are reddish yellow; and the palpi are fuscous. Thorax dull black, with a bronzy tinge, mesonotum greyish dusted and with three or five broad dark vittae, largely fused; some of the pleural hairs yellowish, especially the finer armature of the posterior margin of the mesopleura and the hairs adjacent to the propleural bristle. Abdomen black, hardly shining, with distinct olive-green tinge, rather evenly grey dusted and with a dark central line when seen from behind. Wings infuscated. Calyptrae dull grey, the margin of the lower one with a moderately wide dark border. Halteres yellow.

Frons in front of ocelli about as wide as third antennal segment, haired to near ocelli; parafacials distinctly wider than third antennal segment; vibrissae separated by less distance than either is from eye; palpi slender; aristae whitish centrally. Thorax with the same armature as in *nigrisquama*. Second visible tergite of abdomen lacking posterior marginal bristles centrally. Armature of legs as in *nigrisquama*. First posterior cell of wing narrowly open, ending close to wing tip.

Length, 6.5mm.

Type, Upper Hororata, January, 1922 (G. Archey). Returned to New Zealand.

***Pollenia fumosa* (Hutton).**

In my previous paper I considered this species as identical with *demissa*, but a series of specimens including both sexes, gives ground for the belief that Hutton was correct in separating them. Unfortunately I do not have sufficient material to permit of dissection, so that I must leave the elucidation of the forms on the basis of the male hypopygia to someone more favourably situated. The only

character by means of which I connect the male and female of this form is the fuscous tarsi in both sexes. The type specimen is a male, and I have one specimen of the same sex which agrees with it in all particulars, but the females lack the posterior sublateral thoracic bristle, which is well developed in the male, and the abdomen is not so bright metallic blue-green in the latter as in the female. In fact, the abdomen in the female specimens is very similar to that of the male of *demissa*, while the abdomen in some of the specimens dealt with under the next species as possible variants of the female of that species is very similar to that of the male type of *fumosa*. For further discussion see under the next species.

Localities, Wanganui (Watt), Lake Moana, December 16-21, 1925 (A. Tonnoir), and Kumara, November 16, 1929 (J. W. Campbell).

I am accepting the male sent to me by Professor Speight as the type specimen of this species, and have no female from the type material. It must be noted that in respect to the colour of the legs the specimen does not agree with Hutton's description, as the femora are tawny yellow and not black. It might be assumed that the species described herein as *atrifemur* is what Hutton had before him, but the latter is quite distinct from *fumosa*.

***Pollenia demissa* (Hutton).**

I have either three or four species in the lot of material in hand, or else the species is quite variable both in structure and coloration. However, I prefer in the meantime to consider the phases available as varieties, and give them names to distinguish them, provided they are constant, or possibly distinct species. They may be separated as in the following key, the general characters being the same, except as noted therein and in the subsequent notes.

KEY TO THE VARIETIES.

1. Posterior sublateral bristle lacking ; palpi moderately stout and rather short *minor* var. n.
- Posterior sublateral bristle present ; palpi variable 2
2. Abdomen metallic blue or blue-green ; palpi quite long and slender *demissa* (Hutton)
- Abdomen greenish black, with bronzy to purplish reflections ; palpi rather short and quite noticeably dilated *cuprea* var. n.

Var. *demissa* Hutton.

The type specimen is a female, the male being unknown to Hutton. It is in rather poor condition, and is smaller than any other example now before me. The sublateral bristle on one side is weak, while the one on the other side is quite strong ; in all the other specimens it is strong on both sides. The humeri and some

parts of the pleura are testaceous in most specimens, while in all the females the first posterior cell is closed and very short petiolate, and in the male it is closed at apex, but not distinctly petiolate. I can detect no difference in the armature of the ventral surface of the mid tibia between this species and the preceding one, despite the note by Hutton that such exists. The deep metallic blue abdomen and yellow tarsi readily distinguishes the species from the preceding one in the male.

Localities, Blackball, 3.26, and Kumara, December 14, 1929 (J. W. Campbell), and Dun Mt., March 7, 1924 (A. Philpott).

Var. *minor* novum.

A consistently smaller form than the preceding one, with the posterior sublateral bristle lacking, and the abdomen less distinctly metallic, except on the sides. The palpi are not as much dilated as in the next variety, but they are shorter and wider than in *demissa*. The first posterior cell of the wing is either closed in the margin or short petiolate.

Type and two female paratypes, Wanganui (Watt), in author's collection, but will be sent to Canterbury Museum later.

Var. *cuprea* novum.

Equally as large as the typical form, readily distinguished therefrom by the much duller-coloured abdomen and the dilated palpi. It is possible that there are more forms than one in the set I lay aside tentatively under this name, as the type female has the first posterior cell of the wing closed in the margin, owing to the fourth vein bending rather abruptly forward alongside the tip of the costa, instead of connecting directly with same, while in one of the paratypes there is a very distinct apical petiole, which is longer than the inner cross vein, and the third specimen has the vein ending almost as in the type, but in other respects it is more like the other paratype.

Type, Wanganui (Watt); paratypes, Timaru, September 2, 1921; and Grey River, January, 1921 (G. Archey); and Otarama, October 22, 1921. Type in author's collection, one paratype in collection of the U.S. National Museum, the others in Canterbury Museum.

Genus HUTTONOPHASIA Curran.

This is a genus erected recently for the reception of *Gymnophania pernix* Hutton. Hutton, and also Curran, erroneously placed the genus in Tachinidae, though it is a calliphorid closely related to *Pollenia*. Lack of a convexly developed postscutellum is the outstanding character for the separation from Tachinidae,

but the head is typically calliphorid, the parafacials being wide and furnished with many hairs as in *Pollenia*, and, though the arista is normally bare, there are sometimes a few fine hairs at the base.

— **Huttonophasia pernix** (Hutton).

The lack of anterior postsutural dorsocentrals may be a generic character, but I have seen only one species and do not care to be dogmatic on that point. The genotype is glossy black with black legs, the frontal orbits in female glossy black and the wings hyaline. The thorax is slightly depressed and the abdomen elongate ovate with the dorsum flattened or depressed.

Localities, Christchurch (type), McDonald's, Hoon Hay, Mt. Grey, Upper Hororata, and Otarama.

Genus LUCILIA Robineau-Desvoidy.

I have divided this genus up into several segregates, which I have in a recent paper classed as distinct genera. In the material which I have seen from New Zealand there is but one species, *sericata* Meigen, which is referable to *Phenicia* Robineau-Desvoidy. It is distinguished from true *Lucilia* species, typical of which is *caesar* Linné, by the lack of fine hairs or setulae on the under side of the base of the stem vein (R) of the wing. The character is a dependable one, and material of species in *Lucilia sens. lat.* should be carefully examined to determine which group they belong to. Until I receive more material in the "bluebottle" group I cannot further elucidate the species of New Zealand, but possibly my recent paper on the Australian species may prove of value to resident students of these flies.*

The synonymy of several of the species listed in the present paper will be found in this paper also.

* *Trans. Linn. Soc. N.S.W.*, vol. 52, pt. 3, p. 299 (1927).

THE CALYPTRATE DIPTERA OF NEW ZEALAND.

PART IV.

By J. R. MALLOCH.

Family TACHINIDAE.

In this paper I deal with one new genus, and indicate the synonymy of one of the genera recorded by Hutton from New Zealand.

+ V Genus CEROSOMYIA Hutton.

This genus was erected for the reception of a New Zealand species founded on a single male type specimen, which is now before me. My original supposition that the specimen was malformed is borne out by an examination of the type, the ptilinum having been accidentally forced out above the antennae to form a hornlike projection upon drying, and the membrane between the facial ridges and the parafacials also exerted to form a connecting ridge on each side of the face connecting with the ptilinum, thus misleading Hutton into the belief that the specimen possessed exceptional structural characters upon which he based his genus. It is beyond doubt that the species belongs to the group he accepted as *Phorocera* in his papers on the family, and the characters indicate that *usitata* Hutton, is the same as *clathrata* Nowicki and also *oratus* Walker, as identified by that author.

The New Zealand species placed in *Phorocera* by Hutton do not agree with the typical forms, and are entitled to generic separation therefrom, so that the name *Cerosomyia* must be accepted for the group. It is unfortunate that this is so, as the name is, as explained above, based upon an accidental malformation, and the author's error is thus made a permanent part of our classification without any actual relation thereto in the strict sense.

There are quite a number of species accepted by Hutton as belonging to the group, but several of them appear to me to be synonyms. I hope to be able to get together a sufficient number of specimens of the different species to permit of an intensive study of the genus later, but at present have only the Hutton types and some specimens submitted by Mr. A. L. Tonnoir and some other correspondents, which are insufficient for my purpose.

+ V Genus HETERIA novum.

A rather striking genus, chiefly distinguished from its allies by the structure of the arista and antenna. The basal segment of the arista is as long as, or longer than, the second, the two combined subequal in length to third segment; parafacials with setulose hairs or bristles; third antennal segment more or less produced at upper

apical angle ; some fine hairs below lower calypter ; one distinct bristle at apex of subcostal vein ; upper surface of third vein with fine hairs at base, or extending from base to inner cross vein, and usually one rather noticeable bristle near base, the under side with less extensive hairing ; sternopleurals 2+1 ; prosternum bare ; discal bristles on visible tergites 2 to 4 of abdomen.

Genotype, *Heteria appendiculata*, new species.

KEY TO THE SPECIES.

1. Parafacials with a series of irregular bristles of moderate length and short hairs ; wings with fuscous spots as follows : at apex of subcostal cell, over both cross veins, on bend of fourth vein, and near apex of second vein, the last enclosing a short stump of a vein on posterior side of second vein ; mesonotum broadly brown on disc, and with four incomplete, interrupted, deep black vittae on the brown portion ; eyes almost bare ; scutellum bare below in centre of apex . . . *appendiculata* n. sp.
- Parafacials without well-developed bristles, with short hairs only, which are sometimes confined to upper half ; wings not as conspicuously marked with fuscous, never with a spot near apex of second vein enclosing a short stump of a vein . . . 2.
2. Both cross veins of the wings distinctly clouded with brown or fuscous ; eyes almost bare 3.
- Cross veins of the wings not distinctly clouded with dark colour, sometimes the inner one faintly infuscated ; eyes distinctly haired 5.
3. Scutellum without stiff short hairs below in centre of apex ; vittae on anterior margin of mesonotum deep black and fused, becoming brown before the suture and widely interrupted behind it, reduced to mere spots . . . *punctigera* n. sp.
- Scutellum with numerous hairs below at apex centrally ; mesonotum with brownish central cloud upon which there are four darker vittae anteriorly, which are brown and not deep black on anterior margin and not fused nor darker there than on either side of transverse suture 4.
4. The fine hairs on the underside of the third wing vein continued to beyond midway to inner cross vein . . . *extensa* n. sp.
- The fine hairs on the under side of the third wing vein not continued midway to inner cross vein, usually ceasing short of apex of basal third *plebia* n. sp.
5. Femora and palpi yellowish at bases, tibiae almost entirely yellowish *flavibasis* n. sp.
- Femora, tibiae, and palpi black or fuscous . . . *atripes* n. sp.

+ *Heteria appendiculata* n. sp.

Male and female.—Black, entirely dull ; head thorax, and abdomen densely pale grey dusted. Antennae, aristae, and palpi

black ; frons densely whitish grey dusted, with a lilac tinge in front, becoming black behind and with a connecting central black band on back of head ; upper portions of orbits becoming darker to posterior margins ; epistome testaceous ; parafacials with a changeable dark spot below bases of antennae. Thoracic dorsum with all the area between the lines of intra-alars browned, and on the brown part with four deep black vittae, which are interrupted at the suture and do not extend to the posterior margin, the submedian pair linear, the sublaterals broader ; scutellum when seen from in front with the base grey and the remainder black. Abdomen browned on each tergite from near base to apex on dorsal exposure, becoming darker to hind margin, and with the bases of the bristles and hairs inserted in slightly darker dots. Legs black. Wings greyish hyaline, whitish at bases, the veins fuscous, becoming yellowish basally, with markings as listed in the key to species, sometimes with two dark preapical dots on the apical section of second vein, each enclosing stump veins. Calyptrae white. Halteres yellow.

Male.—Frons fully one-half of the head width at vertexr widened to anterior margin, the interfrontalia about twice as wide as either orbit, each of the latter with three outwardly curved upper outer bristles and about seven incurved bristles along the inner margin, the latter shorter centrally in the series ; ocellars long, erect, and divergent ; inner pair of vertical bristles long and strong, outer pair much shorter ; postverticals short, erect, and slightly divergent ; in addition to the bristles on the orbits there are numerous stiff hairs, which descend on the parafacials to about the lower level of the eye, some of them along inner portion of the parafacials quite strong and bristlelike (Fig. 1) ; profile of head as in the Figure. Thorax with 2 + 3 pairs of strong dorsocentrals and one or two pairs of presutural acrostichals, the prescutellar pair usually present though rather weak ; sternopleurals three, the lower anterior one usually proximad of the upper one ; mesopleura with a bristle near upper margin in centre ; scutellum without hairs below in centre at apex, the marginal bristles six in number, the apical and basal pairs shorter than the central pair, the apicals cruciate. Abdomen with apical central bristles on first and second visible tergites, and a complete apical series on third and fourth, a pair of discals on second and third and a transverse series of discals on fourth ; lobes of fifth sternite broadly rounded, without strong bristles. Legs normal, fore tarsi not widened apically ; fore tibia with an irregular series of anterodorsal bristles and two or three submedian posterior bristles ; mid tibia with one strong and usually one very short submedian ventral bristle, and a series of bristles, three or four in number, on the anterodorsal and posterodorsal surfaces, which become longer apically and do not extend to apex ; hind tibia with two or three anteroventral bristles and the

same anterodorsal and posterodorsal armature as the mid pair. The bristle on under side of the costal vein at apex of auxiliary vein much longer than the one on upper side, distinctly longer than the inner cross vein; venation as in Fig. 2, but the angle of the fourth vein sometimes with a short stump vein; outer cross vein somewhat variable in position, usually very slightly beyond midway between inner cross vein and bend.

Female.—Similar to the male, but with the fore tarsi slightly widened from the second segment to apex, and the abdomen more pointed. Antenna as Fig. 1a.

Length, 5-6mm.

Type, male, Kaikoura, Feb. 24th, 1922; allotype and one female paratype, Cass, Dec. 1st, 1924 (A. Tonnoir).

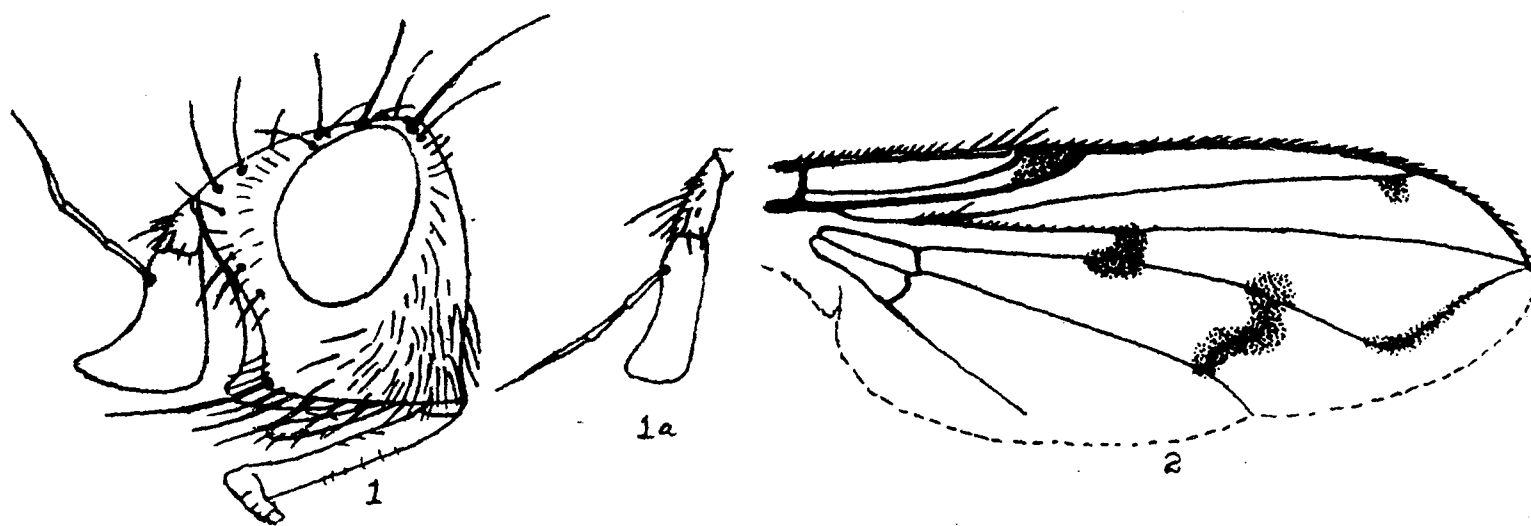


Fig. 1—Head of *Heteria appendiculata* male from the side; 1a, antenna of female of same.

Fig. 2—Wing of *Heteria appendiculata*.

+ *Heteria punctigera* n. sp.

Female.—Very similar to the preceding species, differing in colour in having the interfrontalia not so extensively blackened posteriorly, the frontal orbits not sharply infuscated on inner two-thirds, merely browned along inner margins, the dorsum of thorax not noticeably browned, but with bicoloured vittae, as described in the key to species, the scutellum grey dusted, and, when seen from in front, with some small contiguous brown dots on disc, and the margin blackish, the abdomen with the tergites pale grey dusted, and with numerous dark brown setigerous dots, and an interrupted apical dark brown fascia on second and third tergites, and no dark spot on apical section of the second wing vein.

Structurally very similar to *appendiculata*, but lacking the stump veins on the posterior side of the second vein, and with very much weaker hairs on the parafacials. The eyes in this species appear to be bare, except under a very high power lens; there are no hairs on the ventral surface of scutellum in centre, and the outer

cross vein of the wing is situated at a point less than two-thirds of the distance from the inner cross vein to the bend of fourth vein. Fore tarsi widened apically. Hairs on upper side of third vein continued more than midway to inner cross vein, those on the under side confined to base of vein.

Length, 6 mm.

- Type, Cass, Nov. 19th, 1924 (A. Tonnoir). One specimen.

***Heteria extensa* n. sp.**

Female.—A darker coloured species than either of the two preceding, the dusting being brownish yellow, and not pale grey. The frons is more uniform in colour, being whitish only in certain lights in front centrally, and the upper portion is not deep black but dark brown, as is also the central portion of the back of head. The thoracic dorsum is slightly darkened centrally, and the vittae are dark brown, while there are traces of dark dots at the bases of the bristles; scutellum with some irregular brown markings. Abdomen in type specimen greasy, but apparently coloured as the thoracic dorsum, as there are traces of brown markings centrally on apices of some of the tergites. Wings marked as in *appendiculata*, but without a dark preapical spot on second vein, though there is a trace of a yellowish costal cloud along its extent. In other respects similar to the other species.

Structurally similar to *punctigera*, but the hairs on third vein extend to, or almost to, inner cross vein both above and below. The outer cross vein is less than two-thirds of the distance from inner cross vein to bend of fourth vein. Fore tarsi slightly dilated apically. Scutellum densely haired below centrally at apex.

Length, 6 mm.

Type, Waiho, January 19, 1922 (A. Tonnoir). One specimen.

***Heteria plebia* n. sp.**

Male and female.—Similar to the next preceding species, but the dusting on the thorax and abdomen is pale grey, the dark brown marks on the interfrontalia cease rather abruptly about one-third from the anterior margin, and are separated by a fine pale line in the female, though the entire width in male is usually darkened up to a little from anterior margin; the thoracic dorsum is broadly browned, and has the usual four darker vittae, while the abdominal tergites are broadly browned apically, and the hairs and bristles are inserted in dark dots. The other parts are much as in *extensa*.

Structurally similar to *extensa*, the sexes with the same antennal distinctions as in *appendiculata*, the third segment much narrower in the female than in the male, as shown in Fig. 1a, but the hairs on

the underside of the third wing vein are confined to the basal third or less, though they extend to, or almost to, the inner cross vein on the upper side. The male is very similar to that of *appendiculata* in the form of the abdomen, which is almost cylindrical, and slightly tapered apically. Fore tarsi of the female distinctly dilated on the apical four segments, those of the male not dilated. Outer cross vein of the wing usually very strikingly bisinuate, sometimes rather sharply angulate near middle, and connecting with fourth vein beyond middle of the distance between inner cross vein and bend of fourth, but at over one-third from bend.

Length, 6-7.5 mm.

Type, female, Cass, December 29, 1924 (A. Tonnoir) ; Allotype and four female paratypes, Horseshoe Lake, November 25, 1924 (J. W. Campbell) ; paratypes, Christchurch, no date or collector's name, and Kumara, November 3, 1929 (J. W. Campbell).

It must be noted that two examples, both females, have the first posterior cell of the wing closed at some distance from the margin of the wing, and thus distinctly petiolate. These may represent a distinct species, but there appears to be considerable variation in the character in this and other genera of New Zealand tachinids ; so, pending receipt of more material, I leave them with the present species.

† *Heteria flavibasis* n. sp.

Female.—This and the next species are rather well distinguished from the others that have preceded them in this paper by the quite densely haired eyes, the lack of dark marks on the wings, and the position of the outer cross vein, which is connected with the fourth vein at not over one-third of the distance from the bend of fourth vein to the inner cross vein. Neither of the species have hairs on the underside of the apical central portion of the scutellum, but *appendiculata* and *punctifera* are similar in this respect. The present species differs from all the others in having the femora largely yellowish basally, and the tibiae almost entirely so, usually with a slight darkening basally, and the palpi almost entirely yellowish.

The frons is hardly over one-third of the head width at vertex, and gradually widened to anterior margin, with the interfrontalia hardly wider than either orbit, and the anterior one of the outer bristles on the upper half of frons is more nearly proclinate than in the other group, while the hairs on the parafacials are confined to the upper half. In other respects the species is not remarkable, the third antennal segment being almost as in the female of *appendiculata* and the fore tarsi and chaetotaxy almost the same as in that species.

Length, 5.5 mm.

Type, Loch Lomond, February 14, 1920 (Fenwick). In author's collection.

+ **Heteria atripes** n. sp.

Female.—Distinguished from the preceding species by the entirely black legs and palpi.

Structurally similar to *flavibasis*, but larger and more robust, with the interfrontalia a little wider, and the hairs on the parafacials extending farther towards the vibrissae.

Length, 7 mm.

Type, Otira, November 20, 1919 (J. W. Campbell). U.S. National Museum.

A male before me from the same collection agrees with the female in every character except that the hairs on the upper surface of the third wing vein extend over midway to the inner cross vein instead of being confined to less than the basal third. This may represent another species, but meanwhile I leave them together, pending receipt of additional material.

Locality, Blackball, March, 1920 ; no collector's name, but sent to the Museum by J. W. Campbell along with the other material collected by him, and recorded in this paper.
