found under a log. I have found nymphs of the same species, in company with those of *Koroana arthuria* n. sp., very numerous under stones, in some cases with small ants (*Monomorium* sp.) in the boulder-strewn river-bed at Arthur's Pass (2,300 ft. elevation). There is a fruitful subject of study here not only in regard to the nymphs themselves, but in their relationships with the ants. Swezey* has written an account of the life-history of the Hawaiian *Oliarus koanoa* Kirkaldy. This species spends the nymphal instars "among the decaying leaf-bases and fibrous matter of tree-fern trunks, in cavities or tunnels lined with a white fibrous material which resembled mould, or spider's web, and which is an excretion from the terminal abdominal segments of the nymphs. The nymphs probably feed upon the fern-roots in the fibrous mass of the outside of the fern-trunks, or on juices of the decaying material." In North America, according to Osborn, *Myndus radicis* lives in similar crevices lined by the fibrous material of the abdominal tufts. Swezey also quotes Townsend to the effect that *Oecleus decens* lays its eggs in punctures in the leaves of *Yucca*, each puncture being covered by white fibrous matter.

The Cixiidae are moderately-sized plant-hoppers occurring often in considerable numbers on herbage and bushes, from the mangrove swamps, through forest and tussock, up to the subalpine scrub. The tegmina are folded in a roof-like manner, or in some cases almost approaching the horizontal position over the back. In addition to flying readily by means of the usually ample tegmina and wings, these plant-hoppers use their long and strong metathoracic legs in agile leaping. A leap, in fact, is their usual method of launching into the air. The tendency to brachyptery, so frequent in other families—as, for example, the Delphacidae—is in the Cixiidae but little marked. The peculiar genus *Aka* has the shortest tegmina among the New Zealand forms, but its wings, although fairly short, are broad and ample.

The principal characters of the family may be summed up as follows: Width of head, including eyes, distinctly less than width of pronotum. Ocelli three, median one sometimes practically obsolete, but usually quite well developed. In a few foreign forms the median eye is absent. Pronotum very short, strongly subangularly notched behind (*Edwards*). Tegmina usually large, more or less transparent. Veins strong, macrotrichia conspicuous in many cases. Apical parts of tegmen not reticulate. Subcosta and radius with common stem. In some foreign forms Sc, R, and M are all separate, and in some others all three form a common stalk. Anal area of wing not reticulate except in Meenoplinae. First joint of hind tarsus elongate. Female of many genera bears a tuft of cottony or waxy fibrous material at the end of the abdomen, secreted by the more or less vertical plate-like area, the pygophor, between anal segment and ovipositor.

The first Cixiids from New Zealand were described by Francis Walker in 1850 and 1858. He placed in the genus *Cixius* the seven species known to him, of which two were removed by Buchanan White in 1879 to *Oliarus*, and a third was made the type of a new genus, *Aka*. Of the remaining four of Walker's species Buchanan White knew nothing, but on another new Cixiid from New Zealand he erected the genus *Semo*.

---

* O. H. Swezey, Observations on the Life-history of *Oliarus koanoa* Kirkaldy, *Proc. Hawaiian Ent. Soc.*, 1, pt. 3, pp. 83–84, 1907.

After numerous attempts by Mr. Muir and myself to accommodate all the New Zealand species in these and other known genera, it was decided that, rather than stretch unduly the limits of genera already inconveniently crowded, it would be best to erect four new genera by means of which the relationships of our new forms might be better expressed. To differentiate these new genera Mr. Muir drew up the following key, which for a considerable time I have tested on large series of specimens. The genera have been further differentiated, and the suggested classification shown to be natural, by dissection of the male genitalia of all species in which males were procurable.

All measurements are from apex of vertex to anus, and from base to apex of one tegmen.

KEY TO GENERA OF NEW ZEALAND CIXIIDAE.

1. (12.)	One or more spines on the hind tibiae, not counting apical spines.	
2. (7.)	Five mesonotal carinae, the intermediate two sometimes faint.	
3. (6.)	Face with a median longitudinal carina.	
4. (5.)	Carinae at apex of vertex and base of face distinct. Two transverse carinae on vertex, one dividing face from vertex and one basad of this, the latter straight and transverse, curved, or forming an angle and touching the anterior transverse carina	*Oliarus.*
5. (4.)	Carina at apex of vertex and base of face obscure or missing; median frontal carina forked about middle of face	*Malpha.*
6. (3.)	Face without a median longitudinal carina	*Huttia.*
7. (2.)	Three mesonotal carinae, the middle one sometimes obscure.	
8. (9.)	No median longitudinal carina on face; fronto-clypeal suture arcuate; clypeus swollen or rounded	*Semo.*
9. (8.)	A distinct longitudinal median carina on face.	
10. (11.)	A median longitudinal carina on vertex; clypeus fairly flat with a distinct median carina	*Cixius.*
11. (10.)	No median longitudinal carina on vertex; clypeus fairly rounded without median longitudinal carina. Cu_1 joining M_{3+4} for a short distance	*Koroana.*
12. (1.)	No spines on hind tibiae, except apical ones.	
13. (14.)	Vertex with a longitudinal carina forked at apex, median carina on face forked or thickened on basal half	*Aka.*
14. (13.)	Longitudinal carina on vertex very short, not forked: median frontal carina not forked	*Tiriteana.*

Genus 1. CIXIUS Latreille.

Type: *C. nervosus* (Linn.)

This almost cosmopolitan genus is sufficiently characterized in the above key. The male genitalia of the New Zealand forms are comparatively simple. The aedeagus is straight, with backwardly-directed hooks.

Cixius punctimargo Walker. (Plate 20, figs. 1–4.)

Walker, List Homopt. Insects in *Brit. Mus. Suppl.*, p. 81, 1858. Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 216, 1879. Hutton, *Trans. N.Z. Inst.*, vol. 30, p. 186, 1898; *Index Faunae Nov. Zeal.*, p. 224, 1904. Kirkaldy, *Trans. N.Z. Inst.*, vol. 41, p. 28, 1909.

♂. Length, 3 mm.; tegmen, 4 mm. Very pale olive, the veins and tegmina malachite-green. Eyes brownish. Below brown; clypeus darker; fronto-clypeal suture black. Tegmina hyaline. Veins green, black and thickened at tips. Apical cross-veins black and thick. Stigma hyaline or whitish. Medio-ventral projection of pygophor short and sharp. Anal segment large. Anal style jet-black. Genital styles with stem rather

suddenly bent, apex triangular. Aedeagus straight with two backwardly-directed hooks and a membranous appendage.

♀. Length, 4 mm.; tegmen, 5 mm. Pale brown, eyes dark. Carinae and angles whitish. Tegmina hyaline with whitish veins; tips of veins and apical cross-veins black. Two blackish smudges at nearly half-way, just cephalad of claval suture. Ovipositor stout.

Redescribed from thirteen males and nineteen females. Tarawera (R. J. Tillyard), Herne Bay (W. G. Howes), Auckland (I. H. Myers), Rangitoto Island (I. H. and J. G. Myers)—all in Auckland Province.

Mr. Muir compared my specimens with the type in the British Museum. He writes, "This agrees with the type, which is a male; there is another male and three females in the type series."

Cixius interior Walker. (Plate 20, figs. 5, 6.)

Walker, List Homopt. Insects in *Brit. Mus. Suppl.*, p. 82, 1858. Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 216, 1879. Hutton, *Trans. N.Z. Inst.*, vol. 30, p. 185, 1898; *Index Faunae Nov. Zeal.*, p. 224, 1904. Kirkaldy, *Trans. N.Z. Inst.*, vol. 41, p. 28, 1909.

Cixius aspilus Walker, List Homopt. Insects in *Brit. Mus. Suppl.*, p. 83, 1858. Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 216, 1879. Hutton, *Trans. N.Z. Inst.*, vol. 30, p. 186, 1898; *Index Faunae Nov. Zeal.*, p. 225, 1904. Kirkaldy, *Trans. N.Z. Inst.*, vol. 41, p. 28, 1909.

♂. Length, 4 mm.; tegmen, 5 mm. Pale-greenish; veins, carinae, and angles greener. Eyes dark brown. Tegmina hyaline, veins slightly darker and thicker towarks tips. Stigma hyaline or whitish. At least two apical cross-veins blackish. A blackish streak on wing-margin at apex of clavus. Frons green, clypeus yellowish-brown. Medio-ventral projection of pygophor prominent. Genital styles somewhat as in preceding species, but not bent so abruptly. Aedeagus more complex, long and straight, with three backward hooks and a membranous appendage all grouped near distal end.

♀. Length, 4 mm.; tegmen, 5 mm. Resembles male generally. Ovipositor very dark and stout.

Redescribed from eight males and six females. Rangitoto Island and Waitakerei Hills, Auckland (I. H. and J. G. Myers). Specimens have since been seen from Wanganui (J. G. M.) and Taumarunui (T. R. Harris).

It is with some doubt that Walker's name is given to this species. Mr. Muir, after examining the types, writes: "The type of *C. interior* is a female and the type of *aspilus* is a male, and they appear to be the same species. They are unicolorous, reddish-yellow, with clear tegmina bearing black macrochetae. This colour may have been originally green and have turned yellowish-red. If so, they appear to be your No. 249."

It is interesting to note in this connection that several of my specimens, none of which are more than sixteen months old, are already turning yellowish. Walker's character, "transverse veinlets forming two lines, the interior one incomplete," is seen in the photograph (Plate 20, fig. 5). Walker gives the colour as "testaceous" or "pale testaceous." This beautiful green species is one of our finest Cixiids. As its colour would lead one to expect, it is more essentially a dweller among the green foliage of shrubs and small trees than are the other species. In habitus, and to a less extent in the appearance of the male genitalia, it affords a transition from *Cixius* to *Koroana*.

Cixius rufifrons Walker.

Walker, List Homopt. Insects in *Brit. Mus. Suppl.*, p. 83, 1858. Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 216, 1879. Hutton, *Trans. N.Z. Inst.*, vol. 30, p. 186, 1898; *Index Faunae Nov. Zeal.*, p. 225, 1904. Kirkaldy, *Trans. N.Z. Inst.*, vol. 41, p. 28, 1909.

"Tawny. Head testaceous; vertex narrow, concave; front and face with a distinct keel, their borders slightly elevated; face and disc of the front red. Prothorax very short, much arched. Mesothorax with three keels. Abdomen somewhat luteous. Wings vitreous; veins testaceous, with black points towards the tips; stigma pale testaceous; with a blackish dot. Length of the body, 2 lines; of the wings, 6 lines. (*a.*) New Zealand. Presented by Colonel Bolton."—(*Walker.*)

This species is totally unknown to me. From the description I should have expected it to be synonymous with *C. aspilus* (*C. interior*), but Mr. Muir writes as follows: "*C. rufifrons* Walker type is a male very close to *aspilus*, but the genital styles are broader and the anal segment light (in *aspilus* and *interior* it is fuscous)."

Cixius kermadecensis n. sp.

♀. Length, 4·4 mm.; tegmen, 5·5 mm. Pale-brownish, darker on eyes and angles of pronotum and abdomen. Ventral surface pale. Abdomen darker, with whitish edges to segments. Ovipositor strongly curved; extending slightly beyond tip of abdomen. Frons and clypeus unicolorous, pale drab, edges of face raised. Tegmina hyaline, veins pale brown, macrotrichia darker and very conspicuous. A broad brown transverse smudge at one-third of tegmen, and a smaller one at apex of clavus. Stigma with brownish centre edged with white. Hind-border of vertex less roundly notched than in most other Cixiids, also line bounding vertex cephalad, more angulate.

Described from one female. Sunday Island, Kermadec Islands, 1908 (W. L. Wallace, No. 4); on kawakawa (*Macropiper excelsum*).

Holotype in Dominion Museum, Wellington. I am indebted to the Dominion Museum authorities for the opportunity of describing this insular species.

Genus 2. KOROANA nov.

Type: *K. helena* n. sp.

Longitudinal carina of vertex extremely obscure or entirely obsolete. Clypeus fairly rounded, without median longitudinal carina (Plate 21, fig. 6). Male genitalia complex; three very twisted hooks at base of membranous distal part of aedeagus. Tegmina long and narrow, subparallel-sided. Sc and R joined until half the length of the tegmen; their bases joined to M near base of tegmen. Forking of C about two-thirds along clavus. Claval veins joining margin considerably before apex of clavus, forking about middle. Cu usually touching M for some distance.

In other respects resembles *Cixius*. The venation exhibits considerable variation, as shown by the illustrations (Plate 21, figs. 1–5; Plate 22, figs. 1–3). Of the two species, one is apparently confined to the North Island and the other to the South.

Koroana helena n. sp. (Plate 21, figs. 1–8.)

♂. Length, 4 mm.; tegmen, 5 mm. Reddish, relieved with black. Vertex brownish, eyes dark. Pronotum pale-yellowish. Mesonotum henna-colour, the lateral carinae black, the median greenish. Apex of scutellum

greenish, metanotum black. Basal two or three abdominal segments black; remainder pale-reddish. Frons yellowish, with an area on each side of median ridge and whole of clypeus reddish—distinctly delimited. Tibiae usually with black proximal and distal bands. Tegmina hyaline. Veins brownish, darker at tips, with distinct black macrotrichia. An interrupted, more or less double and very variable brownish fascia obliquely transverse at a little past a third (sometimes practically obsolete). Stigma fuscous, margined with whitish. Genitalia fuscous. Medio-ventral projection of pygophor prominent. Genital styles with the blade bent sharply at right angles to stalk. Apex of peculiar shape, as shown in Plate 21, figs. 7, 8. Aedeagus with three hooks at base of membranous portion, two of the hooks twisted together in a characteristic manner (Plate 21, figs. 7, 8).

♀. Length, 4·8 mm; tegmen, 5·4 mm. Less brightly coloured than male. Disc of mesonotum between lateral carinae entirely greenish. Distal half of abdomen with indications of a median black longitudinal mark. Ovipositor pale-brownish, long and slender.

Described from fifty-three males and thirty-nine females. Apparently throughout North Island.

Holotype and allotype: Myers collection, Department of Agriculture.

This is essentially a bush-, shrub-, and tree-frequenting species.

Koroana arthuria n. sp. (Plate 22, figs. 1–4.)

♂. Length, 4 mm.; tegmen, 4·6 mm. Close to the preceding species, but distinguished by the stouter and more depressed form, shorter tegmina, and darker colour and more abundant pruinosity on both sexes, and also by the following characters: Tegmen with a semicircular fuscous patch on fore-border between one-third and half-way. This is always present, even in the paler forms, and furnishes a means of distinction at first glance. Hooks of aedeagus less twisted, and other genital differences as shown in Plate 22, fig. 4.

♀. Length, 4·5 mm.; tegmen, 4·9 mm. Colour paler than that of male. Ventral surface of abdomen black.

Described from twenty-two males and fifteen females. Trio Islands, Cook Strait (R. J. Tillyard); Mount Arthur (A. Philpott); Arthur's Pass (R. J. Tillyard, J. W. Campbell, W. G. Howes, I. H. and J. G. Myers) Waitati, Otago (C. E Clarke); Queenstown (W. G. Howes).

These are all South Island localities. The Trio Islands form is consistently smaller and lighter in colour than the type (Arthur's Pass), but I can find no structural differences.

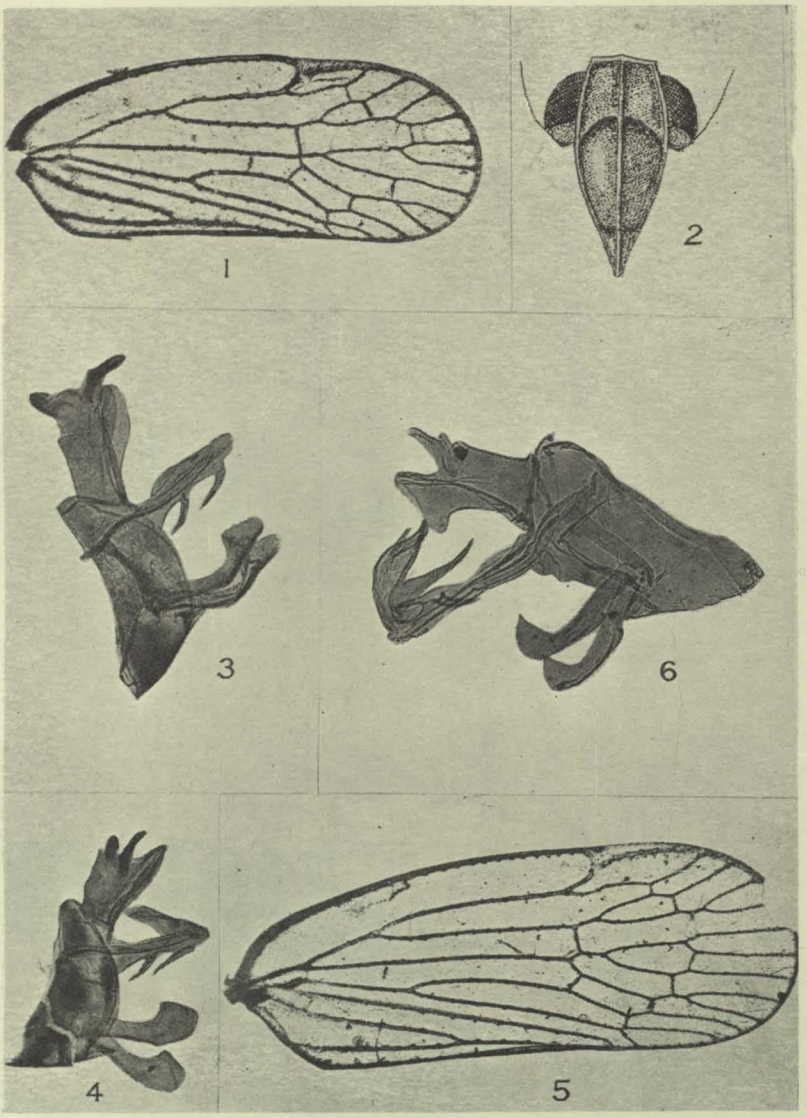
Holotype and allotype: Myers collection, Department of Agriculture.

This species was reared in large numbers from nymphs beneath stones at Arthur's Pass. Small ants were also present, but myrmecophily was not definitely established.

Genus 3. Semo Buchanan White.

Type: *S. clypeatus* Buchanan White.

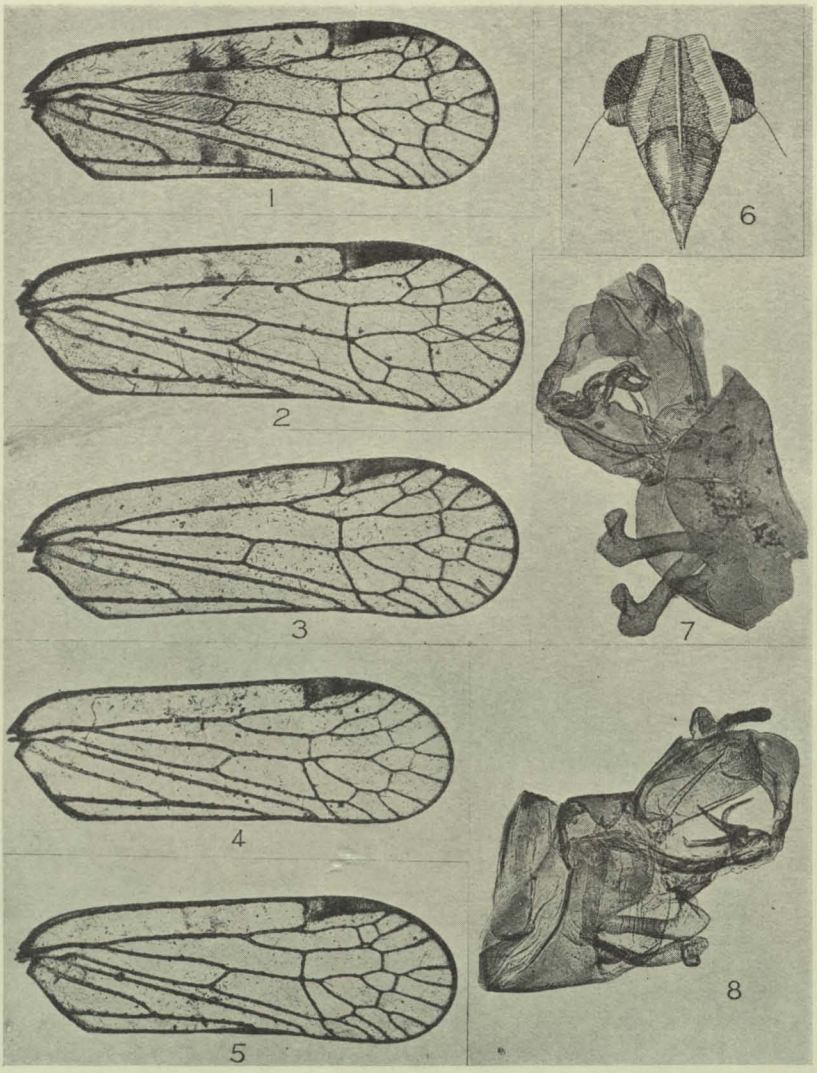
Buchanan White's description is good, except that the head, including eyes, is not as wide as pronotum. There is, therefore, no need to redescribe the genus, especially as its salient distinguishing features are incorporated in the generic key. The male genitalia approach those of the New Zealand species of *Cixius*, but are very much less armed.



[*W. D. Reid, photo, and E. H. Atkinson, sketch.*

FIG. 1.—*Cixius punctimargo* Walker: right tegmen.
FIG. 2.—*Cixius punctimargo* Walker: face.
FIG. 3.—*Cixius punctimargo* Walker: male genitalia, lateral view.
FIG. 4.—*Cixius punctimargo* Walker: male genitalia, semi-lateral view.
FIG. 5.—*Cixius interior* Walker: right tegmen.
FIG. 6.—*Cixius interior* Walker: male genitalia, lateral view.

Face p. 320.]

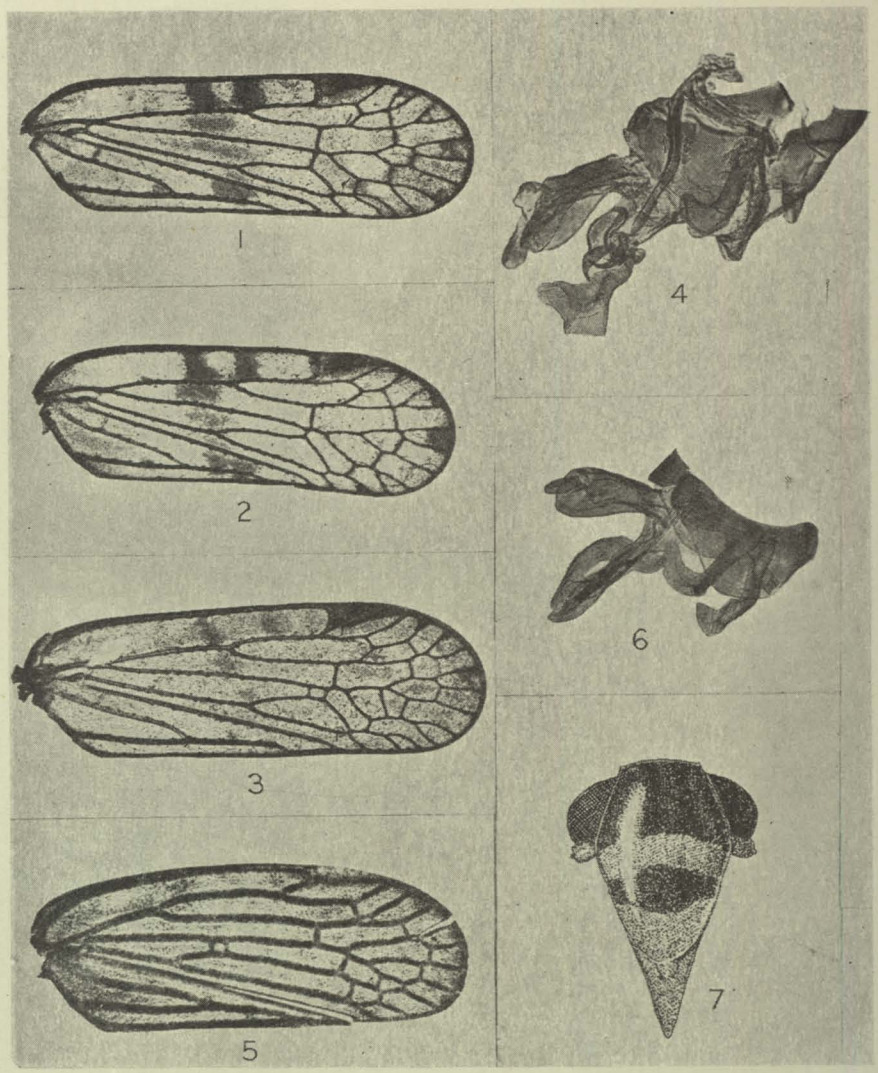


[*W. D. Reid, photo, and E. H. Atkinson, sketch.*

FIGS. 1–5.—*Koroana helena* n. sp.: right tegmen of specimens from various localities, showing venational variation.

FIG. 6.—*Koroana helena:* face.

FIGS. 7, 8.—*Koroana helena:* male genitalia, views from different aspects of two different specimens.



[*W. D. Reid, photo, and E. H. Atkinson, sketch.*

FIGS. 1, 2.—*Koroana arthuria* n. sp.: right tegmen of two specimens of typical form from Arthur's Pass.
FIG. 3.—*Koroana arthuria:* right tegmen of form from Trio Island.
FIG. 4.—*Koroana arthuria:* male genitalia, lateral view; typical form from Arthur's Pass (the Trio Islands form does not differ in genitalia).
FIG. 5.—*Semo clypeatus* Buchanan White: right tegmen.
FIG. 6.—*Semo clypeatus* Buchanan White: male genitalia, lateral view.
FIG. 7.—*Huttia nigrifrons* n. gen. et sp.: face (flagella of antennae broken).

Semo clypeatus Buchanan White. (Plate 22, figs. 5, 6.)

Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 217, 1879; Hutton. *Trans. N.Z. Inst.*, vol. 30, p. 187, 1898; *Index Faunae Nov. Zeal.*, p. 225, 1904. Kirkaldy,* *Trans. N.Z. Inst.*, vol. 41, p. 29, 1909.

♂. Length, 3·5 mm.; tegmen, 4 mm. "Pale ochreous-brown. Head (except the keels of the vertex, side of the frons and antennae), scutellum (except the side margins), apex of tarsi and abdomen (except genitalia) more or less piceous or piceous-black" (*Buchanan White*). To this may be added the following description of genitalia: Pale-brownish. Medio-ventral projection of pygophor prominent but wide and rounded. Genital styles with very short stalks and long blades with broad roundish base and narrower apex. Aedeagus straight and almost unarmed.

♀. Length, 4 mm.; tegmen, 4·5 mm. Colour slightly paler. Ovipositor brownish, stout, but sharply pointed. Normally a heavy mass of waxy material between anal segment and ovipositor.

Twenty-five males and thirty-five females. Mount Egmont (Miss J. Anson); Tararua Ranges, 3,300–3,600 ft. (J. G. Myers); Mount Arthur (T. Cockcroft); Arthur's Pass, 2,600–2,800 ft. (I. H. and J. G. Myers); Wakatipu, 3,600 ft. (G. V. Hudson). Hutton gives the range as "Otago."

This short squat species is apparently confined to the subalpine scrub and to the undergrowth of the forest at its upper limit, in which places it often occurs in vast numbers. The South Island specimens have tegmina slightly more variegated—some of the veins being more conspicuously picked out in whitish than in the North Island specimens—but this difference is not constant.

Genus 4. HUTTIA nov.

Type: *H. nigrifrons* n. sp.

Body short and squat. Tegmina long and hyaline. Vertex with a median longitudinal ridge. Face with no median longitudinal carina. Pronotum very narrow, flattish, with a median longitudinal keel and two lateral ones, none very prominent. Mesonotum rounded, with five keels. Hind tibiae spined. Tegmina long, narrow and parallel-sided. Sc and R joined for rather less than one-third; their bases joined to M for about one-eighth of clavus. Cu forked about middle of clavus; claval veins joining margin near apex, forked about middle. A cross-vein from first claval to Cu_2 at about one-fifth along clavus.

Huttia nigrifrons n. sp. (Plate 22, fig. 7.)

♀. Length, 5 mm.; tegmen, 6·5 mm. Olivaceous marked with blackish. Disc of vertex and of pronotum blackish. Inner two keels of mesonotum curved so that their ends almost touch median keel; all three very distinct, the keels olivaceous and intervening spaces blackish. Tegmina glassy-clear, including the veins, except where the latter, at intervals, are marked with black. A few fuscous marks along the inner border of clavus. Abdomen rounded. Anal segment and ovipositor almost same length, both black and slender. Legs long. Frons almost entirely shining-black; a wide transverse band of white at fronto-clypeal suture, followed by a transverse nearly semicircular band of shining-black; rest of clypeus pale-brownish.

*I do not understand why Kirkaldy placed this, together with *Aka* and the Achilid *Agandecca*, in his Poekillopteridae.

One female. Pakuratahi, Upper Hutt, Wellington (T. Cockcroft). I am deeply indebted to Mr. T. Cockcroft for his sole specimen of this interesting species.

Holotype, female: Myers collection, Department of Agriculture.

Huttia harrisi n. sp.

♀. Length, 5 mm.; tegmen, 5·5 mm. Olivaceous, pronotum green. Inner two keels of mesonotum only faintly indicated. Keels paler in colour than disc. Tegmina hyaline, veins fuscous; stigma whitish. Four fuscous marks on fore-border of tegmen; apical cells tipped with fuscous; a blackish smudge just beyond apex of clavus. Ovipositor brownish, shorter in proportion to its width than in previous species. Frons greenish, passing into yellowish on the clypeus, which is faintly obliquely ridged.

One female. West coast, South Island (T. R. Harris). I have much pleasure in dedicating this fine species to the discoverer.

Holotype: Myers collection, Department of Agriculture.

The localities from which the two species of *Huttia* have come, one in North Island and one in South, are both heavily forested.

Genus 5. Malpha nov.

Type: *M. muiri* n. sp.

Body short and stout and somewhat depressed. Tegmina short and oblong. Division of Sc and R before half-way from base to stigma, their bases joined to M only up to less than a quarter of clavus. Forking of Cu a little more than half-way from base of clavus. Claval veins joining margin well before apex; forking beyond middle. Carina at apex of vertex and base of face obscure or missing; median frontal carina forked about middle of face (in this character approaches *Aka*). Vertex slightly wider than long; widest at base, which is emarginate in a broadly wedge-shaped manner; lateral carinae well developed, continuing unbroken on to the face. Clypeus with median carina fairly distinct; lateral carinae (raised edges) less so. Antennae fairly long; first segment very short; second longer than wide. Prothorax short; hind-margin excavated by a right angle; a median longitudinal carina. Mesonotum with five carinae; distinctly flattened between carinae; hind-margin forming an equilateral triangle. Female with ovipositor short. Hind tibiae spined.

Malpha muiri n. sp. (Plate 23, figs. 1, 2.)

♂. Length, 4 mm.; tegmen, 4·3 mm. Olivaceous marked with chocolate-brown. Lateral margin of pronotum, sides of mesonotum, part of metanotum, and base of abdomen rich chocolate-brown. Frons widest at two-thirds from base, where the sides are strongly raised, basal portion pale-greenish, followed by a wide band of shining-piceous, next a band of yellowish, along the middle of which the fronto-clypeal suture shows as a fine reddish hair-line; apical half of clypeus shining-piceous. Fore and middle tibiae with a proximal and a distal ring of brownish; rest of legs pale. Tegmina clouded with yellowish-white; veins fuscous at intervals except on apical half where they are continuously dark. Stigma yellowish, three or four indistinct marks along costa, and another at distal end of claval vein. Wings milky, veins black. Genital styles small, apical portion of blade narrowed into a small, finger-like process. Aedeagus complex.

♀. Length, 4 mm.; tegmen, 4·3 mm. Colours and markings more obscure. Ovipositor very short and stout but projecting beyond anal segment; between them a small wax-secreting area.

One male and one female. Mount Alpha, 3,600 ft., Tararua Range; on undergrowth of shrubby *Senecio* and *Olearia* in *Nothofagus* forest (J. G. Myers).

Holotype and allotype: Myers collection, Department of Agriculture.

I dedicate this, the genotype of an endemic genus, to Mr. F. Muir.

Malpha iris n. sp.

♀. Length, 4 mm.; tegmen, 4·6 mm. In dorsal view, second joint of antennae projecting well beyond eyes. Pale-brownish; the tegmina folded almost horizontally; glassy-clear with veins fuscous, in parts white. Stigma whitish; apically somewhat thickened and blackish. A black spot at the lateral corners of mesonotum. Basal portion of frons whitish; borders shining yellowish-brown; apical part shining-piceous except to within a short distance of clypeus. Median ocellus black (at least there is a black dot in this position. I am not sure whether it is a functional ocellus). Clypeus long and narrow, whitish. *There is a distinctly marked line of colour from the base of the tegmen on one side to that on the other, passing across face just cephalad of the fronto-clypeal suture: all cephalad of this line, except the basal part of the frons, is shining-black; all caudad of the line is dull-white*—a most striking demarcation. Ovipositor short and stout.

One female. York Bay, Wellington; mixed *Nothofagus* and rain forest (I. H. Myers). I dedicate this species to the discoverer, my wife.

Holotype, female: Myers collection, Department of Agriculture.

Malpha duniana n. sp. (Plate 23, fig. 3.)

♂. Length, 4 mm.; tegmen, 4·1 mm. Olivaceous marked with fuscous. Abdomen blackish. Frons olivaceous spotted with fuscous; fronto-clypeal suture strongly depressed, marked with greenish-white. Mesonotum with the two inner keels somewhat obscure. *Bases of wings and of tegmina milky-white marked with black.* Tegmina hyaline with a fuscous area near the base covering more than half of clavus; a brownish splash including the distal portion of stigma and extending obliquely on to the disc; another at apex of hind (inner) margin of tegmen. Veins blackish and white alternately; extreme tips blackish and thickened. Three or four blackish marks along costa. Wings short and broad. Genital styles large and spatulate. Aedeagus complex, resembling that of *M. muiri*. Fore and middle legs with a proximal and a distal band of brownish.

♀. Length, 5 mm.; tegmen, 5·1 mm. The two inner keels of mesonotum almost obsolete. Abdomen dark. Ovipositor somewhat larger than that of *M. muiri* and *M. iris*.

One male and two females. Dun Mountain, Nelson, 3,000 ft. (R. J. Tillyard and A. Philpott).

Holotype: Myers collection, Department of Agriculture. Allotype: Cawthron Institute.

In the structure of the face and in the shape of the genital styles this species approaches *Aka* more than do the other species of the genus.

Malpha cockcrofti n. sp.

♀. Length, 4·5 mm.; tegmen, 5 mm. Uniform reddish-ochraceous, deepening on the face, under-parts, and mesonotum to a shining-tawny.

Eyes dark. Frons with strong lateral carinae, the fork of median carina very distinct; fronto-clypeal suture almost straight. Face concolorous. Mesonotum concolorous, the inner carinae pale. Tegmina hyaline suffused with orange, veins alternately fuscous and white. Ovipositor not quite so short and stout as in the three preceding species. A large mass of waxy material between ovipositor and anal segment.

One female. Otira, South Island; subalpine (T. Cockcroft).

Holotype: Myers collection, Department of Agriculture.

I have much pleasure in naming this species after its discoverer, to whom I am indebted for much valuable material.

Genus 6. Oliarus Stal.

Type: *O. walkeri* (Stal.).

This cosmopolitan genus is sufficiently differentiated by the characters included in the foregoing generic key. The five mesonotal carinae are usually very strongly marked. The male genitalia of the New Zealand forms show peculiar battle-axe-shaped genital styles and a complex aedeagus with some of the sharp processes projecting almost directly caudad instead of being recurved.

Oliarus oppositus (Walker). (Plate 23, figs. 4–7.)

Cixius oppositus Walker, List Homopt. Insects in *Brit. Mus. Suppl.*, p. 345–46, 1850.

Oliarus oppositus (Walker) Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 217, 1879. Hutton, *Trans. N.Z. Inst.*, vol., 30, p. 186, 1898; *Index Faunae Nov. Zeal.*, p. 225, 1904. Kirkaldy, *Trans. N.Z. Inst.*, vol. 41, p. 29, 1909.

Cixius marginalis Walker, *ibid.*, Suppl., p. 82, 1909.

Oliarus marginalis (Walker) Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 216, 1879. Hutton, *Trans. N.Z. Inst.*, vol. 30, p. 186, 1898; *Index Faunae Nov. Zeal.*, p. 225, 1904. Kirkaldy, *Trans. N.Z. Inst.*, vol. 41, p. 29, 1909. Hudson, *Trans. N.Z. Inst.*, vol. 54, p. 343, 1923.

♂. Length, 3·5 mm.; tegmen, 4·7 mm. Jet-black, with parts of eyes, the edges of pronotum, of tegulae, and of vertex, carinae of face, proximal half of labium, joints of legs, and a very narrow edging to abdominal segments tawny. Carinae of mesonotum black and concolorous with disc. Tegmina hyaline faintly suffused with greyish-yellow. Veins yellowish; black at tips; apical cross-veins black. Macrotrichia black and conspicuous. Stigma whitish, edged behind and distally with blackish. Genital styles with a conspicuous notch in the stem; apical portion halberd-shaped. Aedeagus very complex.

♀. Length, 3·5 mm.; tegmen, 4·7 mm. Ovipositor extremely short. A large mass of waxy material between it and anal segment. Possibly the average size of the female is slightly larger than that of the male. My largest specimen is a female, and my smallest a male.

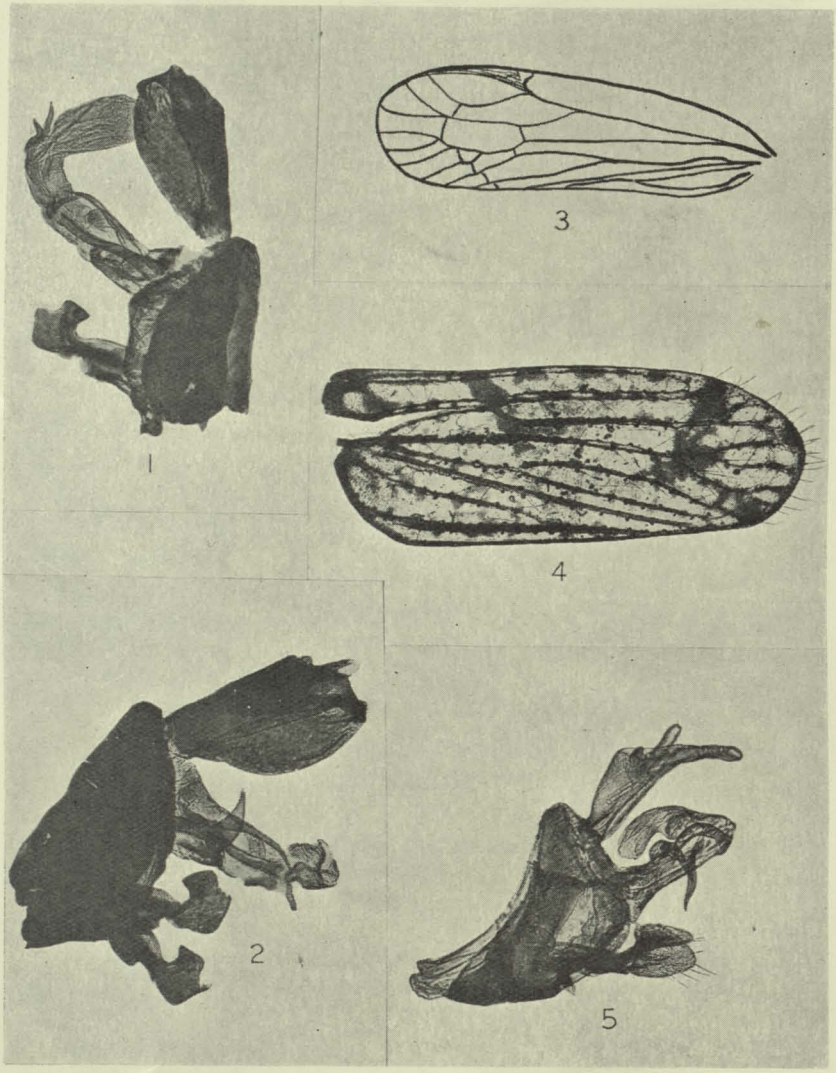
Redescribed from thirty-five males and fifty-four females. Widespread over both Islands, and to an elevation of at least 4,500 ft. [Tararua Range (J. G. Myers)]. This species frequents grass and ground herbage. The size is variable, and Walker's *marginalis* was apparently described from rather larger specimens. My smallest specimen is only 2·9 mm. in length.

Dr. R. J. Tillyard collected a small form on Stephen Island and the Trio Islands in Cook Strait. This is consistently smaller than the mainland form, but I can find no other differences.

[*W. D. Reid, photo.*

FIG. 1.—*Malpha muiri* n. gen. et sp. : right tegmen.
FIG. 2.—*Malpha muiri* n. gen. et sp. : male genitalia, lateral view.
FIG. 3.—*Malpha duniana* n. sp. : male genitalia, lateral view.
FIGS. 4, 5.—*Oliarus oppositus* (Walker) : male genitalia, lateral view; two typical specimens, from Aramoho and Whangarei respectively.
FIG. 6.—*Oliarus oppositus* (Walker) : male genitalia, lateral view; Stephen Island specimens.
FIG. 7.—*Oliarus oppositus* (Walker) : male genitalia, lateral view; Arthur's Pass specimen.

Face p. 324.]



[*W. D. Reid, photo.*

FIGS. 1, 2.—*Oliarus atkinsoni* n. sp.: male genitalia; views of two specimens. In fig. 1 one genital style has been broken off.
FIG. 3.—*Tiritea clarkeian* n. gen. et sp.: left tegmen. (Drawing, J. G. M.)
FIG. 4.—*Aka finitima* (Walker): right tegmen.
FIG. 5.—*Aka finitima* (Walker): male genitalia, lateral view.

There is a very dark form at Arthur's Pass (subalpime to alpine) in which the veins and stigma are almost entirely black. I can detect no differences in structure. This form was reared from nymphs beneath stones.

Oliarus atkinsoni n. sp. (Plate 24, figs. 1, 2.)

♂. Length, 5 mm.; tegmen, 6·3 mm. Close to the preceding species, but differing in its very much greater size and in the following particulars: *Whole body* dusted with pruinose material so that to the naked eye it appears greyish. Tegmina colourless but clouded with whitish. Macrotrichia inconspicuous. Stigma white proximally, black distally. Genitalia differing as shown in the illustration (Plate 24, figs. 1, 2). The stem of the genitalia-styles is more deeply notched and the blade larger in proportion.

♀. Length, 5·8 mm.; tegmen, 7·5 mm. A mass of flocculent, fibrous, waxy material, often as large as abdomen, projecting a considerable way behind anal segment and ovipositor, which latter resembles that of the preceding species.

Described from fourteen males and twenty-six females. Waikanae (E. H. Atkinson); Wellington (J. G. Myers). In considerable numbers on the under-sides of the leaves of New Zealand flax (*Phormium tenax*).

This large and sluggish species has gone a step further than *Oliarus oppositus* in its preference for ground herbage as distinct from bushes, and is found only in flax-swamps, apparently attached to the flax itself, where it may be found sitting singly or *in copula* on the shaded side of the leaf.

It is with much pleasure that I dedicate this species to the discoverer Mr. E. H. Atkinson.

Genus 7. TIRITEANA nov.

Type: *T. clarkei* n. sp.

Tegmina comparatively narrow, parallel-sided, rounded at apex. Margins with distinct border all round, widening out at stigma. Sc and R joined to about half length of tegmen; their bases joined to M for only a very short distance from base. Forking of Cu just basad of separation of Sc and R. Claval vein joining margin before apex, forking rather distad of half length of clavus.

Longitudinal carina of vertex very short, not forked; median frontal carina nor forked. Hind-margin of vertex very broadly and roundly emarginate. Second joint of antennae nearly twice as long as thick. Base of face about half width of apex. Pronotum very short, with median longitudinal keel. Mesonotum long and narrow, tricarinate, somewhat flattened between carinae; hind-margin forming acute angle. Posterior tibiae unarmed. Ovipositor rather short and stout. Flocculent waxy material secreted caudally.

Tiriteana clarkei n. sp. (Plate 24, fig. 3.)

♀. Length, 3·8 mm.; tegmen, 4·9 mm. Dark chocolate-brown; vertex and pronotum paler. Frons widest at about two-thirds from base, where the sides are strongly elevated; shining dark-brown. Clypeus whitish. Under-surface and legs whitish, except abdomen, claws, and distal coronets of tibiae, which are all dark. Antennae long and dead-black. Eyes dark. Pronotum posteriorly broadly angularly emarginate. Mesonotal carinae narrow but very distinct. Tegmina hyaline suffused intermittently with yellowish. A smoky cloud extending from apex of fore-border to apex of clavus obliquely; clavus mostly yellowish; a fuscous cloud at base of

corium. Veins brownish; macrotrichia darker. Wings hyaline, smoky; veins fuscous. Ovipositor stout. Flocculent material in form of long silky fibres.

Two females. Mamaku (C. E. Clarke); Tiritea, Palmerston North (R. J. Tillyard). Dr. Tillyard's specimen was taken in undergrowth of rain forest.

I have much pleasure in dedicating this, the type of a curious endemic genus, to its discoverer, Mr. C. E. Clarke, to whom I am already indebted for much interesting material.

Genus 8. Aka Buchanan White.

Type: *A. finitima* (Walker).

This very distinct genus is sufficiently differentiated by the characters given in the generic key. The tegmina are short and curved to fit the body. The hind legs are extremely long. The male genitalia of the genotype are described below.

Aka finitima Walker. (Plate 24, figs. 4, 5.)

Cixius finitimus Walker, List Homopt. Insects in *Brit. Mus. Suppl.*, p. 81, 1858.

Aka finitima (Walker): Buchanan White, *Ent. Mo. Mag.*, vol. 15, p. 216, 1879. Hutton, *Trans. N.Z. Inst.*, vol. 30, p. 186, 1898; *Index Faunae Nov. Zeal.*, p. 225, 1904. Kirkaldy, *Trans. N.Z. Inst.*, vol. 41, p. 29, 1909.

♂. Length, 4 mm.; tegmen, 3·5 mm. Pale-brownish, heavily spotted and blotched with fuscous; a forked median longitudinal carina on vertex. Side keels and one median longitudinal keel on pronotum. Mesonotum with three strongly-marked carinae and indications of two more; finely transversely striate; outermost carinae bow-shaped, their concavity towards the centre. Tegmina hyaline; veins fuscous and whitish in alternate stretches; six fuscous spots on fore-border; a paler brownish clouded area at base, on centre of disc, and near apex; a distinct fuscous spot just beyond apex of clavus—in some specimens this fuscous spot is enlarged to form a great dark splash across apex of tegmen. Wings hyaline; veins almost colourless. Abdomen almost black. Genitalia fuscous. Genital styles straight-stalked, large-bladed, spatulate. Aedeagus complex, stout; three much-curved hooks at base of membranous appendage.

♀. Length, 5 mm.; tegmen, 4·3 mm. Ovipositor large and sabre-shaped, extending well beyond abdomen. Anal segment small. *No pruinosity.*

Redescribed from thirty-four males and twenty-nine females. Frequents lowland rain-forest, but is particularly numerous in subalpine scrub from 3,500 ft. to 4,000 ft. Tararua Range (J. G. Myers). The tegminal pattern is extremely variable. In July a freshly-emerged adult was found in leaf-mould, showing that the nymphal stadia are probably passed in a cryptozoic habitat.

Wellington district (G. V. Hudson, T. Cockcroft, J. G. Myers); Tararua Range (J. G. Myers); Canterbury (Hutton): Leith, Dunedin (W. G. Howes).

Mr. G. V. Hudson has given me a large handsomely marked female with the following dimensions: length, 6·3 mm.; tegmen, 5·9 mm. This is gigantic; but intermediates are not lacking, and I am loth to separate it specifically until males are discovered and dissected.

The Leaf-mining Insects of New Zealand: Part 4—Charixena iridoxa *Meyr.*, Apatetris melanombra *Meyr.*, Philocryptica polypodii *Watt (Lepidoptera).*

By MORRIS N. WATT, F.E.S.

[*Read before the Wanganui Philosophical Society, 28th October, 1921; received by the Editor, 31st December, 1922; issued separately, 8th July, 1924.*]

Plates 25–31.

(24.) Charixena iridoxa Meyr. (The Astelia-moth). (Plates 25, 26, and Plate 31, figs. 1–3.)

Philpottia iridoxa Meyr., *Trans. N.Z. Inst.*, vol. 48, p. 417, 1916.
Genus *Charixena* Meyr., *Trans. N.Z. Inst.*, vol. 53, p. 335, 1921.

This, one of the most beautiful and striking of the endemic moths, has an extremely interesting life-history, and amongst leaf-mining insects its mine is the largest, the most conspicuous, and most interesting of all. Owing to its being subalpine I have had no opportunity for a continuous study of its habits, the present paper being the result of some five or six short visits to Mounts Egmont and Ruapehu, spread over the same number of years. Although the following notes are therefore far from complete, their publication may be a useful guide to any one wishing to study this moth in its native habitat. Although the mine and the larval and pupal forms were long known, it was not until recently that the imago was successfully reared and the identity of the insect established.

The curious large zigzag tracks on the leaves of the *Astelia* first attracted my attention in 1914, but it was not till Christmas, 1918, that I was able to give them further attention in the same locality, Mount Egmont. The zigzag markings on the leaves widened as they descended, and eventually disappeared into the heart of the plant; and on digging up a plant and separating the leaves around the bulb a white spindle-shaped dipterous-like larva was discovered. A number of larvae were found, but, my holiday coming to an end, my observations had to be left at this stage. Again in February, 1920, I succeeded in finding several of the curious cocoons containing pupae, which I later took home to Wanganui, and managed to keep them alive for several months, until I tried forcing them by means of gentle artificial warmth, when all dried up and died.

In January, 1922, on Mount Ruapehu, some thirty or forty plants containing the immature stages of the insect were secured, taken to Wanganui, and replanted. Having to go to Dunedin in March, I dug up some of the plants and took them with me, carefully potting them. In June I returned to Wanganui on a short visit, and before leaving Dunedin handed the plants to the care of Mr. C. E. Clarke, and took several more plants down when I returned. The plants all stood this repeated digging up and replanting. One day in early August, considering it time to place a cover