

# THE CRANE FLIES OF THE KERMADEC ISLANDS (TIPULIDAE : DIPTERA)

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The present report concerns the crane flies of the Kermadec Islands, being based on a collection that was made in 1966 and 1967 by Dr. J. Charles Watt of the Entomology Division of the Department of Scientific and Industrial Research, Nelson, New Zealand, and by other members of the Ornithological Society of New Zealand Expedition.

The Kermadecs (29° 15' S. Lat., 177° 56' w. Long.) comprise an island group in the South Pacific, lying about 970 km (600 miles) north-east of New Zealand, to which country they have belonged since 1887. The islands total some 15 square miles, the largest being Raoul (Sunday) which is about 20 miles in circuit. In a letter Dr. Watt writes that the islands are fairly young volcanoes, very isolated, and so having had only limited time and opportunities to acquire biota. In the higher plants there is little endemism.

No previous records of Tipulidae from these islands are known to me. The present series includes five species of these flies, all belonging to the major genus *Limonia* Meigen which is the dominant group in the family throughout all the smaller isolated Pacific islands, including all of Micronesia and also the Hawaiian group. Three of the species are described as new at this time. One of the previously known forms, *Limonia (Dicranomyia) aegrotans* (Edwards) is widely distributed in New Zealand while the other, *L. (D.) illingworthi* (Alexander) similarly is widespread throughout eastern Micronesia and certain adjacent larger islands.

Types of the new species and other materials are deposited in the Entomology Division Collection of Insects, Department of Scientific and Industrial Research, Nelson, New Zealand, with certain duplicates being retained in the author's collection. I am deeply indebted to Dr. Guillermo Kuschel, chief of the Systematics Section of the Entomology Division, and to Dr. Watt and others associated with him in the present survey of the Arthropods of the Kermadecs for the privilege of studying the present series of specimens.

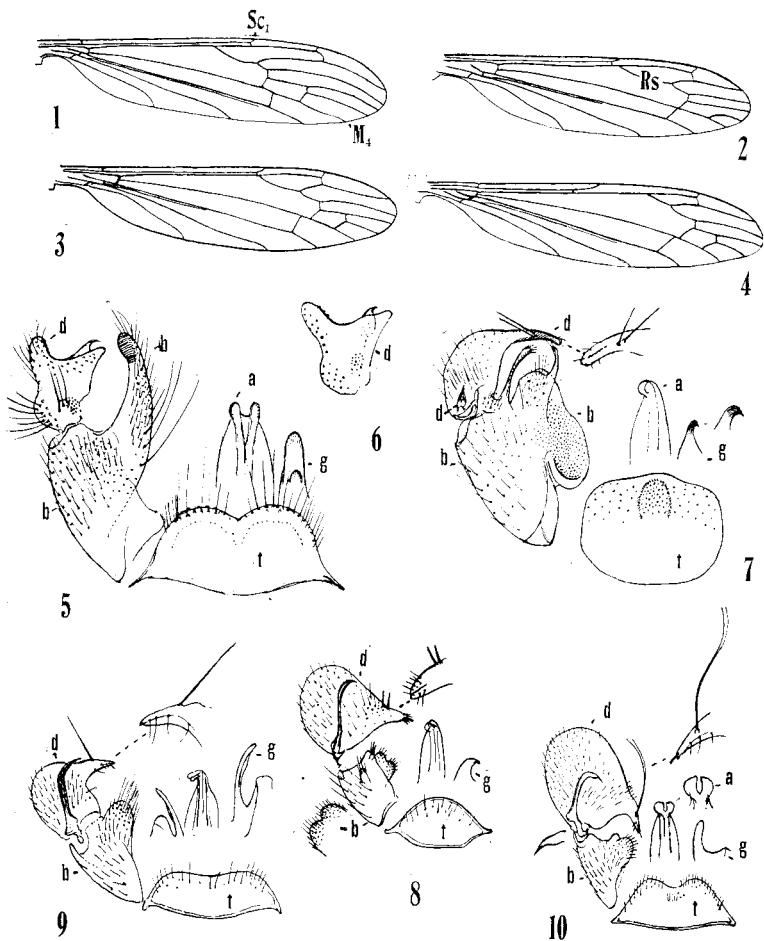


Fig. 1: *Limonia* (*Metalibnotes*) *watti* sp.n.; venation.  
 Fig. 2: *Limonia* (*Dicranomyia*) *aegrotans* (Edwards); venation.  
 Fig. 3: *Limonia* (*Dicranomyia*) *illingworthi* (Alexander); venation.  
 Fig. 4: *Limonia* (*Dicranomyia*) *kermadecensis* sp.n.; venation.  
 Fig. 5: *Limonia* (*Metalibnotes*) *watti* sp.n.; male hypopygium.  
 Fig. 6: *Limonia* (*Metalibnotes*) *perhyalina* sp.n.; male hypopygium.  
 Fig. 7: *Limonia* (*Dicranomyia*) *aegrotans* (Edwards); male hypopygium.  
 Fig. 8: *Limonia* (*Dicranomyia*) *illingworthi* (Alexander); male hypopygium.  
 Fig. 9: *Limonia* (*Dicranomyia*) *kermadecensis* sp.n.; male hypopygium.  
 Fig. 10: *Limonia* (*Dicranomyia*) *subviridis* (Alexander); male hypopygium.  
 (Symbols: Venation— *M*, Media; *Rs*, Radial sector; *Sc*, Subcosta. Male hypopygium— *a*, aedeagus; *b*, basistyle; *d*, dististyle; *g*, gonapophysis; *t*, ninth tergite).

KEY TO THE KERMADEC TIPULIDAE

(Genus *Limonia* Meigen)

1. Wings (Fig. 1) with vein **Sc** long, **Sc**<sub>1</sub> terminating nearly opposite outer end of **Rs**.

(Subgenus *Metalibnotes* Alexander) 2

Wings (Figs. 2-4) with vein **Sc** short, **Sc**<sub>1</sub> opposite or before origin of **Rs**, rarely slightly beyond this.

(Subgenus *Dicranomyia* Stephens) 3

2. Wings pale, with a restricted darker pattern, including especially the stigma that is large and conspicuous in the male, smaller in the female; veins darkened.

*Limonia (Metalibnotes) watti* sp.n.

Wings entirely clear, hyaline, including the veins.

*Limonia (Metalibnotes) perhyalina* sp.n.

3. Wings (Fig. 4) with **Sc** ending some distance before origin of **Rs**, the latter reduced, somewhat shorter than basal section of **R** 4+5; ventral dististyle of male hypopygium (Fig. 9) with a single rostral spine.

*Limonia (Dicranomyia) kermadecensis* sp.n.

Wings (Figs. 2, 3) with **Sc** ending opposite origin of **Rs** or virtually so, the latter much longer than basal section of **R** 4+5; ventral dististyle of male hypopygium (Figs. 7, 8) with two rostral spines (*tristis* group). 4

4. Wings (Fig. 2) with cell **M**<sub>2</sub> open by atrophy of **M**, male hypopygium (Fig. 7) with dorsal dististyle reduced to a microscopic point; rostral spines of ventral style long and slender.

*Limonia (Dicranomyia) aegrotans* (Edwards)

Wings (Fig. 3) with cell 1st **M**<sub>2</sub> closed; male hypopygium (Fig. 8) with dorsal dististyle a long slender rod; rostral spines of ventral style short.

*Limonia (Dicranomyia) illingworthi* (Alexander)

Genus *Limonia* Meigen

*Limonia* Meigen; Illiger's Mag., 2: 262; 1803.

Subgenus *Metalibnotes* Alexander

*Limonia (Metalibnotes)* Alexander; Insects of Micronesia, Diptera, Tipulidae, vol. 12 (in press); 1972.

The subgenus *Metalibnotes* as discussed in the reference cited includes approximately a dozen species, all restricted to the Pacific islands. Additional to the type species of the subgenus, *fijiensis* (Alexander), of Fiji, the following species are known: *delandi* Alexander, Santa Cruz Islands: Vanikoro; *beardsleyi* Alexander, Marshalls; *edgari* Alexander, Marianas; *hebridensis* Edwards, New Hebrides: Ambrim; *jocularis* Alexander, Carolines; *orofenae* Alexander, Society Islands; *perhyalina* sp.n., this report; *sentifera* Alex-

ander, Marshalls; *toxopei* Edwards, Buru; *veitchiana* Edwards, Fiji; and *watti* sp.n. this report.

1. *Limonia (Metalibnotes) watti* sp.n.

Size relatively large (wing approximately 9 mm.); head dark brown, anterior vertex narrow; thorax yellow, praescutum with three brown stripes, the broad central area darker, pleura yellow, patterned with brown; halteres brownish yellow; legs obscure brownish yellow; wings brownish yellow, slightly patterned with brown, stigmal area distinct, larger in male; *m-cu* at near one-third to two-fifths *M* 3+4; abdominal tergites brown, posterior borders in cases narrowly yellowed; male hypopygium with dististyle roughly triangular in outline, outer lobe stout, beak slender, with a narrow subterminal point on outer margin; gonapophysis with apex and a subterminal lobe obtuse.

**Male:** Length about 7-9 mm; wing 8-10 mm; antenna about 2.5-3 mm.

**Female:** Length about 7.5-10 mm; wing 7-9 mm.

Described from alcoholic material. Rostrum and palpi brown. Antennae brown; flagellar segments oval, with short pale apical pedicels, verticils somewhat shorter than the segments, terminal segments with apex strongly narrowed. Head dark brown to black; anterior vertex narrow, about one-half diameter of scape, eyes correspondingly large; setae of posterior vertex long, black.

Pronotum yellow, narrowly darkened above. Mesonotal praescutum yellow with three brown stripes, lateral pair narrow and paler; scutal lobes darkened; scutellum dark brown, parascutella pale; postnotum chiefly yellowed. Pleura yellow, mesepisternum and ventral sternopleurite darker. Halteres brownish yellow. Legs with coxae and trochanters yellow; remainder of legs obscure yellow or brownish yellow, tips of femora vaguely darker, outer three tarsal segments brownish black. Wings (Fig. 1) brownish yellow, slightly patterned with brown, including especially the stigma which is much larger in the male; further restricted paler brown seams at origin of *Rs*, cord and outer end of cell 1st *M*<sub>2</sub>; veins medium brown. Venation: *Sc* long, *Sc*<sub>1</sub> ending shortly before fork of *Rs*, *Sc*<sub>2</sub> near its tip; free tip of *Sc*<sub>2</sub> slightly proximad of *R*<sub>2</sub>; cell 1st *M*<sub>2</sub> rectangular; *m-cu* at near one-third to two fifths *M* 3+4.

Abdomen medium brown, hypopygium more yellowed; posterior borders of tergites yellowed, especially in the female; sternites and eighth segment more uniformly pale. Ovipositor with cerci very slender, gently upcurved to the acute tips. Male hypopygium (Fig. 5) with tergite, *t*, large, posterior border with two low lobes that are provided with very long setae. Basistyle, *b*, with ventromesal lobe long, apex microscopically corrugated, base of stem with a few very long setae. Dististyle, *d*, roughly triangular in outline, outer lobe stout, beak more slender with a still narrower subterminal point; posterior basal lobe with more abundant long setae, near its

base with a smaller lobule that bears three long setae. Gonapophysis, **g**, with apex obtusely rounded, the subterminal lobe smaller, tip similarly obtuse.

Holotype, alcoholic ♂, Kermadecs, Raoul Island, Low Flat, at kerosene light, December 8, 1966 (Watt). Allotopotype, ♀, with the type. Paratopotypes ♂ ♂ ♀ ♀, December 2-8, 1966, January 6, 1967. Paratypes, ♂ ♀, Denham Bay, Raoul, at light, November 17, 1966 (Watt); 1 ♀, Trig V, 425 m (1400 feet) December 17, 1966, beaten from *Ascarina lanceolata*; 2 ♂ ♂, Hutchison Bluff, Raoul, December 14, 1966 (D. V. Merton).

In its hypopygial structure the present fly is most like *Limonia* (*Metalibnotes*) *delandi*, L. (M.) *hebridensis*, and L. (M.) *fijiensis*, differing evidently in the details. I take great pleasure in dedicating this fly to the collector, Dr. J. Charles Watt.

## 2. *Limonia* (*Metalibnotes*) *perhyalina* sp.n.

General coloration of body and appendages yellow, head brown, eyes black; wings crystal clear, entirely unpatterned; veins very delicate, pale yellow, scarcely visible in alcohol or in balsam; vein **Sc**<sub>1</sub> ending shortly before fork of **Rs**; male hypopygium generally as in *watti*, differing in slight details especially the dististyle.

**Male:** Length about 6.5 mm.; wing about 6.5 mm.

**Female:** Length about 7 mm.; wing about 7.5 mm.

Described from alcoholic material. Rostrum, palpi and antennae yellow. Head brown, front yellowed; eyes black, very conspicuous against the yellow ground of body. Antennae of male with proximal flagellar segments subglobular, with short hyaline apical pedicels; outer segments more oval, terminal one about one-third longer than penultimate, narrowed at apex.

Thorax and abdomen uniformly yellow, including the halteres and legs. Wings crystal clear, without pattern, including the stigmal area; veins very delicate, pale yellow, scarcely visible in alcohol or in balsam slide mounts. Venation: **Sc** long, **Sc**<sub>1</sub> ending shortly before fork of **Rs**, the latter only slightly arcuated at origin; cells **R**<sub>3</sub>, **R**<sub>5</sub> and **2nd M**<sub>2</sub> subequal at wing margin, cell **M**<sub>3</sub> slightly more extensive; cell **1st M**<sub>2</sub> approximately two-thirds as long as cell **2nd M**<sub>2</sub>.

Abdomen of female filled with pale eggs. Male hypopygium virtually as in *watti*, differing only in slight details, including especially the dististyle (Fig. 6, **d**).

Holotype, alcoholic ♂, Kermadecs, Raoul Island, November 17, 1966 (Watt). Allotopotype, alcoholic ♀, light trap, December 4, 1966 (Watt); Alexander Collection.

The present fly differs from all previously described members of the subgenus in the entirely unpatterned wings in both sexes. The latter are crystal clear with the pale yellow veins unusually delicate.

Subgenus *Dicranomyia* Stephens

*Dicranomyia* Stephens; Catalogue of British Insects, 2: 243; 1829.

3. *Limonia* (*Dicranomyia*) *aegrotans* (Edwards)

*Limnobia aegrotans* Walker; List Dipt. Brit. Mus., 1: 45; 1848 (nomen nudum).

*Dicranomyia aegrotans* Edwards; Trans. New Zealand Inst., 54: 280-281, fig. 22 (wing); 1923.

*Dicranomyia aegrotans* Alexander; Trans. New Zealand Inst. 55: 644, fig. 22 (male hypopygium); 1924.

Belongs to the *tristis* group; general colouration brown, gray pruinose, praescutum with three brown stripes; halteres pale; legs brown; wings whitened, especially basally, stigma small, circular in outline, brown, veins darker brown, whitened in prearcular and costal fields, cell  $M_2$  open by atrophy of *m*, male hypopygium with tergite very large, suboval; basistyle with ventromesal lobe very large, with two slender posterior projections; dorsal dististyle reduced to a microscopic point, ventral style with rostral prolongation very long, blackened, with two long straight spines.

**Male:** Length about 5 - 6 mm.; wing 6 - 8.5 mm.

**Female:** Length about 6 - 7 mm.; wing 8 - 9 mm.

Wings (Fig. 2) whitened, prearcular and costal fields clearer white, including the veins, the remaining veins light brown. Venation:  $Sc_1$  ending opposite origin of  $R_s$ ,  $Sc_2$  slightly removed, free tip of  $Sc_2$  and  $R_2$  in transverse alignment; cell  $M_2$  open by atrophy of *m*, the outer section of vein  $M_3$  in some specimens free in membrane through the atrophy of its basal section; *m-cu* at or close to fork of  $M$ ; cell 2nd  $A$  broad basally, outer half narrowed.

Male hypopygium (Fig. 7) with tergite, *t*, very large, broadly oval, slightly transverse, setae small and pale, numerous on posterior half; posterior border with a horseshoe-shaped impression that bears more numerous small setulae. Basistyle, *b*, with ventromesal armature large and tumid, near posterior end of mesal face with two slender rods. Dorsal dististyle, *d*, very reduced, represented by a microscopic structure that terminates in an acute point, ventral style long and relatively narrow, rostral prolongation trunklike, blackened, with two long straight spines at near midlength. Gonapophysis, *g*, with mesal-apical lobe a short blackened hook.

Widely distributed in New Zealand. North Island: Wellington, Ohakune, 630 m (2060 feet), October 15, 1921 (T. R. Harris). South Island: Nelson, October 6, 1924 (E. S. Gourlay); Mount Grey and Governors Bay, Christchurch, Canterbury, November (J. W. Campbell). Stewart Island: Half-moon Bay, November 14, 1923 (N. J. Jensen).

Kermadecs: Denham Bay, Raoul Island, January 6-25, 1967 (Watt).

4. *Limonia (Dicranomyia) illingworthi* (Alexander)

*Dicranomyia illingworthi* Alexander; Ann. Ent. Soc. America, 7: 239-240, fig. 1 (wing), fig 7 (male hypopygium); 1914.

*Limonia (Dicranomyia) illingworthi* Alexander; Encycl. Ent., Diptera, 4: 89-90, fig. (male hypopygium); 1929.

*Limonia (Dicranomyia) illingworthi* Alexander; Annot. Zool. Japon., 19: 210; 1940.

Type from Nadi, Fiji Islands, collected July 28, 1913, by J. F. Illingworth. Widely distributed in the islands of the eastern Pacific reaching its western limits in the Caroline Islands (Ponape, Kusaie, Lamotrek), Marshall and Gilbert Islands.

Kermadecs: Raoul Island, January 16-25, 1967 (Watt); a few specimens taken in association with *Limonia (Dicranomyia) aegrotans* (Edwards).

Edwards (Insects of Samoa, VI, Diptera, Fasc. 2, Nematocera, p. 76; 1928) placed this fly in the synonymy of *Limonia (Dicranomyia) sordida* (Brunetti), 1912, widespread in the Oriental region, extending as far east as western Micronesia. While being closely related the two species evidently are distinct in the details of hypopygial structure, especially the conformation of the ventromesal lobe of the basistyle which in *sordida* is long and narrow, as contrasted with the low broad lobe of the present fly, as described and figured herewith.

Wings (Fig. 3). Male hypopygium (Fig. 8) with tergite, **t**, large, narrowed outwardly, apex truncate or only slightly rounded; setae long but pale and inconspicuous. Basistyle, **b**, about two-thirds the size of the ventral dististyle, with two tubercles, the discal one about twice as long as thick, tipped with a few long setae, outer tubercle very reduced, represented chiefly by a small cluster of shorter setae; ventromesal lobe stout, apex truncate, with numerous setae, in cases the outer border weakly emarginate. Dorsal dististyle, **d**, a long slender gently curved rod that terminates in an acute spine; ventral style with rostrum obtuse, with several strong setae, rostral spines very small, about one-third as long as the rostrum beyond their insertion; setae of style relatively sparse, shorter than those of basistyle. Gonapophysis, **g**, with mesal-apical lobe a very short blackened hook. Aedeagus, **a**, with apex bilobed, the condition in the present material less conspicuous than in specimens from the type locality (Fiji).

5. *Limonia (Dicranomyia) kermadecensis* sp.n.

Size medium (wing to 6.5 mm.); general colouration of thorax and abdomen yellow, head darker; antennae with proximal flagellar segments subglobular; wings with veins **Sc** and **Rs** short, the latter less than the basal section of **R** 4+5, cell 1st **M**<sub>2</sub> closed; male hypopygium with a single long straight rostral spine on ventral dististyle, gonapophysis with mesal-apical lobe very long, apex obtuse.

**Male:** Length about 4.8 - 5 mm.; wing 5.5 - 6.5 mm.; antennae about 1.2 - 1.3 mm.

**Female:** Length about 6.5 - 7 mm.; wing about 6 - 6.5 mm.

Described from alcoholic material. Rostrum brownish yellow, palpi slightly darker. Antennae with scape and pedicel light brown, proximal flagellar segments somewhat paler brown, outer segments still paler; flagellar segments subglobular, the outer ones slightly more oval, terminal segment longer than the penultimate. Head light brown; anterior vertex broad, about three times the diameter of scape.

Cervical sclerites faintly darkened, remainder of thorax almost uniformly yellow. Halteres and legs yellow. Wings (Fig. 4) subhyaline or slightly yellowed, unpatterned; veins only slightly darker than the ground. Longitudinal veins beyond general level of origin of **Rs** with trichia, including also the outer third of **2nd A**, lacking on **Rs**. Venation: **Sc** short, ending far before origin of **Rs**, **Sc**<sub>2</sub> retracted, **Sc**<sub>1</sub> longer than **Rs**, the latter very pale, shorter than basal section of **R** 4+5; veins **M** 3+4 and **M**<sub>4</sub> subequal; **m-cu** shortly before fork of **M**.

Abdomen yellow, outer segments, including hypopygium, slightly darker. Ovipositor with cerci slender, nearly straight, hypovalvae approximately as long, stouter. Male hypopygium (Fig. 9) with tergite, **t**, pale, transverse, posterior border very shallowly emarginate, lobes very low. Basistyle, **b**, with ventromesal lobe oval, the longest setae nearly as long as the lobe. Dorsal dististyle, **d**, elongate, curved, extended into a long needle-like spine; ventral style nearly equal in size to the basistyle; rostrum subacute at apex, with a single long straight spine that is about twice as long as the prolongation beyond its insertion. Gonapophysis, **g**, with mesal-apical lobe very long, gently curved, apex obtuse, margin with a low flange. Aedeagus, **a**, with the bilobed apex decurved.

Holotype, alcoholic ♂, Kermadecs, Raoul Island, Denham Bay, light trap, January 10, 1967 (Watt). Allotype, alcoholic ♀, Raoul Island, Lava Point, on wet bank, December 13, 1966 (Watt). Paratopotype, alcoholic male, November 17, 1966 (Watt); Alexander Collection.

The present fly is most similar to species such as **Limonia (Dicranomyia) monilicornis** (Hutton), **L. (D.) subviridis** (Alexander) and **L. (D.) weschei** (Edwards), all with the venation generally the same and differing among themselves chiefly in hypopygial characters. The most similar of these is **subviridis** which still is known only from the South Island of New Zealand. Since this fly has never been adequately described and figured I am providing a further account of the very distinctive male hypopygium. . . . .



**Limonia (Dicranomyia) subviridis (Alexander)**

**Dicranomyia subviridis** Alexander; Ann. Ent. Soc. America, 15: 223-224; 1922.

The types were from Nelson, South Island, New Zealand.

Male hypopygium (Fig. 10) with tergite, **t**, transverse, the transverse breadth about twice the greatest length; posterior border shallowly emarginate, with relatively numerous setae, including a median group. Basistyle, **b**, relatively small, about one-third the ventral dististyle; ventromesal lobe with long setae, near its base on outer face with a small glabrous lobe. Dorsal dististyle, **d**, with stem slender, outer third curved and slightly dilated, apex abruptly narrowed into a slender spine; ventral style with rostral prolongation narrowed apically, at near midlength with two very long spines that are approximately four times the length of the prolongation beyond their insertion, the spines on more than basal half very closely approximated so as to appear as a single spine. Gonapophysis, **g**, with mesal-apical lobe stout, nearly straight, apex obtuse. Aedeagus, **a**, at apex with two flattened semioval blades.