AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Sinclair, Bradley J., 1997. *Icasma* Collin and an allied new genus *Glyphidopeza*, from New Zealand (Diptera: Empidoidea; Ceratomerinae). *Records of the Australian Museum* 49(2): 195–211. [15 October 1997].

doi:10.3853/j.0067-1975.49.1997.1265

ISSN 0067-1975

Published by the Australian Museum, Sydney

Records of the Australian Museum (1997) Vol. 49: 195–211 ISSN 0067-1975

Icasma Collin and an Allied New Genus *Glyphidopeza,* from New Zealand (Diptera: Empidoidea; Ceratomerinae)

BRADLEY J. SINCLAIR[1]

Australian Museum, 6 College Street, Sydney NSW 2000, Australia

[1] Present address: Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University 01, Ropponmatsu, Fukuoka, 810 Japan

bsincrcb@mbox.nc.kyushu-u.ac.jp

ABSTRACT. The endemic New Zealand genus *Icasma* Collin (Diptera: Empidoidea; Ceratomerinae) is reviewed and includes the following seven species: *I. aequabilis* Plant, *I. setosa* n.sp., *I. fascipennis* n.sp., *I. longicauda* n.sp., *I. masneri* n.sp., *I. singularis* Collin (lectotype designated), *I. tararua* n.sp. An allied new genus, *Glyphidopeza* is described from New Zealand and includes the following new species: *G. fluviatilis, G. longicornis*. A key to species and illustrations of male and female terminalia are provided. *Icasma* is divided into two species-groups and the phylogenetic relationships of the species are analysed.

SINCLAIR, BRADLEY J., 1997. *Icasma* Collin and an allied new genus *Glyphidopeza,* from New Zealand (Diptera: Empidoidea; Ceratomerinae). Records of the Australian Museum 49(2): 195–211.

The subfamily Ceratomerinae (Diptera: Empidoidea) is confined to southern South America (including high altitude Equador), eastern Australia, New Zealand, and Norfolk Island (Sinclair unpubl. data). It is a distinctive empidoid subfamily, recognised by its narrow wings and a small conus extending from the pedicel on which the first flagellomere is attached.

Three genera of Ceratomerinae are known from New Zealand. *Ceratomerus* Philippi as currently defined is a trans-Antarctic genus with 13 described (Plant, 1991) and at least 20 undescribed species from New Zealand. This is nearly double the number of species that are known from Australia (Sinclair unpubl. data). The second genus, *Icasma* Collin, is endemic to New Zealand and may be divided into two informal species-groups on the basis of the male cercus. The *I. singularis* Collin species-group includes six species (*I. aequabilis* Plant, *I. singularis* Collin, *I. setosa* n.sp., *I. fascipennis* n.sp., *I. longicauda* n.sp., *I. tararua* n.sp.) and the *I. masneri* group is monotypic. The third genus, *Glyphidopeza* n.gen., comprising two new species was collected from small cascading mountain streams on South Island. The wing venation is very primitive and possibly represents the sister group to the remaining ceratomerines. In this paper the latter two endemic New Zealand genera are described and illustrated.

Materials and methods

This study is based on more than 300 adult specimens borrowed from or deposited in the following institutions: Australian Museum, Sydney (AMS); The Natural History Museum, London, England (BMNH); Canadian National Collection of Insects, Ottawa, Canada (CNC); New Zealand Arthropod Collection, Auckland, New Zealand (NZAC). Abbreviations given here are used throughout the text to indicate deposition of specimens. All type material of Plant (1990), which was originally stored in ethanol, have been critical-point-dried, mounted, and relabelled.

Terms used for adult structures primarily follow those of J. McAlpine (1981), except male terminalia where terms of Cumming *et al.* (1995) and Sinclair (1996) are used. Terms for the female terminalia follows Sinclair (1995). The term "bristle" is used for differentiated large setae on the head, mesonotum, and legs bearing a particular name or one of a series with a particular name, e.g., notopleural bristle, dorsocentral bristle, ocellar bristle. The hair-like setae located between facets of the compound eye are referred to as ommatrichia *sensu* D. McAlpine (1991).

Label data of holotypes are cited in full, with original spellings, punctuation and dates; lines are delimited by a slash, and a semicolon separates data quoted from different labels. Paratypes and additional material are listed under area codes, which refer to specific regions of New Zealand (Crosby *et al.*, 1976): AK—Auckland, BR—Buller, FD—Fiordland, HB—Hawke's Bay, MB—Marlborough, NC—North Canterbury, NN—Nelson, RI—Rangitikei, SD—Marlborough Sounds, TK—Taranaki, WD—Westland, WN—Wellington, WO—Waikato. Scanning electron micrographs were produced on a Cambridge Stereoscan 120.

Specimens were collected by sweep net, yellow pans, and malaise traps. Yellow pans were distributed along streams, creeks, and wet depressions.

Key to genera of New Zealand Ceratomerinae

1. Cell cu*p* present; cell dm long and narrow, distally emitting 3 veins ..... *Glyphidopeza* n.gen.

—— Cell cu*p* absent; cell dm generally short, distally emitting 2 veins 2

2. R_{4+5} branched; Sc complete; wing long and narrow, lacking dark band; stigma present or absent; first flagellomere long, slender and tapering ..... *Ceratomerus*

—— R_{4+5} unbranched; Sc incomplete; wing broad and short, often with dark band; stigma absent; first flagellomere acutely ovate ..... *Icasma*

Glyphidopeza n.gen.

Type species. *Glyphidopeza fluviatilis* n.sp.

Recognition. In addition to the characters listed in the key, *Glyphidopeza* is distinguished from all other ceratomerine genera by the stout ocellar bristle inserted anterolaterally to the anterior ocellus, posteriorly positioned proboscis, presence of pseudotracheae, and the modified basitarsis of the male midleg.

Description. Male. *Head* (Fig. 26): eye with ommatrichia or bare; ocellar bristle inserted anterolaterally to anterior ocellus; 1 pair of postocellar bristles; 3 vertical bristles; postocular margin with row of long setae extending over half width of eye. Conus inserted into first flagellomere. Proboscis arising near back of head; palpus cylindrical; stipes one-third length of lacinia; lacinia fused to labial paraphysis; setae of labellum simple; pseudotracheae present (Figs 3,4).

Thorax: pruinescent patterns lacking; antepronotum narrow; acrostichal setae extending to prescutellar depression, uniserial except for erect anterior pair; 6–7 dorsocentral bristle, anterior pair forward and laterally displaced from line; 2 presutural supra-alars; 2 strong notopleurals; 2 postsutural supra-alars; 1 postalar; 2 pairs scutellar bristles. Antepronotum with 1 pair of short, widely spaced setae; laterotergite bare. Halter knob dark.

Wing: slender, infuscate; 1 long basicostal bristle; C circumambient, anterior margin of C with evenly spaced, spine-like erect setae; stigma absent; Sc complete; R_1 short, reaching costa well before mid-length of wing; R_{2+3} ending beyond radial fork; R_{4+5} branched or unbranched; cell bm small, faintly outlined; cell dm long, narrow and truncate, distally emitting 3 veins; cell cu*p* very narrow, pigmented; A_1 absent.

Legs: fore coxa less than twice length of mid or hind coxae. Fore and hind tibiae with posteroapical comb. First tarsomere of midleg with ventral notch, bearing modified setae. First tarsomere of foreleg longer than following 3 tarsomeres; tarsi somewhat flattened; fifth tarsomere broad, with median, dorsoapical protuberance; empodium pulvilliform.

Abdomen: concolorous with thorax, ventrum slightly paler. Tergite 7 complete, only partially desclerotized medially.

Female. Legs unmodified. Apical abdominal segments retracted into segment 7; apical margins of segment 7 not folded inwards; tergite 7 lacking posterior fringe of setae. Dorsomedial region of tergite 8 desclerotized; transverse fringe of short setae present; anterior margin with heavily sclerotized narrow, median plate, extending into segment 7. Tergite 10 (Fig. 5) undivided medially, bearing 3 pairs of spine-like setae; lateral margin with row of spine-like setae. Cercus membranous, retracted beneath tergite 10, bearing 3 setae. Genital fork small, slender; spermathecal receptacle large, oval, somewhat flattened, with short neck.

Biology. Both species of *Glyphidopeza* were either swept or collected in yellow pans from emergent rocks in cascading mountain streams.

Etymology. The generic name is derived from the Greek *glyphidos* (notch) and *peza* (foot), in reference to the modified first tarsomere of the male midleg. Its gender is feminine.

Key to species of *Glyphidopeza*

1. R_{4+5} branched; anterior postpronotal bristle subequal in thickness to posterior postpronotal bristle ..... *G. fluviatilis*

—— R_{4+5} unbranched; anterior postpronotal bristle much more slender than posterior postpronotal bristle ..... *G. longicornis*

Glyphidopeza fluviatilis n.sp.

Figs 3,4,5–7, 26–28, 34

Type material. HOLOTYPE male, "NEW ZEALAND MB/ Mt. Richmond For. Pk./ Butcher's Flat, 5.ii.1995/ B.J. Sinclair/ cascading creek"; "HOLOTYPE/ Glyphidopeza/ fluviatilis/ Sinclair [red label]" (NZAC). PARATYPES: **BR**—1 male, 8 females, Nelson Lakes NP, Lk. Rotoiti, Black Valley Str., 15–16.ii.1995; yellow pans, B.J. Sinclair (CNC,NZAC); 1 male, 5 females, Nelson Lakes NP, Lk. Rotoroa, Braeburn Tr., *Nothofagus* for., 7.ii.1995, B.J. Sinclair (NZAC); **MB**—20 males, 32 females, same data as holotype (AMS, CNC, NZAC); **NN**—2 females, Graham R. South Branch, Graham Valley, 17–18.ii.1995, yellow pans, B.J. Sinclair (CNC); 1 female, NW Nelson For. Pk., Oparara R., 8.ii.1995, B.J. Sinclair (NZAC).

Recognition. Males are distinguished from *G. longicornis* by the short first antennal segment (less than half the length of the first flagellomere) and a branched R_{4+5}.

Description. Wing length 1.5–1.6 mm.

Male. *Head* (Fig. 26): spherical, eyes bare and widely separated; face brown. Ocellar bristle long, divergent; 1 pair of short postocellar bristles, half length of ocellars; outer vertical bristle long, stout and lateroclinate over eye, longer than ocellar bristle; 2 inner vertical bristles. Antenna (Fig. 27) short, concolorous with head; scape less than half length of first flagellomere, with several long dorsal and ventral setae; pedicel with fringe of long setae; first flagellomere broadly triangular, clothed in long pruinescence; two-segmented arista short, first segment half as long as second; second segment of arista bearing long apical seta. Palpus half length of proboscis.

Thorax: brown, pleura slightly paler, acrostichal row more darkly pigmented. All bristles dark, stout; 6 dorsocentrals, 1 short anterior and 1 long posterior postpronotal bristles.

Wing (Fig. 34): C lacking long setae near base; R_{4+5} branched.

Legs: coxae and basal half of femora pale, remaining leg segments increasingly darkened. First tarsomere of midleg with ventral notch, bearing several flattened setae (Fig. 28). Mid femur with 2 long posterodorsal, apical bristles. Hind tibia lacking preapical dorsal bristle.

Terminalia (Figs 6,7): lateral lobes flanking phallus inconspicuous. Hypandrium lacking flap-like process; apex expanded about phallus; gonocoxal apodeme absent. Ejaculatory apodeme slender, fused to base of phallus. Epandrium lacking dorsal bridge; narrow, with long setae. Surstylus tapering to a narrow apex, bearing 1 long seta on posterior margin; distinctly articulated with epandrium at base; bacilliform sclerite broad, half width of epandrium. Cercus undivided, with several long setae surrounding anus.

Female. Similar to male except as follows: apex of labellum with cluster of more than 6 pairs of stout setae (Fig. 4). Legs unmodified. Terminalia as described under generic description.

Geographic distribution and seasonal occurrence. This species is known from northern South Island, collected in late summer.

Biology. Numerous specimens were collected in cascading streams associated with *Nothofagus* forests.

Etymology. The species name is derived from the Latin *fluviatilis* (of a stream) in reference to the habitat of this species.

Glyphidopeza longicornis n.sp.

Figs 1,2

Type material. HOLOTYPE male, "NEW ZEALAND MB/ Mt. Richmond For. Pk./ Butcher's Flat, 5.ii.1995/ B.J. Sinclair/ cascading creek"; "HOLOTYPE/ Glyphidopeza/ longicornis/ Sinclair [red label]" (NZAC).

Recognition. Males are distinguished from *G. fluviatilis* by a greatly lengthened first antennal segment (subequal in length to first flagellomere) and an unbranched R_{4+5}.

Description. Wing length 2.0 mm.

Male. *Head* (Fig. 1): dark, anterior margin flattened; eyes with ommatrichia and widely separated; face brown. Ocellar bristle short, stout, parallel; 1 pair of postocellar bristles, longer than ocellars; vertical bristles short, stout, subequal in length. Antenna long, paler than head; scape subequal in length to first flagellomere, with 2 long dorsal and 2 long ventral setae; pedicel oval with fringe of long setae; first flagellomere gradually tapering to slender apex, clothed in long pruinescence; two-segmented arista slightly shorter than first flagellomere; both segments subequal in length, second segment of arista lacking apical seta. Palpus two-thirds length of proboscis.

Thorax: dark brown, pleura slightly paler, scutum evenly pigmented. All bristles dark, stout; 7 dorsocentrals; 1 short, fine anterior and 1 long posterior postpronotal bristles.

Wing: basal third of C with several long setae; R_{4+5} unbranched.

Legs: coxae, femora and tibiae pale brown, tarsi dark brown. First tarsomere of midleg projecting obliquely with pair of sickle-shaped setae and several setulae (Fig. 2). Mid femur with 1 long dorsal, preapical bristle. Hind tibia with 1 preapical dorsal bristle.

Terminalia (not dissected): Cercus undivided, posteroapical margin of cercus with erect setae. Epandrium with darkly pigmented dorsoapical surstylus; surstylus broad.

Female. Unknown.

Geographic distribution and seasonal occurrence. This species is known from a single male collected together with *G. fluviatilis*.

Biology. This species was swept from a cascade in a small tributary of Doom Creek across from Butchers Flat campground. The creek emerged from a cool forest, dominated by *Nothofagus*.

Etymology. The species name is an adjective derived from the Latin *longus* (long) and *cornu* (horn), in reference to the long first antennal segment.

Icasma Collin

Icasma Collin, 1928: 22. Type species *I. singularis* Collin (original designation).

Recognition. This genus is distinguished from other ceratomerines by the acutely ovate first flagellomere, unbranched R_{4+5}, and the heavily sclerotized male cercus.

Description. Male. *Head* (Fig. 29): Eyes bare, nearly touching beneath antennae; face with white pruinescence; ocellar bristle long, divergent, inserted anteriorly to lateral ocelli; postocellar bristle divergent; 2 pairs of vertical bristles; postocular margin usually with short setae. Scape shorter than first flagellomere, with fine dorsal setulae and long, ventroapical seta, twice length of pedicel; fringe of setae on pedicel with long dorsal and ventral setae; first flagellomere acutely ovate with apical pruinescence (Fig. 30); two-segmented arista with short pruinescence. Proboscis (Figs 8,9) equal to height of head arising from anterior margin to middle of head; base of labrum lacking dorsal process; palpus short, oval, somewhat flattened, with several long, pale setae; lacinia pale, clearly separated from labium, half length of labium, apical quarter with frayed edges; stipes darkly pigmented, half length of lacinia; setae of labellum slender; pseudotracheae absent.

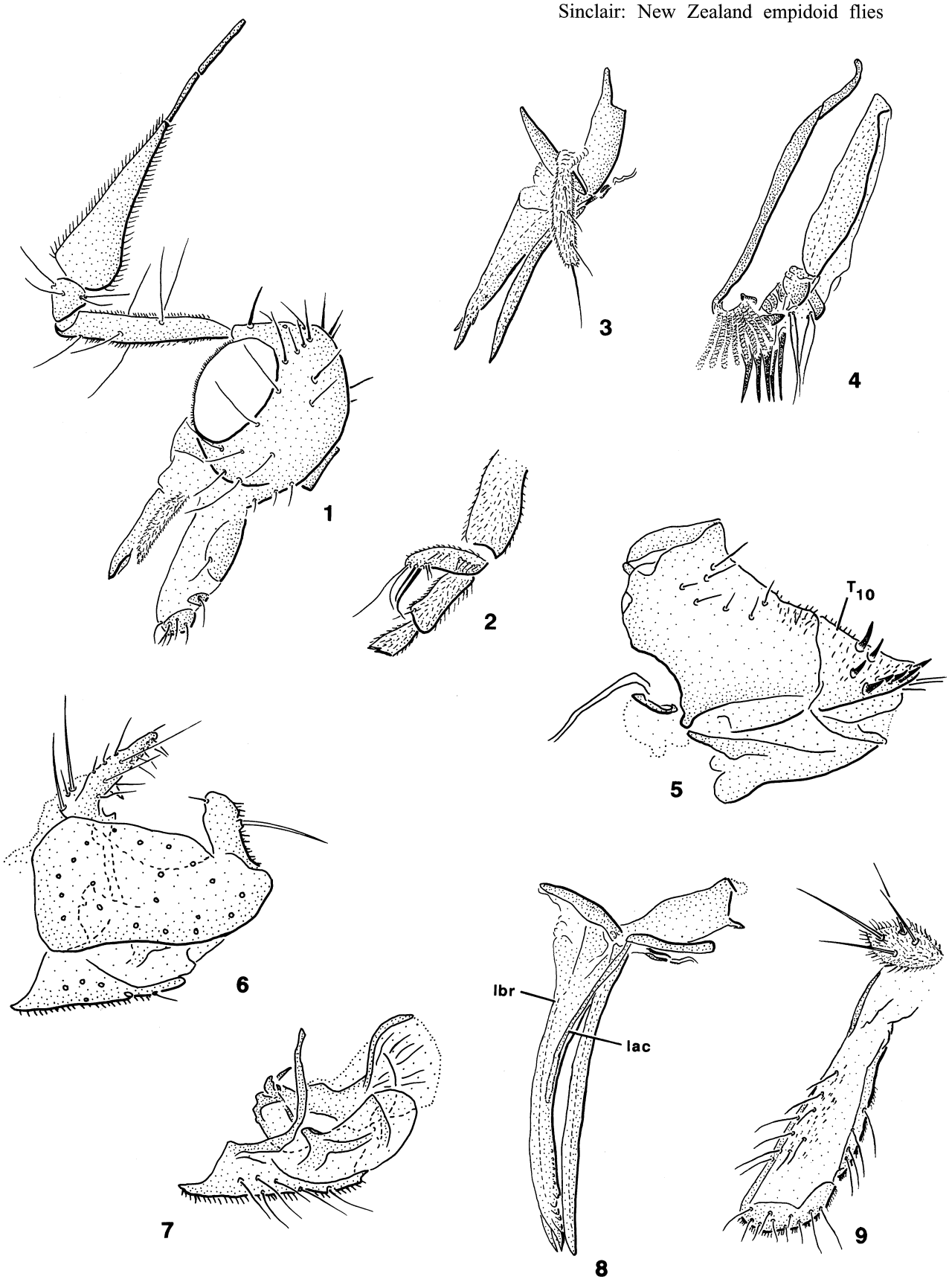
Thorax: vestiture reduced to discrete bristles; mesonotum often clothed in pruinescence. Acrostichals short, biserial or uniserial, with alternate setae divergent; 4 dorsocentrals; 1 postpronotal; 1 presutural supra-alar; 2 notopleurals, lower weak; 0–1 postsutural supra-alar; 1 postalar; 2 pairs scutellar bristles. Antepronotum with 1 pair of short setae; laterotergite bare. Halter knob variable in colour.

Wing: short and broad or long and slender, often with broad transverse band; stigma absent; 1 long basicostal bristle; C circumambient, although faint along posterior margin; C lacking erect setae; Sc incomplete; R_1 short, joining costa at basal third; R_{2+3} extending from middle to two-thirds length of wing; R_{4+5} unbranched; cell dm rectangular, distally emitting 2 veins; medial fork broad; cell cu*p* absent.

Legs: slender, lacking modified setae and processes; setae short, slender; hind tibia with conspicuous posteroapical comb. Tarsomeres unmodified, first tarsomere of foreleg shorter than following 3 tarsomeres; fifth tarsomere flattened dorsoventrally, apex straight, lacking apical lobe; empodium setiform with plumose apex.

Abdomen: faintly dusted with pruinescence; scattered short pale setae; terminalia shiny. Central region of tergite 7 membranous.

Male terminalia: hypandrium often with apical lobe(s); postgonite partially fused to phallus (Figs 10,17,20); gonocoxal apodeme short, slender. Ejaculatory apodeme



Figs 1–9. **1**, *Glyphidopeza longicornis*, head. **2**, *G. longicornis*, first tarsomere, male midleg. **3**, *G. fluviatilis*, female, labrum, hypopharynx. **4**, *G. fluviatilis*, female, labium (outer labellum removed). **5**, *G. fluviatilis*, female terminalia. **6**, *G. fluviatilis*, male terminalia. **7**, *G. fluviatilis*, hypandrium and phallus. **8**, *I. setosa*, labrum and hypopharynx. **9**, *I. setosa*, labium. Abbreviations: lac, lacinia; lbr, labrum; T, tergite.

slender, fused to base of phallus, not articulated. Epandrial halves separated, lacking slender dorsal bridge. Surstylus long and slender, projecting well beyond epandrium; lacking basal articulation; bacilliform sclerite broad, one-third width of epandrium. Cercus heavily sclerotized, bearing modified setae (Figs 11,12,15).

Female. Similar to male except as follows: generally larger in size, especially abdomen; wing occasionally with distinctive markings compared to male. Apical abdominal segments retracted into segment 7; apical margins of segment 7 not folded inwards; tergite 7 lacking posterior fringe of setae. Centre region of tergite 8 with deep U-shaped desclerotized zone; transverse fringe of long setae present; anterior margin lacking median plate. Anterodorsal margin of sternite 8 reduced to long, slender sclerite. Tergite 10 divided medially into rectangular sclerites; posterior margin with row of spine-like setae (Fig. 14); cercus with cluster of spine-like setae, similar to tergite 10. Slender, folded genital fork membranously connected to broad, sclerotized infolding of sternite 8; spermathecal receptacle large, spherical; base of spermathecal duct pigmented for more than diameter of receptacle.

Biology. Adults of *Icasma* were collected in forests close to streams, and swept from low vegetation in upland forests. *Icasma setosa* was collected near cool sphagnum filled pools in a darkly shaded *Nothofagus* forest. Although the immature stages are unknown, they probably inhabit cool, damp or moist soils.

Remarks. There is a single, undescribed female species from Chile (CNC) with R_{4+5} unbranched, but it is not considered congeneric on the basis of the following combination of characters: R_{2+3} extending to near wing tip; apical half of first flagellomere long and tapering; stigma present (yet faint).

Key to species of *Icasma*

1. Mesonotum with pruinescence confined to scutellum (Fig. 32) 2

—— Mesonotum either dusted entirely with pruinescence or with a median stripe (Figs 31,33) 5

2. Wing with broad, dark band (Figs 36,37) 3

—— Wing infuscate, lacking broad band (Figs 35,39) 4

3. Hindleg yellow, lacking dark band; surstylus long, slender and strongly arched, expanded apically bearing setulae (Fig. 20) ..... *I. singularis*

—— Hind femur and tibia with dark central band; surstylus short, expanding apically, bearing stout apical setae (Fig. 17) ..... *I. setosa*

4. First flagellomere brown, 1.5× longer than wide; arista shorter than antenna; surstylus short, broadly expanded apically (Fig. 10) ..... *I. aequabilis*

—— First flagellomere white, slightly longer than wide; arista longer than antenna; surstylus gradually tapering to broad apex (Fig. 16) ..... *I. longicauda*

5. Mesonotum entirely dusted with pruinescence (Fig. 33) ..... *I. tararua*

—— Mesonotum mostly shiny dark brown, with a median pruinescent stripe (Fig. 31) 6

6. Wing infuscate (Fig. 41); cercus with round apex (Fig. 23), posterior margin with subapical peg-like seta (*I. masneri* group) ..... *I. masneri*

—— Wing with wide, dark band (Fig. 36); cercus with narrow apex (Fig. 12), anterior margin with large, spine-like seta ..... *I. fascipennis*

The *Icasma singularis* group

This species group is characterised by short, broad wings, vein R_{2+3} short, extending to middle or just beyond middle of wing, and thickly sclerotized male cerci which are fused medially, bearing a pair of long, spine-like setae. The *singularis* group includes the following species: *I. aequabilis, I. fascipennis, I. longicauda, I. setosa, I. singularis*, and *I. tararua*.

Icasma aequabilis Plant

Figs 10,11, 35, 43

Icasma aequabilis Plant, 1990: 16.

Type material. HOLOTYPE male, NEW ZEALAND (WO)./ N.Is. Mt.Karioi.Raglan./ Malaise Trap by Wainui Str./ 12.x.85–20.x.1985./ coll. H.A. Oliver (NZAC). PARATYPE: **WO**—1 male, Mt. Karioi, Raglan [37°51'S 174°48'E], 31.viii.–7.ix.1986, malaise tp., Wainui str, H.A. Oliver (BMNH).

Additional material. **AK**—1 male, 10 females, Huia, 4.ix.1969 (NZAC); 1 female, P.D.D., 27.viii.68, B.M. May (NZAC).

Recognition. This species is distinguished by lacking a broad band on wings, lacking dark bands on hindlegs, dark antennae, and first flagellomere nearly twice as long as wide.

Description. Wing length 2.15–2.5 mm.

Male. *Head*: shiny dark brown, dusted with pruinescence; postocellar bristle shorter than ocellar bristle; outer vertical bristle subequal in length to ocellar bristle and lateroclinate over eye; inner vertical bristle two-thirds length of outer bristle; postocular margin with short setae, not overlapping eye. Scape yellowish, pedicel brown, first flagellomere brown, 1.5× longer than wide, arista brown, shorter than remaining antenna.

Thorax: mesonotum shining dark brown; pleura (except katepisternum), scutellum and postnotum faintly dusted with pruinescence. All bristles dark; acrostichals uniserial, alternate setae divergent. Halter knob pale.

Wing: short and broad; infuscate, broad brown band lacking. R_{2+3} ending near opposite median fork, gently arched to C.

Legs: pale yellow, with apical tarsomere darkened. Hindleg lacking dark bands.

Abdomen: dark brown; lateral margins of sternite 7 heavily sclerotized; tergite 8 divided medially with posterior fringe of long setae.

Terminalia (Figs 10,11): phallus flanked by postgonites with bifid apex, subequal in length to phallus. Hypandrium lacking flap-like process. Epandrium with anterodorsal lobe with dense setae. Surstylus short, broadly expanded apically, bearing setulae. Cercus subdivided into two sections; basal cercus thinly sclerotized, surrounding anus; upper cercus heavily sclerotized, H-shaped, bearing large, spine-like seta; apical lobes long, strongly divergent.

Female. Similar to male except as follows: wing with cloudy infuscation in cell dm and at base of Rs (Fig. 35).

Geographic distribution and seasonal occurrence. This species is known only from the northwestern region of North Island (Fig. 43), and apparently present from late winter to spring.

Icasma fascipennis n.sp.

Figs 12–14, 31, 36, 43

Type material. HOLOTYPE male, "NEW ZEALAND BR/ Mt Sewell/ TV Station, 853 m/ 22 Nov 1984/ B.A. Holloway"; "HOLOTYPE/ Icasma/ fascipennis/ Sinclair [red label]" (NZAC). PARATYPES: **BR**—10 males, 18 females, Mt. Sewell [42°25'S 171°20'E], TV Station, 853 m, 22.xi.1984, B.A. Holloway (NZAC); 2 males, 2 females, same data (CNC); **WD**—1 male, 1 female, Mt. Greenland [44°39'S 168°41'E], 2500', 6.i.1943, E.S. Gourlay (NZAC).

Additional material. **FD**—2 females, Secretary Is., sweeping shoreline, 25.xi.1981, C.F. Butcher (NZAC). These specimens have mostly pale hind legs and I am reluctant to include them as paratypes until associated males are collected.

Recognition. Distinguished from all other species of *Icasma* by a broad band extending across the full width of the wing, dark brown hind femur, with yellow apex, and dark brown hind tibia dark with yellow base.

Description. Wing length 2.1–2.6 mm.

Male. *Head*: dark brown densely covered with grey pruinescence; postocellar bristle shorter than ocellar bristle; outer vertical bristle subequal in length to ocellar bristle and lateroclinate over eye; inner vertical bristle very short; postocular margin with long setae, overlapping eye. Antenna yellowish-brown; first flagellomere slightly longer than wide; arista dark, longer than remaining antenna.

Thorax (Fig. 31): mesonotum shining dark brown, except for median pruinescent stripe, expanding laterally on prescutellar depression; pleura, notopleuron, scutellum, and postnotum faintly dusted with pruinescence. All bristles dark; acrostichals biserial or uniserial, alternate setae divergent. Halter knob dark.

Wing (Fig. 36): short and broad; broad brown band across full width of wing; extending from near base of Rs to base of median fork. R_{2+3} ending just short of median fork, strongly arched to C.

Legs: coxae, trochanters and first tarsomere pale yellow, remaining tarsomeres dark; femora mostly brown with apical fifth pale; tibiae mostly brown with basal fifth and posteroapical comb pale.

Abdomen: dark brown; lateral margins of sternites 7 and 8 heavily sclerotized; tergite 8 divided medially with posterior fringe of long setae.

Terminalia (Figs 12,13): hypandrium lacking flap-like process; apex expanded about phallus; postgonites inconspicuous. Epandrium with narrow anterodorsal lobe, bearing setulae. Surstylus long, slender, expanding apically, bearing slender setae. Cercus subdivided into two sections; basal cercus thinly sclerotized, surrounding anus; upper cercus heavily sclerotized, apical half fused medially, bearing large, spine-like seta; divided apically into 2 short divergent lobes; lower half divided into widely divergent lobes.

Female. Similar to male.

Geographic distribution and seasonal occurrence. This species is confined to South Island (Fig. 43), collected in late spring and summer.

Etymology. The species name is an adjective derived from the Latin *fascia* (band) and *penna* (wing) in reference to the broadly banded wings.

Icasma longicauda n.sp.

Figs 15,16, 42

Type material. HOLOTYPE male, "NEW ZEALAND: NN/ NW Nelson For. Pk./ Mt.Arthur Tableland/ 17.ii.1995, 950 m/ Quartz Ck., yellow/ pans, B.J. Sinclair"; "HOLOTYPE/ Icasma/ longicauda/ Sinclair [red label]" (NZAC).

Recognition. This species is distinguished by its clear wings, shiny mesonotum (pruinescence confined to scutellum) and unbanded hindlegs. It is most similar to *I. aequabilis* but may be distinguished by features described in the key.

Description. Wing length 2.1 mm.

Male. *Head*: dark brown, clothed in pruinescence, except area at posterolateral margin of ocellar triangle; postocellar bristle shorter than ocellar bristle; outer vertical bristle subequal in length to ocellar bristle and lateroclinate over eye; inner vertical bristle two-thirds length of outer bristle; postocular margin with short setae, not overlapping eye. All antennal segments white; first flagellomere slightly longer than wide; arista pale, base white, longer than remaining antenna.

Thorax: mesonotum shining dark brown; pleura, scutellum, and postnotum faintly dusted with pruinescence. All bristles pale; acrostichals uniserial, alternate setae divergent. Halter knob white.

Wing: short and broad; broad brown band lacking. R_{2+3} ending near base of median fork, gradually arched to C.

Legs: coxae and femora white, remaining segments pale yellow; dark bands lacking on hindleg.

Abdomen: light brown; lateral margins of sternite 7 heavily sclerotized; tergite 8 widely divided medially into pair of rectangular sclerites.

Terminalia (Figs 15,16): phallus flanked by pair of long, thinly sclerotized postgonites extending beyond phallus. Hypandrium with slender apical process, associated with apex of phallus. Epandrium with broad anterodorsal, setose ridge. Surstylus gradually tapering to broad apex, bearing setulae. Cercus subdivided into two sections; basal cercus thinly sclerotized, surrounding anus; upper cercus heavily sclerotized, divided narrowly into pair of parallel lobes, bearing long spine-like seta; lower half reduced to short, divergent lobes.

Female. Unknown.

Geographic distribution and seasonal occurrence. Known only from the type locality (Fig. 42).

Biology. This species was collected in yellow pans distributed along Quartz Creek at Flora Hut. This darkly shaded creek was flowing slowly with several small cascades.

Etymology. The species name is a noun derived from the Latin *longus* (long) and *cauda* (tail) in reference to the long postgonites flanking the phallus.

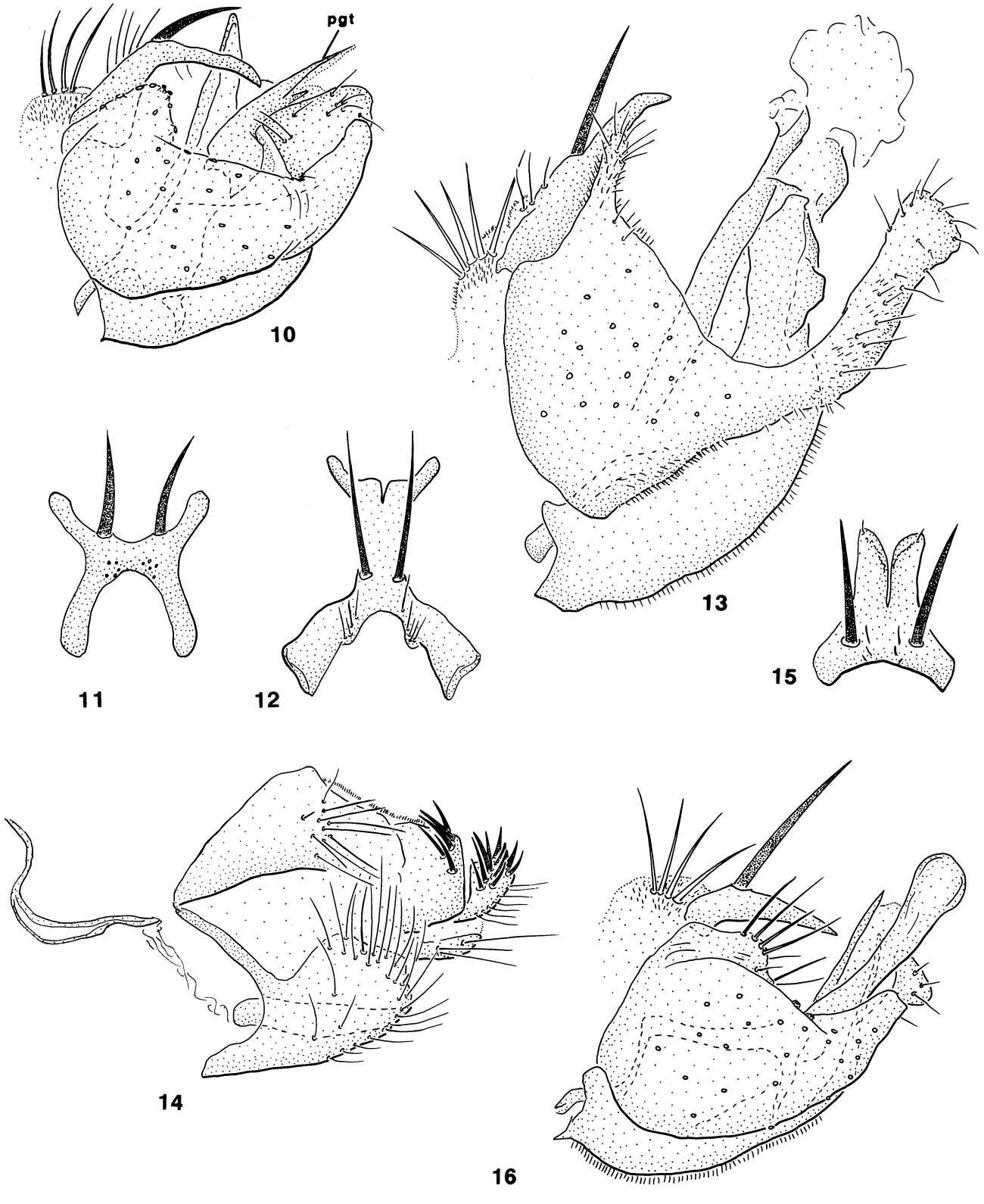
Icasma setosa n.sp.

Figs 8,9, 17,18, 29,30,32, 37, 43

Type material. HOLOTYPE male, "NEW ZEALAND: NN/ Abel Tasman NP, 800 m/ Harwoods Hole sphagnum/ *Nothofagus*, 6–7.ii.1995/ yellow pans,BJ Sinclair"; "HOLOTYPE/ Icasma/ setosa/ Sinclair [red label]" (NZAC). PARATYPES: **BR**—1 female, L. Brunner, Moana Scenic Res., Podocarp, 14–15.ii.1995, yellow pans, B.J. Sinclair (CNC); 10 males, 1 female, Nelson Lakes NP, Lake Rotoiti, 15–16.ii.1995, *Nothofagus* for., B.J. Sinclair (AMS, CNC); **NN**—10 males, 5 females, Canaan, Harwoods Hole, 762 m, 1.ii.1978, A.K. Walker (NZAC); 43 males, 32 females, same data as holotype, yellow pans/sweeping (AMS, BMNH, CNC, NZAC); **WD**—1 male, 1 female, Westland NP, Franz Josef Glacier, 2.i.1984, L. Masner (CNC).

Recognition. This species is distinguished by a broad infuscate band on the wing, extending from R_{2+3} to just beyond cell dm, a shiny scutum (pruinescence confined to scutellum), and banded hindlegs.

Description. Wing length 2.1–2.5 mm.



Figs 10–16. **10**, *Icasma aequabilis*, male terminalia. **11**, *I. aequabilis*, male cercus, anterior view. **12**, *I. fascipennis*, male cercus, anterior view. **13**, *I. fascipennis*, male terminalia. **14**, *I. fascipennis*, female terminalia. **15**, *I. longicauda*, male cercus, anterior view. **16**, *I. longicauda*, male terminalia. Abbreviation: pgt, postgonite.

Male. *Head*: dark brown, faintly dusted with pruinescence; postocellar bristle shorter than ocellar bristle; outer vertical bristle subequal in length to ocellar bristle and lateroclinate over eye; inner vertical bristle two-thirds length of outer bristle; postocular margin with short setae, not overlapping eye. All antennal segments pale yellow; length of first flagellomere nearly twice width; arista dark, longer than remaining antenna.

Thorax (Fig. 32): mesonotum shining dark brown; pleura (except posterior half of katepisternum), scutellum, and postnotum faintly dusted with pruinescence. All bristles dark; acrostichals uniserial, alternate setae divergent. Halter knob dark.

Wing (Fig. 37): short and broad; broad brown band across base, extending from slightly anterior to R_{2+3} to posteriorly beyond cell dm. R_{2+3} ending short of median fork, gradually arched to C.

Legs: pale yellow, with apical tarsomere very dark. Hind femur with wide, median, dark band; hind tibia with corresponding dark band.

Abdomen: light brown; lateral margins of sternites 7 and 8 heavily sclerotized; tergite 8 divided medially with posterior fringe of long setae.

Terminalia (Figs 17,18): postgonite tapering to narrow apex, nearly subequal in length to phallus; hypandrium lacking flap-like process; apex expanded about phallus. Epandrium expanded with broad lobe at base of cercus, bearing long setae. Surstylus short, expanding apically, bearing stout apical setae. Cercus subdivided into two sections; basal cercus thinly sclerotized, surrounding anus; upper cercus heavily sclerotized separated by deep notch, bearing large, spine-like bristle.

Female. Similar to male except as follows: first flagellomere light brown.

Geographic distribution and seasonal occurrence. This species is confined to South Island (Fig. 43), collected during the summer months.

Etymology. The species name is derived from the Latin *setosus* (bristly) in reference to long setae on the tip of the surstylus.

Icasma singularis Collin

Figs 19, 20, 38, 42

Icasma singularis Collin, 1928: 23.

Type material. LECTOTYPE (here designated) male, "Type/ male [red bordered circle]"; "Icasma/ singularis/ TYPE male Collin [hand written]"; "Icasma/ singularis/ _ [orange circle]"; "N[ew]. Zealand/ Ohakune/ III.1923/ T.R. Harris [hand written]" (BMNH). Paralectotypes: 3 females, same data as lectotype (BMNH); 1 male, Ohakune, 1–9.iv.1923, T.R. Harris (BMNH).

Additional material. **AK**—2 males, 1 female, Huia, 4.v.1969, v.1975 (NZAC); **HB**—1 female, Puketitiri, Little Bush, 20.iv.1982 (NZAC). **NN**—1 male, Spooners Range [41°29'S 172°54'E], Nelson, 1800', 18.iii.1966 (NZAC). **RI**—1 male, Tongariro NP, Ohakune, Mangawhero R., 19–20.ii.1995 (CNC); 1 female, Tongariro NP, 7.5 km N Ohakune, Blythe Tr., 19.ii.1995, *Nothofagus* (CNC). **SD**—3 males, Titirangi, light tp, 9,14.vi.1953 (NZAC).

Recognition. This species is recognised by a broad, dark band, extending nearly across the wing, lack of dark bands on the hindlegs, and yellow antennae.

Description. Wing length 2.0–2.5 mm.

Male. *Head*: shiny dark brown, with scattered pruinescence; postocellar bristle shorter than ocellar bristle; outer vertical bristle subequal in length to ocellar bristle and lateroclinate over eye; inner vertical bristle two-thirds length of outer bristle; postocular margin with short setae, not overlapping eye. All antennal segments pale yellow; length of first flagellomere nearly twice width; arista dark, longer than remaining antenna.

Thorax: mesonotum shining dark brown; pleura, scutellum, and postnotum faintly dusted with pruinescence. All bristles pale; acrostichals biserial. Halter knob yellowish brown.

Wing (Fig. 38): short and broad; broad brown band near base, extending from C to beyond cell dm; remainder of wing infuscate. R_{2+3} ending well short of median fork, arched to C.

Legs: pale yellow, with apical tarsomere darkened. Hindleg lacking dark bands.

Abdomen: light brown; lateral margins of sternite 7 heavily sclerotized; tergite 8 divided medially with posterior fringe of long setae.

Terminalia (Figs 19,20): postgonite broad, divergent lobes; hypandrium with flap-like process expanded about phallus and postgonites. Epandrium with very long, stout setae, especially at base of cercus. Surstylus long, slender and strongly arched, expanded apically bearing setulae. Cercus subdivided into two sections; basal cercus thinly sclerotized, surrounding anus; upper cercus heavily sclerotized, bearing large, spine-like seta; apical lobes closely approximated, tips divergent.

Female. Similar to male.

Geographic distribution and seasonal occurrence. This species is widespread throughout North Island and northern South Island (Fig. 42). Adults are present from February to June (Plant, 1990; pers. obs.), and have been swept from low vegetation in upland forests.

Icasma tararua n.sp.

Figs 21,22, 33, 39,40, 42

Type material. HOLOTYPE male, "NEW ZEALAND WN/ Tararua Ra/ Dundas Hut Ridge/ 990 m/ 4–6 Dec 1984/ B.G.Bennett &/ T.K.Crosby/ Malaise trap"; "HOLOTYPE/ Icasma/ tararua/ Sinclair [red label]" (NZAC). PARATYPES: **BR**—1 male, Paparoa Range, Buckland Peaks [41°48'S 171°38'E], 25.xi.1984, B.A. Holloway (NZAC); 1 male, 2 females, Mt. Sewell, TV Station, 853 m, 22.xi.1984, B.A. Holloway (NZAC); **FD**—1 female, Secretary Is., 25.v.1981, C.F. Butcher (NZAC); 1 male, Takahe Valley [45°17'S 167°40'E], L. Orbell, 6.xii.1972, A.C. Eyles (NZAC); **NC**—2 males, Arthurs Pass, 3000', 16.xii.1959, J.I. Townsend & J.S. Dugdale (NZAC); **NN**—1 male, 4 females, NW Nelson For. Pk., Mt. Domett, 1067–1219 m, xi.1971, G.W. Ramsey (NZAC); **TK**—1 male, Pouakai Trig., Pouakai Range, 1280–1370 m, 3.xii.1975, J.S. Dugdale & G.W. Mason (NZAC); 6 males, 4 females, Pouakai Range, 1220 m, 9–13.i.1978, malaise tp., J.S. Dugdale (NZAC); **WN**—20 males, 15 females, Tararua Range, Dundas Hut Ridge, [40°44'S 175°27'E], 990 m, malaise tp., 30.xi.–6.xii.1984, B.G. Bennett & T.K. Crosby (NZAC); 3 males, Tararua Range, Dundas Hut, 1250 m, malaise tp., 28–29.xi.1984, B.G. Bennett & T.K. Crosby (NZAC, 3 males, 3 females deposited in each of AMS and CNC); **WO**—1 male, Mt. Pirongia, 962 m, 16.i.1977, A. Walker (NZAC). 3 males, 3 females, paratypes deposited in each of AMS and CNC.

Recognition. Distinguished from other species of *Icasma* by complete pruinescence of the head and mesonotum. Female wings are darkly banded, while the wings of males are clear.

Description. Wing length 1.9–2.6 mm.

Male. *Head*: dark brown, dusted with grey pruinescence; postocellar bristle nearly equal in length to ocellar bristle; outer vertical bristle subequal in length to ocellar bristle and lateroclinate over eye; inner vertical bristle half length of outer; postocular margin with short setae, not overlapping eye. Scape yellow, pedicel yellow; first flagellomere brown, slightly longer than width; arista dark, longer than remaining antenna.

Thorax (Fig. 33): yellowish brown, mesonotum, postnotum, and pleura dusted entirely with pruinescence. All bristles dark; acrostichals uniserial, alternate setae divergent. Halter knob yellowish brown.

Wing (Fig. 39): short and broad; broad brown band lacking, infuscate. R_{2+3} ending opposite median fork, strongly arched to C.

Legs: pale yellow, with apical tarsi darkened. Hindleg lacking dark bands.

Abdomen: dark brown; lateral margins of sternite 7 heavily sclerotized; tergite 8 divided medially with posterior fringe of long setae.

Terminalia (Figs 21,22): phallus flanked by pair of tapering postgonites; hypandrium lacking flap-like process; apex expanded about phallus. Epandrium with long setae at base of cercus. Lateral margin of surstylus expanded, apex recurved bearing setulae. Cercus subdivided into two sections; basal cercus thinly sclerotized, surrounding anus; upper cercus heavily sclerotized, H-shaped, bearing large, spine-like seta; apical lobes short, strongly divergent.

Female. Similar to male except as follows: wings with broad dark band across base, extending from C to beyond cell dm (Fig. 40).

Geographic distribution and seasonal occurrence. This species is present from early to mid summer (November to January) in both North and South islands (Fig. 42).

Etymology. The species is named after the type locality and is indeclinable.

The *Icasma masneri* group

This species group is characterised by long, slender wings, vein R_{2+3} long, extending well beyond middle of wing, and the male cerci divided not fused medially, lacking long spine-like setae. This group includes the single species *I. masneri*.

Icasma masneri n.sp.

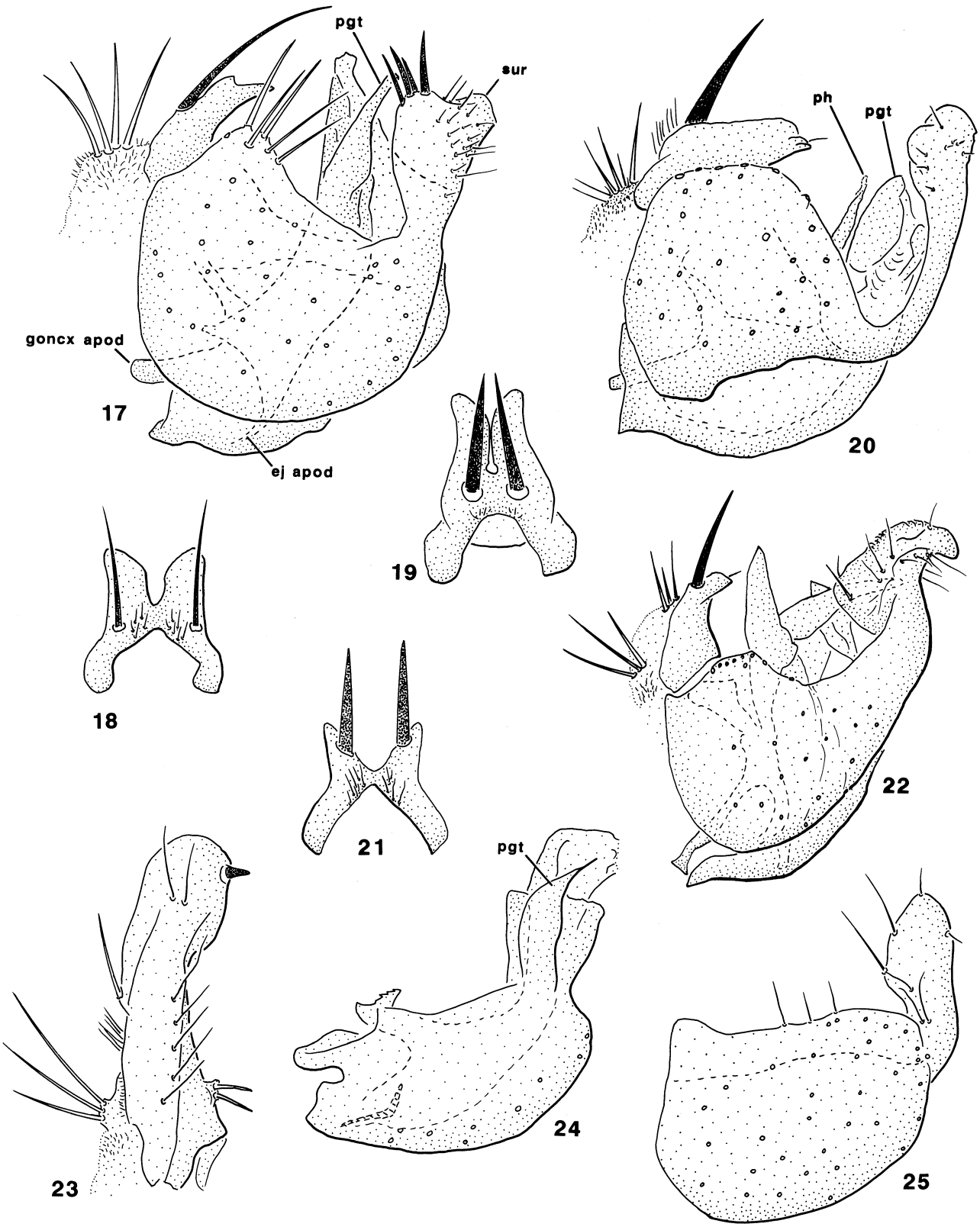
Figs 23–25, 41, 42

Type material. HOLOTYPE male, "NEW ZEALAND: WD/ Westland NP, Franz/ Josef Glacier, yellow/ pans, 10–11.ii.1995/ ex. cascading creek/ B.J. Sinclair"; "HOLOTYPE/ Icasma/ masneri/ Sinclair [red label]" (NZAC). PARATYPES: WD—1 male, Westland NP, Franz Josef Glacier, 2.i.1984, L. Masner (CNC).

Recognition. Distinguished from other species of *Icasma* by clear wings, hind femur with a dark band on the basal half, and scutellum, anterior margin and narrow, median stripe of the scutum clothed in pruinescence.

Description. Wing length 1.8 mm.

Male. *Head*: shiny dark brown, with faintly scattered pruinescence; postocellar bristle equal in length to ocellar bristle; 2 pairs of vertical bristles, outer pair slightly longer and lateroclinate over eye; postocular margin with short setae, not overlapping eye. Scape yellow, pedicel yellow; first flagellomere brown, 1.5× longer than wide; arista dark, longer than remaining antenna.



Figs 17–25. **17**, *Icasma setosa*, male terminalia. **18**, *I. setosa*, male cercus, anterior view. **19**, *I. singularis*, male cercus, anterior view. **20**, *I. singularis*, male terminalia. **21**, *I. tararua*, male cercus, anterior view. **22**, *I. tararua*, male terminalia. **23**, *I. masneri*, male cercus, lateral view. **24**, *I. masneri*, hypandrium, phallus. **25**, *I. masneri*, epandrium, surstylus. Abbreviations: ej apod, ejaculatory apodeme; goncx apod, gonocoxal apodeme; pgt, postgonite; ph, phallus.

Thorax: mesonotum shining dark brown, except for median pruinescent stripe; pleura, scutellum, postnotum, anterior margin of scutum including postpronotal lobe, and notopleuron dusted with pruinescence. All bristles dark; acrostichals uniserial, alternate setae divergent. Halter knob white.

Wing (Fig. 41): long and slender; broad brown band absent; wing faintly infuscate. R_{2+3} ending opposite medial fork, gradually arched to C.

Legs: bright yellow, with apical 3 tarsomeres gradually darkened. Hind femur with wide dark band on basal half; hind tibia lacking corresponding band.

Abdomen: dark brown; lateral margins of sternites 7 and 8 heavily sclerotized; tergite 8 divided medially with posterior fringe of long setae.

Terminalia (Figs 23–25): phallus flanked by pair of postgonites tapering to sharp tip; hypandrium lacking flap-like process; apex expanded about phallus. Epandrium not expanded at base of cercus. Surstylus short, with broad round margin. Cercus not subdivided; heavily sclerotized with round apex; posterior margin with subapical peg-like seta.

Female. Unknown.

Geographic distribution and seasonal occurrence. Known only from the type locality (Fig. 42).

Biology. The holotype was collected in a large, cascading creek, flowing beneath the road to the Glacier. The creek was exposed to bright sunshine, with little shade and the emergent rocks were mostly bare, lacking moss.

Etymology. Named in honour of the collector of the paratype who strongly encouraged my collecting efforts in New Zealand.

Phylogenetic considerations

Glyphidopeza appears to be the most primitive ceratomerine genus, retaining several plesiomorphic characters; for example, presence of a cell cu*p* and pseudotracheae. The genus is characterised by a pair of stout ocellar bristles, inserted anterolaterally to the anterior ocellus, and the secondary sexual modification of the first tarsomere of the male midleg. Despite these two characters, *G. longicornis* may warrant generic status on the basis of significant differences from *G. fluviatilis* (e.g., unbranched R_{4+5}; greatly lengthened scape; eye with ommatrichia), which have been used to define other empidoid genera. This decision must await the collection of additional specimens and species. The striking features of *G. longicornis* are due primarily to male secondary sexual characters and may not warrent separate generic status, especially if females are found to be indistinguishable between the two species.

Glyphidopeza is considered the sister group of the *Icasma* + *Ceratomerus* lineage, and this group is monophyletic on the basis of the following characters: absence of pseudotracheae, loss of cell cu*p*, and two veins distally emitted from cell dm. The latter two genera appear to be monophyletic, but the monophyly of *Ceratomerus* remains to be tested. The monophyly of *Icasma* is supported by character states 1 and 2 discussed below.

Reconstructed Phylogeny of the species of *Icasma*. Seven morphological characters were used in the phylogenetic analysis in an attempt to resolve the relationships among the species of *Icasma*. The remaining taxa of the Ceratomerinae are used to represent a generalised outgroup. The Trichopezinae are considered to represent the sister-group to the Ceratomerinae (Cumming & Sinclair, 1996) and are used to help identify the ground plan apomorphies of the subfamily and assist in determining character polarity.

In the following discussion of characters, the italicised words following a character number describe the apomorphic state of the characters being considered. The character numbers correspond to those used in the cladogram (Fig. 44).

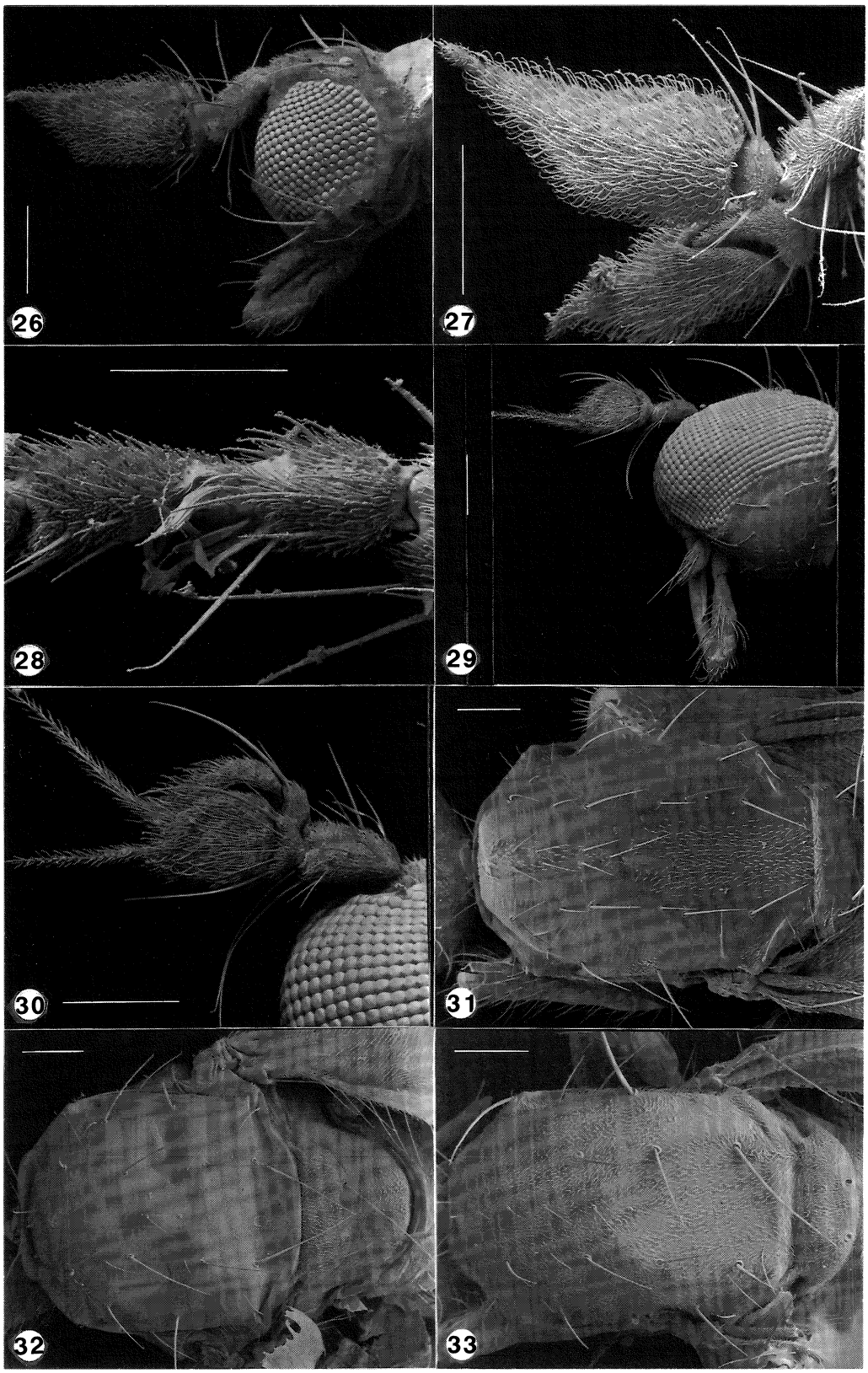
1. *Male cercus heavily sclerotized* The male cercus of the basal genera of the Trichopezinae, *Ceratomerus* and *Glyphidopeza* is normally thinly sclerotized, clothed in setulae and long setae. The cercus of *Icasma* is heavily sclerotized and stout, bearing a pair of modified setae. In contrast to other empidoids with modified male cercus, the cercus of *Icasma* does not appear to be modified for clasping and is quite unique.

2. *R_{4+5} unbranched* R_{4+5} is normally branched in the orthorrhaphous Brachycera, primitive Empidoidea, Trichopezinae, *Glyphidopeza*, and *Ceratomerus*. An unbranched R_{4+5} is also found in the Hybotinae group of subfamilies, Microphorinae, Dolichopodidae, Cyclorrhapha, and numerous genera within the Empidinae, Clinocerinae, and Hemerodromiinae. Despite the obvious homoplastic nature of this character, within the Ceratomerinae an unbranched R_{4+5} is used to characterise the genus *Icasma*.

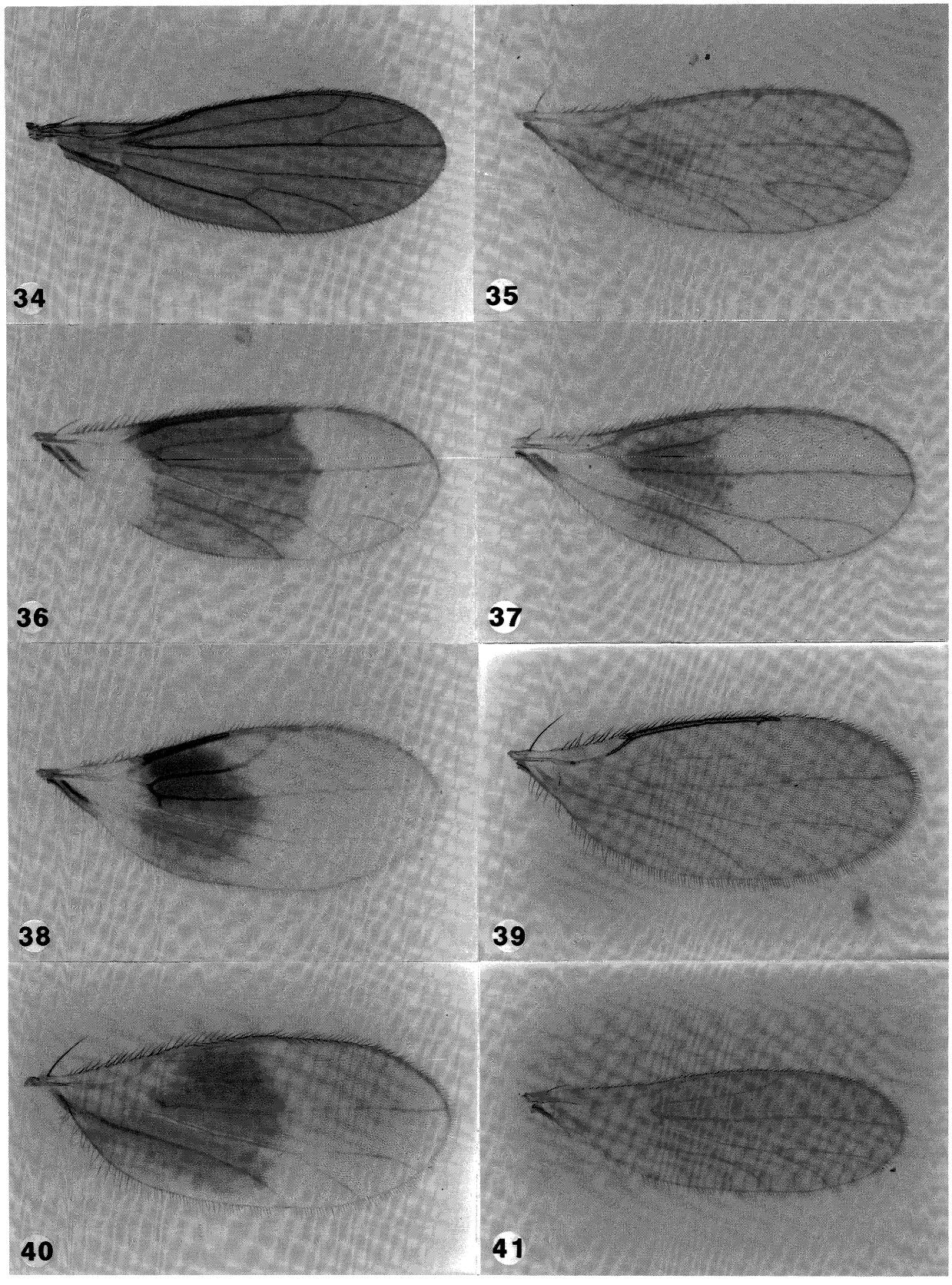
3. *Male cerci fused, bearing pair of long spine-like setae* The male cerci of *Glyphidopeza, Ceratomerus*, and *I. masneri* comprises two separate lobes. The cerci in all remaining species of *Icasma* are narrowly connected ventrally, each bearing a long spine-like seta (Figs 11,12,15).

4. *Wing broad and short* The wing of *Glyphidopeza, Ceratomerus*, and *I. masneri* is long and slender. The *I. singularis* group is distinguished by its broad, short wing (Figs 35–40).

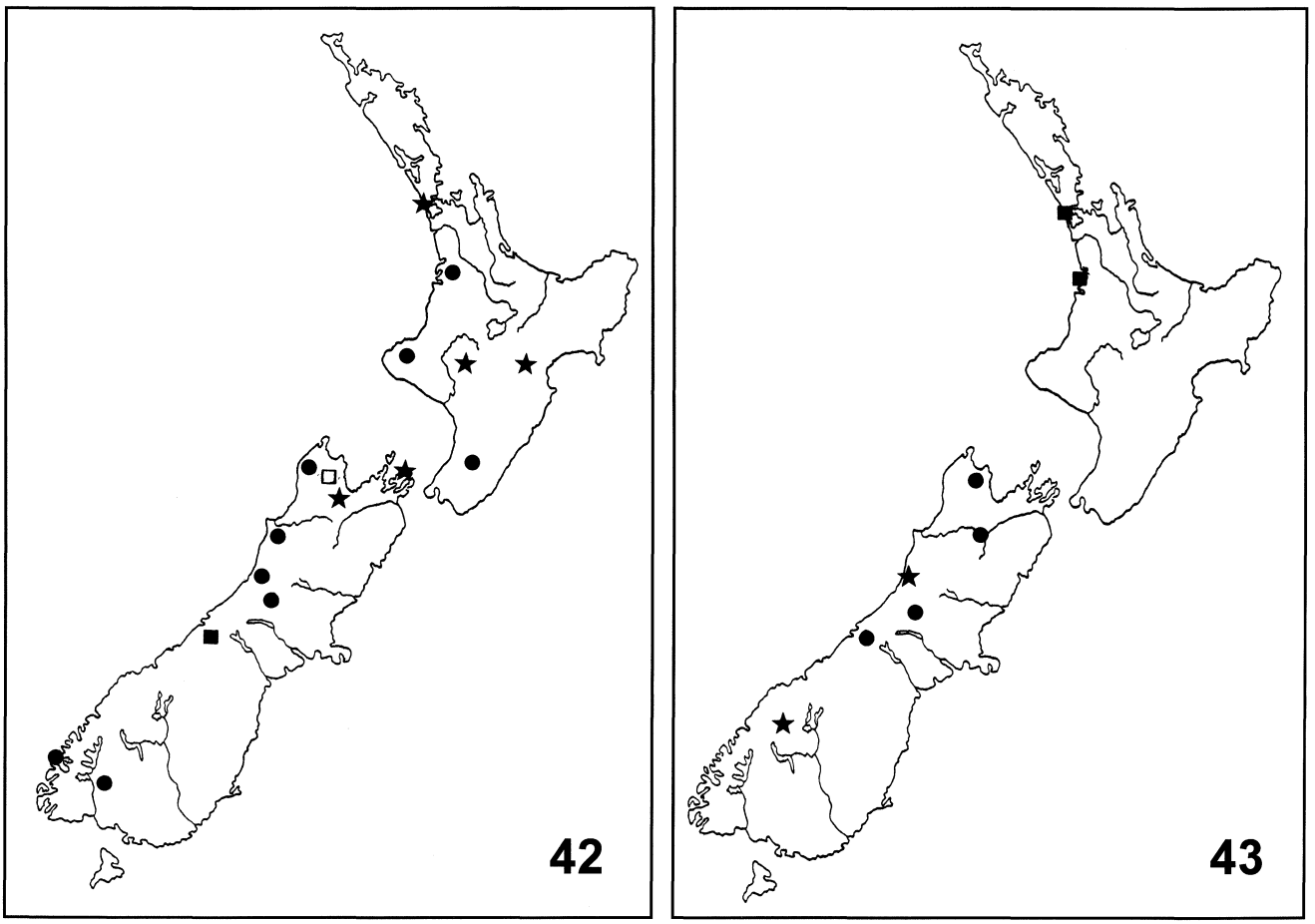
5. *Anterodorsal region of epandrium with dense setae* The anterodorsal region of the epandrium lacks dense setae in *I. masneri* and *I. fascipennis* (Figs 13,25). This region of the epandrium is densely



Figs 26–33. Scanning electron micrographs. **26**, *Glyphidopeza fluviatilis*, head. **27**, *G. fluviatilis*, antenna. **28**, *G. fluviatilis*, first tarsomere, male midleg. **29**, *I. setosa*, head. **30**, *I. setosa*, antennae. **31**, *I. fascipennis*, mesonotum, dorsal view. **32**, *I. setosa*, mesonotum, dorsal view. **33**, *I. tararua*, mesonotum, dorsal view. Scale bars = 0.1 mm, except Fig. 28 where scale bar = 0.05 mm.



Figs 34–41. Left wings of *Glyphidopeza* and *Icasma*. **34**, *G. fluviatilis*. **35**, *I. aequabilis*, female. **36**, *I. fascipennis*. **37**, *I. setosa*. **38**, *I. singularis*. **39**, *I. tararua*, male. **40**, *I. tararua*, female. **41**, *I. masneri*.



Figs 42,43. Known distribution of *Icasma*. **42**, *I. longicauda* (□); *I. masneri* (■); *I. singularis* (★); *I. tararua* (●). **43**, *I. aequabilis* (■); *I. fascipennis* (★); *I. setosa* (●).

clothed with setae in *I. aequabilis* + *I. tararua* and *I. singularis* + *I. longicauda* (Figs 10,16,17).

6. *Surstylus short, broadly expanded apically* The surstylus is short, broadly expanded apically or triangular in profile, supporting the sister-group relationship of *I. aequabilis* and *I. tararua* (Figs 10,22).

7. *Lobes of male cerci closely approximated* The lobes of the cerci are normally widely separated. The lobes of the male cerci are closely approximated in *I. singularis* and *I. longicauda*, supporting their sister-group relationship (Figs 15,19).

The resulting cladogram (Fig. 44) is nearly fully resolved, except for the placement of *I. setosa*.

Zoogeographic considerations

Icasma and *Glyphidopeza* are both apparently endemic to New Zealand. They may still be discovered in southern Chile, but have not yet been found in Australia despite extensive collecting using various mass sampling techniques. If they are found to be truly endemic, this would suggest that both genera evolved following the separation of New Zealand from Australia/Antarctica approximately 84 Mya (Veevers *et al.*, 1991). This scenario of course assumes that their absence is not the result of local extinctions in Australia and Chile.

Glyphidopeza is currently known only from northern South Island. Although *Icasma* is widespread throughout North and South islands, most species are known only from a few localities. Additional distribution data are required before the biogeographic patterns can be investigated. However, the following generalised patterns were found (following the format of Bickel [1991]):

1. North and South islands: *tararua*
2. North Island: *aequabilis*
3. North Island and northern South Island: *singularis*
4. South Island: *fascipennis, longicauda, masneri, setosa*
5. Not recorded from the offshore islands.

Given the scarcity of records in the southern half of South Is., greater collecting efforts (using yellow pans) could result in additional taxa and certainly expand the range of known species.

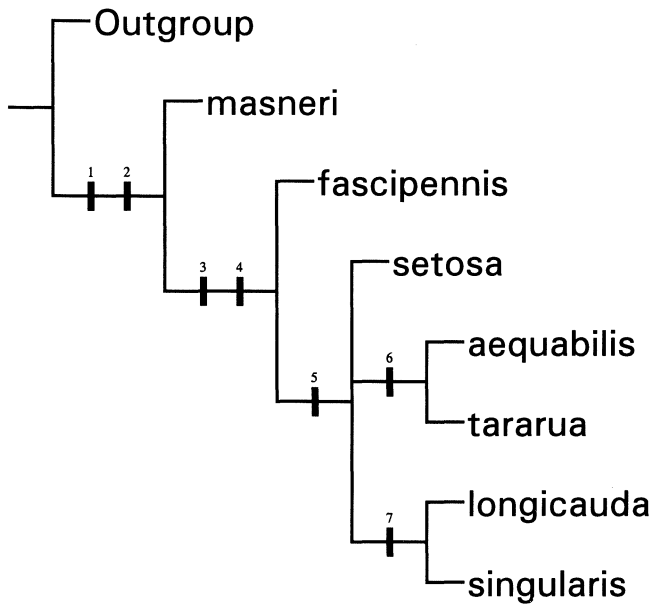


Fig. 44. Hypothesised cladistic relationships of the species of *Icasma*. Numbers refer to characters discussed in "Phylogenetic considerations".

ACKNOWLEDGMENTS. I am indebted to the curators of the listed institutions for loaning specimens under their care. Assistance on locality information was provided by T.K. Crosby (NZAC). I especially wish to thank D.J. Bickel (AMS) for encouragement and discussions during this project. Research facilities were made available by the Australian Museum. Scanning electron micrographs were taken by Geoff Avern (AMS) and wing photos were taken by B. Cooper (CNC). Special thanks to R. Vockeroth (CNC) for his generosity in supporting field work in New Zealand. D.J. Bickel and two anonymous reviewers offered critical comments on drafts of this paper. This research was partially supported by a postdoctoral fellowship from the Natural Sciences and Engineering Research Council of Canada. A grant from the CanaColl Foundation (Ottawa) supported field work in New Zealand. Collecting permits were obtained through the Director of Protected Species Policy Division (Wellington).

References

Bickel, D.J., 1991. Sciapodinae, Medeterinae (Insecta: Diptera) with a generic review of the Dolichopodidae. Fauna of New Zealand, No. 23, 74 pp.

Collin, J.E., 1928. New Zealand Empididae based on material in the British Museum (Natural History). British Museum (Natural History), London, 110 pp.

Crosby, T.K., J.S. Dugdale & J.C. Watt, 1976. Recording specimen localities in New Zealand: an arbitrary system of areas and codes defined. New Zealand Journal of Zoology 3: 69.

Cumming, J.M., & B.J. Sinclair, 1996. The higher-level phylogeny of Eremoneura (Diptera: Brachycera), p. 24. **In** Proceedings of the XX International Congress of Entomology. Florence, Italy.

Cumming, J.M., B.J. Sinclair & D.M. Wood, 1995. Homology and phylogenetic implications of male genitalia in Diptera—Eremoneura. Entomologica Scandinavica 26: 120–151.

McAlpine, D.K., 1991. Review of the Australian kelp flies (Diptera: Coelopidae). Systematic Entomology 16: 29–84.

McAlpine, J.F., 1981. Morphology and terminology—adults. [Chapter] 2. Pp. 9–63. **In** J.F. McAlpine *et al.* eds. Manual of Nearctic Diptera, Vol. 1. Agriculture Canada Monograph 27: vi+1–674.

Plant, A.R., 1990. The genus *Icasma* Collin (Diptera: Empididae: Ceratomerinae), and the description of a new species. New Zealand Entomologist 13: 16–18.

Plant, A.R., 1991. A revision of the genus *Ceratomerus* (Diptera: Empididae: Ceratomerinae) of New Zealand. Journal of Natural History 25: 1313–1330.

Sinclair, B.J., 1995. Generic revision of the Clinocerinae (Empididae), and description and phylogenetic relationships of the Trichopezinae, new status (Diptera: Empidoidea). The Canadian Entomologist 127: 665–752.

Sinclair, B.J., 1996. Revision of the southern Africa genus *Acarterus* Loew (Diptera: Empidoidea), with description of seven new species. Annals of the Natal Museum 37: 215–238.

Veevers, J.J., C.McA. Powell & S.R. Roots, 1991. Review of seafloor spreading around Australia. I. Synthesis of the patterns or spreading. Australian Journal of Earth Sciences 38: 373–389.

Accepted 14 August, 1997.