

Sciaroid but not sciarid: a review of the genus *Ohakunea* Tonnoir & Edwards, with the description of two new species (Insecta: Diptera: Bibionomorpha)

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Abstract. The species of the genus *Ohakunea* are reviewed with emphasis on their adult morphology. Characters of maxillary palpi, wing venation and male genitalia are employed to show that *Ohakunea* should not be classified with the family Sciaridae as has frequently been done before. Instead, the authors suggest that it should be left unplaced within the familial classification of Sciaroidea. It is suggested that *Ohakunea* – solitary or together with further taxa – deserves equal rank to current sciaroid families, pending a more thorough study of other ‘unplaceable’ Sciaroidea. *Ohakunea ingegerdae* sp. n. and *O. papuensis* sp. n. are described from Papua New Guinea. Other *Ohakunea* species, *O. australiensis* Colless, *O. bicolor* Edwards and *O. chilensis* Freeman, are redescribed, and females of *O. australiensis* and *O. bicolor* are characterized for the first time.

Kurzfassung. Eine Übersicht über die Arten der Gattung *Ohakunea* wird vorgelegt, wobei deren Imaginalmorphologie im Mittelpunkt steht. Merkmale der Maxillarpalpen, des Flügelgeüders und des männlichen Genitalapparates werden als Argumente dafür herangezogen, *Ohakunea* nicht zur Familie Sciaridae zu stellen, wie das bislang häufig geschehen ist. Stattdessen wird der Standpunkt bekräftigt, *Ohakunea* vorläufig unplatziert innerhalb des Familiensystems der Sciaroidea zu belassen. Es wird angeregt, *Ohakunea* – allein oder unter Einbeziehung weiterer Taxa – Familienrang zuzugestehen, was nur nach gründlicher Untersuchung anderer ‘unplatzierbarer’ Sciaroidea geschehen sollte. *Ohakunea ingegerdae* sp. n. und *O. papuensis* sp. n. aus Papua-Neuguinea werden neubeschrieben. Andere *Ohakunea*-Arten, wie *O. australiensis* Colless, *O. bicolor* Edwards und *O. chilensis* Freeman, werden nachbeschrieben, und die Weibchen von *O. australiensis* und *O. bicolor* werden erstmals charakterisiert.

Key words. Bibionomorpha, Sciaroidea, phylogeny, *Ohakunea*, taxonomy, new species, Papua New Guinea.

Introduction

For dipterists familiar with fungus gnats in the broadest sense, the genus *Ohakunea* Tonnoir & Edwards, 1927 has a very special reputation. It is one of several genera which cannot be classified convincingly with any family within Sciaroidea, where it belongs without doubt. Most scholars have previously placed it tentatively in Sciaridae and based their decision mainly on similarities that concern wing venation and the presence of an eye bridge, which in *Ohakunea* is, however, incomplete (TONNOIR & EDWARDS 1927; FREEMAN 1951; COLLESS 1963). At the same time, the peculiar structure of male genitalia has made some authors doubt the affiliation of *Ohakunea* to Sciaridae (COLLESS 1963), a view shared by recent workers on that family (for instance, MENZEL & MOHRIG 2000: 12). In this paper we further support such a view by providing additional arguments chiefly derived from wing venation. We also discuss possible relationships of *Ohakunea* to other Sciaroidea as far as adult morphology can provide arguments.

It is also from a biogeographic and paleogeographic point of view that *Ohakunea* deserves special interest. The species included here show the typical transantarctic distribution pattern, with living representatives confined to parts of Australasia on the one hand, and the southern Neotropics on the other, while missing in the entire northern hemisphere. Thus it would appear that *Ohakunea* should be considered an ancient lineage of sciaroids that evolved in Gondwanaland: a relict group with just a few extant species living in remote derivatives of the former southern supercontinent. There are indeed only five species of *Ohakunea* known

so far, including two new species from Papua New Guinea that we will describe below. As in the case of other relict taxa in Sciaroidea and elsewhere, most *Ohakunea* species are rare, a fact that makes them even more mysterious, but also difficult to investigate comprehensively due to the shortage of specimens available for study. Until today adult morphology is the only aspect in the lifehistory of *Ohakunea* species that we know anything of in some detail, whereas larvae have never been found.

This review summarizes what we currently know of *Ohakunea*, a genus which certainly is one of the key groups in understanding interfamilial phylogenetic relationships within the Sciaroidea. Neglected in more recent analyses of sciaroid phylogeny (BLASCHKE-BERTHOLD 1994; MATILE 1990, 1997), *Ohakunea* is a taxon on which virtually nothing has been published for forty years. As new data on other phylogenetically highly significant sciaroids are accumulating rapidly (CHANDLER 2002; JASCHHOFF & DIDHAM 2002), one may be optimistic that we are now closer than ever before to the final goal: a robust hypothesis on the family-level classification and interrelationships within Sciaroidea.

Material and methods

Specimens of the described species were borrowed from various museum collections, in particular the Australian National Insect Collection, Canberra; the New Zealand Arthropod Collection, Auckland; and the Canterbury Museum, Christchurch (in the following referred to by the city name). Pinned specimens were soaked in water, dehydrated in ethanol, made transparent in beechwood creosote and eventually prepared on microscopic slides in Canada balsam. Numerous additional individuals of *Ohakunea bicolor* were obtained by one of us (M.J.) from extensive collections of sciaroids throughout New Zealand in 2001/02; several of these specimens were also slide-mounted in order to investigate morphological details, while the remaining material was stored in ethanol. Specimens of the previously undescribed species have been collected during an expedition to Papua New Guinea in 1999 led by one of us (H.H.); those were all slide-mounted. Types of species described here are deposited in the Swedish Museum of Natural History, Stockholm. Drawings were made using a camera lucida attached to a Leitz Laborlux S compound microscope. Usage of morphological terminology follows, if not otherwise stated, that of SOLI (1997) for Mycetophilidae as this was found to be easily transferable to other Sciaroidea.

Abbreviations

A	anal vein	M	media
C	costa	R	radius
Cu-A	anterior branch of cubitus	Rs	radial sector
Cu-P	posterior branch of cubitus	Sc	subcosta
frm	fused radio-media	ta	anterior crossvein
h	humeral crossvein	tb	posterior crossvein

Numbers behind abbreviations refer to certain vein branches, for instance, R1 is for the anterior branch of radius, R4 and R5 for posterior branches.

The genus *Ohakunea* Tonnoir & Edwards, 1927

Type species. *Ohakunea bicolor* EDWARDS in TONNOIR & EDWARDS, 1927: 799 ff., figs. 45, 190, 191.

Description of the adults. **Habitus.** Slender, fragile, slightly humpbacked sciaroids 2–3.5 mm in size, with long legs and antennae, rather narrow waist, slightly downcurved abdomen, usually inconspicuous brownish coloration, and peculiar, distinctive wing venation.

Head. Head capsule higher than long, covered with setae of various lengths. Postfrons slightly bilobed, non-setose, with small, bilobed frontal tubercle. Face larger than clypeus, flat, non-setose. Clypeus prominent in profile, with strong, long setae, widely fused with face along its upper margin. Antenna shorter than body in males and clearly so in females; inserted slightly above midheight of head. Scape somewhat conical, slightly bigger than subglobular pedicel, both setose ventrally. Flagellum with 14 flagellomeres gradually decreasing

in length; each flagellomere cylindrical with very short conical neck and slender node several times as long as wide, neck and node with smooth transition. Flagellomeres little longer in males than in females. Flagellum without microtrichia except a few basally on flagellomere 1 (and occasionally 2), each flagellomere with even cover of setae (sensilla chaetica) interspersed with numerous sensory spines (sensilla basiconica), and with setae in two lengths: fine short ones about as long as diameter of node, and long ones up to 5 times as long as diameter of node; terminal flagellomere additionally with 2-3 sensory spines at apex. Flagellomeral setae in females little shorter than in males. At vertex with 3 ocelli, all of same size, usually arranged in a narrow triangle, with lateral ocelli almost touching compound eyes. Eyes reniform, separated at vertex for a distance 3-5 times the diameter of an individual ommatidium; with a few fine interommatidial setulae or none at all. Mouthparts well developed, with short proboscis. Labrum weakly sclerotized, triangular, non-setose. Maxilla with lacinia well-developed, the latter style-like, flattened and with dense brush of fine trichia terminally and along inner margin. Maxillary palpus basically with 5 segments; with first segment ('presegment') absent or, in one species, well developed and bearing one strong seta; segments 2-5 setose with some setae spine-like; segment 3 with long, hyaline sensory hairs; segment 3 usually thickest and 5 longest. Labial palpus 2-segmented; labellum 1 smooth, small and non-setose; labellum 2 large, with numerous spine-like setae.

Thorax. Cervical sclerite inconspicuous. Antepronotum well developed, with a few setae, antepronotal sclerites connected by postpronotum, which forms a very narrow ridge above neck. Episternum 1 clearly separated from pronotum, non-setose. Epimeron 1 small, subtriangular, situated at postero-ventral margin of episternum 1. Scutum with dorsal surface evenly arched to a slight degree, with anterior parapsidal sutures weak and no median transverse suture traceable, with long setae laterally, along parapsidal sutures and anteromedially. Paratergite (= vestige of prescutum) distinct from scutum and well sclerotized. Scutellum setose, usually with two of the setae conspicuously long. Mediotergite high, bare, evenly arched to a slight degree, for a short portion laterodorsally fused with laterotergites. Laterotergites usually bare but setose in one species. Postphragma well developed, produced into abdominal cavity for maximally half the length of abdominal segment 1 but usually shorter. Anepisternum 2 subquadrate, much smaller than preepisternum 2, these two sclerites separated by distinct suture. Preepisternum 2 subtriangular ventrally. Pleural suture distinct. Pleural pit indistinct. Epimeron 2 large, without clear subdivision into anterior and posterior portions but with weak incision. Internal mid-coxal fork distinct. Metanotum small, forming a narrow collar above mediotergite. Episternum 3 with indistinct subdivision into small anepisternum and larger subquadrate preepisternum. Epimeron 3 (if correctly identified) membranous rather than sclerotized. Openings of thoracic spiracles without striking features.

Legs. Long, i.e., about 1.8 (fore leg) to 2.1 (hind leg) times the length of body. Coxae comparatively short, i.e., 0.6 (fore coxa) to 0.5 (hind coxa) times the height of thorax. Femora clearly shorter than tibiae; in fore leg, tibia clearly shorter than tarsus; in mid leg, tibia barely shorter than tarsus; and in hind leg, tibia and tarsus equal in length. Tarsomeres 1-5 gradually decreasing in length, with tarsomeres 1 very long. Coxae flattened, with long setae largely confined to anterior margins (fore and mid coxae) or laterodistal portions (hind coxa), with hind margins of mid and usually hind coxae bearing small groups of short setae, which may be spine-like. Femora barely flattened, with dense cover of setae, with longest setae (i.e., those along hind margins) little longer than diameter of femur. Tibiae with dense, tight cover of short, socketed, almost scale-like but pointed setae interspersed with large, unsocketed trichia, the latter much shorter than the former, additionally with a few fine, short, projecting hyaline setae. Tibial spurs small, numbering 1 in fore tibia and 2 in mid and hind tibiae, all of same size. Fore tibia with indistinct triangular anteroapical depression bearing distally an irregular row of strong spine-like setae in one species, or anteroapical depression completely absent. Tarsi with vestiture largely corresponding with that of tibiae. Pretarsal claws small, slightly curved, without teeth. Empodia pulvilliform, narrow, with their hairs about as long as claws. Pulvilli present, broader and shorter than empodia.

Wings. Long, i.e., about as long as body in both males and females; about 2.5 times as long as wide, widest beyond midpoint. No distinct alular or calypterous areas, anal area mod-

erately developed. Membrane transparent, with brownish or greyish tinge; densely and evenly covered with microtrichia and curved, slightly flattened setae on both sides. Venation: C extending to almost apex of wing, i.e., a point at or slightly beyond apex of R5; Sc1 strong proximally but faint distally, ending free; Sc2 present but hardly visible, joining R1; h present, oblique; Rs present but hardly visible, situated unusually close to wing base, with oblique inclination; R (i.e., vein portion between arculus and Rs) very short; R1 (i.e., vein portion from Rs to junction point with anterior wing margin) excessively long, joining C in distal third of wing; R4 present as short, vertical vein in between R1 and R5, situated at or beyond half wing length; R5 (i.e., vein portion from diverging point of M1+2 to junction point with C which is close to wing apex) excessively long, with its most distal portion down-curved; frn (i.e., vein portion between Rs and diverging point of M1+2) present but short; ta absent; tb present but short and with horizontal inclination; mcu absent; M furcate with its stem (= M1+2) a little shorter than its fork; with point where M1+2 diverges from R5 very far basally and situated beyond Rs; M-fork with shape of a slender V; CuA1 and CuA2 originating from one and the same point, i.e., forming a fork without common stem; CuA1 often obsolete proximally but originating from same point like CuA2 as becoming obvious in large-sized specimens, almost straight throughout; CuA2 almost as strong as radial veins and distinct throughout, sometimes slightly sinuous distally; CuP distinct but faint, running close to and reaching about 2/3 the length of CuA2; A1 distinct but faint, reaching beyond half length of CuA2; A2 indistinct and short, just traceable in large-sized specimens. With setae present dorsally and ventrally along posterior wing margin as well as on all veins dorsally, and ventrally on R1 (except most proximal portion) and R5 (except proximal half); 'calypteral margin' with a few long setae nearly as long as width of wing base. Number of sensory pores somewhat variable but usually on R1, 2 distally and 1 medially; and on R5, 2 distally and 2 proximally, apart from numerous pores on Sc and stem vein. Halteres club-shaped, long and slender, with dense cover of setae on both stem and knob.

Abdomen. Tergites usually more strongly sclerotized than sternites. Segment 8 shorter than preceding segments, and sternite 1 always bare. With six pairs of spiracles, one each on segments 2–7. Tergal plaques small and inconspicuous, situated in a lateral position on each of the tergites, with their pattern (see JASCHHOFF 1998) 0/2/2/1/1/1/0.

Terminalia ♂. Sternite 9 present as distinct or largely distinct sclerite; non-setose. Gonocoxites narrow and long, without sclerotized connection basally, with subtriangular, apically narrowly rounded lobes ventrodistally, with long setae scattered over the surfaces and some of ventrodistal setae particularly strong and long, usually with whip-like setae dorsally, with gonocoxal apodemes short and running into dorsal parameral apodemes (see JASCHHOFF & DIDHAM 2002). Gonostylus comparatively small, elongate and very slender, with simple or double terminal tooth, with vestiture very sparse and short. Aedeagus forming a pubescent, membranous extension at tip of a long, weakly sclerotized ejaculatory apodeme, aedeagus dorsally closely attached to parameres. Parameres largely separate, i.e., without forming a true plate-like tegmen; secondarily subdivided into ventral and dorsal pairs, or with just one ventral pair developed; with dorsal pair, if developed at all, having a complicated fine structure and bearing long projections or setae. Tergite 9 present as strong, convex plate of varied shape. Tergite 10 present in all but one species, medially narrowly bridged to tergite 9, setose. Cerci long, weakly pointed or narrowly rounded apically, in particular distally with numerous setae of various lengths. Hypoproct weak, its distal rim sometimes with more distinct contours, rounded apically and with 2–3 setae on either side.

Terminalia ♀. With no significant structural variation between species. Ovipositor very short, with surfaces setose, and setae on gonocoxites 8 and cerci little stronger and longer than elsewhere; with gonocoxites 8 just little longer than tergite 8; tergite 9 very short; gonapophysis 9 present as weak, sclerotized internal rib; tergite 10 very short; sternite 10 weak but distinct and finely setose; cerci one-lobed with lobes elongate and ovoid. With sclerotized spermathecae absent.

Immature stages. Unknown.

Monophyly and phylogenetic relationships of *Ohakunea*. **Habitus.** Compared with other sciaroids, the gestalt of *Ohakunea* is not unlike that of Sciaridae at a glance. However, in *Oha-*

kunea antennae and legs are longer than in many Sciaridae; the head is attached to the thorax clearly below the level of the mesonotum, resulting in a slightly humpbacked appearance which is unlike that in Sciaridae; and even when the waist, i.e., the junction of thorax and abdomen, is not as narrow as in Mycetophilidae s.str., it is also not as broad as it typically is in Sciaridae. Also the size of the postphragma in *Ohakunea* is in between that in Mycetophilidae s.str. (where the postphragma is practically lacking) and Sciaridae (where it is extending deep into the abdominal cavity). Consequently, the postphragma in *Ohakunea*, which is similar to that in Bibionomorpha outside Sciaroidea, might be in a primitive state, whereas it might be in a derived state in both Mycetophilidae (strongly reduced) and Sciaridae (enlarged).

Head. Almost all characters of the head are in a plesiomorphic state, notably the ocelli, which form a narrow triangle, and the maxillary palpi, which consist of five segments. The five-segmented condition of palpi in *Ohakunea* is in opposition to the maximally four-segmented condition in Sciaridae, where one of the two basalmost palpal segments presumably has been reduced throughout this family (see discussion in JASCHHOF & DIDHAM 2002). As for apomorphies concerning the *Ohakunea* head, one must note the reniform eyes which approach at vertex but never form a complete bridge as is typical for Sciaridae.

Thorax. The thoraces of *Ohakunea* and Sciaridae differ in the postphragma, which is distinctly smaller in the former, and in the mid-pleural pit, which in *Ohakunea* is a depression rather than a deep, funnel-like invagination. The mid-pleural pit in Sciaroidea will need further investigation before structural differences, which doubtlessly exist, can be described in detail. Also, further differences that might exist in the thoracic structures are hard to recognize at this stage as the range of variation of thoracic features within the family Sciaridae has not yet been fully elaborated. As a difference to Mycetophilidae s.str., the laterotergites in *Ohakunea* are unpronounced and of ordinary size, which certainly represents the primitive condition.

Legs. Plesiomorphies characterize widely also the legs in *Ohakunea*. Coxae in *Ohakunea* are of the same length as in Sciaridae, and consequently shorter than in most Mycetophilidae s.str. Strikingly big setae, as found on the legs of many Mycetophilidae s.str., are absent in *Ohakunea*; similarly, tibial spurs in *Ohakunea* are also small. In two of the *Ohakunea* species fore tibiae have an anteroapical depression, as in the ground plan of Sciaroidea, but it is worth to notice the lack of this 'tibial organ' in the three other species. As for the vestiture, legs in *Ohakunea* are peculiar in that tibiae and tarsi are covered with pointed but comparatively broad setae, which therefore are reminiscent of scales and very similar to those found in some Cecidomyiidae-Lestremiinae (tribe Lestremiini), for instance.

Wings. The presence of setae on the membrane, the dorsal sides of all veins and even on some of the veins' ventral sides is a primitive character in *Ohakunea*. However, wing shape and venation are clearly in a derived state, and wing venation in particular is extraordinary not only when compared with that in Sciaridae but also the majority of other Sciaroidea. Wing vein homologies are interpreted here in a way that is different from views expressed previously. It is quite obvious that veins like M1+2 and CuA1 in *Ohakunea* have their points of origin extremely close to the wing base ('basalization'), and further that the short vertical vein previously believed to be homologous with the Rs in Sciaridae is situated unusually far distally. When the portion close to the wing base is examined using the high magnification of a compound microscope, a very short and faint, oblique vein becomes apparent that is visible chiefly through its interior tracheae rather than any pigmentation or clearly contoured margins. This vein remnant must be the true Rs while the 'false' Rs situated far distally represents actually the R4. Such an interpretation has consequences, of course, for homologizing several other veins as it was described above. Most notably, *Ohakunea* then appears to have a firm and M1+2 arises from a point beyond Rs, conditions that are met also in Ditomyiidae, Keroplattidae and Rangomaramidae but never so in Sciaridae. The presence of R4 is also exceptional in Sciaridae. We have no doubt that the remnant Rs is a true vein, even though it is known that 'the association between tracheae and lacunae – and therefore between tracheae and subsequent venation – is not always exact' (RICHARDS & DAVIES 1977). We believe that it is a true vein because it lies in exactly the position where one would expect it (from the position of the starting points of M1+2 and CuA1). A further hint comes from another very short and faint

vein, the Sc2, which in *Ohakunea* is visible also through its tracheae rather than a sharp vein delineation. In accepting wing venation in *Ohakunea* as explained here, one must conclude that it is fundamentally different from that in Sciaridae. Similarities to the venation in the other sciaroid families referred to above are certainly due to convergence as can be inferred from the entire set of characters.

Terminalia. Female terminalia in *Ohakunea* are peculiar, and deviating from the supposed sciaroid ground plan, by their shortness and the presence of only one-segmented cerci. Such characters are unlike those usually found in Sciaridae. However, seen for the entire Sciaroidea one would certainly meet comparable conditions here and there in quite distantly related taxa. The situation is similar with the male terminalia. As emphasized also by previous authors, male genitalia in *Ohakunea* are much unlike that in Sciaridae. There is actually one main difference, which lies in the structure of the parameres: in *Ohakunea*, the parameres are largely separate, whereas in Sciaridae they are merged and strongly modified as they form a genital plate or tegmen. The condition in *Ohakunea* we consider plesiomorphic, whereas a subdivision of the parameres into ventral and dorsal pairs is certainly apomorphic and finds a parallel, for instance, in various Mycetophilidae s.str. Thus, strictly speaking, the male terminalia of *Ohakunea* are not 'unusual', but those of Sciaridae are: the genital plate, resulting from the fusion of the parameres, apparently belongs to the ground plan in that family and only secondarily the tegmen may be partially divided. In *Ohakunea*, the presence of the sternite 9 largely distinct from the gonocoxites is noteworthy as it is another plesiomorphy. These as well as other features of male terminalia in *Ohakunea* may similarly be found in other sciaroids, namely in the most variable Mycetophilidae s.str., but these are certainly due to homoplasy.

Conclusions. From the above emerge two major arguments for our view that *Ohakunea* should not be classified with Sciaridae as currently defined: (1) the maxillary palpi in *Ohakunea* are five-segmented whereas palpi in Sciaridae never exceed four segments; and (2) male terminalia in *Ohakunea* are characterized by the presence of separate parameres while Sciaridae have a genital plate or tegmen.

In addition to the fact that *Ohakunea* species are extremely similar to each other due to numerous corresponding plesiomorphies, the genus can be defined formally through the following autapomorphies: (1) the Rs is strongly basalized, a feature which actually stands for a whole cascade of characters (for instance, M1+2 with its point of origin close to the wing base; tb extremely short etc.), all together making up what is termed 'basalization'; and (2) the R4 is re-vitalized by secondary acquisition and situated far distally. The basalization of Rs in *Ohakunea* is not a unique feature within Sciaroidea; for instance, a comparable condition may be found in *Lygistorrhina* (in Lygistorrhinidae) and *Azana* (in Mycetophilidae s.str.). Inferred from the structure of the thorax, *Lygistorrhina* and *Azana* are only distantly related to *Ohakunea* (see MATILE 1990: fig. 1028), so that the basalization of wing veins in these three genera is certainly due to homoplasy. The presence of R4 is a ground plan condition in Sciaroidea and, apart from *Ohakunea*, found in Ditomyiidae, Keroplatidae, Bolitophilidae, Mycetophilidae and *Pterogymnus*, whereas the loss of R4 may be considered an autapomorphy of a clade consisting of Diadocidiidae, the *Heterotricha* group, Sciaridae, Rangomaramidae and Cecidomyiidae. Under consideration of the entire set of characters, *Ohakunea* should belong to the latter clade and its R4 was then acquired secondarily.

The question remains where within Sciaroidea, if not in Sciaridae, *Ohakunea* should be placed. Wing venation is too different to consider a closer affiliation with Ditomyiidae or Keroplatidae, with either of the latter clades also possessing the frm but otherwise showing fundamental differences (as, for instance, ta and tb with vertical or oblique inclination). Rangomaramidae also have the frm, but are characterized by apomorphies which are not shared with *Ohakunea*, most notably the reduction of tibial spurs and the presence of a synsclerite made up of mediotergite and laterotergites. For similar reasons *Ohakunea* cannot be classified with any other family in Sciaroidea. We therefore suggest that *Ohakunea* – either solitarily or together with other unplaceable sciaroids – deserves family status. Naturally, this question can not be addressed without considering sciaroid genera like *Colonomysia* Colless, 1963, the *Heterotricha* Loew group in a strict sense (CHANDLER 2002) and perhaps others.

Species of the genus *Ohakunea*

The genus *Ohakunea* consists of five species:

- australiensis* Colless, 1963 (Australasia: Australia, New Zealand)
- bicolor* Edwards in Tonnoir & Edwards, 1927 (Australasia: New Zealand)
- chilensis* Freeman, 1951 (Neotropics: Argentina, Chile)
- ingegerdae* sp. n. (Australasia: Papua New Guinea)
- papuensis* sp. n. (Australasia: Papua New Guinea)

Key to species (males)

- 1 Terminalia, including tergite 9, with megasetae absent; with parameres consisting of one pair situated ventrally *O. chilensis*
- Terminalia, at least tergite 9, with megasetae present; with parameres subdivided into ventral and dorsal pairs 2
- 2 Gonostyli with simple terminal tooth 3
- Gonostyli with double terminal tooth 4
- 3 Gonocoxites with ventrodistal lobes bearing megasetae *O. bicolor*
- Gonocoxites with ventrodistal lobes lacking megasetae *O. australiensis*
- 4 Tusk-like processes of parameres curved laterally, with finger-like process in between tusks *O. ingegerdae*
- Tusk-like processes of parameres parallel and apically curved ventrally, without finger-like process in between tusks *O. papuensis*

Ohakunea australiensis Colless, 1963

(Figs. 1–5)

COLLESS (1963: 304 ff., fig. 1)

Redescription. Measurements. Body size ♂ up to 2.2 mm, ♀ up to 3.0 mm; wing length ♂ 1.9–2.1 mm, ♀ 2.8–3.0 mm.

Head ♂. Lateral ocelli at some distance from middle ocellus, i.e., ocellar triangle not quite as narrow as in other species. Interommatidial setulae absent. Fourth antennal flagellomere 5.5 times as long as wide, with neck barely 0.2 times the length of node. Flagellomeres with longest setae up to 4.5 times as long as diameter of node. Maxillary palpus with presegment apparently absent, resulting in 4-segmented condition.

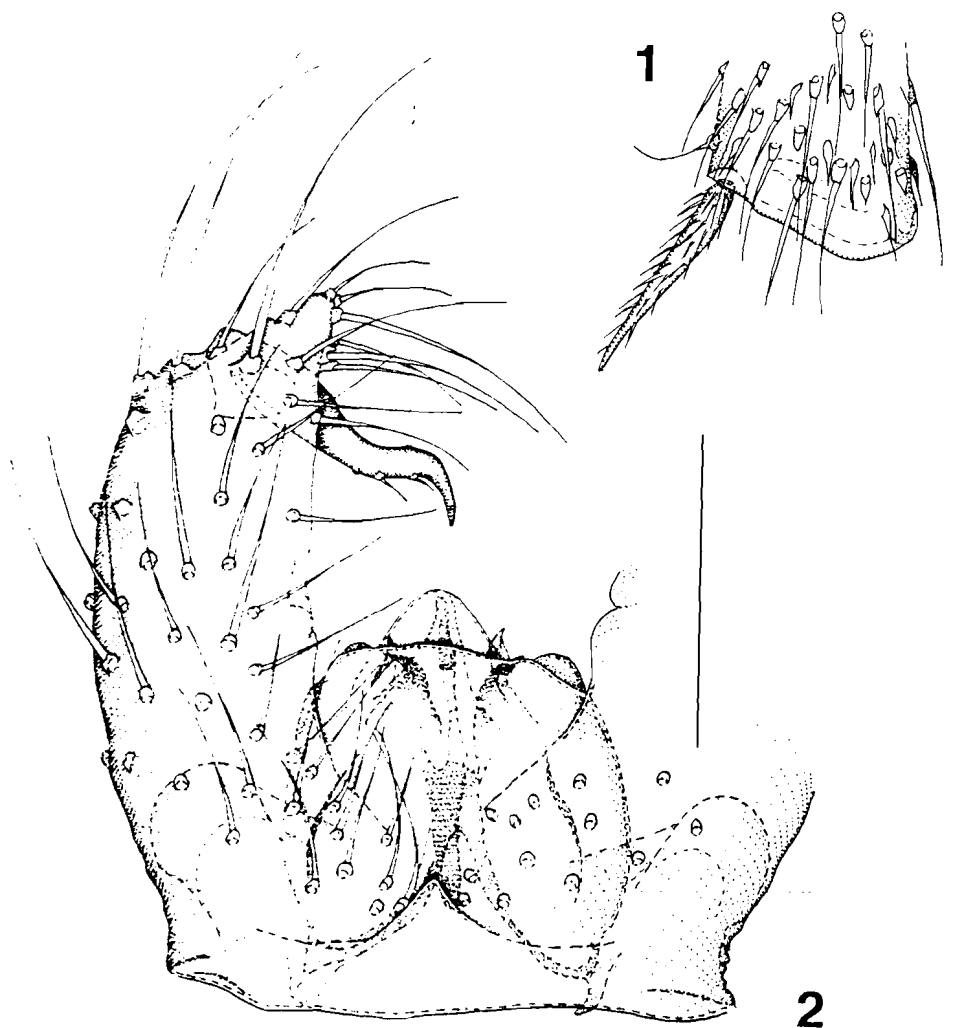
Thorax ♂. Postphragma produced into abdominal cavity for 1/4 the length of abdominal segment 1.

Legs ♂. Fore tibia with anteroapical depression absent (Fig. 1).

Wings ♂. Rs visible only in large specimens, A2 extremely short or absent. Number of sensory pores on R1, 2 distally and 0–1 medially; and on R5, 2 proximally and 1–2 distally.

Abdomen ♂. Tergite 8 one third the length of tergite 7, and sternite 8 two thirds the length of sternite 7. Tergites 1–8 well sclerotized, with long setae. Sternites 1–4(–5) weakly sclerotized; sternite 2 with lateral setae, and sternites 3–8 with long setae arranged in 3 irregular longitudinal rows.

Terminalia ♂. Sternite 9 (Fig. 2) short, laterally merged with but otherwise distinct from gonocoxites, with small, subtriangular posterior lobe situated in between gonocoxal halves. Gonocoxites (Figs. 2–4) with distoventral lobes small, subtriangular and densely setose; with 4–5 pairs of whip-like setae distodorsally which are too short to cross each other. Gonostylus (Figs. 2–4) with flat, rounded basal portion that proceeds into a finger-like distal process directed inwards, the latter curved and terminating in claw-like tooth, further with a tiny spine-like seta at base of tooth and another, somewhat longer seta more inside, further with a fine setula at opposite rim; with fine, short setulae along inner margin of both basal portion and distal process. Aedeagus (Fig. 2) with ejaculatory apodeme comparatively broad. Parameres (Figs. 2–4) apparently subdivided into ventral and dorsal pairs; with the ventral pair weakly sclerotized, somewhat S-shaped, closely attached to dorsolateral membranous portions of aedeagus; with the dorsal pair connected proximally by a sclerotized transverse bridge forming a rectangular plate, on either side having a short projection terminating in hook-like.



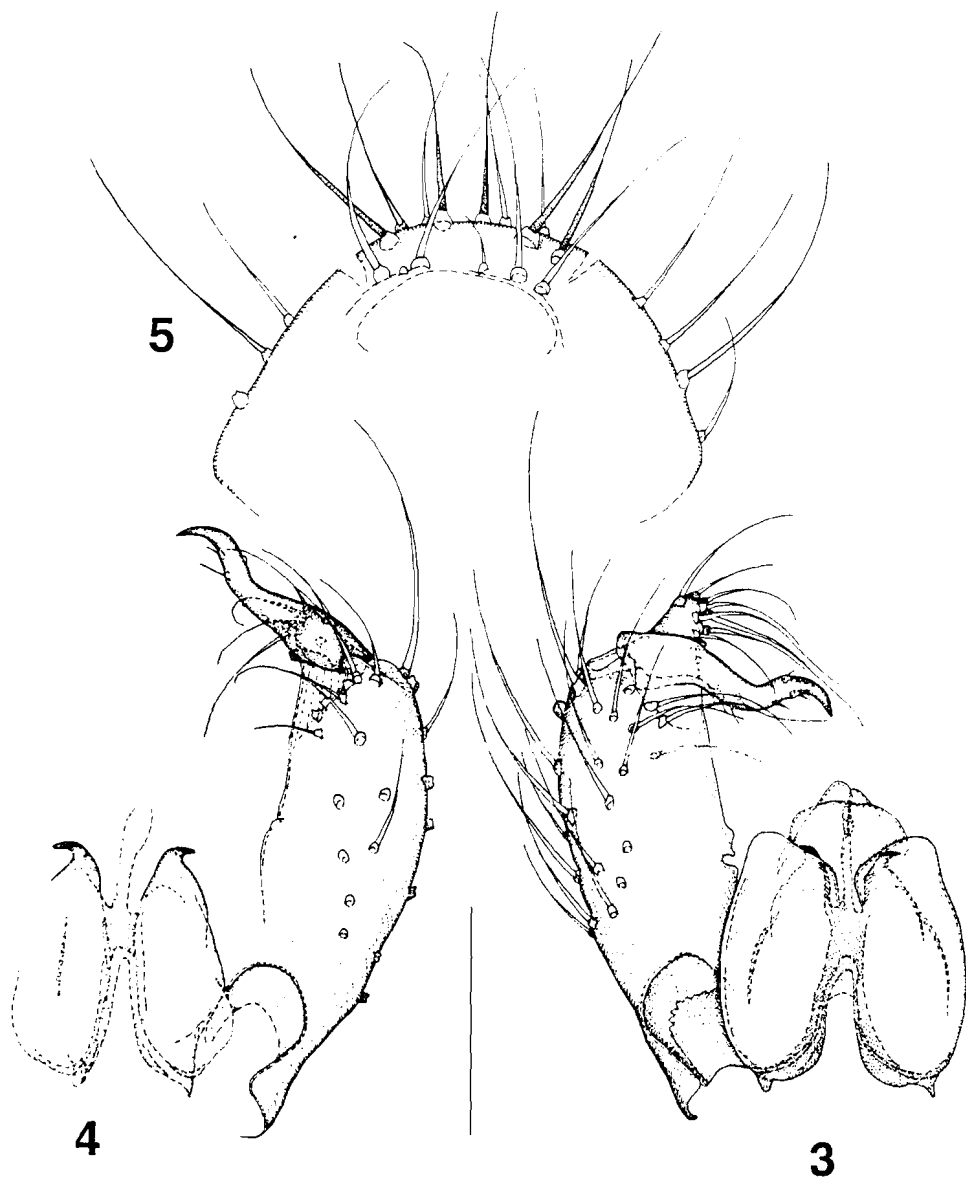
Figs. 1–2. *Ohakunea australiensis* Colless, 1963, male. 1: Tip of fore tibia, anterior view (specimen from Kawau, scale bar 0.05 mm). 2: Terminalia, ventral view, with the dorsal structures omitted (specimen from Kawau, scale bar 0.1 mm).

pointed apex, further – in between these projections – with long, narrow, sclerotized process arising from transverse bridge and running into dorsal membranous portions of aedeagus. Tergite 9 (Fig. 5) with broadly rounded distal margin, its outer surface covered with long setae, most distally – or slightly inside – with row of 5 long megasetae. Tergite 10 (Fig. 5) present as sclerotized plate with 2 long megasetae on either side, apart from a few additional ordinary setae.

Head ♀. Antenna with 4th flagellomere 5 times as long as wide. Flagellomeres with longest setae 2–2.5 times as long as diameter of node.

Terminalia ♀. See under genus description.

Distribution and biology. *Ohakunea australiensis* is a native of Australia, from where it was presumably introduced to New Zealand. The only New Zealand locality known of this species is a subtropical island, Kawau Island Reserve, eight kilometres off the east coast of the



Figs. 3–5. *Ohakunea australiensis* Colless, 1963, male. **3:** Terminalia, dorsal view, with tergite 9 and associated structures omitted (specimen from Kawau). **4:** Dito (paratype). **5:** Tergites 9 and 10, ventral view (specimen from Kawau). (scale bar 0.1 mm)

North Island: the small island is notorious for its exotic vegetation including trees imported from all over the world. As *O. australiensis* has been collected on Kawau in two successive years it must have managed to establish a reproducing population, at least for a certain period of time. Intensive collections in 2001/02 all over the New Zealand main islands failed in recording *O. australiensis* anywhere else (while *O. bicolor* has been found abundantly, see there), while Kawau was not visited during these particular collections. On Kawau Island, *O. australiensis* was found occurring sympatric with *O. bicolor*. The few Australian

specimens were captured in the southeastern parts of the continent, New South Wales and Victoria; according to the original description (COLLESS 1963) the individuals were sweep-netted in moist, shady places in rain forest or wet sclerophyll, mostly in colder, more mountainous regions.

Material. AUSTRALIA: 1 paratype ♂, New South Wales, Macquarie Pass, 2 Nov. 1960, D.H. Colless [a previously pinned specimen now mounted on two slides]; 1♂, New South Wales, Upper Allyn River, 14 Febr. 1968, D.H. Colless; 1♀, Victoria, Maroondah, 8 Oct. 1964, N. Dobrotworsky [all in Canberra]. NEW ZEALAND: 1♂, Auckland, Kawau Island, 27 March–13 May 1992, D. Williams; 1♂, 1♀, same locality but Febr.–March 1993.

Ohakunea bicolor Edwards, 1927

(Figs. 6–16)

EDWARDS in TONNOIR & EDWARDS (1927: 799 ff., figs. 45, 190, 191)

Redescription. An exceptionally colourful species in so far as yellow thorax, coxae, scapes and pedicels contrast sharply with blackish head and brownish abdomen.

Measurements. Body size ♂ 2.0–2.9 mm, ♀ 2.0–3.4 mm; wing length ♂ 2.1–3.0 mm, ♀ 2.1–3.4 mm.

Head ♂ (Fig. 6). With a few short interommatidial setulae. Antenna with 4th flagellomere 8.5 times as long as wide, and with neck 0.1 times the length of node (Fig. 7). Flagellomeres with longer setae up to 4 times as long as diameter of node. Maxillary palpus (Figs. 6, 8) with presegment distinct and bearing 1 strong seta; with terminal segment very long, i.e., 1.5 times as long as segment 4.

Thorax ♂. Postphragma produced into abdominal cavity for up to 1/2 the length of abdominal segment 1 (Fig. 9).

Legs ♂. Mid coxa at hind margin with group of 4–5 short, thick spine-like setae, hind coxa in same position with group of ordinary short setae interspersed with 1–2 thick spine-like setae (Fig. 9). Fore tibia with small, triangular anteroapical depression with net-like fine structure and distally an irregular, interrupted row of 7–8 spine-like setae (Fig. 10).

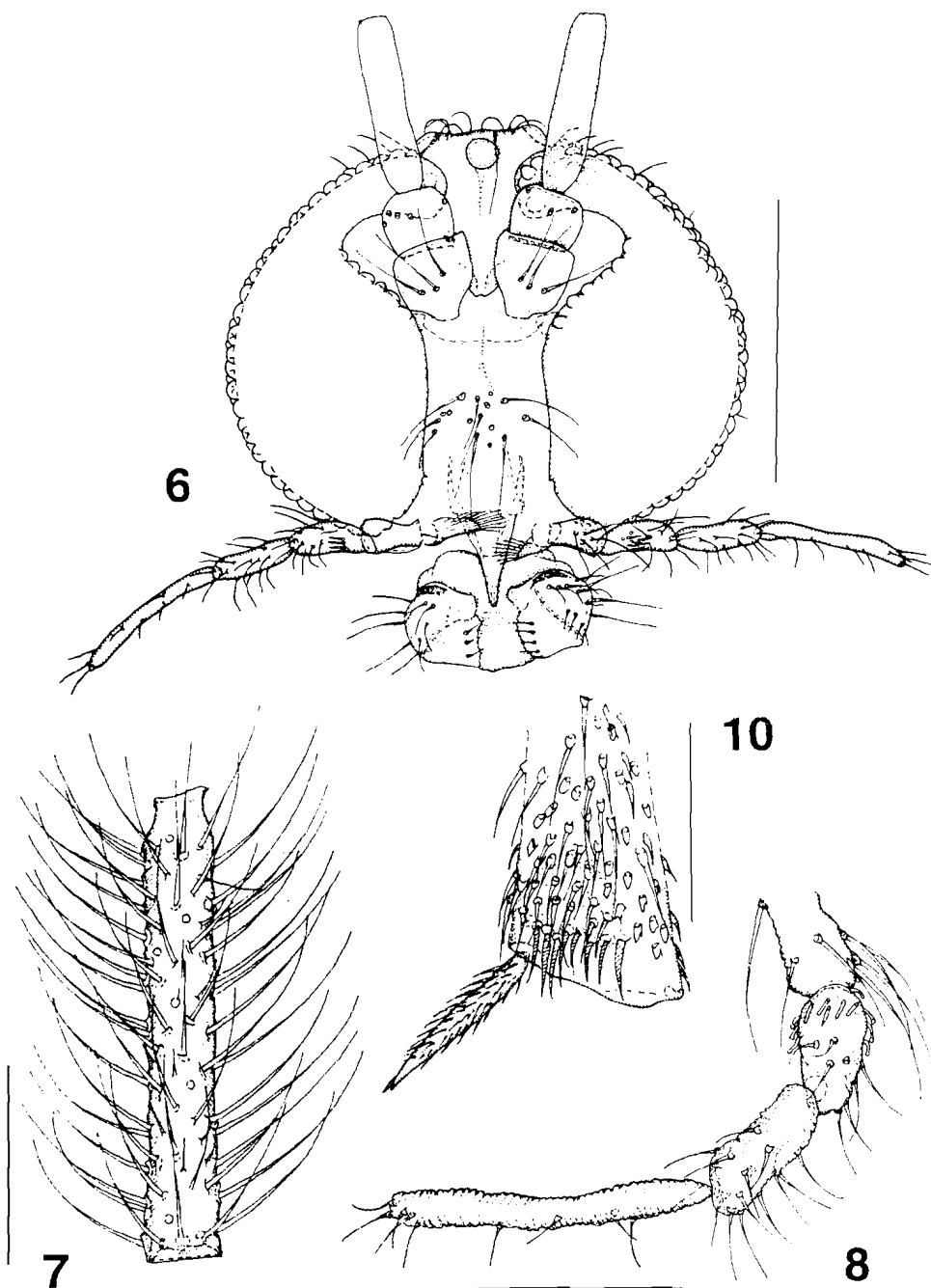
Wings ♂ (Figs. 11, 12). A2 extremely short or absent. Number of sensory pores on R1, 2 distally and 1 medially; and on R5, 2 proximally and 1–2 distally.

Abdomen ♂. Segment 8 less than half the length of segment 7. Tergites 1–8 well sclerotized, with long setae. Sternites 1–5 more weakly sclerotized than more posterior sternites; sternites 2–8 with long setae arranged in 3 irregular longitudinal rows.

Terminalia ♂. Sternite 9 short, distinct from gonocoxites, with posterior lobe situated in between gonocoxal halves. Both gonocoxal halves having two big lobes distoventrally (Fig. 13); with one lobe directed posteriorly, very long and narrow and bearing numerous long setae of which 6–8 are stout, black megasetae, further with one pair of whip-like setae dorsally long enough to cross each other; other lobe shorter, directed inwards, a little curved upwards and covered with numerous setae. Sclerotized process arising from base of gonocoxites or sternite 9, respectively, and forming a Y-shape (Figs. 13–15). Gonostylus inserting close to base of gonocoxal lobe (Fig. 13); with flat, rounded basal portion that proceeds into finger-like process directed inwards, the latter terminating in curved, strong tooth, at base of the latter with 2 extremely short setulae arising from big sockets; further with fine, short setae mainly along inner margin. Parameres apparently subdivided into ventral and dorsal pairs; the ventral pair weakly sclerotized, S-shaped, in particular distally without distinct contours and closely attached to dorsolateral membranous portions of aedeagus; the dorsal pair connected proximally by sclerotized transverse bridge, on either side bearing a strong megaseta plus whip-like seta, which both are extremely long, and a much shorter, pointed, sclerotized projection, further – in between megasetae – with seemingly sclerotized process arising from transverse bridge and running into dorsal membranous portions of aedeagus (Fig. 15). Tergite 9 long, subtriangular with somewhat rounded distal margin, its outer surface covered with long setae, its inner surface with up to 20 stout, black megasetae directed inwards (Fig. 14). Tergite 10 absent.

Head ♀. Antenna with 4th flagellomere 6.5 times as long as wide. Flagellomeres with longer setae up to 2.5 times as long as diameter of node.

Terminalia ♀ (Fig. 16). With yellow coloration.



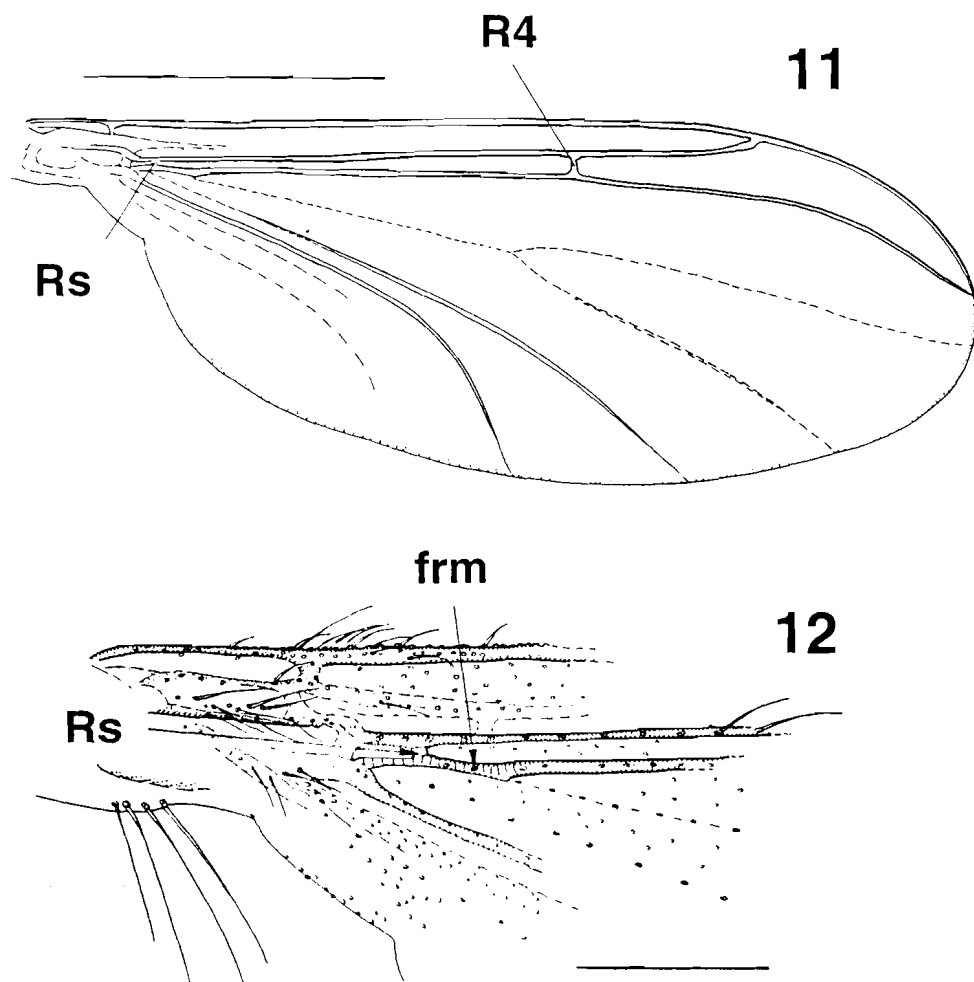
Figs. 6–8, 10. *Ohakunea bicolor* Edwards, 1927. 6: Head in male, frontal view (specimen from Maruia Forest, scale bar 0.25 mm). 7: Male antennal flagellomere 4, mesial view (specimen from Maruia Forest, scale bar 0.1 mm). 8: Maxillary palpus in male, lateral view (specimen from Maruia Forest, scale bar 0.1 mm). 10: Tip of fore tibia in female, anterior view (specimen from Westland, scale bar 0.1 mm).



Fig. 9. *Ohakunea bicolor* Edwards, 1927. Thorax in male, lateral view (specimen from Tongariro Nat. Park, scale bar 0.5 mm).

Remarks. Male genitalia in this species are absolutely distinctive and strongly modified by an excessive lobation and megasetation. There is some variation in the number of megasetae on the distoventral gonocoxal lobes as well as on the inside of tergite 9. However, we hold that such differences are due to infraspecific variation.

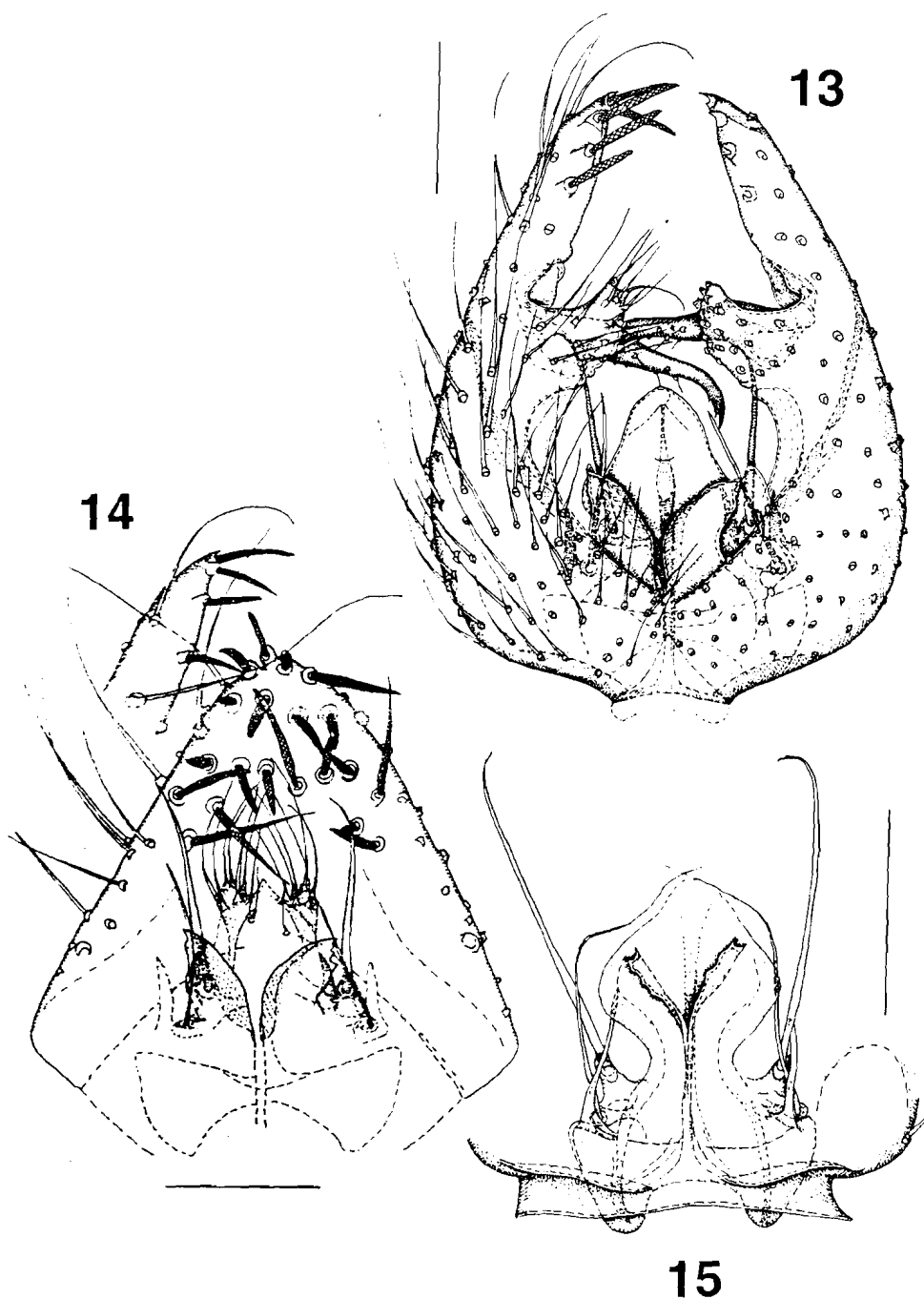
Distribution and biology. *Ohakunea bicolor* is the only species of its genus of which a considerable amount of individuals and collection sites has become known. It is widely distributed throughout New Zealand, but nowhere common on the main islands (including Stewart Island). Its apparent absence from parts of the country is certainly due to the lack of



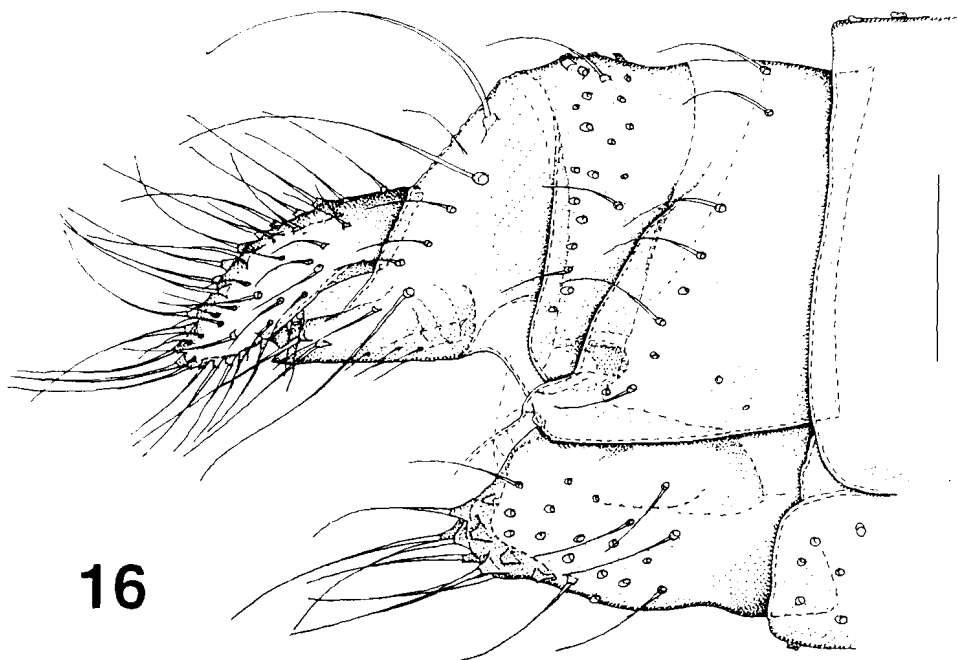
Figs. 11–12. *Ohakunea bicolor* Edwards, 1927. 11: Wing in female (specimen from Tongariro Nat. Park, scale bar 1 mm). 12: Base of wing in female (specimen from Tongariro Nat. Park, scale bar 0.25 mm).

collections, and thus artificial. The species has been collected in different types of mature, native forest that are dominated by podocarps (conifers of the family Podocarpaceae) or beech (evergreen species of *Nothofagus*). Often such forests are mixed stands of podocarps, beeches and a whole variety of other evergreen broadleaf trees. All collection sites of *O. bicolor* were moist, rich in rotting wood, covered with a wealth of ground ferns or mosses, and situated in elevations between sea level and 800 metres. Most of the adults were captured by Malaise traps, a few others sweepnetted. Females were trapped much more often than males: among a total of 111 individuals taken in 2001/02 only 12 were males. The majority of specimens were collected in the warmer half of the year, i.e., between October and March, but – as evidenced by our data – adults can be caught almost all around the year.

Material. [specimens with an asterisk slide-mounted, all others in ethanol; if not otherwise stated, deposited in Auckland] NEW ZEALAND. North Island, Auckland: 1♀*. Kawau Island, April–May 1993, D. Williams; 4♂, 17♀, Taupo, Pureora Forest, Waipapa Reserve, numerous dates Oct. 1983–March 1984, J. Hutcheson; 1♀, same locality but 4–5 Febr. 2002, M. Jaschhof; 1♀, same locality, Select Loop Road, 15 July–23 Aug. 2001, M. & C. Jaschhof; 2♂*, 2♀*. Tongariro National Park, Mangawhero River



Figs. 13–15. *Ohakunea bicolor* Edwards, 1927, male. 13: Terminalia, ventral view, with the dorsal structures omitted (specimen from Maruia Forest). 14: Tergite 9 and associated structures, ventral view (specimen from Maruia Forest). 15: Aedeagus and parameres, ventral view (specimen from Ohakune area). (scale bar each 0.1 mm)



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Fig. 16. *Ohakunea bicolor* Edwards, 1927, female. Terminalia, lateral view (specimen from Ohakune area, scale bar 0.1 mm).

valley 3 km NE Ohakune, 3–4 Febr. 2002, M. Jaschhof. South Island; Nelson: 13♀ (1*). Kahurangi National Park, Takaka River valley (Cobb dam road), 31 Aug.–7 Oct. 2001, M. & C. Jaschhof; 1♀, Marlborough Sounds, Okiwi Bay, Moncrieff Scenic Reserve, 24 Dec. 2001, M. Jaschhof; 1 paratype (abdomen lacking), Buller, Lake Brunner, 4 Febr. 1922, A. Tonnoir; 2♂ (1*), 5♀, Nelson Lakes National Park, Lake Rotoroa, various dates 19 Dec. 2000–15 Jan. 2001 and 22–29 March 1995, Department of Conservation St Arnaud; 7♀, Nelson Lakes National Park, Lake Rotoiti, various dates 13 Dec. 2000–30 Jan. 2001, Department of Conservation St Arnaud; 1♂, Lake Daniells Track 5 km E Springs Junction, 9 Nov. 2001, M. Jaschhof; 1♀, same locality but 24 Nov.–26 Dec. 2001, M. & C. Jaschhof; 1♀, Maruia Forest, Shenandoah Saddle, 3–25 Nov. 2001, M. & C. Jaschhof; 1♀*, same locality but 25 Nov. 2001, U. Kallweit; 2♂*, same locality but 25 Dec. 2001, M. Jaschhof; 5♀, Rahu Scenic Reserve, 12 km NW Springs Junction, 27 Nov.–25 Dec. 2001, M. & C. Jaschhof; 9♀, 5 km W Maruia Springs, 26 Nov.–25 Dec. 2001, M. & C. Jaschhof; 1♀, Paparoa National Park, 5 km E Punakaiki, Inland Pack Track, 30 Sept.–5 Nov. 2001, M. & C. Jaschhof; 1 paratype ♀, Mid Canterbury, Kaituna [labelled Kaitouna which is misspelled (see CROSBY 1976) erroneously as Kaikoura in the original description (see TONNOIR & EDWARDS 1927)], 19 Febr. 1922, A. Tonnoir [in Canberra]; 1♀, Cass, Middle Bush, 9 April 1994, P. M. Jones; 1♀, Westland, Waiatoto, 16 Oct.–20 Nov. 2001, M. & C. Jaschhof; 2♀*, Westland National Park, SE Gillespies Beach, 14 Oct.–21 Nov. 2001, M. & C. Jaschhof; 5♀, Fiordland National Park, Hollyford River valley, Moraine Creek Track, 5–24 Jan. 2002, M. & C. Jaschhof; 1♂, Otago Lakes, Fiordland National Park, Eglinton River valley, Deer Flat, 4–24 Jan. 2002, M. & C. Jaschhof; 2♀, Southland, Catlins, Purakaunui Scenic Reserve, 3 Jan. 2002, M. Jaschhof; 15♀, same locality but 27 Jan.–5 March 2002, M. & C. Jaschhof; 4♀, Catlins Coastal Rain Forest Park, Catlins River valley, 27 Jan.–5 March 2002, M. & C. Jaschhof; 1♀, Stewart Island, Murray River, 18 Jan. 2000, J.B. & G.M. Ward; 2♀, Rakiura Track between Kaipipi Bay and North Arm Hut, 7–8 March 2002, M. Jaschhof.

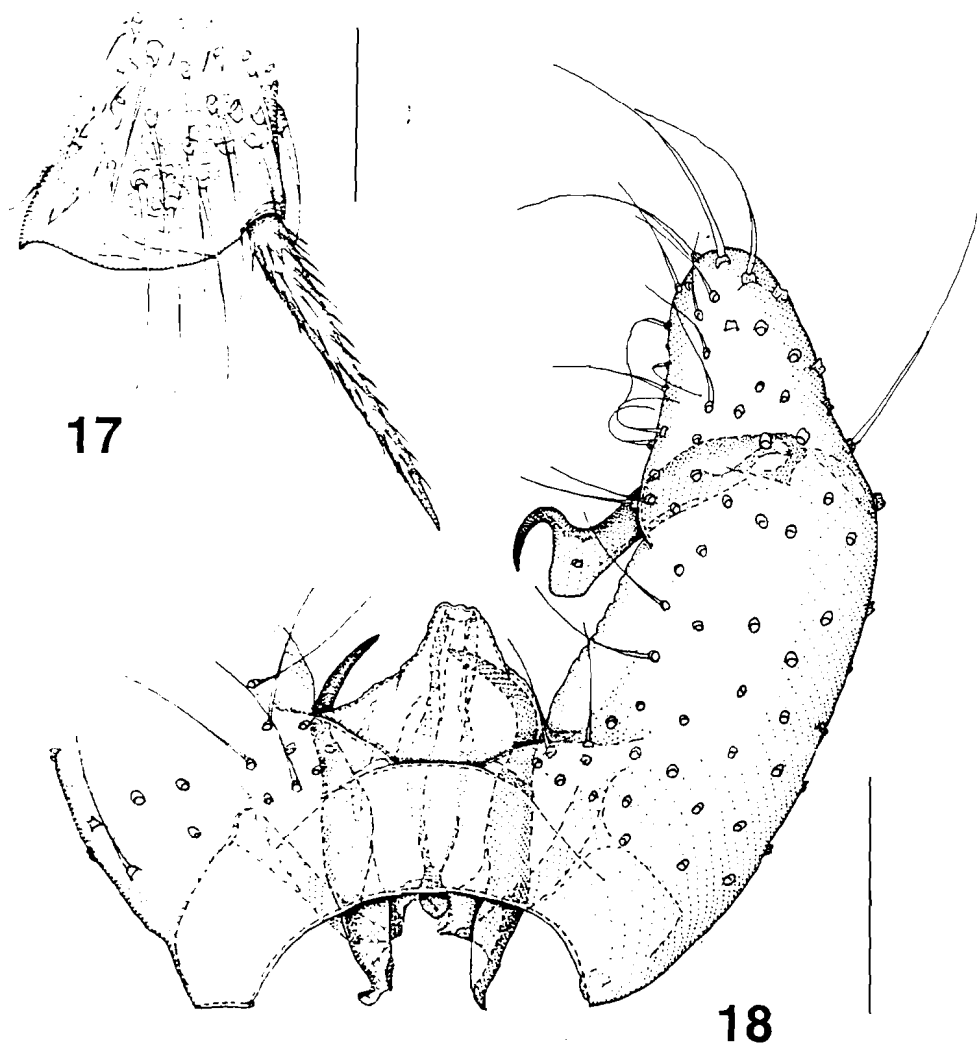
***Ohakunea chilensis* Freeman, 1951**

(Figs. 17–18)

FREEMAN (1951: 28 ff., pl. 2, fig. 9)

Redescription. Measurements. Body size ♂ 3.4 mm; wing length ♂ 3.4 mm.

Head ♂. With interommatidial setulae absent. Flagellomeres with longer setae up to seven times as long as diameter of node. Maxillary palpus with presegment not visible in specimen available for study.



Figs. 17–18. *Ohakunea chilensis* Freeman, 1951, male. 17: Tip of fore tibia, anterior view (paratype, scale bar 0.05 mm). 18: Terminalia, ventral view, with the dorsal structures omitted (paratype, scale bar 0.1 mm).

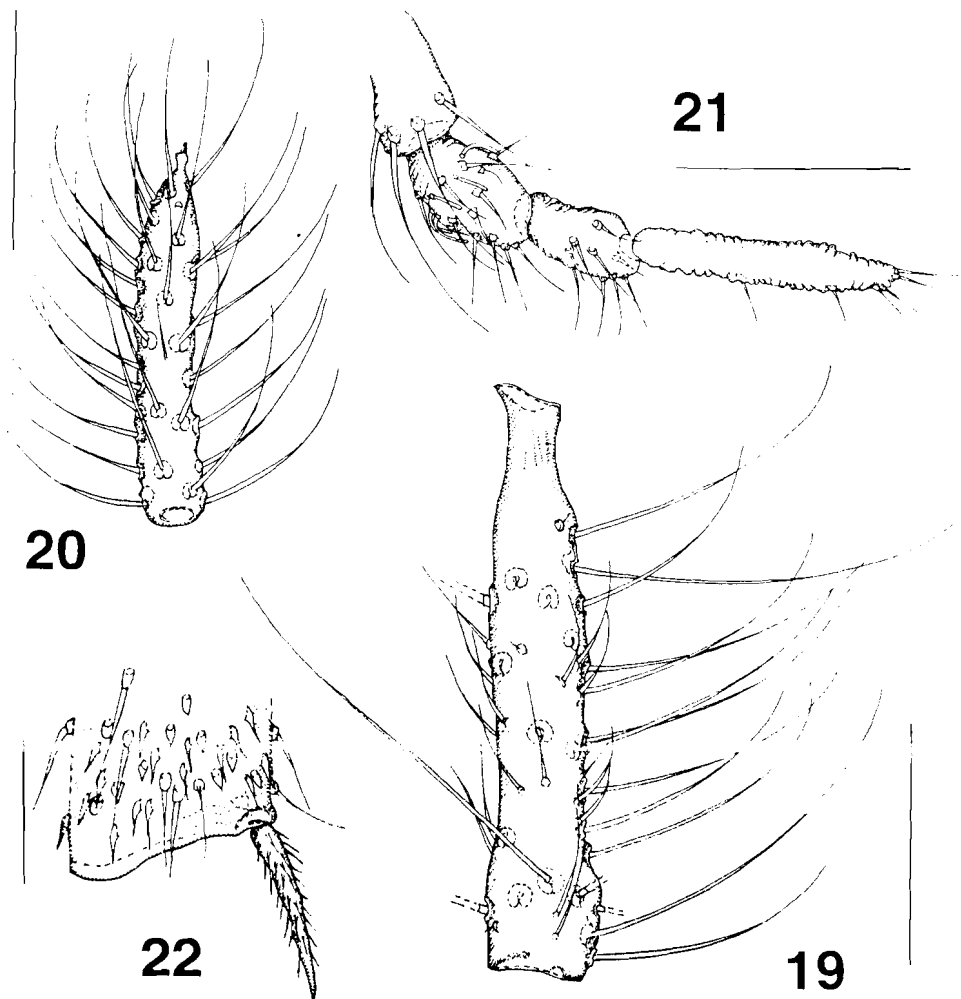
Thorax ♂. Laterotergites with 12–13 long setae. Phragma produced into abdominal cavity for 1/3 the length of abdominal segment 1.

Legs ♂. Mid coxa at hind margin with group of about 4 short, spine-like setae. Fore tibia with small, rounded anteroapical depression with net-like fine structure and ordinary, randomly arranged, long setae (Fig. 17).

Wings ♂. A2 extremely short and pale. Number of sensory pores on R1, 3 distally and 1 medially; and on R5, 3 proximally and 1 distally.

Abdomen ♂. Tergite 8 shorter than sternite 8. Tergites 1–8 well sclerotized, with long setae. Sternites 1–8 less sclerotized than tergites; sternite 2 with mainly lateral setae, and sternites 3–8 with long setae arranged in 3 irregular longitudinal rows.

Terminalia ♂. Sternite 9 distinct from gonocoxites except for its extreme lateral portions, apically widely rounded (Fig. 18). Gonocoxites (Fig. 18) with distoventral lobes



Figs. 19–22. *Ohakunea ingegerdae* sp. n., holotype male. **19:** Antennal flagellomere 4, mesial view (scale bar 0.1 mm). **20:** Ultimate antennal flagellomere, mesial view (scale bar 0.1 mm). **21:** Maxillary palpus, lateral view (scale bar 0.1 mm). **22:** Tip of fore tibia, anterior view (scale bar 0.05 mm).

massive, rounded apically; with some of the dorsal setae somewhat whip-like even though whip-like character is not as obvious as in other *Ohakunea* species; with gonocoxal apodemes short and running into dorsal portions of parameres (as true dorsal parameral apodemes are absent). Gonostylus (Fig. 18) inserting at base of gonocoxal lobe; with crescent-shaped, strong terminal tooth which has 2 tiny setulae with big sockets at its base and which arises from a subterminal lobate extension, the latter with a few tiny setulae. Aedeagus (Fig. 18) with ejaculatory apodeme comparatively broad. Parameres (Fig. 18) consisting of one ventral pair of narrow, sclerotized columns which distally extend into long, tusk-like projections curved dorsally, further with inconspicuous spike-like process on either of parameres ventro-medially; with ventral parameral apodemes distinct and dorsal parameral apodemes practically not distinguishable from posterior portions of gonocoxal apodemes, with the latter connected by a short, weak transverse bridge. Tergite 9 comparatively short, subrectangular.

with broadly rounded distal margin, its outer surface densely covered with long setae but lacking megasetae. Tergite 10 present as short, semicircular lobe at base of tergite 9, with 4 strong and a few more weak setae along distal rim.

Discussion. Male terminalia in *O. chilensis* are less modified compared with other *Ohakunea* species. They certainly come closest to the hypothetical ground plan in this clade. The parameres are largely separate, not secondarily subdivided into two pairs, and with only the ventral portions developed; tergite 9 is short; and megasetae – as found on various parts in other species – are entirely lacking. On the other hand, gonostyli are certainly in a derived state as indicated by the subterminal extension from which the tooth is arising.

Distribution and biology. This species has become known only from a few specimens taken by Frederick W. Edwards in the Rio Negro region both on Argentinean and Chilean territory in the mid-1920ies, and was since then never found again. No details are known to us of the nature of the immediate collection sites; however, the Rio Negro region is known to be extensively forested with beech (*Nothofagus* spp.) and conifers and is thus comparable to habitats in New Zealand where *Ohakunea bicolor* has been found.

Material. ARGENTINA: 1 paratype ♂, Rio Negro region, Lake Correntoso, 18–25 Nov. 1926, F. & M. Edwards [a previously pinned specimen that we slide-mounted in Canada balsam; in Canberra].

Ohakunea ingegerdae sp. n.

(Figs. 19–24)

Description. Measurements. Body size ♂ 2.8 and 3.0 mm; wing length ♂ 2.7 and 2.9 mm.

Head ♂. Interommatidial setulae absent. Antenna with 4th flagellomere 6 times as long as wide, and with neck 0.2 times the length of node (Fig. 19). Flagellomeres with longest setae, i.e., those on ventral sides, up to 4–5 times as long as diameter of node and projecting (Fig. 19), with length difference between ventral and dorsal setae less distinct on more distal flagellomeres (Fig. 20); with short setae about as long as diameter of node and becoming fewer on more distal flagellomeres. Maxillary palpus (Fig. 21) with presegment not visible in the specimens available for study.

Thorax ♂. Phragma produced into abdominal cavity for 1/3 the length of abdominal segment 1.

Legs ♂. Fore tibia with anteroapical depression absent (Fig. 22).

Wings ♂. Rs very weak and A2 absent. Number of sensory pores on R1, 2 distally and 1 medially; and R5, 2 proximally and 2 distally.

Abdomen ♂. Segment 8 less than half the length of segment 7. Tergites 1–8 well sclerotized, with long setae. Sternites 1–5 weakly sclerotized; sternite 2 with a few setae posterolaterally, and sternites 3–8 with long setae arranged in 3 irregular longitudinal rows.

Terminalia ♂. Sternite 9 distinct from gonocoxites, subtriangular with small posterior lobe situated in between gonocoxal halves (Fig. 23). Gonocoxites (Fig. 23) with distoventral lobes large, thumb-like, narrowly rounded apically, setose on outer and inner surfaces; dorsally with some of the setae whip-like and directed inwards, with most distal whip-like setae extremely long and crossing each other. Gonostylus (Figs. 23, 24) with flat, rounded basal portion bearing a few setulae at transition to the finger-like distal process directed inwards, the latter terminating in double tooth of which the ventral one is twice as long and wide as the dorsal one, further with spine-like seta at base of ventral tooth and another, somewhat longer seta more inside, further with fine setula on opposite side. Aedeagus (Fig. 23) forming a large, pyramid-shaped, finely pubescent, membranous extension that surrounds the distal portion of a long, sclerotized ejaculatory apodeme. Parameres (Fig. 23) apparently subdivided into ventral and dorsal pairs; with ventral pair weakly sclerotized, slightly curved and closely attached to dorsolateral membranous portions of aedeagus; with dorsal pair connected proximally by a short sclerotized transverse bridge, on either side with long, tusk-like process directed dorsally; in between tusks with narrow, finger-like process arising from transverse bridge and running into dorsal membranous portions of aedeagus; further with 2 short, subtriangular projections ventrolaterally; with dorsal parameral apodemes broad. Tergite 9 subtriangular, with rounded distal margin; distally with row of 7–8 megasetae directed



Figs. 23–24. *Ohukunea ingegerdue* sp. n., holotype male. **23:** Terminalia, ventral view, with the dorsal structures omitted (scale bar 0.1 mm). **24:** Gonostylus, ventral view (scale bar 0.05 mm).

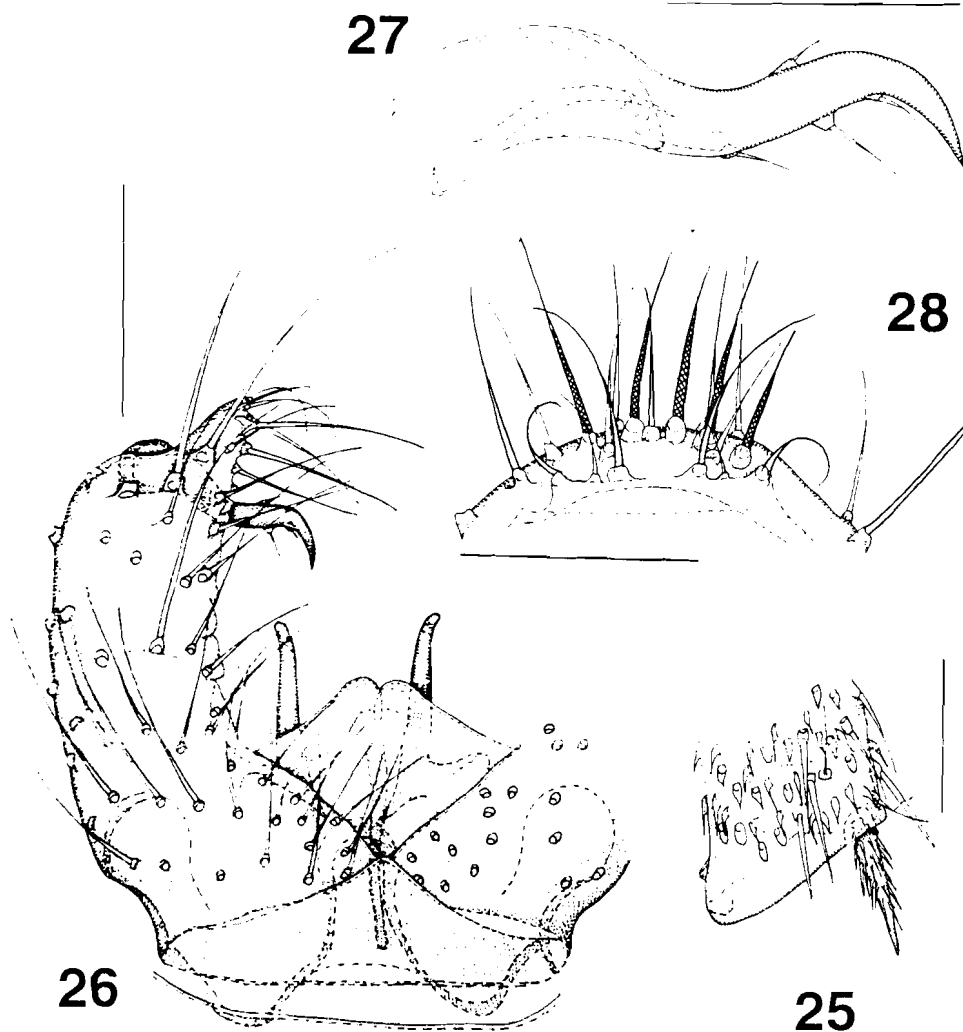
inwards, and long setae elsewhere. Tergite 10 present as somewhat bilobed plate, on either side bearing a few setae including 2 megasetae.

♀. Unknown.

Distribution and biology. Only the type specimens are known of *O. ingegerdue*, with details of their collection site given below. *O. ingegerdue* has been found occurring sympatric with *O. papuensis* (see next).

Derivatio nominis. The species epithet is devoted to Ms. Ingegerd Mattsson, who identified both of the New Guinea species from trap samples.

Material. PAPUA NEW GUINEA: Holotype ♂, Morobe province, Ilauru, Mt Kolorong, 2250 m, in primary mountain forest, 30 Oct.–11 Nov. 1999 by Malaise trap. H. Hippa, R. Norberg & D. Borisch. Paratypes 2♂, same data, and 1♂, same data, but 2260 m.



Figs. 25–28. *Ohakunea papuensis* sp. n., male. 25: Tip of fore tibia, ventral view (paratype, scale bar 0.05 mm). 26: Terminalia, ventral view, with the dorsal structures omitted (holotype, scale bar 0.1 mm). 27: Gonostylus, ventral view (paratype, scale bar 0.05 mm). 28: Tergites 9 and 10, ventral view (holotype, scale bar 0.1 mm).

***Ohakunea papuensis* sp. n.**

(Figs. 25–28)

Description. Identical with *Ohakunea ingegerdae*, except for the following features: Measurements. 43 Body size ♂ 2.5–2.7 mm; wing length ♂ 2.8–2.9 mm.

Head ♂. Antenna lacking flagellum in specimens available for study.

Legs ♂. Fore tibia lacking anteroapical depression (Fig. 25).

Wings ♂. Number of sensory pores on R1, 2 distally and 1 medially; and R5, 1–2 proximally and 2 distally.

Terminalia ♂. Gonocoxites (Fig. 26) with distoventral lobes similarly shaped but smaller than in *O. ingegerdae*; with whip-like setae confined to dorsodistal portions and shorter than in *O. ingegerdae*, i.e., longest setae not crossing each other. Gonostylus (Fig. 27)

terminating in double tooth with the dorsal one very short and largely hidden behind the bigger ventral one. Parameres (Fig. 26) with the dorsal pair having 2 long, tusk-like processes but lacking a finger-like process in between tusks as found in *O. ingegerdae*, further without ventrolateral short projections as found in *O. ingegerdae*. Tergite 9 (Fig. 28) distally with row of 5 megasetae directed inwards and ordinary setae elsewhere.

♀. Unknown.

Distribution and biology. Only the type specimens are known of *O. papuensis*, with details of their collection site given below.

Derivatio nominis. The species epithet is derived from Papua New Guinea, where the original material originates from.

Material. PAPUA NEW GUINEA: Holotype ♂, Morobe province, Iauru, Mt Kolorong, 2260 m, in primary mountain forest, 30 Oct.–11 Nov. 1999, by Malaise trap, H. Hippa, R. Norberg & D. Borisch. Paratypes 2♂, same data but 2200 m, 26–30 Oct. 1999.

Infrageneric relationships

As we infer chiefly from characters of the male genitalia, the two New Guinean species of *Ohakunea*, *O. ingegerdae* and *O. papuensis*, are most closely related. Both have the gonostyli terminating in a double tooth and tusk-like processes arising from the dorsal portions of the parameres, doubtlessly derived characters absent in other congeners. The New Guinean species show their closest affinities to *O. australiensis*. The structure of tergite 10 in these three species is basically identical and strong similarities concern the basic structure of gonocoxites and tergite 9. Further, it is in these three species that the foretibial anteroapical depression is reduced. The indigenous New Zealand representative of *Ohakunea*, *O. bicolor*, is peculiar in many of its characters, as exemplified by the excessive lobation of gonocoxites and megasetation on parts of the gonocoxites and tergite 9. *O. bicolor* might be more closely related to the other Australasian species. Most significantly, it shows the same secondary lobation of the parameres, whereas the parameres are simple in *O. chilensis*. With respect to male genitalic characters, *O. chilensis* perhaps shows the most generalized pattern among all *Ohakunea* species known to date, with the exception that its gonostyli are in a clearly derived state.

Despite the existence of interspecific variation and tentatively resolved phylogenetic relationships, it appears to be inadequate to subdivide this species-poor genus into subgenera, or to separate generically individual species. Apart from the male genitalia, the set of adult morphological characters in *Ohakunea* species is very homogeneous and wing venation alone distinguishes this taxon very well from all other Sciaroidea. Further, given that vast regions which potentially accommodate living *Ohakunea* species are still practically unexplored, one may expect that additional species are discovered, the study of which will certainly further illuminate intrageneric relationships.

Acknowledgements

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