

Rogambara and *Cabamofa*, Two New Genera of Enigmatic Sciaroids from Costa Rica (Insecta: Diptera: Sciaroidea)

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Abstract. In Costa Rica, two new species of peculiar sciaroids were found that are assigned to two new genera, *Rogambara dentata* gen. et spec. nov. and *Cabamofa mira* gen. et spec. nov. The new taxa are described, illustrated and their systematic relationships are discussed. *Rogambara* and *Cabamofa* appear to be sister groups and the two together are the sister group of *Ohakunea*+*Colonomyia*. All four genera form what is here called the *Ohakunea* group that is distinct from any of the existing families in the Sciaroidea and presumably closest to the Sciaridae.

Zusammenfassung. In Costa Rica wurden zwei bemerkenswerte, zu den Sciaroidea gehörige neue Arten gefunden, für die zwei neue Gattungen begründet werden: *Rogambara dentata* gen. et spec. nov. und *Cabamofa mira* gen. et spec. nov. Die neuen Taxa werden beschrieben, illustriert und ihre verwandtschaftliche Stellung wird diskutiert. *Rogambara* ist Schwestergruppe von *Cabamofa*; *Rogambara*+*Cabamofa* ist Schwestergruppe von *Ohakunea*+*Colonomyia*. Diese vier Gattungen bilden die so genannte *Ohakunea*-Gruppe, die keiner der existierenden Familien der Sciaroidea angeschlossen werden kann und vermutlich den Sciaridae am nächsten steht.

Key words. Phylogeny, taxonomy, new species

Stichwörter. Diptera, Sciaroidea, Phylogenie, Taxonomie, neue Gattungen, neue Arten, Costa Rica

1. INTRODUCTION

Fungus gnats in the broadest sense (Diptera: Sciaroidea) are poorly studied in Central America including Costa Rica, a fact applying absolutely to the species level and restrictively to all supraspecific levels. The preparation of the respective chapters for the Manual of Central American Diptera clearly meant a boost for systematic research on the Sciaroidea of this region, and one may hope that, once the Manual is published, this period of increased research activity and output will continue.

In the course of studies by the author on various groups of Costa Rican Sciaroidea, mainly Cecidomyiidae, Mycetophilidae and Sciaridae, two species of enigmatic sciaroids were found which could not be assigned to any of the existing family group taxa. Such 'unplaceable' sciaroids are usually rare, both in nature and collections. Moreover, they are much sought-after objects of phylogenetic studies aiming to further illuminate interfamilial relationships.

Detailed study of the two Costa Rican enigmatics showed that they belong to two different new genera, *Rogambara* and *Cabamofa*, that are closely related to one another and to two other 'unplaceable' genera, *Ohakunea* Tonnoir and Edwards, 1927 and *Colonomyia* Colless, 1963, with the last also present in Costa Rica (HIPPA & JASCHHOF 2004). These four genera together form what is here called the *Ohakunea* group. In the following, the new taxa are described, illustrated and their phylogenetic relationships are discussed.

2. MATERIAL AND METHODS

Specimens of the new species were picked from unsorted Malaise trap samples in the care of the Instituto Nacional de Biodiversidad (INBio), Santo Domingo, Costa Rica. It is noteworthy that only eight specimens in total were found among some 110 Malaise samples from various regions within this small but highly diverse country. Specimens were made transparent by treatment with KOH, dehydrated in ethanol and eventually, after treatment with beechwood creosote, mounted on microscopic slides in Canada balsam. All material, including types, are deposited in the INBio collection. Usage of morphological terminology follows that of SÖLI (1997) for Mycetophilidae. Drawings were made using an Olympus BX50 microscope in combination with the U-DA drawing unit.

3. TAXONOMY

3.1. Genus *Rogambara* gen. nov.

Type species. *Rogambara dentata* spec. nov., described below.

Description

Habitus: Slender, humpbacked sciaroids some 1.5 mm in size; moderately long antennae, legs and wings; rather narrow waist; slightly downcurved abdomen; and distinctive wing venation. Ethanol-preserved specimens coloration brownish.

Head: Head capsule higher than long; vestiture consisting of setae of various lengths, but short in all. Postfrons slightly bilobed, setose; frontal tubercle slightly two-pointed. Face larger than clypeus, non-setose. Clypeus setose, separated from face along its upper margin. Antenna shorter than body, little longer in females than in males, inserted slightly above midheight of head. Scape somewhat conical, subequal to subglobular pedicel, both setose. Antennal flagellum with 14 flagellomeres subequal in length, terminal flagellomere as long as or slightly longer than penultimate; each flagellomere cylindrical with very short conical neck and node less than twice as long as wide, neck and node weakly demarcated from another. Flagellum without microtrichia, except some basally on flagellomere 1. Each flagellomere with even cover of short setae arising from membranous rings and occurring in two sizes: fine and short setae, and stronger and longer ones arising from large basal pores, with latter more numerous in males than in females; setae interspersed with sensory spines; most proximal flagellomeres without setae arising from sockets (present in related genera); terminal flagellomere with 3-4 apical setae arising from sockets. Ocelli absent. Eyes reniform, with complete bridge at vertex, without interommatidal setulae. Mouthparts well developed, with short proboscis. Labrum sclerotized, triangular, non-setose. Maxilla with lacinia well developed, latter style-like and fringed terminally. Maxillary palpus with 3 segments, lacking "presegment"; first segment thickened, with densely set, long hyaline sensory hairs on inner side; second and third segments elongate; all segments setose with some setae spine-like. Labium with prementum (including premental apodemes) poorly developed, with strong setae. Labial palpus 2-segmented; labellum 1 smooth, with some setae; labellum 2 small, with some spine-like setae.

Thorax: Cervical sclerite well sclerotized. Antepronotum well developed, setose with 1 seta very long and strong; antepronotal sclerites interconnected by postpronotum forming very narrow ridge above neck. Episternum 1 clearly separated from pronotum, non-setose. Epimeron 1 small, subtriangular, situated at posteroventral margin of episternum 1. Scutum with dorsal surface slightly evenly arched; with anterior parapsidal suture distinct and median transverse suture weak; with lateral, dorsocentral and acrostichal setae of various lengths, with some setae very long and strong. Paratergite distinct from scutum and well sclerotized. Scutellum setose, with 2 central setae very long and strong. Mediotergite in lateral profile high, slightly arched. Laterotergite large, pronounced, its ventro-anterior margin in touch with posterior margin of preepisternum 2, non-setose. Postphragma well developed, produced into abdominal cavity for about half length of first abdominal segment. Anepisternum 2 setose, large and elongate,

subequal in length to preepisternum 2, both sclerites separated by distinct (anapleural) suture. Preepisternum 2 subtriangular. Pleural suture distinct. Pleural pit distinct. Epimeron 2 poorly sclerotized and demarcated, sometimes with anepimeral portion more distinct. Internal mid-coxal fork distinct. Metanotum poorly defined, forming narrow collar above mediotergite, with 1 long and strong seta on either side. Episternum and epimeron 3 both poorly sclerotized and demarcated. Openings of thoracic spiracles without striking features. **Legs:** Long, i.e. about 1.2 times length of body. Coxae moderately short, i.e. 0.6 (fore coxa) to 0.5 (hind coxa) times height of thorax. Femora slightly shorter than tibiae; tibiae shorter than tarsus. Tarsomeres 1-4 gradually decreasing in length, tarsomeres 1 more than twice as long as tarsomeres 2, tarsomeres 4 and 5 subequal in length. Coxae flattened, with long setae largely confined to anterior portions (fore coxa) or antero-distal margins (mid and hind coxae). Femora barely flattened, with longest setae (i.e., those along hind margins) clearly shorter than width of femur, with large non- and sparsely setose portions. Tibiae with tight cover of comparatively short setae interspersed with large trichia, the latter half to two-thirds as long as setae. Tibial spurs 1:1:1, comparatively long. Fore tibia with anteroapical depression delineated by indistinct subtriangular rim and bearing numerous setae in irregular (proximally) and comb-like (distally) arrangement. Hind tibia with subapical comb of stiff setae similar to those on fore-tibial depression. Vestiture on tarsi largely as on tibiae, additionally with 2 longitudinal rows of short, spine-like setae and 1 dense row of short, scale-like setae underneath. Pretarsal claws very small, slightly curved, without teeth. Empodia and pulvilli each consisting of some hairs shorter than claws. **Wing:** Clearly shorter than body, about 2 times as long as wide, widest near midpoint. No distinct alular or calypterous areas, anal area moderately developed. Membrane transparent, with light-brownish tinge, densely and evenly covered with microtrichia, without setae. Venation: C extending to apex of wing, near apex of M_1 ; Sc broad but very short, ending free; h broad but poorly demarcated; Rs pale, visible mainly through its tracheae, situated unusually close to wing base, with oblique inclination; R (i.e., vein portion between arculus and Rs) very short; R_1 (i.e., vein portion between Rs and junction point with anterior wing margin) excessively long, joining C near midpoint of wing; R_4 absent; R_5 (i.e., vein portion between diverging point of M_{1+2} and junction point with C which is clearly before wing apex) excessively long, almost straight; frn (i.e., vein portion between Rs and diverging point of M_{1+2}) present but extremely short; tb present but short and faint and visible mainly by its tracheae, with oblique inclination; mcu nearly absent; M_{1+2} furcate with stem and proximal portions of fork pale, with point where M_{1+2} diverges from R_5 very far basally and situ-

ated beyond Rs, fork clearly shorter than stem; origin of CuA₁ and CuA₂ closely approximated, i.e. forming fork without common stem; CuP broad, running close to and reaching half length of CuA₂; A₁ apparently running very close to CuP for some distance and thus indistinguishable; A₂ practically absent. Setae present along wing margin and ventrally and dorsally on R, R₁ and R₅. With number of sensory pores somewhat variable, i.e. on R₁, 1-2 distally, and R₅, 1-2 distally and 2-3 proximally, apart from numerous pores on Sc and stem vein. Halter club-shaped, with very few setae on both stem and knob.

Abdomen: Segments 1 and 8 shorter than other segments. Long, strong setae on all sclerites, except sternites 1 and 2. Number of spiracles uncertain. Tergal plaques small and inconspicuous, situated anterolaterally on each sclerite, with their pattern (as far as visible) 0/1-2/1/1/1/1/0. **Terminalia:** Male. Sternite 9 absent as distinct sclerite. Gonocoxites without lobes; gonocoxal apodemes broad. Gonostyli simple (i.e., not lobed), with apical tooth-like structure. Ejaculatory apodeme long, broad and flat, for most part poorly sclerotized. Parameres merged, i.e. forming a tegmen; dorsal parameral apodemes very short and interconnected by sclerotized transverse bridge. Tergite 9 large, plate-like. Tergite 10 absent. Cerci with numerous setae of various lengths distally and dorsally. Hypoproct consisting of one weakly sclerotized lobe, with 2 strong setae. Female. Tergite 8 large, sclerotized, setose. Gonocoxites 8 extended to proximal cercus, truncate terminally, with less than 10 strong setae distally and finer, shorter setae elsewhere; gonapophyses 8 distinct, weakly sclerotized; tergite 9 short, non-setose; gonapophysis 9 weakly sclerotized (i.e., not visible); tergite 10 well-developed but short, setose with some setae longer than any other setae on abdomen, with short posterior extension in which proximal cercus is embedded; sternite 10 present as weakly sclerotized ribs possibly merged posteriorly, with 1 strong lateral seta on either side; cercus one-segmented with distal segment absent; proximal cercus segment bearing numerous strong, straight setae, longer than wide, rounded posteriorly. Two sclerotized, disc-shaped spermathecae.

Immature stages. Unknown.

Diagnosis and discussion. The genus *Rogambara* is characterized by the following apomorphic characters: (1) the absence of ocelli; (2) the complete eye bridge; (3) the number of palpus segments reduced to three; (4) enlarged anepisterna 2; (5) the set of tibial spurs re-

duced to 1:1:1; (6) the basalization of wing veins; (7) simplified male terminalia; and (8) female terminalia with the distal cercus segments absent. Character 6 actually stands for a number of derived features following from the basalization of Rs (JASCHHOF & HIPPA 2003). Character 7 is actually a complex of characters, of which the most important are: the absence of a separate sternite 9; the absence of gonocoxal lobes; and the presence of a tegmen resulting from the fusion of the parameres. Characters 4 and 5 are truly autapomorphic characters of the genus *Rogambara* and found nowhere else in the sciaroids considered its closest relatives (see Phylogeny Section below).

Etymology. The genus name is composed of the family names of three of the parataxonomists working with INBio, Elias Rojas, Billen Gamboa and Wilfredo Arana, in appreciation of their enthusiastic and productive work in the field. The gender is feminine.

***Rogambara dentata* spec. nov.** (Figs. 1-15)

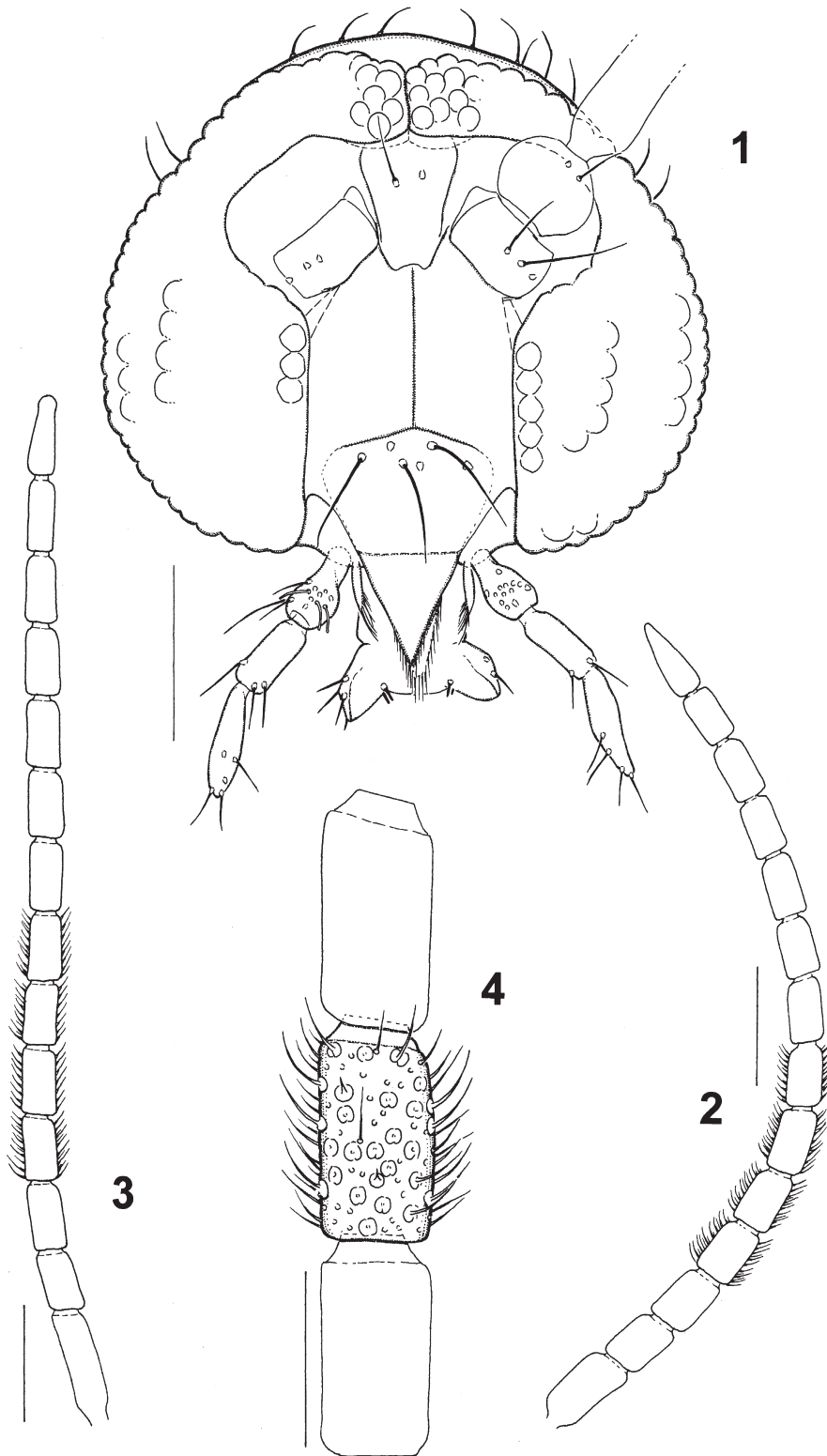
Types. Holotype: Male, Costa Rica, Prov. Limón, Reserva Biológica Hitoy Cerere, Sendero Espavel, 550 m, in tall secondary rain-forest, 18 Sept.-7 Oct. 2003, by Malaise trap, E. Rojas, B. Gamboa, W. Arana, M. & C. Jaschhof. **Paratypes:** 1 male, 2 females, same data as holotype; 1 female, same locality as holotype, but 11 March-1 April 2003; 1 male, Prov. Puntarenas, Parque Nacional Corcovado, 800 m Sendero a Cerro Rincón, 745 m, 20 Dec. 2001-7 Feb. 2002, by Malaise trap, J. Azofeifa.

Other material studied. Costa Rica: 1 male, Limón, Siquerres, Pacuarito, Los Brisas, Reserva Ecologica Rio Dantas, near Estacion El Palenque, 500 m, 22-26 August 1996, by Malaise trap, B. Gustafsson, T. Pape and B. Viklund (in Swedish Museum of Natural History, Stockholm). **Panama:** 1 male, Caribbean coast, San Lorenzo Protected Area near Colon (9°17'N, 79°58'W), wet evergreen forest, 130 m, 18 October 2003, by ground flight interception trap, A. Tishechkin (in Zoology Department, Canterbury University, Christchurch).

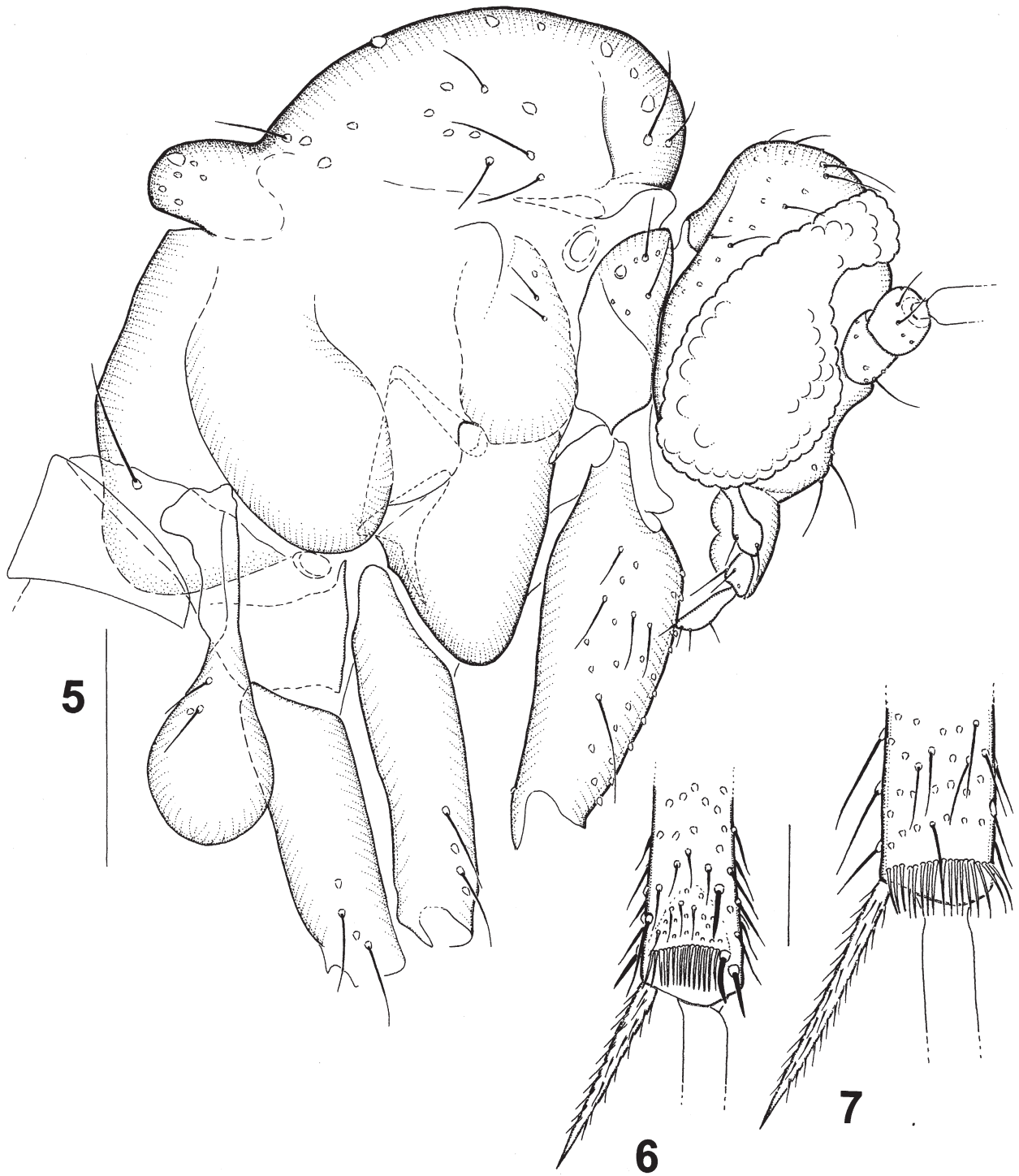
Description (for characters not mentioned here, see genus description above)

Body length: Males – 1.4 mm, females – 1.5-1.6 mm.

Male. Head: Postfrontal lobes each with 1 seta. Antenna (Fig. 2) with fourth flagellomere twice as long as wide, vestiture clearly shorter than width of flagellomere. Eye bridge at vertex 3 facets long. Labrum comparatively wide.



Figs. 1-4: *Rogambara dentata* spec. nov.; – 1: Head of female, frontal view (0.1 mm); – 2: Antenna of male, lateral view (0.1 mm); – 3: Antenna of female, lateral view (0.1 mm); – 4: Flagellomeres 3-5 of female, lateral view (0.05 mm). 1, 3 and 4: Paratypes from Hitoy Cerere; 2: Paratype from Corcovado (In parentheses: Length of scale bar.).



Figs. 5-7: *Rogambara dentata* spec. nov.; – 5: Head and thorax of female, lateral view (0.2 mm); – 6: Apical portion of fore tibia of male (0.05 mm); – 7: Apical portion of hind tibia of male (0.05 mm). 5: Paratype from Hitoy Cerere; 6, 7: Paratype from Corcovado (In parentheses: Length of scale bar.).

Thorax: Anepisternum 2 with maximum 6 setae in upper half. **Legs:** Fore tibia with anteroapical depression bearing comb of some 15 stiff setae (Fig. 6). Hind tibia with subapical comb of some 15 stiff setae (Fig. 7).

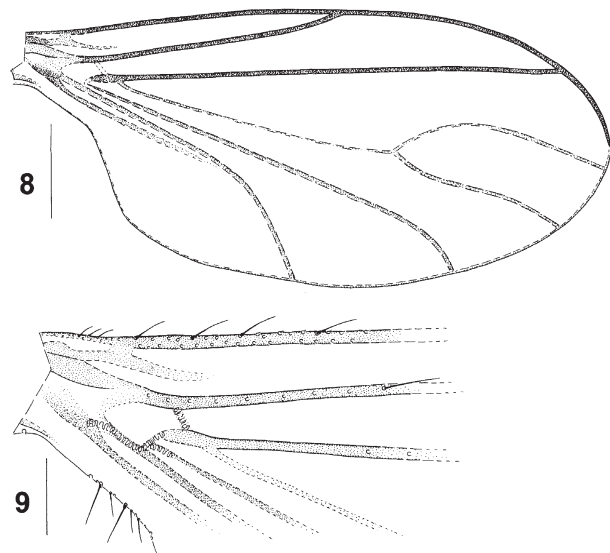
Terminalia: Gonocoxites (Fig. 10) ventrally with wide, V-shaped emargination, below emargination largely membranous and non-setose, with setae of various lengths elsewhere; gonocoxal apodemes broad and strong. Gonostyli (Fig. 10) tapering to tip; with heavy, curved tooth terminally and setae of various lengths elsewhere. Ejaculatory apodeme (Fig. 11) present as broad, flattened, weakly sclerotized rod almost as long as tegmen. Tegmen (Fig. 11) somewhat longer than wide, rounded distally; ventral gonocoxal apodemes swept ventrally; dorsal gonocoxal apodemes very short, interconnected by strong, short, sclerotized transverse bridge. Tergite 9 (Fig. 12) plate-like with long anterolateral bars and broadly rounded distal margin, with numerous setae of various lengths 2 of which are very long and strong. Cerci (Fig. 10) setose, large, broadly rounded terminally. Hypoproct (Fig. 10) consisting of smooth, rounded lobe bearing 2 strong setae.

Female. Head: See Figures 1, 5. Antenna as in Figure 3, with fourth flagellomere as in Figure 4.

Thorax: See Figure 5. **Wing:** See Figures 8, 9.

Terminalia: See Figures 13-15.

Etymology. The name is Latin meaning 'toothed', referring to the gonostylus tooth in males of this species.



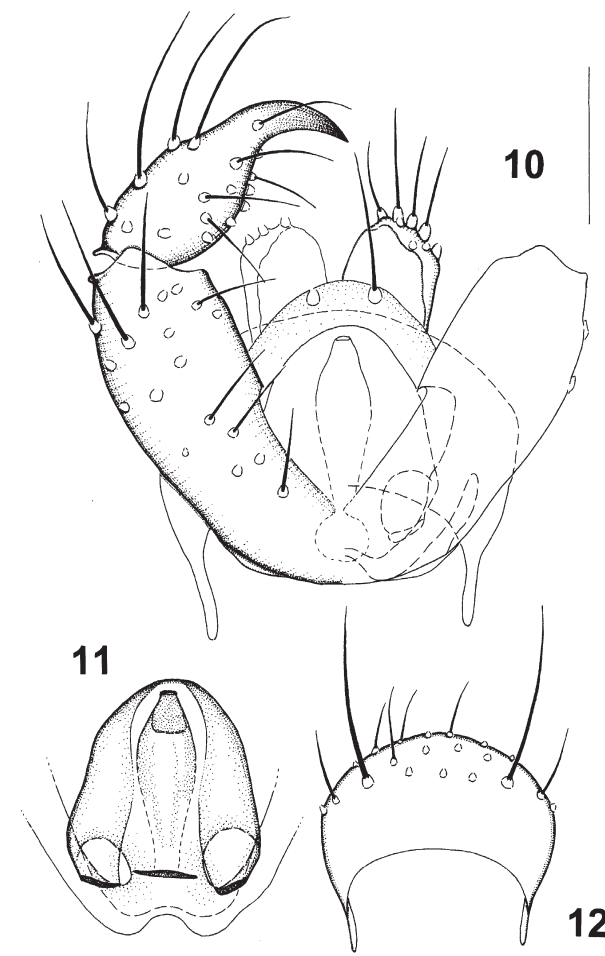
Figs. 8-9: *Rogambara dentata* spec. nov., paratype female; – 8: Wing, setae omitted (0.25 mm). – 9: Wing base (0.1 mm) (In parentheses: Length of scale bar.).

3.2. Genus *Cabamofa* gen. nov.

Type species. *Cabamofa mira* spec. nov., described below.

Description (based on females)

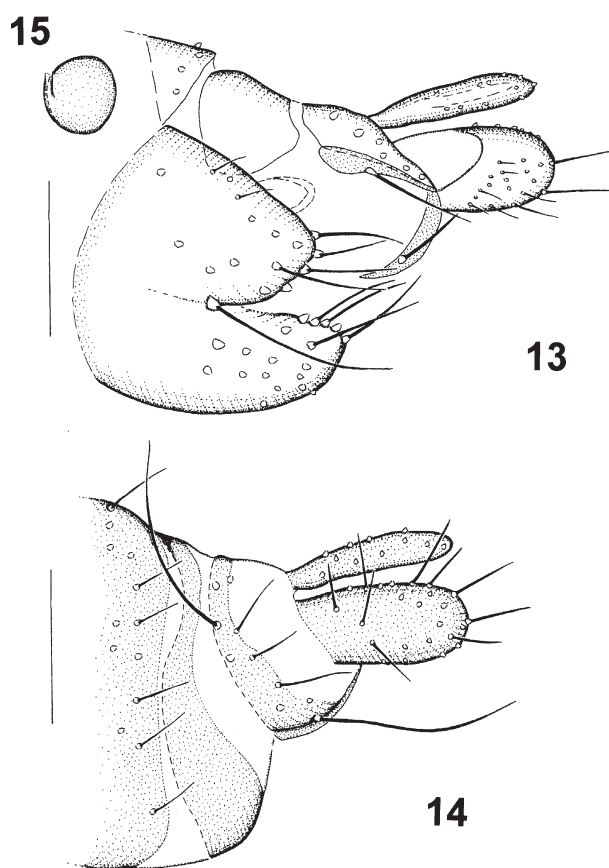
Habitus: Slender, humpbacked sciaroids some 3 mm in size (males might be considerably smaller); with moderately long antennae, legs and wings; rather narrow waist; and distinctive wing venation. Ethanol-preserved specimens coloration light-brownish.



Figs. 10-12: *Rogambara dentata* spec. nov., holotype male; – 10: Terminalia, ventral view; – 11: Tegmen and ejaculatory apodeme, ventral view; – 12: Tergite 9, dorsal view (Length of scale bar = 0.05 mm.).

Head: Head capsule subglobular; vestiture consisting of setae of various lengths, but short in all. Postfrons bilobed, non-setose; frontal tubercle slightly two-pointed. Clypeus setose. Antenna shorter than body, inserted slightly above midheight of head. Scape somewhat conical, subequal to subglobular pedicel, both setose. Antennal flagellum with 14 flagellomeres subequal in length, first and terminal flagellomeres clearly longer; each flagellomere cylindrical with short conical neck and node barely longer than wide, neck and node clearly

demarcated from another. Flagellum without microtrichia, except some basally on flagellomere 1. Each flagellomere with irregular cover of long setae arising from sockets intermixed with short setae arising from membranous rings; setae interspersed with sensory spines. Ocelli absent. Eyes reniform, with complete bridge at vertex and long interommatidial setulae. Mouthparts well developed, with short proboscis. Labrum small, sclerotized, non-setose. Maxilla with lacinia well developed, the latter style-like and fringed marginally and terminally. Maxillary palpus with 5 segments including distinct "presegment" bearing at least 1 strong seta; third segment swollen, with sensory pit on inner side; fourth and fifth segments elongate; all segments setose with some setae spine-like. Labium with premental lobe bearing strong setae. Labial palpus 2-segmented; labellum 1 very small and non-setose; labellum 2 large, with spine-like setae in rows.



Figs. 13-15: *Rogambara dentata* spec. nov., paratype females; – 13: Terminalia, ventrolateral view; – 14: Terminalia, dorso-lateral view; – 15: Spermatheca (Length of scale bar = 0.1 mm.).

Thorax: Cervical sclerite well sclerotized. Antep pronotum well developed, setose; antep pronotal sclerites interconnected by postpronotum forming very narrow ridge above neck and bearing setae laterally. Episternum 1 clearly separated from pronotum, setose. Epimeron 1

small, subtriangular, situated at postero-ventral margin of episternum 1. Scutum with dorsal surface evenly and slightly arched; anterior parapsidal suture distinct and median transverse suture weak; lateral, dorsocentral and acrostichal setae of various lengths. Paratergite poorly developed. Scutellum setose, with 2 central setae very long and strong. Mediotergite in lateral profile comparatively short, slightly arched. Laterotergite large, with rather smooth transition into mediotergite, its ventro-anterior margin approximated with posterior margin of preepisternum 2, non-setose. Postphragma well developed, produced into abdominal cavity for short distance. Anepisternum 2 short, non-setose, both sclerites separated by distinct (anapleural) suture. Preepisternum 2 large, subtriangular. Pleural suture distinct. Pleural pit distinct. Epimeron 2 poorly sclerotized and demarcated. Internal mid-coxal fork distinct. Metanotum poorly defined, forming narrow collar above mediotergite, with 1-2 setae on either side. Episternum 3 large, weakly sclerotized, more clearly demarcated posteriorly with sometimes two parts recognizable. Openings of thoracic spiracles without striking features. **Legs:** Fore leg little shorter and hind leg little longer than body. Coxae moderately short, i.e. 0.6 (fore coxa) to 0.4 (hind coxa) times height of thorax. In fore leg, femur and tibia subequal in length, tibia shorter than tarsus. In mid leg, femur shorter than tibia, tibia shorter than tarsus. In hind leg, femur shorter than tibia, tibia and tarsus subequal in length. Tarsomeres 1-4 gradually decreasing in length, tarsomere 1 more than twice as long as tarsomeres 2, tarsomeres 4 and 5 subequal in length. Coxae flattened, with long setae largely confined to anterior portions. Femora barely flattened, with longest setae (i.e., those along hind margins) clearly shorter than width of femur. Tibiae with dense cover of comparatively short setae interspersed with large trichia, latter half to two-thirds as long as setae. Tibial spurs 1:2:2, comparatively short. In mid and hind tibiae, one spur clearly shorter than other. Fore tibia with anteroapical depression subtriangular, very weakly delineated, bearing numerous setae in irregular (proximally) and comb-like (distally) arrangement. Hind tibia with subapical comb of stiff setae similar to those on fore-tibial depression. Vestiture on tarsi largely as on tibiae. Pretarsal claws crescent-shaped, without teeth. Empodia well developed, as long as claws. Pulvilli delicate, two-thirds as long as claws. **Wing:** Shorter than body, more than 2 times as long as wide, widest slightly beyond midpoint. No distinct alular or calypterous areas, anal area moderately developed. Membrane transparent, with light-brownish tinge, densely and evenly covered with microtrichia, without setae. Venation: C extending to apex of wing, between apices of R_5 and M_1 ; Sc broad but very short, ending free; h broad but poorly demarcated; Rs pale, situated unusually close to wing base, with oblique inclination; R (i.e., vein portion between arculus and Rs) very short;

R_1 (i.e., vein portion between R_s and junction point with anterior wing margin) excessively long, joining C beyond midpoint of wing; R_4 absent; R_5 (i.e., vein portion between diverging point of M_{1+2} and junction point with C which is practically at wing apex) excessively long, curved in distal third; fr_m (i.e., vein portion between R_s and diverging point of M_{1+2}) present, longer than R_s ; tb present, as long as one vein width; mcu present, pale, longer than R_s ; M_{1+2} furcate with its stem almost entirely absent, point where M_{1+2} diverges from R_5 very far basally and situated clearly beyond R_s , fork clearly shorter than stem; CuA_1 and CuA_2 arising separately; CuP distinct, running close to and reaching beyond half length of CuA_2 ; A_1 extending to two-thirds length of CuP ; A_2 nearly absent. Setae present along wing margin, ventrally on R , R_1 , R_5 , M-fork, CuA_1 and CuA_2 , and dorsally on distal portion of R_5 . Number of sensory pores somewhat variable, i.e. on R_1 , 3-4; fr_m , 2-3; and R_5 , 2 distally, apart from numerous pores on Sc and stem vein. Halter club-shaped, with setae on knob.

Abdomen: With segments 1 and 8 shorter than other segments. With setae on all sclerites except sternite 1. Number of spiracles uncertain. Tergal plaques apparently absent. **Terminalia:** Tergite 8 large, sclerotized, setose. Gonocoxites 8 extending up to proximal cercus, densely setose; gonapophyses 8 indistinct, weakly sclerotized; tergite 9 not recognizable as distinct sclerite, possibly merged with tergite 10; gonapophysis 9 present as internal sclerotized fork; tergite 10 setose, with posterior extension in which proximal cercus is embedded; sternite 10 not clearly recognizable; cercus two-segmented, setose; proximal segment subtriangular in lateral view, longer than distal segment; distal segment rounded. Two sclerotized, disc-shaped spermathecae.

Male and immature stages. Unknown.

Diagnosis and discussion. In the genus *Cabamofa*, apomorphic characters include: the absence of ocelli; the complete eye bridge; and the basalization of wing veins. There is no autapomorphic character recognizable for *Cabamofa*; instead, all its derived features are found also in *Rogambara*. However, quite a number of derived features in *Rogambara dentata*, including two autapomorphies recognized, lack in *Cabamofa mira*, a fact making it problematic to argue that these two species are congeneric. In *Cabamofa*, the vestiture of the antennal flagellum includes an even cover with setae arising from sockets, a feature unique within the *Ohakunea* group (see Phylogeny Section below), but at present it is hard to tell whether this is of more than species-specific importance.

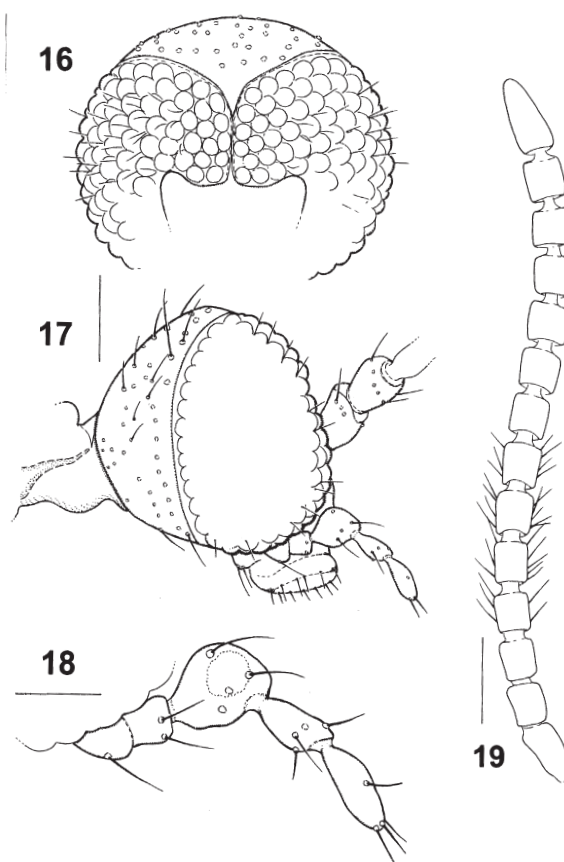
Etymology. The genus name is composed of the family names of three of the parataxonomists working with INBio, Khanaki Caballero, Marco Moraga and Alejandro Azofeifa, in appreciation of their successful field

work to that we owe these very peculiar flies. The gender is feminine.

***Cabamofa mira* spec. nov.** (Figs. 16-26)

Types. Holotype: Female, Costa Rica, Prov. Puntarenas, Parque Nacional Corcovado, Quebrada Ceniza, 300 m, 14 March-5 April 2003, by Malaise trap, K. Caballero, M. Moraga & A. Azofeifa. **Paratypes:** 1 female, same data as holotype.

Description (for characters not mentioned here, see genus description above)



Figs. 16-19: *Cabamofa mira* spec. nov., female; – 16: Eye bridge, dorsofrontal view (0.1 mm); – 17: Head, lateral view (0.1 mm); – 18: Maxillary palpus, lateral view (0.05 mm); – 19: Antennal flagellum, lateral view (0.1 mm). 16: Holotype; 17-19: Paratype (In parentheses: Length of scale bar.).

Body length: Females – 2.9 and 3.1 mm.

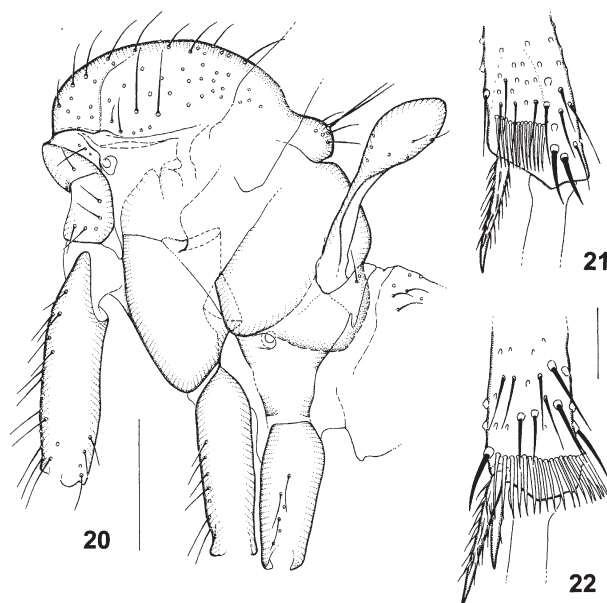
Male. Unknown.

Female. Head: See Figure 17. Antenna (Fig. 19) with node of fourth flagellomere (Fig. 23) 1.1 times as long as wide; longest setae shorter than width of flagellomere. Eye bridge (Fig. 16) at vertex 5 facets long. Maxillary palpus as in Figure 18.

Thorax: See Figure 20. Postpronotum with 3 setae laterally. Anteppronotum with 1 seta. Episternum 1 with 4-5

setae. **Legs:** Fore tibia with anteroapical depression bearing comb of some 12 stiff setae (Fig. 21). Hind tibia with subapical comb of some 18 stiff setae (Fig. 22). **Wing:** See Figures 24, 25.

Terminalia: See Figure 26.



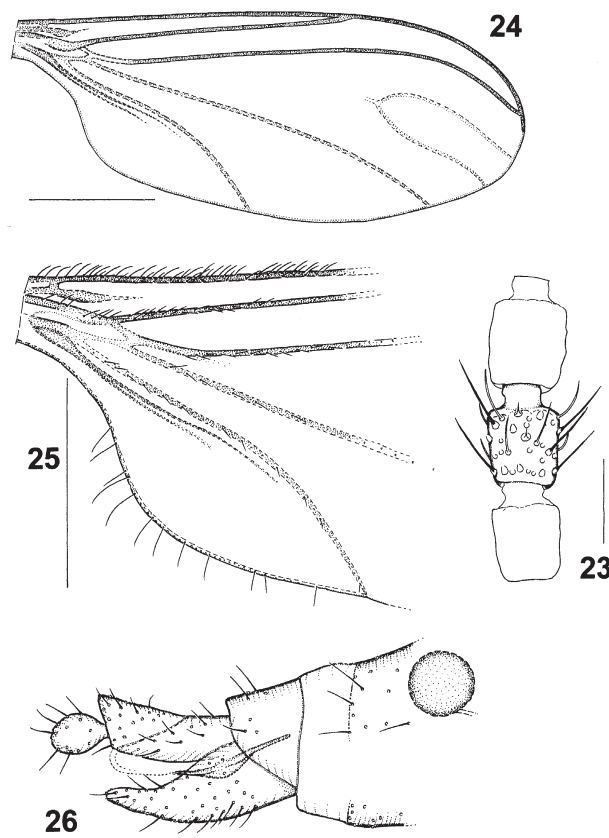
Figs. 20-22: *Cabamofa mira* spec. nov., holotype female; – 20: Thorax, lateral view (0.25 mm); – 21: Apical portion of fore tibia (0.05 mm); – 22: Apical portion of hind tibia (0.05 mm) (In parentheses: Length of scale bar.).

Etymology. The name is Latin meaning ‘strange’, referring to the peculiar assemblage of morphological characters in this species.

4. PHYLOGENY

The peculiar wing vein pattern and well developed postphragma in *Rogambara* and *Cabamofa* give reason to roughly assign them to a group of sciaroid genera which cannot be classified within any existing family of the Sciaroidea. Knowledge of these unplaceable sciaroids has increased significantly in recent years (see CHANDLER (2002) and JASCHHOF (2004) for *Heterotricha* Loew and allies; JASCHHOF & DIDHAM (2002) for Rangomaramidae; JASCHHOF & HIPPA (2003) for *Ohakunea* Tonnoir & Edwards; HIPPA & JASCHHOF 2004, for *Colonomyia* Colless); however, the phylogenetic relationships between these taxa and to the long-recognized family-level taxa within the Sciaroidea remain debatable.

The basalization of Rs and other wing veins (Fig. 27, character 1) serves as an argument to consider *Rogambara*, *Cabamofa*, *Ohakunea* and *Colonomyia* belonging to the same monophyletic group, the *Ohakunea* group. *Rogambara* appears to be most closely related to *Ca-*



Figs. 23-26: *Cabamofa mira* spec. nov., female; – 23: Antennal flagellomeres 3-5, lateral view (0.05 mm); – 24: Wing, setae omitted (0.5 mm); – 25: Wing base (0.5 mm); – 26: Terminalia with one spermatheca, lateral view (0.1 mm). 23, 24 and 26: Paratype; 25: Holotype (In parentheses: Length of scale bar.).

bamofa. Postulation of their sister-group relationship is based on three arguments: the presence of a complete eye bridge, absence (loss) of ocelli and shortening of the antennal flagellum (Fig. 27, characters 2-4). As regards the last character, one must explain that shortening here means shortening of the individual flagellomeres, not shortening through reduction in the number of flagellomeres. The clade *Ohakunea+Colonomyia* is based on two synapomorphies: regaining of the R₄ and loss of sclerotized spermathecae (Fig. 27, characters 5 and 6). As argued by JASCHHOF & HIPPA (2003), R₄ was present in the ground plan of the Sciaroidea and later lost in the hypothetical common ancestor of a clade comprising Diadocidiidae, the *Heterotricha* group *sensu* CHANDLER (2002), *Ohakunea*, *Colonomyia*, Sciaridae, Rangomaramidae and Cecidomyiidae. Among the genera discussed here, *Rogambara* possessed the most apomorphic character states (Fig. 27, characters 7-10), which find their plesiomorphous counterparts in both *Ohakunea* (JASCHHOF & HIPPA 2003; and Fig. 27, characters 11-12) and *Colonomyia* (HIPPA & JASCHHOF 2004; and Fig. 27, characters 13-16). Among the derived features found in *Rogambara*, the three-segmented maxillary

palpus and simplified male terminalia are most noteworthy as these correspond with the conditions found in the Sciaridae, a family considered most closely related to *Ohakunea* and *Colonomyia*. The structure of the maxillary palpus in *Rogambara* and Sciaridae is practically identical. As regards male terminalia, *Rogambara* and Sciaridae differ only in small details. The most important differences lie in the structure of the aedeagus/tegmen complex: in *Rogambara*, the ejaculatory apodeme is broad, flattened and as long as the tegmen and aedeagal teeth are absent; in Sciaridae, the ejaculatory apodeme is usually narrow, tube-like and shorter than the tegmen and aedeagal teeth are usually present. I explain the presence of a three-segmented palpus and simple male terminalia in both *Rogambara* and Sciaridae by homoplasy.

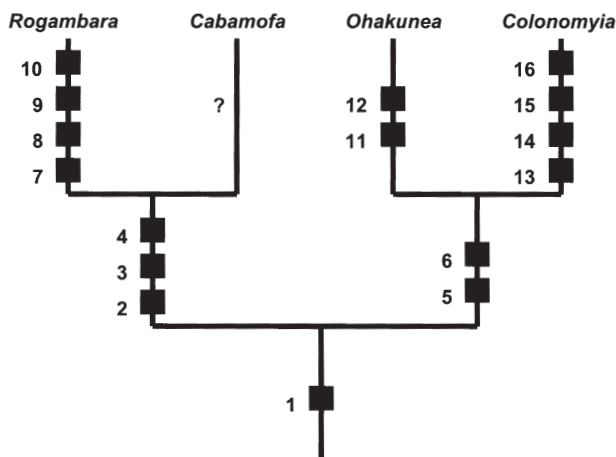


Fig. 27: Postulated relationships between the genera of the *Ohakunea* group (after JASCHHOF & HIPPA (2003); HIPPA & JASCHHOF 2004; and this study). Black blocks = apomorphic characters; ? = no apomorphy recognized. Numbers 1-16 refer to apomorphic character states as follows: 1, Rs and other wing veins basalized; 2, eye bridge complete; 3, ocelli lost; 4, antennal flagellum shortened; 5, R_4 regained; 6, sclerotized spermathecae lost; 7, number of maxillary palpus segments reduced to three; 8, anepisternum 2 enlarged; 9, one spur of mid and hind tibia lost; 10, male terminalia simplified; 11, male terminalia with parameres subdivided into ventral and dorsal pairs; 12, male terminalia with gonostyli strongly narrowed; 13, epimeron 2 shortened; 14, basitarsus with longitudinal row of specialized setae; 15, pretarsal claws deeply bifurcated; 16, male terminalia with gonocoxites bearing interior sclerotized ribs.

The absence of any autapomorphic characters in *Cabamofa* may be explained by the fact that its male is yet to be found, because experience shows that sciaroid male terminalia, due to their structural complexity, often can provide features of significance for phylogenetic considerations. No attempt was made in order to place the *Ohakunea* group among other Sciaroidea, as from a phylogenetic viewpoint the here introduced taxa cannot provide hints additional to those considered earlier (CHANDLER 2002; JASCHHOF & HIPPA 2003; HIPPA & JASCHHOF 2004).

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REFERENCES

- CHANDLER, P. 2002. *Heterotricha* Loew and allied genera (Diptera: Sciaroidea): offshoots of the stem group of Mycetophilidae and/or Sciaridae? *Annales de la Société Entomologique de France* (n.s.) **38**(1-2): 101-144.
- JASCHHOF, M. 2004. The *Heterotricha* Loew group (Diptera: Sciaroidea) in New Zealand. *Beiträge zur Entomologie* **54**(1): 3-30.
- JASCHHOF, M. & DIDHAM, R. K. 2002. Rangomaramidae fam. n. from New Zealand and implications for the phylogeny of the Sciaroidea (Diptera). *Studia dip-terologica Supplement* **11**, 60 pp.
- JASCHHOF, M. & HIPPA, H. 2003. Sciaroid but not sciarid: a review of *Ohakunea* Tonnoir & Edwards, with the description of two new species (Insecta: Diptera: Bibionomorpha). *Entomologische Abhandlungen, Dresden* **60**: 23-44.
- HIPPA, H. & JASCHHOF, M. 2004. A re-evaluation of the genus *Colonomyia* Colless (Diptera, Sciaroidea), with the description of two new species. *Insects Systematics and Evolution* **35**(3): 335-352.
- SÖLI, G. 1997. The adult morphology of Mycetophilidae (s.str.), with a tentative phylogeny of the family (Diptera, Sciaroidea). *Entomologica scandinavica Supplement* **50**: 5-55.

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