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DIPTERORUM

Studia dipterologica und *Studia dipterologica*
erscheinen im Ampyx-Verlag Dr. A. Stark, Berlin

Studia dipterologica
erscheint in zwei
Heften jährlich.



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Starkomyia gen. nov. from New Zealand and its implications for the phylogeny of the Sciaroidea (Diptera: Bibionomorpha)

[*Starkomyia* gen. nov. aus Neuseeland und ihre Bedeutung für die Phylogenie der Sciaroidea (Diptera: Bibionomorpha)]

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Abstract	<i>Starkomyia inexpecta</i> gen. et spec. nov. from New Zealand is described and illustrated, and its systematic position is analyzed and discussed. <i>Starkomyia</i> appears to be another recent southern hemisphere representative of the enigmatic sciaroids that cannot be assigned to any of the recognized family-group taxa of the Sciaroidea. It is hypothesized to be the sister-group of a clade including the <i>Heterotricha</i> and <i>Ohakunea</i> groups. Sciaridae, Rangomaramidae and Cecidomyiidae. The significance of particular wing veins for the evaluation of phylogenetic relationships within the Sciaroidea is critically discussed.
Key words	Diptera, Sciaroidea, phylogeny, taxonomy, new genus, new species, New Zealand
Zusammenfassung	<i>Starkomyia inexpecta</i> gen. et spec. nov. aus Neuseeland wird beschrieben, illustriert und ihre systematische Stellung analysiert und diskutiert. <i>Starkomyia</i> ist ein weiterer bemerkenswerter Vertreter von Sciaroidea, der keinem derzeit anerkannten Taxon der Familiengruppe zugeordnet werden kann. <i>Starkomyia</i> ist hypothetische Schwestergruppe eines Monophylum, das Sciaridae, die <i>Heterotricha</i> - und <i>Ohakunea</i> -Gruppen und vermutlich weitere Taxa einschließt. Die Bedeutung bestimmter Flügeladern für die Erhellung phylogenetischer Beziehungen innerhalb der Sciaroidea wird kritisch geprüft.
Stichwörter	Diptera, Sciaroidea, Phylogenie, Taxonomie, neue Gattung, neue Art, Neuseeland

Introduction

As one may expect from the unique geohistory and biogeography of New Zealand, its fauna of fungus gnat-like flies (Sciaroidea) includes a disproportionately high number of phylogenetically interesting species. Their adults exhibit a very peculiar external morphology and cannot be assigned to any of the traditionally recognized family-group taxa of the Sciaroidea. Such 'unplaceable' sciaroids known from New Zealand are two species of the genus *Anisotricha* CHANDLER (TONNOIR & EDWARDS 1927, CHANDLER 2002, JASCHHOF 2004a); three species of the genus *Insulatracha* JASCHHOF (JASCHHOF 2004a); two species of the genus *Ohakunea* TONNOIR & EDWARDS (TONNOIR & EDWARDS 1927, JASCHHOF & HIPPA 2003); and five species of the family Rangomaramidae (JASCHHOF & DIDHAM 2002). Even though the systematic relationships among them and to the traditional families in the Sciaroidea could not yet be explained convincingly, it is clear that these sciaroids represent at least three distinct, ancient lineages: the *Heterotricha* LOEW group sensu stricto (CHANDLER 2002) that, among others, includes the New Zealand genera *Anisotricha* and *Insulatracha*; the *Ohakunea* group (JASCHHOF, in press); and the Rangomaramidae. In this paper, I introduce *Starkomyia inexpecta* gen. et spec. nov., which is another enigmatic sciaroid obviously representing a lineage distinct from those referred to above. Superficially similar to the southern-neotropical *Freemanomyia elongata* (FREEMAN, 1951)¹, detailed mor-

¹ *Freemanomyia* JASCHHOF, 2004 is a replacement name for *Pterogymnus* FREEMAN, 1951 (JASCHHOF 2004b).

phological study of *Starkomyia inexpecta* revealed its sciarid rather than mycetophilid affinities. Further, this new species demonstrates exemplarily the traps that lie in wait for someone aiming to explain the phylogeny of the Sciaroidea through hints mainly from wing venation. In the following, the new taxa are described, illustrated and the phylogenetic relationship of *Starkomyia* is analyzed and discussed.

The type-locality, Ohakune, of *Starkomyia inexpecta* is well known among researchers of New Zealand Diptera and workers on enigmatic Sciaroidea. The forests north-northeast of Ohakune, at the southern foothills of the active volcano Mount Ruapehu, is one of the finest preserved examples of a mature, mixed stand of podocarp trees (intermingled with broadleaf trees including southern beeches that predominate with increasing altitude) on New Zealand's North Island. These forests survived the deforestation by both the cataclysmic Taupo eruption some 1850 years ago (GABITES 1986) and later human activity – which was a stroke of luck not only for dipterology. As regards enigmatic sciaroids, the Ohakune region was previously shown to provide the habitat for *Insulatricha hippai* JASCHHOF; *Ohakunea bicolor* EDWARDS; and *Rangomarama tonnoiri* JASCHHOF & DIDHAM. Such an accumulation of ancient sciaroids, with *Starkomyia inexpecta* added now, at one and the same site leaves little doubt that at least sizable patches of the Ohakune forest have a long, uninterrupted faunal history. The impression Ohakune forest makes on a human intruder is to step back into Cretaceous times, all the more with such information on ancient flies in mind. In my opinion, flies like *Starkomyia inexpecta* and others, overlooked by most naturalists due to its inconspicuous appearance, are capable of documenting the preciousness of ancient forest ecosystems in New Zealand and elsewhere. Even though not as susceptible to public fascination like, for instance, kiwi birds and leiopelmid frogs, these flies have a successful evolutionary history longer than that of many praised and more attractive forest-dwellers endemic to New Zealand. This fact alone should justify the need for acceptance of research on silvicolous flies, which should be expressed through more generous funding of such research independent of its economic relevance but motivated through a broad sense of responsibility for our natural heritage.

Material and methods

The one individual known of *Starkomyia inexpecta* was collected in course of the author's research visit to New Zealand in 2001/2002. The specimen was made transparent by treatment with KOH, dehydrated in ethanol and eventually, after treatment with beechwood creosote, mounted in Canada balsam on a microscope slide. The holotype is deposited in the New Zealand Arthropod Collection, formerly at Auckland/Mt. Albert and now at Auckland/Tamaki. Other specimens of various Sciaroidea studied comparatively come from the author's collection in the Zoological Institute and Museum Greifswald, Germany; the New Zealand Arthropod Collection, Auckland; the Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica; the Museum für Tierkunde Dresden, Germany; and the United States National Museum, Smithsonian Institution, Washington, D.C. Usage of morphological terminology follows that of SOLI (1997) for Mycetophilidae and, in case of several additional terms related to male terminalia, JASCHHOF & DIDHAM (2002). Drawings were made using an Olympus BX50 microscope in combination with the U-DA drawing unit.

Genus *Starkomyia* gen. nov.

Type species. *Starkomyia inexpecta* spec. nov., described below.

Description (based on male only)

Habitus: Slender, humpbacked sciaroids some 3 mm in size; long antennae, legs and wings; rather narrow waist; slightly downcurved abdomen; and distinctive wing venation. Ethanol-preserved specimens coloration light-brownish.

Head: Head capsule higher than long; setation short and undifferentiated. Postfrons slightly two-lobed, non-setose, with slightly two-pointed frontal tubercle. Face large, non-setose. Clypeus subequal in size to face, projecting in profile, setose, fused with face along upper margin. Antennae longer than abdomen, upturned, inserted near midheight of head. Scape somewhat conical, somewhat larger than pedicel, setose. Pedicel subglobular, setose. Flagellum with 14 flagellomeres, first flagellomere longest, terminal flagellomere longer than penultimate; each flagellomere cylindrical, practically without neck, several times as long as wide. Flagellum without microtrichia except some on flagellomere 1 basally. Each flagellomere with even cover of setae arising from membranous rings, setae as long as diameter of flagellomere or shorter; flagellomeres 1–6 dorsally also with short setae arising from sockets. With 3 ocelli at vertex, arranged in narrow triangle. Eyes reniform, distance between eye portions at vertex subequal to width of ocellar triangle; without interommatidal setulae. Mouthparts well developed, with short proboscis. Labrum beak-like, well sclerotized, non-setose, fringed apically. Lingua with dense fringes apically. Maxillae with lacinia style-like, comparatively broad, fringed terminally. Maxillary palpus with 5 palpomeres, with first palpomere ('presegment') well-developed and setose. Palpomeres 2–5 setose; palpomere 3 with hyaline sensory hairs; palpomeres 2 and 3 thickest and 5 clearly longest. Labium with prementum present as pair of setose lobes. Labial palpus 2-segmented, labellum 1 smaller than 2; labellum 1 non-setose; labellum 2 with numerous, partly spine-like setae.

Thorax: Postpronotum barely traceable, present as narrow sclerite above antepronotum (if correctly identified). Antepronotum subtriangular, setose, with 2 setae very strong and long. Episternum 1 non-setose. Epimeron 1 very weak. Scutum in profile evenly arched to slight degree, with anterior parapsidal suture weak and median transverse suture not traceable. Vestiture of scutum consisting of irregular rows of acrostichal, dorsocentral and lateral setae; some dorsocentrals and laterals very strong and long. Scutellum with pair of very strong and long setae. Prescutoscutal suture deep. Prescutum not traced. Mediotergite high, in profile almost straight. Postphragma well developed, i.e. extending into abdominal cavity, comparatively sharply pointed. Mediotergite and laterotergites with distinct suture in between. Laterotergite large, little pronounced, with long setae. Anepisternum subrectangular; separated from preepisternum 2 by distinct suture. Anepisternal cleft deep. Preepisternum 2 much larger than anepisternum, subtriangular ventrally. Mid-pleural pit present but indistinct. Epimeron 2 with deep cleft dorsally indicating a subdivision into upper anepimeron and lower katepimeron, latter strongly narrowed ventrally. Metanotum very short, barely traceable. Episternum 3 weakly sclerotized, with some short setae posteriorly. Epimeron 3 very narrow. Openings of spiracles without striking features. **Legs:** Coxae clearly longer than half the height of thorax. Coxae with setae as long as coxal diameter. Femora with longer, somewhat erect setae along hind margin and short, adpressed setae elsewhere. Tibial spurs 1:2:2; on mid and hind tibiae, one spur slightly shorter than other. Fore tibia with well developed, almost circular anteroapical depression delineated by sharp rim and bearing numerous spine-like setae. Tibiae and tarsi densely covered with large trichia and short setae, latter mostly adpressed but some setae stronger, spine-like and somewhat erect, additionally with few erect fine, short sensory hairs.

