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Revision of the Holarctic genus *Novakia* Strobl (Diptera: Mycetophilidae)

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Abstract

Two new species of fungus gnats (Diptera: Mycetophilidae), *Novakia miloi* and *Novakia lisae* spp. nov., are described and figured from California. *Novakia distincta* Fisher is transferred to *Tetragoneura* Winnertz and a replacement name, *Tetragoneura fisherae* Kerr, nom. nov., is given for this species. A diagnosis and description of the genus *Novakia* Strobl is presented and includes a key to species of the genus. The relationship of species within the genus *Novakia* is briefly discussed.

Key words: Systematics, *Tetragoneura*, fungus gnats, new species, California

Introduction

Fungus gnats of the family Mycetophilidae are among the most abundant and diverse groups of flies encountered in moist, forested habitats around the world (Brown 2005). As larvae, Mycetophilidae typically develop in fruiting bodies of the larger fungi or in rotting wood, but some are known to develop in bryophytes and bird nests (Hutson *et al.* 1980).

The Holarctic genus *Novakia* Strobl is a small but distinctive group of mycetophilid flies that are placed in the subfamily Sciophilinae (Vockeroth 1981, Vockeroth *in press*) or Leiinae (Chandler 1994, Chandler and Blasco-Zumeta 2001, Chandler et al., 2006). Its biology is not yet known. Recent work on *Novakia* (Chandler and Blasco-Zumeta 2001, Chandler *et al.* 2006) has clarified the identification of the type species, *N. scatopsiformis* Strobl, and the only other Palaearctic member of the genus, *N. simillima* Strobl. It has been known for some time that *Novakia* also occurs in North America (Vockeroth 1981) and in fact, a species of *Novakia* is commonly recovered in Malaise trap samples from the montane regions of California. However no *Novakia* species have yet been described from North America. The present paper describes and figures this species, compares it with the other known *Novakia* species, including another new, less frequently collected *Novakia* species in California, and briefly discusses phylogenetic affinities in the genus.

Materials and Methods

Terminology for wing venation follows McAlpine (1981) and that for thoracic and genitalic morphology follows Søli (1997). Whole specimens and terminalia were macerated in 10% KOH at approximately 95º C for 15–20 minutes to remove soft tissue, then rinsed in distilled water and dilute glacial acetic acid, and dissected in water. Female reproductive organs were stained with a saturated solution of Chlorazol Black in water. Preparations of the terminalia were placed in glycerine in a genitalia vial mounted on the pin beneath the specimen. Line drawings and plates were made using Adobe Illustrator Creative Suite software, aided by digital

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images taken using Q-imaging Micropublisher 5.0, a dissecting scope-mounted digital camera. SEM images were generated with a JEOL JSM-6300 Scanning Electron Microscope, located at the California Department of Food and Agriculture, Plant Pest Diagnostics Lab, and captured using Gatan DigitalMicrograph 3.10.0 software. All digital images were enhanced using Photoshop Creative Suite software. The online key to species was produced using Lucid 3 (Centre for Biological Information Technology, University of Queensland, Australia). Types are deposited in the California State Collection of Arthropods, Sacramento, California, USA (CSCA), the Bohart Museum of Entomology, University of California, Davis, California, USA (UCDC), California Academy of Sciences, San Francisco, California, USA (CASC), the Academy of Natural Sciences, Philadelphia, Pennsylvania, USA (ANSP), the United States National Museum, Smithsonian Institution, Washington D.C., USA (USNM), and the private collections of Peter H. Kerr (PHKC; currently residing at the CSCA) and Peter J. Chandler (PJCC). Types are also deposited in 100% EtOH in the Frozen Tissue Collection of the CSCA (CSCA-FTC) at -80°C for DNA preservation.

Taxonomy

Novakia Strobl

Novakia Strobl 1893:162.

Type species. *Novakia scatopsiformis* Strobl 1893:162, by monotypy.

Diagnosis.

Three ocelli, arranged in lateral line. Frons setose or bare on upper half. Antennae separated or touching at their base; length of antennae considerably shorter in female than in male. Mesopleuron, laterotergite and mediotergite all bare. Wing membrane with small, irregularly arranged trichia only, all wing veins with setae or wing veins mostly bare on the dorsal surface. Costa produced beyond tip of R_5. Subcosta bare, ending free. Wing veins sc-r, Rs, and R_4 absent; r-m longer than R_1; R_1 and R_5 touch or fuse for short distance at their base. Point of furcation of cubital fork before level of point of furcation of media; both cubital branches straight or nearly so. Female tergites 9 and 10 bearing distinctive fringe of setae on posterior margin, setae of tergite 10 light-colored.

Description.

Body length 1.6–2.2 mm. Wing length 1.6–2.3 mm.

Coloration. Head dark brown to black. Eye color brown when preserved fresh in alcohol, typically eyes gray when dried. Antenna brown to dark brown. Scutum and scutellum dark brown to black. Thoracic sclerites brown to black. Coxae, femora, tibiae, pale brown to black or whitish to pale yellow brown as in *N. lisae* sp. n.; tibial spurs yellowish brown to brown; tarsi pale brown to black. Wing hyaline or with brownish tint over most of surface, without markings; haltere stem and knob pale to dark brown. Abdominal segments brown to black. Terminalia brown to dark brown in male; in female, cercus pale yellowish to pale yellowish brown.

Head. Flattened anteriorly, surface often somewhat shiny, with short microtrichia. Three ocelli, arranged in lateral line, relative size of ocelli variable, distance of lateral ocellus to eye margin variable. Occiput rounded. Postocular region and top of head with evenly distributed, short brown setae; frons with short setae or bare. Frontal furrow present, frontal tubercle simple and pointed, positioned between or above antennal bases; face with short setae; transverse frontoclypeal membrane developed or incomplete; clypeus with short setae. Labellum appressed against head, with short dark setae. Lacinia short, inconspicuous. Palp consisting of five palpomeres, about as long or longer than head, sensilla cochleariformis of palpomere 3 small and inconspicuous. Antennal length in male 2–3.5 times the length of head; in female, antennal length 0.8–2.2 times the

length of head; antennal bases separated by approximately 1/3 width of scape or touching; scape wider than long; pedicel wider than long; 14 flagellomeres; length of flagellum considerably shorter in female than in male, terminal flagellomere longer than wide.

Thorax. Surface somewhat shiny with short pubescence throughout. Scutum with short, dark, appressed, evenly distributed setae; lateral prealar setae thicker and longer. Antepronotum and proepisternum setose; other lateral thoracic sclerites bare. Posterior margin of scutellum bearing two pairs of long black setae. Mediotergite bare. Setae of legs short, variable; fore tibia with ovate anteroapical depressed area bearing several rows of small setae. Tarsal claws may be modified into comb-like form; empodium pulvilliform. Wing membrane clear (or mostly brown tinted in *N. lisae*), with small, irregularly arranged trichia over cell membrane surface; costal vein extends approximately 0.3–0.5 of distance between R_5 and M_1; subcostal vein short, thick, bare, and ending free; radial veins with setulae on upper surface; vein R_1 shorter or longer than half length of r-m; crossvein r-m close to R along length, touching or becoming fused for short distance before R_1 arises; Rs absent; stem of medial fork very faint to mostly absent or readily apparent; length of medial fork relative to medial stem variable; medial veins setulose on upper surface or mostly bare; cubitus and its anterior branches (CuA_1 and CuA_2) with setulae on upper surface or bare in; anal vein short, setulose or bare on upper surface.

Male Terminalia. Tergite 8 reduced and terminalia rotated so that dorsal surface of terminalia is directed anteriorly, appressed against abdomen, and ventral surface is directed posteriorly. Epandrium (= tergite 9) posterior margin emarginate or not. Gonocoxites with lateral lobes bearing gonostyli; gonocoxal lobes (Søli, 1997) separated widely or by small notch medially; gonostylus of variable form, sometimes bearing thin, elongate internal lobe.

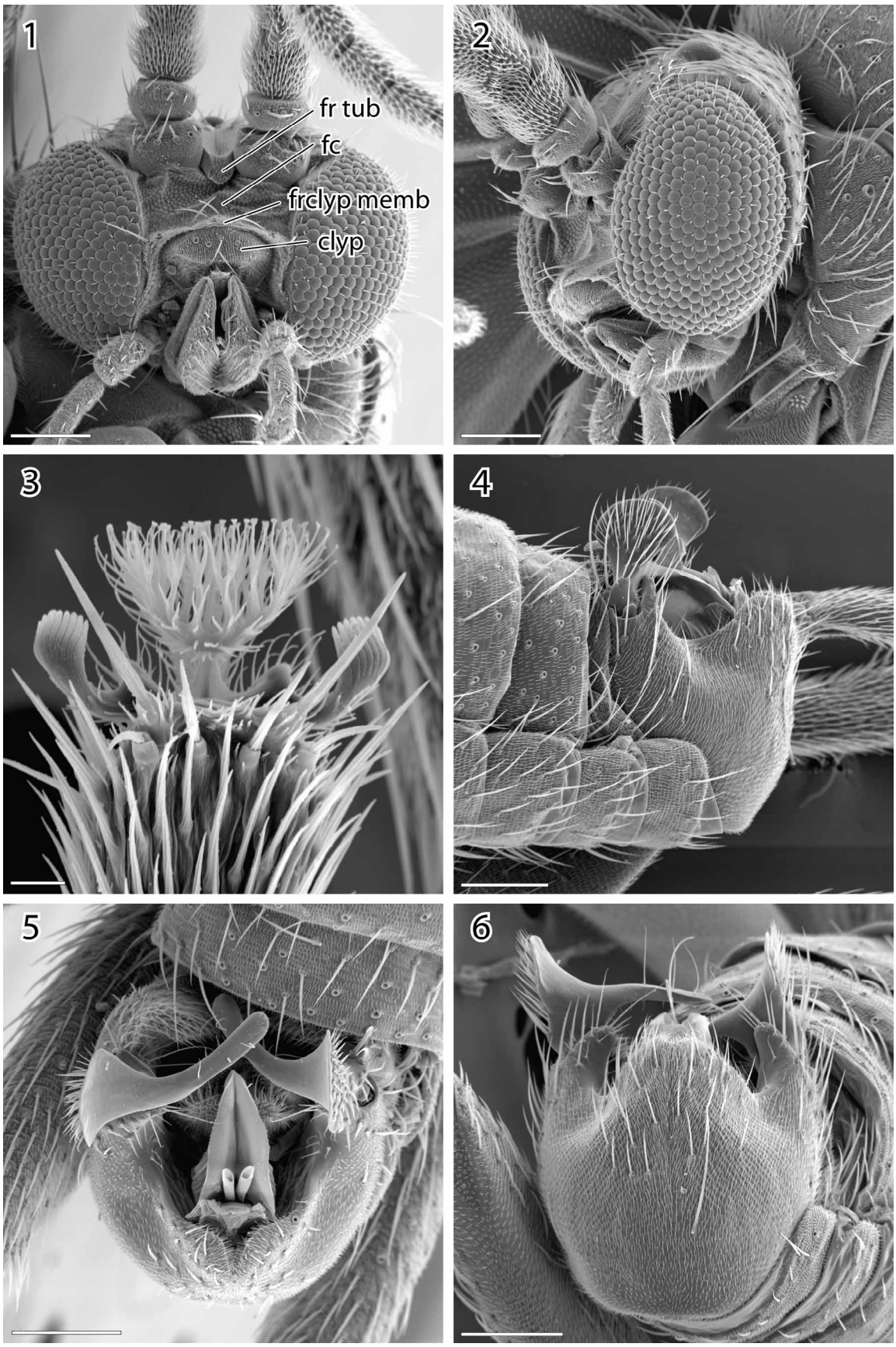
Female Terminalia. Tergite 8 incomplete dorsally, split into two lateral sclerites; tergite 9 entire, posterior margin with row of black setae, of two lengths, interspersed; tergite 10 entire, with fringe of long light-colored setae; cerci two-segmented; two spermathecae.

***Novakia miloi* sp. nov.**
(Figures 1–9, 19B)

Type Material

Holotype: ♂, USA: CA: Calaveras Co., Calaveras Big Trees SP, South grove old fire rd., MT♂4, 3814.44’N 120°15.71’W 1390masl, 22.v.–11.vi.2007 P.H.Kerr & M. Hauser 07LOT089 [CSCA]. Complete specimen on gray point mount.

Paratypes: 1 ♂, 1 ♀, USA: CALIFORNIA, same data as holotype [CSCA]; 5 ♂♂, 6 ♀♀, USA: CALIFORNIA: Calaveras Co., Calaveras Big Trees St. Pk., 38°15’N 120°15’W, 4658’ elev., 8–15.vii.2005, A.R. Cline & S.D. Gaimari, ex: Malaise trap in meadow 06LOT234 [PHKC]; 11 ♂♂, 21 ♀♀, USA: CALIFORNIA: Calaveras Co., Calaveras Big Trees St. Pk., 38°14.9’N 120°15.45’W, ~4600’ elev.; 8–26.vii.2005, A.R. Cline & S.D. Gaimari, ex: Malaise Sequoia forest 06LOT289 [ANSP/ CASC/ CSCA/ PJCC/ UCDC/ USNM]; 1 ♂, 1 ♀, USA: CA: Alpine Co.; Grover Hot Springs St. Pk., forest/meadow edge, 38°41.980’N 119°50.744’W; 1800m, 25.v.–8.vi.2006 P.H.Kerr & A.R.Cline, Malaise trap (site ♂4) 06LOT305 [USNM]; 8 ♂♂, 24 ♀♀, USA: CA: San Bernardino Co., 9 km SE Wrightwood. Lone Pine Canyon, 34°18.17’N, 117°31.81’W, elev. 4127’, 21–28.v.2005, S.L. Winterton & A.R. Cline, Malaise CDFA2005-010 [PHKC/ USNM/ CSCA-FTC, database det. number 07Y152]; 3 ♂♂, 1 ♀, USA: CA: Los Angeles Co., 1 km NW Wrightwood, Big Pines Hwy., 3422.53’N 117°40.18’W, elev. 6476’, 21–28.v.2005, S.L. Winterton & A.R. Cline, Malaise in wash CDFA2005-011 [CSCA-FTC, database det. number 06X278].



FIGURES 1–6. *Novakia miloi*, male. 1, head, anteroventral view; 2, head, oblique lateral view; 3, first tarsus, ventral view; 4, genitalia, lateral view; 5, genitalia, dorsal view; 6, genitalia, terminal view. In figures 1–2 and 4–6, scale bar = 0.1 mm; in figure 3, scale bar = 0.01 mm. *Abbreviations: clyp = clypeus; fc = face; fr tub = frontal tubercle; frclyp memb = frontoclypeal membrane*.

Additional specimens examined: 37 ♀♀, USA: CALIFORNIA, same data as holotype; 6 ♀♀, USA: CALIFORNIA: Calaveras Co., Calaveras Big Trees St. Pk., 38°14.9'N 120°15.45'W, ~4600' elev.; 8–26.vii.2005, A.R. Cline & S.D. Gaimari, ex: Malaise Sequoia forest 06LOT289; 11 ♂♂, 25 ♀♀, USA: CA: San Bernardino Co., 9 km SE Wrightwood. Lone Pine Canyon, 34°18.17'N, 117°31.81'W, elev. 4127', 21–28.v.2005, S.L. Winterton & A.R. Cline, Malaise CDFA2005-010; 1 ♂, 3 ♀♀, USA: CA: San Bernardino Co., 4 km SE Wrightwood, Lone Pine Canyon, 3419.03'N, 117°34.93'W, elev. 5388', 21–28.v.2005, S.L. Winterton & A.R. Cline, Malaise CDFA2005-008; 3 ♂♂, 2 ♀, USA: CA: Alpine Co.; Grover Hot Springs St. Pk., nr. Hot Springs Creek, 3841.997'N 119°50.805'W; 1796masl, 11–25.v.2006 P.H.Kerr & A.R.Cline, 6m Malaise trap (site ♂6) 06LOT277.

Diagnosis

This species is most similar to *N. scatopsiformis* Strobl in having black to brown legs, medial stem faint to absent and about as long as medial fork, and the gonostylus of the male terminalia with a long, slender internal process. *Novakia miloi* n. sp. may be differentiated by the form of the gonostylus, which on its outer surface is rounded evenly and not elongate (Fig. 19).

Description

Body length: 1.6–2.1 mm. Wing length: 1.6–2.3 mm. Females generally slightly larger than males.

Coloration. Face and top of head dark brown to black. Clypeus dark brown to black, basal palpomeres brown, segments becoming increasingly white distally; palpomere 5 entirely white. Antenna brown to dark brown. Scutum and scutellum dark brown to black. Thoracic sclerites brown to black. In male, fore coxa black at uppermost margin, otherwise pale brown; fore femur, tibia and tarsus pale brown. In female, foreleg brown. Mid and hind coxa, femur, and tibia brown; tibial spurs yellowish brown to brown; tarsus brown. Wing hyaline without markings, costa and radial veins thick and brown, other venation very faint light brown, cubital veins darker than medial veins (all veins slightly darker in female); haltere stem and knob pale to dark brown. Abdominal segments dark brown, with faint black band at posterior margin. Terminalia dark brown to black in male; in female, cercus very pale brown to pale yellowish.

Head (Figs. 1–2). Ocelli of approximately equal size; lateral ocellus approximately twice its widest diameter from eye margin. Frons with short brown setae. Frontal tubercle between antennal bases; transverse frontoclypeal membrane present; face wider than long, with 7–9 short dark setae on ventral half, ventral half projecting forward beyond rest of face; clypeus wider than long, with 5–7 short dark setae scattered medially, projecting forward, beyond rest of head. Area between base of antennae and clypeolabral articulation (= face + clypeus) slightly wider than long. Palp longer than head; segments l–2 short, lacking setae; palpomere 3 longer, with short dark setae scattered throughout, also with small and inconspicuous multi-pocketed shallow pits on basal half of inner surface containing 8–10 (female with 13–16) sensilla cochleariformis, attaching to palpomere 4 subapically; palpomere 4 longer than palpomere 3, with short pale brown setae; palpomere 5 cylindrical and elongate, longer than combined length of palpomeres 3 and 4, approximately or slightly less than twice length of palpomere 4, with short pale colored setae. Antennal length in male 2.4–2.8 times the length of head; in female, antennal length 1.3–1.4 times the length of head; antennal bases separated by approximately 1/3 width of scape; scape with ring of dark setae around distal margin, setae approximately as long as length of scape, slightly longer ventrally; pedicel in lateral view wider than scape, with ring of dark setae distally, approximately as long as length of pedicel; all flagellomeres densely setulose, flagellomeres 1–13 wider than long (becoming less so distally), terminal flagellomere longer than wide.

Thorax. Posterior edge of scutellum bearing two to three rows of setae; anterior-most row with setae of equal size, as on scutum; following row with two pairs of long black setae, between each of these pairs, laterally, is one seta of intermediate length; the other setae of the scutellum are as on the scutum. Fore and mid coxa with pale setae anteriorly, hind coxa setose at posterior, distal half only. Femur covered in short, pale to

dark brown setae, approximate femur length to tibia length ratio 1.2 (foreleg), 1.2 (midleg), and 0.9 (hindleg). Tibia and tarsus with longer trichia, as long or nearly as long as tibial setae; all tibial setae short, shorter than width of tibia; fore tibia with ovate anteroapical depressed area bearing several rows of small yellowish brown setae; mid tibia with 6 anterior setae, a row of dorsal setae, and a short row of posterior setae on apical third; hind tibia with a row of approximately 14 anterior setae, a row of dorsal setae, and a short row of posterior setae on apical third, and a cluster of approximately 25 short setae posteroapically. In male, tarsal claw finely dissected terminally, modified into a 8-tined comb (Fig. 3); in female, tarsal claw simple; empodium pulvilliform. Wing (Fig. 7) with small, irregularly arranged microtrichia over cell membrane surface; costal vein extends approximately 0.4 of distance between R_5 and M_1; vein R_1 shorter than half length of r-m; crossvein r-m close to R along length; where they join, r-m and R_5 appear to arch toward R and become fused with R for short distance just before R_1 arises; stem of medial fork very faint and mostly absent, length of medial fork about as long as presumed length of medial stem (from r-m approximately level with humeral crossvein at costa to base of medial fork); medial veins setulose on upper surface; cubitus and its anterior branches (CuA_1 and CuA_2) with setulae on upper surface; anal vein short, setulose on upper surface.

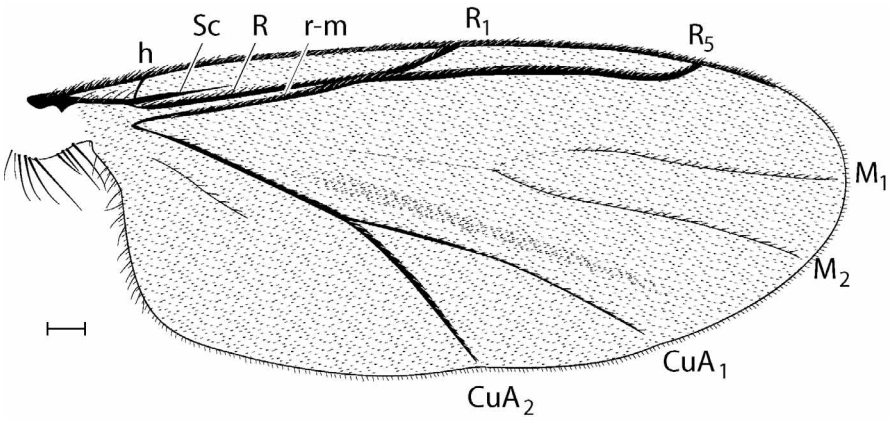


FIGURE 7. *Novakia miloi*, female, wing, dorsal view.

Male Terminalia (Figs. 4–6, 8, 19B). Epandrium (= tergite 9) posterior margin emarginate. Gonocoxal lobes (Søli, 1997) separated by small notch medially; base of gonostylus with row of 5 setae, decreasing in size distally; outer surface of gonostylus flattened and projected distally into thin plane, rounded symmetrically, bearing setae shorter than gonostylus width evenly across exterior surface; internal lobe of gonostylus present, extends past midline, arcs upwards (dorsally), with 3 fine setae on apical half of posterior surface. Aedeagus with central fold, arching dorsally, extending beyond parameres.

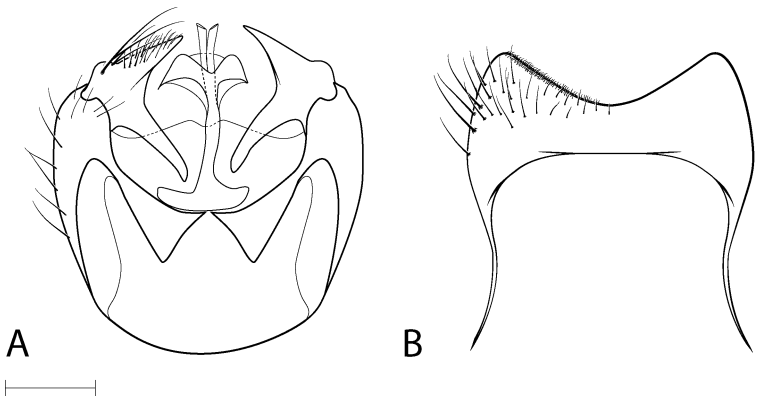


FIGURE 8. *Novakia miloi*, male genitalia. A, hypandrium, dorsal view; B, epandrium, dorsal view. Scale bar = 0.1 mm.

Female Terminalia (Fig. 9). First cercus segment broad, with moderately produced dorsal lobe, second cercus segment ovoid, often flattened; spermathecae spherical, connected directly to genital chamber via short spermathecal ducts, spermathecal duct length approximately same as two-segmented cercus.

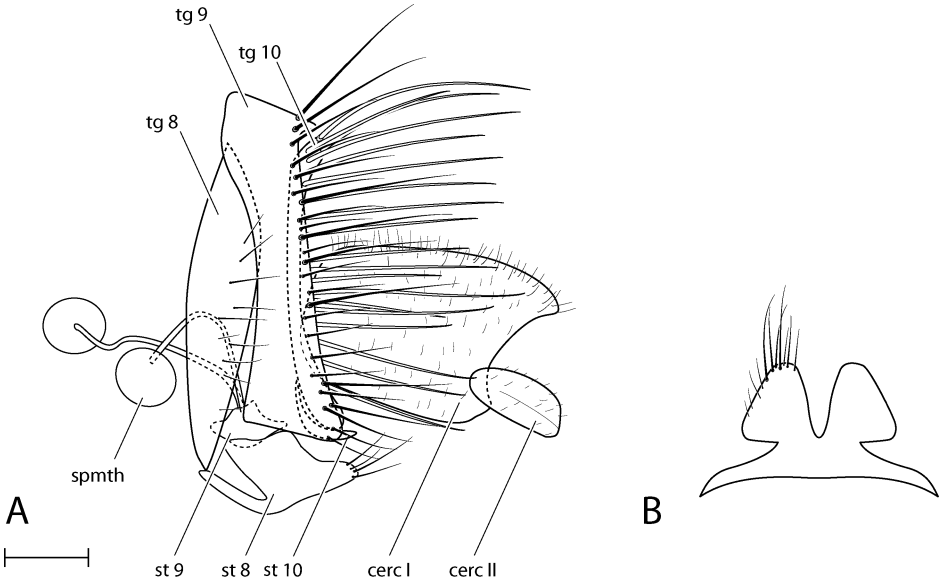


FIGURE 9. *Novakia miloi*, female genitalia. A, terminalia, lateral view; B, sternite 8, ventral view. Scale bar = 0.1 mm. *Abbreviations: cerc=cercus; spmth=spermatheca; st=sternite; tg=tergite; s=seta*.

Comments

The wing of "*Novakia* sp." illustrated in the Manual of Nearctic Diptera (Vockeroth 1981) is identical to the wing of *Novakia miloi* and I believe that the two are the same species. The wing slide used for this illustration remains at the Canadian National Collection (CNC), however the associated specimen has been lost. Thus, the species determination cannot be confirmed. The collection data for the CNC specimen is McBride Springs, Mt. Shasta, California, collected on the 7.XII.76, (no collector name).

This species is commonly caught in Malaise trap samples in California (Alpine, Calaveras, and San Bernadino counties) in or near forested areas above 1200m.

Etymology

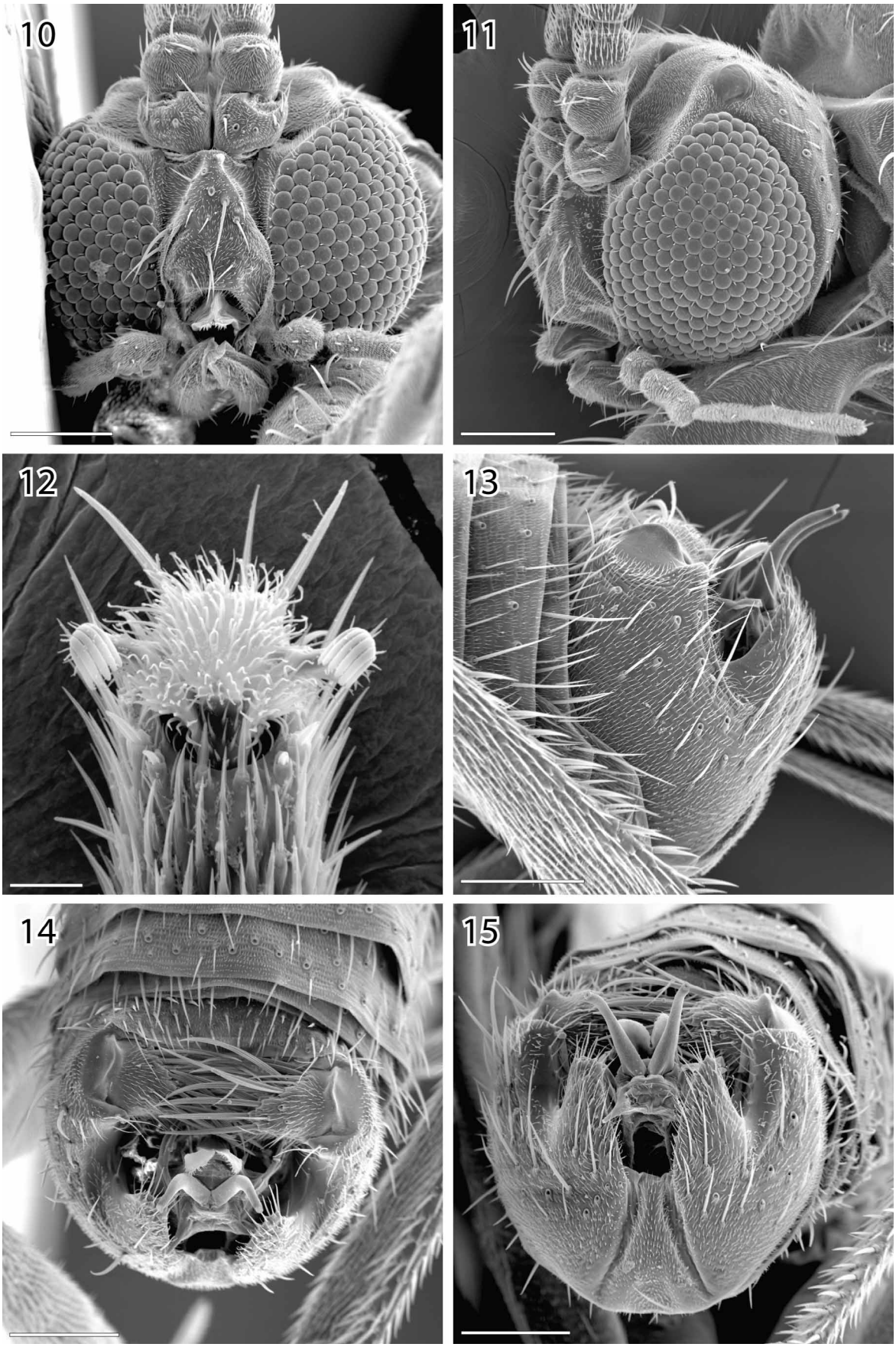
Named in honor of Miles Elias Kerr, "Milo," born 10 July 2004 and present during collection of this species.

***Novakia lisae* sp. nov.**
(Figures 10–18)

Type Material

Holotype: ♂, USA: CA: San Bernardino Co., 9 km SE Wrightwood. Lone Pine Canyon, 34°18.17'N, 117°31.81'W, elev. 4127', 21–28.v.2005, S.L. Winterton & A.R. Cline, Malaise CDFA2005-010 [CSCA]. Specimen on point mount, missing all legs on left side, otherwise in excellent condition.

Paratype: 1 ♀, same data as holotype [PHKC]. Specimen on point mount, in excellent condition.



FIGURES 10–15. *Novakia lisae*, male. 10, head, anteroventral view; 11, head, oblique lateral view; 12, first tarsus, ventral view; 13, genitalia, lateral view; 14, genitalia, dorsal view; 15, genitalia, terminal view. In figures 11–12 and 14–16, scale bar = 0.1 mm; in figure 13, scale bar = 0.01 mm.

Additional paratypes in alcohol: 1 ♂, 1 ♀, same data as holotype [CSCA-FTC, database det. numbers 06X608, 06X609]; 1 ♀, USA: CA: Los Angeles Co., 1 km NW Wrightwood, Big Pines Hwy., 34°22.53'N 117°40.18'W; elev. 6476', 21–28.v.2005, S.L. Winterton & A.R. Cline, Malaise in wash CDFA2005-011 [CSCA-FTC, database det. number 06X706].

Diagnosis

This species is the most distinctive of the genus. The most prominent diagnostic features that separate it from all other *Novakia* species include pale yellowish or white colored mid and hind legs, antennal bases that touch medially, and lateral ocellus positioned approximately its own diameter or less from eye margin.

Description

Body length: 1.8–2.2 mm. Wing length: 1.8–2.1 mm. Males and females approximately the same size.

Coloration. Head dark brown to black. Eye color brown when preserved fresh in alcohol, eyes gray when dried. Antenna brown to dark brown. Clypeus dark brown to black, basal palpomeres pale brown, segments becoming increasingly white distally; palpomere 5 entirely white. Scutum and scutellum brown to black. Thoracic sclerites brown. Coxae whitish or pale yellow, femora and tibiae whitish or pale yellow to pale yellowish brown; tibial spurs yellowish brown to brown; tarsi yellowish brown. Wing with brownish tint over most of membrane, narrow hyaline area posterior of wing vein R_5, cubital veins slightly darker than medial veins (wing veins not noticeably darker in female), haltere stem white and knob pale to dark brown. Abdominal segments brown, with faint black band at posterior margin. Terminalia brown to dark brown in male; in female, cercus pale yellowish to pale yellowish brown.

Head (Figs. 10–11). Median ocellus less than half diameter of lateral ocellus; lateral ocellus less than its own diameter from eye margin (in female, lateral ocellus closer to eye margin). Postocular region and top of head with evenly distributed, short brown setae; frons bare. Frontal tubercle above antennal bases; transverse frontoclypeal membrane oblique, incomplete. Face and clypeus not separated by frontoclypeal membrane medially; face and clypeus swollen and projecting forward, beyond rest of head; area between base of antennae and clypeolabral articulation (= face + clypeus) longer than wide. Palp about as long as head or slightly longer; segments l–2 short, lacking setae; palpomere 3 longer, with short dark setae scattered throughout, also with small and inconspicuous shallow pit on basal half of inner surface containing sensilla cochleariformis (5–8 in male); palpomere 4 longer than palpomere 3, with short pale brown setae; palpomere 5 cylindrical and elongate, longer than combined length of other palpomeres, more than twice length of palpomere 4, with short pale colored setae. Antennal length in male approximately 3.0 times the length of head; in female, antennal length approximately 2.2 times the length of head; antennal bases separated; scape with dorsal extension covering base of pedicel, with ring of dark setae, setae shorter than length of scape, slightly longer ventrally; pedicel in lateral view as wide as scape, with ring of dark setae distally, shorter than length of pedicel; all flagellomeres densely setulose, in male, flagellomeres 1–13 longer than wide and terminal flagellomere approximately twice as long as wide; in female, flagellomeres 1–13 approximately as long as wide and terminal flagellomere slightly less than twice as long as wide.

Thorax. Scutellum bearing two pairs of long black setae on posterior margin, several shorter setae also present on posterior margin. Setae of legs black, short. Fore coxa setose over entire anterior surface and with a few setae on the posterior surface at apex only, mid coxa setose anteriorly, hind coxa with single row of 3–5 setae at distal 2/3 of dorsal surface and with setae at apical margin. Approximate femur length to tibia length ratio 1.2 (foreleg), 1.0 (midleg), and 0.9 (hindleg). Trichia of tibia and tarsus brown, prominent; all tibial setae shorter than width of tibia; fore tibia with ovate anteroapical depressed area bearing several rows of small yellowish setae; mid tibia with 6 anterior setae, 4–5 dorsal setae, and 3–4 posterior setae on apical third; hind tibia with a row of 5–9 anterior setae, a row of dorsal setae, and a 0–3 posterior setae on apical third, and a cluster of approximately 25 short setae posteroapically. In male, tarsal claw finely dissected terminally, modi-

fied into a 6-tined comb (Fig. 12); in female, tarsal claw simple; empodium pulvilliform. Wing (Fig. 16) with small, irregularly arranged trichia over cell membrane surface; costal vein extends approximately 0.4 of distance between R_5 and M_1; subcostal vein short, thick, bare, and ending free; radial veins with setulae on upper surface; vein R_1 longer than half length of r-m; crossvein r-m close to R along length; Rs absent but position marked where radial veins touch before R_1 turns to costal vein; r-m and R_5 join seamlessly (as R and R_1); stem of medial fork readily apparent for its entire length, shorter than length of fork; M_1 and M_2 with reduced, inconspicuous setulae on apical half of upper surface only; basal transversal vein readily apparent; cubital veins bare; anal vein short, bare.

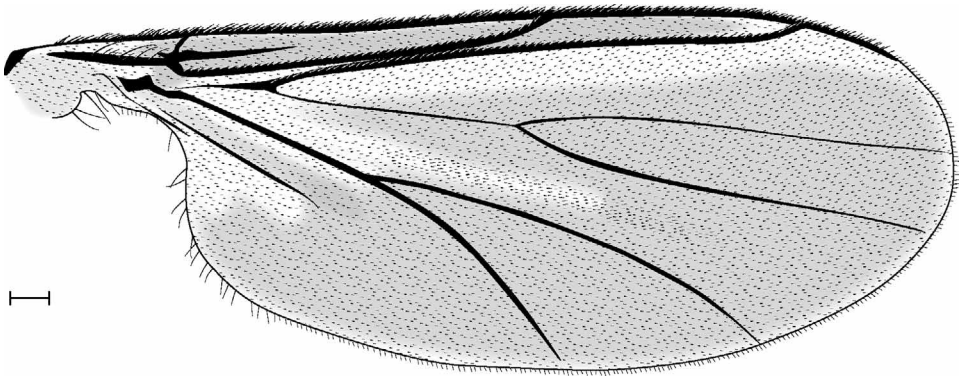


FIGURE 16. *Novakia lisae*, female, wing, dorsal view.

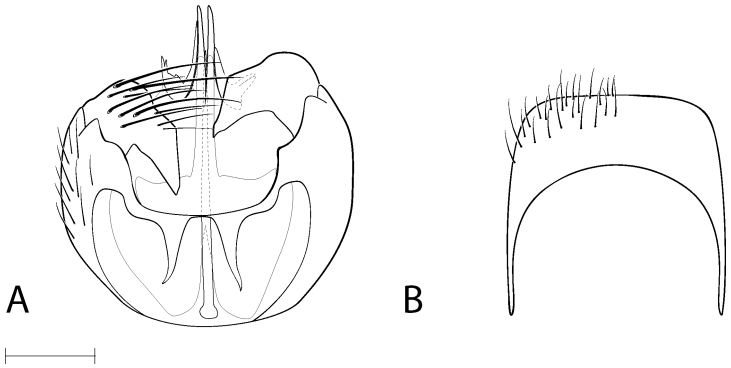


FIGURE 17. *Novakia lisae*, male genitalia. A, hypandrium, dorsal view; B, epandrium, dorsal view. Scale bar = 0.1 mm.

Male Terminalia (Figs. 13–15, 17). Epandrium (= tergite 9) posterior margin not emarginate. Gonocoxal lobes (Søli, 1997) separated medially, exposing aedeagal complex in ventral view; gonostylus armed with thick setae that extend past midline, with tapered apical lobe; internal lobe of gonostylus absent; aedeagus dissected medially, with apical fringe; parameres long, extending prominently beyond confines of genitalic capsule.

Female Terminalia (Fig. 18). First cercus segment broad, second cercus segment ovoid, often flattened with transversely flattened apical beak-like process; spermathecae connected directly to genital chamber via short spermathecal ducts, spermathecal duct length slightly longer than two-segmented cercus.

Comments

This species is only known from the San Gabriel Mountains (near Wrightwood, CA; Los Angeles and San Bernadino counties), where it is sympatric with *N. miloi*.

Etymology

Named in honor of Lisa Sofia Kerr, born 3 November 2006.

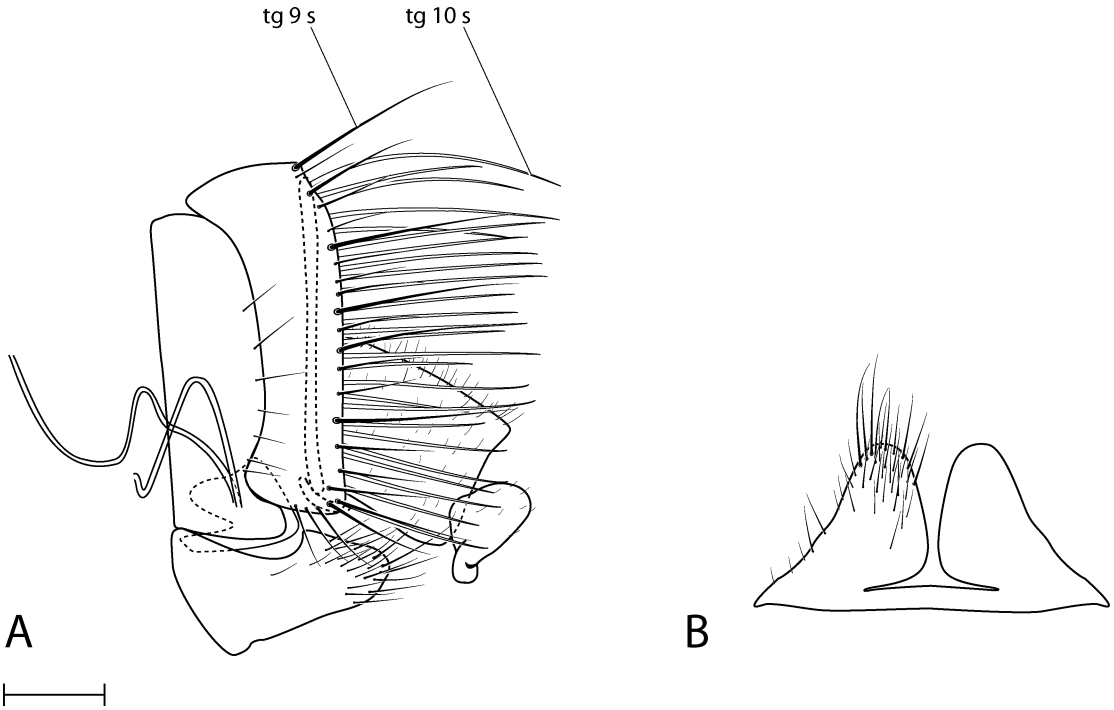


FIGURE 18. *Novakia lisae*, female genitalia. A, terminalia, lateral view; B, sternite 8, ventral view. Scale bar = 0.1 mm. *Abbreviations: tg=tergite; s=seta*.

***Novakia scatopsiformis* Strobl 1893**
(Fig. 19A)

Novakia scatopsiformis Strobl 1893:162
Kerteszina tunesica Enderlein 1913:27

Specimens examined. 1 ♂, CYPRUS, Ayios Therapon, Roadside + scrub etc., 16.v.1983, I.F.G. McLean [PJCC]; 1 ♂, CRETE, Samaria Gorge, Pinus brutia, 17.v.1982, I.F.G. McLean [PJCC].

The type species of this genus is found in the Mediterranean Region and has been recently collected as far north as southern Sweden (J. Kjærandsen, pers. comm.). The male terminalia (dorsal and ventral view), female terminalia (dorsal view), and a portion of the antenna of this species are illustrated in Chandler et al. (2006).

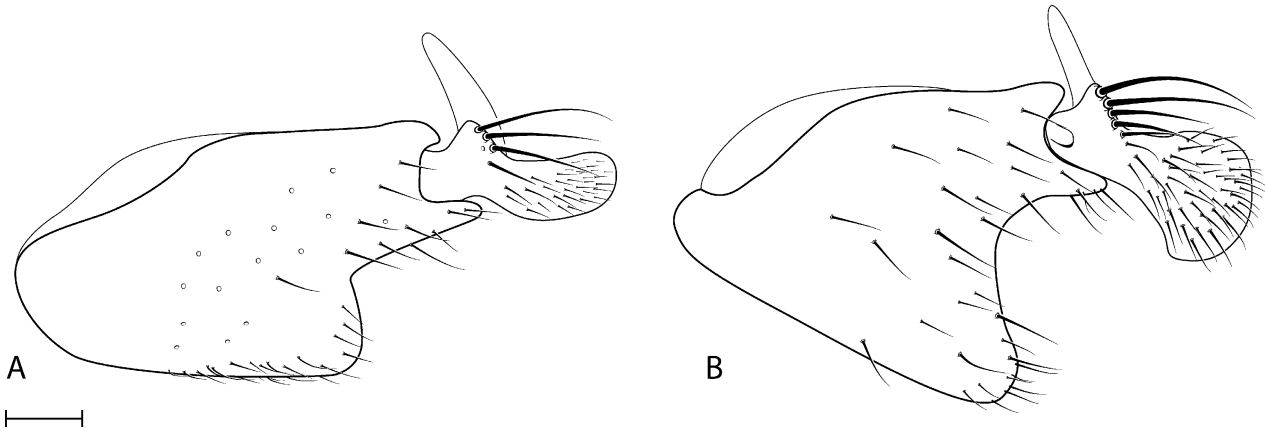


FIGURE 19. Male genitalia, lateral view. A, *Novakia scatopsiformis*; B, *N. miloi.* Scale bar = 0.05 mm.

***Novakia simillima* Strobl 1910**

Novakia simillima Strobl 1910: 45.

Specimens examined. 1 ♂, SPAIN, Zaragoza, near Pina de Ebro, Retuerta de Pina, Juniperus thurifera wds, 2844. 25.3.1991, Malaise trap, Javier Blasco Zumeta [PHKC]; 1 ♂, SPAIN, Zaragoza, near Pina de Ebro, Retuerta de Pina, Juniperus thurifera wds, 2951. 25.4.1991, Malaise trap, Javier Blasco Zumeta [PHKC]; ♂, SPAIN, Zaragoza, near Pina de Ebro, Retuerta de Pina, Juniperus thurifera wds, 2893. 9.iv.1991, Malaise trap, Javier Blasco Zumeta [PHKC].

This species was redescribed by Chandler & Blasco-Zumeta (2001). The type locality is near Admont, Austria, however it is more commonly collected in Spain. The male terminalia (dorsal and ventral view), female terminalia (dorsal view), and a portion of the antenna of this species are illustrated in Chandler et al. (2006).

***Tetragoneura fisherae* Kerr nom. nov.**
(Fig. 20)

Novakia distincta Fisher 1939: 234.
Tetragoneura distincta (Fisher 1939:234) **n. comb.** Preoccupied by *Tetragoneura distincta* Winnertz 1849:19.
Tetragoneura fisherae Kerr **nom. nov.** for *Tetragoneura distincta* (Fisher 1939:234), nec *T. distincta* Winnertz 1849:19.

Holotype (studied): ♂, San José, Costa Rica, (H. Schmidt), IX-19 1930 [ANSP, type no. 6571]. Head missing; both wings in fairly poor condition, slide mounted in euparal.

Allotype (studied): ♀, San José, Costa Rica, (H. Schmidt), IX-10 1930.

Paratypes (studied): 2 ♂♂, San José, Costa Rica, (H. Schmidt), IX-5 1930; 1 ♂, same data as allotype; 1 ♂, San José, Costa Rica, (H. Schmidt), IX-14 1930.

Dr. Uwe Kallweit (Museum für Tierkunde, Staatliche Naturhistorische Sammlungen Dresden) labeled the pinned holotype specimen and associated slide material "*Tetragoneura distincta* (Fisher, 1939), det Kallweit 2000". This is an unusual species that merits more study within the context of a wider review of its closest relatives. For now, I agree with Kallweit that this species fits within the broad concept of *Tetragoneura* Winnertz, a genus in great need of revision. *Novakia distincta* Fisher is certainly not contained within *Novakia* Strobl. This species is hereby transferred to *Tetragoneura* Winnertz. A replacement name is given because the binomial is preoccupied by *Tetragoneura distincta* Winnertz 1849, an available name.

With transfer of this species, the genus *Novakia* Strobl is restricted to the Holarctic Region.

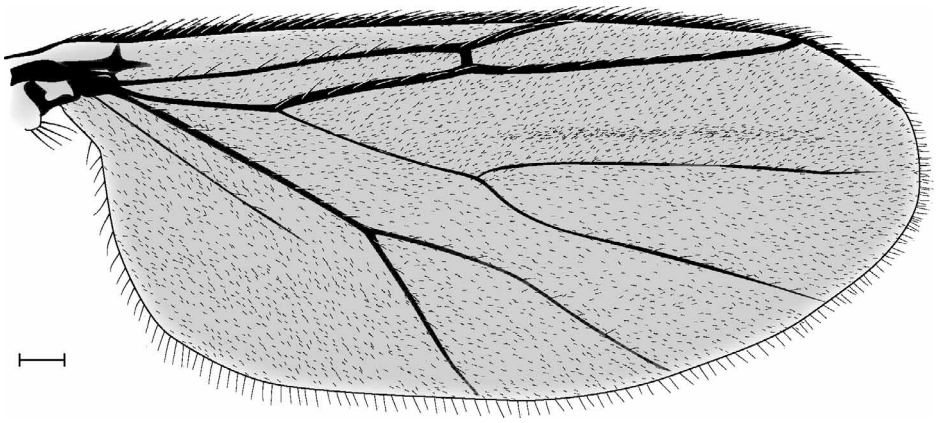


FIGURE 20. *Tetragoneura fisherae*, male holotype, wing, dorsal view.

Key to the species of *Novakia* Strobl

1. Mid and hind leg pale yellowish or whitish, lateral ocellus separated from eye margin by ocellus diameter or less, antennal bases touching, anal wing vein bare .....*N. lisae* n. sp.
   Mid and hind leg brown or black, lateral ocellus separated from eye margin by twice ocellus diameter or greater, antennal bases separated, anal wing vein setulose.....2
2. Median fork of wing longer than median stem, antennal flagellomeres about twice as long as broad, antenna of male over three times length of head, gonostylus of male terminalia lacking internal process ... . *N. simillima* Strobl
   Median fork about as long as median stem, antennal flagellomeres about as long as broad, antenna of male less than three times length of head, gonostylus of male terminalia bearing internal process 3
3. Outer surface of gonostylus of male terminalia evenly rounded, less than twice as long as wide (Figs. 4, 19B), costa extends approximately 0.4 of distance from R_5 to M_1, Nearctic ..... *N. miloi* sp. n.
   Outer surface of gonostylus of male terminalia elongate, at least three times as long as wide (Fig. 19A), costa extends approximately 0.3 of distance from R_5 to M_1, Palaearctic .....*N. scatopsiformis* Strobl

An interactive key of these species, with supplemental images and figures, is available online [http://www.cdfa.ca.gov/phpps/ppd/Entomology/Diptera/Mycetophilidae.htm].

Discussion

The new species *Novakia miloi* and *N. lisae* are representative of the diversity of form that exists within the genus *Novakia* Strobl. The new species differ in many significant ways; most prominently: ocellus form and location, antennal flagellomere form, development of frontoclypeal membrane, setation on frons, wing setation and vein pattern, wing membrane color, leg color, form of the epandrium, gonocoxites, gonostyli, and aedeagal complex, and the form of the female cercus. It may be argued that a new genus is warranted for *N. lisae* on account of its notable differences from the other *Novakia* species, particularly *N. miloi* and the type species of the genus, *N. scatopsiformis* Strobl. The existence of this species expands the concept of *Novakia* considerably. However, all species reviewed here, including *N. lisae*, retain the characteristic fringe of long black setae on tergite 9 and a fringe of long golden setae of tergite 10 in the female. This provides evidence for their recent common ancestry and is the singular distinctive feature of the genus. Until more evidence is generated to clarify the phylogenetic placement of these species within a larger framework, I believe the creation of a monotypic genus is premature.

While the female terminalia may indicate relatedness at a deeper phylogenetic level, the male terminalia are instructive in underscoring phylogenetic affinities within the group. It is clear that *Novakia miloi* and *N. scatopsiformis* are sister taxa; they share a number of derived features such as the reduced medial split between gonocoxal lobes and the form of the gonostylus, including the presence of an inner gonostylus process. The male terminalia of *N. lisae* and *N. simillima* both lack an inner gonostylus process and the gonocoxites are widely emarginate medially. However the rest of the morphology of the male terminalia, consistent with the non-terminalia characters, suggests that *N. lisae* and *N. simillima* are only distantly related and does not indicate that these species are more closely related to each other than to *N. miloi* + *N. scatopsiformis*. Strong setae at the base of the gonostylus, as well other shared characters states including (but not limited to) lateral ocellus approximately twice its diameter from eye margin, setae of frons present, antennal scape touching medially, transverse frontoclypeal membrane complete, wing vein R_1 shorter than half length of r-m, median fork absent or very faint, and wing veins with prominent setae support an hypothesis of common recent ancestry between *N. simillima* and *N. miloi* + *N. scatopsiformis*.

Acknowledgements

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