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A New Genus and Species of North American Robsonomyiini (Diptera: Sciaroidea: Keroplatidae: Macrocerinae) from the Florida Keys

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Abstract. A second genus and species of Nearctic keroplatid fungus gnats (Diptera: Sciaroidea: Keroplatidae: Macrocerinae) attributed to the tribe Robsonomyiini is described: *Calusamyia hribari* Coher, **n. gen., n. sp.**. The relationship of this fly from the Florida Keys with Asian genera and species and the single Nearctic described form of the robsonomyiines is briefly discussed.

Key words. *Calusamyia,* new genus, Florida Keys, Robsonomyiini, Macrocerinae, Sciaroidea

Introduction

This report and description of a new genus of predaceous adult fungus gnat from the Florida Keys, an archipelago of low-lying coralline islands, is the first such adult in the superfamily Sciaroidea. Fungus gnats (Diptera: Keroplatidae) of this area have been extensively taken from light traps used for mosquitoes by Dr. Lawrence Hribar and Mr. David DeMay. Twelve Keys produced more than 200 captures of fungus gnats representing new genera, several sciophiline genera, orfeliine keroplatines, and two common exechiine genera. Whether new forms evolved in these islands is still unclear; genetic population maintenance after arrival from the Neotropical and Nearctic Regions cannot be ruled out. Study of the Florida Keys fauna is well warranted owing to a position between the Austroriparian Subregion of North America and the Antillean Subregion.

Nematocerous Diptera such as culicids and ceratopogonids with Neotropical origins are reported from the Keys by Roth and Young (1944), Downes and Kavanaugh (1988), Hribar et al. (2008), and Grogan et al. (2010). Rafting and transport seem to be the least likely means of invasion because most of these forms require fresh water for their larval stages; bromeliads are too specialized for the number of forms reported. Strong winds of less than hurricane force are a more likely means of transporting small invaders, possibly more than once and possibly in multiples at one time. Body size would be critical to invasion on moderate force winds**.** The Keys mycetophilid fauna collected by light trap is extraordinary for reduced adult size. A series of introductions via the Antillean Islands may eventually be ascertained as stepping-stones when more complete faunal studies of those islands are done.

Post-Pleistocene colonization from volcanic islands and perhaps mainland South America to these coralline islands would require some common, or nearly so, ecological system in the receiving area which invaders could exploit to immediately adapt to the new environment. A food resource acceptable to the adults of the invader with an acceptable oviposition substrate subsequently acceptable to the larvae, which may have a narrower choice of host, must be available. Thus, invaders that survived new resources as immatures and adults could either have maintained their genetic inheritance or survived selective life changes such as produced by a founding bottleneck effect or random drift under the influence of a new environment. Studies such as those by Van der Pijl and Dodson (1966), Jones (1981), Dafni and Bernhardt (1990), among others shed light on the role of sciaroids in pollination and feeding habits. A possible role of honeydew sugars for dipterous evolution has been suggested by Downes and Dahlem (1987). Unpublished studies by Hamilton (2003) center on the requirement of host plants for pollination and subsequent importance of pollinators, particularly fungus gnats.

Macrocerinae, which include the robsonomyiines, are worldwide in distribution. The fungus gnat family Keroplatidae is quickly identified by its wing venation in which Rs and M are fused (r-m fusion of various authors) or touching; the anatomy of the head capsule; the form of the pleural sclerites; the forcipate male terminalia; the elegant, long antennae of *Macrocera* Meigen, 1803 and some robson-

omyiines (Shaw 1948 b, Vockeroth 2009). Robsonomyiines exhibit a reduced radial wing venation and a divided head capsule and thoracic pleura with a reduced and vertical mesepimeron. In Nearctic Region forms, *Calusamyia* n.g. is not particularly closely related to *Robsonomyia* Matile and Vockeroth, 1980 and is separated from all other contemporary macrocerines by a combination of its large eyes, unique spotted wing pattern with a reduced radial field (Fig. 2), and a shallow smooth occipital region, setose anepisternum, strongly oblique sub-rectangular reduced mesepimeron and distinct form of the male terminalia (Fig. 4). Related Robsonomyiini are solely the Christmas I., Indian Ocean *Micrepimera* Matile (1990: 180), the Sri Lanka *Srilankana* Matile (1990: 185) and particularly the Malaysian *Langkawiana* Sevcik (2009a: 58, 2009b) which has long, macrocerine antennae and a reduced mesepimeron with a patch of antero-dorsal setae and a similar but more robust habitus. Other flies in this group are *Robsonomyia sciaraeformis* (Okada), 1939 from Japan (whose possible relationship to *Sciarokeroplatus pileatus* Papp and Sevcik, 2005 from Taiwan and China remains to be determined).

The Beringian connection seems to be the source of the Nearctic *Robsonomyia* which is separable from other macrocerines principally by wing vein anomalies, pleural differences, and head capsule characteristics. The distribution of *Calusamyia* and *Robsonomyia* suggests the less likely instance of Peck's (1989) "tropical land route", a northward migration via Central America and Mexico although no robsonomyiine is yet to be reported from the Neotropical Region.

Keroplatidae: Macrocerinae: Robsonomyiini

***Calusamyia* Coher, new genus (Fig. 1)**

Description. Male. *Head*: mouthparts with connected broad labellar halves appressed ventrally to head capsule); four short palpal segments, lengths subequal, second bulbous with sensory pore; clypeus wider than long, bare; frons triangular with a few small setae, apex slightly porrect; antenna slightly longer than abdomen, scape and pedicel subequal, slightly inflated, pedicel minutely setaceous, fourteen minutely setose flagellar segments with apical segment longer than preceding segments, basal segments with stronger ventral setae; eye dichoptic, large, protuberant, forming bulk of head capsule, with a short stout posterolateral seta; two large slightly projecting ocelli on lateral margin of a pigmented median subrectangular area, their own diameter from eyes and twice that from each other, a minute ocellus on median projection; occipital area with sparse, fine setae, clear crescent-shaped plates and brushy surficial appearance, much less convex than *Macrocera* spp.

Thorax: anterior pronotum sparsely setiferous; mesonotal seta rows very weak, fine, long setae sparse posteriorly, antero-lateral acrostichal area slightly raised; pleura (Fig. 3) with highly reduced sub-quadrate mesepimeron not produced beyond ventral margin of anepisternite is and closely fused with a sunken postero-dorsal unpigmented plate that is narrowly connected anteriorly to a similar plate between it and the anepisternite; anepisternite two thirds size of katepisternite with an anterior cluster of small setae; scutellum band-shaped with two pairs of two long and one short setae; postnotum rounded, bare.

Legs: slender; fore and midcoxa with an anteroapical row of setae; femora with dorsal, ventral and inner rows of somewhat decumbent setae; tibiae setose, appearing brushy apically; foretibia length subequal to its femur, expanded apically; mid tibia slightly shorter than its femur; hind tibia 5:4 to its femur, with well developed apical dorsal setal row; tibial spurs small, 1-2-2; hind basitarsus much longer than combined distal segments; tarsal segments with paired apical spurs, two apical segments very slender, possible flexile; claws scimitar shape; pulvilli recurved.

Wing: (Fig. 2) patterned as figured; membrane minutely setiferous, strong appearance at pigment spots; costal margin strongly setose, less so near base; sc very weak, setose, expanded distally, ending in C; R1+2+3 ends midway in C and not connected basally to Rs, branches of M and R setose, R 4+5 arched, terminating prior to tip of costa; M slightly more than half the length of its branches which are apically divaricate, end in wing margin; 2A half length of 1A when present.

Halter: faintly setose, stem long, knob infolded, ovoid.

Abdomen: tubular, slim with short, fine setae; tergites enfold sternites, clothed in microsetae, with a brush-like appearance principally formed by longitudinal rows of short, fine setae; segment 1 reduced,

setation reduced, segments 2-7 elongate, successively barely shorter, 6 and 7 flattened, broad; tip of abdomen slightly recurved.

Male terminalia (Fig. 4): median gonapophyses setose, rounded; tergal plate wider than high; dististyle stout, slightly curved with strong apical spur.

Female. *Head*: mouthparts with connected broad labellar halves appressed ventrally to head capsule; four short palpal segments, lengths subequal, second bulbous with sensory pore; clypeus wider than long, bare; frons triangular with a few small setae, apex slightly porrect; antenna slightly longer than abdomen, scape and pedicel subequal, slightly inflated, pedicel minutely setaceous, fourteen minutely setose flagellar segments with apical segment longer than preceding segments, basal segments with stronger ventral setae; eye dichoptic, large, protuberant, forming bulk of head capsule, with a short stout posterolateral seta; two large slightly projecting ocelli on lateral margin of a pigmented median subrectangular area, their own diameter from eyes and twice that from each other, a minute ocellus on median projection; occipital area with sparse, fine setae, clear crescent-shaped plates and brushy surficial appearance, much less convex than *Macrocera* spp.

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Legs: slender; fore and midcoxa with an anteroapical row of setae; femora with dorsal, ventral and inner rows of somewhat decumbent setae; tibiae setose, appearing brushy apically; foretibia length subequal to its femur, expanded apically; mid tibia slightly shorter than its femur; hind tibia 5:4 to its femur, with well developed apical dorsal setal row; tibial spurs small, 1-2-2; hind basitarsus much longer than combined distal segments; tarsal segments with paired apical spurs, two apical segments very slender, possible flexile; claws scimitar shape; pulvilli recurved.

Wing: (Fig. 2) patterned as figured; membrane minutely setiferous, strong appearance at pigment spots; costal margin strongly setose, less so near base; sc very weak, setose, expanded distally, ending in C; R1+2+3 ends midway in C and not connected basally to Rs, branches of M and R setose, R 4+5 arched, terminating prior to tip of costa; M slightly more than half the length of its branches which are apically divaricate, end in wing margin; M much more widely divaricate than *Macrocera* or *Robsonomyia;* m-cu as for *Macrocera,* atrophied; branches of Cu ending in the margin; anal veins developed strongly or weakly; 1A weak, ends at level of Cu; 2A half length of 1A when present.

Haltere: faintly setose, stem long, knob infolded, ovoid.

Abdomen: tubular, distended, somewhat flattened, sternites exposed with short, fine setae; tergites enfold sternites, clothed in microsetae, with a brush-like appearance principally formed by longitudinal rows of short, fine setae; segment 1 reduced, setation reduced, segments 2-7 elongate, successively barely shorter.

Female terminalia: (Fig. 5-6) Segment 8 subrectangular with median vertical row of small bristles; segment 9 subquadrate with a flat, hooded tergal sclerite. Cercus elliptical joined with segment 9 by its subbasal margin.

Discussion. *Calusamyia* is the only robsonomyiine that has been taken in large numbers. *Calusamyia* differs from the Nearctic *Robsonomyia reducta* by its elongate antenna, pictured wing and development of the veins of the medial and anal field, different configuration of the mesepimeron and the distinctly developed male terminalia. A reduced mesopleural structure is also found in the western North American macrocerine *Fenderomyia* Shaw, 1948 b.

The above female description is the first female robsonomyiine to be described.

Etymology. The new generic name *Calusamyia* is derived from the title of an original Indian tribe inhabiting southern Florida. The suffix myia is feminine in gender.

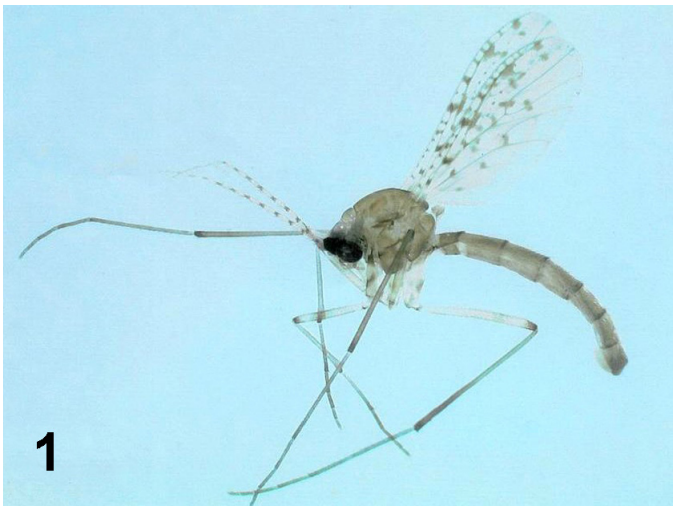


Figure 1. *Calusamyia hribari*, lateral habitus.

***Calusamyia hribari* Coher, new species**
Figures 1-6

Description. Male with cited generic characters. Pigmentation variable from olive-yellow to fuscous.

Head: mouthparts suffused or light; palpus with segments 1-2 suffused or lighter, terminal segment ivory; frons suffused; antenna with scape and pedicel pale; flagellar segments 2-10 ivory with a broad apical and narrow suffused basal band; long, strong setae ventral on each segmental, primarily in light portion.

Thorax: mesonotum brown or with acrostichal and dorsocentral brown stripes on a light background; antero lateral region with a broad comma-shaped area; scutellum and postnotum suffused, latter narrowed abruptly.

Wing: (Fig. 2) 2.1 to 2.4 mm.

Haltere: entirely light or stalk light, knob infuscated.

Legs: coxae with posteromedian infuscated band or spots, widest, most conspicuous on anterior coxa which is dark basally; trochanters, femora and tibiae narrowly suffused apically; hind tibia with distal 0.4 darker than apical portion; tarsi brown or basally light or entirely light.

Abdomen: appearing either gray or speckled and mottled with dark spots; TIV-TVI with narrow, black band; specimens in alcohol TII-TVI light-colored with paired, suffused dorsal longitudinal lines.

Male terminalia: (Fig. 4). Median gonapophyses setose, rounded; tergal plate wider than high; dististyle stout, slightly curved with strong apical spur.

Female. As for the male, abdomen somewhat flattened.

Female terminalia: (Fig. 5-6). Segment 8 subrectangular with median vertical row of small bristles appearing as a segmentation; segment 9 subquadrate with a flat, hooded tergal sclerite. Cercus elliptical joined with segment 9 by its subbasal margin.

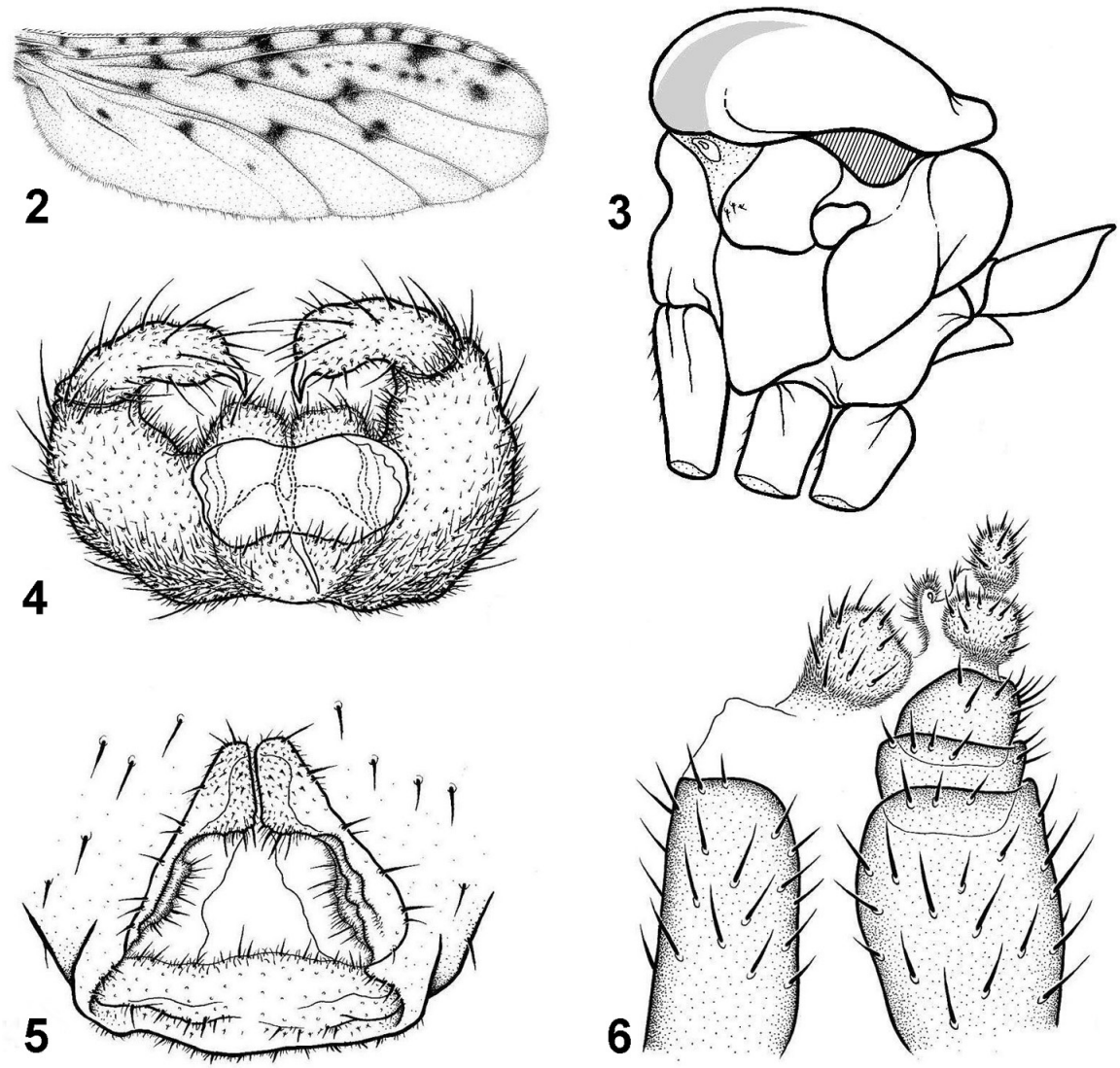
Type material. Holotype. Male: Florida, Monroe Co., No Name Key, 8 June, 2004. A slide deposited in the collection of the Florida State Collection of Arthropods.

Allotype. Female: Florida, Monroe Co., Little Crawl Key, 12 July, 2006. In alcohol. Deposited in the collection of the Florida State Collection of Arthropods.

Paratypes. On slides or in vials of alcohol; many stained. Florida. Monroe Co., No Name Key: 26 January, 2004, m; 8 July, 2004, m; 13 July, 2007, m; 24 August, 2004, m, f; 7 September, 2004, m, f; 21 September, 2004, m,f; 5 October, 2004, 3m; 15 October, 2004, m; 8 November, 2004, m; 7 December, 2004, m. Long Point Key: 20 July, 2006, 2m, 2f; 13; September, 2006, m, f; 28 September, 2006, m, col. D. DeMay. Little Crawl Key: 20 June, 2006, 2m; 12 July, 2006, 3m, f. col. D. DeMay; Big Pine Key: 2 July, 2007.

All collections were from mosquito light traps ran by L. Hribar except where otherwise noted. Paratypes deposited in the Florida State Collection of Arthropods; Cornell University Entomological Museum, California Academy of Natural Sciences.

Discussion. It is possible that *C. hribari* may be breeding in a cave-like environment, possibly in a hollow in a tree or an animal excavation as other keroplatines being not uncommonly found in all stages in caves. The structure of the apical tarsal segments of *C. hribari* may also indicate a habit of hanging at rest in such places as spider webs or the side of their breeding sites. The large eyes, long antennae and time of capture indicate that maximum activity time is in the dark of evening with mating or feeding as possible activities.



Figures 2-6. *Calusamyia hribari*. **2)** Wing. **3)** Thorax, lateral. **4)** Male terminalia, dorsal view. **5)** Female terminalia, ventral view. **6)** Female terminalia, lateral view.

Of interest is the appearance of the row of pigmented spots in wing cell R5. This may possibly indicate the presence of vein R_{4+5} in ancestral forms and a closer relationship with *Macrocera*.

Etymology. It gives me great pleasure to name this species for Dr. L. Hribar who has exhibited extraordinary patience with development of this study.

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