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of the predaceous fungus gnat *Calusamyia hribari* Coher
(Diptera: Keroplatidae) in the Florida Keys

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Seasonal abundance and geographic distribution of the predaceous fungus gnat *Calusamyia hribari* Coher (Diptera: Keroplatidae) in the Florida Keys

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Abstract. New collection records for *Calusamyia hribari* Coher (Diptera: Keroplatidae) are presented. Sufficient material has been amassed to make some statements about the species' distribution, seasonality, and morphology. *Calusamyia hribari* occurs throughout the inhabited Florida Keys, from Key Largo to Key West. New island records include Boca Chica Key, Crawl Key, Summerland Key, Geiger Key, Dredger's Key, Upper Matecumbe Key, Key Largo, Long Key, Tavernier, Windley Key, and Fat Deer Key. As yet it has not been collected from any uninhabited islands within wildlife refuges. About five times more males than females have been collected. Most specimens have been collected in the summer months, with May being the peak of abundance in traps. Females have two spermathecae, similar to other keroplatids.

Key words. Sex ratio, island, trapping, spermatheca.

Introduction

The predaceous fungus gnats (Diptera: Keroplatidae) (Vockeroth 2009) include about 950 species in 92 genera worldwide (Oliveira et al. 2017). Although fungus gnats *sensu lato* are common, widespread insects, surprisingly little is known about many species (Jakovlev 2011). Coher (2011) described *Calusamyia hribari* from a series of specimens collected in carbon dioxide-baited light traps set to monitor mosquito populations in the Florida Keys. In his original description, Coher listed 22 males and 8 females, collected from four islands: No Name Key (13 males, 3 females), Little Crawl Key (5 males, 2 females), Long Point Key (4 males, 3 females), and Big Pine Key. No sex datum was provided for the Big Pine Key collection, but the specimen was located by E.I. Coher and label data indicate that it is a male. Since then, only three other reports of this species have been made. Hribar and Coher (2011) reported collections from Grassy Key (1 male), Key West (2 males), Vaca Key (1 male, 1 female), Little Crawl Key (8 males), and Long Point Key (2 males). Pruszyński and Hribar (2012) collected 10 males and 2 females on Lower Sugarloaf Key. Finally, Hribar (2018) provided collection data for four specimens from Flamingo Island (1 male); Shelter Key, Key Colony Beach (2 males); and Lower Matecumbe Key (1 sex undetermined).

Materials and Methods

Specimens were collected incidentally during surveillance of adult mosquito populations. The Florida Keys Mosquito Control District (FKMCD) conducted weekly surveillance at over 100 trap sites throughout the Florida Keys from 2012 until 2019. Carbon dioxide-baited light traps (John W. Hock, Gainesville, Florida) and BG Sentinel traps (Biogents AG, Regensburg, Germany) were deployed in the late afternoon and retrieved the following morning. Sample bags are collected, returned to the laboratory, placed into a freezer, and insects counted and identified. After mosquito data had been recorded, samples were searched to locate specimens of *C. hribari*. Most specimens were cleared in a solution of phenol and acetic acid and mounted on microscope slides. A few specimens were mounted on paper point mounts. The number of male and female specimens collected during each month was plotted to determine whether there was any seasonal variation in abundance.

Results

New Florida Key Records (Monroe County)

Slide mounted specimens: **Boca Chica Key:** 6 March 2019, R. Garcia, 1 female. **Crawl Key:** 25 June 2015, D. Ledebuhr, light trap, 2 males. **Dredger's Key:** 4 June 2019, A. Diaz, 1 female. **Fat Deer Key:** 9 July 2018, V. Seaverns, 2 males; 10 September 2018, V. Seaverns, 1 female; 18 September 2018, V. Seaverns, 3 males; 24 September 2018, V. Seaverns, light trap, 1 female; 1 October 2018, V. Seaverns, light trap, 1 male; 6 November 2018, V. Seaverns, light trap 1 sex undetermined; 27 December 2018, V. Seaverns, light trap, 2 males, 1 female; 1 May 2019, V. Seaverns, 1 male; 8 May 2019, V. Seaverns, 1 male; 22 May 2019, V. Seaverns, BG trap, 2 males; 29 May 2019, V. Seaverns, 3 males; 5 June 2019, V. Seaverns, 1 male; 12 June 2019, V. Seaverns, 1 male. **Flamingo Island:** 27 August 2018, V. Seaverns, 1 male. **Tavernier:** 2 July 2013, D. DeMay, light trap, 1 female. **Geiger Key:** 20 March 2019, R. Garcia, 1 male. **Grassy Key:** 6 January 2015, L. Hribar, light trap, 1 male; 4 June 2018, V. Seaverns, light trap, 2 males; 6 June 2018, V. Seaverns, light trap, 1 female. **Key Largo:** 2015 (no day or month), no collector, 1 male; 22 October 2013, D. DeMay, light trap, 1 female; 2 October 2018, L. Frischman, light trap, 1 male; 23 October 2018, V. Seaverns, 1 sex undetermined; 27 November 2018, L. Frischman, BG trap, 3 males; 3 December 2018, L. Frischman, 6 males; 4 December 2018, L. Frischman, 1 female; 21 February 2019, Gun Club Road, M. Boehmler, 1 male; 5 March 2019, Wild Bird Center, L. Frischman, 1 female; 12 March 2019, L. Frischman, 1 male; 26 March 2019, Dagny Johnson Key Largo Hammock Botanical State Park, L. Frischman, 1 male; 26 March 2019, Gun Club Road, L. Frischman, 1 male; Card Sound Road, 23 April 2019, L. Frischman, 1 sex unknown; James' Lot, 17 April 2019, L. Frischman, 1 male; James' Lot, Hibiscus Lane, 1 May 2019, L. Frischman, 1 male; bird sanctuary, 17 May 2019, L. Frischman, 3 males; bird sanctuary, 24 April 2019, L. Frischman, 1 male; bird sanctuary, 1 May 2019, L. Frischman, 3 males; Gun Club Road, 1 May 2019, L. Frischman, 1 female; Gun Club Road, 9 May 2019, L. Frischman, 1 male. **Key West:** 19 March 2019, C. Pruszyński, BG trap, 1 female; 26 March 2019, C. Pruszyński, 3 males; 2 April 2019, 2 males; 9 April 2019, C. Pruszyński, BG Sentinel trap, 1 male; 14 May 2019, D. Sagastume, 1 male; 30 May 2019, D. Sagastume, 5 males, 1 female; 4 June 2019, D. Sagastume, 1 male. **Long Point Key:** 11 June 2015, J. Rakofsky, light trap, 1 male; 14 November 2012, D. DeMay, light trap, 1 male; 9 November 2016, H. Murray, 3 males. **Long Key:** 2 July 2015, J. Rakofsky, light trap, 1 male, 14 November 2014, L. Hribar, light trap, 1 male; 21 May 2016, D. DeMay, light trap, 1 male; 10 August 2016, H. Murray, light trap, 1 female; 16 August 2017, H. Murray, light trap, 1 male; 26 September 2018, V. Seaverns, light trap, 1 male; 6 March 2019, V. Seaverns, light trap, 1 male. **Lower Matecumbe Key:** 23 October 2018, L. Frischman, light trap, 1 male; 30 October 2018, V. Seaverns, ABC trap, 1 male; 6 November 2018, V. Seaverns, light trap, 1 male; 13 November 2018, V. Seaverns, light trap, 1 male; 3 December 2018, V. Seaverns, light trap, 1 female; 16 April 2019, V. Seaverns, light trap w/ CO₂, 1 male; 6 May 2019, V. Seaverns, 3 males; 9 May 2019, L. Frischman, 1 male; 28 May 2019, V. Seaverns, 2 males. **Lower Sugarloaf Key:** 19 March 2014, C. Pruszyński, truck trap, 1 male; 27 May 2014, C. Pruszyński, truck trap, 1 male; 29 June 2013, C. Pruszyński, truck trap, 1 male, 1 sex undetermined; 27 May 2014, C. Pruszyński, truck trap, 6 males; bat tower, 12 June 2019, C. Cerminara, 1 male. **Shelter Key (Key Colony Beach):** 14 June 2017, H. Murray, 1 male; 24 January 2019, V. Seaverns, light trap, 1 male; 20 March 2019, V. Seaverns, BG trap, 1 male. **Summerland Key:** 31 October 2018, C. Cerminara, ABC light trap, 1 female. **Upper Matecumbe Key:** 16 April 2015, D. DeMay, 1 male; 9 April 2014, D. DeMay, ABC light trap, 1 male; 1 June 2014 D. DeMay, light trap, 1 male; 19 June 2014, D. DeMay, light trap, 1 male. **Vaca Key:** 4 October 2016, H. Murray, light trap, 1 female; 18 April 2016, H. Murray, light trap, 1 male; 17 May 2017, H. Murray, light trap, 2 males; 9 August 2017, H. Murray, 2 males; 8 May 2017, H. Murray, light trap, 1 female; 2 October 2018, V. Seaverns, light trap, 1 male; 31 October 2018, V. Seaverns, Crane Hammock, 1 male; Crane Point, 19 June 2019, V. Seaverns, 1 male. **Windley Key:** 2 April 2019, W.K. State Park, L. Frischman. **No locality given:** 26 July 2017, I. Hoyer, 1 male.

Point-mounted specimens: **Crawl Key,** 21 November 2013, D. DeMay, light trap, 1 male, 2 females. **Long Point Key:** 21 November 2013, D. DeMay, light trap, 1 female. **Lower Sugarloaf Key:** 27 April 2013, C. Pruszyński, truck trap, 1 male; 18 June 2013, C. Pruszyński, truck trap, 1 male; 6 July 2018,

L. Hribar & C. Pruszynski, truck trap, 1 male; 30 August 2013, C. Pruszynski, truck trap, 1 male.

In summary, new collections of 115 males, 21 females, and 4 of unknown sex (abdomen damaged) revealed new locality records for *Calusamyia hribari* from Boca Chica Key, Crawl Key, Summerland Key, Geiger Key, Dredger’s Key, Upper Matecumbe Key, Key Largo, Long Key, Tavernier, Windley Key, and Fat Deer Key. It has been collected during all months of the year with May as the peak month (Fig. 1). In addition, microscopical examination of eight female specimens revealed that females of *Calusamyia hribari* have two spermathecae.

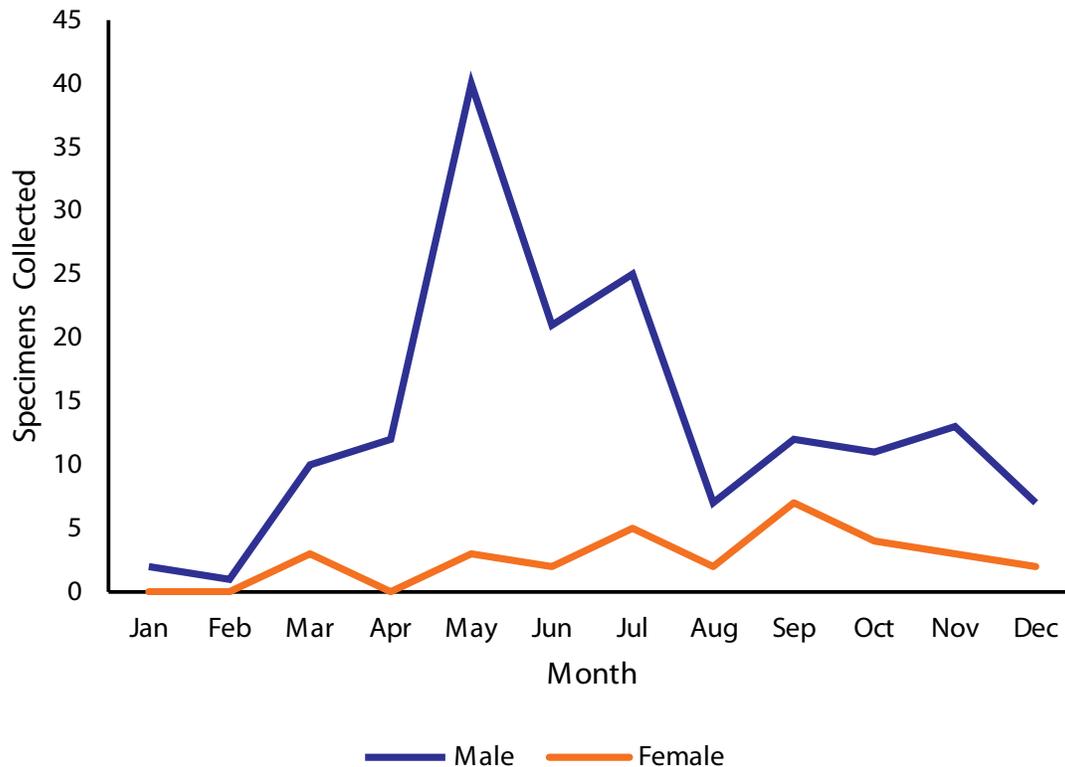


Figure 1. Seasonal distribution of 161 male and 31 female *Calusamyia hribari* Coher.

Discussion

Calusamyia hribari has been collected throughout the Florida Keys, from Key Largo to Key West. Most specimens were collected from Lower Sugarloaf Key (27), No Name Key (16), Little Crawl Key (15), and Long Point Key (15). Collections made on those four islands were in habitats that are not greatly impacted by human activity. It may be that undisturbed or minimally disturbed habitats are preferred by *C. hribari*. On the other hand, no records yet exist from wilderness islands within the Great White Heron National Wildlife Refuge, although mosquito surveillance is routinely conducted on those islands. The islands where the majority of the *C. hribari* specimens were collected have large areas of natural vegetation near collection sites. Trap sites on islands with fewer collections are located in developed areas (neighborhoods) or managed areas (parks).

Immature stages of *C. hribari* are as yet unknown. Larvae of Keroplatidae are associated with rotten wood and the fungi found in rotten wood (Cardew and Carrières 2001). Feeding habits of few species are known; those for which any observations exist appear to be zoophagous, mycetophagous, or zoomycetophagous (Kurina 1998). Larvae spin webs for feeding; prey or fungal spores are caught and ingested (Matile 1996; Cardew and Carrières 2001). Larvae of some species are bioluminescent (Osawa et al. 2014). Blagoderov and Ševčík (2017) provided photographs of the larva of an unidentified *Keroplata* species.

Adult keroplatids have been collected with sweep nets, in UV light traps, in light traps baited with carbon dioxide set to collect mosquitoes, in Malaise traps, and on flowers of Apiaceae (Umbelliferae) and

meadow fescue, *Festuca pratensis* Huds. (Poaceae) (Polevoi 1996; Kurina 2003; Heath and Derraik 2005; Ševčík and Papp 2011; Ševčík 2012). Other Keroplatidae are known from coastal areas, for instance along the Baltic Sea (Rimšaitė et al. 2005).

Based on collection methods reported herein, it is likely that *C. hribari* is a nocturnal flyer, as are other keroplatids (Cardew and Carrières 2001). Over five times as many males as females have been collected (164 vs. 32). These results are unexplained but two possibilities are that males are more apt to fly over long distances than are females, or males may be more readily attracted to lights than females. The presence of two spermathecae is in common with most other mycetophiloid families *sensu lato*, (Vockeroth 1981).

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