

First record of the spider egg predator *Phalacrotophora epeirae* Brues (Diptera: Phoridae) in Hawai'i¹

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Abstract. The spider egg predator, the phorid *Phalacrotophora epeirae* Brues, 1902, is recorded from Kaua'i and marks the first record of the genus in the Hawaiian Islands.

In 2014, unidentified phorids were collected while emerging from the egg sac of the spider *Gasteracantha cancriformis* (Araneidae) on Kaua'i but were mishandled, and consequently destroyed. A second and third collection of the same phorids were made in April and May 2023 and tentative morphological identification of *Phalacrotophora epeirae* Brues, 1902 was rendered by JNM. Additional material was collected by K.N. Magnacca from Hawai'i Island. Further surveys may show it to be found on the other main Hawaiian Islands as well.

To help confirm the identity of this unidentified spider egg predator, adult flies were sent to MM and AK for molecular analysis. One entire adult specimen was subject to CTAB extraction (Li *et al.* 2008) and extracted nucleic acids were used as a template for PCR. A portion of the COI gene was amplified using universal invertebrate COI primers LCO1490 5'-GGTCAACAAATCATAAAGATATTGG-3' and HCO2198 5'-TAAACTTCAGGGT-GACCAAAAATCA-3' developed by Folmer (1994). The PCR conditions were as follows: 5 mins at 95 °C followed by 35 cycles of 95 °C for 40 secs, 51 °C for 40 seconds, 72 °C for 1 min with a final extension at 72 °C for 7 mins. The resulting 654bp product then underwent Sanger sequencing. The resulting specimen sequence (BOLD record HIAAD001-24) was queried through the Barcode of Life Database (BOLD) Animal Identification Engine (https://boldsystems.org/index.php/IDS_OpenIdEngine). The BOLD identification engine results via Tree Based Identification indicated that the insect was *Phalacrotophora epeirae* with 100% probability of placement and most closely related to record JSDIR890-11 (GenBank accession number: KR663566) collected from Ontario, Canada in 2010, sharing 100% nucleotide identity.

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Figure 1. Habitus of *Phalacrotophora epeirae* Brues.

Diptera: Phoridae

Phalacrotophora epeirae Brues, 1902

New state record

(Fig. 1)

This species was originally described from Texas and occurs naturally throughout most of eastern North America from Quebec to northern Mexico (cf. Evenhuis & Pape 2024). They are easily distinguished from other phorids in Hawai'i by their distinctive abdominal coloration and pattern (Fig. 1). A study in Florida by Muma & Stone (1971) showed that 43.7% of 216 *Gasteracantha cancriformis* egg cases collected from more than 20 citrus groves contained various stages of predation by *Phalacrotophora epeirae*, even with hyperparasitism by a *Tetrastichus* sp.

While fortuitous biocontrol of the pestiferous spider *Gasteracantha cancriformis* by *Phalacrotophora epeirae* is welcome in Hawai'i, *P. epeirae* is a recorded natural enemy of



Figure 2. Image of *Gasteracantha cancriformis* egg sac and pupae of *P. epeirae* Brues.

several different spider genera in various families (Gillung & Borkent 2017) including *Gasteracantha* and *Larinoides* (Araneidae: some species previously in *Gasteracantha* were misidentified and are now in *Thelecantha*, like *T. brevispina*) (Brues 1902, 1903; Auten 1925; Muma & Stone 1971), *Pityohyphantes* (Linyphiidae) (Manuel 1984), *Mimetus* (Mimetidae) (Guarisco 2001), and *Phidippus* (Salticidae) (Jones 1940; Manuel 1984). This broad host range and wide distribution across climates is of concern for Hawai'i's diverse spider fauna, including over 184 endemic species in sixteen families.

Material examined. HAWAIIAN ISLANDS. **Kaua'i:** 8♂♀, Līhu'e, HDOA Plant Quarantine Branch office, 21.97278, -159.37522, 21 April 2023, L. Ishii (from egg sac of *Gasteracantha cancriformis*) [Fig. 2] on vehicle) (vouchers in Bishop Museum Entomology collection and Hawai'i Department of Agriculture); 16♂♀, Kīlauea, 21.19582, -159.35652, 3 May 2023, L. Ishii and C. Kishimoto (from egg sacs of *Gasteracantha cancriformis* on wall) (vouchers in Hawai'i Department of Agriculture collection), det. A. Kong via COI molecular analysis, BOLD HIAAD001-24. **Hawai'i:** 1♂, Kapāpala Canoe Management Area, 1460 m, 19.3607, -155.4654, 10 Apr 2023, on *Myrsine lessertiana*, K.N. Magnacca, H23041008-01.

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