

## A NEW SPECIES OF *FALLIA* SHARP (CUCUJOIDEA: DISCOLOMATIDAE) FROM THE WEST INDIES, WITH A WORLD CHECKLIST FOR *FALLIA*

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### ABSTRACT

A new discolomatid species, *Fallia iviei* Cline and Shockley, **new species**, is described from the Dominican Republic. A distribution map, habitus and character images, and discussion of its biology are provided. The new species represents the first known member of the genus from the West Indies. A species checklist for all nine described species of *Fallia* Sharp is presented.

Key Words: taxonomy, catalog, Hispaniola, Dominican Republic, Caribbean

Discolomatidae is a family of small cucujoid beetles (1–8 mm long) with a mostly circumtropical distribution. These beetles generally are thought to be saprophagous as they are commonly found in leaf litter, compost heaps, and other areas of decomposition, including subcortical spaces of decaying logs (Arrow 1939; Costa Lima 1953; Crowson 1967; Lawrence 1982; Scholtz and Holm 1985; Lawrence 1989; Ide and Costa 1990; Lawrence 1991; Lawrence and Britton 1994; Peck 2006). However, specific records do exist for them on higher fungi, *e.g.* bracket/shelf fungi (Lawrence 1982; Peck 2006).

Discolomatidae is a monophyletic lineage (Robertson *et al.* 2008; Lawrence *et al.* 2011), and a current review of the family was recently completed (Cline and Ślipiński 2010). Little species-level work has been pursued on New World Discolomatidae. The last comprehensive work that covered species of *Fallia* Sharp from the region was a review in *Genera Insectorum* (John 1959a), and the most recent *Fallia* species described from the Neotropics are from nearly the same time (John 1944; John 1959b). Thus, more than 50 years have passed since the last taxonomic work, and an accumulation of specimens has occurred in the intervening years through more concentrated collecting efforts, biodiversity inventories, and the advent of additional passive collecting techniques (*i.e.*, black-light and mercury vapor bulb collecting, flight intercept and Malaise trapping, and fogging fallen logs). Unfortunately, numerous Discolomatidae

likely remain in museums' undetermined Cerylonidae, Endomychidae, Corylophidae, and Latridiidae, with which Discolomatidae has shared an intertwined taxonomic history.

*Fallia* is a small genus of Discolomatidae within the subfamily Aphanoccephalinae (see Cline and Ślipiński 2010 for discussion of discolomatid phylogeny). The genus contains nine species, including the new one described herein (see checklist below). *Fallia* can easily be recognized from other discolomatid genera based on the minute, shiny, globular to ovate body; widely separated, minute, globose metacoxae; antennae 8- or 9-segmented with ovate antennal club; meso-metasternal junction straight; mesosternum convex and large compared to prosternum and metasternum; pronotum with two lateral pores and elytra with six lateral pores along margin; head mostly retracted with anterior third protruding beyond anterior margin of pronotum; and head more densely setose than pronotal or elytral surfaces (diagnosis based in part on Sharp 1902 and John 1959a). Most previously described *Fallia* species are known from localities in Central (four species) and South America (three species); however, one is also known from Hawaii. The status of *Fallia elongata* Scott as native or adventive in Hawaii has not been conclusively established. The new species described herein is the first representative of the genus from the West Indies. As with most other minute Cucujoidea, there are undoubtedly numerous new species awaiting

discovery throughout the Neotropics, particularly as more specimens are collected in South America and the Caribbean.

Members of *Fallia* are infrequently collected and host information is minimal. A fungal host record is given by Peck (2006) for *Fallia galapagana* John occurring on a species of *Fomes* (Fries) Fries (Basidiomycota: Aphyllophorales). Most specimens have typically been found in subcortical spaces of decaying logs, fogging with insecticides, or collected via flight intercept traps or blacklights. Although no gut content analyses have been performed, the habits of *Fallia* in areas of fungal decomposition and on *Fomes* suggests possible saprophagy. The collection on *Fomes* may indicate an accidental capture or, depending on the state of decay of the fungus specimen, an association with an ascomycete decomposing the sporocarp. This latter phenomenon has previously been described in Coleoptera (Wheeler 1987) and may ultimately prove to be common. No larvae are known for *Fallia*.

#### MATERIAL AND METHODS

Loaning institution codens are derived from Evenhuis (2011). The following museums and institutions provided existing type material, comparative material, or specimens for the new species' type series: British Museum of Natural History (BMNH), California Academy of Sciences (CAS), California State Collection of Arthropods (CSCA), Deutsches Entomologisches Institut (DEI), Florida State Collection of Arthropods (FSCA), Montana State University (MTEC), Snow Entomological Collection, University of Kansas (SNEC), and the United States National Museum (USNM), as well as the first author's collection (ARCC), which is currently housed in the Plant Pest Diagnostics Center in Sacramento, California. Material of six of the eight previously described species was examined, excluding *Fallia colourata* John and *F. galapagana*, which are both endemic to the Galapagos Islands and easily distinguished from this new species based on their descriptions.

Habitus images were captured using a Canon EOS 7D attached to a Visionary Digital Imaging System (Visionary Digital™, Palmyra, VA). Images were then montaged and edited using Adobe Photoshop®. Genitalia were extracted, manually cleaned with minuten pins and KOH, and placed on glycerin slide mounts for observation and imaging. Scale bars were calibrated with an ocular micrometer using SPOT® Advanced software on the images of the genitalia, which were taken with a digital camera attached to a Nikon® SMZ1500 dissecting microscope. Scanning electron micrographs were prepared using a Hitachi TM3000 Tabletop SEM running in standard mode with

charging reduction under a vacuum of 40 Pa and an accelerating voltage of 15.0 kV.

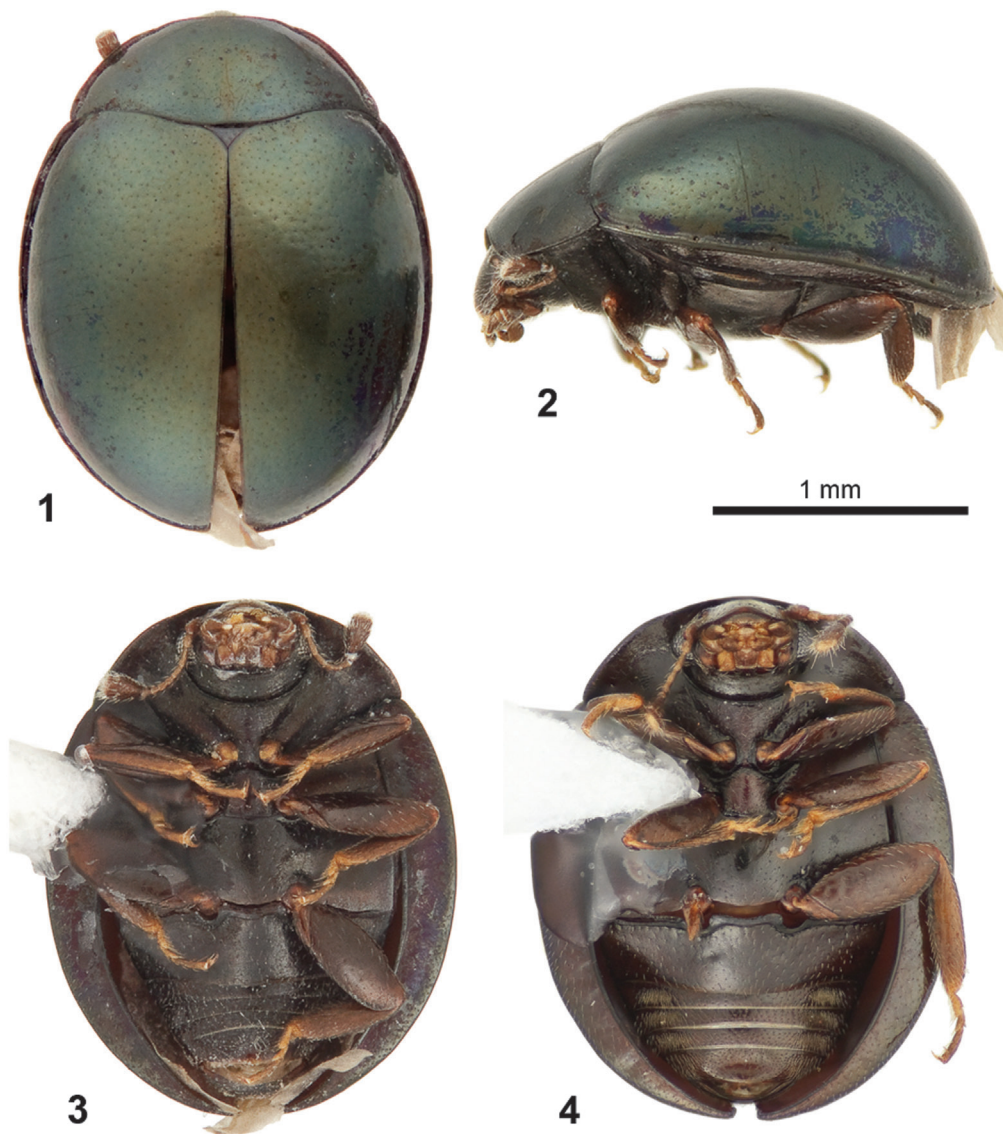
Total length and width measurement values are averaged for the entire type series of specimens ( $n = 25$ ). Total length was defined as the distance from the anterior margin of the pronotum to the apex of the elytra, and total width was measured at the widest point across the elytra. Pronotal length was the length measured at the midline from the anterior to posterior margin, and pronotal width was measured at the widest point across the pronotum. Elytral length was measured from the anterior margin to the apex along the suture, and elytral width was measured at the widest point across one elytron. Metasternal length was the length measured at the midline from the anterior to posterior margin, and metasternal width was measured at the widest point across the metaventre.

Specimen label data are reported verbatim with the conventions of semicolons (;) to designate line breaks and back slashes (/) to designate different labels.

#### *Fallia iviei* Cline and Shockley, new species (Figs. 1–11)

**Diagnosis.** *Fallia iviei* is easily distinguished from all other members of the genus by the following combination of unique characters: 1) a large, robust body shape with a low L:W ratio, *i.e.*, <1.3:1; males with lateral depressions on abdominal ventrites 2–4 bearing dense setal patches; 3) extreme curvature of the male aedeagus; and 4) an irregular, faintly impressed puncture pattern on the pronotum, with microreticulate surface sculpturing on interspaces between punctures.

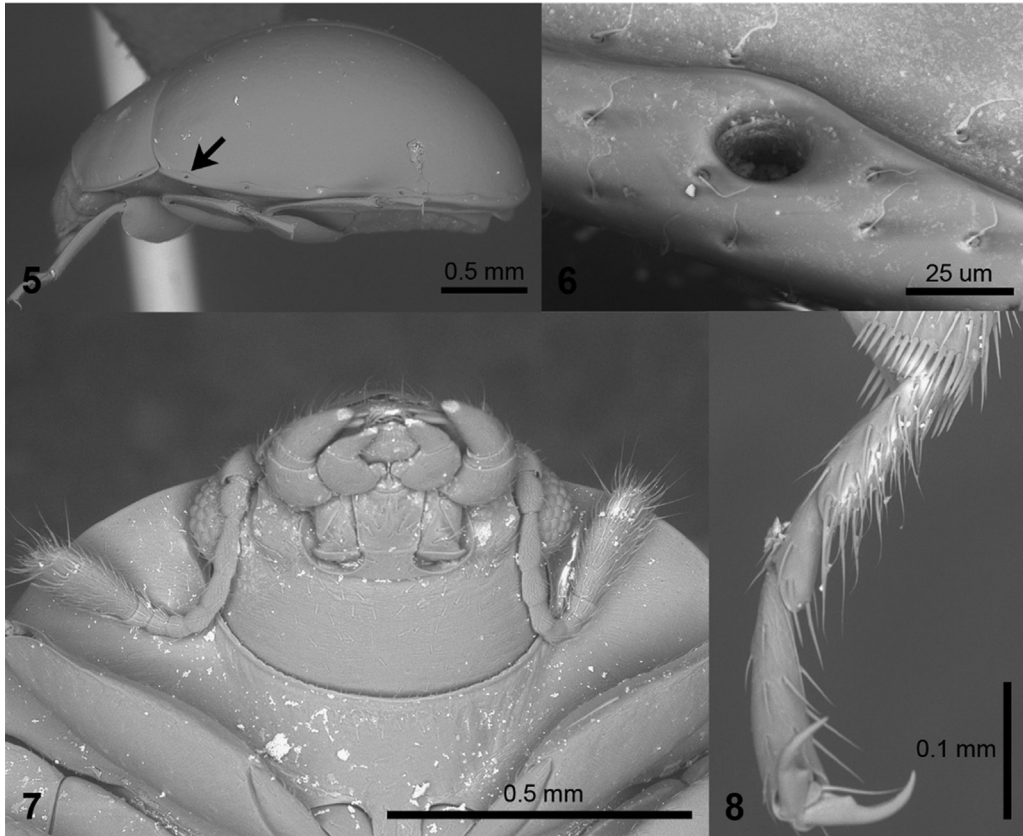
**Description.** Overall body shape somewhat rotund, convex (Figs. 1–4), L:W = 1.28:1; body widest across middle of elytra. Body coloration dark brownish black with a green metallic hue on dorsal surface, ventral surface dark reddish brown with legs, antennae, and mouthparts lighter. Length 1.8 mm, width 1.4 mm. **Head:** Partially retracted underneath pronotum so that half of eye is obscured (Fig. 2). Shape somewhat rectangular, lateral margins of fronto-clypeal region not distally convergent. Antennal insertions fully exposed, medially positioned on vertex between eyes. Surface punctures minute, irregular, and each bearing a short, fine, pale seta. Interspaces finely microreticulate. Antennal grooves short, moderately convergent, extending postero-ventrally from just anterior of eye along ventral margin of eye. Vertex indistinctly convex, becoming more convex in clypeal and labral regions. Fronto-clypeal suture conspicuous and evenly arcuate between antennal insertions. Clypeus large and moderately convex to vaulted. Temples not visible from above, completely obscured by pronotum. Eyes prominent, elliptical to somewhat



**Figs. 1–4.** *Fallia iviei*. 1) Dorsal habitus; 2) Lateral habitus; 3) Ventral habitus, female; 4) Ventral habitus, male.

rounded, coarsely faceted, with no interfacetal setae. Eye width equal to 5–6 facet diameters. Antennae 9-segmented with annulate 1-segmented club (Fig. 7). Club elongate with broadly rounded apex and slightly narrowed base; club  $\sim 0.35$  length of segments 1–8 combined. Terminal segment with apex bearing moderately elongate setae and 6–8 elongate setae extending beyond the apical margin; subapical ring of setae present at  $\sim 0.66$  of segment with setae not extending beyond apex. Scape elongate,  $\sim 2.2X$  longer than pedicel, evenly tapering at base. Pedicel

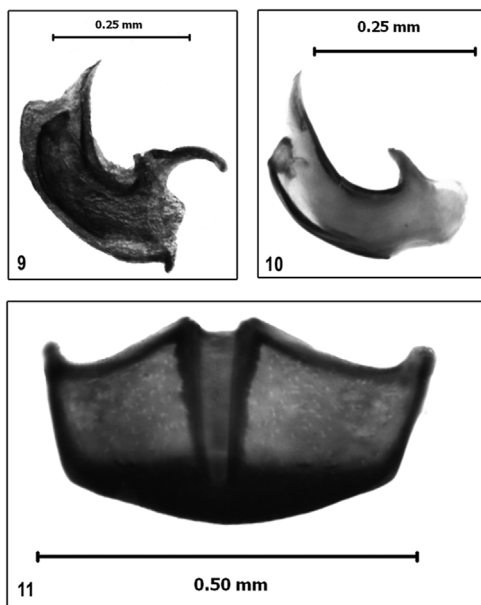
barrel-shaped. Antennomere 3 slightly longer and narrower than pedicel, antennomere 4 subequal to pedicel, antennomeres 5–8 individually shorter than pedicel. Labrum membranous in apical third, anterior margin broadly concave. Mandibles apically bifid. Ventral mouthparts (including maxillary and labial palpi) clearly visible from below (Fig. 7). Clypeo-labral suture concave to slightly indented. Maxillary palpi well-developed, 3-segmented, terminal segment conical with entire apex covered with sensory pegs, terminal segment equal in length to



**Figs. 5–8.** Scanning electron micrographs of *Fallia iviei*. **5)** Lateral habitus showing secretory pores; **6)** Close-up of anterior elytral secretory pore; **7)** Head and prosternum, ventral view; **8)** Prothoracic tarsus.

segments 1–2 combined. Labial palpi well-developed, 3-segmented, terminal segment conical with entire apex covered with sensory pegs, terminal segment shorter than segments 1–2 combined. **Pronotum:** Transverse, much wider than long (W:L = 2.4:1), widest at posterior angles, evenly convex. Anterior angles broadly rounded, indistinct. Posterior angles distinct, somewhat obtuse. Lateral margins narrowly explanate, and slightly reflexed, evenly and arcuately convergent toward anterior angles. Lateral marginal bead with 2 secretory pores, 1 near posterior angles and 1 near 0.66 length from posterior angles. Anterior margin slightly concave. Anterior marginal bead with a secretory pore near the anterior angles. Posterior margin broadly but distinctly convex medially and concave laterally. Posterior margin not bordered. **Prosternum:** Length between anterior margin of procoxal cavities and anterior margin of prosternum longer than width of procoxae, with well-developed, oblique impressions anterior to coxal cavities extending antero-laterally from the procoxae. Prosternal process laterally expanded

and declivitous posterior to procoxae; in lateral view, flat to slightly concave over procoxal cavities, posterior margin with well-developed, evenly rounded vertical face posterior to procoxal cavities. Procoxal cavities separated by 1X procoxal cavity width. **Mesonotum:** Scutellum clearly visible, acutely triangular; similar surface punctation and sculpturing as on pronotum. Mesosternum well-developed, convex, and at same level as metasternum; surface punctation and sculpturing faint, becoming almost glabrous medially. Meso-metasternal junction concave with anterior margin of metasternum broadly convex. Mesocoxal cavities separated by ~1.5X procoxal cavity width. **Metasternum:** Transverse (W:L = 3.9:1); metasternal disc punctation and sculpturing faint, punctures diffuse, minute as on dorsal surface, and each bearing a short, fine, pale seta; lateral regions of metasternum with rugose microsculpturing present. Postcoxal lines of mesocoxae absent on metasternum. Metacoxal cavities separated by 2X procoxal cavity width. **Elytra:** Complete, covering pygidium; longer than wide



**Figs. 9–11.** Male genitalia and pygidium of *Fallia iviei*. **9)** Median lobe within tegmen, lateral view; **10)** Median lobe (tegmen removed), lateral view; **11)** Pygidium, dorsal view.

(L:W = 1.73:1). Lateral margins narrowly explanate and slightly reflexed to elytral apex. Each elytron bearing 6 secretory pores along the lateral margin (Figs. 5–6). Punctuation and sculpturing similar to that on head and pronotum, except setiferous punctures more diffusely dispersed. Humeral angles not raised. Metathoracic wings well-developed. **Legs:** Tibiae and femora strongly flattened. All femora excavated for reception of tibiae; profemora with excavated region on anterior face, meso- and metafemora with excavation on posterior face. All femora and tibiae generally elongate elliptical, widest near middle. Each tibia with small, stiff spines present along posterior margin. Meso- and metatibiae with apico-lateral margin somewhat sharply angulate, not rounded to apex. Tarsi 3-3-3; simple with some projecting setae ventrally; claws simple with small basal tooth (Fig. 8). **Abdomen:** Abdominal ventrite 1 broadly truncate between metacoxae, large, longer than ventrites 2–4 combined. Ventrites 2–4 each with proportionately more small, pale setae than ventrite 1. Hypopygidium with posterior margin evenly convex, length equal to ventrites 2–3 combined. Pygidium with posterior margin broadly rounded, dorsal surface possessing a deep, central channel extending along anterior 0.75 of sclerite (Fig. 11). **Female genitalia:** Weakly sclerotized, almost completely membranous. **Male genitalia:** Well-sclerotized (Figs. 9–10). Median lobe

of aedeagus strongly curved with sharply acuminate apex, basal process well-developed (Fig. 10).

**Variation.** Sexual dimorphism is apparent in the presence of densely setose, lateral, elliptical depressions on abdominal ventrites 2–4 in males (Fig. 4). The hypopygidium of males also possesses more densely setose lateral areas, but the setose areas are not contained within depressions, and the shape of the sclerite is similar to that of females. The male pygidium has the posterior margin more ventrally curved, presumably so that the extruded genitalia extend in a more anterior/ventral plane during copulation.

**Material Examined.** Holotype (male): DOM.REP. : Prov.Pedernales; ca. 35 km N.Cabo Rojo, 1250 m; LasAbejas, 26AUG–09SEP1988; flight intercept trap; M. Ivie, Philips & Johnson / ♂ (MTEC). Paratypes (24 total): DOM.REP. : Prov. Pedernales; ca. 35 km N.Cabo Rojo, 1250 m; LasAbejas, 26AUG–09SEP1988; flight intercept trap; M. Ivie, Philips & Johnson / ♀ (1 specimen in MTEC). DOM.REP. : Prov.Pedernales; ca. 35 km N.Cabo Rojo, 1250 m; LasAbejas, 26AUG–09SEP1988; flight intercept trap; M. Ivie, Philips & Johnson (1 specimen in ARCC; 1 specimen in USNM; 9 specimens in MTEC). DOM.REP. : Prov. Pedernales; ca. 35 km NNW. CaboRojo; 1370 m, El Aceitillar; 26AUG–09SEP1988, pine for.; flight intercept trap / M.A.Ivie, T.K.Philips & K.A.Johnson colrs. (1 specimen in MTEC). DOMIN.REP. : Prov. Pedernales; ca. 35 km N.Cabo Rojo, 1250 m; Las Abejas, 26 AUG 1988; ex large very rotten log; M. Ivie, Philips & Johnson (1 specimen in MTEC). DOMIN.REP:Prov.Pedernales; ca. 35 km N Cabo Rojo, 1250 m; Las Abejas, 26 AUG 1988; beating veg., M.A.Ivie,; T.K.Philips & K.A.Johnson (1 specimen in ARCC; 1 specimen in USNM; 4 specimens in MTEC). DOMIN.REP : Prov.Pedernales; P.N. Sierra Baoruco, 1240 m; 18°09.032'N, 71°37.475'W; Las Abejas, 22JULY1999; M.A. Ivie, in rotten log (1 specimen in MTEC). DOM.REP:Prov.Pedernales; P.N. Sierra de Baoruco; 18°09.023'N, 71°37.387'W; Las Abejas, 09AUG1999; 1240 m, M.A. Ivie, at night (3 specimens in MTEC). DOMINICAN REPUBLIC; Pedernales Prov., PN Sierra de Baoruco, Las Abejas; 18°09.011'N, 71°37.342'W; 1150 meters 11 July 2004; blacklight. S.W. Lingafelter (1 specimen in USNM).

**Etymology.** The specific epithet is a noun in the genitive form that honors Dr. Michael Ivie, a respected colleague and friend, and one of the collectors of the type series.

**Distribution.** The type series is known from the Dominican Republic on the island of Hispaniola, with a specific distribution as shown in Fig. 12.

**Biology.** Interestingly, some specimens of *F. iviei* were collected at night. Label data indicate that specimens were collected in flight intercept traps or from beating vegetation at night, suggesting potential



Fig. 12. Distribution of *Fallia iviei* in the Dominican Republic.

for nocturnal activity within the genus. As this is not a typical collecting technique, it might partially explain the relative paucity of specimens in collections. Likewise, the label data indicate the species' presence in rotten logs, suggesting a fungivorous or saprophagous lifestyle. No gut contents were isolated to determine diet, but could be an interesting avenue of research to explore.

#### FALLIA SPECIES CHECKLIST

- Fallia brasiliensis* John 1944: 88 – Brazil  
*Fallia colourata* John 1959b: 295 – Galapagos Islands (Ecuador)  
*Fallia elongata* Scott 1908: 433 – Hawaii (USA)  
*Fallia galapagana* John 1959b: 295 – Galapagos Islands (Ecuador)  
*Fallia iviei* Cline and Shockley, **new species** – Dominican Republic  
*Fallia minor* Sharp 1902: 630 – Guatemala, Honduras  
*Fallia punctulata* Sharp 1902: 631 – Guatemala, Panama  
*Fallia schmidti* John 1944: 88 – Costa Rica  
*Fallia synthetica* Sharp 1902: 630 – Panama

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