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Research Article

Description of the queen caste of *Pheidole obscurithorax* (Hymenoptera: Formicidae)

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Abstract: *Pheidole obscurithorax,* the South-American big-headed ant, is native to South America, but now common along the United States Gulf Coast region. Although the major and minor workers castes have been described, reproductive castes have not. The spread of exotic and potentially invasive ant species that disperse by flight can be monitored in part through the use of various aerial and light traps. However, due to a paucity of descriptions of reproductive castes of ants in general, identifications of these castes from traps are difficult at best. To better facilitate the identification of *P. obscurithorax* and its spread in the Gulf Coast region of the US, the queen caste of the exotic *Pheidole obscurithorax* is described. Photographs of morphological structures, including wing venation, are provided.

Keywords: Invasive ants, monitoring, identification, wing venation, queen caste

Introduction

The genus *Pheidole* (Hymenoptera: Formicidae: Myrmicinae) includes over 1000 species worldwide with many of these species having subtropical to tropical distributions (Wilson 2003, Bolton 2014). Currently, 21 described species are known to occur in the southeastern US, including four exotic species, *P. flavens* Roger, *P. megacephala* (Fabricius), *P. moerens* Wheeler, and *P. obscurithorax* Naves, (MacGown 2003).

Pheidole obscurithorax, the South American big-headed ant, is a large, dark colored species in the *fallax* species group (Wilson 2003). This South American native is now common along the US Gulf Coast from eastern Georgia and northern Florida to eastern Texas and appears to be steadily increasing its range county by county. *P. obscurithorax* shows invasive potential in the US based on the steady expansion of its range and its ability to successfully compete with the red imported fire ant (*Solenopsis invicta* Buren) and native species nesting in the same habitats (Storz and Tschinkel 2004).

Although Santschi (1923) originally described the species the name he used was an unavailable quadrinomial (*P. fallax arenicola obscurithorax*). Later, Naves (1985) described this as a subspecies of *P. fallax,* and he included descriptions of major and minor castes. Wilson (2003) raised *obscurithorax* to species level and provided brief re-descriptions of the major and minor worker castes. Larvae, males, and queens have not been described.

Descriptions of reproductive castes and larvae are scant in taxonomic treatments of ants. This is due to difficulty in collecting these castes in association with workers and their respective

colonies. However, the need for having descriptions of reproductive castes is great, especially for exotic species. Our understanding of the spread of exotic species is generally limited to finding colonies of workers. However, most ant species have winged reproductive castes that can be collected using aerial traps (*e.g.* Lindgren funnels, Malaise traps, barrier traps) and light traps. These types of traps could serve as useful tools for early detection and monitoring the spread of exotic ant species throughout a region. Unfortunately, reproductive castes of many species of ants have not been described, which makes identification of alates from these types of traps problematic at best.

Methods

Photomicrographs were made with a Leica DFC 495 digital camera mounted on a Leica Z16 macroscope with motorized z-stepping, and image stacks were merged using Leica Application Suite V 4.1.0 with Montage Module. Measurements were made using an eyepiece micrometer placed in a 10X eyepiece of a Leica MZ16 stereomicroscope at a magnification of 10–100X. Measurements are given in millimeters. Examined specimens are deposited in the Mississippi Entomological Museum (MEM).

Measurements.

HL: Head Length; maximum length of head in full-face view, excluding mandibles, measured from anterior margin of clypeus to a line tangent to posterior most projection of vertex margin.

HW: Head Width; maximum width of head excluding eyes in full-face view.

EL: Eye Length; maximum length of eye in lateral view.

SL: Scape Length; maximum length of scape excluding basal constriction.

MOL: Median Ocellar length; maximum length of median ocellus.

IHTD: Inner Hypostomal Teeth Distance; distance between the apical tips of inner hypostomal teeth.

OHTD: Outer Hypostomal Teeth Distance; distance between the apical tips of outer hypostomal teeth.

ML: Mesosomal Length; in lateral view, measured from anterior edge of pronotum to posterior corner of propodeal lobes.

PRW: Pronotal Width; maximum width of pronotum in dorsal view.

PTW: Petiole Width; maximum width of petiole in dorsal view.

PPW: Postpetiole Width; maximum width of postpetiole in dorsal view.

PSL: Propodeal Spine Length; distance from inflection point between dorsal face of

propodeum and base of spine to tip of spine.

FWL: Forewing Length; maximum length of forewing.

Results

Nine queens (5 alate and four dealate) were examined: ALA., Baldwin Co., 30°32'16"N 87°42'45"W, 13 June–1 July, 2013, A. Hoogmoed; Mobile Co., Mobile, 30°38'27"N 88°04'49"W, 02 July 2013, J. Lasiter, typographis lure MOBEBB201302. MISS. Greene CO., 1.5 mi S Pisgah, 31°04'43"N 88°27'54"W, 20 June–25 July 2006, D. W. Haynes, Lindgren funnel trap baited with Typosan; Jackson Co., 5.5 mi WNW Harleston, 39°44'06"N 88°35'55"W, 20 June–25 July 2006, D. W. Haynes, Lindgren funnel trap baited with Typosan; Jackson Co., 4.5 mi NW Pine, 30°43'45"N 88°44'19"W, 16 May–20 June 2006, D. W. Haynes, Lindgren funnel trap baited with Typosan; and Stone Co., [no specific locality data], 13–27 May 2005 (2 queens), J. M. Strong, Lindgren funnel trap baited with Typosan and alpha-pinene; Stone Co., 30°52'42"N 89°09'40"W,

1 July 2013, A. Hoogmoed, CHW-130701-3, and Stone Co., 30°50.882 N 89°08.288 W, Coll. on 5 Aug. 2014.

***Pheidole obscurithorax* Naves**, 1985

Pheidole fallax subsp. *obscurithorax Naves*, 1985: 61 (s.w.) ARGENTINA. Neotropics. [First available use of *Pheidole fallax arenicola obscurithorax* Santschi, 1923: 58; unavailable name.] *Pheidole obscurithorax*: Wilson, 2003: 331.

Diagnosis. The combination of large size, dark coloration, heavily reticulate head, scapes strongly angled at base and thickened medially, and five distinct hypostomal teeth will separate queens of *P. obscurithorax* from any other North American *Pheidole* species.

Description. Queen (Figs. 1–3): HL 1.36–1.42, HW 1.58–1.64, SL 0.98–1.00, EL 0.32–0.40, MOL 0.15–0.16, IHTD 0.46–0.49, OHTD 0.63–0.65, ML 2.53–2.55, PRW 1.30–1.60 PSL 0.12–0.15, PTW 0.53–0.55, PPW 0.75–0.80, FWL 7.40–7.80 (n=4). Concolorous dark reddish-brown. Entire body with numerous semi-erect to erect setae present, with setae on head and dorsum of mesosoma shorter and stiff, those on gaster longer and more flexuous. Head quadrate, slightly wider than long; posterior border straight to weakly convex; front and sides of head with deep rugoreticulation present; anterior margin of clypeus with deep notch in middle. Mandibles large, mostly edentate, but with large basal tooth, four minute denticles, and two large apical teeth. Antenna with 12 antennomeres (including scape and pedicel), apical three antennomeres forming a loose club; scape short, strongly angled basally and thickened medially. Eyes large, located at approximately the midpoint of head on sides of head. Three ocelli present, arranged in roughly an equilateral triangle. Hypostomal border with short, blunt tooth in middle, two short, triangular inner teeth, and two widely spaced thickly triangular outer teeth. Mesoscutum and mesoscutellum with longitudinal striae; sides of pronotum, mesopleura (anepisternum and katepisternum), metapleura, sides and dorsum of propodeum, and sides and dorsum of petiolar and postpetiolar nodes with transverse striae with interstitial punctation dulling the surface (except on propodeal dorsum where punctures are reduced). First gastral tergite with fine longitudinal striae anteriorly, becoming shagreened and shiny posteriorly. Wings pale translucent amber color with veins light brown; forewing venation of typical myrmicine type (Fig. 2C) with pterostigma and costal, basal, subbasal, discal, and two submarginal cells closed; hindwing lacking jugal lobe and with costal, basal, and subbasal cells closed.

Discussion

Although the *fallax* species group includes at least 103 species, only seven other species appear to be closely related to *P. obscurithorax*, *P. fallax* Mayr*, P. gigas* Wilson*, P. jelskii* Mayr*, P. puttemansi* Forel*, P. roushae* Wilson*, P. tobini* Wilson*,* and *P. valens* Wilson (Wilson 2003). These related species are all Neotropical in distribution. Thus far, *P. obscurithorax* is the only member of this group of eight species known to have made its way into the US, although *P. fallax* and *P. jelskii* have been reported from the West Indies (Wilson 2003 and MEM specimen data). Of these species, *P. fallax* and *P. jelskii* are the most similar in appearance to *P. obscurithorax*. With the identification keys in Wilson's monograph of the *Pheidole* in the New World (Wilson 2003), it is relatively easy to separate the major workers of these related species; however, the minor workers of all three are very similar to one another making identifications based on the minor worker caste alone difficult, especially in Central America, northern South America, and the West Indies where their respective ranges all overlap. Of the eight related species, *P. jelskii* is the only one for which the male and queen have been described (Forel 1893). Identifications of males and queens unassociated with a colony in this group of eight species from outside of the US may be unreliable. The current situation in the US is quite different, as *P. obscurithorax* is the only exotic member of the *fallax* group known to occur there. Only two native species, *P. dentata* Mayr and *P. morrisi* Forel, in the *fallax* species group occur in the southeastern US, including eastern Texas where *P. obscurithorax* has been reported. Major workers of both native species are easily distinguished from *P. obscurithorax* by their lack of strong sculpture. Minor workers of *P. dentata* may be confused with *P. obscurithorax,* but can be separated by their smaller size and the nuchal collar not being visible in full-face view. Males and queens of both of these native species in the *fallax* group have been described (Forel 1901, Mayr 1886) and both lack the strong sculpture of

P. obscurithorax. With the description of the queen of *P. obscurithorax* provided here, reliable identification of queens of *P. obscurithorax* collected in the US is now possible.

Acknowledgments

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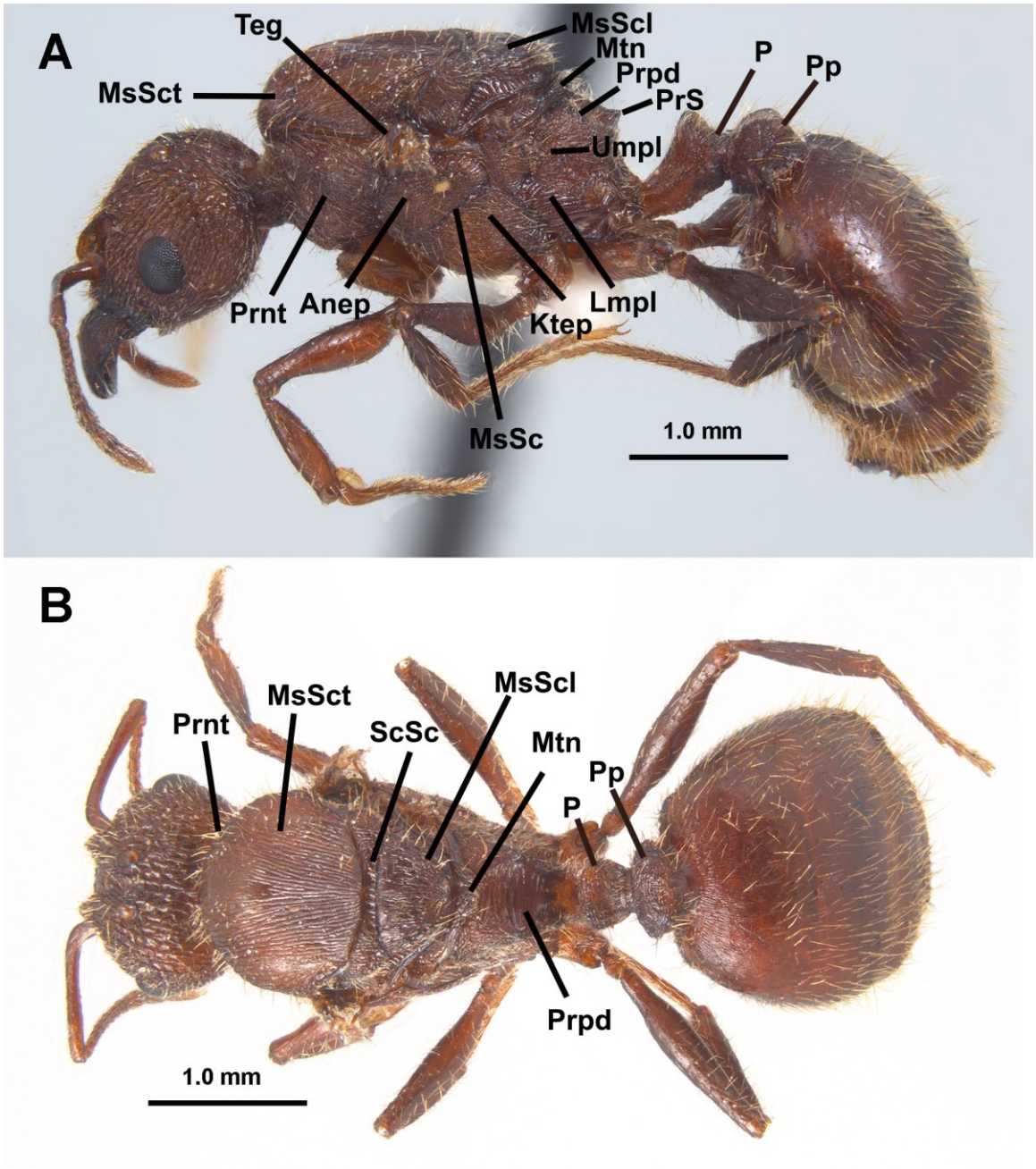

Figure 1. *Pheidole obscurithorax* queen. **(A)** Lateral view and **(B)** dorsal view. Abbreviations: Anep = anepisternum, Ktep = katepisternum, Lmpl = lower metapleuron, MsSc = mesopleural sulcus, MsScl = mesoscutellum, MsSct = mesoscutum, Mtn = metanotum, P = petiole, Pp = Postpetiole, Prnt = pronotum, Prpd = propodeum, PrS = propodeal spine, ScSc = scutellar sulcus, Teg = tegula, and Umpl = upper metapleuron

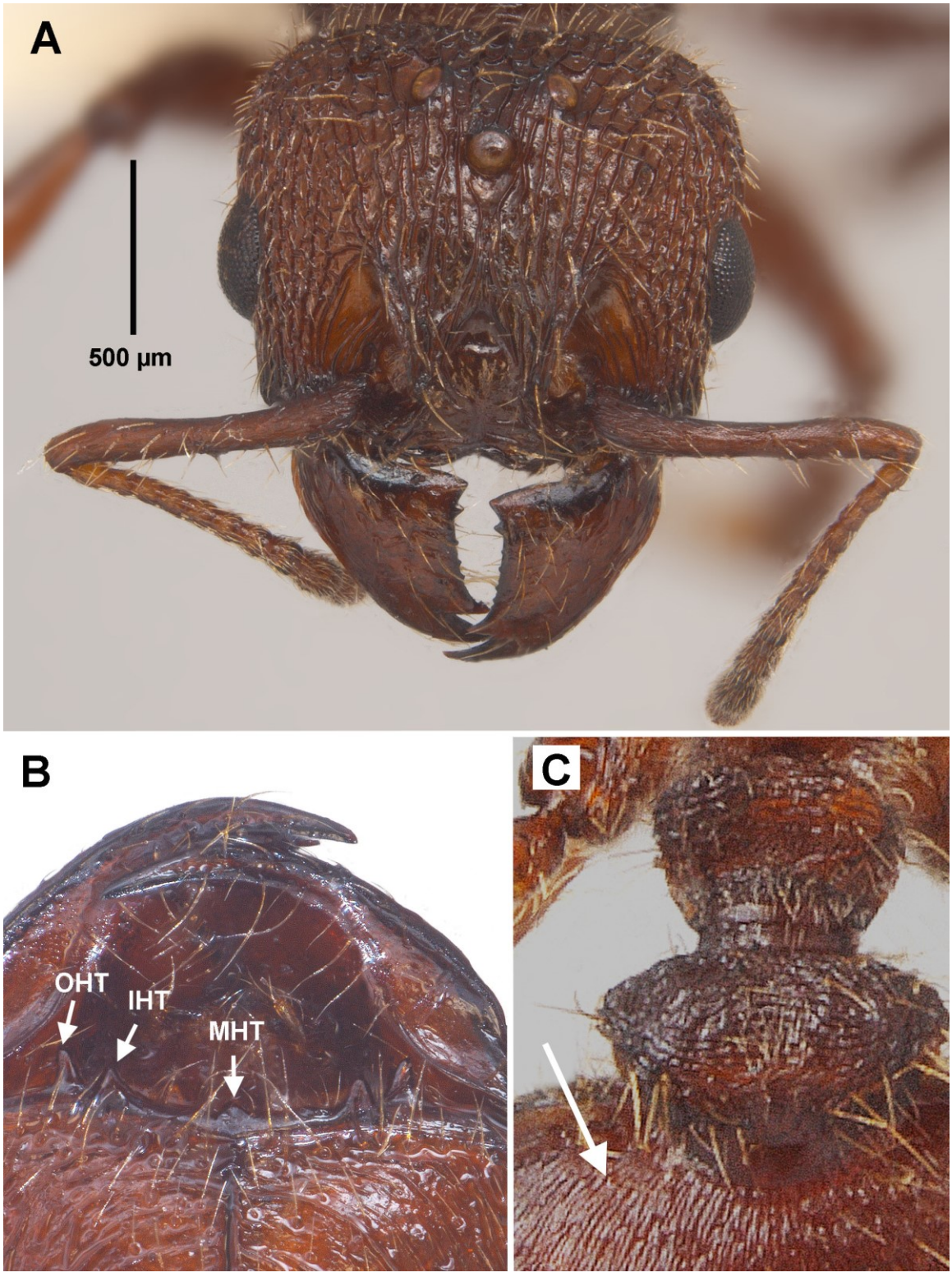

Figure 2. *Pheidole obscurithorax* queen. **(A)** Full-face view of head; **(B)** ventral view of head showing outer hypostomal teeth (OHT), inner hypostomal teeth (IHT), and median hypostomal tooth (MHT); and **(C)** dorsal view of petiole, postpetiole, and part of the first gastral tergite. Arrow points to fine longitudinal ridges.

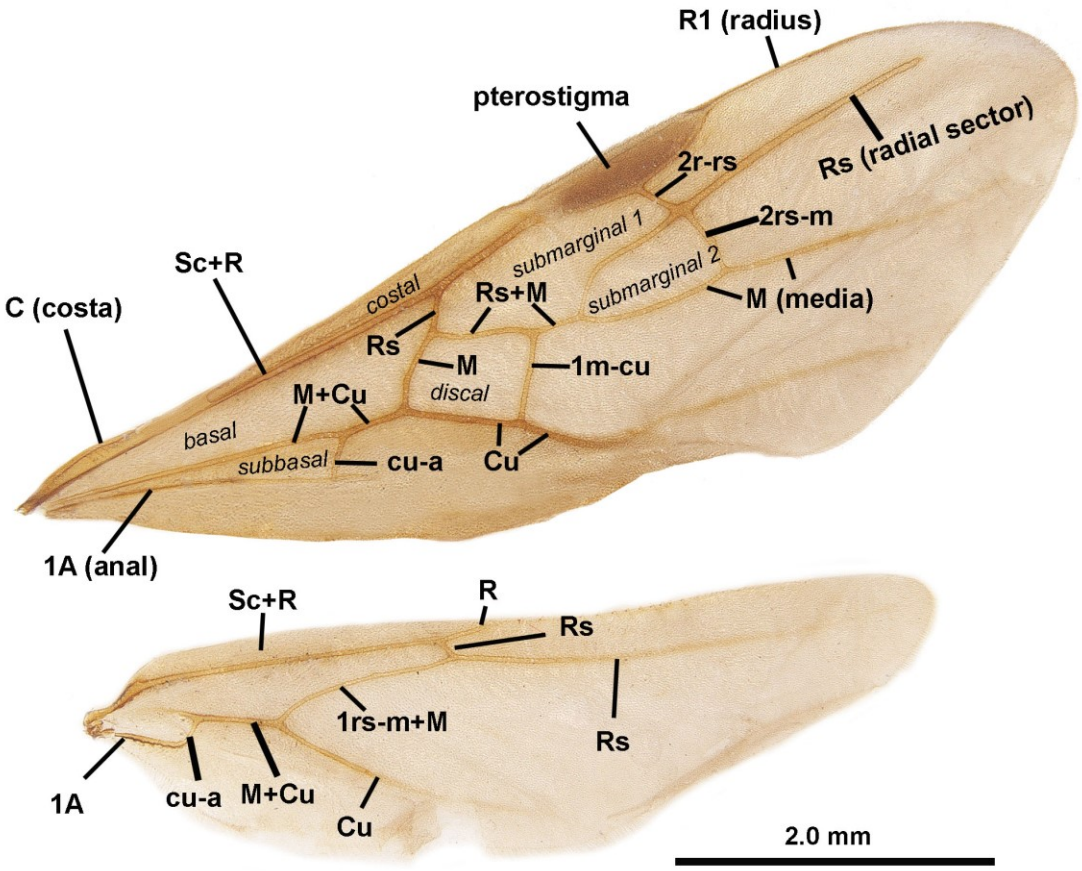

Figure 3. Forewing and hindwing of *Pheidole obscurithorax* queen with venation labeled.