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Taxonomy and systematics

The genus *Pheidole* (Hymenoptera: Formicidae: Myrmicinae) in Puebla, Mexico

El género Pheidole *(Hymenoptera: Formicidae: Myrmicinae) en Puebla, México*

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Abstract

A list of 35 species of the genus *Pheidole* distributed in the state of Puebla, Mexico is provided, based on literature reports and specimens from regional collections, and complemented with diagnoses, distributional, biological, and taxonomic comments. *Pheidole hirtula* Creighton, 1958 is synonymized under *Pheidole obtusospinosa* Pergande 1896, because both names are considered to represent extremes of the normal intraspecific variation of a single species. Thirteen species are endemic to the country and 7 are new state records. Seventeen morphospecies could not be identified to species level.

Keywords: Biodiversity; Insects; Mexican Transition Zone; Neotropics; Nearctic

Resumen

Se proporciona una lista de 35 especies del género *Pheidole* que se distribuyen en el estado de Puebla, México, basada en registros de literatura y especímenes de colecciones regionales, y complementada con diagnosis y comentarios distribucionales, biológicos y taxonómicos. *Pheidole hirtula* Creighton, 1958 es sinonimizada con *P. obtusospinosa* Pergande 1896, ya que se considera que ambos nombres representan extremos de la variación intraespecífica normal de una sola especie. Trece especies son endémicas del país y 7 son nuevos registros para el estado. Diecisiete morfoespecies no pudieron ser determinadas al nivel de especie.

Palabras clave: Biodiversidad; Insectos; Zona de Transición Mexicana; Neotrópico; Neártico

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Introduction

Pheidole Westwood, 1839 is the most diverse genus of the family Formicidae. It comprises more than 9.5 percent of the entire known ant fauna, with over 1,167 species described worldwide, and it may possibly reach 1,500 species (Bolton, 2021; Wilson, 2003). Almost any ecological niche has been exploited by species of the genus, from social parasites such as *P. parasitica* (Wilson, 1984) to specialist arboreal species such as *P. exarata* (Longino, 2009).

There are 126 species of *Pheidole* distributed in Mexico (Dáttilo et al., 2020), with some information available from the Nearctic (Mackay & Mackay, 2002; Wilson, 2003) and Neotropical regions (Longino, 2009, 2019; Wilson, 2003). However, there is not much information regarding the Mexican Transition Zone, which is exceptionally rich in endemic species of other groups (Halffter, 1987; Morrone, 2019).

Pheidole vorax, the first species of the genus known from Mexico, was described by Fabricius (1804), based on specimens collected in America Meridionali (= South America). Forel (1899) described *P. delecta* from Michoacán, *P. vasliti* var. *hirtula* from Durango, and *P. kinki* race *insipida* from Guerrero. Some years later he presented a list of the species collected by Wheeler during a trip to Mexico, citing localities in Aguascalientes, Morelos, Querétaro, and Zacatecas (Forel, 1901a). During 1952 and 1953, Creighton collected colonies of *Pheidole* in northwestern Mexico (Baja California, Chihuahua, Coahuila, Durango, and Sonora), and reported *P. tepicana* from Hidalgo, Jalisco, Morelos, Nayarit, Nuevo León, San Luis Potosí, Tamaulipas, and Veracruz (Creighton & Gregg, 1955). In 1969, Roy Snelling sent Robert E. Gregg some individuals of 2 possible new species, 1 of them Mexican, later described by the latter as *P. dwyeri* (Gregg, 1969). Gregg also noted that the type locality of *P. granulata* Pergande, 1896 was San José del Cabo, Baja California, not Tepic, Nayarit (Gregg, 1969).

Wilson's (2003) revision of the genus *Pheidole* included the descriptions of several species of the New World. In the case of Mexico, Wilson described 47 new species and synonymized 13 from 17 states of the country (Baja California, Baja California Sur, Chiapas, Chihuahua, Coahuila, Guerrero, Hidalgo, Estado de México, Michoacán, Morelos, Nayarit, Oaxaca, San Luis Potosí, Sinaloa, Tamaulipas, Veracruz, and Yucatán). All the species of the New World were classified by Wilson in 19 species groups, but only the *P. crassicornis* group has proved to be monophyletic (Moreau, 2008). Mexico has 14 of the 19 species groups: *biconstricta*, *crassicornis*, *diligens*, *fallax*, *flavens*, *granulata*, *lamia*, *megacephala* (introduced), *perpusilla*, *pilifera*, *punctatissima*, *scrobifera*, *transversostriata*, and *tristis*.

Longino (2009) undertook several expeditions to the states of Chiapas, Oaxaca, and Veracruz, which culminated with the description of 8 new species of *Pheidole* from Mexico and later in 2019, described 12 new species (Longino, 2009, 2019). The same year, Longino visited the state of Puebla and obtained interesting species of *Pheidole* in leaf litter, 7 of which remain undescribed (Pheidole JTL-260, Pheidole JTL-290 -295) (Longino, pers. comm.). The remaining Mexican species of the genus were described with material collected in the USA and South America, representing their presence in Mexico as an extension of their natural geographic distribution. The most recent effort to understand the biodiversity and distribution of the genus was the course "*Pheidole* of Mexico: diversity, taxonomy and determination" (Jalisco, June 26-30, 2017), where specimens from different parts of the country were revised by the participants, with the support of John Longino as instructor. This is the most complete collaborative effort for a genus of Formicidae in Mexico, with a book in process of publication as a result.

For the state of Puebla, the first record of the genus was provided by Quiroz and Deloya (1992). These authors could not identify the species of *Pheidole*. The taxonomic difficulties of the genus and the scarce information on the Mexican species demonstrate the need to have a species inventory of the country before any studies on the systematics, evolution, or distribution. Our objective is to compile a list of the species of *Pheidole* distributed in the state of Puebla.

Material and methods

We gathered all the reports of the genus *Pheidole* for the state of Puebla, then obtained the names of the repositories and visited these collections to examine the specimens of these literature reports when the possibility existed, with particular emphasis on undetermined material. The remaining reports were obtained from AntWeb (2020).

For the correct identification of the species, we used the original descriptions and diagnoses of the species, the digital keys of the *Pheidole* Working Group that uses morphological and morphometrical characters for the identification, and the comparison with specimens and photographs from AntWeb. Observations and measurements were made with an Olympus SZ61 stereomicroscope with a micrometer, and whenever it was necessary with an auxiliar 2x objective.

Photographs were taken with a Canon 1300D digital camera, a pentacon bellow, 2 Amscope 4X Plan Achromatic finite objective lenses (model PA4XK-V300),

and a Nikon BD Plan 10X; all the components on an X-Axis rail linear platform. The software used was Zerene Stacker, Lightroom and Photoshop. For the species without available specimens, photographs were taken from AntWeb (2020); we include the name of the photographer and source in the figure captions for these photographs. Photographs are unavailable for a few species that are reported from the literature.

References are provided for the distribution in the Nearctic and Neotropical regions and the Mexican Transition Zone (*sensu* Morrone, 2019) and the Mexican states, but with emphasis on localities from the state of Puebla. Other localities were considered when they helped understand the distribution of the species.

The information of the specimens is cited as in their labels, with the following format: Country, State, Municipality, Locality, GPS Coordinates ± Error, Elevation, Collection Date, Collection method, Habitat, Microhabitat, Collector, (number of individuals, Caste, Collection, and Collection code). This information was transcribed and supplemented to an electronic database in Excel, but some specimens do not have some of the data previously described and were omitted from the database. When coordinates, elevation, or both were not present on the label, they were estimated using Google Earth taking as reference the municipality or locality. The absence of this section in some species is because their occurrence report comes from the literature; only the geographic information of the examined specimens is cited in this study.

Castes are abbreviated as follows: super soldier (ss), soldier (s), worker (w), and dealate queen (dq). These abbreviations were used after the collection acronym, followed by a unique specimen identifier; some specimens have an individual code in their respective collection. For all the specimens, data were unified using the AntWeb format, with the objective of reporting them in the same public database. Specimens in this database receive a unique identify code (ANTCAT); if a specimen has a previous code from a regional database (like CCMVF or ICUAP) the code provided by AntWeb is considered.

A final consideration is the common practice of putting more than 1 specimen per pin for different castes, making it difficult to assign a unique identification code. In this study, unique identification codes were assigned from top to bottom, printing a single identification number for each label, so that if there are 3 specimens on the pin, there will be 3 unique identification labels, as well as 3 individual records in the database.

Specimens were obtained on loan from the following collections: BSIE, Laboratorio de Biología de Suelos, Instituto de Ecología A. C., Xalapa, Veracruz, Mexic; CCMVF, César Maximiliano Vázquez Franco, Private Collection, Puebla, Mexico; ICUAP, Centro de Agroecología, Instituto de Ciencias, Benemérita Universidad Autónoma de Puebla, Puebla, Mexico; IEXA, Instituto de Ecología A. C., Xalapa, Veracruz, Mexico; LRC, Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México, Tlanepantla, Estado de México, Mexico; UDLAP, Universidad de las Américas, Cholula, Puebla, Mexico.

Results

We report a list with 35 species distributed in Puebla and propose one nomenclatural change. Thirteeen species are endemic to the country (*P. azteca*, *P. centeotl*, *P. chalca*, *P. dwyeri*, *P. erethizon*, *P. laevivertex*, *P. mixteca*, *P. nubicola*, *P. polimorpha*, *P. rima*, *P. skwarrae*, *P. tolteca*, *P. yucatana*) and 7 are new state records (*P. bilimeki*, *P. dwyeri*, *P. erethizon*, *P. mixteca*, *P. polymorpha*, *P. titanis*, *P. yucatana*).

Seventeen species could not be identified in this study, to which 7 previously discovered but still undescribed species by Longino should be added. We include photographs of 32 species, in some cases of both castes, which in some case represent the only public photographs, for example, the minor worker of *P. granulata* or the major worker of *P. tolteca*.

Pheidole albipes Wilson, 2003 (Fig. 1)
Pheidole albipes Wilson, 2003: 367.

Diagnosis. Species distinguished by its color pattern, with reddish-brown body, coxae and femora light brown, and pale yellow tibiae and tarsi in both castes. Major worker with irregular rugoreticulate region between the eye and the occipital border. In the minor worker the humerus is subdenticulate in dorsal-oblique view (Wilson, 2003).

Distribution. Neotropical region and Mexican Transition Zone. Guatemala and Mexico. Veracruz, Oaxaca, Chiapas, and Puebla: Cuetzalan (AntWeb, 2020; Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Biology. Wilson (2003) reported 2 colonies nesting in small rotting tree branches in the ground leaf litter, and another colony under the bark of a large rotten log, in a degraded lowland forest.

Pheidole azteca Wilson, 2003 (Fig. 2)
Pheidole azteca Wilson, 2003: 558.

Diagnosis. Similar to *P. obtusospinosa*, but the major worker is distinguished by the quadrate shape of the head, a small patch of rugoreticulum between each eye, the antennal fossa closer to the eye (Wilson, 2003), and the scape exceeding the occipital border of the head

(smaller in *P. obtusospinosa*). The minor worker has a propodeal spine reduced, like a denticle; it is bigger in *P. obtusospinosa*.

Distribution. Mexican Transition Zone. Endemic to Mexico. Mexico City, Tlaxcala, and Puebla: Tepeyahualco and Zapotitlán Salinas (AntWeb, 2020; Dáttilo et al., 2020; Landero-Torres et al., 2015; Vásquez-Bolaños, 2015).

Biology. The few records reported the species in a riparian forest, corn crop, and pine and yucca forest; the only notes of the species biology were provided by AntWeb (2020), where there is a reference of majors and minors found beneath a dead *Yucca* stump. The specimens collected in this study were caught with a pitfall trap in an abandoned agricultural field, now having a uniform cover of "chimalacate" (*Viguiera dentata*), at an elevation of 1,300 to 1,450 m.

Taxonomic comments. Differences between minors of *P. azteca* and *P. obtusospinosa* are scarce; the specimens examined were provisionally assigned to this species based on the mesonotal profile and the propodeal spines. The propodeal spines of the minor of *P. obtusospinosa* are small but sharp and easily distinguished in lateral and dorsal oblique view.

Material examined. Mexico. Puebla. Zapotitlán Salinas, CCITIPI 18º19' N, 97º27' W, 1,455 m, 15-XI-2017, campo de cultivo abandonado, Delgadillo Sánchez Daniela (1w, LRC, LRC006); CCA1 T3 P1, 18º19' N, 97º27' W, 1,300 m, 12-XI-2017, campo de cultivo abandonado, Guerrero Sánchez Luis Enrique (4w, LRC, LRC035-38); CCA2 T1P4; 18º19' N, 97º27' W, 1,300 m, 12-XI-2017, campo de cultivo abandonado, Guerrero Sánchez Luis Enrique (4w, LRC, LRC047-50).

Pheidole bilimeki Mayr, 1870 (Fig. 3)
Pheidole bilimeki Mayr, 1870: 985.
Pheidole floridana var. *deplanata* Pergande, 1896: 883; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole floridana var. *antoniensis* Forel, 1901b: 364; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole anastasii var. *venezuelana* Forel, 1905: 159; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole punctatissima annectens Wheeler, 1905: 93; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole punctatissima insulana Wheeler, 1905: 93; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole anastasii var. *johnsoni* Wheeler, 1907: 272; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole anastasii var. *cellarum* Forel, 1908: 55; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole floridana ares Forel, 1908: 57; Wilson, 2003: 378 (= *P. bilimeki*).
Pheidole lauta Wheeler, 1908a: 470; Sarnat et al., 2015: 35 (= *P. bilimeki*).
Pheidole rectiluma Wilson, 2003: 493; Longino, 2009: 16 (= *P. bilimeki*).

Diagnosis. Similar to *P. anastasii* (not reported from Puebla) and *P. punctatissima;* it is distinguished by the smaller scape (SI 95-108) of the minor worker (Longino & Cox, 2009). The major worker can be identified by the concolor head of *P. bilimeki* and the bicolored pattern of *P. punctatissima*.

Queen. Described by Mayr (1870), Forel (1901b, 1908), and Wheeler (1908a).

Male. Described by Forel (1905, 1908) and Wheeler (1908a).

Distribution. Neotropical region. Mexico to Venezuela. Campeche, Chiapas, Hidalgo, Oaxaca, Quintana Roo, Nayarit, Tamaulipas, Veracruz, and Puebla: Zapotitlán de Méndez (Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Biology. Common species in perturbed areas. Specimens were collected in the urban area of the municipality.

Material examined. Mexico. Puebla. Zapotitlán de Méndez 20º00'15.3108" N, 97º42'43.7390" W, 693 m, 16-III-2018, selva baja caducifolia, suelo (concreto), Vázquez-Franco C. M. #11 (4s, 5w, CCMVF, CASENT0649568-576).

Pheidole centleotl Wheeler, 1914 (Fig. 4)
Pheidole centeotl Wheeler, 1914: 46.

Diagnosis. Trimorphic species, similar to *P. tepicana* and *P. polymorpha*; and similar to the dimorphic *P. ceres,* and *P. yucatana* because of the smooth and shiny occipital lobes. The super major worker has a deeper occipital cleft, its sides rising more steeply to the occipital lobes on either side (Wilson, 2003), giving the occipital lobes a more rounded shape in frontal view compared to *P. tepicana* and *P. polymorpha*. The minor worker has a foveolate sculpture with a shiny patch on the vertex, with a transversal carinula in frontal view, similar to *P. polymorpha*; however, *P. polymorph*a has a strong foveolate texture and transversal carinae but without shiny patches in the vertex and *P. tepicana* has a shiny face.

Distribution. Nearctic and Neotropical regions and Mexican Transition Zone. Endemic to Mexico. Chiapas, Hidalgo, Guerrero, Michoacán, Morelos, Veracruz, and Puebla: Amozóc (Dáttilo et al., 2020; Vásquez-Bolaños, 2015; Vázquez-Franco et al., 2014; Wilson, 2003).

Biology. The species was found in oak pine forest, pine forest, secondary forest, xeric shrub, and an opuntia field, at 570 to 2,400 m, most commonly above 2,200 m (Dáttilo et al., 2020; Wilson, 2003).

Material examined. Mexico. Puebla. Zapotitlán Salinas, 18º19'55.8" N, 97º27'12.2" W, 1,457 m, VIII-2008,

Pitfall, Matorral y cactáceas columnares, Ríos-Casanova L. (1w, LRC, LRC028; 1w, CCMVF, CASENT0649706). 18°20'0" N, 97°27'6.9" W, 1,521 m, Tetechera (1w, LRC, LRC027).

Pheidole ceres Wheeler, 1904 (Fig. 5)
Pheidole ceres Wheeler, 1904: 10.
Pheidole ceres tepaneca Wheeler, 1914: 46; Wilson, 2003: 570 (= *P. ceres*).

Diagnosis. Similar to *P. centeotl, P. xerophila* (not reported for the state), and *P. yucatana.* The major worker can be distinguished by its head sculpture, with a longitudinal carina crossing the head in the middle line to the occiput. The minor worker has a mesonotal convexity, that is difficult to see.

Queen. Described by Wheeler (1914).

Male. Described by Wheeler (1914).

Distribution. Nearctic and Neotropical regions and Mexican Transition Zone. USA and Mexico. Tlaxcala, Querétaro, Jalisco, Veracruz, Nayarit, and Puebla: Cuetzalan (AntWeb, 2020; Dáttilo et al., 2020; Longino, pers. comm.).

Biology. Collected in a pine forest and tropical dry forest, at 1,800 to 3,080 m. It is a montane species (Wilson, 2003).

Pheidole chalca Wheeler, 1914 (Fig. 6)
Pheidole chalca Wheeler, 1914: 44.

Diagnosis. Major worker distinguished by its square head and the smooth and shiny posterior third of the dorsum of the head and an area from the antennal fossa to the posterior border. Below this area it has a rugoreticulate small patch; the rest of the head has longitudinal carinae. The minor worker has a smooth, shiny pronotum.

Distribution. Mexican Transition Zone. Endemic to Mexico. Tlaxcala and Puebla: San Salvador el Seco (Dáttilo et al., 2020; Vázquez-Franco et al., 2014).

Biology. The species inhabits pine forest, at 2,700 to 2,900 m. It is probably a montane species.

Pheidole deceptrix Forel, 1899 (Fig. 7)
Pheidole deceptrix Forel, 1899: 66.
Pheidole chiapasana Wilson, 2003: 273; Longino, 2009: 25 (= *P. deceptrix*).
Pheidole variceps Wilson, 2003: 775; Longino, 2009: 25 (= *P. deceptrix*).

Diagnosis. Similar to *P. laevivertex* and *P. sciophilla.* The head of the major worker is longitudinally carinulate and foveolate. The mesosoma is foveolate in *P. deceptrix* and *P. sciophila,* but *P. laevivertex* has a smooth and shiny pronotum, that is transversally carinulate. The minor worker has no promesonotal groove in the mesosoma and the dorsal face of the first gastral tergite is smooth and shiny; *P. laevivertex and P. sciophila* have a promesonotal groove.

Queen. Known, but undescribed (Longino, 2009).

Distribution. Neotropical region and Mexican Transition Zone. Mexico to Honduras. Chiapas, Oaxaca, Tlaxcala, and Puebla: Jolalpan (AntWeb, 2020; Dáttilo et al., 2020).

Biology. It is a montane species, inhabiting cloud forest from 1,300 to 2,750 m. Nests are in the soil and under stones (AntWeb, 2020).

Taxonomic comments. Pheidole deceptrix is a polytypic species. For a correct identification, the descriptions of its junior synonyms and Longino's notes (2009) should be consulted.

Pheidole dwyeri Gregg, 1969 (Fig. 8)
Pheidole dwyeri Gregg, 1969: 97.

Diagnosis. It may be confused with P. titanis or P. mecacephala (not reported for the state) because of its big size. The easiest way to distinguish it is the 4-segmented antennal club of the major worker.

Distribution. Neotropical region. Endemic to Mexico. Jalisco, Morelos, Nayarit (Tres Marías islands), and Puebla: Jolalpan (Dáttilo et al., 2020; Gregg, 1969).

Biology. Specimens were collected in a diurnal tuna bait, in a tropical deciduous forest during the dry season, at an elevation of 885 m. In the Biological Station El Limón, of the Natural Protected Area Sierra de Huautla, Morelos, it inhabits the station's building, the electric installation specifically, and was seen carrying different dead arthropods.

Taxonomic comments. The minor workers of the Puebla and Morelos populations have a darker, reddish color.

Material examined. Mexico. Morelos, Tepalcingo, Estación Biológica el Limón, 18°32'33.10"N, 98°56'10.03" W, 1,311 m, 06-VI-2018, selva baja caducifolia, Vázquez-Franco C. M.#38 (2s, 4w, CCMVF, CASENT0649579-84; 1s, 2w, ICUAP). Puebla. Jolalpan, Rancho el Salado, 18º19'40.5984" N 98º58'04.1965" W, 883 m, 08-IV-17, selva baja caducifolia, en la trampa, Vázquez-Franco C. M. (1s, 1w, CCMVF, CASENT0649577, CASENT0649578).

Pheidole erethizon Wilson, 2003 (Fig. 9)
Pheidole erethizon Wilson, 2003: 154.

Diagnosis. Similar to *P. azteca* and *P. obtusospinosa*. Distinguished in the major worker by a scape base flat, and head foveolate, except frontal triangle and central piece of clypeus. The minor worker has a narrow occiput seen

in full-face view, but lacking a nuchal collar. Dense long hair covers the body in both castes but particularly in the first gastral tergite of the major worker (Wilson, 2003).

Distribution. Neotropical region. Endemic to Mexico. Michoacán, Morelos, and Puebla: Acatlán de Osorio (Vásquez-Bolaños, 2015; Wilson, 2003).

Biology. Unknown.

Material examined. Mexico. Puebla. Acatlán de Osorio, 18º05'40.9" N, 98º05'40.9" W, 1,224 m, 03-II-2013, trampa de miel (cocina 4), Mejía F. (2w, IEXA, CASENT0649708, CASENT0649709); 18º20'52.7" N, 98º04'7" W, 1,184 m, 20-XII-2012, trampa de miel (baño 5), Mejía F. (2w, IEXA).

Pheidole fimbriata Roger, 1863 (Fig. 10)
Pheidole diversa Smith, 1860: 74 (*non* Smith, 1858); Kempf, 1965: 183 (= *P. fimbriata*).
Pheidole fimbriata Roger, 1863: 196.
Pheidole smithii Dalla-Torre, 1892: 90 (replacement name for *P. diversa* Smith, 1860).
Pheidole fimbriata var. *tucumana* Forel, 1913: 228; Wilson, 2003: 690 (= *P. fimbriata*).
Pheidole soesilae Makhan, 2007: 1; Longino, 2019: 35 (= *P. fimbriata*).

Diagnosis. The major worker can be immediately recognized by the dense fringe of short, suberect to erect hairs on the petiolar peduncle and entire venters of the petiole and postpetiole, and the minor worker by a fringe of short hairs on venter of petiole. Both castes have small eyes (Wilson, 2003).

Distribution. Neotropical region. Mexico to South America. Hidalgo, Querétaro, Veracruz, Chiapas, Oaxaca, and Puebla: Cuetzalan (AntWeb, 2020; Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Pheidole glomericeps Wilson, 2003 (Fig. 11)
Pheidole glomericeps Wilson, 2009; 429.

Diagnosis. Distinguished by the major worker with cordiform head, covered by longitudinal carinae except the antennal scrobes (making them more evident), frontal triangle, and clypeus. The minor worker has reduced elliptical eyes, with a body completely foveolate except the first gastral tergite and the postpetiole lobe.

Distribution. Neotropical region. Mexico to Panama. Chiapas, Tabasco, Veracruz, Oaxaca, and Puebla: Cuetzalan (AntWeb, 2020; Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Biology. This species inhabits tropical rainforest, below 930 m (AntWeb, 2020; Dáttilo et al*.,* 2020).

Pheidole granulata Pergande, 1896 (Fig. 12)
Pheidole granulata Pergande, 1896: 890.
Pheidole (Ceratopheidole) granulata Emery, 1922: 113.

Diagnosis. Similar to *P. dwyeri* and *P. skwarrae*. It shares with *P. dwyeri* the 4- segmented antennal club, but its habitus is completely different; only these 3 species have this condition in the antenna. *Pheidole skwarrae* is the species most similar to *P. granulata* in Puebla, but differs by the following features: the major worker has a less concave occipital profile and more impressed foveolate texture in the face; and the minor has a small rugoreticulum patch between each eye and the antennal fossa, and a concolor body.

Distribution. Nearctic and Neotropical regions. USA to Mexico. Baja California, Baja California Sur, Nayarit, and Puebla: Jolalpan (Dáttilo et al., 2020; Kempf, 1972; Vásquez-Bolaños, 2015; Wilson, 2003).

Biology. Specimens were collected in a nocturnal tuna and honey bait in a tropical deciduous forest during the dry season, at 892 m.

Comments. The most common visual reference of the species is Wilson's (2003) illustration. The Jolalpan specimens differ in the presence of foveolate clypeus with longitudinal carina (smooth in Wilson's figure), less pilosity, and the small rugoreticulum close to the eye. This probably represents intraspecific variation, and more populations are needed to clarify this case. The rugoreticulum patch close to the eye, however, has a different size. In some specimens it is small and difficult to see, and it may be absent in other populations. The specimens from Puebla extend the distribution area of the species east to the Transmexican Volcanic Belt. It is possibly distributed in the states between Puebla and Nayarit.

Material examined. Mexico. Puebla. Jolalpan, Rancho el Salado, 18º19'39.0396" N, 98º58'06.4454" W, 392 m, 08-IV-2017, trampa atún nocturna, selva baja caducifolia, en la trampa, Vázquez-Franco C. M. (1s, 4w, CCMVF, CASENT0649585-589).

Pheidole harrisonfordi Wilson, 2003 (Fig. 13)
Pheidole harrisonfordi Wilson, 2003: 433.

Diagnosis. Major similar to *P. simonsi*. Major worker distinguished by a face more quadrate compared to *P. simonsi*, and the presence of longitudinal carinae in the center of the face (missing in *P. simonsi*). The minor worker is similar to those of other small yellow species and exhibits some variation; for a correct determination the major worker is required.

Distribution. Neotropical region and Mexican Transition Zone. Chiapas, Oaxaca, Quintana Roo, Veracruz, and Puebla: Cuetzalan and Hueytamalco (AntWeb, 2020; Dáttilo et al., 2020).

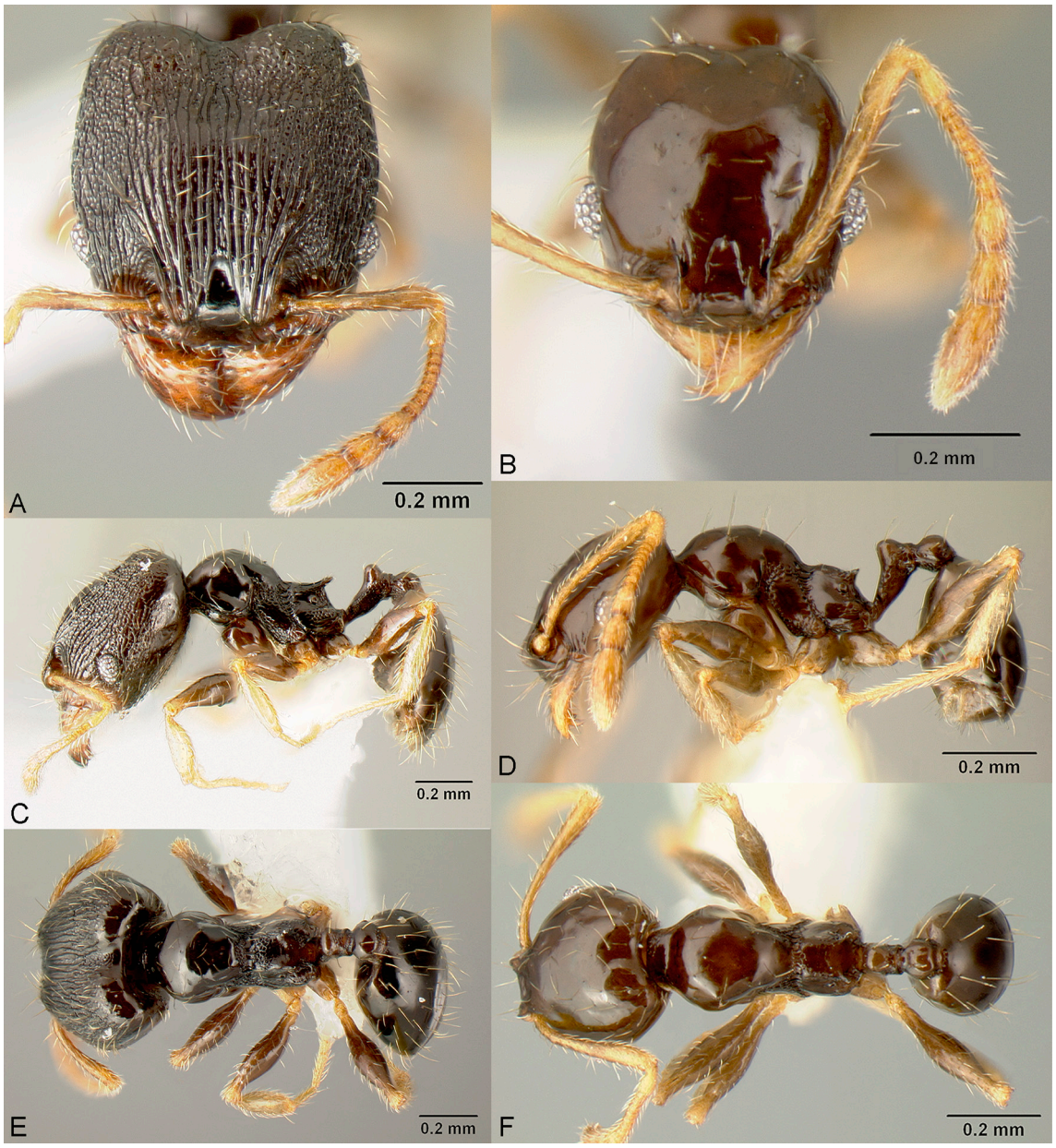

Figure 1. *Pheidole albipes*, full-face view (A), profile (C), and dorsal view (E) of major worker (JTLC000010035) and full-face view (B), profile (D), and dorsal view (F) of minor worker (JTLC000009724). Photographs by J. Russ, courtesy of AntWeb.

Biology. This species occurs in wet forest habitats, from sea level to 1,800 m. It is one of the most abundant species in Winkler or Berlese samples of forest floor litter and may also recruit to baits. Despite its abundance in Winkler samples, nests never have been encountered (Longino, 2009).

Taxonomic comments. Longino (2009) considers that *P. harrisonfordi* is a species complex, which will probably be divided into various species in the future.

Pheidole hoplitica Wilson, 2003 (Fig. 14)
Pheidole hoplitica Wilson, 2003: 579.

Diagnosis. Similar to *P. tepicana*. Major worker distinguished by the head in lateral view with a posterior

Figure 2. *Pheidole azteca*, full-face view (A), profile (C), and dorsal view (E) of major worker (JTLC000016325). Photographs by Jeremy Pilllow, courtesy of AntWeb, and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649707). Photographs available on AntWeb.

dorsal profile markedly concave, in frontal view with rugoreticulate occipital lobes (transversal carinae in *P. tepicana*), carinae turned outward near the center of the head toward the occipital corners, and a smooth patch in the center of the head cut this carinulate pattern (Wilson, 2003).

Distribution. Mexican Transition Zone. Tlaxcala and Puebla: Amozóc (Dáttilo et al., 2020; Vásquez Bolaños, 2015; Vázquez- Franco et al. 2014).

Biology. Unknown.

Pheidole laevivertex Forel, 1901 (Fig. 15)
Pheidole laevivertex Forel, 1901a: 131.

Diagnosis. Similar to *P. deceptrix* and *P. sciophila.* The major worker can be separated by the following combination of characters: face with longitudinal carinula except the occipital lobes that are smooth and shiny and a small rugoreticulum patch between the eye and the

Figure 3. *Pheidole bilimeki*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649571) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649570). Photographs available on AntWeb.

antennal fossa and the pronotum with a fine transversal carinulae. The minor worker has a complete foveolate body with the first gastral tergite shagreened. *Pheidole deceptrix* and *P. sciophila* have the first gastral tergite smooth and shiny.

Distribution. Nearctic region. Endemic to Mexico. Aguascalientes, Hidalgo, Morelos, and Puebla: Amozoc and San Rafael Coxcatlan (Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Biology. The species was collected in agricultural field, pasture (Dáttilo et al., 2020), and oak forest between 1,990 to 2,350 m, in localities with some degree of perturbation. Specimens were captured with a honey trap in the oak forest, where it is a relatively common species.

Taxonomic comments. In some specimens there is a smooth lineal patch behind the frontal triangle.

Material examined. Mexico. Puebla. Amozoc, Flor del Bosque, T:C P:4, 19°0’36.62” N, 98°6’1.26” W, 2,303 m, 20-X-2007, trampa de miel, zona erosionada, en la trampa, Valenzuela J. and Miguelena J. (1s, 2w, CCMVF, CASENT0649599-601); San Rafael Coxcatlan, 18º21’ N, 97º07’ W. 1,250 m, X-2000 Pitfall, Cuajiotal, en la trampa, Ríos-Casanova L. (1w, LRC).

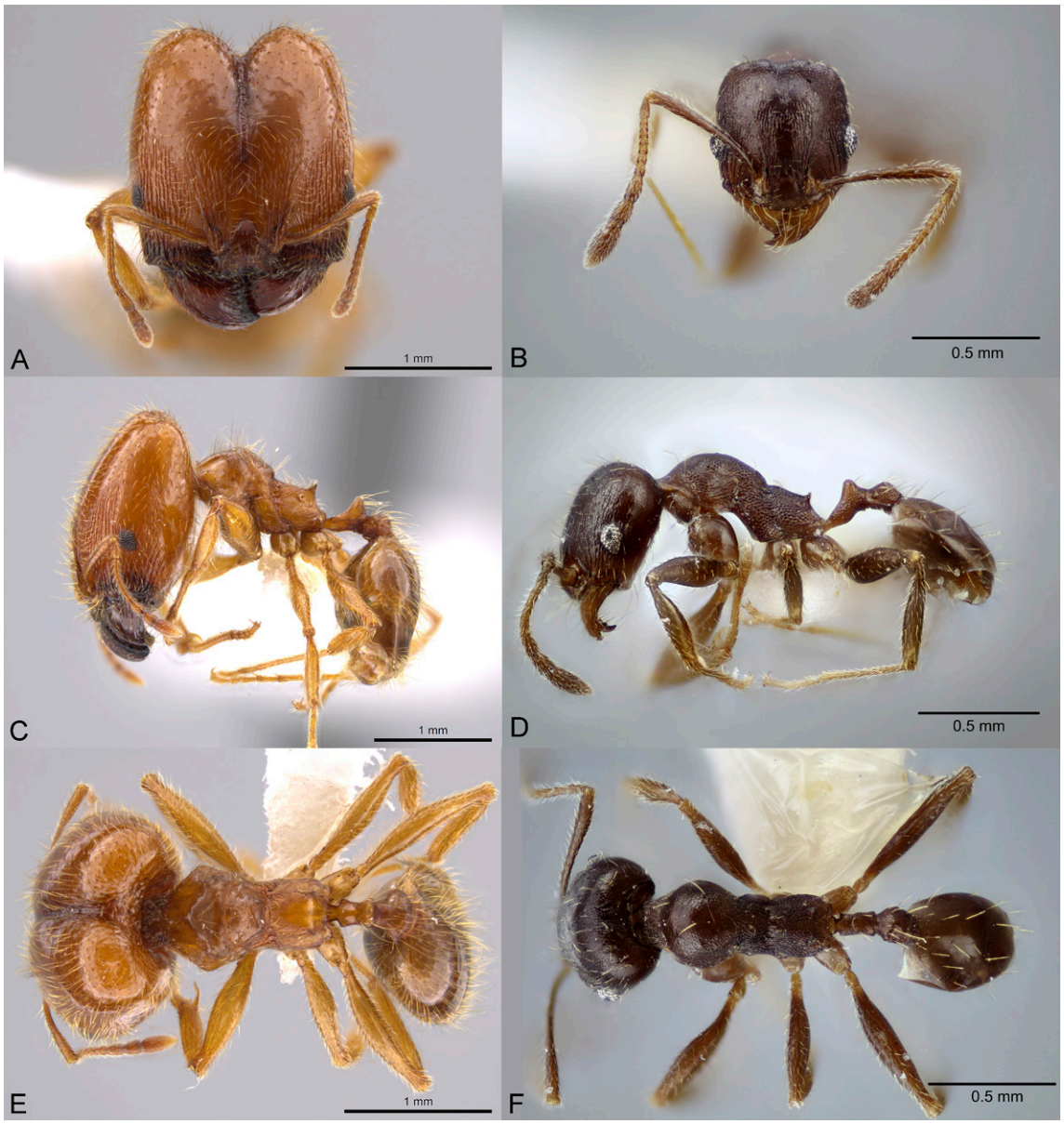

Figure 4. *Pheidole centeotl*, full-face view (A), profile (C), and dorsal view (E) of major worker (JTLC000010334) photograph by M. Pierce, courtesy of AntWeb and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649706) photographs available on AntWeb.

Pheidole mixteca Wilson, 2003 (Fig. 16)
Pheidole mixteca Wilson, 2003: 460.

Diagnosis. Similar to *P. nebulosa.* Major worker distinguished by the smooth and shiny occipital lobes, front and middle of the head foveolate with a longitudinal face, sculpture that disappears in the vertex, pronotum smooth, humerus angulate with a small foveolate patch in the humerus; minor worker with frontal lobes bulging forward in lateral view.

Geographic range. Neotropical region and Mexican Transition Zone. Endemic to Mexico. Oaxaca and Puebla: Amozoc and Tehuacan (AntWeb, 2020; Wilson, 2003).

Biology. Unknown.

Material examined. Mexico. Puebla. Amozoc, Flor del Bosque, T: A P:6, 19°0’27.76” N, 98°5’53.34” W, 2,272 m, 12-VII-2007, pitfall, matorral, en la trampa, Valenzuela J. and Miguelena J. (2w. CCMVF, CASENT0649603, CASENT0649604).

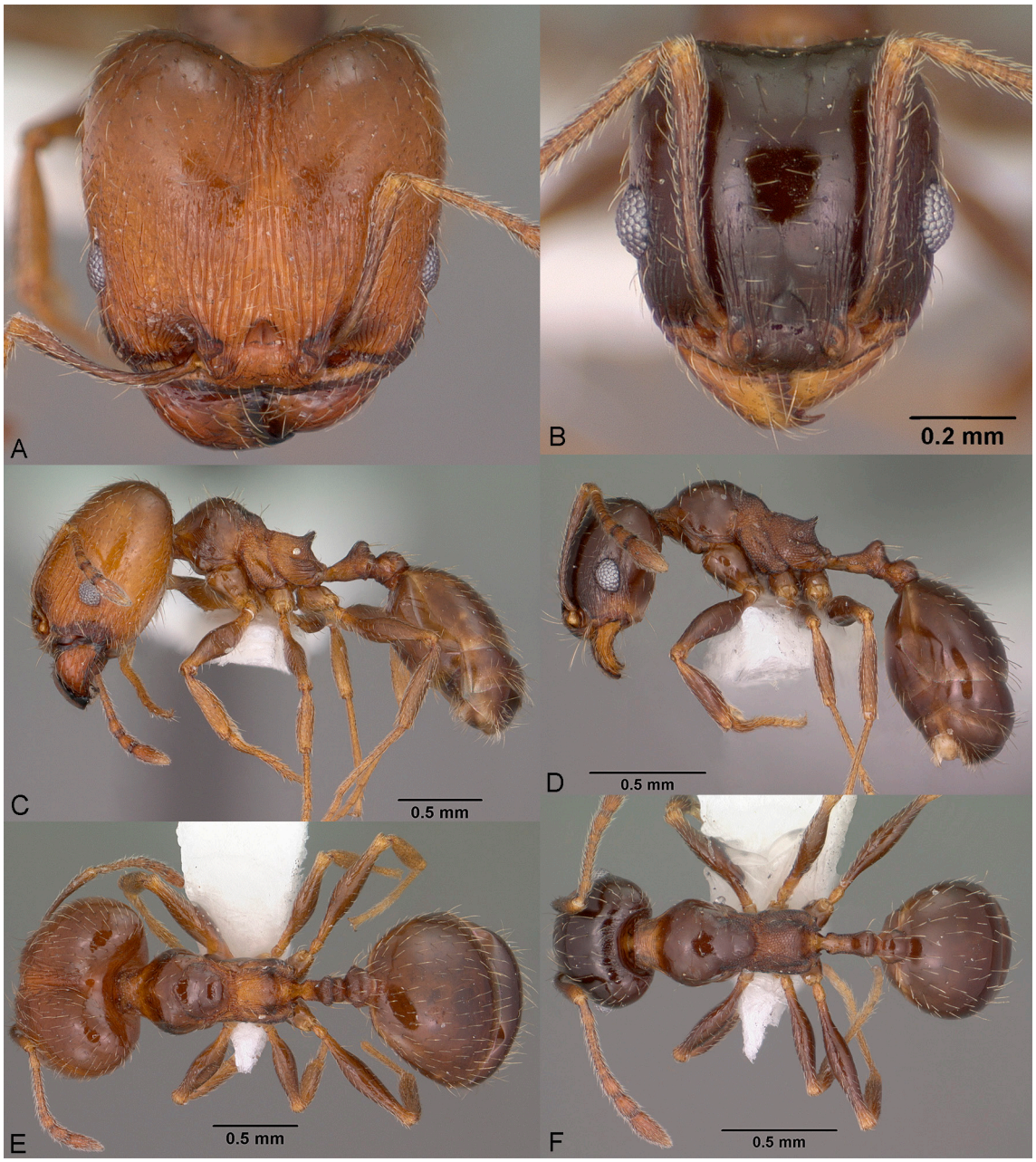

Figure 5. *Pheidole ceres*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0102870) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0102871). Photographs by Jen Fogarty, courtesy of AntWeb.

Pheidole nebulosa Wilson, 2003 (Fig. 17)
Pheidole nebulosa Wilson, 2003: 470.
Pheidole scabriventris Wilson, 2003: 503; Longino, 2009: 57 (= *P. nebulosa*).

Diagnosis. Major worker distinguished by the large medial rounded tooth in the hypostomal margin, without inner hypostomal teeth, and smaller size (Longino, 2009). The yellow form can be confused with *P. bilimeki,* but there are no reports of this variant, previously named *P. scabriventris*, in Puebla.

Distribution. Neotropical region. Mexico to Costa Rica. Chiapas, Oaxaca, Veracruz, and Puebla: Cuetzalan, Hueytamalco and Zapotitlán de Méndez (AntWeb, 2020; Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Biology. Specimens collected from the nest in rotten wood on the forest floor, in a coffee plantation with shade,

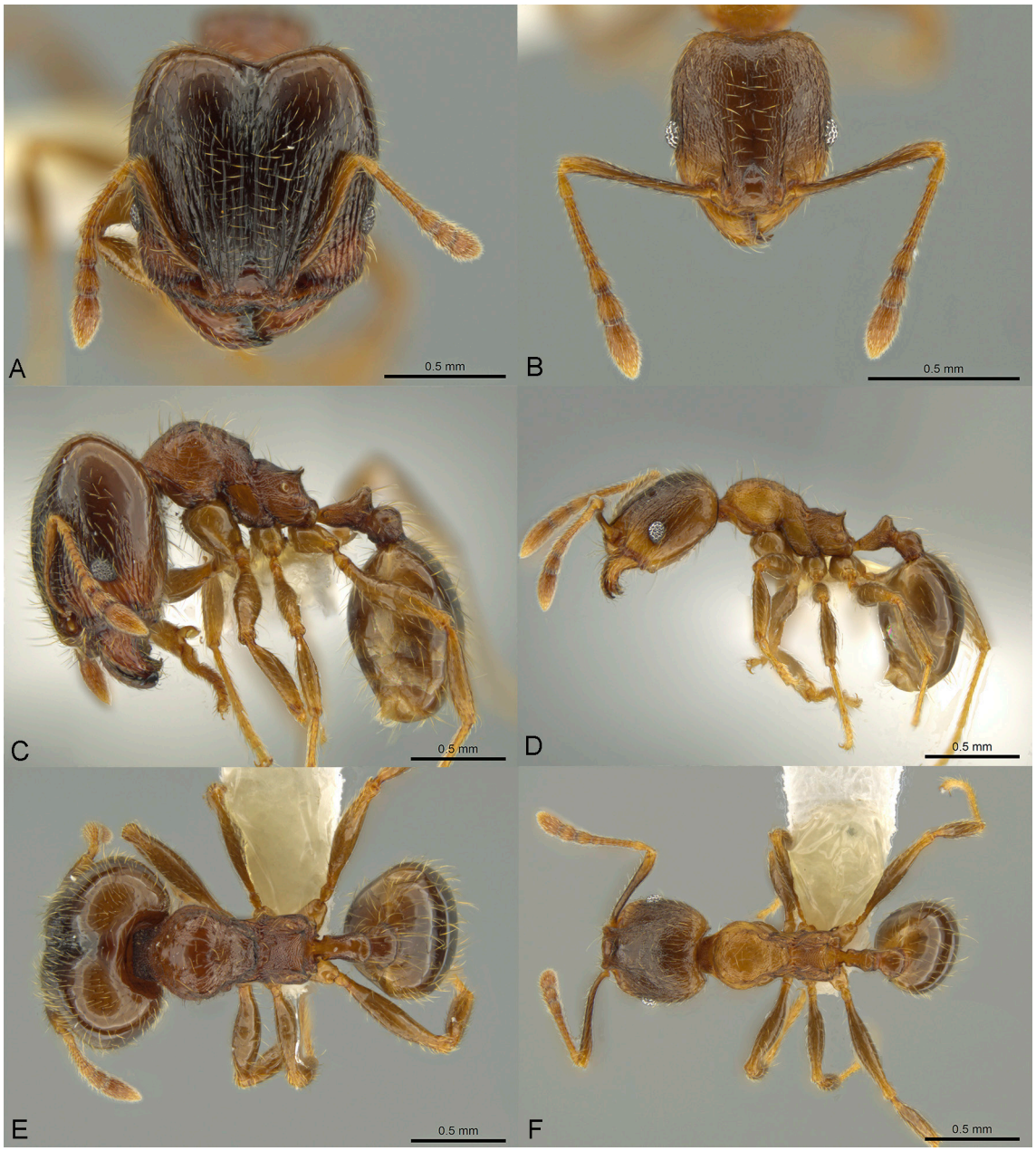

Figure 6. *Pheidole chalca*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0631889) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0631888) photographs by Skyler Oswald, courtesy of AntWeb.

where the original vegetation cover was semi-evergreen tropical forest, at an elevation of 693 m.

Taxonomic comments. The population of Zapotitlán de Méndez is darker in color. This is a variable character that is yellow in the type series. One intercaste specimen was locatedin the collection of Zapotitlán de Méndez; the origin of this condition probably is an alteration in the development by the juvenile hormone (Rajakumar et al., 2012). A similar condition has been reported for *P. boruca* (Wilson, 2003).

Material examined. Mexico. Puebla. Zapotitlan de Méndez, 20º00'15.3108" N, 97º42'43.7390" W, 693 m, 17-III-2018, aspirador bucal, cafetal con sombra diversificado, tronco podrido, Vázquez-Franco C. M. #21 (3s, 3w; CCMVF, CASENT0649605-610).

Figure 7. *Pheidole deceptrix*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0611124) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0611123). Photographs by Jeremy Pilllow, courtesy of AntWeb.

Pheidole nubicola Wilson, 2003 (Fig. 18)
Pheidole cielana Wilson, 2003: 275; Longino, 2019: 51 (= *P. nubicola*).
Pheidole nubicola Wilson, 2003: 329.
Pheidole petrensis Wilson, 2003: 337; Longino, 2019: 51 (= *P. nubicola*).

Diagnosis. A species with wide variation, similar to *P. bilimeki, P. roushae*, and *P. susannae.* The major worker is distinguished by the anterior and medial part of the head foveolate with transversal caninae to rugoreticulate, including frontal lobes only foveolate with longitudinal carinae, occasionally with medial ocellus present; and pronotum rugoreticulate to only foveolate in dorsal view. *Pheidole nubicola* and *P. roushae* have frontal lobes rugoreticulate, but *P. nubicola* is smaller, has less strong promesonotal groove and less pilosity. The minor worker

Figure 8. *Pheidole dwyeri*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649578) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649580). Photographs available on AntWeb.

of *P. nubicola* has a smooth and shiny to foveolate first gastral tergite versus smooth and shiny in *P. roushae.*

Distribution. Nearctic and Neotropical regions and Mexican Transition Zone. Endemic to Mexico. Estado de México, Querétaro, Veracruz, and Puebla: Hueytamalco and Tlaola (AntWeb, 2020; Dáttilo et al., 2020).

Biology. A common species from tropical forest with some records in urban areas of Veracruz. Longino (2019) considered this taxon to be a widespread montane species (1,000-2,000 m) in eastern Mexico, but another report mentioned the species at 18 m (Dáttilo et al., 2020).

Taxonomic comments. Pheidole nubicola is a variable species. For a correct identification, the descriptions of its junior synonyms should be consulted.

Material examined. Mexico. Puebla. Tlaola Cuamila, 20º09'49.6368" N, 97º54'19.5002" W, ±50 m, 1,023 m, 13-08-19, trampa atún, bosque mesófilo de montaña, en la trampa, Vázquez-Franco C. M. (2w, CCMVF, CASENT0649611, CASENT0649612).

Pheidole obtusospinosa Pergande, 1896 (Fig. 19)
Pheidole obtusospinosa Pergande, 1896: 889.

Figure 9. *Pheidole erethizon*, full-face view (A), profile (C), and dorsal view (E) of major (JTLC000016369) photographs by Skyler Oswald, courtesy of AntWeb, and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649708). Photographs available on AntWeb.

Pheidole subdentata Pergande, 1896: 888 (*non* Mayr, 1853); Wheeler, 1914: 50 (= *P. obtusospinosa*).
Pheidole (*Cardiopheidole*) *vaslitii* var. *hirtula* Forel, 1899: 65.
Pheidole arizonica Santschi, 1911: 3; Creighton, 1958: 211 (= *P. subdentata*).
Pheidole vaslitii var. *acolhua* Wheeler, 1914: 48; Creighton, 1958: 211 (= *P. hirtula*).
Pheidole hirtula Creighton, 1958: 211, syn. nov.

Diagnosis. A trimorphic species, similar to *P. azteca*. The major worker of *P. obtusospinosa* is distinguished by the occipital lobes with a foveolate pattern accompanied by foveae, a cordiform head and scape that does not cross the occipital border of the head; *P. azteca* has no strongly sculptured occipital lobes but has a quadrate head and larger scape. The minor worker of *P. obtusospinosa* has

Figure 10. *Pheidole fimbriata*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0178017) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0178018). Photographs by April Nobile, courtesy of AntWeb.

a propodeal spine small or reduced to denticles, clearly distinguished but in *P. azteca* denticles are reduced and practically absent.

Queen. Described by Wheeler (1909, 1914).

Male. Undescribed.

Distribution. Nearctic and Neotropical regions and Mexican Transition Zone. Canada and southern USA to Mexico. Baja California, Baja California Sur, Durango, Guanajuato, Hidalgo, Jalisco, Estado de México, Michoacán, Morelos, Oaxaca, Querétaro, Quintana Roo,

Sonora, Tlaxcala, and Puebla: Amozoc de Mota, Izucar de Matamoros, Puebla, and Tepeyahualco (AntWeb, 2020; Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Biology. A common species in pine forest, secondary forest, tropical deciduous forest, and urban areas of the Valley of Mexico, at 10 to 2,400 m, most commonly above 1,500 m. Nests found under stones and cement slabs in urban areas.

Taxonomic comments. The revision of several collections from central Mexico showed that it is not possible to separate *P. hirtula* and *P. obtusospinosa*. The traditional differences between both species are the presence of the elongate foveae of the rear half of the dorsum of the head, with the interspaces densely foveolate and opaque in *P. obtusospinosa* versus rounded foveae of the rear half of the dorsum of the head, with the interspaces smooth and shiny in *P. hirtula* (Wilson, 2003). Ward (2000) mentioned both names when referring to the identity of *P. vaslitii* and commented as a difference between the species the less cordate form of the head and stronger sculpture in the posterior half of the head in *P. obtusospinosa* versus a cordate head and less strong sculpture for *P. hirtula*, but these characters were taken from Creighton's (1958) discussion of the identity of *P. vaslity*. The revision of several specimens showed that variations in the head sculpture are not constant between the specimens, and that different character states are mixed together, namely, some specimens have an elongate fovea, with the interspaces smooth and shiny. Finally, some specimens from Zacatecas show the same pattern in the same colony: some minor workers exhibit the typical shape of *P. hirtula* and the super major of the same colony has the sculptured pattern of *P. obtusospinosa* (Fig. 20). For these reasons we consider that the names are synonyms. The minor workers exhibit some variation in the size of the propodeal spine and sculpturing of the face; some specimens have a face smooth and shiny to finely shagreened in the areas close to the eyes.

Material examined. Mexico. Jalisco. Tequila, La Toma, 20°54'41.6196" N, 103°49'21.6087" W ±600, 102 m, 23-VI-2017, manual en hojarasca, selva baja caducifolia, Vázquez-Franco C. M. (1s, 2w CCMVF, CASENT0649648, CASENT0649649, CASENT0649650). Estado de México. Texcoco, Universidad de Chapingo, División de Ciencias Forestales, 18º29'28.05" N, 98º53'0269" W, 2,264 m, 28-IX-2018, manual, zona urbana, Mandujano (1ss, LRC). Mexico City. Coyoacán, Cantera Oriente, Pedregal de San Ángel, sendero, 19º32'02" N, 99º17'37" W, 2,270 m, 05-XII-2013, pitfall, zona urbana, Villar-García Paola (1s, LRC). Puebla. Amozoc, Caseta Amozoc, 19º0"49" N, 98º04'08" W, 2,329 m, 18-IV-2010, manual, suelo, Rojas Fernández Patricia (1s, 2w, BSIE); Amozoc, Flor del Bosque, T:C P:3, 19°1'27.2" N, 98°6'57.86" W, 2,406 m, 20-X-2007, pitfall, encinal, en la trampa, Valenzuela J., Miguelena J. (1ss, 1s, 1w, CCMVF, CASENT0649625, CASENT0649626, CASENT0649627); Amozoc, Flor del Bosque, T:I P:4, 19°1'20.94" N, 98°6'36.23" W, 2,415 m, 12-VII-07, pitfall, matorral, en la trampa, Valenzuela J. Miguelena (1ss, 1s, 1w, CCMVF, CASENT0649591, CASENT0649592, CASENT0649593) (1ss, 1s, 1w, ICUAP, ICUAPFOR000011-13); Izucar de Matamoros, El Aguacate, 06-VII-1997, R. Castillo (1ss, 1s, 1w, IEXA, HM-21-743, 3 specimens with the same code); Puebla, 19º0'20.38" N, 98º1201.79" W, ±5 m, 2,135 m, 12-X-2017, directa, zona urbana, banqueta, Vázquez-Franco C. M. (1s, 1w, CCMVF, CASENT0649613, CASENT0649614); Puebla, 19º0'20.38" N, 98º12'1.79" W, ±5 m, 2,135 m, VI-2018, directa, zona urbana, banqueta, Vázquez-Franco C. M. (1dq, CCMVF, CASENT0649615); Puebla, Parque Ecológico Revolución Mexicana, 19º01'46.35" N, 98º11'10.70" W, 2,150 m, VI-2017, trampa chicharrín, vegetación secundaria, Sandoval-Ruíz César Antonio et al. (4s, 4w, CCMVF, CASENT0649616-623). Zacatecas. Saín Alto, 23º29'30.5" N, 103º06'32" W, 2,165 m, 08-XII-2019, manual diurno, selva baja caducifolia, nido bajo roca, Vázquez-Franco C. M. 81-82 (3ss, 3s, 3w, CCMVF, CASENT0649633, CASENT0649634-641; 2ss, 2s, 2w, ICUAP, ICUAPFOR000023-28); 23º29'30.5", 103º05'43.4", 2,142 m, 07-XII- 19, trampa atún, campo abierto, Vázquez-Franco C. M. (2s, 4w, CCMVF000000142-47; 2s, 2w, ICUAP, ICUAPFOR000029-32).

Pheidole polymorpha Wilson, 2003
Pheidole polymorpha Wilson, 2003: 592.

Diagnosis. Similar to *P. tepicana*. Super major worker distinguished by a small rugoreticulate patch between the eye and the antennal fossa, and the head smooth and shiny, with a carinulate pattern versus the face without the rugoreticulate patch and a foveolate texture under the longitudinal carinulate pattern in *P. tepicana.* Back of occipital lobes with transversal carinae. The minor worker has a faveolated head versus smooth and shiny in *P. tepicana.*

Distribution. Nearctic region and Mexican Transition Zone. Endemic to Mexico. Hidalgo, Tlaxcala, Mexico, Sonora, and Puebla (AntWeb, 2020; Dubovikoff & Coronado-Blanco, 2017; Vásquez-Bolaños, 2015; Vázquez-Franco et al., 2014; Wilson, 2003).

Pheidole prattorum Wilson, 2003
Pheidole prattorum Wilson, 2003; 736.

Diagnosis. Major similar to those of *P. tepicana*, *P. polymorpha*, and *P. ceres,* distinguished by the face

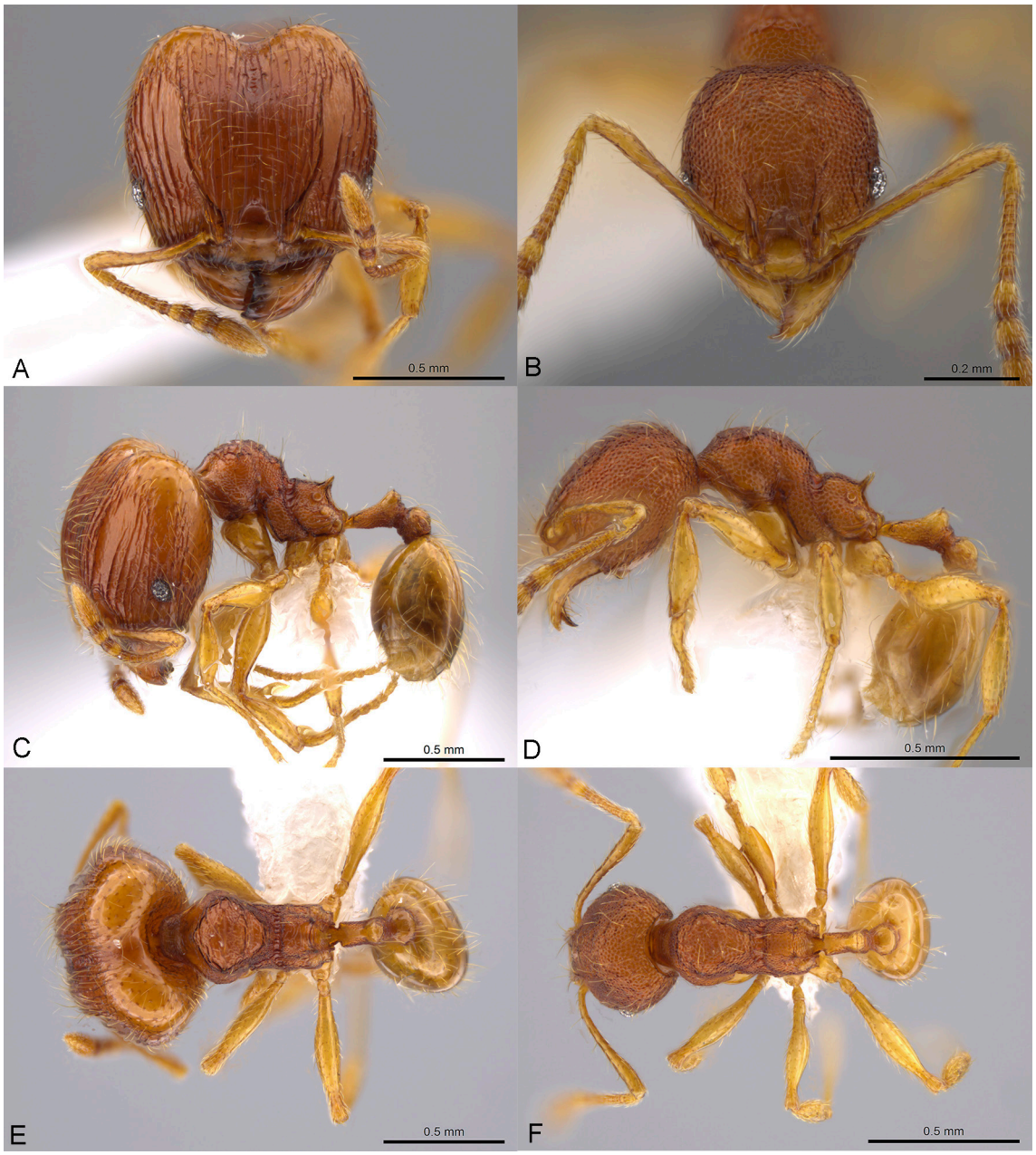

Figure 11. *Pheidole glomericeps*, full-face view (A), profile (C), and dorsal view (E) of major worker (JTLC000014002) and full-face view (B), profile (D), and dorsal view (F) of minor worker (JTLC000014003). Photographs by M. Pierce, courtesy of AntWeb.

sculpture with carinulae covering most of anterior two-thirds of head dorsum, the rest is smooth, without any kind of rugoreticulum patch, only a foveolate texture between the longitudinal carinulae between the antennal fossa and the eye. The reddish-brown color can be a useful character when comparing this species with the others of the state.

Distribution. Neotropical region and Mexican Transition Zone. Mexico to Costa Rica. Oaxaca, Veracruz, Chiapas, and Puebla: Cuetzalan and Hueytamalco (AntWeb, 2020; Dáttilo et al., 2020).

Biology. It inhabits cloud forest and tropical rainforest, at 140 to 1,100 m (Dáttilo et al., 2020).

Pheidole punctatissima Mayr, 1870 (Fig. 21)
Pheidole punctatissima Mayr, 1870: 400.

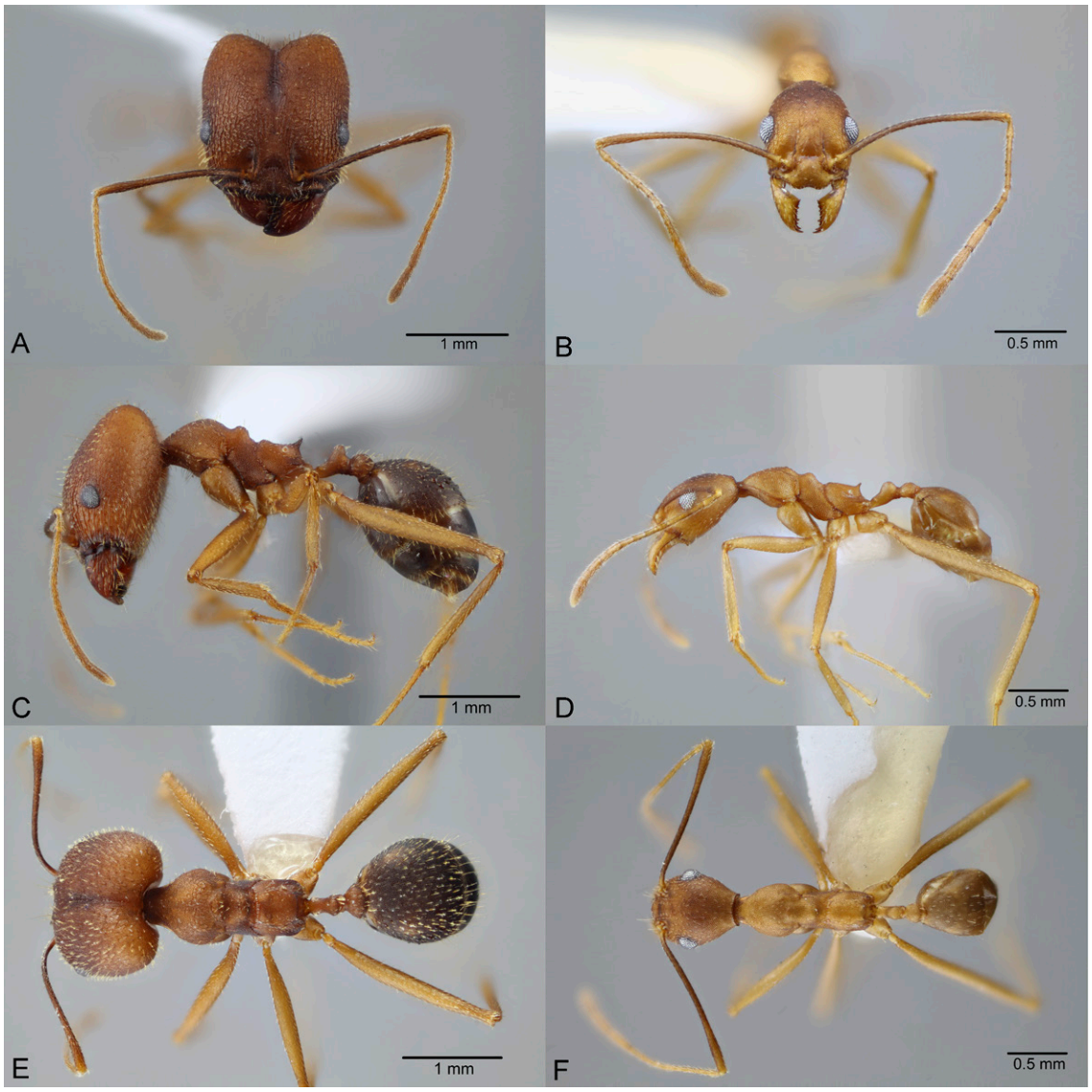

Figure 12. *Pheidole granulata*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649585) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649589). Photographs available on AntWeb.

Diagnosis. Similar to *P. bilimeki*, *P. nebulosa*, and *P. rima*. The major worker can be easily distinguished by the particular color pattern of the head, dark red brown anteriorly and yellow posteriorly. The minor worker is difficult to separate; the only difference is its relatively longer scape (SI 114-125).

Distribution. Nearctic and Neotropical regions. Mexico to Venezuela. Campeche, Chiapas, Chihuahua, Guerrero, Jalisco, Hidalgo, Oaxaca, Quintana Roo, Tamaulipas, Veracruz, Yucatán, and Puebla: Cuetzalan and Hueytamalco (AntWeb, 2020; Dáttilo et al., 2020; Vásquez-Bolaños, 2015).

Biology. A common species in tropical forest, with arboreal preferences. Some aspects of its biology were treated by Longino and Cox (2009).

Pheidole rima Longino, 2019 (Fig. 22)
Pheidole rima Longino, 2019: 55.

Diagnosis Similar to *P. bilimeki* and *P. punctatissima.* Distinguished by a cordiform head overlain with reticulate rugulae laterally and posteriorly, longitudinal rugulae medially between frontal carinae gastral dorsum smooth and shiny. The minor worker has a face foveolate, overlain with faint reticulate rugulae, pronotal humeri with

Figure 13. *Pheidole harrisonfordi*, full-face view (A), profile (C), and dorsal view (E) of major worker (JTLC000016399) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0646277). Photographs by J. Longino, courtesy of AntWeb.

short triangular tubercles; mesosoma entirely foveolate, bicolored, red head and mesosoma, contrasting with the black gaster.

Distribution. Neotropical region. Endemic to Mexico. Veracruz, Oaxaca, and Puebla: Cuetzalan and Hueytamalco (AntWeb, 2020; Longino, 2019).

Biology. The only known information was provided by Longino (2019).

Taxonomic comments. Longino (pers. comm.) reported a series of darker specimens from Puebla.

Pheidole roushae Wilson, 2003 (Fig. 23)
Pheidole roushae Wilson, 2003: 344.

Diagnosis. Similar to *P. nubicola.* The major workers distinguished by the frontal lobes rugoreticulate and the irregular rugulae scattered over the dorsal surface of the

Figure 14. *Pheidole hoplitica*, full-face view (A), profile (C), and dorsal view (E) of major worker (JTLC000016399) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0646277) photographs by J. Longino, courtesy of AntWeb.

occipital lobes (Wilson, 2003). In the minor worker, the erect dense pilosity and propodeal spines are sharp, pointy and smaller in *P. nubicola*.

Distribution. Neotropical region and Mexican Transition Zone. Mexico to Costa Rica. Veracruz, Chiapas, and Puebla: Cuetzalan and Hueytamalco (AntWeb, 2020; Dáttilo et al., 2020).

Figure 15. *Pheidole laevivertex*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649599) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649600) available on AntWeb.

Biology. The species was collected in urban areas, at 980 to 1,570 m.

Pheidole simonsi Wilson, 2003
Pheidole arctos Wilson, 2003: 623; Longino, 2019: 59 (= *P. simonsi*).
Pheidole gangamon Wilson, 2003: 626; Longino, 2019: 59 (= *P. simonsi*).
Pheidole simonsi Wilson, 2003: 630.
Pheidole thrasys Wilson, 2003: 631; Longino, 2019: 59 (= *P. simonsi*).

Diagnosis. Major worker distinguished by the clypeus smooth and shiny without any carinae, with antennal scrobes, the rest of the face foveolate with a posterior third of the face rugoreticulate in frontal view, promesonotal dorsum rugoreticulate or transversal carinulate. In the minor worker the face, pronotum, and first gastral tergite are smooth and shiny, with a long propodeal spine.

Geographic range. Neotropical region and Mexican Transition Zone. Mexico to Panama. Chiapas, Oaxaca, Veracruz, Tamaulipas, and Puebla: Cuetzalan (AntWeb, 2020; Dáttilo et al., 2020; Longino, 2019).

Figure 16. *Pheidole mixteca*, full-face view (A), profile (C), and dorsal view (E) of major worker (JTLC000016460) photographs by J. Longino, courtesy of AntWeb, and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649604) available on AntWeb.

Biology. It inhabits tropical areas. The few reports of this species are from mature tropical forest, but some Mexican reports located the species in a coffee plantation (Dáttilo et al., 2020).

Pheidole skwarrae Wheeler, 1934 (Fig. 24)
Pheidole skwarrae Wheeler, 1934: 163.

Diagnosis. Similar to *P. granulata*, distinguished by the 3-segmented antennal club. More characters are discussed in *P. granulata*.

Queen. Described by Wheeler (1934).

Distribution. Neotropical region. Endemic to Mexico. Morelos, Jalisco, and Puebla: Acatlán de Osorio, San Rafael Coxcatlan, and Zapotitlan de Salinas (AntWeb, 2020, Dáttilo et al., 2020).

Figure 17. *Pheidole nebulosa*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649605) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649606) available on AntWeb.

Biology. Collected with pitfall and tuna baits, in tropical dry forest and xeric shrub land at 200 to 1,455 m. *Pheidole swkarrae* has a higher elevational distribution than *P. granulata*, but the species probably are sympatric in some parts of the Mexican Transition Zone.

Material examined. Mexico. Puebla. Acatlan de Osorio, 18º20'51.6" N, 98º45'76.4" W 1,173 m, 01-I-2013, trampa de miel, Mejía F. (1s, IEXA); San Rafael Coxcatlan, 18º21' N, 97º07' W, 1,250 m, I-2001, pitfall, cuajiotal, en la trampa, Ríos-Casanova L. (1s, 1w, LRC, CASENT0649704, CASENT0649705); Zapotitlán de Salinas, CCH1T1P4, 18º19' N, 97º27' W, 1,300 m, 12-XI-2017, pitfall, campo de cultivo invadido por chimalacate, en la trampa, Guerrero Sánchez Luis Enrique (4w, LRC).

Pheidole soritis Wheeler, 1908a (Fig. 25)
Pheidole sitarches Wheeler, 1908a: 440; Wilson, 2003: 598 (= *P. soritis*).
Pheidole sitarches subs. *rufescens* Wheeler, 1908a: 443; Wilson, 2003: 598 (= *P. soritis*).
Pheidole sitarches var. *transvarians* Wheeler, 1908a: 442; Wilson, 2003: 598 (= *P. soritis*).
Pheidole soritis Wheeler, 1908a: 439; Cole, 1953: 298, 1956: 115 (= *P. sitarches*).

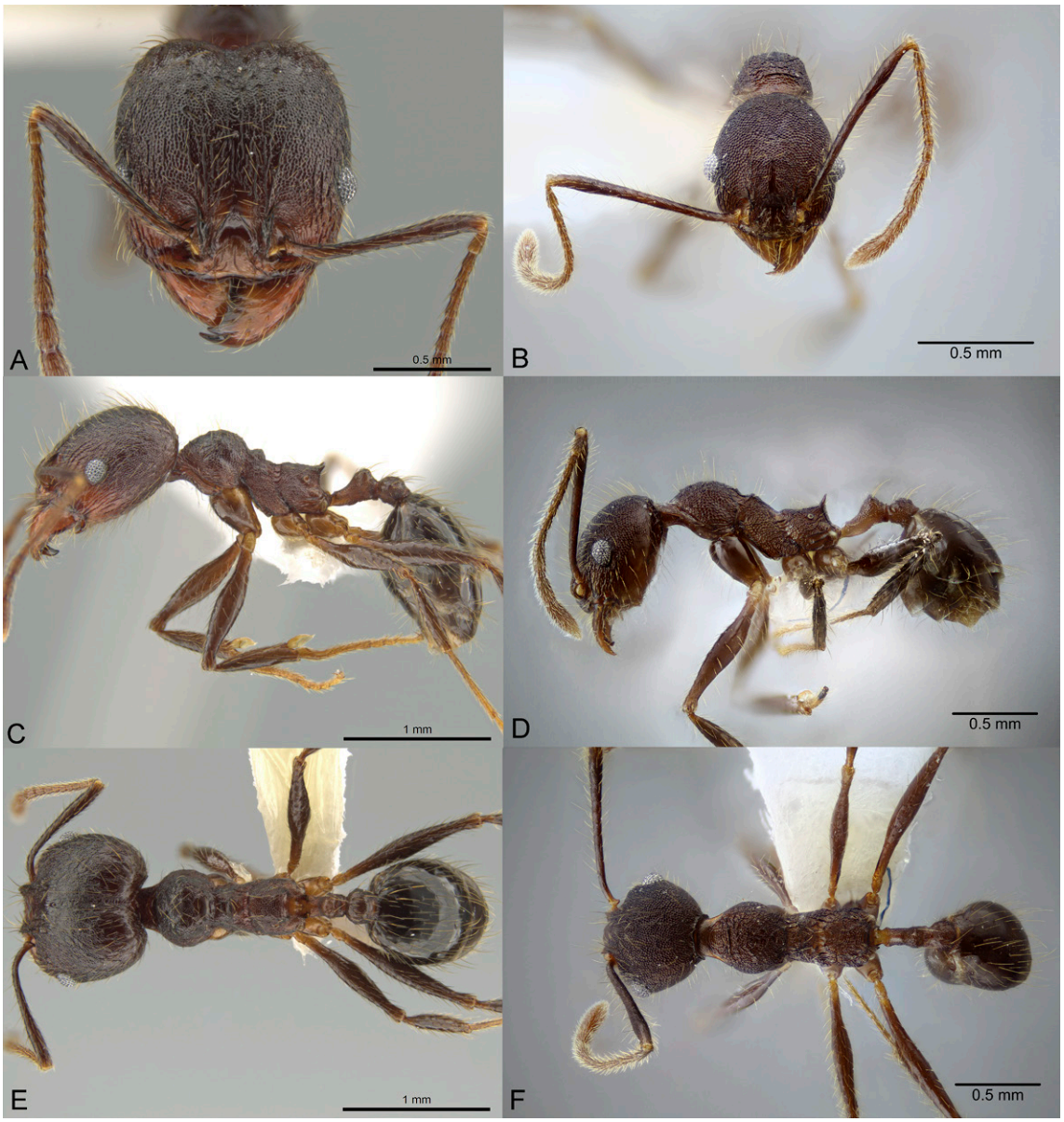

Figure 18. *Pheidole nubicola*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0640821) photographs by J. Longino, courtesy of AntWeb, and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649611) available on AntWeb.

Pheidole sitarches subs. *rufescens* var. *campestris* Wheeler, 1908a, 443; Wilson, 2003: 598 (= *P. soritis*).
Pheidole sitarches soritis; Creighton, 1950: 190; Gregg, 1959: 30; Smith, 1979: 1373 (= *P. soritis*).

Diagnosis. Similar to *P. polymorpha.* Major worker distinguished by an anterior half of the head, clypeus and frontal lobes (except frontal triangle) with longitudinal rugae, and the posterior half of the head with rugae follow the general shape of the occipital lobes. The minor worker has some pairs of short spatulate setae in the mesososma, peciole, and postpeciole (Wilson, 2003).

Distribution. Nearctic and Neotropical regions and Mexican Transition Zone. USA to Mexico. Coahuila, Jalisco, Puebla, Sonora, Tamaulipas, Tlaxcala, and Veracruz (Dáttilo et al., 2020).

Biology. Mainly inhabits oak forest and pine forest, at elevations of 30 to 3,000 m.

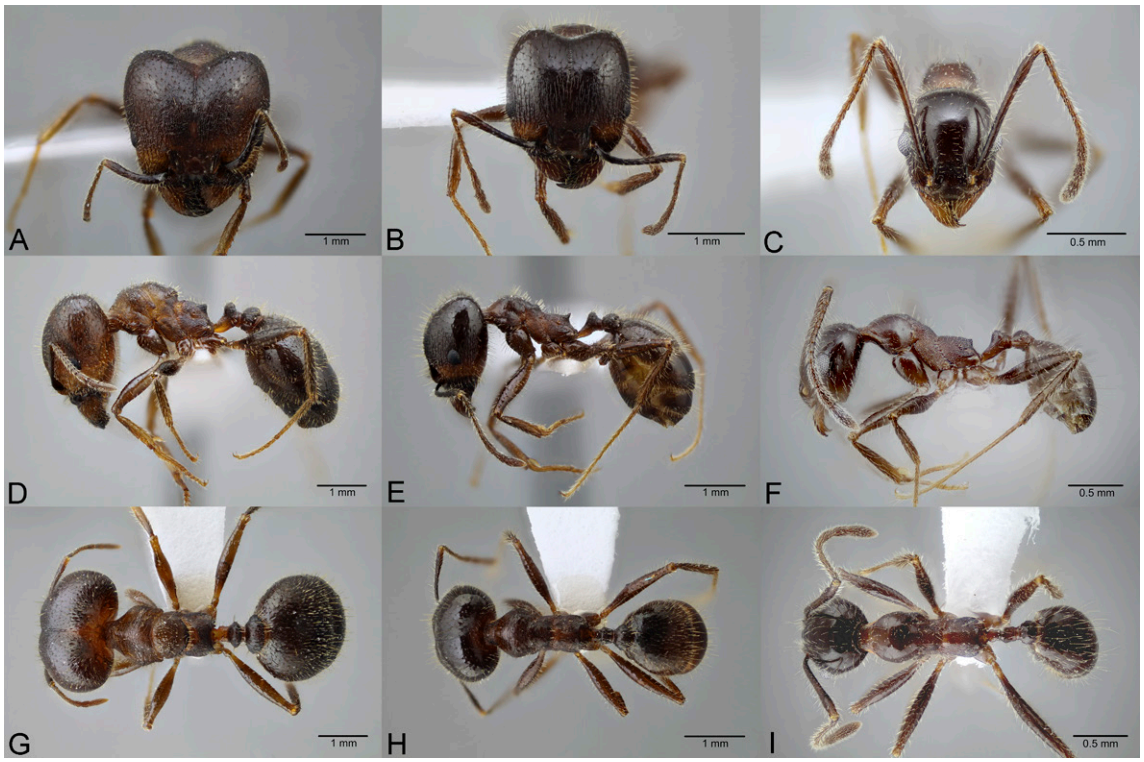

Figure 19. *Pheidole obtusospinosa*, full-face view (A), profile (D), and dorsal view (G) of super major worker (CASENT0649633) full-face view (B), profile (E), and dorsal view (H) of major worker (CASENT0649640) and full-face view (C), profile (F), and dorsal view (I) of minor worker (CASENT0649635). Photographs available on AntWeb.

Taxonomic comments. The minor worker exhibits variation on the sculpture in the southern part of its distribution, that corresponds to Mexico; the minor worker's head is smooth and shiny. Wilson (2003) suggests the possibility that *P. soritis* is a species complex.

Pheidole subarmata Mayr, 1884 (Fig. 26)
Pheidole subarmata Mayr, 1884: 37.
Pheidole cornutula, Emery, 1890: 52; Brown, 1981: 526 (= *P. subarmata*).
Pheidole subarmata var. *elongatula* Forel, 1893: 408; Brown, 1981: 526 (= *P. subarmata*).
Pheidole subarmata var. *nassavensis* Wheeler, 1905: 92; Brown, 1981: 526 (= *P. subarmata*).
Pheidole cornutula var. *imbecillis* Emery, 1906: 151; Brown, 1981: 526 (= *P. subarmata*).
Pheidole (Elasmopheidole) hondurensis Wheeler, 1908b: 133; Brown, 1981: 526 (= *P. subarmata*).
Pheidole subarmata var. *borinquenensis* Wheeler, 1908b: 133; Brown, 1981: 526 (= *P. subarmata*).
Pheidole cornutula var. *dentimentum* Santshi, 1929: 285; Brown, 1981: 526 (= *P. subarmata*).
Pheidole subarmata var. *nefasta* Santschi, 1929: 285; Brown, 1981: 526 (= *P. subarmata*).

Diagnosis. Distinguished by a rectangular head, anterior half of the head with a longitudinal carinae, except the clypeus, frontal lobes project to the front in lateral view, without promesonotal groove. Minor worker with occiput broad, without nucal carinula, propodeal spines reduced to denticles. Both castes with body smooth and shiny.

Queen. Described by Forel (1893) and Santschi (1923).

Male. Described by Forel (1893) and Santschi (1923).

Geographic distribution. Neotropical region and Mexican Transition Zone. Mexico to South America. Campeche, Chiapas, Hidalgo, Estado de México, Querétaro, Quintana Roo, Tabasco, Veracruz, and Puebla: San Nicolás de los Ranchos (Vásquez-Bolaños, 2015, Dáttilo et al., 2020).

Biology. A common species inhabiting various vegetations types like tropical forest, secondary forest, grasslands, and urban zones. Wilson (2003) mentioned that it is easy to collect by searching adjacent to roads and fields.

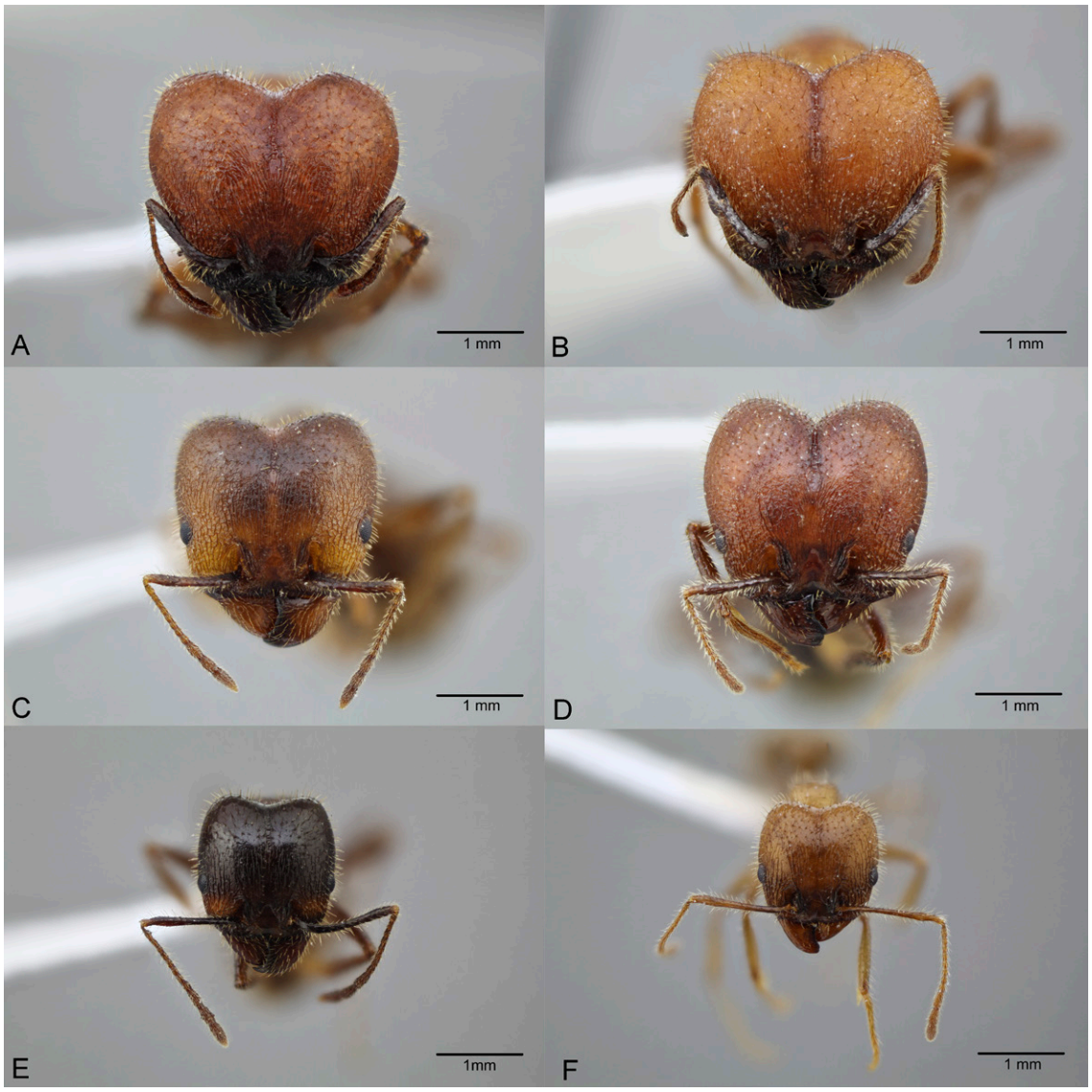

Figure 20. *Pheidole obtusospinosa*, full-face view of super major workers (A) (CASENT0649639), (B) (CASENT0649703), (C) (ICUAPFOR000023) and (D) (CASENT0649591) and full-face view of major workers (E) (CASENT0649640) and (F) (CASENT0649613). (A), (C) and (E) from the same nest in Zacatecas, (B), (C), and (F) from Puebla. Photographs available on AntWeb.

Pheidole susannae Forel, 1886 (Fig. 27)
Pheidole susannae Forel, 1886: 6.
Pheidole susannae r. *obscurior* Forel, 1886: 7; Longino, 2009: 79 (= *P. susannae*).
Pheidole partita Mayr, 1887: 590; Wilson, 2003; 330 (= *P. oscurior*).
Pheidole susannae r. *atricolor* Forel, 1901b: 356; Wilson, 2003: 351 (= *P. susannae*).
Pheidole incisa evoluta Borgmeier, 1929: 204; Kempf, 1964: 63 (= *P. susannae*).

Diagnosis. Similar to *P. nubicola.* The major worker is distinguished by the longitudinal carinae in the midline of the head and frontal lobes, crossing over the head, sides of head covered by a rugoreticulate pattern bordering the eyes, and occipital lobes smooth and shiny. First gastral tergite shagreened. The minor worker has conspicuous nucal carina, and head and propodeum smooth.

Queen. Described by Forel (1893, 1901b).

Male. Described by Forel (1893, 1901b).

Figure 21. *Pheidole punctatissima*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0619681) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0619442). Photographs by Jeremy Pilllow, courtesy. of AntWeb.

Distribution. Neotropical region and Mexican Transition Zone. Mexico to South America. Campeche, Chiapas, Oaxaca, Quintana Roo, Tabasco Veracruz, and Puebla: Amozoc (Dáttilo et al., 2020; Vázquez-Franco et al., 2014).

Biology. It is a relatively common species in disturbed habitats throughout the Neotropics, in numerous habitats, including highly disturbed areas such as city parks, seasonal dry forest, mature lowland rainforest, and second growth rainforest. It can occur on the ground or in the canopy. Workers readily recruit to baits, and major workers often recruit along with minor workers. Nests are found in small cavities and appear to be somewhat opportunistically inhabited (Longino, 2009). In Mexico, the species was

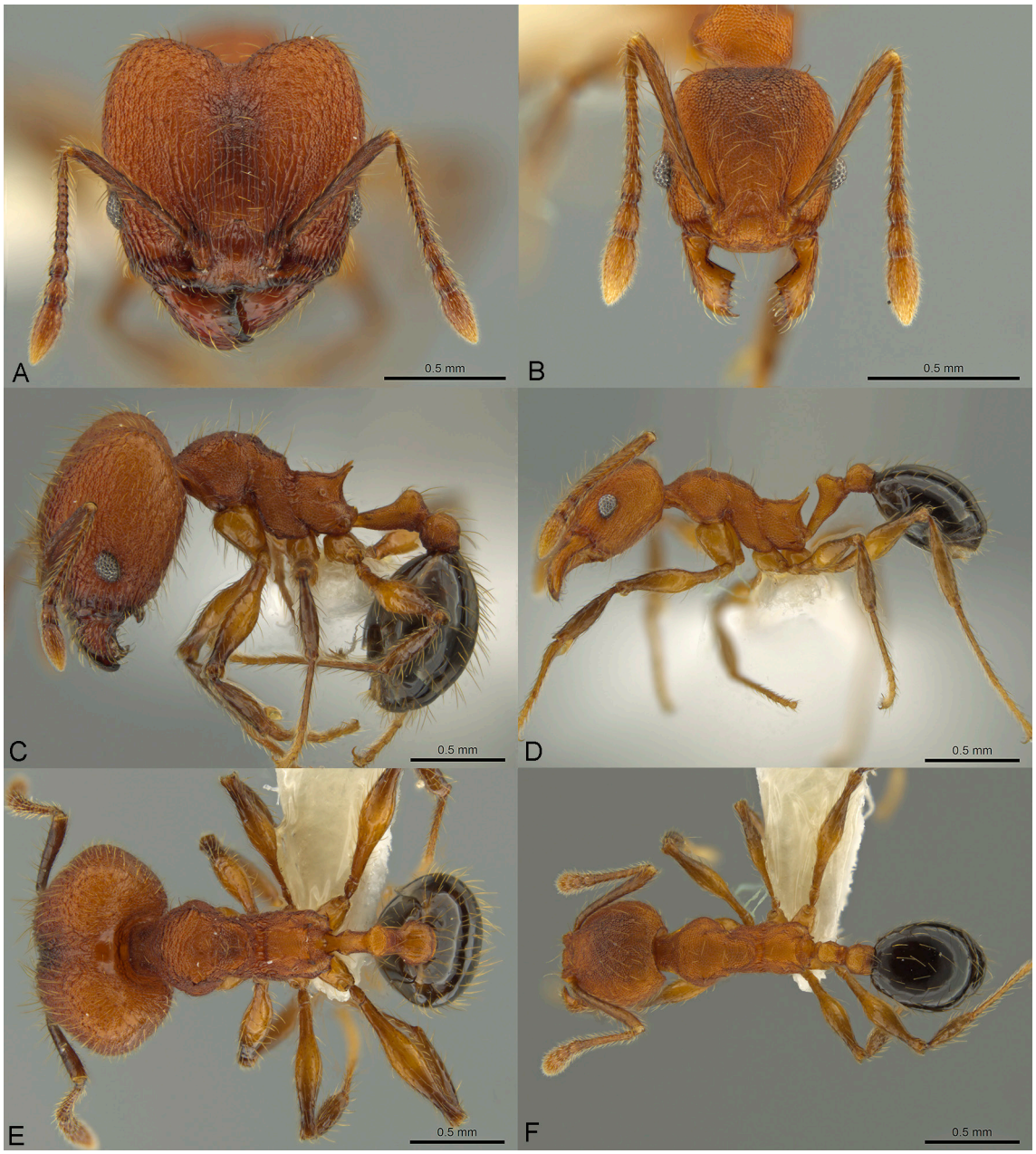

Figure 22. *Pheidole rima*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0633308) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0633307). Photographs by J. Longino, courtesy of AntWeb.

collected in coffee plantation, pasture, riparian forest, secondary forest, tropical dry forest, tropical rainforest, and pine forest (Dátillo et al., 2020).

Pheidole tepicana Pergande, 1896 (Fig. 28)
Pheidole tepicana Pergande, 1896: 878.
Pheidole rugifrons Pergande, 1896: 880; Emery, 1901: 119 (= *P. tepicana*).
Pheidole carbonaria Pergande, 1896: 881; Emery, 1901: 119 (= *P. tepicana*).
Pheidole kingi André, 1898: 244; Creighton & Gregg, 1955: 24 (= *P. tepicana*).
Pheidole townsendi André, 1898: 246; Emery, 1922: 105 (= *P. kingi*).
Pheidole kingi instabilis Emery, 1901: 120; Creighton & Gregg, 1955: 24 (= *P. tepicana*).

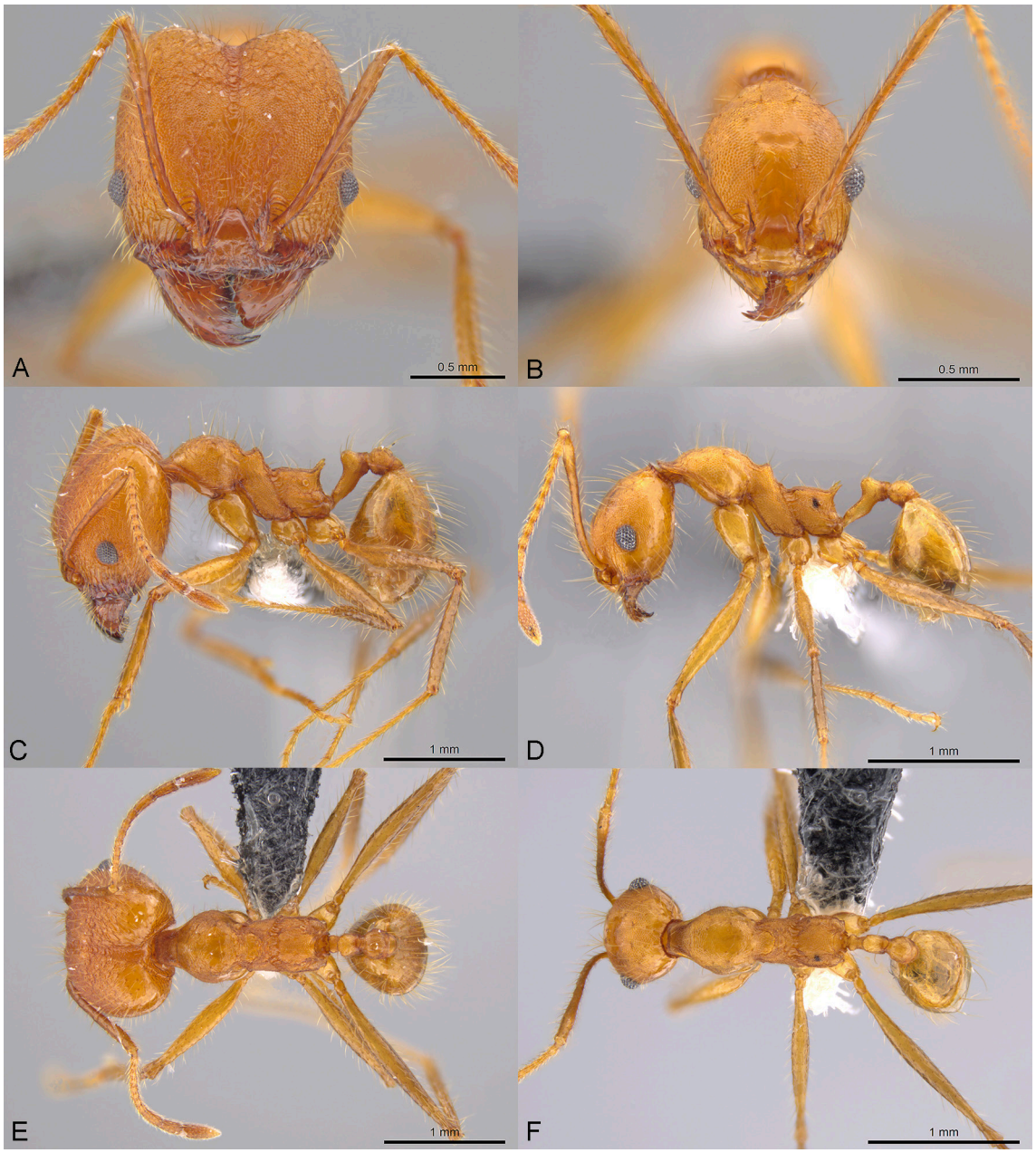

Figure 23. *Pheidole roushae*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0610898) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0610899) Photographs by M. Pierce, courtesy of AntWeb.

Pheidole kingi torpescens Creighton & Gregg, 1955: 404; Creighton & Gregg, 1955: 24 (= *P. tepicana*).

Diagnosis. A common trimorphic species, similar to *P. polymorpha.* The super major has a rectangular foveolate face with anterior 1/3 of the head covered with longitudinal striate occipital lobes with transversal carinulae and a small rugoreticulum patch between the antenna lobe and the eye. Major worker with the same general pattern of the super major, but without the foveolate pattern below the carinae anterior border of clypeus crenate. Minor worker with face, propodeum, and gaster completely smooth and shiny, the anepisternum with a small foveolate patch and propodeum dorsum foveolate, and the propodeal spines are reduced to a small denticle. The minor worker of *P. tepicana* has a head entirely smooth and shiny (foveolate in *P. polymorpha*).

Figure 24. *Pheidole skwarrae*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649704) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649705) available on AntWeb.

Distribution. Nearctic and Neotropical regions. USA to Mexico. Hidalgo, Jalisco, Morelos, Estado de México, Nayarit, Nuevo León, San Luis Potosí, Tlaxcala, Veracruz, Tamaulipas (Vásquez- Bolaños, 2015, Dáttilo et al., 2020), and Puebla: Amozoc, Flor Jolalpan, and San Rafael Coxcatlan (Vázquez-Franco et al., 2014).

Biology. A common species in arid semiarid and perturbed areas, at elevations of 18 to 2,900 m. The super major is difficult to see in bait traps. The presence of a super mayor suggests a granivore habit. This species is notably flexible in its choices of nest site (Wilson, 2003); in Puebla some nests can be seen on the university campus, in open areas.

Taxonomic comments. The species presents variation in color, from dark brown to yellow brown. This variation may be related to the vegetation; the dark brown variation can be observed in temperate forest and the yellow brown can be found in arid zones.

Material examined. Mexico. Jalisco. Tequila, La Toma, 20°54’41.6196” N, 103°49’21.6087” W, ±600 m, 102 m, 23-VI-2017, colecta manual, selva baja caducifolia, Hojarazca, Vázquez-Franco C. M. (1ss,

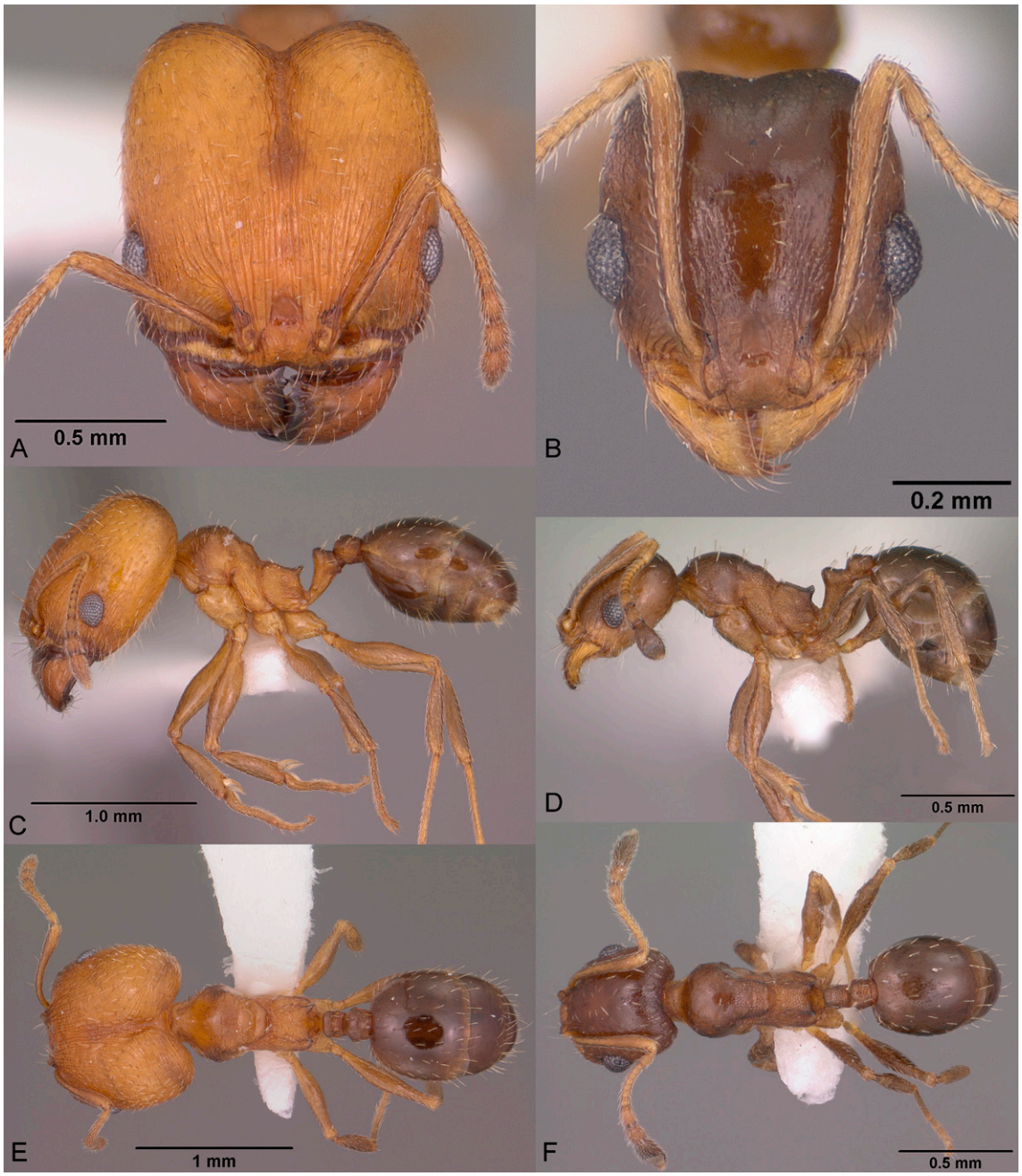

Figure 25. *Pheidole soritis*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0104447) photographs of Jen Fogarty, and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0104448) photograps by April Nobile, courtesy of AntWeb.

2w, CCMVF, CASENT0649664, CASENT0649665, CASENT0649666). Puebla. Amozoc, Caseta Amozoc, 19º03'49" N, 98º04'08" W, 2,329 m, 18-IV-2010, Manual, Suelo, Rojas Fernández Patricia #PR1002 (1ss, 1s, 4w, BSIE); Amozoc, Flor del Bosque, T:III P:6, 19°0'49.4" N 98°6'1.14" W, 2,327 m, 12-VII-2007, colecta directa, bosque de eucalipto, en la trampa, Valenzuela J. y Miguelena J. (1 ss, CCMVF, CASENT0649653); Flor del Bosque, T1 P3 LL, 19º0'19" N, 98º6'7" W, 2,257 m, 07-VII-2017, Pastizal, FLC (2s, UDLAP); Flor del Bosque, T3 P5, 19º01'50" N, 98º20'35" W, 2,333 m, IV- 2016, ANP (1s, UDLAP). Jolalpan, Rancho el Salado, 18º20'26.7288"

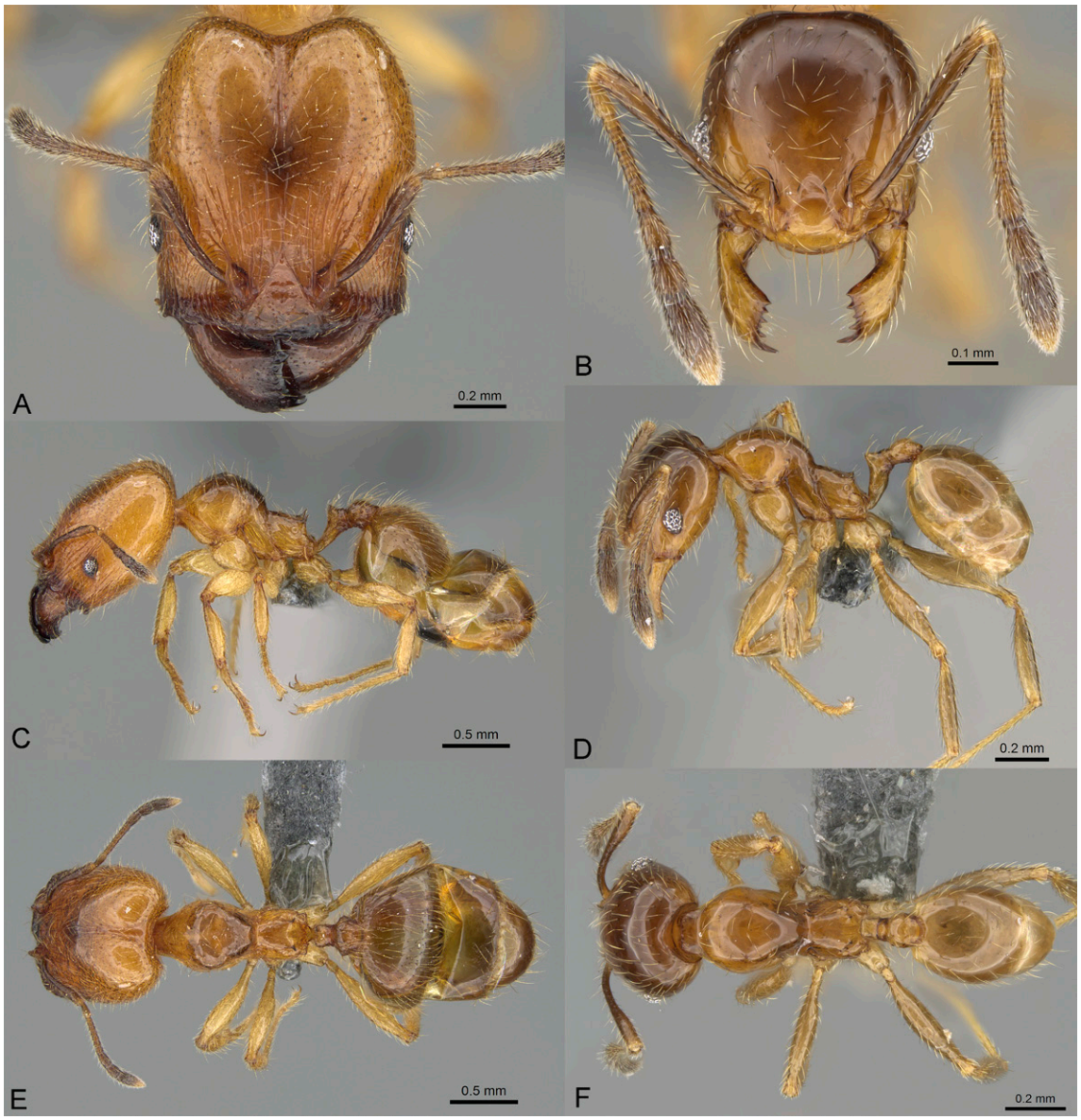

Figure 26. *Pheidole subarmata*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0768605) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0768602).

N, 98º57'12.8068" W, 959 m, 08-IV-2017, pitfall, selva baja caducifolia, en la trampa, Vázquez-Franco C. M. (1ss, 1w, CCMVF, CASENT0649653, CASENT0649654; 1ss, 1w, ICUAP); San Rafael Coxcatlan, 18º21' N, 97º07' W, 1,250 m, X-2000, pitfall, cardonal, en la trampa, Ríos-Casanova L. (6w, LRC).

Pheidole titanis Wheeler, 1903 (Fig. 29)
Pheidole titanis Wheeler, 1903: 95.

Diagnosis. Big species, similar to *P. dwyeri*, but distinguished by the 3-segmented antennal club, the shiny occipital lobes and less concave occipital profile and in the soldier the strongly crenate anterior border of the clypeus.

Distribution. Nearctic region. Southern USA and Mexico. Sonora, Jalisco, Veracruz (Dáttilo et al., 2020), and Puebla: San Rafael Coxcatlán and Tehuacán-Cuicatlán Valley (Ríos-Casanova, 2004).

Biology. Common species in desert zones, between 50 and 1,600 m. In Puebla collected in a pitfall trap.

Material examined. Mexico. Puebla. San Rafael Coxcatlán, 18º21' N, 97º07' W, 250 m, I-2000, pitfall, fouquerial, en la trampa, Ríos-Casanova L. (1w, LRC,

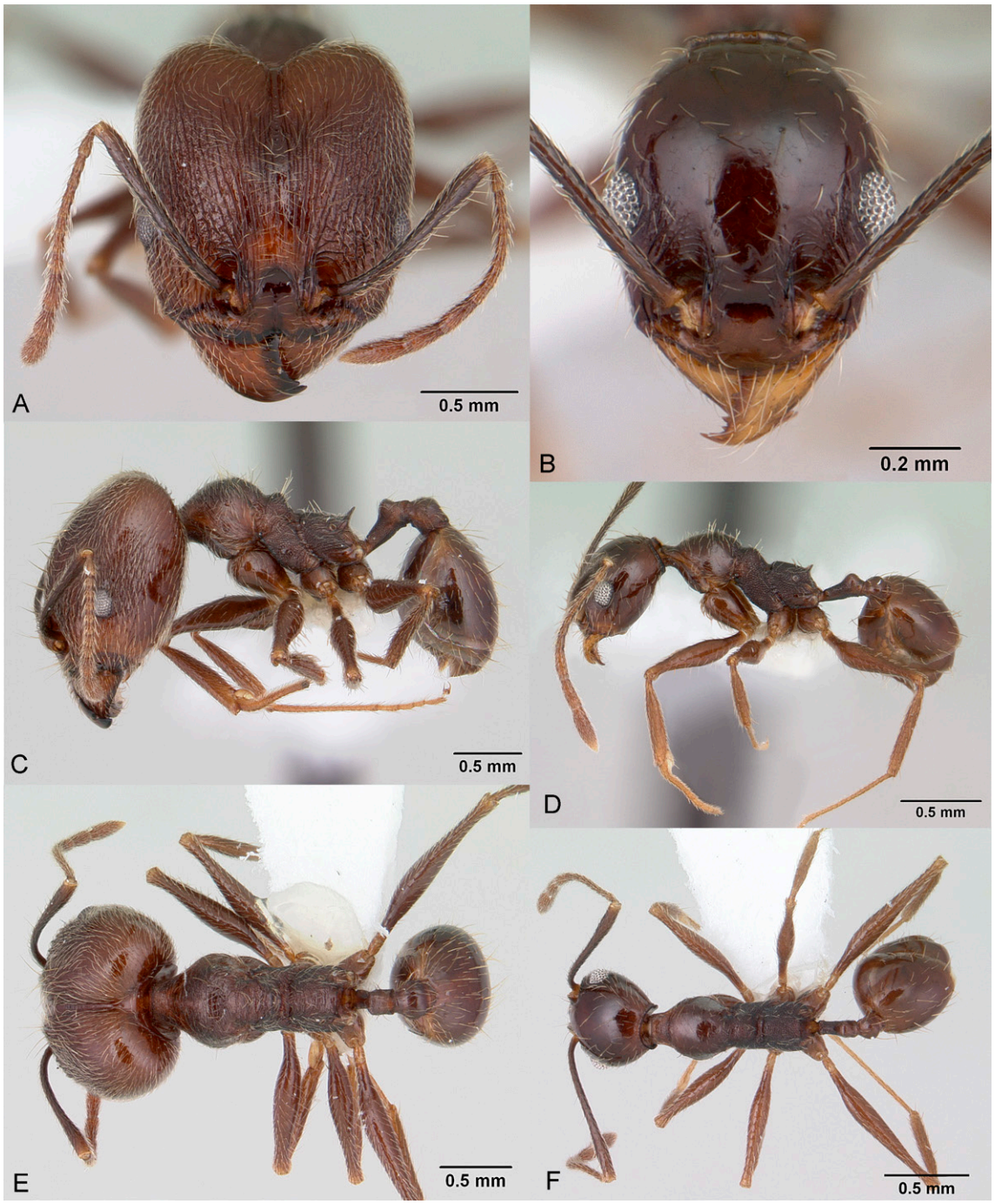

Figure 27. *Pheidole susannae*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0178039). Photographs by Michele Esposito, and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0178040). Photographs by April Nobile, courtesy of AntWeb.

CASENT0649712); San Rafael Coxcatlán, 18º21' N, 97º07' W, 1,250 m, I-2001, pitfall, chiotillal, en la trampa, Ríos-Casanova L. (2w, LRC); Zapotitlán de Salinas, 18º19' N, 97º27' W, 1,480 mm, 12-XI-2017, pitfall, mezquital abierto, Delgadillo Sánchez Daniela (1w, LRC). Zapotitlán de Salinas, Cerro Cutác, CL5, 18°20'6.6" N, 97°26'50"

Figure 28. *Pheidole tepicana*, full-face view (A), profile (D), and dorsal view (G) of super major worker (CASENT0649653) full-face view (B), profile (E), and dorsal view (H) of major worker (CASENT0649710) and full-face view (C), profile (F), and dorsal view (I) of minor worker (CASENT0649711). Photographs available on AntWeb.

W, 1711 m, VIII-2008, pitfall, selva baja caducifolia, en la trampa, Ríos-Casanova L. (1w, LRC).

Pheidole tolteca Forel 1901 (Fig. 30)
Pheidole tolteca Forel, 1901a: 133.

Diagnosis. Similar to *P. nubicola*. Both species have a foveolate body, but the *P. tolteca's* major worker has a particular bicolored pattern in the head and appendages light reddish brown, the rest of the body medium reddish brown, and pronotal dorsum with scattered rugae, while *P nubicola* has a rugoreticulum pattern in the pronotal dorsum. The minor can be separated by the difference in pilosity; *P. tolteca* has less dense erect pilosity and occiput narrow; the minor of *P. nubicola* has a more concave occiput, not narrow and denser and greater pilosity.

Distribution. Nearctic and Neotropical regions and Mexican Transition Zone. Endemic to Mexico. Michoacán, Jalisco, and Puebla: Acatlan de Osorio, Atoyatempan, and Zapotitlan de Salinas (Dáttilo et al., 2020).

Biology. It was collected in tropical deciduous forest and pine forest, at 1,500 to 2,400 m. Major workers were observed releasing a transparent sticky substance by the gaster when they were collected. There are reports of similar behavior in *P. bicostricta* (Kugler, 1979) and *P. vistana* (Pullen, 1961); in the former, this substance originates in the hypertrophial pygidial glands and is used in predation, combined with grasping the various appendages of the insect and pulling it backwards, stretching the enemy or prey, and pinning it to the ground; however, this behavior was not observed in *P. tolteca*.

Taxonomic comments. Some specimens have a size (HL: 1.144, HW: 0.92) larger than that of the original description (HL: 1.06, HW: 0.86), but without any other morphological variation; unfortunately, none of these series has major workers.

Material examined. Mexico. Morelos. Cuernavaca, 18º58'5" N, 99º14'13.1" W, ±3 m, 1,876 m, 10-VI-2018, Manual diurna, Zona urbana, Banqueta, Vázquez-Franco C. M. #48 (2s 2w, CCMVF, CASENT0649660-663; 2s, 2w, ICUAP, ICUAPFOR000036-39). Puebla. Acatlán de Osorio, 18º20'23.3" N, 98º04'45.6" W, 1,165 m, 12-I-2013, trampa de miel, Mejía F. (2w, IEXA); Atoyatempan, 18º47'26.76" N, 97º54'56.34" W, 1,854 m, 07-IV-2018, manual nocturna, matorral crasicaule, Vázquez-Franco C. M. # 28 (2s, 2w, CCMVF, CASENT0649656-659; 2s, 2w, ICUAP, ICUAPFOR000040-43); Zapotitlán de Salinas,

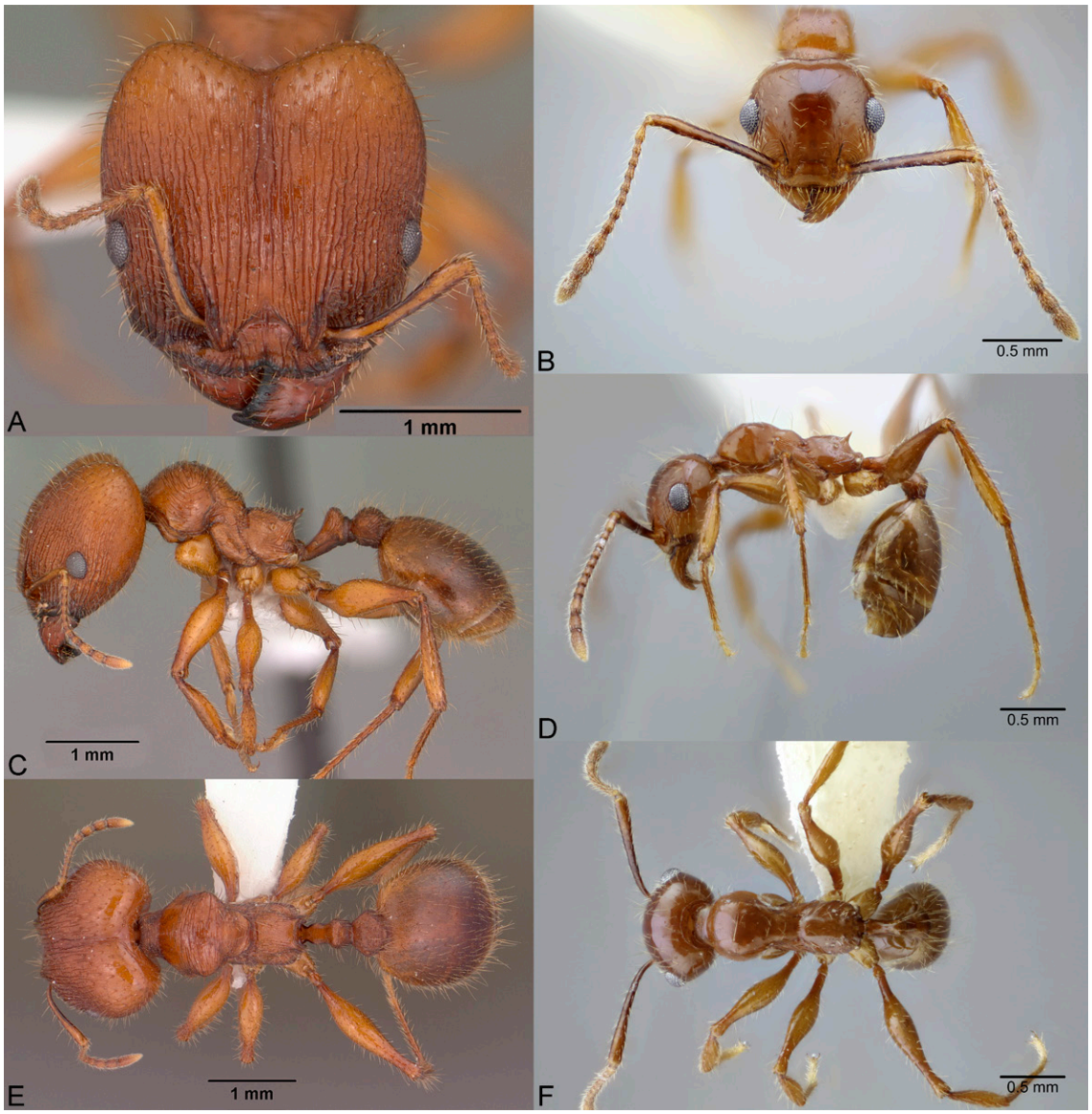

Figure 29. *Pheidole titanis*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0104449). Photographs by Jen Fogarty, courtesy of AntWeb, and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649712). Photographs available on AntWeb.

MC2TIP9, 18º19' N, 97º27' W, 1,455 m, 12-XI-2017, pitfall, mezquital cerrado, Guerrero López Luis Enrique (1w, LRC); Zapotitlán de Salinas, Cerro Cutác, TML5, 18°19'32.8" N, 97°27'16.9" W, 1,376 m, VIII-2008, pitfall, mezquital cerrado, en la trampa, Ríos-Casanova L. (1w, LRC).

Pheidole tysoni Forel, 1901 (Fig. 31)
Pheidole tysoni Forel, 1901b: 348.

Diagnosis. Similar to *P. mixteca,* it is distinguished by the nearly complete absence of sculpturing on the body, except for longitudinal carinulae on the anterior half of the head capsule of the major and minor, short and faint carinulae on the humerus of the major, and small patches of foveolae on the waist (major) or propodeal dorsum (minor) (Wilson, 2003). *Pheidole mixteca* has foveolate sculpture in some areas of the body in both castes.

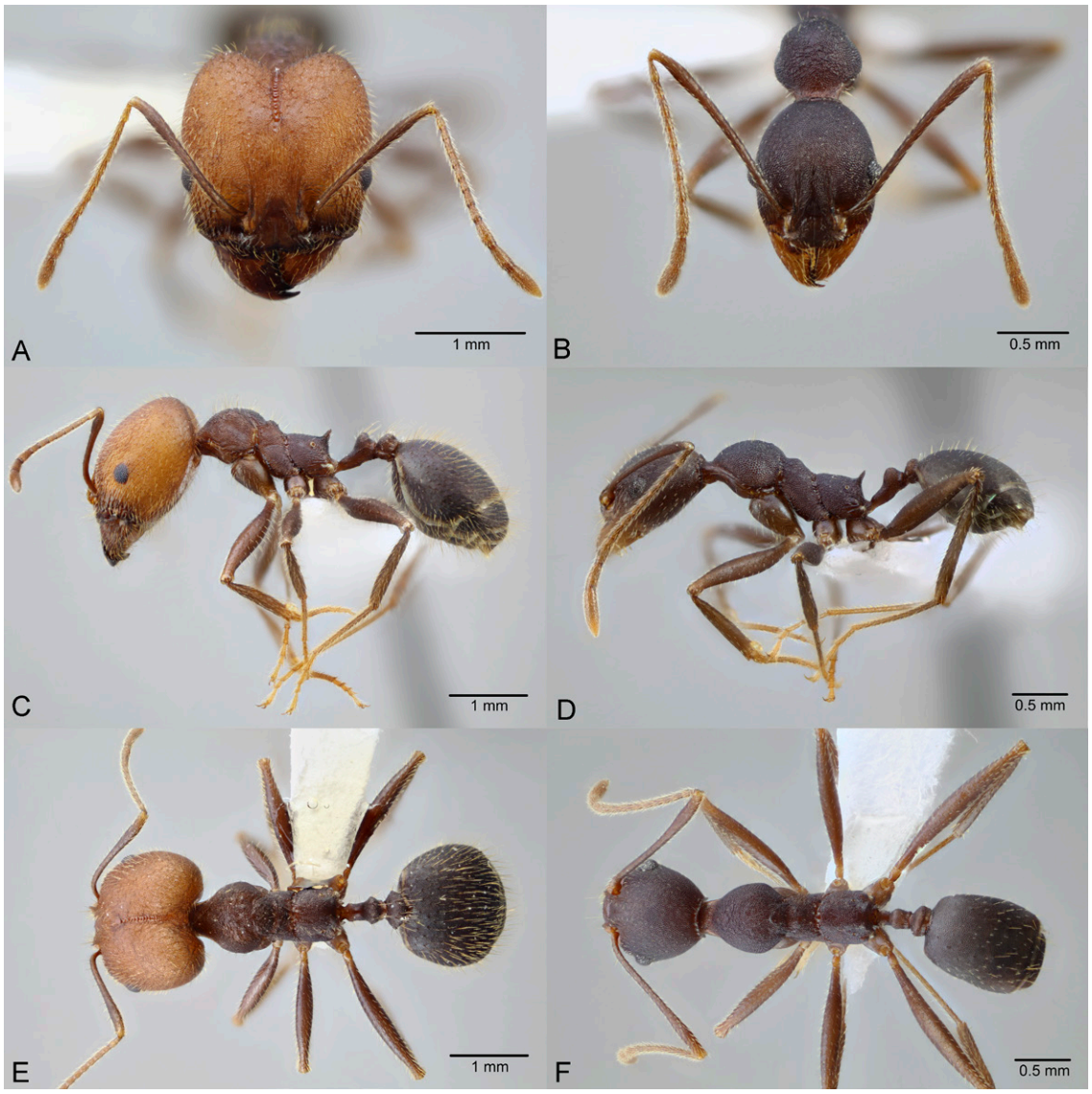

Figure 30. *Pheidole tolteca*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649660) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649661). Photographs available on AntWeb.

Distribution. Nearctic region and Mexican Transition Zone. Southeastern USA, Canada, and Mexico. Chihuahua and Puebla: Tepeyahualco (AntWeb, 2020; Wilson, 2003).

Biology. Known data of the species were reported by Wilson (2003).

Pheidole xyston Wilson, 2003 (Fig. 32)
Pheidole xyston Wilson, 2003: 535.

Diagnosis. The major worker can be distinguished by the head completely foveolate with longitudinal carinae crossing all the face, with occipital lobes with rugoreticulate lobes that overlay the previously described pattern, pronotal humerus extremely angulate, and posteriorly curving pronotal spines. The minor worker has a smooth and shiny pronotum with toothed humerus.

Distribution. Neotropical region and Mexican Transition Zone. Mexico to Guatemala. Oaxaca, Veracruz, Chiapas, and Puebla: Cuetzalan and Hueytamalco (AntWeb, 2020; Dáttilo et al., 2020).

Biology. Unknown.

Pheidole yucatana Wilson, 2003 (Fig. 33)
Pheidole yucatana Wilson, 2003: 608.

Figure 31. *Pheidole tysoni*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0104426) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0104427). Photographs by April Nobile, courtesy of AntWeb.

Diagnosis. Similar to *P. ceres and P. xerophila* (not reported for the state). In frontal view the major worker has an occiput sprinkled with sparse but coarse foveae and fine carinulae extend from behind eye to occipital corners, and in lateral view the promesonotal juncture angulate. The minor worker can be confused with *P. tepicana,* but *P. yucatana* has a more concave pronotum profile.

Geographic range. Neotropical region. Endemic to Mexico. Hidalgo, Yucatán, and Puebla: Amozoc (Dáttilo et al., 2020; Wilson, 2003).

Biology. Unknown.

Taxonomic comments. The type series of this species was collected in the Yucatán Peninsula, at an elevation close to sea level. It is pertinent to mention that the report

Figure 32. *Pheidole xyston*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0640897) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0640900). Photographs by J. Longino, courtesy of AntWeb.

in Puebla is at an elevation of 2,272 m, in a landscape with pine-oak forest. The collection of Puebla is similar to Wilson's description, with the only difference of a stronger texture in the face.

Material examined. Mexico. Puebla. Amozoc, Flor del Bosque, T:2 P:6 M35, 19°0'27.76" N, 98°5'53.34" W, 2,272 m, 12-VII-2007, pitfall, matorral, en la trampa, Valenzuela J. Miguelena J. (1s, 2w, CCMVF, CASENT0649700, CASENT0649701, CASENT0649702; 1s, 2w, ICUAP).

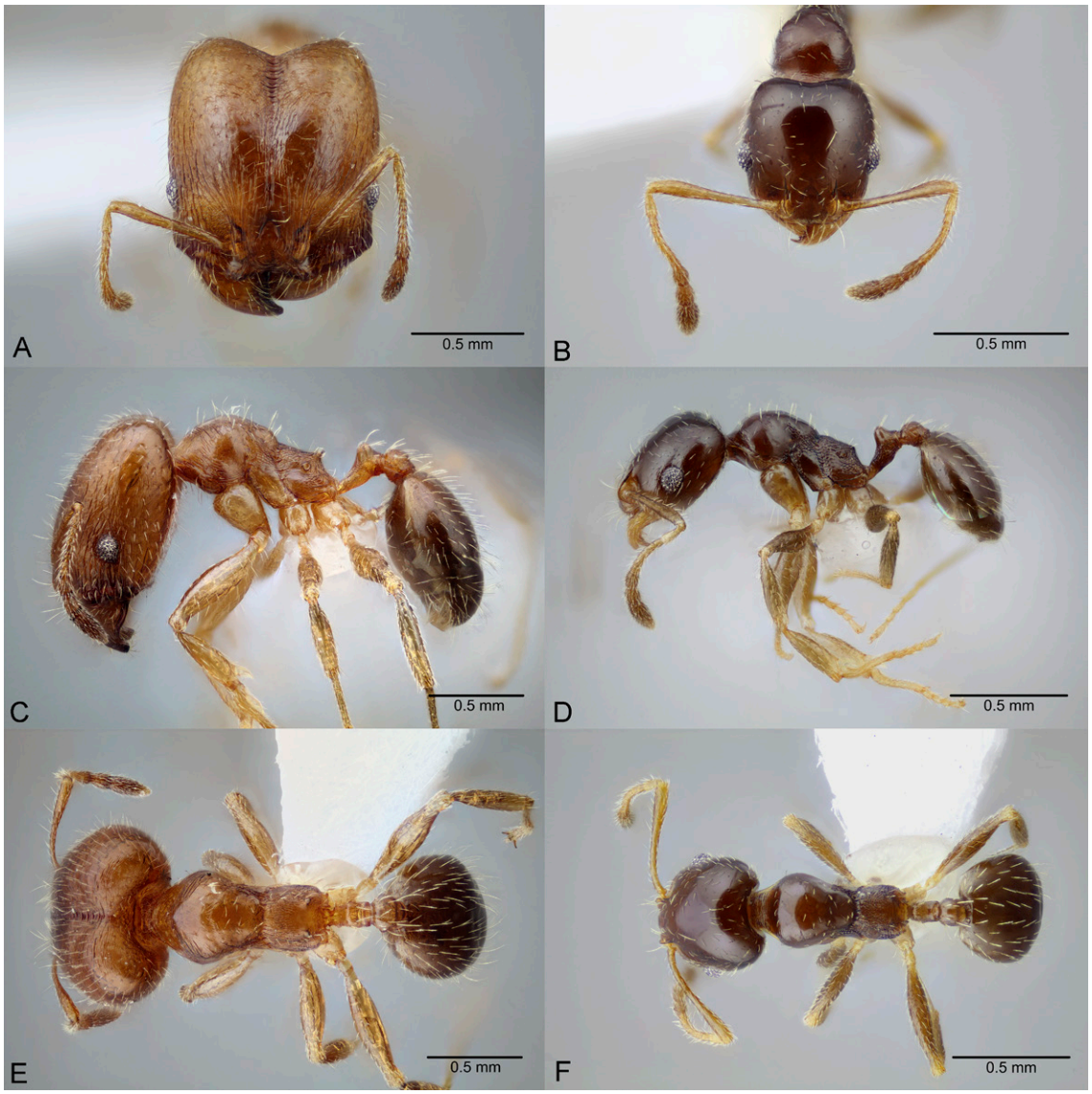

Figure 33. *Pheidole yucatana*, full-face view (A), profile (C), and dorsal view (E) of major worker (CASENT0649700) and full-face view (B), profile (D), and dorsal view (F) of minor worker (CASENT0649701). Photographs available on AntWeb.

Remarks

The knowledge of the genus *Pheidole* in the state of Puebla, and of Formicidae in general, is scarce. It is necessary to sample across the state; the principal information for this study came from a few projects in particular areas or from sporadic collecting events (for example the CCMVF collection) and information is not represented for all the species (Miguelena, 2008; Ríos-Casanova et al., 2004). A more systematic collection effort would provide great opportunity for new myrmecologists to work in a territory with a complex evolutionary history in the Mexican Transition Zone

Some species could not be identified, because of the poor state of conservation of the specimens, or because both castes were not represented or were only represented by a few specimens. This problem has been previously reported (Longino, 2009, 2019; Wilson, 2003). In a few cases, it seems wiser to wait to have more specimens for a better identification.

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