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Research Article

The Ant Genus *Dorymyrmex* Mayr (Hymenoptera: Formicidae: Dolichoderinae) in Colombia

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The aim of this paper is to actualize the taxonomy of *Dorymyrmex*, by addressing problems at both the genus and the species levels. We also explore the taxonomy and distribution of *Dorymyrmex* in Colombia. We list, diagnose, and key nine species in the country, including three new species: *Dorymyrmex amazonicus* n. sp. Cuezzo & Guerrero, *Dorymyrmex xerophylus* n. sp. Cuezzo & Guerrero, and *Dorymyrmex tuberosus* n. sp. Cuezzo & Guerrero. We provide a detailed description of these new species based on the worker caste and, where possible, other castes. All localities where *Dorymyrmex* was collected or cited in the literature were mapped to provide a graphical view of its range.

1. Introduction

Dorymyrmex Mayr [1] is one of the most diverse and complex genera of the ant subfamily Dolichoderinae from a taxonomical and biogeographical point of view. In a recent study, Ward et al. [2] provided a detailed phylogeny of Dolichoderinae based on molecular data and proposed an internal arrangement of this subfamily in four tribes, based in one unrooted topology: (((Dolichoderini, Leptomyrmecini), Bothriomyrmecini, Tapinomini)). *Dorymyrmex* is considered by these authors as a monophyletic member of Leptomyrmecini and sister group of *Forelius* Emery, 1888 [3].

This genus has a strictly American distribution, inhabiting in the Nearctic and Neotropical regions and containing more than 90 species, several undescribed. Reasons for considering as an especially difficult group of ants include variability within species in color, pilosity, sculpture, and size. The majority of species are actually poorly defined, often distinguished only on the basis of color. No broader modern taxonomic key exists at species level. The most recent contribution to solve the taxonomic jungle of *Dorymyrmex* was Snelling [4], who built on work by Trager [5] to clarify the taxonomy of the Nearctic species.

Despite being considered by many ant collectors as "road side weeds", several species of *Dorymyrmex* shown a high degree of endemicity, specialized habitat preferences, and varied population structure. Some species may serve as potential agents of biological control of annual crop pests [5, page 12]. Species of *Dorymyrmex* nest preferentially in dry or disturbed habitats, generally in soil without vegetation cover. Several species are known to attend aphids and other hemipterous insects. Such behavior is common in other Dolichoderinae genera and related subfamilies.

The main purposes of this paper are to provide a redefinition of *Dorymyrmex* using morphological characters from worker, queen, and male and to make a revision of the genus in Colombia. We describe three new species and provide a key to workers of all nine species found in Colombia. This is the first contribution of a series of systematic studies about this still poorly known ant genus.

2. Materials and Methods

2.1. Studied Material Belongs to the Following Institutions

CASC: California Academy of Sciences, San Francisco, California, USA.

CEUM: Insect Collection, Universidad del Magdalena, Santa Marta, Magdalena, Colombia.

IAvH: Insect Collection Instituto Alexander von Humboldt, Villa de Leyva, Boyacá, Colombia.

ICN: Insect Collection, Instituto de Ciencias Naturales, Universidad Nacional, Bogotá D.C., Colombia.

IFML: Instituto Fundación Miguel Lillo, Tucumán, Argentina.

LACM: Los Angeles County Museum of Natural History, Los Angeles, California, USA.

MCZC: Museum of Comparative Zoology, Cambridge, Massachusetts, USA.

MHNG: Muséum d'Histoire Naturelle, Geneva, Switzerland.

MZSP: Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil.

NHMB: Natural History Museum of Basel, Switzerland.

USNM: United States National Museum of Natural History/ Smithsonian Institution, Washington D.C., USA.

2.2. Primary Type Material Examined

2.2.1. Dorymyrmex amazonicus **Holotype**. Amazonas, Leticia, 4°13′08″S 69°56′29″W, 06 Jun 1976, COLOMBIA (ICN). Paratypes: 2w, Amazonas, Leticia, 4°13′08″S 69°56′29″W, 06 Jun 1976, COLOMBIA: 1w (CASC), 1w (IFML).

2.2.2. Dorymyrmex bicolor **Syntypes**. 1w and 1q, Phoenix, USA (MCZC); 2w, Tucson, Arizona, USA (MHNG).

2.2.3. Dorymyrmex biconis **Syntypes**. 2w, Sierra Nevada de Santa Marta, San Antonio, Guajira Prov., COLOMBIA (MHNG).

2.2.4. Dorymyrmex brunneus **Lectotypes**. 2w, São Paulo, BRAZIL (MHNG) designed by Kempf 1975: 375 [6].

2.2.5. Dorymyrmex goeldii **Syntypes**. 2w, Pará, BRAZIL (MHNG).

2.2.6. Dorymyrmex insanus **Neotype**. 1w, Interstate 20, 12 mi E Big Spring, Howard Co., Texas, USA, 16 April 1981, coll. by W. F. Buren, (USNM) designed by Snelling 1995: 4 [4].

2.2.7. Dorymyrmex tuberosus **Holotype**. 1w, Santander: Bucaramanga, UIS, 906 m., 7°21′0.12″N 73°20′1.22″W, COLOMBIA, Jun 2003, N. Ruiz & F. Fernández coll., (ICN). Paratypes: 7w, Bolivar, San Juan Nepomuceno, 24.Oct.1990 F. Bekker leg. Ex *Manihot esculenta*, COLOMBIA: 2w, (USNM); same data and loc. than holotype, 4w, (ICN), 1w (CASC).

2.2.8. Dorymyrmex xerophylus **Holotype**. 1w, Magdalena, Santa Marta, Vereda Mosquito, 11°10′23.6″N 74°10′45″W 96 m, manual collection; 03 Jan 2008, R. Guerrero, coll., COLOMBIA (ICN). Paratypes: 1w, La Guajira, Zona El Cerrejón, 11°1′59.88″N 72°39′0″W, 240 m, COLOMBIA, pitfall trap, 19 Dec 2006, R. Guerrero, coll., (ICN); 1w, Magdalena, Santa Marta, Vereda Mosquito, 11°10′23.6″N 74°10′45″W 96 m, COLOMBIA, manual collection; 03 Jan 2008, R. Guerrero, coll., (CEUM).

2.3. Measurements and Indexes. Measurements were taken with micrometer ocular to 40x–80x attached to a stereoscope. All measurements are expressed in mm. The measurements and indexes used were the following:

HL: head length, in full-face view, the maximum length of the head capsule,

HW: head width, in full-face view, the maximum width of the head capsule above the eyes,

EL: eye length, the maximum length of the eye in full-face view,

EW: eye width, the maximum width of the eye in full-face view,

SL: scape length, the length of the scape from the apex to the basal flange, not including the basal condyle,

WL: Weber's length, measured in perfect lateral view of the mesosoma, diagonally from the posteroventral corner of the mesosoma to the farthest point on anterior face of the pronotum, excluding the neck.

Indexes

CI: Cephalic Index = HW × 100/HL.

SI: Scape Index = SL × 100/HL.

REL: Relative Length of the Eye = EL × 100/HL.

OI: Ocular Index = EW × 100/EL.

TLI: Thorax Length Index = WL × 100/HL.

Holotypes will be deposited in IAvH, ICN and paratypes in CASC, CEUM, IFML, and MZSP. All the species recorded were re-described based in all castes (worker, gyne, and male) when material was available.

Male terminology follows Ward [7].

3. Results

3.1. Synopsis. Genus *Dorymyrmex* Mayr, 1866 [1].

Type species: *Dorymyrmex flavescens*, by monotypy.

Region: Neotropical, Nearctic.

Dorymyrmex Mayr (1866a: 494 [1]).

Psammomyrma as subgenus of *Dorymyrmex*: Forel, 1912: 43 [8]. Type species: *Dorymyrmex planidens*, by subsequent designation of Wheeler, 1913: 82 [9]. Kempf, 1972: 100 [10].

Psammomyrma as junior synonym of *Dorymyrmex*: Forel, 1913: 350 [11]; Santschi, 1922: 365 [12]; Wheeler, W. M. 1922: 689 [13]; Snelling and Hunt, 1976: 93 [14]; Shattuck, 1992: 77 [15]; Bolton, 1994: 27 [16]; Bolton, 2003: 86 [17].

Conomyrma as subgenus of *Dorymyrmex*: Forel, 1913: 350 [11]. Type species: *Prenolepis pyramica*, by subsequent designation of Santschi, 1922: 365 [12]; Forel, 1917: 248 [18]; Wheeler, W. M., 1922: 689 [13]; Gallardo, 1930: 147 [19]; Smith, M. R., 1951: 837 [20]; Smith, M. R., 1958: 140 [21].

Conomyrma as a genus: Kusnezov, 1952: 429 [22]; Kusnezov, 1959: 51 [23]; Kusnezov, 1964: 66 [24]; Kempf, 1972: 78 [10]; Snelling, 1973: 1 [25]; Smith, D. R., 1979: 1419 [26]; Holldöbler and Wilson, 1990: 17 [27]; Jaffé, 2004: 9 [28].

Conomyrma as junior synonym of *Dorymyrmex*: Brown Jr., 1973: 179 (provisional) [29]; Shattuck, 1992: 77, [15]; Bolton, 2003: 86, [17].

Araucomyrmex as genus: Gallardo, 1919: 249 [30]. Type species: *Dorymyrmex tener*, by original designation; Wheeler, 1922 [13]: 689; Kusnezov, 1956: 28 [31]; Kusnezov, 1959: 51 [23]; Kusnezov, 1964: 66 [24]; Kempf, 1972: 25 [10]; Snelling, 1975: 9 [32]; Snelling and Hunt, 1976: 93 [14]; Dlussky and Fedoseeva, 1988: 77 [33].

Araucomyrmex as junior synonym of *Conomyrma*: Snelling, 1981: 402 [34].

Araucomyrmex as junior synonym of *Dorymyrmex*: Brown Jr., 1973: 178 (provisional) [29]; Shattuck,1992: 77 [15]; Bolton, 2003: 87 [17].

Ammomyrma as a subgenus of *Dorymyrmex*: Santschi, 1922: 365 [12]. Type species: *Dorymyrmex exanguis*, by original designation. Gallardo, 1930: 147 [19]; Kempf, 1972: 100 [10].

Ammomyrma as junior synonym of *Araucomyrmex*: Snelling and Hunt, 1976: 93 [14].

Ammomyrma as junior synonym of *Dorymyrmex*: Shattuck, 1992: 77 [15]; Bolton, 2003: 87 [17].

Biconomyrma as a subgenus of *Conomyrma*: Kusnezov, 1952: 429 [22]. Type species: *Dorymyrmex pyramicus* var. *brunneus* (now *Dorymyrmex brunneus*), by subsequent designation of Kusnezov, 1959: 51 [23].

Biconomyrma as genus: Kusnezov, 1959: 51 [23]; Kusnezov, 1964: 67 [24].

Biconomyrma as junior synonym of *Conomyrma*: Smith, M. R., 1958: 140 [21]; Kempf, 1972: 78 [10].

Biconomyrma as junior synonym of *Dorymyrmex*: Shattuck, 1992: 78 [15]; Bolton, 2003: 87 [17].

Spinomyrma as subgenus of *Dorymyrmex*: Kusnezov, 1952: 429 [22]. Type species: *Dorymyrmex alboniger*, by subsequent designation of Kusnezov, 1959: 51 [23]; Kempf, 1972: 100 [10].

Spinomyrma as genus: Kusnezov, 1956: 30 [31] (in key); Kusnezov, 1959: 51 [23]; Kusnezov, 1964: 66 [24].

Spinomyrma as junior synonym of *Dorymyrmex*: Kempf, 1972: 100 [10]; Snelling and Hunt, 1976: 93 [14]; Shattuck, 1992: 78 [15]; Bolton, 1994: 26 [16]; Bolton, 2003: 87 [17].

The characters used here to identify *Dorymyrmex* are based on the diagnosis proposed by Shattuck [15, page 78], with some differences. Characters mentioned below, with**, are redefined and based in the Shattuck proposal; characters with* are new.

We have not used the length of curved hairs placed in the dorsal clypeal margin proposed by Shattuck [15], because it is quite variable along the genus. Some species have these setae shorter, not reaching the distal edge of closed mandibles.

3.2. Diagnostic Characters Common to All Castes. Apical teeth of mandible elongate, at least twice longer than preapical**. This character was used by Shattuck [15] only for workers but is also a constant in all known queens and males. Psammophore is present as a discrete group of elongated hairs, uniform in length, arranged in a definite pattern, on the ventral face of head**. Third segment of the maxillar palp elongate, longer than segments 4 + 5 + 6 joined together.

3.3. Worker Diagnosis. Monomorphic to slightly polymorphic ants. Mandibles with 5-6 teeth and 2–4 denticles on masticatory margin and several denticles on basal margin*. Dorsal surface of mandible longitudinally striated*. Pair of erect setae on the dorsal face of pronotum present or absent*. A well-defined spine, cone, or tubercle always present between dorsal and declivitous faces of propodeum**.

3.4. Queen Diagnosis. Forewing with close radial cell*. Forewing with 1-2 cubital cell and 0-1 discoidal cells*. Hindwing with only 0–3 closed cells placed in the basal part of the wing*.

3.5. Male Diagnosis. Antennal scape relatively short, at most only slightly longer than the length of funicular segments 1 + 2 + 3*. Second funicular segment with a lateral bend**. Mandible with 2–4 teeth (sometimes with 2 or more denticles)**. Forewing with close radial cell*.

4. Dorymyrmex in Colombia

Only four species of *Dorymyrmex* have been mentioned in the most recent list of Neotropical ants [35] in Colombia. We record 9 species, two new records and three new for science: *Dorymyrmex amazonicus* n. sp., *Dorymyrmex tuberosus* n. sp., and *Dorymyrmex xerophylus* n. sp.

Table 1: Major characters differing among worker, queen, and male of *Dorymyrmex* and *Forelius*.

Character	*Dorymyrmex*	*Forelius*
Psammophore	Present	Absent
Third maxillary palp segment	Elongated	Subequal in length to the remaining segments
Apical tooth of mandible	Greatly elongated	Slightly larger than the subapical
Queen and male forewing	With a close radial cell	With an open radial cell

Major characters used to separate *Dorymyrmex* from *Forelius*, the closest Dolichoderinae ant genus found in South America are given in Table 1.

4.1. List of Dorymyrmex in Colombia

D. amazonicus n. sp. Cuezzo & Guerrero

D. bicolor Wheeler, 1906 [36]

D. biconis Forel, 1912 [8]

D. brunneus Forel, 1908 [37]

D. goeldii Forel, 1904 [38]

D. insanus (Buckley, 1866) [39]

D. pyramicus Roger, 1863 [40]

D. tuberosus n. sp. Cuezzo & Guerrero

D. xerophylus n. sp. Cuezzo & Guerrero.

4.2. Key to Dorymyrmex Workers in Colombia. This key is based on worker caste of all valid species of *Dorymyrmex* found in Colombia.

(1) Mesosomal profile with two well-developed tubercles, one on the posterodorsal margin of mesonotum and the other on the dorsal face of propodeum (Figures 3(b) and 11(b)) ... (2).

(1′) Mesosomal profile lacking a mesonotal tubercle (Figures 1(b), 8(b), and 9(d)); in some specimens, we can see an angle in the posterior end of mesonotum (Figures 2(b), 7(b), 7(d), 9(b), and 12(b)) but never a well-differentiated knob (= tubercle). Mesosomal profile bearing only a well-developed tubercle placed between the dorsal and declivitous faces of propodeum. ... (3).

(2) Body concolorous light reddish brown to yellowish. Pubescence sparse. Dorsal face of propodeum, anterior to the tubercle, convex. Propodeal tubercle stout and higher than the promesonotal profile in lateral view (Figure 3(b)) ... *D. biconis*.

(2′) Body concolorous dark brown, pubescence dense. Dorsal face of propodeum, anterior to the tubercle, straight. Propodeal tubercle thin and lower than or at the same level than the promesonotal profile in lateral view (Figure 11(b)) ... *D. tuberosus* n. sp.

(3) Body bicolored, head and mesosoma always yellow-reddish, gaster dark brown to black; some specimens could be lighter but always with the gaster darker than the rest of the body ... (4).

(3′) Body concolorous orange or medium to dark brown ... (5).

(4) Promesonotal profile continuous (Figure 9(d)). Propodeal tubercle pointed backward. Petiolar scale short, sharp apically, forward directed. Subpetiolar process feebly developed, convex, and covering all the ventral surface of petiole ... *D. pyramicus*.

(4′) Promesonotal profile interrupted in posterior end of mesonotum, forming an angle and determining a clear mesosomal dorsal and declivitous face (Figure 2(b)). Petiolar scale tall, rounded apically, upward directed. Subpetiolar process not well developed, only conspicuous in the ventral end of petiole ... *D. bicolor*.

(5) Posterior end of mesosoma, in lateral view, forming an angle but not a tubercle (Figures 7(b), 7(d), 9(b), 12(b), and 12(c)) ... (6).

(5′) Posterior end of mesosoma straight, without a differentiated dorsal and declivitous face (Figures 1(b) and 8(b)) ... (8).

(6) Small ants, TLI: <117. Scape short, not surpassing the posterior margin of head more than twice its maximum diameter (Figure 12(a)). Posterior margin of head strongly convex ... *D. xerophylus* n. sp.

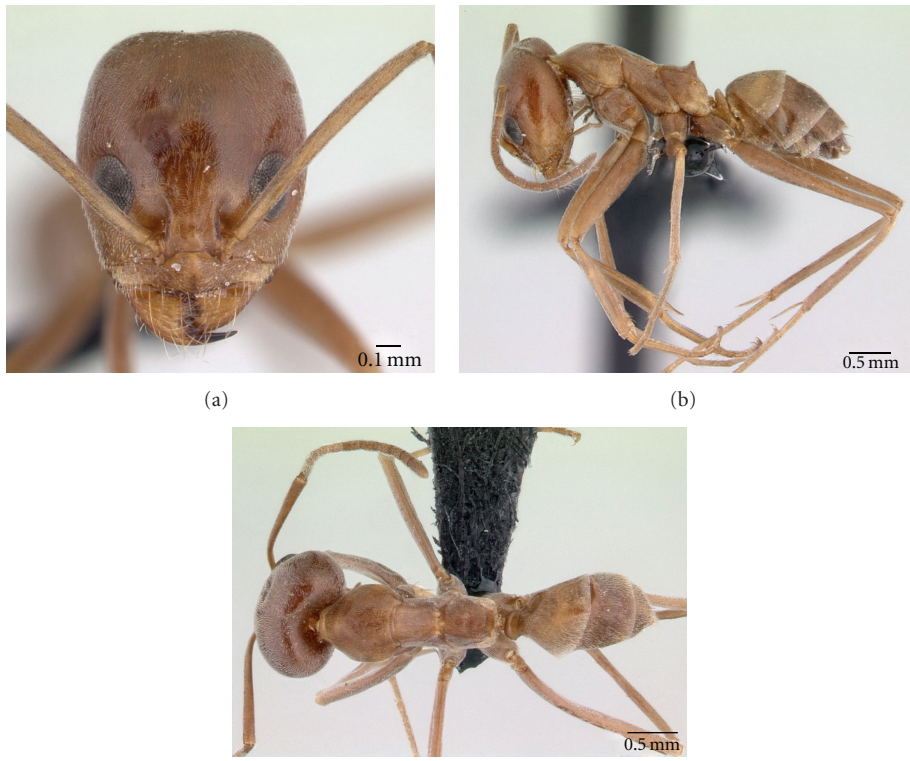
(6′) TLI >117. Scape longer, surpassing the posterior margin of the head more than three times its maximum diameter (Figures 7(a), 7(c), and 9(a)). Posterior margin of head straight to concave in the middle but never convex ... (7).

(7) Posterior margin of head always medially concave (Figure 9(a)). Promesonotal profile uniformly convex. Dorsal face of propodeum, anterior to the tubercle, straight (Figure 9(b)) ... *D. insanus*.

(7′) Posterior margin of head straight to slightly concave in the middle. Promesonotal profile straight to feebly convex. Dorsal face of propodeum, anterior to the tubercle, sinuous (Figures 7(b) and 7(d)) ... *D. brunneus*.

(8) Lateral margin of head, in full-face view, strongly convex, with compound eyes placed far inside the head capsule (Figure 1(a)). Posterior margin of head concave in the middle. Propodeal tubercle well developed and upward directed (Figure 1(b)). ... *D. amazonicus* n. sp.

(8′) Lateral margin of head slightly convex (Figure 8(a)). Posterior margin of head strongly convex (Figure 8(a)). Propodeal tubercle poorly developed (Figure 8(b)) ... *D. goeldii*.



(a) (b)

(c)

Figure 1: *Dorymyrmex amazonicus* n. sp. worker, holotype. (a) Head in full-face view; (b) body in lateral view; (c) body in dorsal view (CASENT0192703). Pictures and labels of localities of each photographed specimen are available at http://www.antweb.org/.

5. Species Account

5.1. Dorymyrmex amazonicus Cuezzo & Guerrero n. sp. *(Figures 1(a)–1(c) and 13)*

5.1.1. Diagnosis

Worker. Large ant, TLI: 133–135. Head with lateral margins broadly convex and posterior margin of head concave medially. Short scape not surpassing the posterior margin of the head more than three times its apical width.

5.1.2. Description

Worker

Measurements. Holotype (Paratypes = 2). HL: 1.00 (1.02–1.04). HW: 0.92 (0.94–0.96). EL: 0.30 (0.28–0.30). EW: 0.22 (0.22). SL: 1.06 (1.06–1.08). WL: 1.32 (1.36–1.40). CI: 92 (92). SI: 106 (104). REL: 30 (27–29). OI: 73 (73–79). TLI: 132 (133–135).

Head and scapes reddish-brown; lateral clypeal region and dorsal face of mandibles testaceous yellow; masticatory mandibular margin dark brown; mesosoma, legs, petiole, and gaster yellowish-brown. Whitish, short, and appressed pubescence covering all the body tagma. *Head* (Figure 1(a)): head slightly longer than wide, with lateral margins strongly convex and posterolateral corners rounded. Posterior margin of the head concave in the middle. Mandibles strongly striate, with apical tooth four times longer than others. Masticatory margin with four denticles. Compound eye well developed and placed far inside the head capsule. Psammophore with short hairs disposed in a semicircle; the hairs on the top line are close to the foramen magnum and not reaching the oral cavity. Scape short (SI = 104–106) not surpassing the posterior margin of the head more than three times its apical width. *Mesosoma* (Figure 1(b)): dorsal face of pronotum with no erected setae, pronotum and mesonotum in profile forming a continuous line, not interrupted (Figure 1(b)), metanotal suture not impressed. Dorsum of propodeum weakly sinuate. Propodeal cone acute, upward directed with wide base. Apical point of the propodeal cone reaches the same level of the highest point of pro-mesonotum in lateral view. Declivitous face of propodeum convex. *Metasoma*: petiolar scale wide, thin and rounded in the apex.

Queen and Male. Unknown.

Examined Material. Type series.

Geographic Distribution. Colombia, Amazon rainforest. Only known from its type locality (Figure 13).

Etymology. The name *amazonicus* refers to the apparently unusual distribution of this species, the Amazon rainforest in Colombia. It is a noun in apposition and invariant.

(a) (b)

(c)

Figure 2: *Dorymyrmex bicolor* worker. (a) Head in full-face view; (b) body in lateral view; (c) body in dorsal view (CASENT0179517). Pictures and labels of localities of each photographed specimen are available at http://www.antweb.org/.

Natural History. The type series was collected in the vicinity of an Amazonian forest relict, outside Leticia (Colombia). All the specimens were collected in open deforested habitat, probably this is an indication of the preference of this species to nest in highly anthropic or disturbed environments.

5.1.3. Comments. At first view, this species could be confused with *D. brunneus,* but a greater TLI, shorter scapes, eyes placed deep inside the head capsule, and a continuous mesosomal profile in *D. amazonicus* are the best characters to separate it from *D. brunneus*. Other *Dorymyrmex* species found in Colombia share with *D. amazonicus* the shape of mesonotal profile (i.e., *D. pyramicus*), but all the characters, given in the key and in the diagnosis above, are useful to separate *D. amazonicus* from other species of *Dorymyrmex* found in Colombia.

5.2. Dorymyrmex bicolor Wheeler, 1906 [36] *(Figures 2(a)–2(c), 6(a), and 13)*

Dorymyrmex pyramicus var. *bicolor* Wheeler, 1906: 342 [36]. Description of worker.

Dorymyrmex pyramicus var. *bicolor* Wheeler: Gallardo, 1916: 63 [41]. Description of queen.

Conomyrma (*Biconomyrma*) *bicolor* (Wheeler): Kusnezov, 1952: 430 [22].

Conomyrma bicolor Wheeler: Snelling, 1973: 4 [25]; Johnson, 1989: 192 [42].

Dorymyrmex bicolor Wheeler: Cole Jr., 1957: 130 [43]; Crozier, 1970: 114 (karyotype) [44]; Shattuck, 1992: 85 [15]; Shattuck, 1994: 75 [45]; Snelling, 1995: (key) [4]; Bolton et al. 2006 (catalog) [46].

5.2.1. Diagnosis

Worker. CI equal or over 90. Worker bicolored: head, mesosoma, and petiole, dark reddish; gaster black (Figures 2(b) and 2(c)). Same pattern of color is found in queen. Posterior margin of the head slightly concave in frontal view. Dorsal face of pronotum with no erect setae. Mesonotal profile continuous with pronotum, with a distinct dorsal and declivitous face before mesopropodeal suture.

Queen. Head slightly wider than long with the posterior margin of head strongly concave (Figure 6(a)). Maximum diameter the head behind of compound eyes.

Male. Unknown.

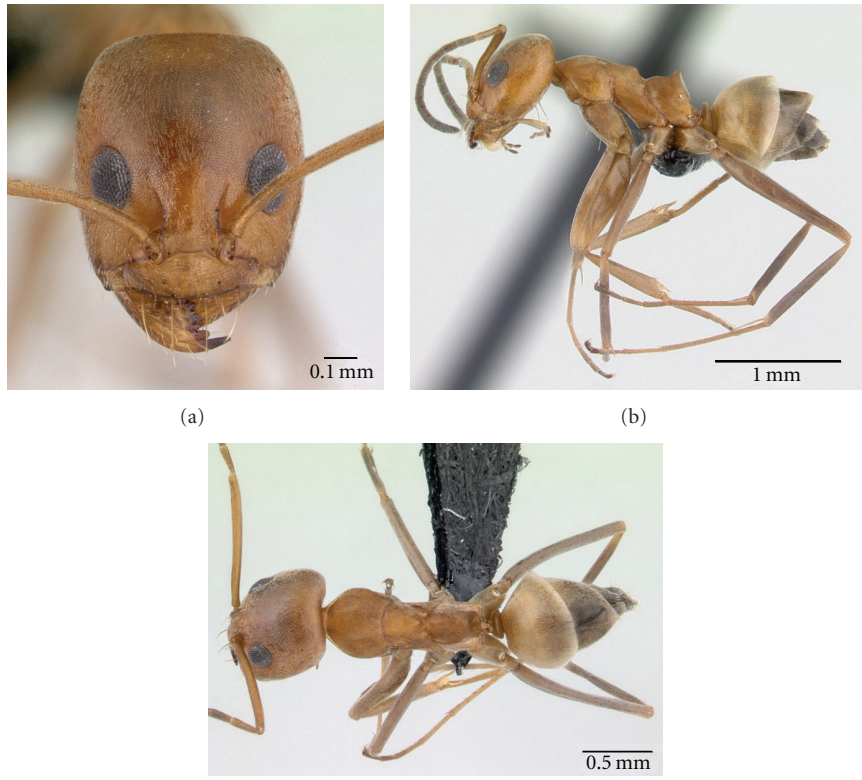


Figure 3: *Dorymyrmex biconis* worker. (a) Head in full-face view; (b) body in lateral view; (c) body in dorsal view (CASENT0179483). Pictures and labels of localities of each photographed specimen are available at http://www.antweb.org/.

5.2.2. Descriptions

Worker

Measurements. ($n = 25$): HL: 0.78–1.1; HW: 0.7–1; EL: 0.18–0.28; EW: 0.15–0.2; SL: 0.78–1.05; WL: 1.25–1.53; CI: 90-91; SI: 105–111; REL: 23–25; OI: 73–86; TLI: 139–161.

Worker bicolored: head, mesosoma, and petiole, dark reddish; gaster black. Funicle and legs darker than rest of the body in some specimens. *Head* (Figure 2(a)): square in frontal view, almost as wide as long, sides slightly convex. Posterior margin of head feebly convex medially. Scape short (SI: 105–111). Psammophore with short hairs disposed in a triangle, far from the foramen magnum, slightly reaching the oral cavity. *Mesosoma* (Figures 2(b) and 2(c)): promesonotum in profile, forming a continuous convexity; end of mesonotum with well-differentiated dorsal and declivitous faces, anterior to metanotal suture. Propodeal tubercle short, upward directed, with wide base. *Metasoma*: petiolar scale forward directed.

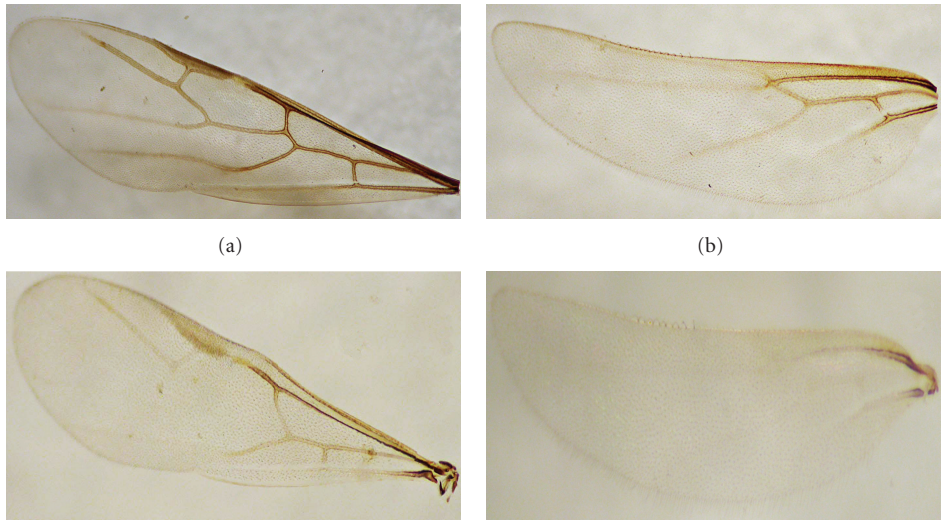
Queen

Measurements. ($n = 7$): HL: 1.18–1.23; HW: 1.25–1.33; EL: 0.38–0.4; EW: 0.18–0.23; SL: 1.08–1.13; WL: 2.43–2.6; CI: 106–108; SI: 91-92; REL: 32-33; OI: 47–56; TLI: 206–212.

Similar to worker in color. Whitish pubescence covering all body tagma. *Head*: Wider than long, with convex sides, in frontal view. Posterolateral corner rounded, posterior margin of head slightly concave (Figure 6(a)). Masticatory margin of mandible with six teeth and two or three denticles; basal margin completely dentate with a well-differentiated angle between both margins. Scape surpassing posterior margin of the head by more than twice its maximum diameter. *Mesosoma*: Parapsidal furrow well developed, diverging forward, axilla not divided. Anepisternum and katepisternum incompletely divided by a short pleural suture. Wings: forewing with only one close radial cell, one cubital cell, and no discoidal cell; pterostigma well developed, longer than wide. Hindwing with three cells closed in basal area; hamuli with 12 hooks. *Metasoma*: petiolar scale tall, stout, forward directed, and rounded apically. Ventral face of petiole slightly convex. Gaster with dark brown tergites and covered with whitish pubescence.

Male. Unknown.

Examined Material. COLOMBIA: La Guajira, Riohacha, Corregimiento Camarones, SFF Los Flamencos, 1w (CASC), 4w (CEUM); Magdalena, 1w (ICN), 1w (LACM) (see Figure 12).



(a) (b) (c) (d)

Figure 4: Wings of *Dorymyrmex biconis.* (a) Queen forewing; (b) queen hindwing; (c) male forewing; (d) male hindwing.

Additional Examined Material. Outside COLOMBIA: Syntypes and no type material: USA (Western Texas to Southern Nevada, and California), Mexico, Belize, El Salvador, Grenada, Honduras, Jamaica, and Perú. MEXICO**:** Acapulco, 2w (USNM); Chihuahua, 1w, (LACM); Cordoba, 1w, (USNM); Guerrero, 2w, (USNM); Ixtapa, 8w, (LACM); Revolcadero, 4w, (USNM); Zihuatanejo, 4w, (LACM); Uruapan, 2w, (USNM); San Blas, Playa Nayarit, 2w (LACM); Sinaloa, 30.5mi N. Los Mochis, 1w, (LACM); Guaymas, 11w, (LACM); Nogales, 4w, (USNM); Rio Yaqui, 1w, (LACM); San Bernardo, 3w, (LACM); Tecamachalco, 7 mi. NW Puebla, 2w, (LACM); Veracruz, 2 mi. S. Mocambo, 3w, (USNM); Veracruz, Boca del Rio, 2w, (USNM); Cordoba, 1w, (USNM); Veracruz, Fortin, 3w, (USNM); Jalapa, 3w, (USNM); Itze ChiChen, 1w, (USNM); BELIZE: 9w, (USNM); EL SALVADOR: San Salvador, 2w, (USNM); GRENADA: BWI, St. George's, 8w, (USNM); HONDURAS: Tegucigalpa, 1w, (USNM); JAMAICA: no further data, 1w, (USNM); PERÚ: Lima, 10w, (USNM).

Geographic Distribution. Southwest of USA to Peru.

Etymology. The name of *bicolor* is referred to the particular pattern of colors found in all known castes (worker and queen).

Natural History. Nest, briefly described by Wilson [47], has a small entrance hall with more regularly formed craters than *D. insanus*. *D. insanus* and *D. pyramicus* are sympatric in the northern part of its distributional range. Both species mentioned above are very active in open areas between 11:00 a.m. and 3:30 p.m and share similar habits of foraging according wilson's observations [47].

5.2.3. Comments. Several species of *Dorymyrmex* (*D. pyramicus, D. thoracicus,* etc.) have the same pattern of colors and could be confused with *D. bicolor* s. str. In some papers, *D. bicolor* was confused with *D. pyramicus*, because of its pattern of colors (orange head, mesosoma and petiole with dark gaster), but two main characters are useful to identify and to differentiate both species: head width (larger in workers and queens of *D. bicolor*) and mesonotum interrupted in lateral view, with a well-defined dorsal and declivitous faces, often descending vertically or nearly so, into mesopropodeal suture, (as described below, *D. pyramicus* has a promesonotal profile continuous, convex in lateral view). Apparently, *D. bicolor* belongs to a complex of species, as observed by Forel [48]. The identity of this complex could be solved with a more detailed and extensive research, specially comparing nest series from the west part of USA.

5.3. Dorymyrmex biconis Forel, 1912 [8] *(Figures 3(a)–3(c); 4(a)–4(d); 5(a)–5(d); 6(c)-6(d); 13)*

Dorymyrmex biconis Forel, 1912: 37 [8]. Description of worker.

Conomyrma (Biconomyrma) biconis Forel: Kusnezov, 1952: 430 [22].

Dorymyrmex biconis Forel: Shattuck, 1992: 85, [15]; Shattuck, 1994: 75 [45]; Bolton et al. 2006 [46] (catalog).

5.3.1. Diagnosis

Worker. Concolorous reddish brown. CI: 84–107. Posterior margin of head straight to slightly convex. Mesosomal profile interrupted by the presence of two tubercles: one stout short metanotal tubercle, posteriorly directed, and another placed in apical corner of the propodeum, dorsally directed.

Queen. Color similar to worker but darker. Head subquadrate with a straight posterior margin. Compound eyes

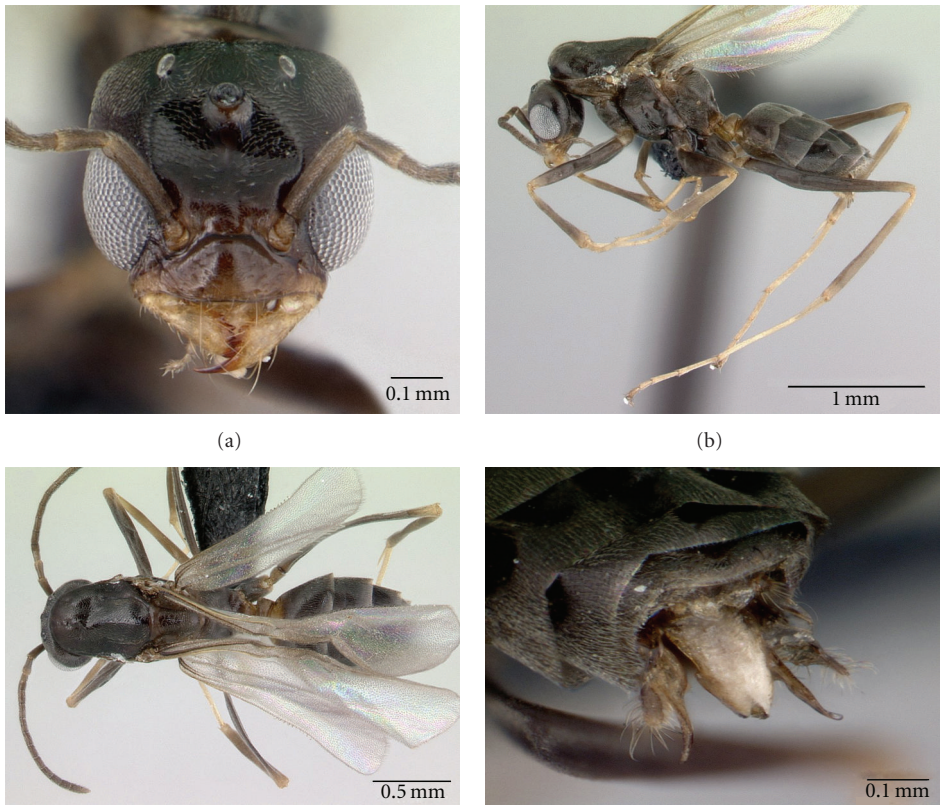


Figure 5: *Dorymyrmex biconis* male. (a) Head in frontal view; (b) profile of mesosoma; (c) dorsal view; (d) male genitalia in dorsal view (CASENT0192695). Pictures and labels of localities of each photographed specimen are available at http://www.antweb.org/.

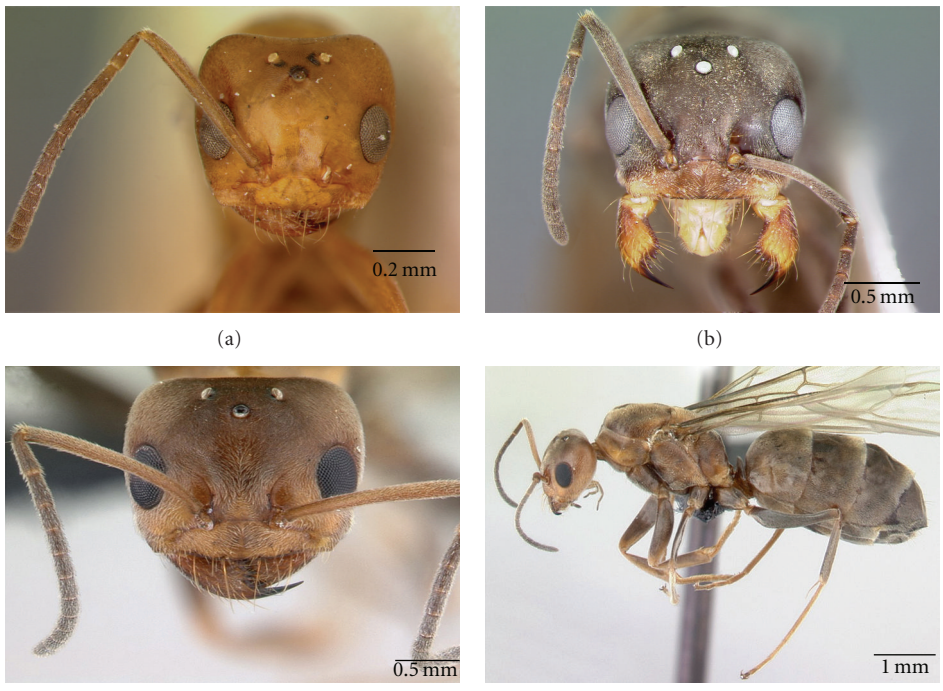


Figure 6: Queens of three *Dorymyrmex* species. (a) and (b) Heads of (a) *Dorymyrmex bicolor*; (b) *Dorymyrmex brunneus*; (c)-(d) *Dorymyrmex biconis*: (c) head and (d) body profile.

Figure 7: *Dorymyrmex brunneus* workers. (a) and (c) Head in full-face view; (b) and (d) body in lateral view. (a)-(b) CASENT0192705; (c)-(d) CASENT0192698. Pictures and labels of localities of each photographed specimen are available at http://www.antweb.org/.

notably developed, longer than wide, placed in middle of lateral margin of head.

Male. Mandible thin, falcate, with only three teeth: one long apical tooth, one subapical, and one denticle. Masticatory and basal margin well differentiated, basal margins completely devoid of teeth or denticles.

5.3.2. Descriptions

Worker

Measurements. ($n = 62$): HL: 0.56–1.16; HW: 0.62–1.20; EL: 0.18–0.34; EW: 0.16–0.32; SL: 0.78–1.10; WL: 1.00–1.12; CI: 84–107; SI: 93–127; REL: 24–33; OI: 55–88; TLI: 128–191.

Concolorous reddish brown, whitish pubescence covering all body tagma. Some specimens have some segments of gaster darker than rest of the body. Worker length 2.8–3.0 mm. *Head* (Figure 3(a)): subquadrate, longer than wide, with lateral sides straight to slightly convex, posterior margin of the head straight to slightly convex. Scape surpassing the posterior margin of head by no more than 1/3 of its length. Compound eyes placed far from posterior clypeal margin but in the first half of the head. Psammophore with short hairs disposed in a triangle; the hairs in the top line are near to the foramen magnum and do not reach the oral cavity. *Mesosoma*: mesonotum with a stout cone, rounded apically, and shorter than propodeal tubercle. Mesonotal tubercle directed posteriorly. Metanotal suture well developed and located inside a very pronounced concavity posterior to mesonotal tubercle (Figure 3(b)). Dorsal face of propodeum anterior to tubercle sinuate (Figure 3(b)). *Metasoma*: petiolar scale directed dorsally.

Queen (Figures 6(c) and 6(d))

Measurements. ($n = 7$): HL: 1.10–1.16; HW: 1.18–1.20; EL: 0.40–0.46; EW: 0.28–0.32; SL: 1.06–1.12; WL: 2.04–2.32; CI: 102–107; SI: 93–102; REL: 36–40; OI: 61–76; TLI: 179–200.

Body reddish brown, darker than worker. Pubescence dense, with long, decumbent hairs covering all body tagma. *Head*: subquadrate. Head capsule with lateral margins parallel to slightly convex, especially in their posterior half. Posterior margin of head straight, with occipital corners rounded. Mandible with a long and sharp apical tooth, three additional teeth and four denticles along the masticatory margin; basal margin completely denticulate without any

Figure 8: *Dorymyrmex goeldii* worker. (a) Head in full-face view; (b) body in lateral view; (c) body in dorsal view (CASENT0192699). Pictures and labels of localities of each photographed specimen are available at http://www.antweb.org/.

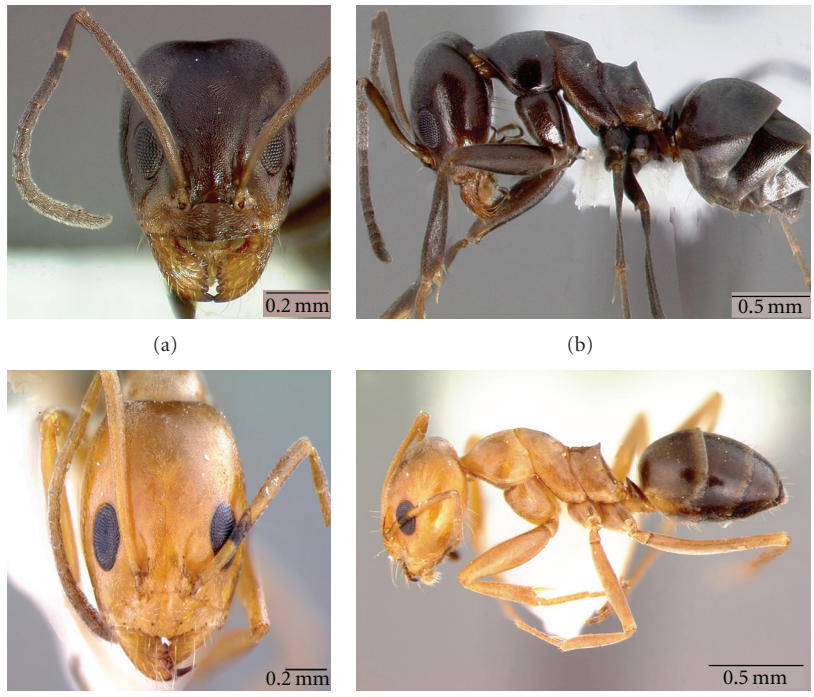


Figure 9: *Dorymyrmex* workers. (a) and (c) Heads of (a) *Dorymyrmex insanus*; (c) *Dorymyrmex pyramicus*; (b) and (d) body profiles of (b) *Dorymyrmex insanus*; (d) *Dorymyrmex pyramicus*.

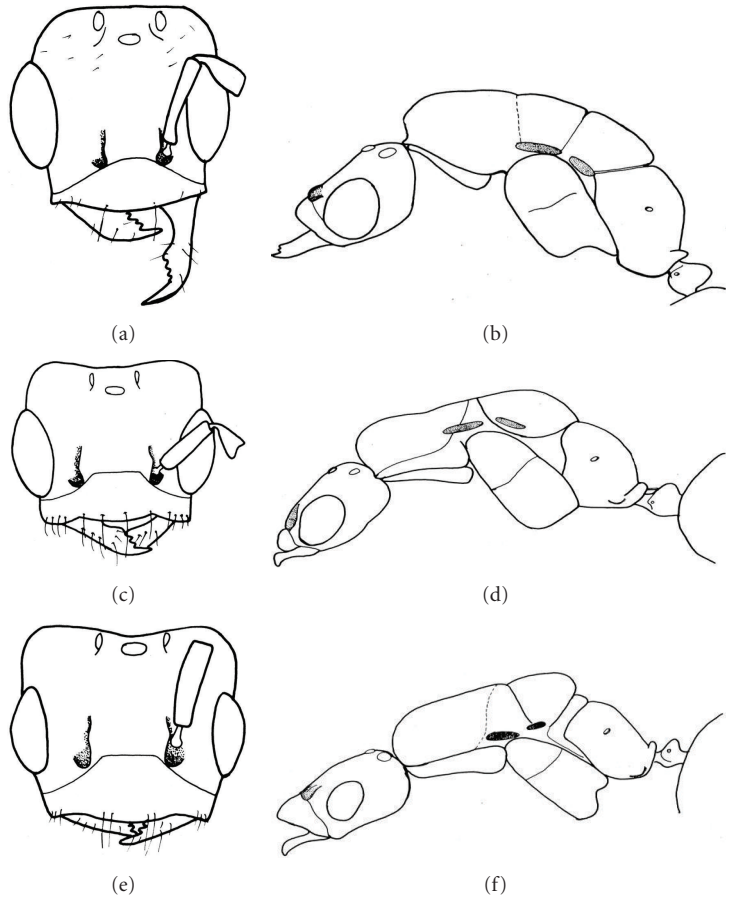


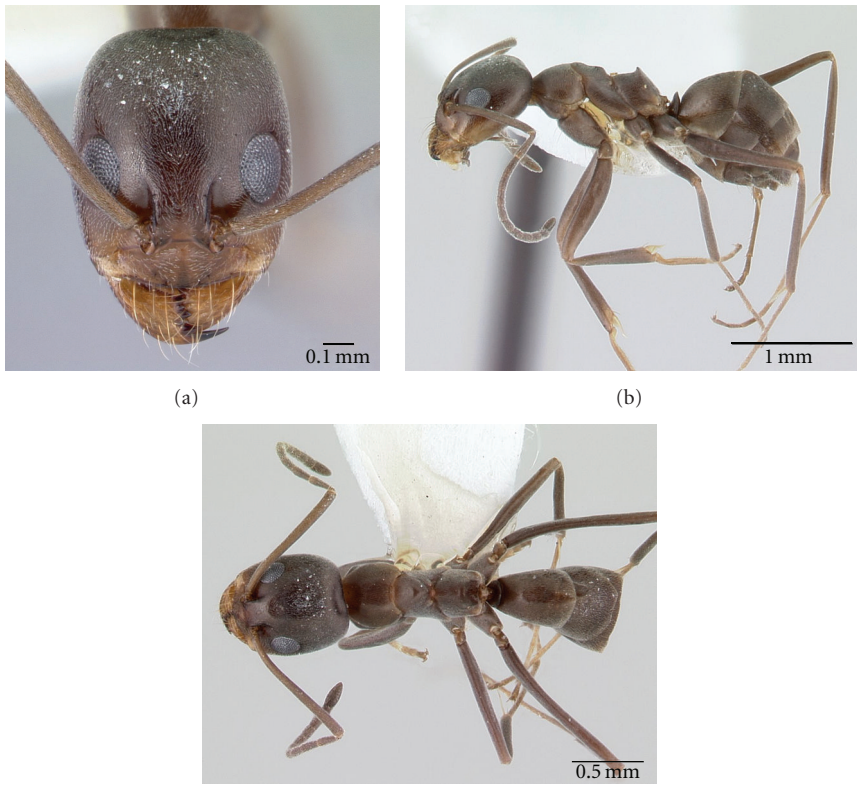
Figure 10: Males of three *Dorymyrmex* species. (a), (c), and (e) Heads of (a) *Dorymyrmex brunneus*; (c) *Dorymyrmex insanus*; (e) *Dorymyrmex pyramicus*; (b), (d), and (f) body profiles of (b) *Dorymyrmex brunneus*; (d) *Dorymyrmex insanus*; (f) *Dorymyrmex pyramicus.*

angle between both margins. Compound eyes notably large, longer than wide, placed in the middle of lateral sides. Scape surpassing the posterior margin of head by twice its maximum diameter. *Mesosoma*: parapsidal furrow slightly developed, visible in dorsal view as a tenuous line reaching posterior half of pronotum, diverging forwards, axilla not divided. Anepisternum and katepisternum incompletely divided by a short pleural suture. Pleural suture with long and abundant hairs (better observed in specimens preserved in EtOH). Wings (Figures 4(a) and 4(b)): forewing with one close radial cell, only one cubital cell, no discoidal cell; pterostigma well developed, longer than wide. Hindwing with three closed cells, hamuli with 12 hooks. *Metasoma*: petiolar scale tall, directed dorsally, and apically obtuse. Petiolar ventral face straight with posterior end slightly convex. Gastral tergites dark brown, especially in posterior 2/3; sternite 1 and 2 lighter than the rest of the body.

Male (Figures 5(a)–5(d))

Measurements. ($n = 5$): HL: 0.56–0.60; HW: 0.58–0.62; EL: 0.30–0.34; EW: 0.24–0.28; SL: 0.22–0.24; WL: 1.24–1.36; CI: 100–107; SI: 38–41; REL: 50–59; OI: 75–88; TLI: 217–234.

Body dark brown to black, mandibles yellowish brown except masticatory margin which is reddish brown; legs, except femora, lighter than rest of the body. Head and mesosoma strongly pointed. Pilosity with dense, decumbent, thin, and whitish hairs covering all tagma. Katepisternum and metapleural area with only a few hairs. Anterior face of petiolar scale with 2-3 long hairs. *Head* (Figure 5(a)): square. Posterior margin of head weakly concave medially; occipital corners rounded; dorsal face of head with a weak, middle furrow. Mandible thin and falcate, with parallel sides; one long apical tooth, three times longer than subapical one, one denticle, and a diastema before the angle with the basal margin. Masticatory and basal margin well differentiated; basal margins completely devoid of teeth or denticles. Posterior part of clypeus wide and reaching the toruli; anterior clypeal margin convex, with a subclypeal border thin, anteromedial part of clypeus straight. Antenna with exposed condyle; long scape (< to EL) reaching posterior margin of compound eye; pedicel as long as each flagellomere. Compound eye large, maximum length more than 2/3 of cephalic length. Median ocellus hyaline, well developed; lateral ocelli close to posterior margin of head. *Mesosoma* (Figure 5(b)): pronotum long, comprises more than a half of mesosoma, projecting forward as an



(a) (b)

(c)

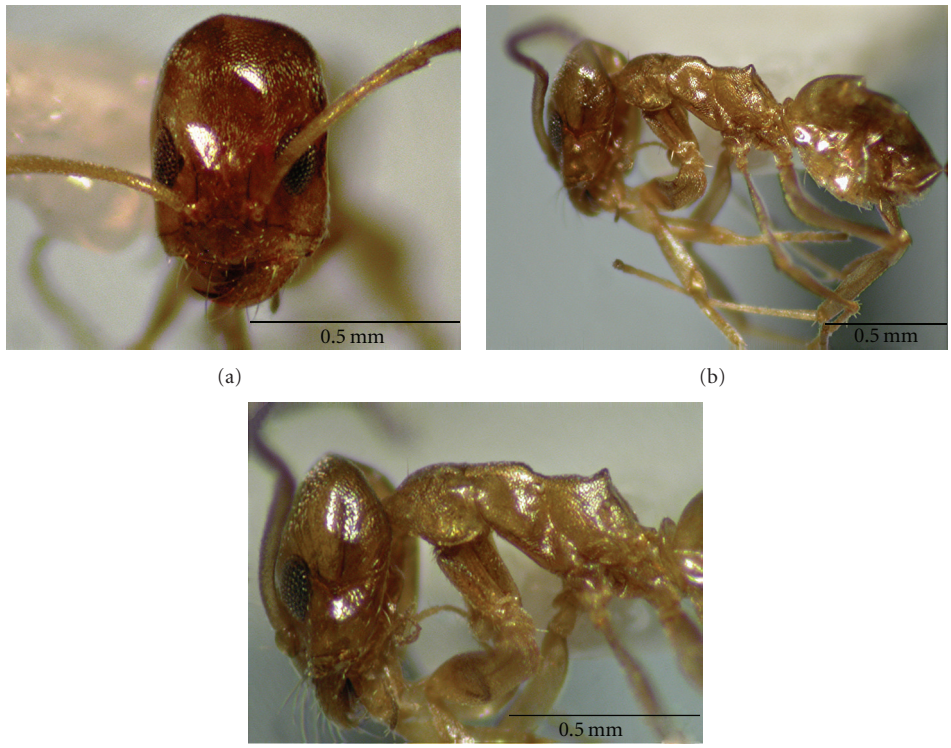
Figure 11: *Dorymyrmex tuberosus* n. sp. worker. holotype. (a) Head in full-face view; (b) body in lateral view; (c) body in dorsal view (CASENT0179518). Pictures and labels of localities of each photographed specimen are available at http://www.antweb.org/.

elbow with a strong depression medially; parapsidal furrows running parallel, reaching the middle part of pronotum, placed inside the depression. Mesonotum twice longer than wide. Anepisternum and katepisternum completely divided by a mesopleural sulcus. Dorsal face of propodeum not well differentiated form posterior face, with a strong declivitous face; propodeal spiracles strongly protruded. Wings (Figures 4(c) and 4(d)): forewing with close radial cell, no close cubital nor discoidal cell. Hindwing without closed cells, hamuli with 12 hooks. *Metasoma*: petiolar scale low and apically rounded, without ventral petiolar process. Pygostyle stout and short, well developed; paramere stout, covered with long dark setae; digitus curved ventrally, longer than volsella (Figure 5(d)); aedeagus serrate ventrally.

Examined Material. COLOMBIA: Atlántico: Puerto Colombia, 1w (IAvH). Bolívar: Zambrano, Hda. Monterrey, 15w (IAvH); same locality above, 8w (IAvH); same locality above, 3w (IAvH-E 90487); same locality above, 3w (IAvH-E 90486); same locality above, 3w (IAvH-E 90485); same locality above, 3w (IAvH-E 90484). Boyacá: Moniquirá, 8w (IFML); Ráquira, Desierto de la Candelaria, 10w (IAvH); Villa de Leyva—Plaza central, 4w (IAvH and IFML). Caldas: Mpio. Aguadas, La Nubia, 7w (IAvH); Mpio. Aguadas, La Nubia, Cañón Río Arma, 3w (IAvH). Cesar: Chiriguaná, 10w (CEUM). Córdoba: Ciénaga de Oro, 2w (IAvH). Cundinamarca: Fusagasugá, 1w (IAvH). Huila: Altaminar [Altamira], 1w (ICN-MHN # 2847); Altamira, 1w (IAvH); 10 Km. N San Agustín, 2w (IAvH); 10 Km. W Palermo, 1w (IAvH). La Guajira: Cabo de la Vela, 4w (CEUM, ICN); Maicao, 6w (LACM); Riohacha, 24w (LACM); SFF Los Flamencos, 6w (CEUM, ICN). Magdalena: Ciénaga, 1w (LACM); PNN Tayrona, Sector Neguanje, 131w and 15q (CAS, IAvH and IFML); Pivijay, 7w (IAvH); Santa Marta, San Antonio, 2w (IAvH), Santa Marta, Valenera, 9w (LACM), Santa Marta, 4w (LACM); Santa Marta, 5m (ICN).

Additional Examined Material. Outside COLOMBIA: Brazil, Peru and Venezuela. BRAZIL: Bahia, Planalto Casimiro Andrade, 10w (MZSP); ES, Santa Tereza, 2w (MZSP); PA, Pindobal, 2w (MZSP). PERU: Puerto Pizarro: #1091, 5w (MZSP). VENEZUELA: Lara: Barquisimeto, 2w (IFML).

Geographic Distribution. Brazil (Bahia, Pará, and Espírito Santo States), Colombia (Atlántico, Bolívar, Boyacá, Caldas, Córdoba, Cundinamarca, Huila, La Guajira, Magdalena, and Valle del Cauca Departments), Perú (Puerto Pizarro), Venezuela (Lara State: Barquisimeto).



(a) (b)

(c)

Figure 12: *Dorymyrmex xerophylus* n. sp. worker. (a) Head in full-face view; (b) and (c) body in lateral view; (c) body in dorsal view. These pictures were made by RJG using Nikon Coolpix digital camera and COMBINE Z5 software.

Etymology. The name of this species refers to the main diagnostic character of *D. biconis*: the presence of a pair of tubercles interrupting the mesosomal profile (Figure 3(b)).

Natural History. In Colombia, *Dorymyrmex biconis* is spread throughout, from sea level to more than 2300m. It is more common in lowlands (i.e., Colombian Caribbean region, North of Colombia) and quite common in anthropic environments, with higher abundance in urban places. Nevertheless, workers of *D. biconis* have been collected in primary dry forests and in mangroves. *D. biconis* builds nests in soil devoid of vegetation, in very warm areas. Exceptions are arid but extremely cold places such as Boyacá, Colombia. As in other species of *Dorymyrmex*, nests are superficial, with simple architecture, and no more than 10–15 cm in depth. Excavated nests by RJG in Santa Marta (Magdalena, Colombia) share a similar architecture: only one circular entrance (no more than 5 mm in diameter) surrounded by a mound of sand or other soil particles with a diameter of 9-10 cm. The nest consist of one chamber with queens and males, a second one with larvae and worker pupae, and a third chamber with food and insects remains, such as several Bruchidae (Coleoptera). In one nest, RJG collected some dead Thysanoptera in the food storage camera.

One nest of *D. biconis* can keep between 10 to 15 alate queens, 8 to 10 males and several tens of workers. Sometimes there are no more than 100 to 200 workers in a single nest. No dealate queens have been found in explored nests. Colonies of *D. biconis* are probably polydomous, and queen may fly outside of its colony to build satellite nests. In some cases, RJG has found two or three nests in an area of 10 m^2; only one of these nests had queens.

5.3.3. Comments. The first description of *D. biconis* was based in workers collected in San Antonio (St. Antonio), Santa Marta, Colombia [8]. Three species of *Dorymyrmex* (*D. bituber*, *D. pulchellus*, and *D. tuberosus* n. sp.) share a few characters with *D. biconis*. This is a group of species easy to recognize by the presence of two well-developed mesosomal tubercles: one in the last part of the metanotum and the other one between the dorsal and declivitous faces of propodeum. Considering its geographical distribution, *D. biconis* seems to be confined to the north and central parts of South America, from Venezuela to Peru. This species was included in the subgenus "*Biconomyrma*" [19] based on characters of wing venation of queen.

5.4. Dorymyrmex brunneus Forel, 1908 [37] *(Figures 6(b); 7(a)–7(d); 10(a)-10(b); 13)*

Dorymyrmex pyramicus var. *brunnea* Forel, 1908: 385 [37]. Description of worker.

Dorymyrmex pyramicus subsp. *brunneus* Forel: Forel, 1911: 306 [48]. Description of queen.

Dorymyrmex pyramicus subsp. *brunnea* Forel: Emery, 1913: 37 [49].

Dorymyrmex (*Conomyrma*) *pyramicus* race *brunneus* Forel: Forel, 1913: 244 [50].

Dorymyrmex pyramicus subsp. *brunneus* Forel: Santschi, 1912: 53 [51], Gallardo 1916: 59 [41] (queen redescribed).

Dorymyrmex (*Conomyrma*) *brunneus* var. *spurious* Forel: Santschi, 1929: 305 [52].

Conomyrma (*Biconomyrma*) *brunnea* (Forel): Kusnezov, 1952: 430 [22].

Conomyrma brunnea (Forel): Kempf, 1975: 375 [6].

Dorymyrmex brunneus Forel: Shattuck, 1992: 85 [15]; Shattuck, 1994: 77 [45]; Bolton et al. 2006 (catalog) [46].

5.4.1. Diagnosis

Worker. Head slightly longer than wide. Posterior margin of head straight to feebly concave medially (Figure 7(a)). Psammophore with short hairs disposed in a triangle, not reaching the posterior end of hypostome. Pro-mesonotum depressed in lateral view, always lower than the apex of propodeal tubercle. Mesonotal profile with a well-defined dorsal and declivitous face in the posterior end. Metanotal suture well impressed forming a concavity anterior to the propodeum.

Queen. Maximum diameter of head behind the compound eyes. Posterior margin of head feebly concave medially. Forewing with only one close cubital cell.

Male. Dark brown. Scape long, reaching the posterior margin of compound eyes. Mandible with only three teeth. Forewing with no discoidal and no cubital cells, hindwing with only two closed cells. Pygostyle poorly developed, paramere stout and covered with long hairs.

5.4.2. Descriptions

Worker

Measurements. Lectotype: HL: 0.95; HW: 0.8; EL: 0.23; EW: 0.125; SL: 0.875; WL: 1.175; CI: 84; SI: 92; REL: 24; OI: 54; TLI: 124.

Other Examined Material. w ($n = 98$): HL: 0.70–1.04; HW: 0.64–0.92; EL: 0.22–0.30; EW: 0.10–0.20; SL: 0.80–1.14; WL: 1.00–1.46; CI: 83–117; SI: 98–129; REL: 24–34; OI: 45–77; TLI: 122–171.

Concolorous dark brown; whitish pubescence covering all body tagma. 0–2 erected setae on the dorsum of pronotum. *Head* (Figures 7(a) and 7(c)): subquadrate, with lateral margins strongly convex, maximum head width at the compound eye level. Mandibles strongly striate, reddish brown. Compound eyes in central 1/3 of the head as seen in frontal view. Scape long (SI: 92–129), surpassing the posterior margin of head by more than twice its maximum width. Posterior margin of head usually straight but sometimes feebly concave in the middle. Psammophore with a few extremely short hairs disposed in a triangle, the hairs in the top line are near to the foramen magnum and do not reach the oral cavity. Upper setae of psammophore close to the anterior margin of foramen magnum. *Mesosoma*: promesonotal profile sinuate to straight and, in lateral view, always lower than the apex of propodeal tubercle (Figures 7(b) and 7(d)). Posterior end of mesonotum forming two faces, one dorsal and one declivitous but not conforming a well-developed tubercle (Figures 7(b) and 7(d)). Propodeal tubercle stout, with wide base, and slightly directed dorsally. Declivitous face straight to slightly convex (Figure 7(d)). *Metasoma*: petiole forward directed, included in a concavity placed in the anterior face of the first gastral segment. Scale apically thin and rounded.

Queen

Measurements. ($n = 5$): HL: 1.13; HW: 1.15; EL: 0.38; EW: 0.18; IOD: 0.78; SL: 1.1; WL: 2.3.

Color and pubescence as in worker; *head*: subquadrate, maximum diameter after the compound eyes (Figure 6(b)). Clypeal sides lighter than the rest of the head; scape surpassing the posterior margin of head by more than twice its maximum width; mandibles striated with four teeth and two denticles; posterior margin of head feebly concave medially. *Mesosoma*: parapsidal furrows well developed, parallel, axilla not divided. A short, incomplete suture divides anepisternum from katepisternum. Forewing with only one closed cubital cell; radial cell long and close. *Metasoma*: low and stout petiole, apically rounded.

Male (First Description)

Measurements. ($n = 3$): HL: 0.58–0.6; HW: 0.58–0.63; EL: 0.28–0.33; EW: 0.15–0.2; SL: 0.25; WL: 1.3–1.38.

Color of the body similar to worker and queen; *head* (Figure 10(a)): subquadrate with round occipital corner; mandibles thin with only three teeth, the apical more than twice longer than the others. Scape long, reaching the posterior margin of compound eyes. *Mesosoma*: parapsidal furrows parallel, axilla not divided medially; forewing with one close radial cell and no cubital nor discoidal cell. Hindwing with only two closed cells. *Metasoma*: petiolar scale (Figure 10(b)) low, round, and stout, ventral process round, feebly developed. Pygostyle poorly developed; paramere stout covered with long, erected setae; aedeagus serrate ventrally.

Examined Material. COLOMBIA: Amazonas: Araracuara, 9w (IAvH). Antioquia: Sonsón, Quebrada La Violeta, 6w (IAvH-E 90491); same data as above, 1w (IAvH-E 90502); same locality, 3w (IAvH-E 90476); same locality, 2w (AvH-E 90492). Boyacá: El Infiernito, 14w (IAvH); Ráquira, Desierto

de la Candelaria, 10w (IAvH), one of these specimens was photographed; Arcabuco, 1w (IAvH). Caldas: Aguadas, 2w (IAvH); Aguadas, Arenillas, 9w (IAvH); same data, #CES292, 3w (IAvH-E 90503), same data, #CES292, 3w (IAvH-E 90496); same data, #CES292, 3w (IAvH-E 90461); Aguadas, Puente Albania, 1w (IAvH-E 90501); Aguadas, Cañón Río Arma, 3w (IAvH); same data, #CES069, 12w (IAvH), same data, #CES068, 1w (IAvH-E 90504); Aguadas, Quebrada Pito, 1w (ICN-MHN 022550); Manizales, Vereda El Dorado, Finca El Placer, 2w (IAvH); La Nubia, 7w (IAvH). Cauca: Mercaderes, Mojarras, rivera del río Guachicano, 7w + 1 queen (CEUM). Caquetá: Puerto Solano, PNN Chiribiquete, río Curañé-Amú, 1w (IAvH). Cundinamarca: Fusagasugá, 2w (ICN); Nariño: RN La Planada, 6w (IAvH). Meta: 7w (LACM); 65 Km. E Puerto López, 2w (LACM). Quindío: Circasia, Vereda Buena Vista, Finca Calamar, 12w (IAvH); Calarcá, Vereda Pradera Baja, Finca La Holanda, 3w (IAvH); same data, 9w [2w (IAvH-E 90473), 2w (IAvH-E 90474), 3w (IAvH-E 90470), 2w (IAvH-E 90472)]. Risaralda: La Virginia, Finca Miralindo, 6w (CEUM). Santander: Barrancabermeja, [2w (IAvH-E 90490), 2w (IAvH-E 90498), 2w (IAvH-E 90493)]; Socorro, Vereda Altos de Reina, Finca San Luis, [1w (IAvH 25099), 1w (IAvH 25097), 1w (IAvH 25098)]; same locality, Finca El Clavelino, [1w (IAvH 25162), 1w (IAvH 25163)]. Tolima: locality not recorded, 8w (LACM). Valle del Cauca: Buenaventura, Bajo Anchicayá, [1w (IAvH-E 90499), 1w (IAvH-E 90500)]. Vichada: Cumaribo, Selva de Matabén, 7w (IAvH).

Additional Examined Material. Outside COLOMBIA: Several series from Argentina, Bolivia, Brazil, Guatemala, and Paraguay. ARGENTINA: Chaco: Las Palmas, #989, 6m, (MACN); Entre Ríos, 5w, (MACN); Misiones: Esperanza, 5w and 1m, (MZSP); San Luis2w, (MZSP); #236, C. Bruch coll, identified as "cotypus", 2w, (MACN). BOLIVIA: Cochabamba, 10w, #9479, 4w, (IFML); Depto. Santa Cruz, Prov. Andrés Ibáñez, 12 km E Santa Cruz, 5w, (IFML). BRASIL: BA: Bom Jesus da Lapa, 6w, (CEPEC); MT: Araguai, 2w, (MZSP); Cáceres, 1w, (MZSP); Campo Grande, 6w, 1q (MZSP); Carmo da Cachoeira, 5w, 1q, (MZSP); same loc, 3w, (MZSP); Colonia Vicentina, Dourados, 1w, (MZSP); 3w, (MZSP); Cuiabá, 22w, 2m, (MZSP); Chapada, 8w, (MZSP); same loc, 2w, (MZSP); Diamarum, Parque Nac. Xingu, 12w, (MZSP); Fátima, 7w, (MZSP); Faz. Beija Flor, 4w, (MZSP); Faz. Sta. Blanca, Corumbá, 4w, (MZSP); Itaum, 1w, (MZSP); Jardim, 9w, (MZSP); Mons. Paulo, V. dos Santos, 6w, (MZSP); Paconé, 8w, (MZSP); same loc, 3w, (MZSP); same loc, 5w, (MZSP); Porto Murtinho, 4w, (MZSP); Rondonópolis, 2w, (MZSP); same loc, 3w, (MZSP); Santa Bárbara, 2w, (MZSP); Serra Caraça, 16w, (MZSP); same loc., 4w, (MZSP); Serra do Urucum-Corumbá, 24w, (MZSP); S. Lourenço, 1w, (MZSP); Tiradentes, 1w, (MZSP); Três Lagoas, 4w, (MZSP); Utiariti, Río Papagaio, 6w, (MZSP); same loc, 3w, (MZSP); PE: Caruara, 2w, (MZSP); Diapoque, 5w, (MZSP); João Pessoa, 9w, (MZSP); Prado, Recife, 3w, (MZSP); Recife, 4w, (MZSP); same loc, 3w, (MZSP); Tapera, 2w, (MZSP); PR: Castro, 3w, (MZSP); Foz do Iguazú, Cataratas, 4w, (MZSP); Marienthal, 2w, (MZSP); Rio Negro, 3w, (MZSP); same loc, 1w, (MZSP); Rolandia, 3w, (MZSP); RD: Assis, 2w, (MZSP); RGS: Erechim, Campinas, 14w, (MZSP); Três Arroios, 5w, 2m, (MZSP); RJ: Fábrica Nacional de Motores, 2w, (MZSP); Itaipava, 2w, (MZSP); Jardim Primavera, 2w, (MZSP); Macaé, 4w, (MZSP); Marambaia, 2w, (MZSP); Rio de Janeiro, 5w, (MZSP); RS: Morretes, 6w, (MZSP); SC: Blumenau, 1w, (MZSP); Camboriu, 12w, (MZSP); Canoinhas, 3w, (MZSP); Forquilhinha, 5w, (MZSP); Ituporanga, 3w, (MZSP); Poço Grande, 3w (MZSP); Rio do Sul, 9w, (MZSP); Rodeio, 1w, (MZSP); SP: Agudos, 14w, (IFML); Amparo, 3w, (MZSP); Anhembi, 11w, 2q, (MZSP); Assis, Rd 333, km 44, 2w, (MZSP); Avaré, 5w, (MZSP); Barueri, 31w, (MZSP); Butantan, 1w, (MZSP); Campinas, 5w, (MZSP); Campo dos Jordão, 6w, 3m (MZSP); Campo Limpo, 1w, (MZSP); Caraguatatuba (Res. Flor. 40m), 4w, (MZSP); Curitiba, 6w, (MZSP); Embú, 1w, (MZSP); Faz. Itaqueri, Rôa Esperança do Sul, 18w, (MZSP); Alhambra, 6w, (MZSP); Ilha da Vitória, 16w, 5q, 8m, (MZSP); Ilha dos Buzios, 1w, (MZSP); Interlagos, 12w (cotype), (MZSP); Monte Mor, 7w, 2m, (MZSP); Piracicaba, 12w, (MZSP); Rio Claro, Bairro Saudade, 9q, (MZSP); Rio Claro, Horto Forestal, 3w, (MZSP); Rod. S.Paulo-Curitiba, Km 300, M.Iporanga, 15w, (MZSP); S.Sebastião, 4w, (MZSP); Teod. Sampaio, 2W, (MZSP); Ubatuba, 2w, (MZSP); Venceslau, 3w, (MZSP); 20 km W Conchas, 4w, (MZSP); Boraceia, 6w, (MZSP); Piracicaba, 9w, (MZSP); S. Sebastião, Bairro S. Francisco, 4w, (MZSP); Orlândia, 3w, (MZSP); Holambra, 6w, (MZSP); Praia Grande 3w, (MZSP); Interlagos, 12w, (MZSP); Anhembi, Faz. B. Rico, MANAUS, Amazonas, 4w, (IFML); PARAGUAY: Caacupé, 3w, (IFML); Pastoreo, 5w, (MZSP); GUATEMALA: Antigua, 3w, (USNM).

Geographic Distribution. Argentina, Bolivia, Brazil, Colombia (Amazonas, Antioquia, Boyacá, Caldas, Caquetá, Cundinamarca, Nariño, Meta, Quindío, Santander, Tolima, Valle del Cauca, Vichada), French Guyana, Guyana, Panama, Guatemala, Paraguay, and Surinam.

Etymology. The name "*brunneus*" means dark brown. It is the main color of worker, queen, and male.

Natural History. D. brunneus is mainly restricted to arid environments of the Andean region of Colombia, at elevations above 1000 m. Some lowland populations live in dry forests of western Colombia (Valle del Cauca, 400–500 m), savannas in eastern plains (Vichada, 240 m), and in Colombian Amazon basin (Amazonas, 200–300 m).

Like *Dorymyrmex biconis, D. brunneus* is well adapted to anthropic environments. Most of the specimens studied here have been collected in areas transformed by humans, mainly in open areas with low vegetation (stubble), coffee plantations (shade coffee culture), wooded areas for cattle grazing, and urban areas.

5.4.3. Comments. D. brunneus is one of the most variable species of *Dorymyrmex* with the widest distributional range. This species was found from Panama (Canal Zone) up to the central part of Argentina. This species is the most frequently

collected in Brazil, from sea level to more than 2000 m. As suggested by the variability observed in specimens from Figures 7(a)–7(d), *D. brunneus* may be a species complex. More detailed studies are needed based on series of specimens collected from same nest and different localities from all over its distributional range.

The shape of the mesosomal profile was one of the most frequently characters used to separate species of *Dorymyrmex* but is almost unusable to identify *D. brunneus*. Local populations of this species have strong differences in the profile of mesosoma (Figures 7(b) and 7(d)) and scape length. There are morphological variations among Colombian populations which seem to be stable: only workers with broad head (CI: 90–107) have a strong mesonotal depression making a sort of tubercle at the middle of mesonotum (different from *D. biconis*), with a deep and wide metanotal groove. Besides, workers have a median ocellus and, sometimes, two tiny lateral ocelli (populations from Boyacá, Colombia). The shape of queen head in frontal view (Figure 6(b)), mandibles with only three teeth in male and the number of closed cells in forewings have proved to be useful to separate *D. brunneus* from other *Dorymyrmex* species.

5.5. *Dorymyrmex goeldii* Forel, 1904 [38] *(Figures 8(a)–8(c); 13)*

Dorymyrmex Göldii Forel, 1904: 41 [38].

Dorymyrmex (Ammomyrma) goeldii Forel: Kusnezov, 1952: 429 [22].

Conomyrma goeldii (Forel): Kempf, 1972: 79 [10].

Dorymyrmex goeldii Forel: Shattuck, 1992: 85 [15]; Bolton et al. 2006 (catalog) [46].

5.5.1. Diagnosis

Worker. Concolours, light brown. Head longer than wide, with the posterior margin of head strongly convex, scape long (SI: more than 115), long mesosoma, in profile.

Queen and Male. Unknown.

5.5.2. Descriptions

Worker

Measurements. ($n = 30$): HL: 0.70–0.86; HW: 0.55–0.72; EL: 0.20–0.26; EW: 0.10–0.18; SL: 0.85–1.00; WL: 1.05–1.36; CI: 77–84; SI: 116–160; REL: 29–32; OI: 50–69; TLI: 147–163.

Concolours, light brown. Sculpture reticulated, widely spaced. Pubescence whitish and dense. Pilosity brownish. *Head* (Figure 8(a)): psammophore triangular with short setae, the hairs in the top line close to the foramen magnum and do not reach the oral cavity. Uppermost setae of psammophore close to the lower margin of foramen magnum. Scape surpassing occipital margin by more than twice its apical width. Posterior margin of head slightly straight. *Mesosoma* (Figures 8(b) and 8(c)): 0–2 pronotal erected setae; propodeal tubercle round and short tubercle, directed dorsally; declivitous face of propodeum straight to feebly convex. *Metasoma*: low petiolar scale.

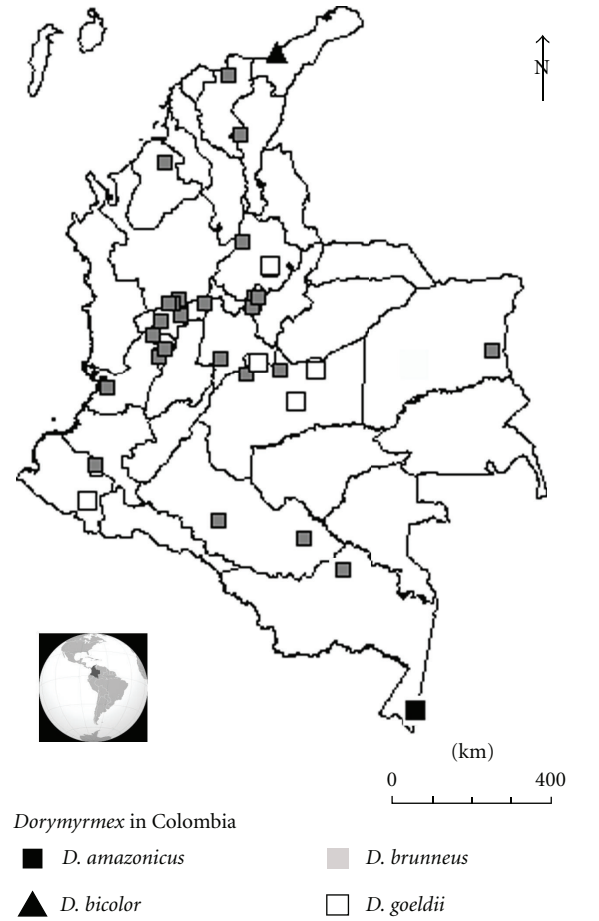


Figure 13: Geographic distribution of *Dorymyrmex amazonicus* n. sp., *Dorymyrmex bicolor*, *Dorymyrmex brunneus,* and *Dorymyrmex goeldii* in Colombia.

Queen and Male. Unknown.

Examined Material. COLOMBIA: Meta: Puerto López, 6w (IAvH); PNN Sierra de la Macarena, Caño Curía, Sendero Cachicaos, 29w (IAvH); same locality, 29w (IAvH); same locality, 25w (IAvH); Cumaral, 5w (LACM). Nariño: R.N. La Planada, 1w (IAvH). Santander: Socorro, Vereda Alto de Reinas, Finca San Luis, 1w (IAvH).

Additional Examined Material. Outside COLOMBIA: BOLIVIA: Ignacio de Velasco, 3w (MZSP). BRAZIL: MT: Rondonópolis, 11w (MZSP). PE: Araripina, 9w (MZSP). PI: 5 km E Oeiras, Faz. Talhada, 10w (MZSP); 10 km N. Corrente, Faz. Maracujá, 2w (MZSP); Canto do Buriti, 2w (MZSP). SP: Agudos, 9w (MZSP); same locality, 11w (IFML).

Geographic Distribution. Bolivia, Brazil, and Colombia (Meta, Nariño and Santander). Figure 13 shows distribution of *D. goeldii* in Colombia.

Etymology. Named in honor of Emilio Goeldi.

Natural History. Geographical distribution of *D. goeldii* has a strong disjunction in Colombia: some populations are found in the Andean region (Deptartment of Santander and Nariño) at high altitude, between 1700 a 1900 m; other colonies, where *D. goeldii* is more common, prefer open areas of an isolated chain of mountains in the La Macarena National Park; in this area, specimens were collected at 493 m.

5.5.3. Comments. Characters given in the diagnosis are enough to differentiate this species from all other *Dorymyrmex* found in Colombia.

5.6. Dorymyrmex insanus (Buckley, 1866) [39] *(Figures 9(a)-9(b); 10(c)-10(d); 14)*

Formica insana Buckley, 1866: 165 [39].

Dorymyrmex insanus: McCook, 1880: 185-186 [53].

Dorymyrmex pyramicus (as senior synonymy of *D. insanus*): Mayr, 1886: 433 [1]; Emery, 1895: 331 [54]; W. M. Wheeler, 1902: 6-7, [55]; W. M. Wheeler, 1906: 342 [36]; Creighton, 1950: 346–349 [56].

Dorymyrmex pyramicus v. *insana*: Santschi, 1920: 381 [57] (revived from synonymy as variety of *D. pyramicus*).

Dorymyrmex (*Conomyrma*) *pyramicus*: Smith, 1951: 837 [20]; Gregg, 1963: 432–434 [58] (in part).

Conomyrma insana: Snelling, 1973 [25] (in part), Johnson, 1989: 185 [42] (Senior synonym of *D. medeis* and *D. reginicula*).

Dorymyrmex insanus (Buckley): Shattuck, 1992: 85 [15]; Shattuck, 1994: 84 [45]; Snelling, 1995: [4]; Bolton et al. 2006 [46].

5.6.1. Diagnosis

Worker. Medium brown to dark. Head longer than wide, lateral sides parallel and slightly convex. Posterior margin of head with a weak median emargination. Pronotum with 0–2 erect setae. Pro-mesonotum slightly convex with a weak subangle behind, forming a feeble tubercle in the same line of propodeum in profile.

Queen. Maximum cephalic width at the level of compound eyes, weakly narrow behind.

Male. Dark brown to black. Maximum head width after level of eyes. Posterior margin of head feebly concave in the middle; only three teeth present on the masticatory margin of the mandible. Forewing with no discoidal nor cubital cells.

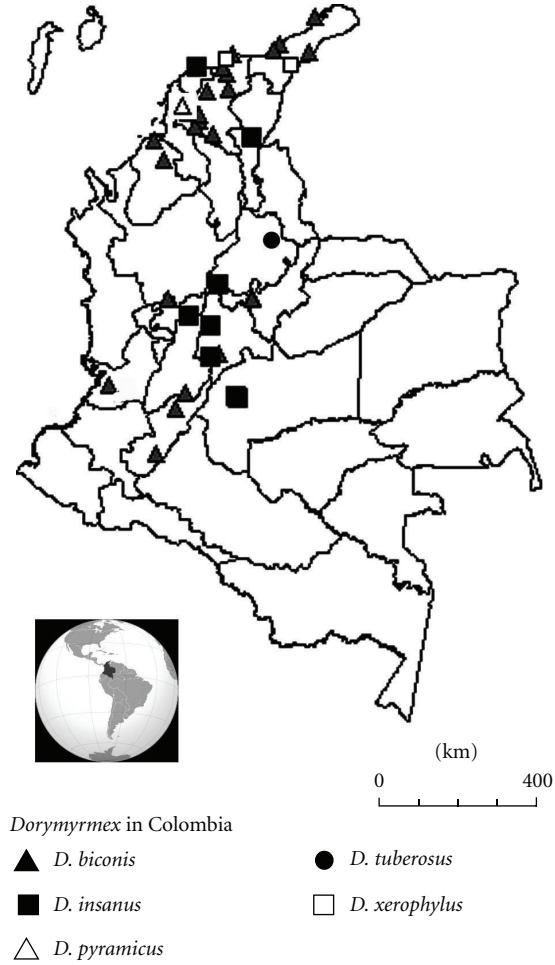


Figure 14: Geographic distribution of *Dorymyrmex biconis*, *Dorymyrmex insanus*, *Dorymyrmex pyramicus*, *Dorymyrmex tuberosus* n. sp., and *Dorymyrmex xerophylus* n. sp. in Colombia.

5.6.2. Descriptions

Worker

Measurements. ($n = 55$): HL: 0.78–1.16; HW: 0.70–1.00; EL: 0.22–0.57; EW: 0.15–0.22; SL: 0.80–1.12; WL: 1.08–1.44; CI: 79–96; SI: 74–119; REL: 25–71; OI: 26–82; TLI: 125–147.

Head, mesosoma, and gaster medium brown to dark; some specimens are almost black. Head and dorsal part of mesosoma covered with a dense and whitish pubescence but lighter than in *D. brunneus*. *Head* (Figure 9(a)): subquadrate, convex laterally. Compound eyes placed in first cephalic third. Scape surpassing the posterior margin of head by 1/3 of its length. Posterior margin of head concave medially. Psammophore with short setae, disposed in a double file, forming a semicircle; the hairs in the top line are disposed far from the foramen magnum and do not reach the oral cavity. *Mesosoma* (Figure 9(b)): profile interrupted in the middle, promesonotal profile higher than apical summit of propodeal tubercle. Mesonotal sclerite, in profile, forming an angle defining two faces, one dorsal and one posterior but not forming a real tubercle. In profile, the dorsal face

of propodeum is feebly sinuate. *Metasoma*: petiolar scale directed dorsally. No ventral petiolar process.

Queen. Well described by Snelling [4].

Male (First Description)

Measurements. (n = 4): HL: 0.55–0.6; HW: 0.58–0.63; EL: 0.25–0.28; EW: 0.15; SL: 0.25–0.28; WL: 1.08–1.23.

Body dark brown, mandibles yellowish brown except masticatory margin which is reddish brown. Whitish pubescence covering all the body. *Head* (Figure 10(c)): square with round occipital corner; posterior margin of head feebly concave in the middle. Mandible falcate, with subparallel inner and outer sides, with only three teeth: apical tooth three times longer than the preapical one; there is no well differentiated angle between masticatory and basal margins; basal margin completely devoid of tooth or denticles. Posterior margin of clypeus wide, reaching torulus; anterior margin of clypeus convex. Scape long (> or = to EL) surpassing posterior margin of compound eye; pedicel as long as each flagellomere. Compound eye large, exceeding the lateral margin of head. Hyaline ocelli well developed; lateral ocelli placed close to the posterior cephalic margin. *Mesosoma* (Figure 10(d)): pronotum projected forwards as an elbow; parapsidal furrows strongly divergent, reaching the middle part of pronotum. Mesonotum twice longer than wide in lateral view. Anepisternum and katepisternum completely divided by a mesopleural suture. Profile of propodeum continuous, dorsal and declivitous faces not well defined. Forewing with no discoidal nor cubital cell. Hindwing with 0–3 closed cells. Hamuli with 12 hooks. *Metasoma*: petiole low; scale apically rounded in lateral view; ventral petiolar process short. Pygostyle short, stout and covered with white, erect setae. Stout paramere, differentiated from volsella by a sulcus; digitus curved surpassing the volsellae in length, no cuspis present; aedeagus ventrally serrate.

Examined Material. COLOMBIA: Atlántico: Barranquilla, Km. 6 vía Puerto Colombia, 5w (CEUM). Boyacá: Puerto Boyacá, Puerto Romero, Vereda La Fiebre, Finca El Golfo, 1w (ICN). Cesar: Chiriguaná, 14w (CEUM). Cundinamarca: Fusagasugá, Rio Cuja, [1w (ICN-022530), 1w (ICN-022467), 1w (ICN 022468), 1w (ICN-022534), 1w (ICN-022529), 1w (ICN-022533), 1w (ICN-022536), 1w (ICN-022531), 2w (ICN-CORD78)]; Villeta, Buenos Aires, [1w (ICN-022538), 1w (ICN-022537)]. Meta: Vereda el Cocuy, 3°19′7.68″N 73°54′21.96″W 467 m, 23 Apr 1978, [1w (ICN-022542), 1w (ICN-022543)]; San Juan de Arama, Vereda Monserrate, PNN Sierra de la Macarena, 1w (ICN-F86M159); Meta, loc. not recorded, 2w (LACM). Tolima: Municipio Fresno, Vereda Colombia, Finca Las Perlas, 1w (IAvH).

Additional Examined Material. (Outside of COLOMBIA): USA: Arizona: Cochise Co., Portal, 33w (LACM); same locality, 2w, 2m, 2q (LACM); 4 mi. N. Sedona, Oak Co., 2w (LACM). California: Glamis, Riverside Co., 9w (LACM); 3.5 mi NW Glamis, Algodones Dunes, Imperial Co., 5w; La Jolla, San Diego Co., 4w (LACM). Kansas: Anthony City Lake, Harper Co., 5w, 1m, 1q (LACM).

Geographic Distribution. Colombia (Boyacá, Cesar, Cundinamarca, Meta and Tolima), Costa Rica, El Salvador, Honduras, Panama, USA (Arizona, California and Kansas).

Etymology. Insanus means mad, probably because of the crazy movement of foraging workers on the ground.

Natural History. In Colombia, *Dorymyrmex insanus* is commonly found in lowlands. This species nests close to the sea level (75 m.) in anthropic sub-xerophytic deciduous forests and in temporal cultivated areas. Some populations are restricted to arid and open areas of central Colombia, between 400 and 700 m, where small herbs cover the ground.

5.6.3. Comments. Taxonomical limits of this species are here clearly defined. In the past, the names of *D. pyramicus* and *D. insanus* were used as synonyms, in a sort of confusion, considering both species as one with a wide distributional range (from Texas, USA, to Argentina). Snelling [4] was the first to recognize this mistake and to propose a clear description of *D. insanu*s, designating a neotype worker (Figures 9(a) and 9(b)) and neoparatypes. According to him, *D. insanus* can be found from Central Texas to Kansas and westward to Northern California. In the same paper, Snelling [4] says that the southern limit of its range is unclear in part due to inadequate collecting. With new material examined from Central and South America, we can confirm the presence of *D. insanus* in Central America and in the north part of South America. For more information, see comments of *D. pyramicus* below. Another interesting data is that *D. insanus* was considered as a vulnerable species by de IUNC Red List as fitting the "D2" criteria of the vulnerable (VU) category in the "1994 Categories & Criteria," meaning the population has an acute restriction in its area of occupancy (typically less than 100 km^2) or in the number of locations (typically less than five). With the distributional data provided here, this species can be considered to exceed the above criteria and, therefore, should be removed from the list of endangered species.

5.7. Dorymyrmex pyramicus Roger, 1863 [40] *(Figures 9(c)-9(d); 10(e)-10(f); 14)*

Prenolepis pyramica Roger, 1863: 160 [40]. Description of worker.

Dorymyrmex pyramicus (Roger): Mayr, 1870 : 947 [59]; Mayr, 1870b: 394 [60].

Dorymyrmex pyramicus: Emery, 1888: 362 [3]. Description of male.

Dorymyrmex (*Conomyrma*) *pyramicus* (Roger): Forel, 1913: 350 [11].

Dorymyrmex pyramicus (Roger): Gallardo, 1916: 54 [41] (w, q, m redescribed).

Dorymyrmex (Conomyrma) pyramicus (Roger): Santschi, 1925: 244 [61].

Dorymyrmex (Conomyrma) pyramicus G. C. Wheeler & J. Wheeler, 1951: 83 [62] (description of larvae).

Conomyrma (Conomyrma) pyramica (Roger): Kusnezov, 1952: 430 [22]; Snelling, 1973: 4 [25]; Goñi et al. 1984: 366 [63] (karyotype).

Dorymyrmex pyramicus (Roger): Shattuck, 1992: 85 [15]; Shattuck, 1994: 85 [45]; Bolton et al. 2006 [46] (catalog).

5.7.1. Diagnosis

Worker. Promesonotal profile continuous, strongly convex. Head, mesosoma, and legs reddish-yellow with gaster dark brown to black. Psammophore reaches the posterior margin of hypostoma.

Queen. Head subquadrate, maximum width at level of compound eyes; scape surpassing the posterior margin of head by no more than its maximum width; mandibles feebly striated with four teeth and two denticles on the masticatory margin; posterior margin of head straight. Forewing with only one large cubital cell.

Male. Head wider than long; posterior margin of head medially concave; scape long, surpassing the level of compound eyes, pygostyle poorly developed.

5.7.2. Descriptions

Worker

Measurements. ($n = 10$): HL: 0.78–0.88; HW: 0.73–0.78; EL 0.20–0.25; EW: 0.1–0.13; SL: 0.78–0.85; WL: 1.18–1.20; CI: 89–94; SI: 97–100; REL: 26–29; OI: 50–52; TLI: 137–152.

Head, mesosoma, and petiole concolorous reddish yellow; gaster always darker than the rest of the body, frequently dark brown to black. Whitish and sparse pubescence covering all body tagma. *Head* (Figure 9(c)): posterior margin of head feebly emarginated medially. Psammophore with short hairs forming a triangle; the hairs in the top line are dispose near to the foramen magnum and do not reach the oral cavity. Upper seta line of psammophore close to anterior margin of foramen magnum. *Mesosoma* (Figure 9(d)): pronotum with two subdecumbent short setae. Promesonotal profile strongly convex. Mesonotum not angulated, as in *D. insanus*. Propodeal tubercle well developed and directed dorsally. Declivitous face of propodeum, straight. *Metasoma*: petiolar scale pointing dorsally.

Queen

Measurements. ($n = 2$): HL: 1.15–1.18; HW: 1.18–1.2; EL: 0.33–0.4; EW: 0.13–0.15; IOD: 0.73; SL: 0.93–0.95; WL: 1.93–1.95; CI: 102-103; SI: 80-81.

Color and pubescence as in worker. *Head*: subquadrate; scape surpassing the posterior margin of head by no more than its maximum width; mandibles feebly striated, four teeth and two denticles on the masticatory margin; posterior margin of head straight; external margin of compound eye included in head surface in frontal view; ocelli hyaline, close to the posterior margin of head. *Mesosoma*: parapsidal furrows not well developed but parallels, axilla not divided medially. Anepisternum incompletely separated from katepisternum by a short suture. Forewing with only one close cubital cell; radial cell open. *Metasoma*: petiolar scale low, stout, and rounded apically.

Male

Measurements. ($n = 2$): HL: 0.6–0.64; HW: 0.7–0.75; EL: 0.2–0.26; EW: 0.13–0.14; SL: 0.34; WL: 1.48–1.50.

Body color similar to worker and queen. *Head* (Figure 10(e)): subquadrate, wider than long; lateral side of clypeus feebly projected forward; mandibles thin, with four teeth, apical tooth more than twice longer than the others; scape long, surpassing posterior margin of compound eyes. *Mesosoma* (Figure 10(f)): parapsidal furrows present and parallel, axilla not divided medially; forewing with one close radial cell and no cubital nor discoidal cell. Hindwing with two basal cells. *Metasoma*: petiole stout and low, directed dorsally, ventral process round, feebly developed. Pygostyle poorly developed; gonystylus stout covered with few erect setae; digitus short and no cuspis. Aedeagus with serrate ventral border.

Examined Material. COLOMBIA: Bolivar, Zambrano, 1w (IaVH), no more data available.

Additional Examined Material. Outside Colombia: ARGENTINA: La Rioja: Guayapa, 17w (IFML). Salta: PN El Rey, 2w (IFML); Campo Quijano, 19w (IFML). Tucumán: Salinas, 12w (IFML); Villa Nougués, 123w, 37q, 21m (IFML); Tucumán, 2w (MZSP). BRAZIL: Bahia: Rodelas, 2w (CEPEC); Domingos, Ilhéus, 1w (CEPEC); Simões Filho, 1w (CEPEC); Planalto, 1w (CEPEC). ES: Cda. Barra, 1w (CEPEC); REG-Linh, 1w (CEPEC); Itaúnas, Cord. De Antonia. 1w (MZSP); Rio de Janeiro: Macaé, 2w (MZSP); MT: Rondonopolis, 1w (MZSP); Tres Lagoas, 4w (MZSP); RS: Tramandaí, 49w (MZSP); Porto Alegre, 2w (MZSP). SC: Florianópolis, Praia da Joaquina, 1w (MZSP). CUBA: Guavia Cave, 3w (LACM). GUATEMALA: Escuintla, 20w (USNM); PARAGUAY: Central, Areguá, 3w (IFML); URUGUAY: Carmelo, 2w (LACM).

Geographic Distribution. Central and South America. Cuba, Guatemala, Colombia (literature records), Brazil (Bahía, Espírito Santo, Mato Grosso, Rio de Janeiro, Rio Grande and Santa Catarina States), Uruguay, Paraguay, Argentina (La Rioja, Salta, and Tucumán Provinces).

Etymology. The name of *pyramicus* refers to the typical tubercle or cone on propodeum present in all species of *Dorymyrmex*, giving to the propodeal angle an appearance of pyramid. Several *Dorymyrmex* species are known as "pyramid ants."

5.7.3. Comments. This species was described by Roger [40] as *Prenolepis pyramica* from one worker collected in Bahia, Brazil, and transferred to *Dorymyrmex* by Mayr [59]. Unfortunately, Wheeler [55] erroneously stated that *Formica insana* Buckley [39] (*Dorymyrmex insanus*) was an "undoubtedly synonym" of *D. pyramicus*. Originally, *Formica insana* was described from Texas and southern states of the United States. Workers of *D. insanus* are concolorous black to dark brown, as Snelling [25] says (see Figures 8(a) and 8(b)), differing from workers of *D. pyramicus* that are typically bicolored, as we describe above. Nevertheless, this mistake persisted, authors having considered *D. pyramicus* as a species with a very large distribution, from the south part of the United States throughout the Caribbean area to the north of Argentina. We only found one worker of *D. pyramicus* in Colombia, but there are bibliographic records that confirm its presence in this country [35]. Apparently, *D. insanus* and *D. pyramicus* are only sympatric in Central America (Cuba and Guatemala) and in the north part of South America (Colombia, Venezuela, and Northern Brazil). Beside color, *D. pyramicus* and *D. insanus* can be differentiated by the shape of head in full-face view and the shape of the promesonotal profile (continuous in *D. pyramicus*, interrupted at its end in *D. insanus*).

5.8. Dorymyrmex tuberosus Cuezzo & Guerrero n. sp. *(Figures 11(a)–11(c); 14)*

5.8.1. Diagnosis

Worker. Dark brown; whitish pubescence in all tagma; scape long; posterior margin of head concave in the middle; mesonotal profile interrupted by a short but distinct tubercle, besides a thin tubercle directed dorsally between dorsal and declivitous faces of propodeum.

5.8.2. Description

Worker

Measurements. Holotype (paratype): HL: 0.88 (0.93); HW: 0.80 (0.88); EL: 0.24 (0.25); EW: 0.20 (0.23); SL: 1.04 (0.98); COD: 0.18 (0.2); WL: 1.18 (1.20); CI: 90 (95); SI: 105 (106); REL: 27 (28); OI: 83 (90); TLI: 134 (131).

Concolorous, dark brown with the lateral corners of the clypeus reddish brown. Whitish and dense pubescence covering the all body. *Head* (Figure 10(a)): longer than wide. Compound eye placed in the middle of the lateral part of cephalic capsule, not surpassing the lateral margins. Psammophore with short hairs disposed in a triangle; the hairs on the top line are close to the foramen magnum and not reach the oral cavity. Scape long, surpassing the posterior margin of head. Mandibles strongly striate, with five teeth and at least two denticles along the masticatory margin and numerous denticles along the basal margin. Posterior margin of head with a feeble medial emargination. *Mesosoma* (Figures 11(b) and 11(c)): in profile with two tubercles, one in the posterior end of the mesonotum and one between the dorsal and the declivitous faces of the propodeum. *Metasoma*: petiolar scale directed dorsally, thin apically.

Queen and Male. Unknown.

Examined Material. Type series.

Geographic Distribution. COLOMBIA: (Bolivar: San Juan Nepomuceno, Santander: Bucaramanga, type localities).

Etymology. The name *tuberosus* refers to the presence of two tubercles on the dorsal face of both mesonotum and propodeum.

Natural History. Known only from museum collections. Specimens of Santander were collected in the campus of the Industrial University of Santander and those deposited in LACM have a label saying: "ex-Manihot," probably referred to be collected in a cultivate place. According to this data, *D. tuberosus* prefers, as several species of *Dorymyrmex,* disturbed habitats.

Examined Material. Type series.

5.8.3. Comments. Two well-developed tubercles on the mesosoma, along with whitish pubescence, and general dark color can be useful to differentiate *D. tuberosus* from the other species of *Dorymyrmex* found in Colombia. This species could be confused with *D. brunneus* by color but differs by the following characters: shape of the head, slightly wider after compound eyes and always with an emargination in the middle of posterior margin. Pro-mesosomal profile always at level or higher than the apex of propodeal cone. In contrary to *D. brunneus, D. tuberosus* has well-developed tubercles on the mesonotum.

5.9. Dorymyrmex xerophylus Cuezzo & Guerrero n. sp. (Figures 12(a)–12(c); 14)

5.9.1. Diagnosis

Worker. Small ants, TLI: <117. Head oval in full-face view, lateral margins parallel, and posterior margin strongly convex. Compound eyes not surpassing the sides of cephalic capsule. Propodeal tubercle short, stout, and lower than mesonotum. Pubescence dense and golden.

5.9.2. Description

Worker

Measurements. Holotype (Paratype): HL: 0.60 (0.62). HW: 0.44 (0.46). EL: 0.18 (0.18). EW: 0.12 (0.12). SL: 0.52 (0.54). WL: 0.70 (070). CI: 73 (74). SI: 87 (87). REL: 41 (39). OI: 67 (67). TLI: 117 (113).

Concolorous, light brown; only tergites 2 and 4 of gaster, darker. *Head* (Figure 11(a)): longer than wide. Mandibles feebly striate (only seen at more than 100x), with 4 teeth and 2 denticles. Compound eye well-developed in the first part of head in full-face view. Psammophore with only few hairs disposed in the central part of ventral cephalic face, not reaching the oral cavity; those hairs are equidistant between

the foramen magnum and the oral cavity. Scapes short (SI = 87). *Mesosoma* (Figures 12(b) and 12(c)): dorsal face of pronotum with two erect hairs lengthless than the greatest width of the antennal scape. Mesonotum straight in profile, lower than pronotum, only interrupted in its posterior end, forming a declivitous face continuous with propodeum. *Metasoma*: petiolar scale wide, thin and rounded apically.

Queen And Male. Unknown.

Examined Material. Type series.

Geographic Distribution. COLOMBIA (La Guajira and Magdalena, type localities).

Etymology. The specific name is in apposition, refers to the extremely arid environments where *D. xerophylus* usually nests.

Natural History. Ants of Magdalena were collected with sausage baits, between 10:00 and 11:00 a.m. Apparently, *D. xerophylus* prefers, like other *Dorymyrmex*, open areas of dry forests in lowlands. Specimens were found in dry forest of Sierra Nevada de Santa Marta, dominated by Poaceae. This habitat is subjected to occasional human disturbances resulting from logging. Ants collected in La Guajira live in restored areas of opencast coal mines, abandoned 10 years ago.

5.9.3. Comments. *D. xerophylus* is close to *D. goeldii* but differ by size, pubescence, and color. In Colombia, only this two species have the posterior margin of head strongly convex and head more than twice longer than wide (CI: 73-74 and 77–40 for *D. xerophylus* and *D. goeldii*, resp.).

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