

José Celestino Mutis, the ants, and *Pheidole mutisi* sp. nov.

José Celestino Mutis, las hormigas y *Pheidole mutisi* n. sp.

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Abstract: A new ant species, *Pheidole mutisi* (Hymenoptera: Formicidae: Myrmicinae), is described in honor of José Celestino Mutis, the Neogranadian “Wiseman” who conducted the first studies on ants in the New World, although his writings on the subject remained unknown for many years. Here we offer some general comments about Mutis’ myrmecological studies. This publication commemorates the 200th anniversary of Mutis’ death. The new species is characterized by its smooth, shiny body without standing pilosity (major) and long propodeal spines (major and minor).

Key words: Formicidae. New Species. Myrmicinae. Colombia.

Resumen: Se describe una nueva especie de hormiga, *Pheidole mutisi* (Hymenoptera: Formicidae: Myrmicinae), en honor del sabio naturalista José Celestino Mutis, quien realizó las primeras observaciones sobre hormigas en el Nuevo Mundo, aunque sus escritos permanecieron desconocidos por mucho tiempo. Se ofrecen algunos comentarios generales sobre las observaciones mirmecológicas de Mutis. Con esta publicación se conmemoran los 200 años de la muerte de Mutis. La nueva especie se separa por su cuerpo liso y brillante, sin pilosidad conspicua (soldado), así como las largas espinas propodeales (soldado y obrera).

Palabras clave: Formicidae. Nueva Especie. Myrmicinae. Colombia.

Introduction

“In his first letter to me, my dear gentlemen Linnaeus, whom I respect as a mentor, asked if I would work on a memoir on the ants of America...”
(Mutis, letter to von Pajkull).

November 11, 2008 marks the 200th anniversary of the death of naturalist José Celestino Mutis, leader of the Botanical Expedition in New Granada and pioneer of natural sciences in America. To commemorate this occasion we present a brief profile of Mutis as a pioneer in the study of ants, and describe a new species of ant in his honor.

Mutis, the first years

When the archbishop Messia de la Cerda brought José Celestino Mutis into his retinue in 1760 and asked if he would accompany him to the New World as his personal physician, he never imagined that this same man would achieve anything beyond looking after his basic medical care. Mutis did faithfully serve his employer as a physician in the territory of New Granada (now Colombia, Venezuela and Ecuador), but it was his passion for nature, the new nature of a New World, that inspired him to embark for the Americas without thinking twice. So accomplished was he in his scholarly pursuits that he soon became known as “Mutis the Wiseman.”

In addition to being a physician and a priest, Mutis was a naturalist with broad interests in astronomy, mathematics, meteorology, mineralogy, botany and zoology, especially entomology. With a great passion for the observation and study of nature, Mutis was in his element: the exuberant and little-explored lands of the tropics. The epic days of Discovery and

of The Conquest had already passed and the Americas had become great fiefdoms for the European powers, ripe for exploitation.

With few exceptions (like the expeditions to Peru and Chile), there had not been any interest in scientific exploration of the *Nuevo Reino*. Any interest in a particular region or its resources (minerals or timber) obeyed the desire of the crown to obtain money or resources for purely practical ends. Mutis found himself in New Granada in a world that was culturally backward, intellectually weak and conservative, “in the dark” as would later be said by Francisco José de Caldas.

Mutis arrived with a desire to speak of new ideas, perceived to be dangerous, such as the ideas of Copernicus (who attracted the ire of the Inquisition) and wanting to understand “the curiosities of Nature.” He had to wait almost 20 years until finally, in 1783, the extraordinary scientific adventure that would be called “The Botanical Expedition” would begin. Under his guidance, native peoples worked alongside those with formal training to study on a grand scale (in space and time) the flora, fauna, and minerals of the *Nuevo Reino*.

While Mutis was waiting patiently for the Spanish crown to authorize the expedition and send resources, he spent several years in the mines of El Sapo, in the north of Tolima, in central Colombia, “administering” the mines, although this was really an excuse to dedicate himself to the observation of nature and its creatures (Hernández de Alba 1983a, b).

In reading Mutis’ memoirs and other writings, and the works of Mutis scholars, we see the image of a man profoundly interested in the fauna of this new territory, especially its insects. Hernández de Alba (1983c:265) unapologetically referred to him as “Mutis the entomologist,” and based on reading Mutis’ *Journal of Observations*, we venture to say that the Wiseman himself would have been flattered to have been called “Mutis

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the myrmecologist,” or “Mutis the ant scholar.” In one of his letters he writes, “[I] am determined [to continue] our correspondence about the insects; they have drawn all of my affection, without detracting from my interest in the other branches of natural history (Hernández de Alba 1983c).

Mutis the myrmecologist

Mutis spent six years, from 1777 forward, in the Cerro El Sapo (Toad Mountain), as foreman of the mines of the same name. Approximately 420 species of plants and more than 80 animals have been recorded from this locality (Echeverry, without date). An additional 24 “groups” (species, forms) of ants were documented from this locality, as recounted in *History of the Ants*, prompting Mutis to exclaim that this mountain should have been called “Ant Mountain” (Hernández de Alba 1983c). In subsequent years, the Botanical Expedition would radiate from this locality, covering a broad area between Tolima and Cundinamarca. From those explorations came many observations that enriched our concepts of variation within insects and other groups of arthropods.

In a letter to the Baron von Pujkall, Mutis writes excitedly that his exploration of the world of the ants began at the request of the naturalist Carl Linnaeus. In fact, in his first letter to Mutis, Linnaeus asked his colleague on the other side of the world to prepare a memoir (synopsis) of the American ants. Linnaeus was as eager to receive specimens and notes about ants of New Granada, as he was to receive plant specimens! It seems that Mutis took the request to heart and his enthusiasm is evident in his *Journal of Observations*, in which he reports on as many as twenty ant species (Hernández de Alba 1983a).

Unfortunately Mutis’ original “memoir” on ants was lost. Nevertheless, a second memoir remained behind (Hernández de Alba 1983c:265-268), as did his *Journal of Observations*, in which Mutis compiled a series of observations and meditations that comprise the first written treatment of American ants (Hernández de Alba 1983a, b). The Wiseman observed, collected, compared, made microscopic examinations, interviewed native people and returned continually to the field, making quantitative and qualitative notes. Some of his observations were original, new and unique; others were new to him, although already known in the Old World. As such, Mutis at times lamented his isolation and limited access to books (although his ca. 200 books at El Sapo were a luxury).

Mutis was the first to establish, for example, the nomadic character of the legionary ants (*Eciton*), referring to insects that “had no fixed home” and noting how their hordes destroyed everything they encountered. He also wrote about subterranean legionnaires, lustrous ants that do not sting, but bite, and that we now call *Labidus*. He was particularly intrigued by the habits of the leaf-cutter ants and marveled at their complex nests; through observation and comparative study, he worked out the nature of their caste system, including the queen, the males, the soldiers and the workers. Early on, Mutis warned about the danger these ants present to mankind, by causing major crop damage.

Reading his scientific writings (Hernández de Alba 1983c) and his *Journal*, we estimate that about twenty ant species, perhaps more, were examined by The Wiseman (Table 1). In weighing Mutis’ contribution to myrmecology, we have to take into account several handicaps: the scarcity of time he was able to devote to the ants, given his many other tasks and

responsibilities and, above all, the diminutive size of the ants, which makes description a great challenge. In interpreting his notes, we should also remember that, for many of his ants, Mutis had to resort to native names or apply names of his own, since the science of classification was just emerging in Europe with the publication of Carl Linnaeus’ *Systema Naturae*. Mutis only had access to the 12th edition of the *Systema Naturae*, published in 1766. The correspondence between Mutis and the Swedish naturalist was fruitful for both parties, although unfortunately Mutis’ ants never got into Linnaeus’ hands.

Mutis recognized that the ants were more common in the lowlands than the highlands and also concluded that the American ants were new, being distinct from those of Europe. On several occasions, he also elaborated species descriptions. For example in one of the entries in his *Journal* he devoted almost two long pages describing in minute detail the “ant of death.” In spite of the limitations of his optical equipment, he documented details of the antennae, eyes, mesosoma and abdomen, with such clarity and precision that today we can determine that what he had in his hand was a *Cephalotes* ant: “these are innocuous and can remain still even when disturbed, seeming as though they are dead”. Not even Linnaeus himself wrote such thorough descriptions, nor did many of the myrmecologists working at the end of the 19th and start of the 20th centuries, men who generally devoted just a few vague and imprecise lines to describe a new species. Had Mutis had access to literature and formal training from his mentor, as well as more time, he surely would have been a good taxonomist, and the premier taxonomist working with ants.

Upon his death in 1808, and the demise of the Botanical Expedition shortly after, a part of Mutis’ specimens, illustrations and notes would be sent to Spain, but unfortunately another part was lost on the way. With the passing of the years, the magic of his writings remained hidden from the lights of History, Culture and Science.

Although Linnaeus named a new plant genus in honor of “the wiseman”, *Mutisia*, we venture to think that Mutis would have been pleased to have his name associated with a new species of ant, the insects that inspired him with so much passion. And not just any ant, but a species belonging to one of the two most diverse ant genera (perhaps the most diverse), *Pheidole*, some of whose species will have passed right across his desk as he worked, taking notes well into the night, by the light of a single candle.

Methods

Measurements and indices follow the proposal of Longino (2008) in the *Pheidole* Working Group and the definitions below are taken from such page. Measurements were made using an Optical Instruments stereomicroscope at 80X magnifications and a white light lamp. All measurements are in mm.

Measurements: *HL* Head length: Maximum length, in full face view, from the apex of the clypeus to middle of vertex; *HLA* Anterior head length: Perpendicular distance, in full face view, between two horizontal lines, one tangent to anterior most projection of clypeus, one tangent to lower most margin of compound eye; *HW* Head width: Maximum width in full face view (excluding eyes); *SL* Scape length (excluding basal condyle), in straight line distance; *EL* Eye Length: Maximum length of compounded eye; *ML* Mesosoma length: In lateral

Table 1. List of common names used by Mutis in his *Diarios* edited by Hernández de Alba (1983a, b). In front of each name the probable taxonomic equivalent and some notes are offered.

Common name in spanish (English in brackets)	Genus or species	Notes
Hormigas de agua (Water ants)	<i>Monomorium</i> or <i>Pheidole</i> , other small Dolichoderinae	Small, opportunists, some invading houses, and some with “tar” odor
Hormigas ajiseritas (Little spice ants)	<i>Monomorium</i>	Small, with some “spicy flavor when accidentally eaten”
Hormiga arrancapedazos (Bite pieces ants)		Without any clue; Mutis postpone their description “for other day”
Hormiga arriera (Arriera ants)	<i>Atta</i>	One of the common ant mentioned by Mutis, who also called these as <i>culonas</i> and describe their use as human food
Hormiga bizcochuelera o maravilla (Little cake or marvellous ants)		As in water ants
Hormiga cazadora (Hunter ant)	Ponerinae, perhaps <i>Pachycondyla</i>	
Hormiga cazadora leonada (Leonine hunter ant)	<i>Eciton</i>	Mandibles conspicuous, nomadic habits, highly predators than sporadically invade human houses, where are welcomed
Hormiga cazadora negra (Brown ant)	<i>Eciton</i>	As above
Hormiga colorada (Brown ant)		A single mention as <i>mulatas</i> enemies
Hormiga culona (Big ass ant)	<i>Atta cephalotes</i> or <i>A. sexdens</i>	Human food source
Hormiga cucuncha (Cucuncha ant)	Formicinae	The workers (<i>espadones</i>) transport males and Mutis describe this behavior as “danza de las cucunchas” (Cucunchas dance)
Hormiga flechera (Arrow ant)		Strong and painful sting
Hormiga Guate (Guate ant)	<i>Labidus praedator</i>	Smooth and shining, subterraneous and predator
Hormiga melcocha o descolorida (Pale ant)		Mutis mention the big headed males and the females in this ant
Hormiga melórica o solitaria (Meloric or solitary ant)		Big headed soldier (<i>cabezón</i>), name provided by the Muti’s gardener
Hormiga de muerto (Dead ant)	<i>Cephalotes</i>	Mutis describes carefully one <i>Cephalotes</i> species
Hormiga mulata (Mulate ant)		A variety of <i>Arriera</i> ?
Hormiga musaela (Banana ant)	Perhaps <i>Crematogaster</i>	Small and inoffensive ant, nesting in the banana’s tree bráctees
Hormiga pataloa (Lon legged ant)	<i>Eciton</i>	Called also hunter ants. Mutis write about the lack of “fixed home” and transport of immatures by workers
Hormiga rascona (Scratchy ant)		Supposedly enemies of leaf cutting ants
Hormiga de Roso (Roso’s ant)		Lover of <i>Palo de Cruz</i> flower nectar
Hormiga solitaria (Solitary ant)		Other name for the <i>melorica</i> ants
Hormiga tambocha (Tambocha ant)	<i>Eciton</i>	Blind, see <i>pataloas</i>
Hormiga de tierra (Ground ant)	<i>Pheidole</i>	Small, dark, dimorphic, nuisance in houses
Hormiga tigre cabeza (Big headed tiger ant)	<i>Azteca</i> ?	Mutis describe the nest in tree branches, including the queen, with structures similar to sponges or bee hives. This is a puzzling observation, because no known ant made nest with panels “Bigger and more valiant than their foes the <i>pataloas</i> ”
Hormiga tigre (Tiger ant)		
Hormiga tijereta (Scissor ant)		A nest is mentioned, including males
Hormiga vagabunda (Tramp ant)	<i>Eciton</i>	See <i>pataloa</i>
Hormiga de la vara santa (Vara Santa ant)	<i>Pseudomyrmex triplarinus</i>	Slender and stinging ants

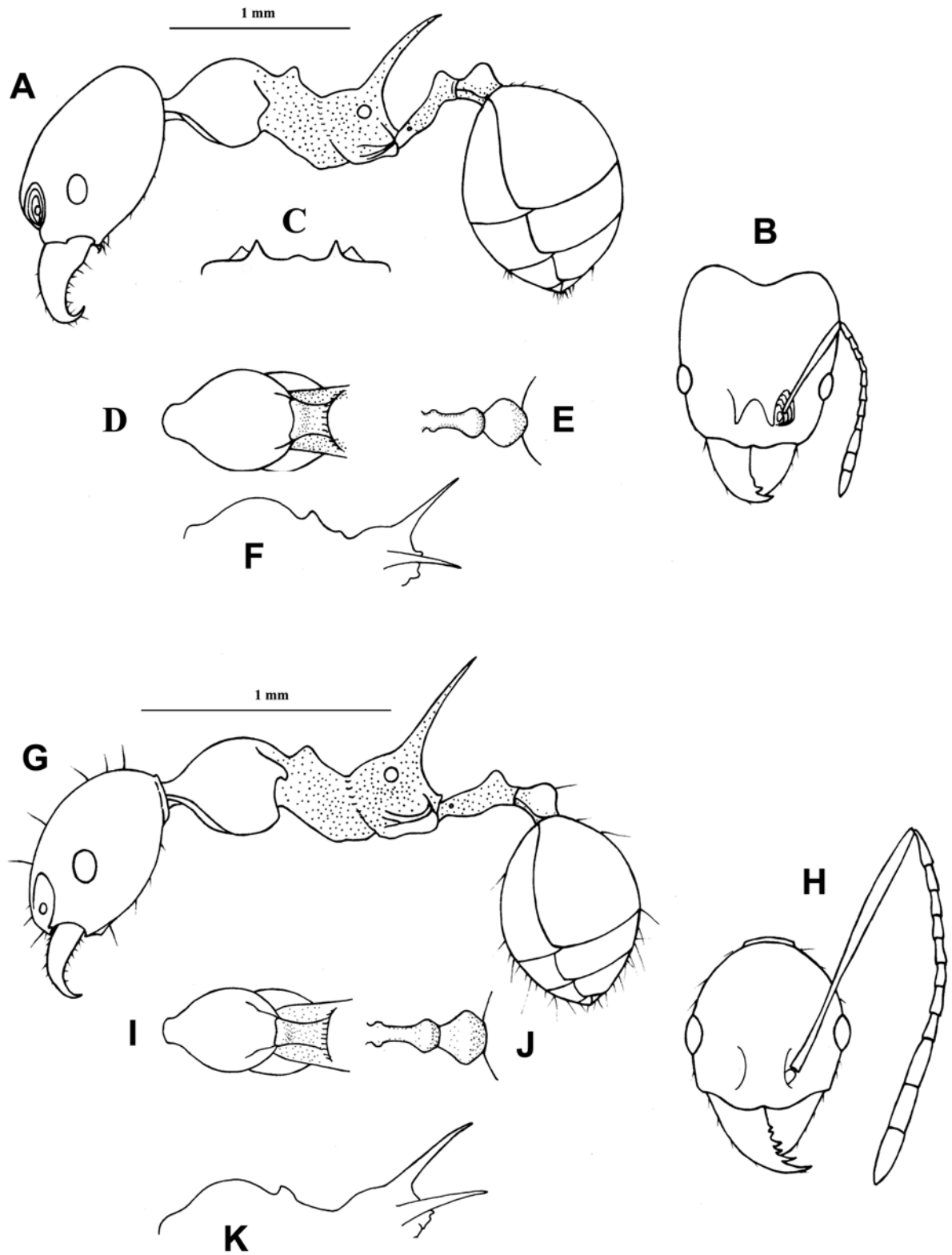


Figure 1. *Pheidole mutisi* new species. **A-F.** Holotype Soldier. **A.** Body in lateral view. **B.** Head in full face view. **C.** Hypostomal bridge. **D.** Promesonotum in dorsal view. **E.** Petiole and postpetiole in dorsal view. **F.** Mesosoma outline in dorsal oblique view. **G-K.** Paratype worker. **G.** Body in lateral view. **H.** Head in full face view. **I.** Promesonotum in dorsal view. **J.** Petiole and postpetiole in dorsal view. **K.** Mesosoma outline in dorsal oblique view. Scale, 1 mm.

view, length of mesosoma, diagonally from posteroventral corner of mesosoma to farthest point on anterior face of pronotum, excluding the neck; *PSL* Propodeal spine length: Distance from inflection point between dorsal face of propodeum and base of spine to tip of spine; *PMG* Depth of promesonotal groove: A line tangent to dorsalmost convexities of pronotum and mesonotum, measuring perpendicular distance from this line to bottom of promesonotal groove; *SPL* Propodeal spiracle width: Includes cuticular ring; *PTW* Petiole width (dorsal view); *PPW* Postpetiole width (dorsal view); *IHT* Distance between inner hypostomal teeth (major workers only); *OHT* Distance between outer hypostomal teeth (major workers only).

Indices: *CI* Cephalic index : $HW / HL \times 100$. *SI* Scape index: $SL / HL \times 100$. *PSLI* Propodeal spine index: $PSL / HL \times 100$. *PMGI* Promesonotal groove index: $PMG / HL \times 100$. *SPLI* Propodeal spiracle index: $SPL / HL \times 100$. *PPI* Postpetiole index: $PPW / PTW \times 100$. *HTI* Hypostomal tooth index: $IHT / OHT \times 100$. The description follows the format of Wilson (2003). The pictures were taken in the Ant Room, of the Museum of Comparative Zoology, Harvard University using the Automontage (Syncroscopy inc) processing software.

Depositories

ICN. Insect Collection, Instituto de Ciencias Naturales, Universidad Nacional de COLOMBIA, Bogotá D.C., Colombia. MCZ. Museum of Comparative Zoology, Harvard University, Cambridge, USA.

Pheidole mutisi new species (Figs. 1, 2).

Type (Major). COLOMBIA, Nariño. Altaquer. Barbacoas. El Barro. Nambí Natural Reserve, 1°18'N 78°05'W, 1200 m., 1-march-2006, S. Cabrera leg. No. 32 (Deposited in ICN); Paratypes (One major, two minors), same data (Deposited in ICN, MCZ).

Etymology. Named after José Celestino Mutis, the distinguished XVIII naturalist, named "The Wiseman", a Neogranadinian who realized the first study of habits in tropical ants in the Americas.

Diagnosis. A medium size member of the *P. diligens* group, distinguished by the following traits.

Major. Light brown, medium sized, head slightly longer than broad, sides slightly convex, vertex deeply convex in the middle,

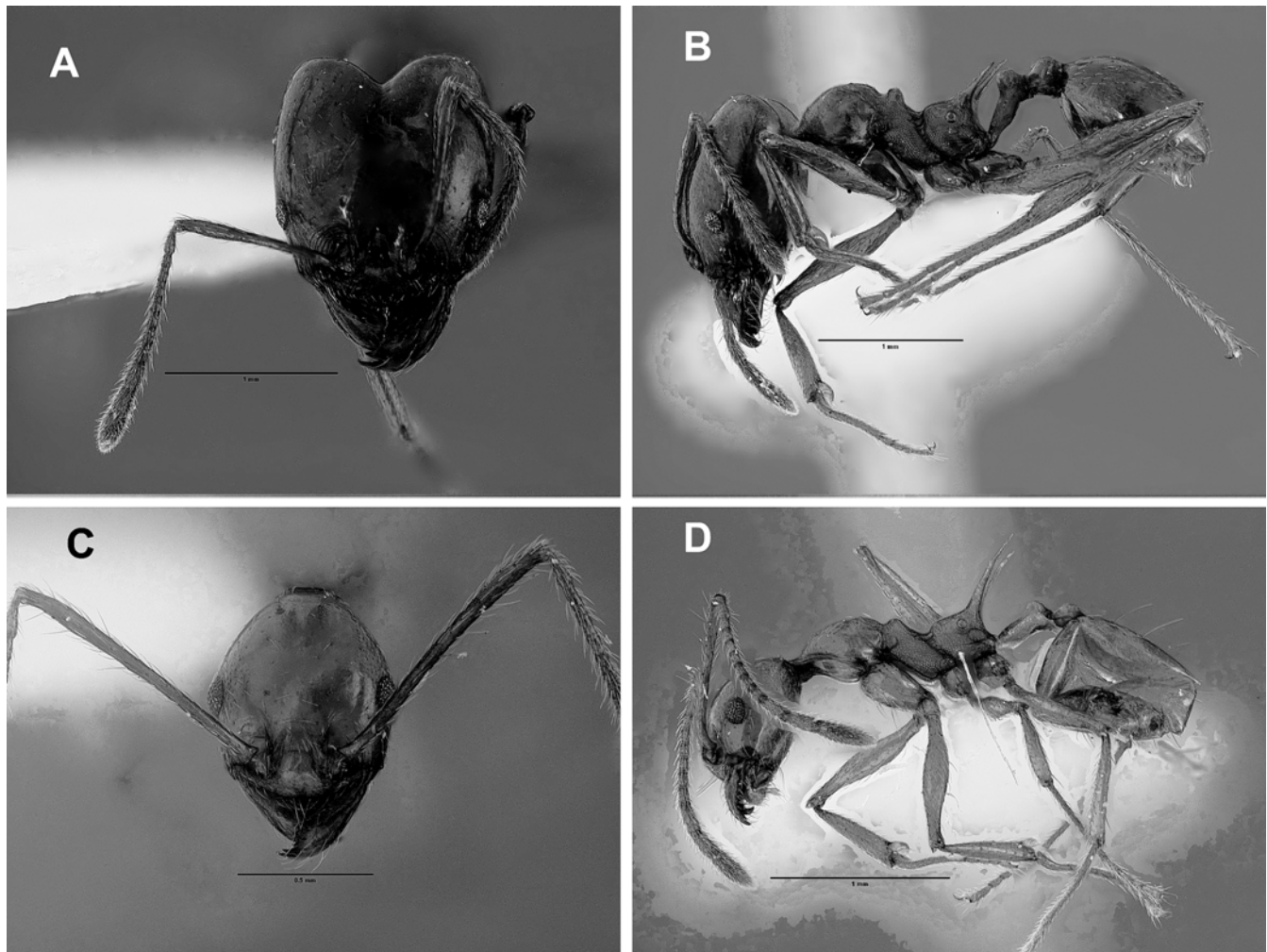


Figure 2. *Pheidole mutisi* new species. **A.** Head in full face view, holotype major worker (soldier). **B.** Body in lateral view, holotype major worker (soldier). **C.** Head in full face view, paratype minor worker. **D.** Body in lateral view, paratype minor worker.

in lateral view, mesonotum narrowly produced, propodeal spines very long, surpassing petiolar length; head, mandibles, promesonotum, coxae, dorsum of petiole and postpetiole and gaster smooth and shining, mesopleuron and propodeum reticulate, sides of petiole and postpetiole finely reticulate; except for appendages, body completely lacking pilosity.

Minor. Light brown, occiput narrowed with short nuchal, propodeal spines in side view noticeably longer than petiole, and from above divergent; dorsum of head, petiole and gaster with long, erect hairs (largest about 0.26 mm), rest of body (except appendages) without pilosity.

Measurements and indices. Holotype major (paratype minor) HL 1.38 (0.80) HLA 0.35 (0.30) HW 1.20 (0.61) SL 0.98 (1.07) EL 0.19 (0.14) ML 1.35 (1.08) PSL 0.50 (0.50) PMG 0.08 (0.06) SPL 0.08 (0.04) PTW 0.23 (0.11) PPW 0.33 (0.2) IHT 0.44 OHT (0.50 aprox.) CI 87 (77) SI 71 (134) PSLI 36 (63) PMGI 5.4 (7.1) SPLI 5.8 (5.4) PPI 145 (175) HTI 88 (aprox.).

Color. Major and minor: Body light brown, in major mandibles and genae dark brown.

Queen and male. Unknown.

Range. Known only from the type locality.

Biology. Collected with Winkler trap in litter of montane humid forest.

Comments. The very long propodeal spines, body smooth and shining lacking pilosity (major) distinguishes this new species from any other New World *Pheidole*.

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