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# A taxonomic revision of South American species of the seed-harvester ant genus Pogonomyrmex (Hymenoptera: Formicidae). Part II 

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#### Abstract

This paper provides a taxonomic revision and reviews natural history for 35 South American species of the seed-harvesting ant genus Pogonomyrmex. Species treated herein mostly comprise the P. rastratus-group; four species are revived from synonomy, three taxa are elevated from subspecies to species, five taxa are synonymized, and 20 new species are described. The following taxa are revived from synonomy: $P$. intermedia Menozzi, $P$. semistriata Emery, $P$. spinolae Emery, and $P$. weiseri Santschi. The following taxa are raised from subspecies to species: P. leonis Kusnezov, P. pulchellus Santschi, and $P$. sanmartini Kusnezov. The following new synonymies are proposed, with the senior synonym listed first, and the junior synonym(s) in parentheses: $P$. carbonarius Mayr $(=P$. kusnezovi Cuezzo \& Claver, $=P$. weiseri var. neuquensis Santschi, $=P$. variabilis Santschi); $P$. vermiculatus Emery ( $=P$. vermiculatus var. chubutensis Forel, $=P$. vermiculatus var. jorgenseni Forel). The following new species are described: P. apterogenos, P. araucania, P. atacama, P. bolivianus, P. colca, P. cusquena, P. excelsior, P. forelii, P. granulatus, P. lagunabravensis, P. loaensis, P. mapuche, P. maulensis, P. pichachen, P. propinqua, P. santschii, P. strioligaster, P. tafi, P. varicolor, and P. wilsoni. One species treated herein has brachypterous queens ( $P$. atacama), one species has dimorphic queens (winged and brachypterous in $P$. longibarbis), and two species have ergatoid (permanently wingless) queens and ergatoid males ( $P$. apterogenos, $P$. laguanbravensis); the latter two are the only known ant species in which both sexual castes are only ergatoid. I also provide keys for workers and queens (in English and Spanish), diagnoses for males, photographs of known castes, distribution maps, and a summary of known biology.


Key words: Pogonomyrmex, queen phenotypes, South America, seed-harvester ants, species key, taxonomic revision

## Resumen

Este artículo proporciona una revisión taxonómica y revisa la historia natural de 35 especies sudamericanas de Pogonomyrmex. Las especies tratadas aquí comprenden principalmente el grupo P. rastratus; cuatro taxones se cambian desde el estado de sinonimia al estado de especie, tres taxones se elevan desde estado de subespecie a especie; cinco taxones se sinonimizan y se describen 20 nuevas especies. Los siguientes taxones son cambiados desde sinonimia a estado de especie: P. intermedia Menozzi, P. semistriata Emery, P. spinolae Emery, y P. weiseri Santschi. Los siguientes taxones son elevados desde estado de subespecie a especie: P. leonis Kusnezov, P. pulchellus Santschi, and P. sanmartini Kusnezov. Se proponen las siguientes nuevas sinonomías, con el sinónimo mayor en primer lugar, y el (los) sinónimo(s) menor(es) entre paréntesis: $P$. carbonarius Mayr ( $=$ P. kusnezovi Cuezzo \& Claver, $=P$. weiseri var. neuquensis Santschi, $=$ $P$. variabilis Santschi); $P$. vermiculatus Emery ( $=P$. vermiculatus var. chubutensis Forel, $=P$. vermiculatus var. jorgenseni Forel). Se describen las siguientes nuevas especies: P. apterogenos, P. araucania, P. atacama, P. bolivianus, P. colca, P. cusquena, P. excelsior, P. forelii, P. granulatus, P. lagunabravensis, P. loaensis, P. mapuche, P. maulensis, P. pichachen, P. propinqua, P. santschii, $P$. strioligaster, $P$. tafi, $P$. varicolor, y $P$. wilsoni. Una especie aquí tratada tiene reinas braquípteras ( $P$. atacama), una especie tiene reinas dimórficas (aladas y braquípteras en $P$. longibarbis) y dos especies tienen reinas ergatoides (permanentemente sin alas) y machos ergatoides ( $P$. apterogenos, $P$. laguanbravensis); las dos últimas son las únicas especies de hormigas conocidas en las que ambas castas sexuales son sólo ergatoides. También proporciono claves para obreras y reinas (en inglés y español), diagnosis para los machos, fotografías de las castas conocidas, mapas de distribución y un resumen de la biología conocida.

Palabras Clave: Pogonomyrmex, fenotipos de reinas, Sudamérica, hormigas recolectoras de semillas, clave para especies, revisión taxonómica.

## Introduction

The seed-harvester ant genus Pogonomyrmex (subfamily Myrmicinae) consists of 68 described species that occur as three biogeographic faunas, one in North America ( 32 species) (Bolton, 2020), one on the Caribbean Island of Hispaniola (3 species) (Johnson \& Cover, 2015), and one in South America (33 species) (Bolton, 2020; Johnson, 2015; Johnson \& Moreau, 2016); no species are common to any two areas. Recent revisions of Pogonomyrmex include Hispaniola (Johnson \& Cover, 2015), South American species groups other than P. rastratus and P. brevibarbis (Johnson, 2015), and three species that were moved from Pogonomyrmex to the new genus Patagonomyrmex (Johnson \& Moreau, 2016).

This revision is the third paper in a series that attempts to stabilize taxonomy for South American species of the ant genus Pogonomyrmex so that we can better study their rich and interesting ecology, life history, and evolution
(see also Johnson, 2015; Johnson \& Moreau, 2016). The first of these papers revised 21 species in all species groups except for the $P$. rastratus and $P$. brevibarbis groups (Johnson, 2015), while the second paper transferred three species to the new genus Patagonomyrmex (Johnson \& Moreau, 2016). This paper revises South American species in the $P$. rastratus-group, and I also diagnose the male of $P$. abdominalis. The combination of Johnson (2015) and this paper includes all known South American species except for those in the P. brevibarbis-group and several morphologically difficult species (including $P$. andinus), bringing the total to 57 described species in South America and 92 for the entire genus. Numerous additional species undoubtedly remain to be discovered and described. This revision redescribes workers of all previously known species so as to provide a homogenous treatment in one language, especially given the often short original descriptions (sometimes one sentence) in five languages (English, French, Italian, Latin, Spanish). The keys herein include all known species of Pogonomyrmex in South America, providing a single source for identification. The taxonomic history of Pogonomyrmex is given in Johnson (2015).

## Methods

Morphological characters were photographed using a Spot Insight QE camera attached to a Leica MZ $12{ }_{5}$ microscope. Images were then projected onto a video monitor, and characters were measured using ImageJ (available at http://rsb.info.nih.gov/nih-image/). Measurements were calibrated using photographs of an ocular micrometer scaled in 0.1 mm increments. All measurements are given in mm (minimum-maximum). The following standard measurements were used:

| HL | Head Length: length of the head capsule excluding mandibles, in full-face view, from midpoint of the anterior clypeal margin to the midpoint of the posterior margin. |
| :---: | :---: |
| HW | Head Width: maximum width of the head immediately behind the eyes, measured in full-face view. |
| CI | Cephalic Index: $(\mathrm{HW} / \mathrm{HL}) \times 100$. |
| MOD | Maximum Ocular Diameter: maximum diameter of the eye measured with the head in full lateral aspect. |
| OI | Ocular Index: (MOD/HW) $\times 100$. |
| OMD | Oculo-Mandibular Distance: minimum distance from the anterior eye margin to the nearest point of the malar area (base of mandible). |
| SL | Scape Length: maximum straight line length of the antennal scape from apex to base. |
| SI | Scape Index: $(\mathrm{SL} / \mathrm{HW}) \times 100$. |
| PNW | Pronotal Width: maximum width of the pronotum, as seen from above, measured at a right angle to the longitudinal axis of the mesosoma. |
| HFL | Hind Femur Length: measured along the dorsal margin from the articulation with the trochanter to most distal tip of the femur. |
| HFI | Hind Femur Index: $(\mathrm{HFL} / \mathrm{HW}) \times 100$. |
| ML | Mesosoma Length: in workers, diagonal length of the mesosoma in profile from the point at which the pronotum meets the cervical shield to the posterior base of the metapleural lobe. In queens and males, diagonal length from juncture of mesoscutum and pronotum to the posterior base of the metapleural lobe. |
| PW | Petiole Width: maximum width of petiolar node, as seen from above, at a right angle to the longitudinal axis of the mesosoma |
| PPW | Postpetiole Width: maximum width of postpetiole, as seen from above, at a right angle to the longitudinal axis of the mesosoma. |

Collections are referred to by the following acronyms:

| CASC | California Academy of Sciences, San Francisco, California, USA |
| :--- | :--- |
| CPDC | Centro de Pesquisa do Cacau, Ilhéus, Bahia, Brazil |
| CRSC | Chris Smith Collection, Earlham College, Richmond, Indiana, USA |


| GGC | Guido Grandi Collection, Department of Agroenviromental Sciences and Technologies, University <br> of Bologna, Bologna, Italy |
| :--- | :--- |
| IFML | Instituto Fundación Miguel Lillo, Tucumán, Tucumán Province, Argentina |
| LACM | Los Angeles County Museum of Natural History, Los Angeles, California, USA |
| MACN | Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina |
| MCZC | Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA |
| MHNG | Museum of Natural History, Geneva, Switzerland |
| MLPA | Museo de La Plata, La Plata, Buenos Aires Province, Argentina |
| MMPC | Matt M. Prebus Collection, Tempe, Arizona, USA |
| MNNC | Museo Nacional de Historia Natural, Santiago, Región Metropolitana de Santiago, Chile |
| MNHN | Museo Nacional de Historia Natural, La Paz, Departamento La Paz, Bolivia |
| MSNG | Museo Civico di Storia Naturale di Genova, Genova, Italy |
| MUSM | Universidad Nacional Mayor de San Marcos, Museo de Historia Natural, Lima, Peru |
| MZSP | Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil |
| NHMB | Naturhistorisches Museum, Basel, Switzerland |
| NHMW | Naturhistorisches Museum, Vienna, Austria |
| RAJC | Robert A. Johnson Collection, Tempe, Arizona, USA |
| RGPC | Rodrigo C. Pol Collection, Mendoza, Mendoza Province, Argentina |
| USNM | National Museum of Natural History, Smithsonian Institution, Washington, DC, USA |

Latitude and longitude data were rarely available from older collections. To create distribution maps, these data were approximated using Google Earth (https://www.google.com/earth/), Geonames (http://www.geonames. org/), and/or directory of cities and towns in the world (http://www.fallingrain.com/world/index.html). The known geographical distribution of each species is also discussed relative to ecoregions of occurrence as defined by Olson et al. (2001). Most elevation data are based on approximately 350 series collected by the author. High resolution photographs of holotypes, lectotypes, paralectotypes, and non-type specimens are available at http://www.antweb. org/ and http://www.asu.edu/clas/sirgtools/pogonomyrmex/SOUTHAMERICANPOGOS.htm. Both web sites also display high-resolution photographs for wings of queens and for wings and genitalia of males; the latter site also shows type locality and/or habitat photos for some species treated herein.

Types were examined for all species except $P$. intermedia, which was examined from a photograph of a syntype. For species in which males are known I provide a brief diagnosis using salient characters, measurements, and photographs.

The genus Pogonomyrmex is unusual for having a significant number of species in which the queens are not fully alate, i.e., they lack fully sized wings and consequently lack the ability to fly. These queens occur as two phenotypes, ergatoid and brachypterous. Ergatoid queens permanently lack wings or any structures associated with wings as well as flight muscles, and both of these reductions lead to various degrees of fusion for the mesosomal sclerites (Peeters, 2012). Ergatoid queens commonly vary across species in their morphology and in the extent of their similarity to their worker caste, and this pattern also occurs in Pogonomyrmex (Figure 1). Ergatoid queens of Pogonomyrmex are distinguished from workers externally by their larger size and presence of ocelli (except for ocelli lacking in $P$. mayri) (Johnson, 2015), and internally by presence of a spermatheca and a higher number of ovarioles (Johnson, 2010).

Several species of Pogonomyrmex also have brachypterous queens, i.e., non-functional wings that are reduced in size with the size ranging from minute to nearly full size. As noted by Peeters (2012), dealate brachypterous queens can easily be mistaken for dealate, fully winged queens. However, these two phenotypes can be separated in species of Pogonomyrmex because the mesosoma of dealate brachypterous and dealate, fully alate queens display characteristic morphological differences. For dealate, fully alate queens in profile, the anterior face of both the pronotum and mesoscutum rise vertically, with the anterior and dorsal surface of the mesoscutum forming an approximately $90^{\circ}$ angle (Figures $2 \mathrm{~F} \& 2 \mathrm{H}$ ), and the mesoscutum is enlarged and the pronotum small (Figures 2E \& 2G). Dealate brachypterous queens show two general phenotypes. In the first case, the mesoscutum is greatly reduced in size while the pronotum is greatly enlarged (Figures $2 \mathrm{~A} \& 2 \mathrm{~B}$ ), and in profile the pronotum rises at an approximately $45^{\circ}$ angle to meet the dorsal surface of the mesoscutum (Figure 2B). In the second case, the mesoscutum is only


FIGURE 1. Closeup photographs in dorsal view and in profile showing the diversity of mesosomal morphologies for ergatoid queens of Pogonomyrmex: (A-B) P. pencosensis (CASENT0869790), (C-D) P. apterogenos (CASENT0869791), (E-F) P. laticeps (CASENT0217266), (G-H) P. cunicularius (CASENT0173109), and (I-J) P. naegelii (CASENT0869793). Photographs by Robert Johnson and Erin Prado from www.AntWeb.org.


FIGURE 2. Closeup photographs of the mesosoma in dorsal view and in profile that distinguish between brachypterous and fully alate queens of Pogonomyrmex: (A-B) dealate brachypterous queen of P. tinogasta (CASENT0235287), (C-D) brachypterous queen of $P$. atacama (CASENT0922568), (E-F) dealate queen of fully winged P. mapuche (CASENT0280985), and ( $\mathrm{G}-\mathrm{H}$ ) fully winged queen of P. spinolae (CASENT0869792). Red arrows (A, B, E, F) show remaining wing scars after the wings have been lost in a brachypterous (A-B) and fully alate queens (E-F). Blue, green, and yellow arrows show morphological differences between brachypterous and fully alate queens. Blue arrows show the much enlarged pronotum in brachypterous queens (A \& C) compared to the pronotum of fully alate queens (E \& G). Green arrows show differences in the profile of the pronotum, with brachypterous queens having either a sloping (B) or vertical pronotum (D), whereas fully alate queens always have a vertical pronotum ( $\mathrm{F} \& \mathrm{H}$ ). Yellow arrows show brachypterous queens with the mesoscutum meeting the pronotum on a horizontal plane (A) or the mesoscutum slopes at $45^{\circ}$ from the juncture of the pronotum to the dorsum of the mesoscutum (D), whereas the mesoscutum continues vertically from the pronotum in fully alate queens ( $\mathrm{F} \& \mathrm{H}$ ). Photographs by Michele Esposito and Robert Johnson from www.AntWeb.org.


FIGURE 3. Closeup photographs of the mesosoma in dorsal view and in profile of apparent intercastes for Pogonomyrmex: (A-B) P. longibarbis (CASENT0914117), (C-D) P. sanmartini (CASENT0280979), (E-F) P. tafi (LACMENT273737), and (G-H) P. vermiculatus (CASENT0280984). Note the enlarged, convex mesosomas in profile, and the strongly arched mesoscutellum in dorsal view. Photographs by Michele Esposito from www.AntWeb.org.
slightly reduced in size and the pronotum slightly enlarged, the anterior margin of the pronotum rises vertically, but the anterior margin of the mesoscutum rises at approximately $45^{\circ}$ to meet the dorsal surface of the mesoscutum (Figures 2C \& 2D).

Several apparent intercastes (see Peeters, 2012) also have been collected in Pogonomyrmex. These individuals are slightly larger than workers, and compared to workers, they display an enlarged mesosoma that is typically convex in profile. In dorsal view, the pronotum is enlarged and the mesonotum is reduced in size, and the promesonotal groove is distinct and usually shaped as a pointed arch (Figure 3).

South American species of Pogonomyrmex also display wide variation in color and color combinations, especially compared their North American congeners. Color often is viewed as an unstable character for species identification, but it can be a useful for separating species that have been well collected. The author has made numerous collections of South American species that suggest color is a stable character for the vast majority of species treated herein. Consequently, I use color as a character in the keys when it facilitates separating species, while also including morphological characters to the extent possible. However, note that three species (P. carbonarius, P. sanmartini, $P$. varicolor) vary in color within colonies and/or or across locales; this variation is discussed in the relevant species accounts.

## Results

Synonymic list of South American species of Pogonomyrmex in the rastratus group, known castes, and countries in which each species is known to occur
P. apterogenos (w.q.m). Argentina. NEW SPECIES
$P$. araucania (w.q.m). Argentina, Chile. NEW SPECIES
P. atacama (w.q.m). Chile. NEW SPECIES
P. atratus Santchi, 1922b: 347 (w). Argentina.
P. bolivianus (w). Bolivia. NEW SPECIES
P. carbonarius Mayr, 1868: 172 (w.q.m). Argentina.
$=$ vermiculatus var. variabilis Santschi, 1916: 511 (w.m). Argentina (Río Negro). NEW SYNONYMY
= weiseri var. neuquensis Santschi, 1922a: 243 (w). Argentina (Neuquén). NEW SYNONYMY
= kusnezovi Cuezzo \& Claver, 2009: 105 (w). Argentina (Río Negro). NEW SYNONYMY
P. catanlilensis Gallardo, 1931: 187 (w.q.m). Argentina.
P. colca (w). Peru. NEW SPECIES.
P. cusquena (w). Peru. NEW SPECIES
P. excelsior (w). Argentina, Chile. NEW SPECIES
P. forelii (w). Argentina. NEW SPECIES
P. granulatus (w.m). Argentina. NEW SPECIES
P. intermedia Menozzi, 1935: 320 (w.q.m). Chile. NEW STATUS
P. lagunabravensis (w.q.m). Argentina. NEW SPECIES
P. leonis Kusnezov, 1951: 278 (w). Argentina. NEW STATUS
P. loaensis (w.q.m). Chile. NEW SPECIES
P. longibarbis Gallardo, 1931: 185 (w.q.m). Argentina.
P. mapuche (w.q). Argentina. NEW SPECIES
P. maulensis (w.q.m). Chile. NEW SPECIES
P. meridionalis Kusnezov, 1951: 277 (w). Argentina.
P. pichachen (w.q). Argentina, Chile. NEW SPECIES
P. pronotalis Santschi, 1922b: 350 (w.q.m). Argentina.
P. propinqua (w.q.m). Argentina. NEW SPECIES
P. pulchellus Santschi, 1925b: 223 (w.q.m). Argentina. NEW STATUS
P. rastratus Mayr, 1868: 171 (w.q.m). Argentina.
P. sanmartini Kusnezov, 1953: 110 (w.q.m). Argentina. NEW STATUS
P. santschii (w.q.m). Argentina, Chile. NEW SPECIES

## Key to workers for Pogonomyrmex species occurring in South America

(includes $P$. brevibarbis-group, but not to species level)
1 Fine, dense, incised striae lacking on first gastral tergum or restricted to base; tergum smooth and shining $\underline{o r}$ with faint, barely visible, unincised striae or fine coriarious sculpture on medial anterior one-third to one-half of segment
.2

- $\quad$ Fine, dense, clearly visible, incised striae (usually longitudinal) extending over medial anterior one-third to all of first gastral tergum . 36
2 (1) Cephalic dorsum with scattered small foveae (use $>50 \times$ magnification); part to all of cephalic dorsum with fine longitudinal striae (Figures 4A-B); antennal scapes short, extending beyond eyes less than one-third the distance from posterior margin of eyes to posterior corners of head (coarctatus-group)
. 3
- $\quad$ Cephalic dorsum lacking foveae; cephalic dorsum with prominent longitudinal rugae or rugoreticulate (Figures 4C-D); antennal scapes longer, extending beyond eyes by more than one-half the distance from posterior margin of eyes to posterior corners of head
.6
3 (2) Striae cover only part of cephalic dorsum, areas lacking striae shining to strongly shining $\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots$
- Striae cover entire cephalic dorsum, entire dorsum weakly shining ................................................... 5

4 (3) Workers usually larger, strongly polymorphic with supermajors ( $\mathrm{HW}=1.94-3.54 \mathrm{~mm}$ ); weak to moderately coarse transverse rugae on posterior surface of petiolar node; rugae on dorsum of postpetiole often absent, if present usually restricted to posterior margin; inferior propodeal spines lacking or very reduced in size, broadly rounded; interrugae on mesosoma finely granulate, moderately shining. coarctatus

- Workers smaller, monomorphic ( $\mathrm{HW}=1.91-2.33 \mathrm{~mm}$ ); coarse rugae cover posterior surface of petiolar node; weak to moderately coarse transverse rugae on dorsum of postpetiole; inferior propodeal spines present, wider than long, apex bluntly angulate to acuminate; interrugae on mesosoma not granulate, smooth and strongly shining . . . . . . . . . . . . . . . . . marcusi
5 (4) In profile, lateral lobes of clypeus massively enlarged with narrow gap (much less than width of antennal scapes) (Figure 5A) between clypeal lobes and frontal carinae; concolorous ferruginous orange to orange-red. . lobatus
- In profile, lateral lobes of clypeus not enlarged with broad gap (similar to width of antennal scape) (Figure 5B) between clypeal lobes and frontal carinae; bicolored, head dark red to reddish-black, gaster blackish . . . . . . . . . . . . . . . . . . micans
6 (2) In frontal view, head elongate $(\mathrm{CI}=81-99)$; hind femora long, $\mathrm{HFI}=119-152$; scapes strongly striate; psammophore poorly developed, consisting of hairs scattered over ventral side of head (cunicularius-group) . . . . . . . . . . . . . . . . . . . . . . . . . . 7
- In frontal view, head subquadrate to quadrate ( $\mathrm{CI}=95-121$ ); hind femora rarely long, $\mathrm{HFI}=51-122$; scapes smooth to moderately striate; psammophore poorly to well developed
.. 7 ................................................................... . . 9
7 (6) In profile, petiolar node rounded; inferior propodeal spines wider than high, broadly rounded; first gastral tergum smooth and polished, strongly shining; superior propodeal spines shorter than distance between their bases
. ............ cunicularius
- In profile, petiolar node angulate; inferior propodeal spines about as wide as high, acuminate; first gastral tergum moderately to strongly coriarious, dull to weakly shining; superior propodeal spines longer than distance between their bases ....... 8
8 (7) Promesonotal dorsum weakly rugoreticulate to transversely rugose, rugae strongest on anterior pronotal dorsum; propodeal dorsum consistently transversely rugose (Figure 6A); body concolorous tannish-red
. pencosensis
- Promesonotal dorsum coarsely and consistently rugoreticulate; propodeal dorsum rugoreticulate to transversely rugose (Figure 6B); bicolored, mesosoma and petiolar node medium to dark orangish-brown to reddish-brown, rest of body lighter . . .

9 (6) Superior propodeal spines absent or consisting of small to moderate sized denticles, tubercles, or short teeth with width greater than length 10
- Superior propodeal spines present, length usually greater $\geq 0.5 \times$ the distance between their bases . . . . . . . . . . . . . . . . . 13

10 (9) Dorsum of postpetiole lacking transverse rugae . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . inermis
Dorsum of postpetiole with regular to wavy transverse rugae . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 11
11 (10) Superior propodeal spines consist of blunt tubercles or denticles; in profile, head from posterior margin of eyes to posterior corners rugose; posterior corners rugose; only known from lowlands of Guayaquil area of Ecuador .
theresiae

- Superior propodeal spines consist of acuminate denticles to short teeth; in profile, head from posterior margin of eyes to posterior corners faintly rugose to mostly smooth and shining, rugae weakening posterad; posterior corners smooth and shining; only known from high elevations $(\approx>3000 \mathrm{~m})$ from Cucso to Arequipa, Peru

12 (11) Longitudinal rugae on promesonotum strongly irregular with numerous lateral branches to rugoreticulate (Figure 7A); promesonotal suture not impressed
colca Longitudinal rugae on promesonotum regular to moderately irregular with few lateral branches (Figure 7B); promesonotal suture usually weakly to moderately impressed
. cusquena
13 (9) Superior and inferior propodeal spines long, acuminate; in profile, posterior surface of petiolar node with crest along anterior margin; anteroventral margin of peduncle of petiole with acuminate spine; mesosoma with at least several long, flexuous hairs; anterior margin of clypeus with minute medial tooth (sylvestris-group)

- Superior and inferior propodeal spines rarely long and acuminate; in profile, posterior surface of petiolar node rarely with crest along anterior margin; anteroventral margin of peduncle of petiole straight or with triangular process, but lacking acuminate spine; mesosoma rarely with long, flexuous hairs; anterior margin of clypeus lacking minute medial tooth ...... 16
14 (13) Larger species ( $\mathrm{HW}=1.58-1.68 \mathrm{~mm}$ ); mandibles with seven teeth; compound eyes lacking hairs between ommatidia; clypeus with prominent medial carina; in profile, anterodorsal margin of postpetiole not offset from helcium ......... striatinodis
- $\quad$ Smaller species ( $\mathrm{HW}=1.16-1.29 \mathrm{~mm}$ ); mandibles with six teeth; compound eyes with hairs between ommatidia; clypeus lacking prominent medial carina; in profile, anterodorsal margin of postpetiole offset from helcium

15
15 (14) Lateral surface of petiolar node longitudinally rugose; in profile, procoxae transversely striate; femora and tibiae smooth to weakly coriarious, weakly shining to shining; medial clypeal region between antennal insertions with 9-12 fine, closely spaced, longitudinal rugae, interrugae dull to weakly shining
stefani

- Lateral surface of petiolar node mostly smooth and shining; in profile, procoxae finely imbricate; femora and tibiae very strongly coriarious, dull; medial clypeal region between antennal insertions with 5-8 coarse, sometimes wavy, longitudinal rugae, interrugae more or less shining
ylvestris
16 (13) Hairs on head (including psammophore) and mesosoma very short, maximal length similar to or slightly greater than width of cephalic interrugae (note that one to few long, coarse, stiff hairs are occasionally present along posterior margin of head and/or pronotum)
tenuipubens
- Hairs on head (including psammophore) and mesosoma moderately long, maximal length much longer than width of cephalic interrugae

17
17 (16) Dorsum of mesosoma and posterior surface of petiolar node rugoreticulate to vermiculate; psammophore poorly developed; inferior propodeal spines well developed, acuminate, length $>0.5 \times$ the length of superior propodeal spines ........... 18

- Dorsum of mesosoma usually rugose, sometimes rugoreticulate to vermiculate; posterior surface of petiolar node with transverse or oblique rugae or otherwise, rarely rugoreticulate to vermiculate; psammophore well developed; inferior propodeal spines poorly developed, broadly rounded, length $<0.2 \times$ the length of superior propodeal spines $\underline{\boldsymbol{o}}$ if well developed then propodeal spiracles circular
18 (17) Small lobe projects dorsally from anterior margin of antennal fossae, best viewed from posterior margin of head looking down onto dorsum of lateral clypeal lobes (Figure 8A); in dorsal view, posterior surface of petiolar node narrow, usually about as wide as distance between tips of superior propodeal spines; mesosomal hairs moderately short, longest rarely $>0.7-0.8 \times$ MOD
- Lacking small lobe that projects dorsally from anterior margin of antennal fossae (Figure 8B); in dorsal view, posterior surface of petiolar node broader, distinctly wider than distance between tips of superior propodeal spines; mesosomal hairs longer, longest approaching to slightly exceeding MOD
abdominalis
19 (17) Dorsum of postpetiole smooth and shining, granulate, punctate, or otherwise, but lacking transverse rugae (rarely with one to few longitudinal rugae)
- Dorsum of postpetiole with transverse rugae or rarely oblique to longitudinal rugae .................................. 22

20 (19) Posterior surface of petiolar node lacking rugae or rarely with few weak longitudinal rugae; head and mesosoma usually concolorous dark brown to black, rarely with blackish head and orangish mesosoma; metanotal sulcus usually present, weakly to strongly impressed; inferior propodeal spines well developed, usually acuminate; propodeal spiracles circular

- Posterior surface of petiolar node with weak to moderately coarse transverse rugae; head and mesosoma concolorous light to dark ferruginous orange; metanotal sulcus rarely present; inferior propodeal spines absent to poorly developed; propodeal spiracles narrowly ovate

21

Workers smaller ( $\mathrm{HW}=1.24-1.61 \mathrm{~mm}$ ); occurs in Argentina, Uruguay, Paraguay $\ldots \ldots \ldots \ldots \ldots \ldots \ldots$. $\ldots$ uruguayensis
22 (19) Deeply incised, fine, closely spaced, regular rugae cover cephalic dorsum and mesosoma, interrugae only slightly wider than rugae (Figures 9A-B); head and mesosoma black, gaster dark ferruginous orange ....................... mendozanus

- Rugae on cephalic dorsum and mesosoma coarser, wavy to slightly irregular; rugae on mesosoma irregular or rugoreticulate to vermiculate; interrugae on head and mesosoma distinctly wider than rugae (Figures 9C-D); color variable, but if head and mesosoma black and gaster dark orange, then interrugae on cephalic dorsum are strongly granulate ................. 23
23 (22) Interrugae on cephalic dorsum smooth to moderately granulate, weakly shining to shining ........................... 24
- Interrugae on cephalic dorsum moderately to strongly granulate, weakly shining to dull (rastratus-group [part]) ...... 25

24 (23) Body concolorous black except for dark reddish band encircling eyes; rugae on promesonotum longitudinal, usually regular; rugae at medial posterior margin of head longitudinal, rarely rugoreticulate .
tinogasta

- Head and mesosoma dark reddish-black, gaster black; rugae on promesonotum transverse, oblique, or irregular, rarely longitudinal; rugae along medial posterior margin of head usually partly rugoreticulate ........................... laticeps
$\mathbf{2 5}$ (23) Body concolorous black . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . atratus
- Body bicolored or concolorous ferruginous orange, reddish-orange, or reddish-brown ................................ . 26

26 (25) Head blackish to black, gaster light to dark ferruginous orange or orangish-black . ................................... 27

27 (26) Larger ( $\mathrm{HW}=1.76-2.06 \mathrm{~mm}$ ); first gastral tergum moderately to strongly coriarious anterad, dull to weakly shining; rugae on dorsum of pronotum weak to moderately coarse; medial rugae on mesonotum usually continue to anterior margin of pronotum; promesonotal suture usually weakly to moderately impressed
meridionalis

- $\quad$ Smaller (HW = 1.61-1.81); first gastral tergum smooth and shining to strongly shining anterad; rugae on dorsum of pronotum coarse; medial rugae on mesonotum diverge or become transverse to rugoreticulate on pronotum, rarely continuing to anterior margin of the pronotum; promesonotal suture usually absent
pronotalis
28 (26) Bicolored with head dark reddish to reddish-brown, mesosoma and gaster blackish to black .......................... 29
Body concolorous $\underline{\boldsymbol{o r}}$ if bicolored then mesosoma and gaster not black ............................................ 30
29 (28) Smaller (HW $1.42-1.69 \mathrm{~mm}$; ML $1.52-2.01 \mathrm{~mm}$ ); longitudinal rugae on dorsum of mesonotum moderately to well developed, rugae often diverging toward humeral shoulders of pronotum or becoming transverse or rugoreticulate-vermiculate along anterior margin of pronotum; gaster black . ...................................................... vermiculatus (part)
- $\quad$ Larger ( $\mathrm{HW}=1.93 \mathrm{~mm}$; $\mathrm{ML}=2.29 \mathrm{~mm}$ ); longitudinal rugae on dorsum of mesonotum weakly developed, rugae continue to anterior margin of pronotum; gaster orangish-brown to brownish-orange . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . leonis
30 (28) Mesosoma concolorous with to slightly darker than head and gaster ................................................. 31
Part to all of mesosoma blackish to black, notably darker than head and gaster . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 33
31 (30) First gastral tergum (including posterior portion) moderately to strongly coriarious, dull, occasionally with posterior margin weakly coriarious
semistriata (part)
- Posterior margin and usually posterior one-third or more of first gastral tergum smooth and shining to strongly shining, rarely weakly coriarious

32
32 (31) For most to all workers in a series, hairs on dorsum of mesosoma longer, at least several hairs $\geq 0.7-0.8 \times$ MOD and greater than length of superior propodeal spines
spinolae

- Hairs on dorsum of mesosoma shorter, most hairs $<0.5 \times$ MOD and no longer than length of superior propodeal spines ....

33 (30) Mesosoma black, occasionally with a weak orangish to reddish infusion on pronotum, infusion rarely present on mesonotum 34 Pronotum to entire mesosoma ferruginous orange to reddish-brown, reddish-black or blackish-red ................... . 35
34 (33) Larger $(H W=2.27 \mathrm{~mm})$; eyes placed farther from base of mandibles ( $\mathrm{OMD} / \mathrm{MOD}=1.52-1.53$ ); rugae between frontal lobes weakly converging, $1-2$ pairs of medial rugae meet and end at posterior margin of frontal triangle; up to several irregular transverse rugae along anterior margin of pronotum that continue posteroventrally on sides of pronotum; eyes smaller com-


- $\quad$ Smaller ( $\mathrm{HW}=1.34-2.02 \mathrm{~mm}$ ); eyes placed closer to base of mandibles ( $\mathrm{OMD} / \mathrm{MOD}=0.88-1.21$ ); rugae between frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle; rugae along anterior margin of pronotum strongly irregular to rugoreticulate, never transverse; sides of pronotum rugoreticulate; eyes larger compared to head length ( $\mathrm{MOD} / \mathrm{HL}=0.20-0.26$ )
. santschii
35 (33) For most to all workers in a series, medial portion of clypeus notably darker (usually blackish to black) than frontal triangle and cephalic dorsum (Figure 58A); dorsum and sides of pronotum and mesonotum concolorous . . . . . . . . . . . . maulensis
- Medial portion of clypeus concolorous with frontal triangle and cephalic dorsum (Figure 40A); for some to most workers in a series, dorsum and sides of pronotum lighter than mesonotum
intermedia
36 (1) Head and mesosoma with fine, dense, deeply incised, subparallel-parallel rugae; anterior margin of clypeus with small medial

- Head and mesosoma with prominent irregular to regular, longitudinal rugae, interrugae usually wider than rugae; anterior margin of clypeus entire, lacking a medial tooth 37
37 (36) Dorsum of mesosoma and posterior surface of petiolar node rugoreticulate to vermiculate . ................ naegelii (part)
- Dorsum of mesosoma usually rugose, sometimes rugoreticulate-vermiculate; posterior surface of petiolar node with transverse or oblique rugae or otherwise, but never rugoreticulate to vermiculate (rastratus-group [part])
38 (37) All workers in a series with head and mesosoma blackish to black, occasionally with a weak orangish infusion on promesonotum; gaster light to dark ferruginous orange to orangish-black
- Some to all workers in a series concolorous $\boldsymbol{O r}$ if bicolored, then gaster concolorous to or darker than head and/or mesosoma

Super propeal spies moderath to 10. with one to several transverse (sometimes very irregular) rugae along anterodorsal margin of pronotum ............ forelii - $\quad$ Superior propodeal spines consist of tubercles, denticles, short teeth to long spines, or a mixture of lengths, length $<0.5 \times$ the distance between their bases for some to all workers in a series $\underline{\boldsymbol{o r}}$ if spines consistently long, then anterodorsal margin of pronotum on most workers in a series with longitudinal or oblique rugae or rugoreticulate

40
40 (39) Superior propodeal spines consist of tubercles, denticles, or short blunt teeth; only known from Salta Province, Argentina
granulatus

- Superior propodeal spines consist of short to long spines for at least some workers in a series; occurs from Mendoza south to Chubut Province, Argentina

41
41 (40) Smaller ( $\mathrm{HW}=1.48-1.79 \mathrm{~mm}$; $\mathrm{PNW}=0.98-1.18 \mathrm{~mm}$; $\mathrm{ML}=1.56-2.07 \mathrm{~mm}$ ); in dorsal view, rugae on promesonotum regular to wavy, longitudinal rugae on mesonotum usually diverge to humeral shoulders of pronotum with one to few transverse rugae along anterodorsal margin; in dorsal view, rugae on posterior margin of head mostly regular with few lateral branches that rarely connect to adjacent rugae; striae on first gastral tergum longitudinal
varicolor (part) Larger ( $\mathrm{HW}=1.67-2.04 \mathrm{~mm} ; \mathrm{PNW}=1.15-1.42 \mathrm{~mm} ; \mathrm{ML}=2.01-2.76 \mathrm{~mm}$ ); in dorsal view, longitudinal rugae on mesono-
tum weakly to strongly irregular, often nearly rugoreticulate; rugae on pronotum usually rugoreticulate-vermiculate; in dorsal view, rugae on posterior margin of head strongly irregular, usually with numerous lateral branches that connect to adjacent rugae; striae on first gastral tergum oblique and/or transverse for some to most workers in a series
catanlilensis
42 (38) First gastral tergum with striae along base to extending over anterior one-third to one-half of medial portion of segment, occasional workers with striae that extend over slightly more than anterior one-half of segment
43

- First gastral tergum with striae extending over anterior two-thirds or more of medial portion of segment . . . . . . . . . . . . . . 46
43 (42) Mesosoma ferruginous orange, reddish-orange, or orangish brown .................................................. . 44
Mesosoma blackish to black . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 45
44 (43) Posterior corners of head rugose; longitudinal rugae on dorsum of mesonotum irregular, continuing to anterior margin of pronotum; mandibles with six teeth; superior propodeal spines consist of short, triangular teeth with height less than width at base; rugae on dorsum of postpetiole mostly transverse; rugae on medial portion of clypeus subparallel-parallel (Figure 23A)
bolivianus
- Posterior corners of head smooth and shining to strongly shining for most to all workers in a series; longitudinal rugae on dorsum of mesonotum regular, anterior margin of pronotum usually with one to few transverse rugae; mandibles with seven teeth; superior propodeal spines consist of short, triangular teeth to long spines; rugae on dorsum of postpetiole mostly longitudinal; rugae on medial portion of clypeus converge anterad to form up to several concentric, narrowly rounded V's (Figure 18A)
atacama
45 (43) Head dark red to reddish-black, gaster black . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . vermiculatus (part)
Head and gaster ferruginous orange . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . santschii (part)
46 (42) For most to all workers in a series, rugae on medial portion of clypeus converge anterad to form up to several concentric narrowly rounded V's (Figure 48A); head and mesosoma concolorous dark ferruginous orange loaensis
- $\quad$ Rugae on medial portion of clypeus subparallel-parallel, not converging anterad (Figure 44A) $\underline{\boldsymbol{o r}}$ converging anterad on occasional workers that have a reddish-black to blackish-red head and black mesosoma . . . . . . . . . . . . . . . . . . . . . . . . . . . 47
47 (46) For most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; lateral longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterior margin of pronotum usually with one to several transverse rugae that continue onto pronotal sides (Figures 10A-D) . . . . . . . . . 48 For most to all workers in a series, rugae on dorsum of promesonotum usually wavy to irregular, discontinuous $\underline{\boldsymbol{o r}}$ with short lateral branches; rugae on mesonotum mostly longitudinal but often becoming irregular to rugoreticulate on pronotum; anterior margin of pronotum lacking transverse rugae $\underline{\boldsymbol{o r}}$ with one to few irregular transverse rugae to rugoreticulate $\underline{\boldsymbol{o r}}$ rugae on dorsum of promesonotum well defined, very regular and continuous and continuing to anterior margin of pronotum (Figures 10E-H) 53
48 (47) Superior propodeal spines consist of short triangular teeth to long spines, length $>0.5-0.6 \times$ the distance between their bases for some to all workers in a series; inferior propodeal spines shorter than superior propodeal spines
- Superior propodeal spines consist of tubercles or denticles to rarely short spines; height of inferior propodeal spines usually similar to or greater than that of superior propodeal spines . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 50
49 (48) Head and gaster mostly light to dark ferruginous orange to reddish-orange rastratus
- Head reddish, reddish black, or black; gaster black . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . sanmartini (part)
50 (48) Rugae on cephalic dorsum between frontal lobes weakly converging, 1-2 pairs of medial rugae usually converging together near posterior margin of frontal triangle (Figure 11A); head ferruginous orange, dorsum of pronotum and mesonotum concolorous orangish-black, rest of mesosoma blackish-orange to blackish; superior propodeal spines usually consist of short, triangular teeth apterogenos
- $\quad$ Rugae on cephalic dorsum between frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle (Figure 72A); head and mesosoma mostly concolorous ferruginous orange to light orangish-black or reddish-brown, mesosoma sometimes darker than head; superior propodeal spines consist of tubercles or denticles to short spines . 51
51 (50) Dorsum of pronotum orangish-black to blackish, darker than adjoining mesonotum; sides of pronotum blackish to black . .
pulchellus (part)
- Dorsum and sides of pronotum concolorous with adjoining mesonotum . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 52
52 (51) Superior propodeal spines consist of tubercles, denticles, or minute teeth (all rounded to blunt tipped); inferior propodeal spines longer than superior spines; keel connecting superior propodeal spines absent
lagunabravensis
- Superior propodeal spines consist of minute teeth, short triangular teeth, or short spines (all acuminate); inferior propodeal spines shorter than to as tall as superior spines; keel connecting superior propodeal spines well developed . . . . longibarbis
53 (47) Body concolorous light to dark ferruginous orange to dark reddish-orange or brownish-orange; petiolar node, postpetiole, gaster, legs sometimes slightly darker . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . semistriata (part)
- Body concolorous black or bicolored with head and/or gaster ferruginous orange to dark reddish-black, mesosoma usually blackish to black 54
54 (53) Posterolateral margins of first gastral tergum not polished and glass-like, weakly to strongly coriarious or striate, moderately shining to dull 55 Posterolateral margins of first gastral tergum usually glass-like, smooth and shining to strongly shining . . . . . . . . . . . . $\mathbf{5 8}$
55 (54) For all workers in a series, superior propodeal spines consist of tubercles or denticles, rarely short acuminate teeth; head dark red to reddish-black, gaster reddish-black to black; mandibles with seven teeth for some to most workers in a series; height of inferior propodeal spines usually similar to or greater than length of superior propodeal spines mapuche For at least some workers in a series, superior propodeal spines long, length $>0.4-0.6 \times$ the distance between their bases; head and/or gaster ferruginous orange or reddish-orange, occasionally blackish-orange to black, but never dark red to reddishblack; mandibles with six teeth, rarely seven; height of inferior propodeal spines usually less than length of superior propodeal


## spines

56 (55) Dorsum of mesonotum with regular to moderately irregular, subparallel-parallel, longitudinal rugae, lateral branches usually absent and adjacent rugae rarely contacting one another (Figure 109C); superior propodeal spines long, length $>0.6 \times$ the distance between their bases; occurs from San Juan to Salta Provinces, Argentina weiseri (part)

- Dorsum of mesonotum with irregular longitudinal rugae to rugoreticulate-vermiculate, lateral branches usually connecting with adjacent rugae (Figure 69C); superior propodeal spines consist of tubercles, denticles, or short to long spines; occurs from Mendoza and San Luis to Chubut Provinces, Argentina

57
57 (56) Head and gaster concolorous light to dark ferruginous orange for all workers in a series; superior propodeal spines long, length usually $>0.6 \times$ the distance between their bases; most hairs on anterior half of first gastral tergum $<0.16 \mathrm{~mm}$ long $\ldots$
propinqua*
Color variable, within and across colonies: concolorous black or with head and gaster reddish-orange to dark blackish-orange to black with a weak orangish infusion, gaster often notably darker than head; at least some workers in a series with superior propodeal spines that consist of tubercles, denticles, or short spines with a length $<0.3 \times$ the distance between their bases; several to most hairs on anterior half of first gastral tergum $>0.18 \mathrm{~mm}$ long
. carbonarius*
*These two species can be very difficult to separate given that workers in some colonies of $P$. carbonarius have a concolorous light to dark ferruginous orange head and gaster and long propodeal spines. However, they can be easily separated if queens and/or males are available (see keys).
58 (54) Head and gaster ferruginous orange to reddish-orange, mesosoma black, sometimes with an orangish infusion on pronotum; superior propodeal spines long, length $>0.6 \times$ the distance between their bases

- Head and/or gaster reddish-black, dark blackish-red or black, rarely reddish-orange; superior propodeal spines consist of denticles, short teeth, or long spines

60
59 (58) Sides of pronotum with regular to irregular vertical rugae with few lateral branches, adjacent rugae rarely contacting one another (Figure 109B); inferior propodeal spines well developed, triangular, height about one-half the length of superior propodeal spines, apex subacuminate; occurs from San Juan to Salta Provinces, Argentina .
weiseri (part)

- Sides of pronotum with strongly irregular rugae with numerous lateral branches, adjacent rugae often contacting one another, or rugoreticulate (Figure 94B); inferior propodeal spines poorly developed, wider than tall, apex broadly rounded, height much less than length of superior propodeal spines; only known from Neuquén Province, Argentina strioligaster
60 (58) Restricted to the Patagonia region of Argentina and Chile 61
- Restricted to high elevation and altiplano habitats (usually $>3000 \mathrm{~m}$ ) of northwestern Argentina (Catamarca, Salta, Tucumán, Jujuy Provinces), Bolivia, Chile, and probably Peru 63
61 (60) Head and gaster reddish-orange to dark blackish-red; longitudinal rugae on cephalic dorsum posterior to eyes wavy to irregular, often with secondary rugae, rugae on medioposterior margin strongly irregular to rugoreticulate; superior propodeal spines moderately long to long, length $\geq 0.3-0.6 \times$ the distance between their bases
. . pichachen
- Head and/or gaster black for some to all workers in a series; longitudinal rugae on cephalic dorsum posterior to eyes regular to wavy, rugae continuing to posterior margin or diverging toward posterior corners, but usually lacking secondary rugae or reticulations; superior propodeal spines consist of tubercles, denticles, triangular teeth, or short to long spines . . . . . . . . 62
62 (61) Concolorous black; some to all striae on first gastral tergum oblique and/or transverse . . . . . . . . . . . . . . sanmartini (part)
- For some to most workers in a series, head and/or gaster orangish to reddish-orange, sometimes dark blackish-orange; striae on first gastral tergum longitudinal
varicolor (part)
63 (60) Head dark reddish-black to blackish-red (Figure 35A); malar area, gaster blackish to black; mesosoma dark blackish-red to black . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . excelsior
- Head dark ferruginous orange to brownish or reddish-black (Figures 72A \& 97A); malar area not blackish or only blackish at mandibular margin; mesosoma concolorous to slightly darker than head; gaster dark orangish-black to blackish . . . . . . 64
64 (63) Rugae on mesopleura regular to wavy, lacking lateral branches; posterior margin of first gastral tergum smooth and shining pulchellus (part)
- Rugae on mesopleura wavy to irregular, usually with numerous lateral branches that often connect with adjacent rugae; posterior margin of first gastral tergum usually with striae or moderately to strongly coriarious, rarely smooth and shining ....

Mediciones estándar utilizados en los claves de Español:

| AC | Ancho Cefálico: ancho máximo de la cabeza inmediatamente posterior a los ojos, medido en vista <br> de cara completa. |
| :--- | :--- |
| LC | Longitud Cefálico: longitud de la cápsula de la cabeza excluyendo mandíbulas, en vista frontal, <br> desde el punto medio del margen clipeal anterior a la punto medio del margen posterior. |
| DMO | Diámetro Máximo Ocular: diámetro máximo del ojo medido con la cabeza en vista lateral. <br> Distancia Óculo-Mandibular: la distancia más corta (o mínima) desde el margen anterior del ojo <br> DOM |
| IC | ínsta el punto más cercano del área malar (base de la mandíbula). |
| AP | Ancho Pronotal: ancho máximo del pronoto, visto desde arriba y medido en un ángulo recto al eje <br> longitudinal del mesosoma. | ticulación con el trocánter hasta su punto más distal.

LML Longitud del Mesosoma: longitud diagonal del mesosoma en vista lateral desde el punto en el cual el pronoto y el escudo cervical se encuentran hasta la base posterior del lóbulo metapleural. En reinas y machos, la longitud diagonal desde la unión del mesoscuto y el pronoto hasta la base posterior del lóbulo inferior metapleural.


FIGURE 4. Photographs showing characters for the Pogonomyrmex coarctatus species group: (A-B) small foveae on cephalic dorsum, very fine longitudinal striae on part to all of cephalic dorsum, and short antennal scapes for (A) P. coarctatus (CASENT0172632), and (B) P. lobatus (CASENT0172684), and (C-D) small foveae lacking on cephalic dorsum, prominent longitudinal rugae to rugoreticulate on cephalic dorsum, and longer antennal scapes for (C) P. bispinosus (CASENT0281087) and (D) P. naegelii (CASENT0172677). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 5. Photographs in profile showing size of the gap between the clypeal lobe and frontal lobe: (A) Pogonomyrmex lobatus-red arrow shows narrow gap between clypeal lobe and frontal lobe (gap less than width of the antennal scape) (CASENT0869788), and (B) Pogonomyrmex micans-black arrows show wider gap between clypeal lobe and frontal lobe (gap greater than width of the antennal scape) (CASENT0869787). Photographs by Robert Johnson from www.AntWeb.org.


FIGURE 6. Photographs of Pogonomyrmex showing: (A) P. pencosensis worker (CASENT0869789) with dorsum of promesonotum weakly rugoreticulate to transversely rugose and propodeal dorsum mostly transversely rugose, (B) P. serpens worker (CASENT0235271) with dorsum of mesosoma rugoreticulate, (C) P. pencosensis ergatoid queen (CASENT0869790) with dorsum of mesosoma irregularly rugose to moderately rugoreticulate, and (D) P. serpens ergatoid queen (CASENT0235270) with dorsum of mesosoma rugoreticulate to vermiculate. Photographs by Michele Esposito and Robert Johnson from www. AntWeb.org.


FIGURE 7. Photographs showing rugae patterning on dorsum of promesonotum: (A) Pogonomyrmex colca (CASENT0923342) with longitudinal rugae on promesonotum strongly irregular with numerous lateral branches to rugoreticulate, and (B) Pogonomyrmex cusquena (CASENT0922566) with longitudinal rugae on promesonotum regular to moderately irregular with few lateral branches. Photographs by Robert Johnson from www.AntWeb.org.


FIGURE 8. Photographs from posterior margin of head looking down onto lateral clypeal lobes: (A) Pogonomyrmex naegeliiblack arrows show small lobe that projects dorsally from anterior margin of antennal fossae (CASENT0914811), and (B) Pogonomyrmex abdominalis-red arrows show absence of small lobe on anterior margin of antennal fossae (CASENT0914813). Photographs by Michele Esposito from www.AntWeb.org.

## Clave para las especies de Pogonomyrmex de Sur América basada en las obreras <br> (grupo $P$. brevibarbis incluido pero no a las especies)

1 Estrías finas, densas, incisas ausentes en el primer tergo gastral o restringidas a la base; tergo liso y brillante $\underline{\boldsymbol{o}}$ con estrías débiles, apenas visibles, sin incisión o una fina escultura anastomizante en medial tercio a la mitad anterior del segmento . .
....................................................................................................................... . 2

- Estrías incisas finas, densas, claramente visibles (generalmente longitudinales) que se extienden sobre un tercio anterior medial hasta todo el primer tergo gastral
2 (1) Dorso cefálico con pequeñas fosetas dispersas (use $>50 \times$ aumentos); parte a todo el dorso cefálico presenta finísimas estrías longitudinales (Figuras 4A-B); escapos antenales cortos, que se extienden menos de un tercio de la distancia desde los margenes posteriores de los ojos a las esquinas posteriores de la cabeza (grupo coarctatus)
- Dorso cefálico carece de fosetas; dorso cefálico rugoreticulado o con rugosidades longitudinales prominentes (Figuras 4CD); escapos antenales más largos, que se extienden más de la mitad de la distancia desde los margenes posteriores de los ojos a las esquinas posteriores de la cabeza
- Estrías cubren todo el dorso cefálico, superficie dorsal brilla débilmente . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 5

4 (3) Obreras generalmente más grandes, fuertemente polimórficas con supermayores ( $\mathrm{AC}=1,94-3,54 \mathrm{~mm}$ ); rugosidades transver-
sales débiles a moderadamente gruesas presentes en la superficie posterior del nodo del pecíolo; rugosidades del dorso del pospecíolo a menudo ausente, si está presente generalmente se restringen al margen posterior; espinas propodeales inferiores ausentes o muy reducidos en tamaño, ampliamente redondeadas; interrugosidades del mesosoma finamente granulados y moderadamente brillantes
coarctatus

- Obreras más pequeñas, monomórficas $(\mathrm{AC}=1,91-2,33 \mathrm{~mm})$; superficie posterior del nodo del pecíolo cubierto de rugosidades gruesas; dorso del pospecíolo con rugosidades transversales débiles a moderadamente gruesas; espinas propodeales inferiores presentes, más anchas que altas, forma del ápice varía desde ángulo romo hasta acuminado; interrugosidades del mesosoma no son granulados, de aspecto liso y fuertemente brillante

4 5

 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . marcusi
5 (4) En vista lateral, lóbulos laterales del clípeo sumamente engrosado con una estrecha brecha (mucho menos del anchos del escapos antenales) entre los lóbulos del clípeo y las carenas frontales (Figura 5A); coloración uniforme naranja ferruginosa a naranja rojiza
. lobatus

- En vista lateral, lóbulos laterales de clípeo no engrosado y con amplia brecha (similar al anchos del escapos antenales) entre los lóbulos de clípeo y las carenas frontales (Figura 5B); cuerpo de dos colores, cabeza roja oscura a negro-rojizo, gáster negruzco
micans
6 (2) En vista frontal, cabeza alargada ( $\mathrm{IC}=81-90$ ); fémures posteriores largos (IFP = 119-152); escapos antenales fuertemente estriados; psamóforo poco desarrollado, que consiste de pelos dispersos en la parte ventral de la cabeza (grupo cunicularius)
- En vista frontal, cabeza semicuadrada a cuadrada ( $\mathrm{IC}=95-121$ ); fémures posteriores rara vez largos (IFP =51-122); escapos antenales lisos a moderadamente estriados; psamóforo poco a bien desarrollado


## 

 enales lisos a moderadamente estriados; psamoforo poco a bien desarrollado . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 97 (6) En vista lateral, nodo del pecíolo redondeado; espinas propodeales inferiores más anchas que altas, ampliamente redondeadas; primer tergo gastral liso y pulido, fuertemente brillante; longitudes de espinas propodeales superiores menor a la distancia entre sus bases.
cunicularius

- En vista lateral, nodo del pecíolo angulado; espinas propodeales inferiores tan anchas como altas, acuminadas; primer tergo gastral con finas líneas anastomizantes bien desarrolladas, mate a débilmente brillante; espinas propodeales superiores más largas que la distancia entre sus bases


8 (7) Dorso promesonotal débilmente rugoreticulado a transversalmente rugoso, rugosidades más fuertes anteriormente; dorso del propodeo consistentemente transversalmente rugoso (Figura 6A); cuerpo uniforme marrón claro-rojo . . . . . . pencosensis

- Dorso promesonotal totalmente con rugoreticulación gruesa; dorso del propodeo rugoreticulado a transversalmente rugoso (Figura 6B); cuerpo de dos colores, mesosoma y nodo del pecíolo oscuro anaranjado-marrón a marrón rojizo, resto del cuerpo más claro
serpens
9 (6) Espinas propodeales superiores ausentes, o forman dentículos, tubérculos pequeños a moderados en tamaño o dientes cortos más anchas que largas . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 10 Espinas propodeales superiores presente, sus longitudes generalmente $\geq 0,5 \times$ la distancia entre sus bases . . . . . . . . . . . 13
10 (9) Dorso del pospecíolo carece de rugosidades transversales . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . inermis
- Dorso del pospecíolo con rugosidades regulares a transversalmente onduladas . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 11

11 (10) Espinas propodeales superiores consisten en tubérculos o dentículos romos; en vista lateral, cabeza desde los margenes posteriores de los ojos hasta las esquinas posteriors rugosas; las esquinas posteriores rugosas; conocida solamente de tierras bajas en las áreas alrededores de Guayaquil, Ecuador .
theresiae
Espinas propodeales superiores consisten en dentículos acuminados hasta dientes cortos; en vista lateral, cabeza desde los margenes posteriores de los ojos hasta las esquinas posteriores levemente rugosas a mayormente lisas y brillantes, las arrugas se debilitan en la partes posteriores; esquinas posteriores lisas y brillantes; conocida solamente de elevadas altitudes $(\approx>3000$ m) desde Cusco a Arequipa, Peru

12 (11) Arrugas longitudinales sobre promesonoto fuertemente irregulares con numerosas ramas laterales a rugoreticuladsa (Figura 7A); sutura promesonotal no impresa
 Arrugas longitudinales en promesonoto regulares a moderadamente irregulares con pocas ramas laterales (Figura 7B); sutura promesonotal generalmente débil a moderadamente impresa . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . cusquena
13 (9) Espinas propodeales superiores e inferiores largas y acuminadas; en vista lateral, superficie posterior del nodo del peciolo con cresta en margen anterior; margen anteroventral del pedúnculo del pecíolo con una espina acuminada; mesosoma con al menos varios pelos largos flexuosos; margen anterior del clípeo con diente mediano diminuto (grupo sylvestris) . . . . . . 14

- Espinas propodeales superiores e inferiores rara vez largas y acuminadas; en vista lateral, la cara posterior del nodo del pecíolo rara vez con cresta en el margen anterior; margen anteroventral del pedúnculo de pecíolo recto o con un proceso triangular, nunca con espina acuminada; mesosoma rara vez con pelos largos, flexuosos; margen anterior del clípeo sin diente medio diminuto .
14 (13) Especie más grande ( $\mathrm{AC}=1,58-1,68 \mathrm{~mm}$ ); mandíbulas con siete dientes; ojos compuestos sin pelos entre los omatidios; clípeo con carena media prominente; en vista lateral, el margen anterodoral de pospecíolo no esta desplazado del helcio . . .


## striatinodis

Especie más pequeña ( $\mathrm{AC}=1,16-1,29 \mathrm{~mm}$ ); mandíbula con seis dientes; ojos compuestos con pelos entre los omatidios; clípeo carece de una carena prominente medial; en vista lateral, el margen anterodorsal de pospecíolo esta desplazado del helcio. y tibias lisas o con líneas muy finas y someras anastomizantes, poco brillantes a brillantes; medio del clípeo entre inserciones
antenales con 9-12 rugosidades longitudinales, finas, estrechamente espaciadas, interrugosidades mates a débilmente bril-lantesstefani
Superficie lateral del nodo del pecíolo principalmente lisa y brillante; en vista lateral, procoxas finamente imbricadas; fémuresy tibias con líneas finas y bien talladas anastomizantes, mates; medio del clípeo entre inserciones antenales con 5-8 rugosi-dades longitudinales gruesas, a veces onduladas, interrugosidades más o menos brillantessylvestris
16 (13) Pelos cefálicos (incluyendo el psamóforo) y del mesosoma muy cortos, sus longitudes máximas similar o ligeramente mayoral ancho de las interrugosidades cefálicas (téngase en cuenta que uno a pocos pelos rígidos, gruesos y largos ocasionalmenteestán juntos al margen posterior de la cabeza y/o pronoto)tenuipubens

- Pelos cefálicos (incluyendo el psamóforo) y del mesosoma moderadamente largos, sus longitudes máximas mucho más largasque el ancho de las interrugosidades cefálicas17
17 (16) Dorso del mesosoma y superficie posterior del nodo del pecíolo rugoreticuladas a vermiculadas; psamóforo poco desar-rollado; espinas propodeales inferiores bien desarrolladas, acuminadas, longitud $>0,5 \times$ la longitud de espinas propodealessuperiores18
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naegelii (parte)
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- Individuos más pequeños ( $\mathrm{AC}=1,61-1,81$ ); primer tergo gastral liso y brillante a fuertemente brillante anteriormente; arrugasen el dorso del pronoto gruesas; arrugas mediales del mesonoto divergen o se vuelven transversales a rugoreticuladas en elpronoto, y rara vez continúan hasta el margen anterior del pronoto; sutura promesonotal generalmente ausente
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maulensis
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44 Esquinas posteriores de la cabeza rugosas; rugosidades longitudinales en el dorso del mesonoto irregulares, continuando hasta el margen anterior del pronoto; mandíbulas con seis dientes; espinas propodeales superiores consisten en dientes cortos y triangulares con una altura menor que el ancho de la base; rugosidades en el dorso del pospecíolo mayormente transversales; arrugas en la porción medial del clípeo subparalelas-paralelas (Figura 23A)
bolivianus
- Esquinas posteriores de la cabeza lisas y brillantes a intensamente brillantes para la mayoría de las obreras en una serie; rugosidades longitudinales en el dorso del mesonoto regulares, margen anterior del pronoto usualmente con una o pocas arrugas transversales; mandíbulas con siete dientes; espinas propodeales superiores consisten en dientes triangulares cortos a espinas largas; arrugas en el dorso del pospecíolo mayormente longitudinales; arrugas en la porción medial del clípeo convergen anteriormente para formar hasta varias $V$ concéntricas y estrechamente redondeadas (Figura 18A)
atacama
45 (43) Cabeza de rojo oscuro a negro rojizo, gáster negro . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . vermiculatus (parte)
- Cabeza y gáster naranja ferruginosa . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . santschii (parte)
46 (42) Para la mayoría de las obreras en una serie, arrugas en la porción medial del clípeo convergen anterad para formar hasta varias V concéntricas estrechamente redondeadas (Figura 48A); cabeza y mesosoma naranja ferruginoso oscuro concoloro
loaensis
- $\quad$ Arrugas en la porción medial del clípeo subparalelas-paralelas, no convergen anteriormente (Figura 44A) $\underline{\boldsymbol{o}}$ convergen anteriormente en obreras ocasionales que tienen una cabeza de color negro rojizo a rojo negruzco y mesosoma negro 47
47 (46) Para la mayoría de las obreras de una serie, arrugas en el dorso del promesonoto bien definidas, muy regulares y continuas, sin ramas laterales cortas; arrugas longitudinales laterales en el mesonoto divergen hacia los hombros humerales del pronoto; margen anterior del pronoto generalmente con una o varias arrugas transversales que continúan en los lados pronotales (Figuras 10A-D) .48
- Para la mayoría de las obreras de una serie, arrugas en el dorso del promesonoto suelen ser onduladas a irregulares, discontinuas $\underline{\boldsymbol{o}}$ con ramas laterales cortas; arrugas en el mesonoto mayormente longitudinales pero a menudo se vuelven irregulares a rugoreticuladas en el pronoto; margen anterior del pronoto sin arrugas transversales $\underline{\boldsymbol{o}}$ con una o pocas arrugas transversales irregulares a rugoreticuladas $\underline{\boldsymbol{o}}$ arrugas en el dorso del promesonoto bien definido, muy regular y continuo y que continúan hasta el margen anterior del pronoto (Figuras 10E-H)
48 (47) Espinas propodeales superiores consisten en dientes triangulares cortos a espinas largas, longitud $>0,5-0,6 \times$ la distancia entre sus bases para algunas a todas las obreras en una serie; espinas propodeales inferiores más cortas que espinas propodeales superiores 49
- Espinas propodeales superiores consisten en tubérculos o dentículos hasta espinas raramente cortas; altura de las espinas propodeales inferiores generalmente similar o mayor que la de espinas propodeales superiores 50 49 (48) Cabeza y gáster mayormente naranja claro a oscuro ferruginoso a naranja rojizo $\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots$. . . . . . . rastratus
- Cabeza rojiza, negra rojiza o negra; gáster negro . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . sanmartini (parte)
50 (48) Arrugas en el dorso cefálico entre los lóbulos frontales convergen débilmente, $1-2$ pares de arrugas mediales generalmente convergen cerca del margen posterior del triángulo frontal (Figura 11A); cabeza naranja ferruginosa, dorso del pronoto y mesonoto concoloros anaranjado-negro, resto del mesosoma negruzco-anaranjado a negruzco; espinas propodeales superiores generalmente consisten en dientes cortos y triangulares . apterogenos
- Arrugas en el dorso cefálico entre lóbulos frontales subparalelas-paralelas, arrugas mediales generalmente continúan hacia el triángulo frontal (Figura 72A); cabeza y mesosoma en su mayor parte naranja ferruginoso concoloro a naranja-negro claro o marrón rojizo, mesosoma a veces más oscuro que la cabeza; espinas propodeales superiores consisten en tubérculos o dentículos a espinas cortas 51
51 (50) Dorso del pronoto negro anaranjado a negruzco, más oscuro que el mesonoto contiguo; lados del pronoto negruzco a negro
pulchellus (parte)
- Dorso y lados del pronoto coinciden con el mesonoto contiguo ................................................. 52
$\mathbf{5 2}$ (51) Espinas propodeales superiores consisten en tubérculos, dentículos o dientes diminutos (todos redondeados a romos en la punta); espinas propodeales inferiores más largas que las espinas superiores; quilla que conecta las espinas propodeales superiores ausentes
lagunabravensis
- Espinas propodeales superiores consisten en dientes diminutos, dientes triangulares cortos o espinas cortas (todas acuminadas); espinas propodeales inferiores más cortas que tan altas como las espinas superiores; quilla que conecta las espinas propodeales superiores bien desarrolladas
longibarbis
53 (47) Cuerpo concoloro naranja ferruginoso claro a oscuro a naranja rojizo oscuro o naranja parduzco; nodo del pecíolo, pospecíolo, gáster, patas a veces un poco más oscuras semistriata (parte)
- Cuerpo negro concoloro $\underline{\underline{g}}$ bicolor con cabeza y/o gáster naranja ferruginoso a negro rojizo oscuro, mesosoma generalmente negruzco a negro
54 (53) Márgenes posterolaterales del primer tergo gastral no pulidos y vidriosos, débil a fuertemente anastomizantes o estriados, moderadamente brillantes a opacos
- Márgenes posterolaterales del primer tergo gastral generalmente vidriosos, lisos y brillantes a muy brillantes ............ . 58

55 (54) Para todas las obreras de una serie, espinas propodeales superiores consisten en tubérculos o dentículos, raramente dientes cortos y acuminados; cabeza de rojo oscuro a negro rojizo, gáster de rojizo negruzco a negro; mandíbulas con siete dientes en algunos a la mayoría de las obreras en una serie; altura de espinas propodeal inferiores generalmente similar o mayor que la longitud de las espinas propodeales superiores
mapuche
Para al menos algunas obreras en una serie, espinas propodeales superiores largas, longitud $>0,4-0,6 \times$ la distancia entre sus bases; cabeza y/o gáster naranja ferruginoso o naranja rojizo, ocasionalmente naranja negruzco a negro, pero nunca rojo oscuro a negro rojizo; mandíbulas con seis dientes, rara vez siete; altura de espinas propodeales inferiores generalmente menor que la longitud de espinas propodeales superiores 56
56 (55) Dorso del mesonoto con arrugas longitudinales, subparalelas-paralelas, regulares a moderadamente irregulares, ramas laterales generalmente ausentes y arrugas adyacentes rara vez se contactan entre sí (Figura 109C); espinas propodeales superiores largas, longitud $>0,6 \times$ la distancia entre sus bases; ocurre desde la Provincia de San Juan hasta la Provincia de Salta, Argentina weiseri (parte)

- Dorso del mesonoto con arrugas longitudinales irregulares a rugoreticuladas-vermiculadas, ramas laterales que generalmente conectan con arrugas adyacentes (Figura 69C); espinas propodeales superiores consisten en tubérculos, dentículos o espinas cortas a largas; ocurre desde las Provincias de Mendoza y San Luis hasta la Provincia de Chubut, Argentina
57 (56) Cabeza y gáster concoloroso naranja ferruginoso claro a oscuro para todas las obreras de una serie; espinas propodeales superiores largas, longitud generalmente $>0,6 \times$ la distancia entre sus bases; la mayoría de los pelos en la mitad anterior del primer tergo gastral $<0,16 \mathrm{~mm}$ de largo
propinqua*
- Color variable, dentro y entre las colonias: negro concoloro o con cabeza y gáster de naranja rojizo a naranja negruzco oscuro a negro con una infusión de naranja débil, gáster a menudo notablemente más oscuro que la cabeza; al menos algunas obreras en una serie con espinas propodeales superiores que consisten en tubérculos, dentículos o espinas cortas con una longitud < $0,3 \times$ la distancia entre sus bases; varios a la mayoría de los pelos en la mitad anterior del primer tergo gastral $>0,18 \mathrm{~mm}$ de largo
carbonarius*
* Estas dos especies pueden ser muy difícil de separar dado que las obreras en algunas colonias de P. carbonarius tienen una cabeza y gáster de color claro a oscuro naranja ferruginoso y espinas propodeales largas. Sin embargo, estas dos especies se separan fácilmente si hay reinas $\mathrm{y} / \mathrm{o}$ machos disponibles (ver claves).
58 (54) Cabeza y gáster naranja ferruginoso a naranja rojizo, mesosoma negro, a veces con una infusión anaranjada en el pronoto; espinas propodeales superiores largas, longitud $>0,6 \times$ la distancia entre sus bases
- Cabeza y/o gáster negro rojizo, rojo negruzco oscuro o negro, raramente naranja rojizo; espinas propodeales superiores consisten en dentículos, dientes cortos o espinas largas

60
59 (58) Lados del pronoto con arrugas verticales regulares a irregulares con pocas ramas laterales, arrugas adyacentes rara vez se contactan entre sí (Figura 109B); espinas propodeales inferiores bien desarrolladas, triangulares, altura aproximadamente la mitad de la longitud de espinas propodeales superiores, ápice subacuminado; ocurre desde la Provincia de San Juan hasta la Provincia de Salta, Argentina weiseri (parte)

- Lados del pronoto con arrugas fuertemente irregulares con numerosas ramas laterales, arrugas adyacentes que a menudo se contactan entre sí, o rugoreticuladas (Figura 94B); espinas propodeales inferiores poco desarrolladas, más anchas que altas, ápice ampliamente redondeado, altura mucho menor que la longitud de espinas propodeales superiores; conocida solamente en la Provincia de Neuquén, Argentina
strioligaster
60 (58) Ocurre en la región de la Patagonia de Argentina y Chile 61
- $\quad$ Ocurre en hábitats de altiplano y altas elevaciones (generalmente $>3000 \mathrm{~m}$ ) del noroeste de Argentina (Provincias de Catamarca, Salta, Tucumán, Jujuy), Bolivia, Chile y probablemente Perú 63
61 (60) Cabeza y gáster naranja rojizo a rojo negruzco oscuro; arrugas longitudinales en el dorso cefálico posterior a los ojos onduladas a irregulares, a menudo con arrugas secundarias, arrugas en el margen medioposterior fuertemente irregulares a rugoreticuladas; espinas propodeales superiores moderadamente largas a largas, longitud $>0,3-0,6 \times$ la distancia entre sus bases . .


## pichachen

- Cabeza y/o gáster negro para algunas a todas las obreras de una serie; arrugas longitudinales en el dorso cefálico posterior a los ojos de regulares a onduladas, arrugas continúan hasta el margen posterior o divergen hacia las esquinas posteriores, pero generalmente carecen de arrugas o reticulaciones secundarias; espinas propodeales superiores consisten en tubérculos, dentículos, dientes triangulares o espinas cortas a largas
.62
62 (61) Negro concolor; algunas a todas estrías en el primer tergo gastral oblicuo y/o transversal ............. sanmartini (parte)
- $\quad$ Para algunos o la mayoría de las obreras en una serie, la cabeza y/o el gáster entre naranja rojizo, a veces naranja negruzco oscuro; estrías en el primer tergo gastral longitudinal
. varicolor (parte)
63 (60) Cabeza de color negro rojizo oscuro a rojo negruzco (Figura 35A); área malar, gáster negruzco a negro; mesosoma rojo negruzco oscuro a negro . excelsior
- Cabeza de color naranja ferruginoso oscuro a pardusco o negro rojizo (Figuras 72A \& 97A); área malar no negruzca o solo negruzca en el margen mandibular; mesosoma concoloro a ligeramente más oscuro que la cabeza; gáster oscuro anaranjadonegro a negruzco 64
64 (63) Arrugas en mesopleura de regulares a onduladas, sin ramas laterales; margen posterior del primer tergo gastral liso y brillante. .pulchellus (parte)
- Arrugas en mesopleura onduladas a irregulares, generalmente con numerosas ramas laterales que a menudo se conectan con las arrugas adyacentes; margen posterior del primer tergo gastral generalmente con estrías o anastomizantes de moderada a fuerte, el margen posterior rara vez es liso y brillante
tafi


FIGURE 9. Photographs showing deeply incised, closely spaced parallel rugae that cover the cephalic dorsum and mesosoma with interrugae slightly wider than rugae: (A-B) Pogonomyrmex mendozanus (CASENT0914385), and coarser, wavy to weakly irregular rugae on head, and rugae on mesosoma irregular to rugoreticulate to vermiculate on mesosoma, and interrugae on head and mesosoma distinctly wider than rugae: (C-D) Pogonomyrmex laticeps (CASENT0103263). Photographs by Michele Esposito from www.AntWeb.org.

## Key to queens for Pogonomyrmex species occurring in South America

(excluding P. brevibarbis group species)

Queens are unknown for the following species: atratus, bolivianus, colca, cusquena, excelsior, forelii, leonis, meridionalis, stefani, striatinodis, sylvestris, tenuipubens, theresiae, wilsoni.

1 Ergatoid (permanently wingless) (Figure 1) ............................................................................... 2

- Winged (including brachypterous) (Figure 2) ...................................................................... 11

2 (1) Queens small ( $\mathrm{HW}=1.17-1.27 \mathrm{~mm}$ ); mesoscutum, mesoscutellum, and posterior surface of petiolar node rugoreticulate (Figure 1J); in profile, mesosoma discontinuous between metanotum and propodeum (Figure 1K) . . . . . . naegelii (part)

- Queens larger ( $\mathrm{HW}=1.44-2.57 \mathrm{~mm}$ ); mesoscutum, mesoscutellum, and posterior surface of petiolar node usually rugose, rarely rugoreticulate; in profile, mesosoma continuous or nearly so between metanotum and propodeum . 3
3 (2) Anterior clypeal margin with small medial tooth; anterior surface of petiolar node striate . . . . . . . . . . . . . . . . . . . . . . mayri
- Anterior clypeal margin entire, lacking a medial tooth; anterior surface of petiolar node usually smooth and shining, never striate ............................................................................................................................ . 4
4 (3) Fine, dense, deeply incised striae (usually longitudinal) cover anterior one-third or more of first gastral tergum ......... . 5
- First gastral tergum smooth and shining to moderately coriarious, weakly shining, lacking striae except occasionally at base

6 (4) Queens larger $(\mathrm{HW}=2.43-2.57 \mathrm{~mm})$; in dorsal view, petiolar node only slightly longer than wide, anterior margin broadly rounded; in dorsal view, postpetiole wider than long; occurs in Chile bispinosus

- $\quad$ Queens smaller ( $\mathrm{HW}=1.44-2.38 \mathrm{~mm}$ ); in dorsal view, petiolar node notably longer than wide, anterior margin spatulate to angulate; in dorsal view, postpetiole longer than wide; occurs in Argentina, Bolivia, Paraguay, Uruguay
7 (6) Eyes large ( $\mathrm{OI}>27.5$ ); posterior surface of petiolar node and dorsum of postpetiole weakly coriarious, petiolar node lacking transverse rugae but sometimes with few longitudinal rugae; in profile, apex of petiolar node usually angulate with a small crest along anterior margin; propodeal spiracles circular or nearly so
. (brevibarbis-group [part])
- Eyes small ( $\mathrm{OI}<26.0$ ); posterior surface of petiolar node and/or dorsum of postpetiole with transverse rugae; in profile, apex of petiolar node usually rounded to subangulate and lacking a small crest along anterior margin; propodeal spiracles narrowly ovate
.8
8 (7) Anterior margin of clypeus concave; gaster blackish to black; psammophore well developed, consisting of long hairs along basolateral margin of head
laticeps (part)
- Anterior margin of clypeus flat to weakly convex; gaster tannish-brown, reddish-brown, or brown; psammophore poorly developed, consisting of short to medium-length hairs scattered across ventral side of head (cunicularius-group)


9 (8) In profile, petiolar node rounded; inferior propodeal spines wider than high, broadly rounded; first gastral tergum smooth and polished, strongly shining . cunicularius

- In profile, petiolar node angulate; inferior propodeal spines about as wide as high, acuminate; first gastral tergum moderately to strongly coriarious, dull to weakly shining . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 10
10 (9) Sculpturing on dorsum of mesosoma and posterior surface of petiolar node weak to moderately strong, irregularly rugose to moderately rugoreticulate (Figure 6C); body concolorous tannish-red
pencosensis
- $\quad$ Sculpturing on dorsum of mesosoma and posterior surface of petiolar node coarse, rugoreticulate to vermiculate (Figure 6D); bicolored, mesosoma and petiolar node medium to dark orangish-brown to reddish-brown, rest of body lighter ... serpens
11 (1) Queens small ( $\mathrm{HW}=1.15-1.30 \mathrm{~mm}$ ); psammophore poorly developed, consisting of short hairs scattered across ventral side of head . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 12 Queens larger ( $\mathrm{HW}=1.43-4.06 \mathrm{~mm}$ ); psammophore well developed, consisting of numerous long hairs along basolateral margin of head

13
12 (11) Cephalic dorsum, mesoscutum, mesoscutellum, and posterior surface of petiolar node at least partly rugoreticulate to vermiculate; hairs short, all hairs on mesosoma, posterior surface of petiolar node, dorsum of postpetiole, and gaster shorter than MOD
naegelii (part)

> Cephalic dorsum, mesoscutum, and mesoscutellum with regular to weakly irregular longitudinal rugae, posterior surface of petiolar node granulate-punctate; hairs longer, longest hairs on mesosoma, posterior surface of petiolar node, dorsum of postpetiole, and gaster $>$ MOD
> abdominalis
13 (11) First gastral tergum smooth and shining to moderately coriarious, weakly shining, lacking striae except occasionally at baseFine, dense, incised striae (usually longitudinal) cover anterior one-third or more of first gastral tergum (rastratus-group[part])

- Fine, dense, incised striae (usually longitudinal) cover anterior one-third or more of first gastral tergum (rastratus-group [part])
14 (13) Queen larger $(\mathrm{HW}=2.91-4.06 \mathrm{~mm})$; cephalic dorsum with scattered foveae (use $>50 \times$ magnification); part to all of cephalic dorsum with longitudinal striae (Figures 4A-B); antennal scapes short, extending beyond eye less than one-third the distance from posterior margin of eyes to posterior corner of head (coarctatus-group) . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 15
Queens small ( $\mathrm{HW}=1.43-2.81 \mathrm{~mm}$ ); cephalic dorsum lacking scattered foveae; cephalic dorsum with prominent longitudinal rugae (Figures 4C-D); antennal scapes longer, extending beyond eye by more than one-half the distance from posterior margin of eyes to posterior corners of head
15 (14) Fine striae cover only part of cephalic dorsum, areas lacking striae shining to strongly shining . . . . . . . . . . . . . . . . . . 16
- Fine striae cover entire cephalic dorsum, entire dorsum weakly shining . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 17

16 (15) Queens larger $(H W=3.69-4.06 \mathrm{~mm})$; cephalic dorsum mostly lacking fine striae; inferior propodeal spines poorly developed, wider than tall, broadly rounded. coarctatus

- Queens smaller $(H W=2.91 \mathrm{~mm})$; most of cephalic dorsum covered by moderately dense striae; inferior propodeal spines well developed, triangular, apex bluntly angulate to acuminate . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . marcusi
17 (15) In profile, lateral lobe of clypeus massively enlarged with narrow gap (much less than width of antennal scape) between clypeal lobe and frontal carina (Figure 5A); concolorous ferruginous orange to orange-red . . . . . . . . . . . . . . . . . . . lobatus
- In profile, lateral lobe of clypeus not enlarged with broad gap (similar to width of antennal scape) between clypeal lobe and frontal carina (Figure 5B); bicolored, head dark red to reddish-black, gaster blackish . . . . . . . . . . . . . . . . . . . . . . . micans
18 (14) Brachypterous, with minute wings; in dorsal view, pronotum large and well developed; mesoscutum poorly developed, anterior margin barely surpassing humeral shoulders of pronotum; in profile, pronotum rises at an approximately $45^{\circ}$ angle to meet mesoscutum (Figures 2A-B)
- Wings fully developed or nearly so; in dorsal view, pronotum small, poorly developed; mesoscutum well developed, anteriormargin extending to or near pronotal collar; in profile, pronotum rises nearly vertically to meet mesonotum (Figures 2C-H) ..... 22
19 (18) Dorsum of gaster dark ferruginous orange
19 (18) Dorsum of gaster dark ferruginous orange 19 (18) Dorsum of gaster dark ferruginous orange ..... 20 ..... 20
Dorsum of gaster black ..... 21
20 (19) Head and mesosoma mostly ferruginous orange longibarbis (part)
Head and mesosoma black mendozanus
21 (19) Head and mesosoma dark reddish-black, gaster black laticeps (part)
Concolorous black except for reddish area encircling eye ..... tinogasta
22 (18) Superior propodeal spines absent $\underline{\boldsymbol{o r}}$ forming denticles or tubercles ..... 23
Superior propodeal spines present, moderately to well developed ..... 24
23 (22) Queens larger ( $\mathrm{HW}=1.79-2.19 \mathrm{~mm}$ ); inferior propodeal spines lacking; in dorsal view, dorsum of postpetiole lacking trans-verse rugae or with few incomplete rugae; body usually bicolored with gaster notably darker than rest of body; occurs inArgentinainermis
- $\quad$ Queens smaller ( $\mathrm{HW}=1.41-1.58 \mathrm{~mm}$ ); inferior propodeal spines moderately well developed, consisting of a broadly round- ed, thin process; in dorsal view, dorsum of postpetiole covered with weak transverse rugae; body concolorous ferruginousorange; occurs in Chilesemistriata (part)
24 (22) Posterior surface of petiolar node and dorsum of postpetiole smooth and shining to moderately coriarious, weakly shining,rarely with few longitudinal or transverse rugae; head, mesosoma, and gaster concolorous dark brown to black; inferior pro-podeal spines well developed, acuminate; propodeal spiracles circular or nearly so(brevibarbis-group [part])
Posterior surface of petiolar node and usually dorsum of postpetiole with numerous transverse rugae; color variable, usuallyorangish or orange and black but never concolorous dark brown to black; inferior propodeal spines poorly developed, usuallysubangulate to broadly rounded; propodeal spiracles narrowly ovate25
25 (24) Head blackish to black pronotalis
Head ferruginous orange, dark reddish-brown to dark brown, or reddish-black ..... 25
26 (25) Mesosoma and gaster black vermiculatus (part)
Mesosoma and gaster variable in color but never concolorous black ..... 27
27 (26) Transverse rugae on dorsum of postpetiole lacking, discontinuous, or only present on lateral margins, faint to absent medially;body concolorous tannish-brown to reddish-brown; lateral margins of propodeal declivity with numerous, fine, delicate hairs;occurs in Argentina, Paraguay, Uruguayuruguayensis
Transverse rugae cover dorsum of postpetiole; body concolorous or bicolored; lateral margins of propodeal declivity lackingnumerous, fine, delicate hairs; occurs in Chile28
28 (27) Mesopleura, propodeum, and petiolar node black, not concolorous with mesoscutum ..... intermedia
Mesopleura, propodeum, and petiolar node dark ferruginous orange to orangish-brown, concolorous with mesoscutum
spinolae (part)
29 (13) Head and mesosoma black, gaster dark ferruginous orange ..... 30
Concolorous $\underline{\boldsymbol{o r}}$ if bicolored, then gaster concolorous to or darker than head and/or mesosoma ..... 31
30 (29) Gaster (including posterior margins of terga and sterna) concolorous ferruginous orange; hairs along posterior margin of firstand second gastral terga longer, longest hairs notably longer than MODcatanlilensis
Gaster ferruginous orange to orangish-black with blackish to black transverse bands across posterior margin of terga andsterna, base of first gastral tergum sometimes blackish; hairs along posterior margin of first and second gastral terga shorter,longest hairs usually $\leq$ MODvaricolor (part)
31 (29) Body concolorous black ..... 32
Bicolored; head and/or part of mesosoma orangish or reddish to dark orange or reddish-black $\underline{\boldsymbol{o r}}$ if concolorous, then mostlyorangish to orangish-brown33
32 (31) Dorsum of propodeum with 4-6 widely spaced transverse rugae sanmartini*
Dorsum of propodeum with 7-12 narrowly-spaced transverse rugae varicolor (part)* Queens are unknown from parts of Neuquén Province, Argentina, where workers sometimes have reddish heads; it is un-known if queens from these areas have a reddish head.
33 (31) Striae extend over anterior one-third to one-half of medial portion of first gastral tergum, occasional individuals with striaeand/or coriarious sculpture extending over slightly more than anterior one-half of tergum, rest of tergum usually smooth andshining34
Striae extend over anterior two-thirds or more of medial portion of first gastral tergum; rest of tergum smooth and shining tomoderately to strongly coriarious, weakly dull to dull37
34 (33) Mesosoma and gaster black ..... 35
Mesosoma concolorous ferruginous orange to reddish-orange or bicolored (orange and black); gaster concolorous ferruginousorange to dark orange or orangish-black36
35 (34) Head reddish-orange to reddish-brown; interrugae on cephalic dorsum weakly to moderately granulate-punctate, lackinga beaded appearance, weakly shining to shining; medial rugae along posterior margin of head regular to irregular; in pos-terodorsal view, posterior corners of head smooth and shining to rugose, interrugae smooth and shining
vermiculatus (part)
- Head dark reddish-black to blackish-red; interrugae on cephalic dorsum strongly granulate-punctate, with a beaded appear-ance, dull; medial rugae along posterior margin of head strongly irregular to rugoreticulate-vermiculate; in posterodorsalview, posterior corners of head rugose, interrugae granulate-punctate, dullpichachen
36 (34) Mesopleura and propodeum blackish to black, posterior corners of head rugose ..... strioligaster
Mesopleura and propodeum ferruginous orange to reddish-orange; posterior corners of head usually smooth and shiningatacama
37 (33) Pronotal sides concolorous blackish to black ..... 38
Pronotal sides mostly dark orangish to orangish-brown or dark reddish-brown, occasionally blackish with dark orangish toorangish-black pronotal shoulders44
38 (37) Anepisternum ferruginous orange to reddish-orange or dark reddish to reddish-brown pulchellusAnepisternum blackish to black39
39 (38) Queens smaller ( $\mathrm{HW}=1.43-1.87 \mathrm{~mm}$; $\mathrm{PNW}=1.15-1.42 \mathrm{~mm}$; $\mathrm{ML}=1.89-2.55 \mathrm{~mm}$ ); in profile, posterolateral and lateralmargins of first gastral tergum smooth and shining; in profile, striae not visible or visible over a very limited part of medialportions of first gastral tergum40
- $\quad$ Queens larger $(H W=1.87-2.49 \mathrm{~mm}$; $\mathrm{PNW}=1.34-1.80 \mathrm{~mm} ; \mathrm{ML}=2.34-3.17 \mathrm{~mm}$ ); in profile, posterolateral and lateralmargins of first gastral tergum with striae or moderately to strongly coriarious, weakly shining to dull; in profile, striae visibleover extensive parts of medial portions of first gastral tergum41
40 (39) Mesoscutum dark orangish-brown to reddish-brown; cephalic dorsum posterior to ocelli with irregular rugae, often with shortlateral branches to rugoreticulate; in posterodorsal view, medial rugae on cephalic dorsum diverging to posterior corners ofhead well anterior to posterior margin; in posterodorsal view, posterior margin of head with up to several transverse, stronglyirregular, medial rugae with short lateral branchestafi
- Anterior and lateral portions of mesoscutum blackish to black, central and posteromedial portions of mesoscutum orangish-brown to reddish-brown; cephalic dorsum posterior to ocelli with regular rugae that usually lack short lateral branches; inposterodorsal view, medial rugae on cephalic dorsum continue to near posterior margin before diverging to posterior cornersof head; in posterodorsal view, posterior margin of head with mostly longitudinal, regular to weakly irregular rugae that lackshort lateral branches41 (39) Superior propodeal spines consist of minute spines to short triangular teeth; inferior propodeal spines usually taller thanlength of superior propodeal spines; head reddish to reddish-brown . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . mapuche
- Superior propodeal spines consist of short, acuminate teeth to moderately long spines; inferior propodeal spines usuallyshorter than to as long as superior propodeal spines; head usually ferruginous orange to dark ferruginous orange or orangish-brown to reddish-brown42
42 (41) Head dark ferruginous orange or orangish-brown to reddish-brown, gaster dark orangish-brown to reddish-brown or blackish;superior propodeal spines consist of short, acuminate teeth to moderately long spines; most hairs on first gastral sternite $\geq$$0.6-0.8 \times \mathrm{MOD}$; hairs along posterior margin of second gastral sternite long, overlapping those along posterior margin of thirdgastral sternitecarbonarius
- Head and gaster concolorous ferruginous orange; superior propodeal spines moderately long; most hairs on first gastral ster-nite approximately $0.2-0.6 \times \mathrm{MOD}$; hairs along posterior margin of second gastral sternite short, not overlapping those alongposterior margin of third gastral sternite43
43 (42) Interrugae on cephalic dorsum weakly to moderately granulate, weakly shining; occurring in La Rioja, Catamarca, Tucumán,and Salta Provinces of Argentinaweiseri*
Interrugae on cephalic dorsum moderately to strongly granulate, dull; occurring in San Luis, San Juan, and Mendoza Prov-inces of Argentina and possibly further southpropinqua*Queens of these two species are very difficult to separate morphologically, but they are easily distinguished based on differ-ences in their geographic distribution.
44 (37) Longitudinal rugae on cephalic dorsum posterior to eyes strongly irregular, often with short lateral branches ..... 45
Longitudinal rugae on cephalic dorsum posterior to eyes regular, lacking short lateral branches ..... 47
45 (44) In profile, most hairs on dorsum of mesoscutum and mesocutellum approach to exceed MOD; anepisternum and katepister-num reddish-brown to brownish-redspinolae (part)In profile, hairs on dorsum of mesoscutum and mesoscutellum rarely $>0.5-0.6 \times \mathrm{MOD} \underline{\text { and } / \boldsymbol{o r}}$ part to most of anepisternumand/or katepisternum blackish to black46
46 (45) In dorsal view, anterior and posterolateral portions of mesoscutum usually blackish to black, weakly to notably darker thanrest of mesoscutum; in posterodorsal view, rugae along posterior margin of head and rugae on pronotal sides moderately tostrongly irregular, usually with few short lateral branchesmaulensisIn dorsal view, mesoscutum concolorous reddish-orange to reddish-brown; in posterodorsal view, rugae along posterior mar-gin of head strongly irregular with numerous short lateral branches; in profile, pronotal sides rugoreticulate . . . . araucania
47 (44) In profile, pronotum usually lighter than adjoining anepisternum and/or katepisternum; first gastral tergum ferruginous or-
ange ..... rastratus
- In profile, pronotum concolorous to slightly darker than adjoining anepisternum and katepisternum; first gastral tergum darkferruginous orange, dark brownish-orange, blackish-orange, or blackish to black48
48 (47) Rugae on pronotal sides irregular to weakly rugoreticulate ..... semistriata (part)
- Rugae on pronotal sides regular to wavy ..... 49
49 (48) Petiole, postpetiole, and first gastral tergum ferruginous orange; occurs in Chile ..... loaensisPetiole, postpetiole blackish to black; first gastral tergum partly to mostly blackish to black; occurs in Argentinalongibarbis (part)
Clave para las especies de Pogonomyrmex de Sur América basada en las reinas
(grupo $P$. brevibarbis incluido pero no a las especies)

Las reinas son desconocidas para las siguientes especies: atratus, bolivianus, colca, cusquena, excelsior, forelii, leonis, meridionalis, stefani, striatinodis, sylvestris, tenuipubens, theresiae, wilsoni.

2 (1) Reinas pequeñas $(\mathrm{AC}=1,17-1,27 \mathrm{~mm})$; mesoscuto, mesoescutelo y superficie posterior del nodo del pecíolo rugoreticulados (Figura 1J); en vista lateral, mesosoma presenta una discontinuidad entre el metanoto y el propodeo (Figura 1K)

- Reinas más grandes $(\mathrm{AC}=1,44-2,57 \mathrm{~mm})$; mesoscuto, mesoescutelo y superficie posterior del nodo del pecíolo generalmente rugosos, rara vez rugoreticulado; en vista lateral, mesosoma continuo, o casi, entre el metanoto y el propodeo
.3
3 (2) Margen antemedio del clípeo con diente pequeño; superficie anterior del nodo del pecíolo estriado . . . . . . . . . . . . . . . . mayri Margen anteromedio del clípeo entero, sin diente; superficie anterior del nodo del pecíolo generalmente lisa y brillante, nunca estriado .4
4 (3) Estrías finas y densas, talladas (generalmente longitudinales) cubren la tercera parte anterior, o más, del primer tergo gastral
 ocasionalmente en la base .
5 (4) Arrugas en el dorso del pronoto longitudinales . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . apterogenos
Arrugas en el dorso del pronoto transversales . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .lagunabravensis
6 (4) Reinas más grandes $(A C=2,43-2,57 \mathrm{~mm})$; en vista dorsal, nodo del pecíolo ligeramente más largo que ancho, su margen anterior ampliamente redondeado; en vistal dorsal, pospecíolo más ancho que largo; ocurre en Chile . . . . . . . . bispinosus Reinas pequeñas ( $\mathrm{AC}=1,44-2,38 \mathrm{~mm}$ ); en vista dorsal, nodo del pecíolo notablemente más largo que ancho, su margen anterior espatulado a angulado; en vista dorsal, pospecíolo más largo que ancho; ocurre en Argentina, Bolivia, Paraguay, Uruguay
.7
7 (6) Ojos grandes $(\mathrm{IO}>27,5)$; superficie posterior del nodo del pecíolo y el dorso de pospecíolo con débiles líneas anastomizantes, nodo del pecíolo sin arrugas transversales pero a veces con pocas arrugas longitudinales; en vista lateral, ápice del nodo del pecíolo generalmente angulado con una pequeña cresta a lo largo del margen anterior; espiráculos propodeales circulares o casi circulares
(grupo brevibarbis ([parte])
- Ojos pequeños $(\mathrm{IO}<26,0)$; superficie posterior del nodo del pecíolo y/o dorso de pospecíolo con arrugas transversales; en vista lateral, ápice del nodo del pecíolo normalmente redondeado a subangulado y sin una pequeña cresta a lo largo del margen anterior; espiráculos propodeales estrechamente ovalados
8 (7) Margen anterior del clípeo cóncavo; gáster negruzco a negro; psamóforo bien desarrollado, que consiste de pelos largos a lo largo del margen basolateral de la cabeza .
laticeps (parte)
- Margen anterior del clípeo recto a ligeramente convexo; gáster marrón claro, marrón rojizo o marrón; psamóforo poco desarrollado, que consiste de pelos cortos a medianos dispersos en el lado ventral de la cabeza (grupo cunicularius) . . . . . . 9
9 (8) En vista lateral, nodo del pecíolo redondeado; espinas propodeales inferiores más anchas que altas, ampliamente redondeadas; primer tergo gastral liso y pulido, fuertemente brillante .
cunicularius En vista lateral, nodo del pecíolo angulado; espinas propodeales inferiores tan anchas como altas, acuminadas; primer tergo gastral con líneas finas anastomizantes moderadamente a fuertemente talladas, brillo mate a débilmente resplandeciente . 10
10 (9) Esculpido del dorso mesosomal y superficie posterior del nodo del pecíolo débil a moderadamente fuerte, rugoso e irregular a moderadamente rugoreticulado (Figura 6C); cuerpo uniformemente marrón claro a rojo
pencosensis
- Esculpido del dorso mesosomal y superficie posterior del nodo del pecíolo grueso, rugoreticulado a vermiculado (Figura 6D); cuerpo bicolor, mesosoma y superficie posterior del nodo del pecíolo de medio a oscuro anaranjado-marrón claro u oscuro hasta marrón rojizo, el resto del cuerpo más claro
serpens
11 (1) Reinas pequeñas $(A C=1,15-1,30 \mathrm{~mm})$; psamóforo poco desarrollado, que consiste de pelos cortos esparcidos por el lado ventral de la cabeza 12
- Reinas más grandes $(\mathrm{AC}=1,43-4,06 \mathrm{~mm})$; psamóforo bien desarrollado, que consiste de numerosos pelos largos a lo largo del margen basolateral de la cabeza

13
12 (11) Dorso cefálico, mesoscuto, mesoescutelo y la superficie posterior del nodo del pecíolo por lo menos parcialmente rugoreticuladas a vermiculadas; pelos cortos, todos los pelos del mesosoma, de la superficie posterior del nodo del pecíolo, dorso de pospecíolo y gáster más corto que DMO

## naegelii (parte)

- Dorso cefálico, mesoscuto y mesoescutelo con arrugas longitudinales regulares a débilmente irregulares, superficie posterior del nodo del pecíolo granulado-punteado; pelos más largos, los pelos más largos en el mesosoma, en la superficie posterior del nodo del pecíolo, en el dorso de pospecíolo y el gáster > DMO . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . abdominalis
13 (11) Primer tergo gastral liso y brillante a con líneas finas anastomizantes moderadamente talladas, poco brillante, sin estrías excepto ocasionalmente en la base 14
- Estrías finas y densas, talladas (generalmente longitudinales) cubren la tercera parte anterior o más del primer tergo gastral (grupo rastratus [parte])

28
14 (13) Reinas más grandes ( $\mathrm{AC}=2,91-4,06 \mathrm{~mm}$ ); dorso cefálico con fosetas dispersas (use aumentos $>50 \times$ ); parte a todo el dorso cefálico con estrías longitudinales (Figuras 4A-B); escapos antenales cortos, que se extienden menos de un tercio de la distancia desde los margenes posteriores de los ojos a las esquinas posteriores de la cabeza (grupo coarctatus) . . . . . . . . . . 15

- Reinas pequeñas $(A C=1,43-2,81 \mathrm{~mm})$; dorso cefálico sin fosetas dispersas; dorso cefálico con prominentes arrugas longitudinales (Figuras 4C-D); escapos antenales más largos, que se extienden más de la mitad de la distancia desde los margenes posteriores de los ojos a las esquinas posteriores de la cabeza.
15 (14) Sólo una parte del dorso cefálico cubierto por estrías finísimas, zonas sin estrías brillantes a fuertemente brillantes . . . 16 Dorso cefálico cubierto por estrías finísimas, todo el dorso débilmente brillante . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 17
16 (15) Reinas más grandes ( $\mathrm{AC}=3,69-4,06 \mathrm{~mm}$ ); mayor parte del dorso cefálico sin finas estrías; espinas propodeales inferiores poco desarrolladas, más anchas que altas, ampliamente redondeadas
coarctatus
- $\quad$ Reinas pequeñas $(\mathrm{AC}=2,91 \mathrm{~mm})$; mayor parte del dorso cefálico cubiertos por estrías moderadamente densas; espinas propodeales inferiores bien desarrolladas, triangulares, sus ápices acuminados o forma de ángulo romo
marcusi
17 (15) En vista lateral, lóbulos laterales del clípeo muy engrosado, con una estrecha brecha (mucho menor que el ancho de los escapos) entre los lóbulos del clípeo y las carenas frontales (Figura 5A); uniformemente anaranjado ferruginoso a naranja-rojo
lobatus
En vista lateral, lóbulos laterales del clípeo no engrosado y con una amplia brecha (similar al ancho de los escapos) entre los lóbulos de clípeo y las carenas frontales (Figura 5B); cuerpo bicolor, cabeza rojo oscuro a rojizo-negro, gáster negruzco . . micans
18 Braquípteros, con alas diminutas; en vista dorsal, pronoto grande y bien desarrollado; mesoscuto poco desarrollado, su margen anterior apenas supera los "hombros" del húmero de pronoto; en vista lateral, pronoto se eleva formando un ángulo de aproximadamente $45^{\circ}$ para unirse con el mesoscuto (Figuras 2A-B)
- Alas completamente desarrolladas, o casi tan; en vista dorsal, pronoto pequeño, poco desarrollado; mesoscuto bien desarrollado, su margen anterior se extiende hasta o cerca del cuello pronotal; en vista lateral, pronoto se eleva casi verticalmente para unirse con el mesoscuto (Figuras 2C-H) 22
19 (18) Dorso de gáster naranja pardo oscuro ..... 20
Dorso de gáster negro ..... 21
20 (19) Cabeza y mesosoma principalmente naranja ferruginosa longibarbis (parte)
Cabeza y mesosoma negras
mendozanus
21 (19) Cabeza y mesosoma oscuro rojizo-negro, gáster negro
laticeps (parte)
Cuerpo concoloro negro excepto la zona que rodea el ojo la cual es rojiza ..... tinogasta
22 (18) Espinas propodeales superiores ausentes $\underline{o}$ forman dentículos o tubérculos ..... 23
Espinas propodeales superiores presentes, moderadas a bien desarrolladas ..... 24
23 (22) Reinas más grandes ( $\mathrm{AC}=1,79-2,19 \mathrm{~mm}$ ); sin espinas propodeales inferiores; en vista dorsal, dorso del pospecíolo carecede arrugas transversales o tiene pocas arrugas incompletas; cuerpo usualmente bicolor con el gáster notablemente más oscuroque el resto del cuerpo; ocurre en Argentina
- $\quad$ Reinas pequeñas ( $\mathrm{AC}=1,41-1,58 \mathrm{~mm}$ ); espinas inferiores propodeales moderadamente bien desarrolladas, consisten de unprocesos delgados, ampliamente redondeado; en vista dorsal, dorso del postpecíolo cubierto con arrugas transversales débiles;cuerpo uniformemente anaranjado ferruginoso; ocurre en Chilesemistriata (parte)
24 (22) Superficie posterior del nodo del pecíolo y dorso del pospecíolo lisos y brillantes a moderadamente anastomizantes, que brilladébilmente, raramente con pocas arrugas longitudinales o transversales; cabeza, mesosoma, y gáster concoloro marrón oscuroa negro; espinas propodeales inferiores bien desarrolladas, acuminadas; espiráculos propodeales circulares o casi circularesSuperficie posterior del nodo del pecíolo y usualmente el dorso del pospecíolo con numerosas arrugas transversales; colorvariable, generalmente anaranjado o naranja y negro pero nunca concoloro marrón oscuro a negro; espinas propodeales in-feriores poco desarrolladas, generalmente subanguladas a ampliamente redondeadas; espiráculos propodeales estrechamenteovalados25
25 (24) Cabeza negruzca a negra pronotalis
Cabeza naranja ferruginosa, marrón rojiza oscura a marrón oscura o negra rojizo ..... 26
26 (25) Mesosoma y gáster negras vermiculatus (parte)
Mesosoma y gáster de color variables, pero nunca uniformemente negro ..... 27
27 (26) Arrugas transversales en el dorso del pospecíolo ausentes, discontinuas, o solamente presentes en las márgenes laterales,débiles a ausentes medialmente; cuerpo uniformemente marrón parduzco a marrón rojizo; márgenes laterales del declive delpropodeo con numerosos pelos finos y delicados; ocurre en Argentina, Paraguay, Uruguaycarecen de pelos numerosos, finos y delicados; ocurre en Chile28
28 (27) Mesopleura, propodeo, y nodo del pecíolo negros, no de color uniforme con el mesoscuto intermedia
Mesopleura, propodeo, y nodo del pecíolo de color naranja ferruginoso oscuro a marrón anaranjado, uniforme con el mes-oscuto29 (13) Cabeza y mesosoma negras, gáster naranja ferruginoso oscuro30
De color uniforme, $\underline{\boldsymbol{o}}$ si bicolor, entonces el gáster de color uniforme o más oscuro que la cabeza y/o el mesosoma ..... 31
30 (29) Gáster (incluyendo los márgenes posteriores de los tergos y esternos) uniforme naranja ferruginoso; pelos a lo largo del mar-gen posterior del primer y segundo tergos gastrales más largos, notablemente más largos que DMOcatanlilensisGáster naranja ferruginoso a negro anaranjado con bandas transversales negruzcas a negras a través del margenes posterioresde los tergos y esternos, base del primer tergo gastral algunas veces negruzco; pelos a lo largo de la margenes posteriores delprimer y segundo tergos gastrales cortos, pelos más largos usualmente $\leq$ DMOvaricolor (parte)
31 (29) Cuerpo uniformemente negro ..... 32
- Cuerpo bicolor; cabeza y/o parte del mesosoma anaranjado o rojizo a anaranjado oscuro o negro rojizo $\underline{\boldsymbol{o}}$ si es uniforme encolor, entonces mayormente anaranjado a marrón anaranjado33
32 (31) Dorso del propodeo con 4-6 arrugas transversales ampliamente espaciadas ..... sanmartini*
- Dorso del propodeo con 7-12 arrugas transversales estrechamente espaciadas varicolor (parte)* Se desconocen si las reinas de partes de la Provincia de Neuquén, Argentina, tienen una cabeza rojiza.
33 (31) Estrías se extienden sobre el tercio anterior hasta la mitad de la porción media del primer tergo gastral, ocasionalmente indi-viduos con estrías y/o estructuras anastomizantes que se extienden sobre un poco más de la mitad anterior del tergo, el restodel tergo usualmente liso y brillante34
- Estrías se extienden sobre los dos tercios anteriores o más de la porción media del primer tergo gastral; el resto del tergo liso y brillante a moderadamente a fuertemente anastomizante, débilmente opaco a opaco . . . . . . . . . . . . . . . . . . . . . . . . . 37
34 (33) Mesosoma y gáster negras . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 35
- Mesosoma uniformemente ferruginoso naranja a anaranjado rojizo $\underline{\boldsymbol{o}}$ bicolor (naranja y negro); gáster uniformemente ferruginoso naranja a naranja oscuro o negro anaranjado

36
35 (34) Cabeza de color naranja rojizo a marrón rojizo; interrugas en el dorso cefálico débilmente a moderadamente granuladaspunteadas, sin apariencia de cuentas, débilmente brillante a brillante; arrugas medias a lo largo del margen posterior de la cabeza regulares a irregulares; en vista posterodorsal, esquinas posterior de la cabeza liso y brillante a rugosa con interrugas lisas y brillantes
. vermiculatus (parte)

- Cabeza de color negro rojizo a rojo negruzco; interrugas en el dorso cefálico fuertemente granuladas-punteadas, con una apariencia de cuentas, opaco; arrugas medias a lo largo del margen posterior de la cabeza fuertemente irregulares a rugoreticu-ladas-vermiculadas; en vista posterodorsal, esquinas posteriores de la cabeza rugosa, con interrugas granuladas-punteadas, opaco
pichachen
36 (34) Mesopleura y propodeo negruzcos a negros en color; esquinas posteriores de la cabeza rugosa . . . . . . . . . . . strioligaster Mesopleura y propodeo naranja ferruginoso a naranja rojizo en color; esquinas posteriores de la cabeza suele ser liso y brillante
atacama
37 (33) Lados pronotales uniforme negruzcos a negros en color . ......................................................... 38 Lados pronotales en su mayoría de color anaranjado oscuro a marrón anaranjado o marrón rojizo, ocasionalmente negruzcos con hombros pronotales de color anaranjado oscuro a negro anaranjado

44
38 (37) Anepisterno naranja ferruginoso a naranja rojizo o rojizo oscuro a marrón rojizo . . . . . . . . . . . . . . . . . . . . . . . pulchellus
Anepisterno negruzco a negro ........................................................................................... . 39
39 (38) Reinas pequeñas $(\mathrm{AC}=1.43-1.87 \mathrm{~mm} ; \mathrm{AP}=1.15-1.42 \mathrm{~mm} ; \mathrm{LM}=1.89-2.55 \mathrm{~mm})$; en vista lateral, márgenes laterales y posterolaterales del primer tergo gastral son lisos y brillantes; en vista lateral, estrías no son visibles o son visibles sobre una parte muy limitada de la porción medial del primer tergo gastral

- Reinas más grandes $(\mathrm{AC}=1.87-2.49 \mathrm{~mm} ; \mathrm{AP}=1.34-1.80 \mathrm{~mm} ; \mathrm{LM}=2.34-3.17 \mathrm{~mm})$; en vista lateral, márgenes laterales y posterolaterales del primer tergo gastral presentan estrías o son moderadamente a fuertemente anastomizantes, débilmente brillantes a opacas; en vista lateral, estrías son visibles sobre extensas partes de la porción medial del primer tergo gastral . .

40 (39) Mesoscuto marrón anaranjado oscuro a marrón rojizo; dorso cefálico posterior a los ocelos con arrugas irregulares, a menudo con ramas laterales cortas a rugoreticuladas; en vista posterodorsal, arrugas mediales en el dorso cefálico divergen hacia esquinas posteriores de la cabeza mucho antes que el margen posterior; en vista posterodorsal, margen posterior de la cabeza con hasta varias arrugas mediales transversales fuertemente irregulares con ramas laterales cortas . . . . . . . . . . . . . . . . . . tafi

- Porciones anterior y lateral del mesoscuto negruzcos a negros, porciones central y posteromedial del mesoscuto de color marrón anaranjado a marrón rojizo; dorso cefálico posterior a ocelos con arrugas regulares que generalmente carecen cortas ramas; en vista posterodorsal, arrugas mediales en el dorso cefálico continúan hasta cerca del margen posterior de la cabeza antes de divergen hacia las esquinas posteriores de la cabeza; en vista posterodorsal, margen posterior de la cabeza con arrugas principalmente longitudinales, regulares a débilmente irregulares que carecen de cortas ramas laterales . . . . santschii
41 (39) Espinas propodeales superiores forman espinas diminutas a dientes triangulares cortos; espinas propodeales inferiores usualmente más altas que la longitud de espinas propodeales superiores; cabeza rojiza a marrón rojiza ............. mapuche
- Espinas propodeales superiores forman dientes cortos y acuminados a moderadamente espinas largas; espinas propodeales inferiores usualmente más cortas que, o largas como, espinas propodeales superiores; cabeza usualmente de color naranja ferruginoso a naranja ferruginoso oscuro o marrón anaranjado a marrón rojizo
42 (41) Cabeza naranja ferruginosa oscura o marrón anaranjada a marrón rojiza, gáster marrón anaranjado oscuro a marrón rojizo o negruzco; espinas propodeales superiores consisten de cortos dientes acuminados a espinas moderadamente largas; la mayoría de los pelos en el primer esterno gastral $\geq 0.6-0.8 \times$ DMO; pelos a lo largo del margen posterior del segundo esterno gastral largos, superponiendo aquellos en el margen posterior del tercer esterno gastral
carbonarius
- Cabeza y gáster uniforme naranja ferruginosos; espinas propodeales superiores moderadamente largas; la mayoría de los pelos en el primer esterno gastral son aproximadamente $0.2-0.6 \times$ DMO; pelos a lo largo del margen posterior del segundo esterno gastral, cortos no se superponen a los pelos a lo largo del margen posterior del tercer esterno del gáster 43
43 (42) Interrugas en el dorso cefálico débilmente a moderadamente granuladas, débilmente brillantes; ocurre en las Provincias de La Rioja, Catamarca, Tucumán, y Salta, Argentina . weiseri*
- Interrugas en el dorso cefálico moderadamente a fuertemente granuladas, opacas; ocurre en las Provincias de San Luis, San Juan, y Mendoza, Argentina y posiblemente más al sur . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . propinqua *Reinas de estas dos especies son muy difíciles de separar morfológicamente, pero se distinguen fácilmente en función de las diferencias en su distribución geográfica.
44 (37) Arrugas longitudinales en el dorso cefálico posterior a los ojos fuertemente irregulares, a menudo con cortas ramas laterales Arrugas longitudinales en el dorso cefálico posterior a los ojos regulares, sin cortas ramas laterales . . . . . . . . . . . . . . . . . . . . . . . . . . 47 45 (44) En vista lateral, la mayoría de los pelos en el dorso del mesoscuto y mesoescutelo se aproximan para exceder DOM; anepisterno y katepisterno de color marrón rojizo a rojo parduzco spinolae (parte) En vista lateral, pelos en el dorso del mesoscuto y mesoescutelo raramente $>0.5-0.6 \times$ DOM $\downarrow / \underline{0}$ en parte o en su mayoría el anepisterno y/o el katepisterno color negro a negruzco .46
46 (45) En vista dorsal, porciones anterior y posterolateral del mesoscuto usualmente negruzcas a negras, débil a notablemente más oscuras que el resto del mesoscuto; en vista posterodorsal, arrugas a lo largo del margen posterior de la cabeza y arrugas en

|  | los lados pronotales moderadamente a fuertemente irregulares, usualmente con pocas ramas laterales cortas . . . . maulensis |
| :---: | :---: |
|  | En vista dorsal, mesoscuto uniforme naranja rojizo a marrón rojizo; en vista posterodorsal, arrugas a lo largo del margen posterior de la cabeza fuertemente irregulares con numerosas cortas ramas laterales; en vista lateral, lados pronotales reticuladas |
| 47 (43) | En vista lateral, pronoto usualmente más claro que el adyacente anepisterno y/o katepisterno; primer tergo gastral naranja ferruginoso <br> rastratus |
| - | En vista lateral, pronoto uniforme a ligeramente más oscuro que los adyacentes anepisterno y katepisterno; primer tergo gastral naranja ferruginoso oscuro, naranja parduzco oscuro, naranja negruzco, o negruzco a negro |
| 48 (47) | Lados pronotales con arrugas irregulares a débilmente rugoreticuladas . . . . . . . . . . . . . . . . . . . . . . semistriata (parte) |
| - | Lados pronotales con arrugas regulares a onduladas ......................................................... . . 49 |
| 49 (48) | Pecíolo, pospecíolo, y primer tergo gastral naranja ferruginosos; ocurre en Chile . . . . . . . . . . . . . . . . . . . . . . loaensis |
|  | Pecíolo y pospecíolo negruzcos a negros; primer tergo gastral parcialmente a mayormente negruzco a negro; ocurre en Argentina <br> longibarbis (parte) |

## Species accounts

## Overview of the $P$. rastratus-group

The $P$. rastratus-group consists of a heterogenous group of $>30$ species that are geographically widespread in Argentina and Chile, and probably also in Bolivia and Peru. Species in this group occur in numerous habitats that range from low elevations in Patagonia and the Monte Desert to high elevations in the altiplano. This group consists of numerous, difficult to identify species that typically lack diagnostic characters, and this is especially true for species with striae on their first gastral tergum. Kusnezov (1951) exemplified this difficulty by commenting, "with few exceptions, no character is sufficient to separate species in the $P$. rastratus-group because they typically differ by distinct combinations of characters or they display graded characters". This situation is exacerbated given the 20 additional species described in this paper, especially as many of these new species have striae on their first gastral tergum. In addition, characters such as color, striae on the first gastral tergum, sculpture pattern, and length of superior propodeal spines can vary intraspecifically, e.g., P. carbonarius, $P$. sanmartini, P. varicolor, and $P$. vermiculatus, making accurate identification difficult without vouchers. Because of this variation, it is imperative that large nest series be collected for unfamiliar species to encompass this variation, especially given that several couplets in the key refer to characters possessed by "most to all workers in a series". It also is recommended that collectors search sites to locate possible sympatric congeners, which also can reduce problems during identification. It also is imperative to have a voucher collection that can be used to verify identifications. Consequently, all of these species can usually be identified with high accuracy. The most difficult species to identify are those from the high elevation altiplano habitats of northern Argentina, and northern Chile. In addition to intranidal variation, some species display morphological variation among populations, e.g., P. catanlilensis, P. sanmartini, and P. vermiculatus. However, morphology of these species does not vary consistently across populations, and so they are maintained as one species.

## Pogonomyrmex apterogenos NEW SPECIES

(Figures 1E-F, 10A, 11-13)
Distribution-Figure 14A

Holotype worker [MACN: CASENT0914124]: ARGENTINA, Catamarca Province: Departamento Tinogasta, Chuschuil Valley at 20.9 km S Cortaderas, $27^{\circ} 44.0^{\prime} \mathrm{S} 68^{\circ} 08.2^{\prime} \mathrm{W}, 10,380^{\prime}(3145 \mathrm{~m}), 31$ January 2010 (R.A. Johnson \#4376). Paratypes, same data as holotype: IFML ( 6 workers), MACN ( 24 workers), LACM ( 6 workers), MCZC ( 9 workers), RAJC ( 21 workers), UCDC ( 3 workers), USNM ( 3 workers). Additional paratype series from the same locality and date-RAJ \#4377: MACN (6 workers), RAJC ( 6 workers); RAJ \#4378: MACN ( 12 workers), RAJC (11 workers, 1 ergatoid male): RAJ \#4379: IFML ( 6 workers), MACN (9 workers), RAJC (12 workers); RAJ \#4380: IFML (3 workers), MACN (9 workers), RAJC (11 workers, 1 ergatoid male).


FIGURE 10. Closeup photographs for workers of Pogonomyrmex showing dorsum of promesonotum with rugae that are well-defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae: (A) P. apterogenos holotype worker (CASENT0914124), (B) P. lagunabravensis holotype worker (CASENT0249051), (C) P. longibarbis (CASENT0249056), and (D) P. sanmartini (CASENT0922481), and dorsum of promesonotum with rugae that are usually wavy to irregular, discontinuous $\boldsymbol{o r}$ with short lateral branches; rugae on mesonotum mostly longitudinal but often becoming irregular to rugoreticulate on pronotum; anterodorsal margin of pronotum with wavy to irregular rugae to rugoreticulate, usually with short lateral branches: (E) P. RAJ-altip worker (CASENT0235280), (F) P. andinus (CASENT0914130), (G) P. tafi holotype worker (CASENT0235307), and (H) P. sanmartini (CASENT0922479). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 11. Photographs of Pogonomyrmex apterogenos holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914124). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 12. Photographs of Pogonomyrmex apterogenos ergatoid queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0173116). Photographs by April Nobile from www.AntWeb.org.


FIGURE 13. Photographs of Pogonomyrmex apterogenos ergatoid male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0173117). Photographs by April Nobile from www.AntWeb.org.


FIGURE 14. Geographic distribution of: (A) Pogonomyrmex apterogenos, (B) P. araucania, and (C) P. atacama. The large black circle in each panel denotes the type locality.

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, posterolateral margins smooth and shining to moderately coriarious, weakly shining, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae, (3) superior propodeal spines consist of tubercles, denticles, or teeth, rarely short spines, (4) rugae between frontal lobes weakly converging, 1-2 pairs of medial rugae meet and end at posterior margin of frontal triangle, and (5) head ferruginous orange, dorsum of promesonotum concolorous orangish-black, rest of mesosoma blackish-orange to blackish (Figures 10A, 11).

Measurements-holotype ( $n=13$ paratypes). HL 1.64 (1.53-1.82); HW 1.68 (1.43-1.79); MOD 0.39 ( $0.34-$ 0.41); OMD 0.39 (0.34-0.44); SL 1.33 (1.07-1.36); PNW 1.09 (0.94-1.16); HFL 1.75 (1.35-1.83); ML 1.93 (1.612.02); PW 0.41 ( $0.35-0.44$ ); PPW 0.56 ( $0.48-0.60$ ). Indices: SI 79.17 (68.94-83.22); CI 102.44 ( $93.46-102.53$ ); OI 23.21 (21.43-25.00); HFI 104.17 (88.27-104.27).

Description. Head quadrate to longer than wide $(C I=93.46-102.53)$; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, 1-2 pairs of medial rugae meet and end at posterior margin of frontal triangle, rugae between frontal lobes weakly converging. Interrugae on cephalic dorsum moderately to strongly granulate-punctate, dull to weakly shining; posterior corners rugose, interrugae weakly granulate, weakly shining to smooth and shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.92-1.15 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=68.94-83.22$ ) failing to reach posterior corners of head by less than to about the length of basal funicular segment. Antennal scapes usually weakly striate, interstriae weakly to moderately granulate, weakly shining to smooth and shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent widely spaced, regular, sub-parallel-parallel rugae. For most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae that continue onto pronotal sides. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin strongly angulate. Promesonotal suture usually present. Regular to weakly irregular rugae on mesopleura angle posterodorsally; regular transverse rugae on dorsum of propodeum traverse anteroventrally on sides. Superior propodeal spines consist of acuminate denticles, small triangular teeth, or rarely short spines, length rarely more than width at base, spines usually connected by well defined keel. Inferior propodeal spines wider than high, triangular, tip broadly rounded to acuminate, height similar to or slightly greater than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to densely granulate, dull to weakly shining. Legs moderately coriarious, weakly shining to smooth and shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with a weak to well developed, broadly rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface notably shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, sides subparallel anterad, slightly narrower posterad, anterior margin broadly rounded. Sides and posterior surface of petiolar node with regular transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, width and length similar; transverse to weakly arcuate rugae posterad, anterad rugae traversing medially from lateral margin then curving anterad to become longitudinal; anterolateral rugae concentric, curving from lateral to anterior margin, or rarely with all anterad rugae transverse or weakly arcuate; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly granulate, weakly shining to smooth and strongly shining. Striae extend over more than anterior one-half of first gastral tergum, often extending to posterior margin or posterior margin moderately to strongly coriarious, dull to weakly shining; posterolateral margins smooth and shining to moderately coriarious, weakly shining.

Erect, mostly short to medium length, yellowish pilosity moderately abundant on head, no hairs exceed about $0.7 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on fu-
nicular segments. Legs with moderately abundant suberect to decumbent, yellowish setae. Rest of body with moderately dense, erect, medium-length, yellowish setae. Head dark ferruginous orange to dark red-orange; mandibles, antennae, clypeus, frontal lobes, anterior margin of head black; dorsum of promesonotum orangish-black; rest of mesosoma dark orangish-black, blackish, or black; gastral terga very dark orange-black (Figures 10A, 11).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) ergatoid, (2) first gastral tergum with striae, (3) anterior margin of clypeus entire, and (4) in dorsal view, pronotum and mesoscutum weakly differentiated, longitudinal rugae on mesoscutum continue longitudinally or obliquely onto pronotum (Figures 1E-F, 12).

Measurements- $(n=6)$. HL 1.83-1.96; HW 1.84-1.94; MOD 0.43-0.48; OMD 0.43-0.51; SL 1.25-1.42; PNW 1.14-1.25; HFL 1.52-1.95; ML 2.08-2.30; PW 0.47-0.50; PPW 0.57-0.75. Indices: SI 66.67-77.17; CI 95.92-103.28; OI 22.75-25.54; HFI 82.61-103.26.

Description. Ergatoid; in full-face view, head quadrate to subquadrate $(\mathrm{CI}=95.92-103.28)$, posterior margin flat. Longitudinal rugae on cephalic dorsum wavy, medial rugae not diverging toward posterior corners along posterior margin; rugae between frontal lobes weakly converging, $1-2$ pairs of medial rugae meet and end at posterior margin of frontal triangle. Posterior corners rugose; interrugae on cephalic dorsum and posterior corners moderately granulate-punctate, dull to weakly shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

Mesosoma lacking morphological structures related to or for inserting wings; all mesosomal surfaces with subparallel, wavy rugae; interrugae smooth and shining to moderately granulate-punctate, weakly shining. Pronotum large with longitudinal or oblique rugae that continue from mesoscutum and traverse ventrally on pronotal sides, anterior margin occasionally with transverse rugae. Mesoscutum reduced in size, not extending to pronotal collar; sides subparallel, converging to bluntly acuminate, arcuate anterior margin. Dorsum of propodeum transversely rugose; superior propodeal spines reduced to small teeth; inferior propodeal spines triangular, longer than superior spines, tips acuminate. Peduncle of petiole long, anteroventral margin with a weakly developed rounded process. In profile, petiolar node asymmetrical with anterior surface notably shorter than posterior surface, apex angulate. Postpetiole convex in profile; in dorsal view, maximum width about equal to length. Posterior surface of petiolar node and dorsum of postpetiole with wavy transverse rugae; interrugae weakly punctate, weakly shining to shining. Striae extend over more than anterior one-half of first gastral tergum, often extending to posterior margin or posterior margin moderately to strongly coriarious, weakly shining to dull; posterolateral margins smooth and shining to moderately coriarious, weakly shining. Most body surfaces with moderately abundant suberect to erect, short, white to cream-colored setae, longest hairs on posterior terga. Head ferruginous orange; pronotum, mesoscutum, first gastral tergum blackish-orange; rest of body blackish to black, sometimes with a weak orangish infusion (Figures $1 \mathrm{E}-\mathrm{F}, 12$ ).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) ergatoid, (2) in profile, cephalic rugae posterior to eyes continue more or less directly to posterior corners, not forming circumocular whorls and not converging posterior to eyes, and (3) notauli absent (Figure 13).

Measurements- ( $n=8+2$ paratypes). HL 1.35-1.60; HW 1.35-1.64; MOD 0.42-0.48; OMD 0.21-0.31; SL $0.54-0.61$; HFL $1.52-1.70$; ML $1.84-2.20$; PW $0.42-0.49$; PPW $0.57-0.66$. Indices: SI $34.76-42.22$; CI $92.47-$ 106.34; OI 29.14-33.10; HFI 103.40-118.52.

Additional material examined. ARGENTINA: Catamarca: Rt 45 at 28.4 km S Cortaderas, 10,170', Jan 28, 2010 (RAJC); Rt 45 at 13.7 km S Cortaderas, 10,900', Jan 5, 2006 (MCZC; RAJC); Rt 45 at 1.4 km N Cortaderas, 11,070', Jan 9, 2010 (RAJC); Rt 45 at 20.5 km N Cortaderas, 11,090', Jan 5, 2010 (CASC; MCZC; RAJC; UCDC); Rt 45 at 30.5 km E Chile border, 13,330', Jan 30, 2010 (RAJC); Rt 60 at 0.5 km E La Gruta, 13,300', Mar 20, 2017 (RAJC) (Figure 14A).

Etymology. The specific epithet, apterogenos (Latin, aptero $=$ wingless, and genos $=$ parentage), refers to this species having ergatoid queens and males.

Discussion. Pogonomyrmex apterogenos is not known to co-occur with any congeners. However, P. apterogenos is similar to P. lagunabravensis, P. longibarbis, and P. pulchellus; all four species inhabit high elevations ( $>$ 3000 m ), striae extend over more than anterior one-half of first gastral tergum, and longitudinal rugae on promesonotum are very regular, subparallel-parallel, with several continuous, transverse rugae along the anterior margin of the pronotum (Figure 10). Pogonomyrmex apterogenos can be distinguished from all three species based on the $1-2$ most medial rugae on the cephalic dorsum converging and ending near the posterior margin of the clypeus, and
rugae between the frontal lobes weakly converging. In P. lagunabravensis, P. longibarbis, and P. pulchellus, the 1-2 most medial rugae on the cephalic dorsum are subparallel-parallel and typically continue onto the clypeus rather than ending near the posterior margin of the clypeus. Pogonomyrmex apterogenos might also be confused with $P$. rastratus, but the superior propodeal spines of $P$. apterogenos usually consist of acuminate denticles or small triangular teeth with length of the inferior propodeal spines similar to or longer than the superior spines. In P. rastratus, the superior propodeal spines are short to long, usually long in some workers in a series, and the inferior propodeal spines are shorter than the superior spines.

Biology. Little is known about the biology of $P$. apterogenos. Nests from the type series were in very sparsely vegetated Puna Desert habitat that consisted of scattered Chuquiraga atacamensis (Asteraceae) and occasional individuals of Atriplex sp. (Amaranthaceae). At another location in this same valley (near 4000 m ), workers foraged solitarily for seeds on an Adesmia sp. (Fabaceae). Nests were relatively difficult to locate at this site, but workers were easy to locate on these plants and follow back to their nest.

Pogonomyrmex apterogenos, along with its sister species, $P$. lagunabravensis, appear to be unique among ants in that both queens and males are ergatoid. Little is known about the mating system of either species. Males were collected from 5-30 January, and one ergatoid queen was collected under a rock on March 20, indicating that the ergatoid queens of this species found nests independently. The larger size of queens makes them relatively easy to differentiate from workers, but males and workers are similar in size and color such that caste must be verified using a hand lens or microscope. It is unknown if males continue to produce sperm throughout their life, as occurs in ergatoid males of some species of Cardiocondyla (see Heinze \& Hölldobler, 1993). Partly excavated nests suggested that colonies are diffuse, with tunnels radiating in all directions. These partial excavations indicated that colonies probably contain from 500 to more than 1000 workers.

Pogonomyrmex apterogenos inhabits elevations from 3080-4040 m. This species occurs in the Central Andean puna and Southern Andean steppe ecoregions, as defined by Olson et al. (2001) (Figure 14A).

## Pogonomyrmex araucania NEW SPECIES

(Figures 15-17)
Distribution-Figure 14B

Holotype worker [MACN: CASENT0914128]: ARGENTINA, Neuquén: Departamento Aluminé, 4.8 km E Villa Pehuenia, $38^{\circ} 53.3^{\prime} \mathrm{S} 71^{\circ} 08.3^{\prime} \mathrm{W}, 3830^{\prime}(1160 \mathrm{~m})$, 9 February 2011 (R.A. Johnson \#4700). Paratypes, same data as holotype: IFML ( 3 workers), LACM ( 3 workers), MACN ( 3 workers), MCZC ( 3 workers), MNNC ( 3 workers), RAJC ( 20 workers, 1 alate queen), UCDC ( 3 workers), USNM ( 3 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) well developed psammophore, (2) first gastral tergum lacking striae, weakly to strongly coriarious along base or extending over anterior one-half of segment $\underline{\boldsymbol{o r}}$ with faint, barely visible, unincised striae on anterior one-third to one-half of segment, (3) posterior margin and usually posterior one-third or more of first gastral tergum smooth and shining to strongly shining, rarely weakly coriarious, (4) transverse rugae on posterior surface of petiolar node and dorsum of postpetiole, (5) head and mesosoma concolorous to nearly concolorous light to dark ferruginous orange to reddish-brown, (6) clypeus orangish to orangish-red, concolorous with adjacent cephalic dorsum, (7) legs and antennal scapes usually orangish-brown, occasionally brownish to blackish, (8) superior propodeal spines long, length $>0.6 \times$ the distance between their bases, (8) in profile, most hairs on dorsum of mesosoma $<0.5 \times$ MOD and no longer than length of superior propodeal spines (Figure 15).

Measurements-holotype ( $n=12$ paratypes). HL 1.63 (1.32-1.70); HW 1.65 (1.43-1.78); MOD 0.31 ( $0.30-$ 0.35); OMD 0.40 (0.34-0.45); SL 1.28 (1.06-1.36); PNW 1.09 (0.95-1.17); HFL 1.71 (1.30-1.81); ML 1.92 (1.622.02); PW 0.41 (0.36-0.44); PPW 0.63 (0.51-0.63). Indices: SI 77.58 (73.29-81.33); CI 101.23 (98.03-108.33); OI 18.79 (19.66-23.33); HFI 103.64 (87.84-107.74).

Description. Head subquadrate to wider than long $(C I=98.03-108.33)$, broadest just posterior to eyes; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, rugae usually becoming irregular or rugoreticulate-vermiculate posterior to eyes, especially along posterior margin. In full-face view, medial rugae usually diverging toward posterior corners of head. Posterior corners rugose, interrugae weakly to moderately granulate, weakly shining to dull, occasionally smooth and shining. Cephalic interrugae strongly granulate, dull, with a beaded appearance. Anterior margin of clypeus concave, dorsum with numerous subparallel, longitudinal
rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margins of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.18-0.23 \times$ HL. In profile, eyes situated slightly anterior to middle of head, $O M D=0.97-1.37 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes $(\mathrm{SI}=73.29-81.33)$ reaching or just failing to reach posterior corners of head. Antennal scapes smooth and shining to moderately coriarious, weakly shining, often with weak longitudinal striae; basal flange moderately well developed, flattened, with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex. All mesosomal surfaces with prominent, irregular rugae to rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, anterolateral margins angulate. Promesonotal suture usually absent. Dorsum of mesonotum with strongly irregular, longitudinal rugae that diverge toward humeral shoulders of pronotum, anteromedial portion of pronotum rugoreticulate $\underline{o r}$ anterad portion to all of pronotum and sometimes anterad portion of mesonotum rugoreticulate; pronotal sides rugoreticulate. Irregular rugae on mesopleura angle posterodorsally, secondary rugae usually present; irregular transverse to oblique rugae on dorsum of propodeum traverse anteroventrally onto mesopleura. Superior propodeal spines long, length $>0.6 \times$ the distance between their bases, spines connected by a well defined keel; inferior propodeal spines broader than high, apex weakly rounded to subangulate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to moderately granulate-punctate, weakly shining. Legs smooth and shining to weakly to moderately coriarious, weakly shining.

Peduncle of petiole about $0.8 \times$ long as petiolar node, anteroventral margin with a well developed rounded process that narrows posterad, then continues subparallel-parallel to dorsal margin to near posteroventral margin of petiolar node. In profile, posterior surface of petiolar node weakly convex, node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to weakly rounded. In dorsal view, petiolar node longer than broad, widest near spatulate anterior margin, gradually tapering posterad. Posterior surface of petiolar node with regular to irregular, wavy or arcuate, transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest at or near posterior margin, tapering to anterior margin, maximum width and length about equal. Wavy to irregular transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node, secondary rugae usually present, sometimes nearly rugoreticulate; interrugae on both surfaces weakly to moderately coriarious, weakly shining. First gastral tergum weakly to strongly coriarious along base to extending over anterior one-half of segment, sculpturing sometimes appearing as faint, barely visible, unincised striae on anterior one-third to one-half of segment; posterior margin and usually posterior one-third or more of first gastral tergum smooth and shining to strongly shining, rarely weakly coriarious.

Erect, short to medium-length, white pilosity moderately abundant on head, longest along posterior margin approximately $0.8 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect, medium-length, white setae. In profile, most hairs $<0.5 \times$ MOD and no longer than length of superior propodeal spines. Head and mesosoma concolorous to nearly concolorous light to dark ferruginous orange to reddish-brown; legs and antennal scapes usually orangish-brown, occasionally brownish to blackish; gaster dark ferruginous orange with a darker band along posterior margin of terga (Figure 15).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining, (3) transverse rugae cover posterior surface of petiolar node and dorsum of postpetiole, (4) longitudinal rugae on cephalic dorsum posterior to eyes strongly irregular, often with short lateral branches, interrugae strongly granulate, dull, with a beaded appearance, (5) in posterodorsal view, rugae along posterior margin of head and in profile, rugae posterior to eyes strongly irregular, with numerous short lateral branches, (6) in profile, rugae on pronotal sides rugoreticulate, (7) head, pronotum, mesoscutum, mesoscutellum, concolorous reddish-orange to reddish-brown, (8) part to most of anepisternum and/or katepisternum blackish to black, and (9) in profile, hairs on dorsum of mesoscutum and mesoscutellum rarely $>0.5-0.6 \times \mathrm{MOD}$ (Figure 16).

Measurements- $(n=6)$. HL 1.59-1.68; HW 1.64-1.74; MOD 0.33-0.38; OMD 0.34-0.44; SL 1.15-1.28; PNW 1.32-1.42; HFL 1.48-1.77; ML 2.24-2.51; PW 0.49-0.54; PPW 0.71-0.82. Indices: SI 67.25-74.85; CI 99.40-104.82; OI 19.54-23.17; HFI 90.24-104.22.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of small ocelli on head. In full-face view, head subquadrate to quadrate ( $\mathrm{CI}=99.40-104.82$ ), broadest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy to irregular, rugae posterior to eyes strongly irregular, often with short lateral branches; in posterodorsal view, rugae along posterior margin of head and in profile, rugae posterior to eyes strongly irregular, with numerous short lateral branches. In full-face view, medial rugae continuing to posterior margin, interrugae strongly granulate-punctate, dull, with a beaded appearance; posterior corners irregularly rugose, interrugae weakly to strongly granulate, weakly shining to dull. Mandibles with five to six teeth, dorsal surface rugose. Psammophore moderately well developed.

All mesosomal surfaces except pronotal sides with regular to wavy, subparallel rugae, rugae irregular to rugoreticulate on pronotal sides, interrugae weakly to moderately granulate-punctate, weakly shining; superior propodeal spines long, length about $0.4-0.5 \times$ the distance between their bases, acuminate; inferior propodeal spines moderately well developed, wider than tall, apex subangulate to angulate. Peduncle of petiolar node long, anteroventral surface with a weakly to moderately well developed, broadly rounded process that narrows posterad and continues to posterior margin of petiolar node. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy, transverse rugae. In dorsal view, postpetiole slightly wider than long; wavy to irregular, transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly granulate-punctate, weakly shining to smooth and shining. Striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining. Most body surfaces with moderately abundant suberect to erect, medium-length, whitish to cream-colored setae. In profile, hairs on dorsum of mesoscutum and mesoscutellum rarely $>0.5-0.6 \times$ MOD. Head and mesosoma mostly concolorous red-dish-orange to reddish-brown, part to most of anepisternum and/or katepisternum blackish to black; gaster lighter ferruginous orange with a darker transverse band along posterior margin of terga (Figure 16).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) bicolored: head and mesosoma black, gaster ferruginous orange, (3) erect hairs lacking on first gastral tergum, (4) anterior portion to all of anepisternum and katepisternum smooth and shining, (5) posterior surface of petiolar node mostly smooth and shining, (6) dorsum of postpetiole with faint regular, transverse or longitudinal rugae, interrugae mostly smooth and shining, and (7) interrugae on mesoscutum and mesoscutellum weakly granulate, weakly shining to smooth and shining. Note that no characters were found to separate males of $P$. araucania and $P$. maulensis (Figure 17).

Measurements- $(n=10)$. HL 1.14-1.32; HW 1.16-1.34; MOD 0.42-0.46; OMD 0.16-0.24; SL 0.34-0.41; HFL 1.46-1.77; ML 2.17-2.36; PW 0.41-0.55; PPW 0.66-0.73. Indices: SI 26.98-33.62; CI 95.35-108.70; OI 34.13-37.40; HFI 111.45-142.24.

Additional material examined. ARGENTINA: Neuquén: Pino Hachado, Jan 17, 2010 (RGPC); Villa Pehuenia, Jan 19, 2010 (RGPC); 2.5 km W Villa Pehuenia, 3780', 9 Feb, 2011 (MCZC; RAJC); Angostura, Jan 21-22, 1949 (IFML); Aluminé, Jan 19, 1949 (LACM; USNM); Angostura-Aluminé, Jan 21, 1949 (IFML); 1.6 km W entrance to Parque Nacional Lanin, 3250', Feb 7, 2011 (RAJC); Lago Tromen, 1050 m, Jan 9, 1995 (MCZC; UCDC). CHILE: Araucanía: Rt 181 at 54.6 km SE Longquimay, 5080', Feb 27, 2014 (MCZC; RAJC) (Figure 14B).

Etymology. The specific epithet, araucania, is a noun in apposition and invariant in form that is derived from the name of the homeland of the Mapuche people in Patagonia (south central Chile and adjacent areas of Argentina).

Discussion. Pogonomyrmex araucania is distinguished from all congeners except for P. spinolae by: (1) first gastral tergum lacking striae, weakly to strongly coriarious along base to over anterior one-half or more of segment $\underline{\boldsymbol{o r}}$ with faint, barely visible, unincised striae on anterior one-third to one-half of segment, (2) superior propodeal spines long, length $>0.6 \times$ the distance between their bases, (3) transverse rugae on posterior surface of petiolar node and dorsum of postpetiole, and (4) head and mesosoma concolorous to nearly concolorous light to dark ferruginous orange to reddish-brown. Length of hairs on the dorsum of the mesosoma appears to be the only character that reliably separates $P$. araucania and $P$. spinolae. In $P$. araucania these hairs are shorter with most hairs $<0.6-0.7 \times$ MOD; these hairs are longer in $P$. spinolae, with most approaching to exceeding MOD.


FIGURE 15. Photographs of Pogonomyrmex araucania holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914128). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 16. Photographs of Pogonomyrmex araucania paratype alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914129). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 17. Photographs of Pogonomyrmex araucania male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914355). Photographs by Michele Esposito from www.AntWeb.org.

Biology. Pogonomyrmex araucania workers are solitary foragers. Nests are placed in open, exposed sites, and the nest entrance ranges from a hole in the ground to a tumulus up to 15 cm in diameter. Sexuals have been collected from 9-27 February and a dealate queen was collected on 27 February, indicating that mating flights occur during the austral summer. Partial nest excavations indicate that colonies probably contain up to 1000 workers. Pogonomyrmex araucania inhabits elevations from 985-1540 m. This species occurs in the Valdivian temperate forests ecoregion, as defined by Olson et al. (2001) (Figure 14B).

## Pogonomyrmex atacama NEW SPECIES

(Figures 2C-D, 18-20)
Distribution-14C

Holotype worker [MNNC: CASENT0922565]: CHILE, Antofagasta: El Loa Province: Rt 23 at 35.9 km NE Socaire, $23^{\circ} 50.0^{\prime} \mathrm{S} 67^{\circ} 51.9^{\prime} \mathrm{W}, 12,720^{\prime}(3855 \mathrm{~m})$, 23 March 2017 (RA Johnson \#5837). Paratypes, same data as holotype: IFML ( 3 workers), LACM ( 6 workers), MACN ( 3 workers), MCZC ( 6 workers), MNNC ( 12 workers); RAJC ( 54 workers, 4 alate queens), UCDC ( 3 workers), USNM ( 6 workers). Additional paratype series from same locality and date-RAJ \#5838; RAJC (9 workers); RAJ \#5839; IFML (3 workers), LACM (3 workers), MACN (3 workers), MCZC ( 3 workers), MNNC ( 6 workers); RAJC ( 9 workers), USNM ( 3 workers); RAJ \#5840; MNNC ( 5 workers); RAJC (18 workers), UCDC (3 workers), USNM (3 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum with striae along base to extending over anterior one-third to one-half of medial portion of segment, rest of tergum smooth and shining to strongly shining, (2) longitudinal rugae on dorsum of mesonotum regular, anterior margin of pronotum usually with one to few transverse rugae, (3) mesosoma ferruginous orange, reddish-orange, or orangish brown, (4) superior propodeal spines consist of short to moderately long spines with length greater than width at base, (5) height of inferior propodeal spines less than length of superior propodeal spines, (6) posterior corners of head usually smooth and shining to strongly shining, (7) mandibles with seven teeth, (8) rugae on medial portion of clypeus converge anterad to form up to several concentric, narrowly rounded Vs, and (9) rugae on dorsum of postpetiole mostly longitudinal (Figure 18).

Measurements-holotype ( $n=12$ paratypes). HL 1.68 (1.39-1.70); HW 1.73 (1.47-1.79); MOD 0.42 ( $0.36-$ 0.42); OMD 0.38 (0.32-0.48); SL 1.31(1.06-1.34); PNW 1.09 ( $0.98-1.15)$; HFL 1.69 (1.41-1.78); ML 1.92 (1.652.04); PW 0.42 ( $0.37-0.45$ ); PPW 0.58 ( $0.50-0.65$ ). Indices: SI 75.72 ( $67.95-79.01$ ); CI 102.98 (101.96-113.82); OI 24.28 (22.22-26.53); HFI 97.69 (94.15-101.75).

Description. Head quadrate to wider than long $(C I=101.96-113.82)$; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae not diverging to diverging toward posterior corners; for most workers, posterior margin with transverse rugae medially to along entire margin. Rugae on medial portion of clypeus converge anterad to form up to several concentric, narrowly rounded Vs. Interrugae on cephalic dorsum moderately to strongly granulate-punctate, with a beaded appearance, weakly shining; posterior corners smooth and shining to strongly shining, faint striae visible on occasional workers. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with seven teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.23-0.29 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.90-1.24 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=67.95-79.01$ ) failing to reach posterior corners by less than length of basal funicular segment. Antennal scapes smooth and shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly convex; all mesosomal surfaces with prominent, wavy to irregular rugae. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin weakly to moderately angulate. Promesonotal suture usually weakly to moderately impressed. Wavy to irregular, longitudinal rugae on mesonotum continue onto pronotum, lateral rugae diverging to humeral shoulders of pronotum with one to several transverse rugae along anterior margin of pronotum. Irregular rugae on pronotal sides traverse ventrally or posteroventrally. Irregular rugae on mesopleura angle posterodorsally; irregular transverse, oblique, or nearly longitudinal rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines consist of short, triangular teeth to long spines, lacking well defined keel that connects spines. Inferior propodeal spines moderately well developed,


FIGURE 18. Photographs of Pogonomyrmex atacama holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922565). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 19. Photographs of Pogonomyrmex atacama paratype alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922568). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 20. Photographs of Pogonomyrmex atacama male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0923353). Photographs by Michele Esposito from www.AntWeb.org.
wider than high, apex weakly rounded, height usually less than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to moderately granulate-punctate, weakly shining to smooth and shining. Legs weakly coriarious, weakly shining to shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with well developed rounded process. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface longer than posterior surface, apex subangulate to weakly rounded. In dorsal view, petiolar node longer than wide, sides subparallel, narrowest posterad, anterior margin spatulate to broadly rounded. Posterior surface of petiolar node with regular to wavy transverse to occasionally oblique rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, maximum width and length about equal. Rugae on dorsum of postpetiole mostly longitudinal, finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly granulate, weakly shining to shining. Striae extend over anterior one-third to one-half of medial portion of first gastral tergum, posterior portion smooth and shining to strongly shining.

Erect, mostly short to medium length, whitish pilosity moderately abundant on head. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish to pale yellow setae. Rest of body with moderately dense, erect, mediumlength, whitish to pale yellow setae. Head and mesosoma dark ferruginous orange to orangish-brown, mesosoma sometimes slightly darker than head; mandibles, antennae, legs, petiolar node, postpetiole, gaster dark brownishorange (Figure 18).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) striae cover anterior one-quarter or more of first gastral tergum, (2) medioposterior one-quarter to one-third or more of first gastral tergum (including posterolateral margins) smooth and shining, (3) mesopleura and propodeum ferruginous orange to orangish-black, (4) posterior corners smooth and shining, faint rugae sometimes present, (5) in dorsal view, interrugae on mesoscutum weakly coriarious, shining, and (6) transverse rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figures 2C-D, 19).

Measurements-( $n=4$ paratypes). HL 1.54-1.64; HW 1.68-1.74; MOD 0.38-0.42; OMD 0.39-0.41; SL 1.24-1.28; PNW 1.22-1.26; HF 1.58-1.72; ML 2.05-2.22; PW 0.40-0.49; PPW 0.62-0.63. Indices: SI 71.26-75.60; CI 103.05-111.04; OI 22.62-24.14; HFI 94.05-101.78.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to slightly wider than long $(\mathrm{CI}=103.05-111.04)$, widest just posterior to eyes, posterior margin flat to weakly convex. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae weakly diverging to diverging toward posterior corners of head; interrugae on cephalic dorsum weakly to moderately granulate-punctate, with a weakly beaded appearance, weakly shining; posterior corners smooth and shining or with faint rugae. Mandibles with six to seven teeth, often with one to two additional denticles between teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces with subparallel, regular to wavy rugae; interrugae on mesoscutum weakly granulate, weakly shining, interrugae on other parts of mesosoma weakly to moderately granulate, weakly shining; superior propodeal spines consist of triangular teeth, width at base similar to length; inferior propodeal spines wider than tall, apex weakly rounded to rounded, height less than to similar to length of superior propodeal spines. Peduncle of petiole long, anteroventral margin with a weakly to moderately developed, broadly rounded process that narrows, then continues posterad parallel to dorsal surface. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate. Posterior surface of petiolar node with wavy to irregular, transverse to arcuate rugae, weakly shining. In dorsal view, postpetiole wider than long; dorsum with wavy to irregular, transverse to strongly arcuate rugae that are finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly granulate-punctate, weakly shining. Striae cover anterior one-third to one-half of first gastral tergum, rest of segment smooth and shining to strongly shining. Most body surfaces with moderately abundant suberect to erect, short to medium-length, whitish setae. Head ferruginous orange; mesosoma dark orange to orangish-black or blackish-orange; gaster blackish or with first gastral tergum orangish-black; petiole, postpetiole, legs, antennae, black (Figures 2C-D, 19).

The queen of $P$. atacama appears to be brachypterous. The body retains all structures of a fully alate queen, and the wings retain all cells of a fully alate queen. However, the wings are reduced in size as they do not extend to the posterior margin of the gaster, and the tips are weakly to strongly concave rather than weakly to moderately convex as in fully alate queens. Additionally, in profile the anterior margin of the mesoscutum rises at an approximately
$45^{\circ}$ angle to meet the dorsal surface (Figure 2D) rather than having a vertical anterior face as occurs in fully alate queens (Figures 2F \& 2H).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over anterior one-third to one-half of first gastral tergum, (2) in profile, rugae forming circumocular whorls posterior to eyes, (3) notauli present, and (4) head and mesoscutellum mostly dark ferruginous orange (Figure 20).

Measurements- $(n=1)$. HL 1.22; HW 1.24; MOD 0.48; OMD 0.14; SL 0.38; HFL 1.50; ML 2.12; PW 0.47; PPW 0.62. Indices: SI 30.65; CI 101.64; OI 38.71; HFI 120.97.

Additional material examined. CHILE: Antofagasta: Rt 23 at 12.5 km NE Socaire, 12,560', Mar 23, 2017 (RAJC); Rt 23 at 56.2 km NE Socaire, 13,520', Mar 23, 2017 (RAJC) (Figure 14C).

Etymology. The specific epithet, atacama, is a noun in apposition and invariant in form that is derived from a group of Native Americans that lived in northeastern Chile.

Discussion. Pogonomyrmex atacama likely co-occurs with P. loaensis and possibly other $P$. rastratus-group species. Pogonomyrmex atacama and $P$. loaensis are similar, but they can be distinguished based on the following characters. In P. atacama: (1) striae extend over the anterior one-third to one-half of the medial portion of the first gastral tergum, and (2) posterior corners of head usually smooth and shining to strongly shining. In $P$. loaensis: (1) striae extend over the anterior two-thirds or more of the medial portion of the first gastral tergum, and (2) the posterior corners of the head rugose. Pogonomyrmex atacama is distinguished from most other P. rastratus group species based on striae extending over the anterior one-third to one-half of the first gastral tergum. Pogonomyrmex bolivianus is the only species with this character that is likely to be confused with P. atacama. In P. atacama: (1) the posterior corners of head smooth and shining to strongly shining for most to all workers in a series, (2) mandibles with seven teeth, (3) longitudinal rugae on dorsum of mesonotum regular; anterior margin of pronotum usually with one to few transverse rugae, (4) superior propodeal spines consist of short, triangular teeth to long spines, (5) rugae on dorsum of postpetiole mostly longitudinal, and (6) one to few rugae on medial portion of clypeus converging anterad forming a narrowly rounded V-shaped pattern. In P. bolivianus: (1) the posterior corners of head rugose, (2) longitudinal rugae on dorsum of promesonotum irregular, continuing to anterior margin of pronotum, (3) mandibles with six teeth, (4) superior propodeal spines consist of short, triangular teeth, (5) rugae on dorsum of postpetiole mostly transverse, and (6) rugae on frontal triangle subparallel-parallel, continuing onto clypeus.

Biology. Pogonomyrmex atacama workers are solitary foragers. Nests are placed in open, exposed sites with a tumulus that ranges from 15-20 cm in diameter. Sexuals have been collected on 23 March, indicating that mating flights occur during the austral summer. Partial nest excavations indicated that colonies probably contain up to 1000 workers.

Pogonomyrmex atacama inhabits sites at elevations from 3805-4095 m. This species occurs in the Central Andean dry puna ecoregion, as defined by Olson et al. (2001) (Figure 14C).

## Pogonomyrmex atratus

(Figure 21)
Distribution-22A

Pogonomyrmex vermiculatus var. atrata Santschi, 1922b: 347 (worker). Syntypes examined: 2 workers [MACN], 1 worker
[MHNG], 11 workers [MLPA]. ARGENTINA, Mendoza Province: Tres Esquinas (Dr. Carette). See also Gallardo, 1932:
139, fig. 25. MHNG worker here designated LECTOTYPE [CASENT0173346].
Pogonomyrmex atratus Santschi: Kusnezov, 1951: 251, raised to species.
Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum smooth and shining, lacking striae, (2) body concolorous black, (3) longitudinal rugae on cephalic dorsum irregular, widely spaced, and (4) interrugae on cephalic dorsum strongly granulate, dull (Figure 21).

Measurements-lectotype $(n=12)$. HL 1.78 (1.60-1.80); HW 1.73 (1.62-1.92); MOD 0.38 ( $0.34-0.43$ ); OMD 0.42 ( $0.36-0.54$ ); SL 1.25 (1.14-1.45); PNW 1.14 (1.04-1.30); HFL 1.71 (1.51-2.03); ML 1.96 (1.86-2.47); PW 0.41 ( $0.40-0.50$ ); PPW 0.59 ( $0.54-0.71$ ). Indices: SI 72.25 (69.51-80.49); CI 97.19 ( $97.59-106.67$ ); OI 21.97 (20.61-24.57); HFI 98.84 (87.50-121.56).

Redescription. Head quadrate to subquadrate $(\mathrm{CI}=97.19-106.67)$, widest just posterior to eyes; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, rugae irregular


FIGURE 21. Photographs of Pogonomyrmex atratus worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0281101). Photographs by Shannon Hartman from www.AntWeb.org.


FIGURE 22. Geographic distribution of: (A) Pogonomyrmex atratus, (B) P. bolivianus, and (C) P. carbonarius. The large black circle in each panel denotes the type locality. See text regarding the type locality for $P$. atratus.
and widely spaced; in full-face view, medial rugae weakly diverging toward posterior corners of head. Interrugae on cephalic dorsum strongly granulate, dull; posterior corners rugose, interrugae mostly smooth and shining. Anterior margin of clypeus strongly concave; dorsal surface with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six to eight teeth, most commonly seven ( $29 \%$ with six teeth, $66 \%$ with seven teeth, $5 \%$ with eight teeth, $n=38$ ). Mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.95-1.29 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=69.51-80.49$ ) failing to reach posterior corners of head by less than length of basal funicular segment; scapes shining, basal flange moderately well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent, weakly to strongly irregular, subparallel rugae, occasionally rugoreticulate to vermiculate. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin weakly to strongly angulate. Dorsum of promesonotum with longitudinal rugae that diverge toward humeral shoulders of pronotum then traverse posteroventrally or longitudinally on pronotal sides; rugae on mesopleura angle posterodorsally. Superior propodeal spines well developed, slightly shorter than distance between their bases, spines connected by well defined keel; irregular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Inferior propodeal spines, wider than high, tips rounded to weakly acuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to strongly granulate, dull to weakly shining. Legs weakly shining to shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin often with wide, rounded expansion, but lacking a triangular process. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably shorter than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest near rounded to spatulate anterior margin. Sides and posterior surface of petiolar node with regular to weakly irregular transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest at or near posterior margin, narrowing anterad, maximum width about equal to length. Transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces moderately granulate-punctate, weakly shining. First gastral tergum smooth and shining.

Erect, white pilosity moderately abundant on head, most hairs uniformly short ( $<0.5 \times$ MOD) with one to few longer hairs approaching to exceeding MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to semidecumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect white setae, often similar in length, longest not exceeding MOD. Body concolorous black; mandibles, distal funicular segments, tarsi often slightly lighter brownish-black (Figure 21).

Queen. Unknown.
Male. Unknown.
Additional material examined. ARGENTINA: Mendoza: Rt 220 at 40.0 km NW El Sosneado, 6580', Jan 24, 2008 (IFML; LACM; MACN; MCZC; RAJC; UCDC; USNM); Rt 220 at 41.7 km NW El Sosneado, 6650', Jan 24, 2008 (RAJC) (Figure 22A).

Etymology. The specific epithet, atratus (Latin, atratus = clothed in black), refers to the deep black coloration that Santschi noted in the species description.

Discussion. Pogonomyrmex atratus likely co-occurs with an unidentified congener that was part of the syntype series. This worker lacked striae on the first gastral tergum, the superior propodeal spines consisted of denticles, and a coloration that consisted of head orangish-brown, dorsum of pronotum and mesonotum dark reddish to reddishblack, rest of body black. A label was added to this pin saying "Not a syntype of Pogonomyrmex vermiculatus var. atrata Santschi". Pogonomyrmex carbonarius and a P. brevibarbis-group species occur near areas inhabited by $P$. atratus. Pogonomyrmex atratus is distinguished from $P$. brevibarbis-group species by presence of transverse rugae on the posterior surface of the petiolar node and dorsum of postpetiole (P. brevibarbis-group species usually lack rugae on both segments). Pogonomyrmex atratus is distinguished from P. carbonarius and all other concolorous black congeners by lacking striae on the first gastral tergum (striae present in P. carbonarius and all other concolorous black congeners).

Santschi (1922b) described P. atratus as a variety of P. vermiculatus, and Kusnezov (1951) raised P. atratus to species level saying only that sculpturing on the thorax was distinct from that of $P$. vermiculatus. He also wrote that
this sculpturing was similar to that on P. carbonarius, from which it differed by lacking striae on the first gastral tergum. Based on this similarity, Kusnezov (1951) indicated that $P$. atratus might be a subspecies of $P$. carbonarius. The large series of workers collected during this study affirm specific status for $P$. atratus, which previously was known from only syntype workers collected $>90$ years ago.

Biology. Workers are solitary, diurnal foragers that sometimes travel $>20 \mathrm{~m}$ to harvest seeds and related items. Nests are most easily located by baiting foragers with cookie crumbs, then following them to the nest. The two nests that I observed were in open habitat with tumuli that ranged from $15-20 \mathrm{~cm}$ in diameter; one nest was under a rock with the tumulus at the edge of the rock, the other was in a clump of Stipa sp. (Poaceae). The site was dominated by sandy, gravelly, rocky soil. Partial nest excavations indicated that colonies contain approximately 500-800 workers.

Pogonomyrmex atratus is only known from the type locality at Tres Esquinas, Mendoza, and one canyon in southwestern Mendoza Province. However, it seems doubtful that Tres Esquinas is the actual type locality given that this area is in the Low Monte Desert ecoregion (Olson et al., 2001), where only desert species such as P. propinqua were collected. Based on habitats and elevations at which I collected $P$. atratus, the true type locality is probably west of Tres Esquinas in the foothills of the Andes. Overall, P. atratus inhabits elevations from 1990-2015 m suggesting that this species inhabits foothill and mid-elevation habitats along the western side of the Andes in Mendoza and possibly adjacent provinces. This species is only known from the Southern Andean steppe ecoregion, as defined by Olson et al. (2001) (Figure 22A).

## Pogonomyrmex bolivianus NEW SPECIES

(Figure 23)
Distribution-22B
Holotype worker [CASC: CASENT0914125]: BOLIVIA, La Paz: 45 mi S La Paz, 25 February 1951 (E.S. Ross \& A.E. Michelbacher). Paratypes, same data as holotype: CASC ( 7 workers), MCZC ( 2 workers), MNHN ( 2 workers), RAJC (2 workers), USNM (2 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum with striae along base to extending over anterior one-third to one-half of medial portion of segment, rest of tergum smooth and polished, strongly shining, (2) longitudinal rugae on dorsum of promesonotum irregular, continuing to anterior margin of pronotum, (3) mesosoma dark ferruginous orange to orangish-brown, (4) posterior corners of head rugose, (5) superior propodeal spines consist of short, triangular teeth with a length less than width at base, (6) height of inferior propodeal spines greater than length of superior propodeal spines, (7) mandibles with six teeth, (8) rugae on frontal triangle subparallel-parallel, continuing onto clypeus, and (9) rugae on dorsum of postpetiole mostly transverse (Figure 23).

Measurements-holotype ( $n=12$ paratypes). HL 1.54 (1.43-1.61); HW 1.66 (1.53-1.69); MOD 0.32 ( $0.31-$ 0.35); OMD 0.42 ( $0.41-0.47$ ); SL 1.16 (1.07-1.31); PNW 1.08 (1.06-1.18); HFL 1.57 (1.42-1.65); ML 1.87 (1.651.95); PW 0.40 ( $0.37-0.43$ ); PPW 0.55 ( $0.54-0.69$ ). Indices: SI 69.88 (66.46-77.51); CI 107.79 (100.64-110.00); OI 19.28 (18.45-22.88); HFI 94.58 (89.38-101.90).

Description. Head quadrate to wider than long $(C I=100.64-110.00)$; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae diverging toward posterior corners of head. Rugae on frontal triangle subparallel-parallel, continuing onto clypeus. Interrugae on cephalic dorsum weakly to moderately granulate-punctate, weakly shining to shining; posterior corners rugose, interrugae mostly smooth and shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.19-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.20-1.43 \times \mathrm{MOD}$. In fullface view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=66.46-77.51$ ) reaching posterior corners of head or failing to do so by less than length of basal funicular segment. Antennal scapes strongly striate, interstriae moderately granulate, dull to weakly shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent widely spaced, wavy
to irregular rugae. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin weakly to moderately angulate. Promesonotal suture usually weakly to moderately impressed. Wavy to irregular, longitudinal rugae on mesonotum continue onto pronotum, medial rugae continue to anterior margin of pronotum, lateral rugae diverging to humeral shoulders of pronotum. Rugae on pronotal sides irregular, traversing ventrally or posteroventrally or weakly rugoreticulate. Irregular rugae on mesopleura angle posterodorsally; irregular transverse or oblique rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines consist of short, triangular, acuminate teeth, spines connected by a weak to well defined keel. Inferior propodeal spines moderately well developed, wider than high, triangular, tips rounded to broadly rounded, height greater than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly granulate-punctate, weakly shining to smooth and shining. Legs weakly coriarious, weakly shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with poorly developed rounded process. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface longer than posterior surface, apex subangulate to weakly rounded. In dorsal view, petiolar node longer than wide, sides subparallel, narrowest posterad, anterior margin spatulate to broadly rounded. Sides and posterior surface of petiolar node with regular to wavy transverse to occasionally oblique rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, width and length similar. Transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly granulate, weakly shining to smooth and strongly shining. Striae extending over anterior one-third to onehalf of medial portion of first gastral tergum, weakly shining with a silky appearance, posterior portion smooth and polished, strongly shining.

Erect, mostly short to medium length, whitish pilosity moderately abundant on head, few hairs $>0.4-0.5 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish to pale yellow setae. Rest of body with moderately dense, erect, medium-length, whitish to pale yellow setae. Head and mesosoma dark ferruginous orange to orangish-brown, mesosoma sometimes slightly darker than head; mandibles, antennae, legs, petiolar node, postpetiole, gaster dark brownish-orange (Figure 23).

Queen. Unknown.
Male. Unknown.
Additional material examined. None.
Etymology. The specific epithet, bolivianus, is derived from Ross \& Michelbacher collecting the syntype series in Bolivia.

Discussion. Pogonomyrmex bolivianus is not known to co-occur with any congeners, but note that very few series of Pogonomyrmex have been collected from the Bolivian altiplano. Regardless, P. bolivianus is easily diagnosed by longitudinal striae that cover only the anterior one-third to one-half of the first gastral tergum with the rest of the tergum smooth and polished, strongly shining. Pogonomyrmex atacama is the only species with this character that is likely to be confused with P. bolivianus. In P. bolivianus: (1) the posterior corners of head rugose, (2) longitudinal rugae on dorsum of promesonotum irregular, continuing to anterior margin of pronotum, (3) mandibles with six teeth, (4) rugae on dorsum of postpetiole mostly transverse, and (5) rugae on frontal triangle subparallel-parallel, continuing onto clypeus. In P. atacama: (1) the posterior corners of head smooth and shining to strongly shining for most to all workers in a series, (2) mandibles with seven teeth, (3) longitudinal rugae on dorsum of mesonotum regular; anterior margin of pronotum usually with one to few transverse rugae, (4) rugae on dorsum of postpetiole mostly longitudinal, and (5) one to few rugae on frontal triangle converging anterad forming a narrowly rounded V-shaped pattern. Pogonomyrmex cusquena is another congener from high elevation habitats, but $P$. cusquena lacks striae on the first gastral tergum.

Biology. Nothing is known about the biology of P. bolivianus. The collection locale for the syntype series was given only as 45 mi south of La Paz , which is within the Bolivian altiplano at an elevation that likely ranges from 3940-4240 m. It seems likely that $P$. bolivianus is restricted to altiplano habitats of Bolivia and probably nearby areas of Peru. Pogonomyrmex bolivianus is only known from the type locality, which appears to be in the Central Andean dry puna ecoregion, as defined by Olson et al. (2001) (Figure 22B).


FIGURE 23. Photographs of Pogonomyrmex bolivianus holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914125). Photographs by Michele Esposito from www.AntWeb.org.

## Pogonomyrmex carbonarius

(Figures 24-28)
Distribution-22C
Pogonomyrmex carbonarius Mayr, 1868: 172 (worker). Holotype worker examined [NHMW, CASENT0173355]. ARGENTINA, Gran Pampa del Sur, between the dry streambed of the Agua Caliente and Río del Diamante (February 1866, Strobel leg.).
Pogonomyrmex rastratus Mayr: Mayr, 1887: 611, description of male, incorrect synonymy.
Pogonomyrmex rastratus var. carbonarius: Emery, 1906: 157, revived status, as subspecies, but taxonomic change was based on a series of sanmartini that was misidentified as carbonarius. See also Gallardo, 1932: 136, fig. 23 (redescription).
Pogonomyrmex carbonarius: Kusnezov, 1951: 251, raised to species, but taxonomic change was based on two series of sanmartini that were misidentified as carbonarius.
Pogonomyrmex vermiculatus var. variabilis Santschi, 1916: 511 (worker, male). Syntypes examined: 1 worker [MHNG], 1 worker [MZSP]. Syntype worker at NHMB not examined. ARGENTINA, Río Negro: Corral Chico (Dr. Lehmann, 6 March 1915). See also Gallardo, 1932: 142, figs. 28, 29. MZSP worker here designated LECTOTYPE [CASENT0217252]. NEW SYNONYMY
Pogonomyrmex variabilis Santschi: Kusnezov, 1951: 253, raised to species.
Pogonomyrmex weiseri var. neuquensis Santschi, 1922a: 243 (worker). Syntypes examined: 1 worker [MACN], 1 worker [MLPA]. ARGENTINA, Neuquén: Cerro Policía, \#1529 (Dr. Schiller leg.). Kusnezov, 1951: 252, incorrect synonymy under rastratus. See also Gallardo, 1932: 148. MACN worker here designated LECTOTYPE [CASENT0217256]. NEW SYNONYMY
Pogonomyrmex kusnezovi Cuezzo \& Claver, 2009: 105, figs. 3, 4 (worker). Holotype and 3 paratype workers examined [IFML]. ARGENTINA, Río Negro: Conesa, \#5712 (N. Kusnezov leg., 10 January 1950). NEW SYNONYMY

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over more than anterior two-thirds of first gastral tergum, posterior margin with striae or moderately to strongly coriarious; posterolateral margins moderately to strongly coriarious, weakly shining to dull, (2) at least some workers in a series with superior propodeal spines that consist of tubercles, denticles, or short spines with a length $<$ $0.3 \times$ the distance between their bases, (3) several to most hairs on anterior half of first gastral tergum $>0.18 \mathrm{~mm}$ long, and (4) usually bicolored with head reddish-orange and gaster reddish-orange to dark blackish-orange to black, mesosoma black, or rarely concolorous black (concolorous black known only in Mendoza Province) (Figures 24-26).

Measurements-lectotype $(n=12)$. HL $1.77(1.70-2.06)$; HW 1.87 (1.84-2.25); MOD 0.39 ( $0.34-0.45$ ); OMD 0.43 (0.39-0.50); SL 1.27 (1.30-1.63); PNW 1.23 (1.13-1.43); HFL 1.94 (1.70-2.15); ML 2.34 (1.88-2.42); PW 0.44 ( $0.42-0.63$ ); PPW 0.63 ( $0.60-0.81$ ). Indices: SI 67.91 (60.75-78.26); CI 105.65 (104.55-116.15); OI 20.86 (18.22-20.74); HFI 103.74 (80.57-105.50).

Redescription. Head subquadrate to wider than long ( $\mathrm{CI}=104.55-116.15$ ); posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae continuing to posterior margin or weakly diverging toward posterior corners of head; interrugae moderately to strongly granulate, with a beaded appearance, dull to weakly shining. Posterior corners rugose, interrugae moderately granulate, weakly shining to smooth and shining. Anterior margin of clypeus moderately concave, dorsum with several subparallel longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and ventral side of mandibles. Mandibles with six to seven teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.19-0.23 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.05-1.28 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes $(\mathrm{SI}=60.75-78.26)$ failing to reach posterior corners by more than length of basal funicular segment. Antennal scapes with weak longitudinal striae, weakly to moderately granulate, weakly shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent parallel-subparallel wavy to irregular rugae. In dorsal view, humeral portion of pronotum enlarged, lateral margins weakly to distinctly angulate. Dorsum of promesonotum with very irregular longitudinal rugae, usually with numerous, short lateral branches to nearly rugoreticulate, rugae diverging toward pronotal shoulders or becoming rugoreticulate-vermiculate on pronotum; ventrally trending irregular rugae to rugoreticulate on pronotal sides; rugae on mesopleura angle posterodorsally. Superior propodeal spines range from short, triangular teeth to long spines, bases connected by well defined keel; wavy transverse rugae on dorsum of propodeum traverse anteroventrally on sides. Inferior propodeal spines well developed, slightly wider than high, apex subangulate to angulate. Propodeal spiracles narrowly ovate. Interrugae on mesosoma moderately to densely granulate, dull to weakly shining. Legs weakly shining to shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin flat with a very weakly to moderately well developed, broadly rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface longer than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, narrowing posterad. Sides and posterior surface of petiolar node with wavy to irregular transverse, oblique, or longitudinal rugae to rugoreticulate. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, width and length similar. Wavy to irregular transverse rugae on dorsum of postpetiole are finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly to moderately coriarious, weakly shining. First gastral tergum with striae over more than anterior two-thirds of segment, rest of segment with striae or moderately to strongly coriarious, weakly shining to dull; posterolateral margins moderately to strongly coriarious, weakly shining to dull.

Erect, mostly short, whitish pilosity moderately abundant on head. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish setae. Rest of body with moderately dense, erect, medium to long, whitish to yellowish setae; several to most hairs on anterior half of first gastral tergum $>0.18 \mathrm{~mm}$ long. Color highly variable, both within and across colonies. The most common color pattern is head and gaster reddish brown to orangish brown, mesosoma black. Other color patterns include: (1) head reddish brown to orangish brown, gaster dark reddish brown to blackish or black, and (2) concolorous black (concolorous black form know only from Mendoza Province) (Figures 24-26).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior two-thirds of first gastral tergum; areas lacking striae (including posterolateral margins) moderately to strongly coriarious, weakly dull to dull; in profile, striae visible over extensive parts of more medial portions of segment, (2) relatively large ( $\mathrm{HW}=1.87-2.49 \mathrm{~mm}$; $\mathrm{PNW}=1.34-1.80 \mathrm{~mm}$; $\mathrm{ML}=2.34-3.17$ mm ), (3) superior propodeal spines consist of short acuminate teeth to moderately long spines, (3) head dark ferruginous orange or orangish-brown to reddish-brown, gaster dark orangish-brown to reddish-brown or blackish, (4) mesoscutum, mesoscutellum concolorous orangish or dark reddish to reddish-brown; pronotum, anepisternum blackish to black, (5) most hairs on first gastral sternite approximately $0.7-0.8 \times \mathrm{MOD}$ or longer, those near posterior margin often exceeding MOD (Figure 27).

Measurements- $(n=12$ ). HL 1.55-2.47; HW 1.87-2.49; MOD 0.38-0.52; OMD 0.43-0.58; SL 1.28-1.65; PNW 1.34-1.76; HFL 1.93-2.46; ML 2.52-3.17; PW 0.54-0.69; PPW 0.72-0.97. Indices: SI 58.80-72.63; CI 100.81-127.32; OI 18.06-21.93; HFI 87.10-106.42.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to much wider than long ( $\mathrm{CI}=100.81-127.32$ ), broadest just posterior to eyes, posterior margin flat to weakly convex. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae diverging toward posterior corners of head; posterior corners rugose, interrugae on cephalic dorsum and posterior corners moderately to strongly granulate-punctate, dull to weakly shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel-parallel, regular to wavy rugae, rugae irregular to rugoreticulate on pronotal sides; interrugae weakly to moderately granulate-punctate, weakly shining to weakly dull; superior propodeal spines consist of short acuminate teeth to moderately long spines. Inferior propodeal spines wider than tall, weakly rounded to angulate. Peduncle of petiole long, anteroventral margin angles downward then continues posterad parallel to dorsal surface. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy to irregular, transverse rugae. In dorsal view, postpetiole wider than long; dorsum with wavy to irregular, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly granulate-punctate, weakly shining. Striae extend over more than anterior two-thirds of first gastral tergum; areas lacking striae (including posterolateral margins) moderately to strongly coriarious, weakly dull to dull. Most body surfaces with moderately abundant suberect to erect, short to medium length, whitish to cream colored setae; most hairs on first gastral sternite approximately $0.7-0.8 \times$ MOD or longer, those near posterior margin often exceeding MOD. Head dark ferruginous orange or orangish-brown to reddish-brown; gaster dark orangish-brown to blackish; ferruginous orange to orangish-brown, posterior margins of gastral terga with blackish bands; mesoscutum, mesoscutellum concolorous orangish or dark reddish to reddish-brown; pronotum, anepisternum, propodeum, legs, antennae blackish to black (Figure 27).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) in dorsal view, rugae on cephalic dorsum posterior to eyes longitudinal, subparallel-parallel, continuing to posterior margin, (3) anterior one-half or more of anepisternum and usually katepisternum smooth and shining; subparallel-parallel, longitudinal rugae present posterad, (4) bicolored: head and mesosoma black, gaster ferruginous orange to reddish-orange, (5) larger: HW = 1.34-1.61 mm, PW $=0.49-0.64 \mathrm{~mm}$, PPW $=0.71-0.81 \mathrm{~mm},(6)$ rugae on posterior surface of petiolar node and dorsum of postpetiole usually irregular to rugoreticulate or granulate, and (7) interrugae on mesoscutum, mesoscutellum, posterior surface of petiolar node, and dorsum of postpetiole usually moderately to strongly coriarious, dull (Figure 28). Note that males are unknown for the closely related $P$. mapuche.

Measurements- $(n=12$ ). HL 1.18-1.59; HW 1.34-1.61; MOD 0.48-0.62; OMD 0.15-0.25; SL 0.33-0.53; HFL 1.42-2.08; ML 2.06-2.72; PW 0.49-0.64; PPW 0.71-0.81. Indices: SI 24.63-33.97; CI 101.26-120.66; OI 32.05-38.51; HFI 97.26-139.13.

Additional material examined. ARGENTINA: Chubut: Rt 2 at 6.5 km E Jct Rt 3, 300', Feb 16, 2014 (RAJC); Rt 3 at 16.4 km S Jct Rt 4, 130', Feb 18, 2014 (RAJC); Rt 3 at 11.9 km S Río Negro-Chubut border, 550’, Feb 17, 2014 (RAJC); 19.9 km N Malaspina, 550 m , Dec 13, 1966 (CASC; LACM); 3 km N Puerto Lobos, 20 m , Dec 14, 1966 (CASC; LACM). La Pampa: Rt 151 at 2.3 km N Puelén, 1520', Feb 14, 2014 (RAJC); Río Colorado, no date (MLPA); no loc, no date (MACN). Mendoza: Rt 220 at 15.3 km NW El Sosneado, 5570', Jan 24, 2008 (RAJC); Rt 220 at 30.6 km NW El Sosneado, 6150' (RAJC); Rt 220 at 34.4 km NW El Sosneado, 6300' (RAJC); Rt 40 at 20.5 km ENE El Sosneado, 4490 ' (RAJC); Rt 40 at 23.7 km S El Sosneado, 4980' (IFML; LACM; MACN; RAJC; USNM); Rt 40 at 15.9 km N Dique Agua de Toro, 5300', Feb 12, 2104 (RAJC); Rt 101 at 2.9 km S Río Diamante, 5220', Feb 12, 2014 (IFML; LACM; MACN; RAJC; UCDC; USNM); Rt 101 at 4.2 km S Río Diamante, 5300’, Feb 12, 2014 (RAJC); Rt 101 at 34.2 km S Río Diamante, 5770', Feb 12, 2014 (RAJC); Rt 222 to Las Leñas, Jan 30, 1999 (IFML); Cochico, no date (MLPA); Rt 188 at 11.8 km W Canalejas, 1260', Jan 27, 2008 (RAJC); 5.69 km SE Cachueta, 1796 m, Jan 8, 2008 (RAJC; WPMC); 6.01 km SW Cachueta, 1567 m , Jan 8, 2008 (RAJC; WPMC); Portrerillos, Nov 21, 2009, (RGPC); no loc, no date (MZSP). Neuquén: Covunco, Jan 10, 1950 (IFML); P. Huincul (= Plaza Huincul), Apr 5, 1920 (IFML). Río Negro: Rt 3 at 71.5 km S Jct Rt 23, 500’, Feb 17, 2014 (RAJC); Rt 151 at 5.6 km S Río Negro-La Pampa border, $1170^{\prime}$, Feb 14, 2014 (RAJC); Rt 151 at 47.8 km S Río Negro-La Pampa border, 1090', Feb 14, 2014 (RAJC); Rt 151 at 87.2 km S Río Negro-La Pampa border, 1480', Feb 14, 2014 (RAJC); Rt 23 at 13.1 km E Valcheta, 620', Feb 17, 2014 (RAJC); Rt 23 at 29.4 km W Valcheta, 730', Feb 16, 2014 (RAJC); Rt 23 at 45.7 km E Valcheta, 590', Feb 17, 2014 (RAJC); Rt 3 at 18.3 km S Jct Rt 23, 630', Feb 17, 2014 (RAJC); Rt 6 at 29.7 km SW Jct Rt 22, 1180', Feb 15, 2014 (RAJC); Rt 6 at 62.1 km SW Jct Rt 22, 1470’, Feb 15, 2014 (IFML; LACM; MACN; RAJC; UCDC; USNM); Rt 6 at 145.7 km SW Jct Rt 22, 2870', Feb 15, 2014 (RAJC); 1.7 km S General Conesa, 260', Jan 21, 2011 (RAJC); Rt 251 at 76.0 km S General Conesa, 200’, Jan 21, 2011 (RAJC); Conesa, Oct 1, 1950, (IFML); $11.7 \mathrm{~km} \mathrm{~S} \mathrm{Jct} \mathrm{Rts} 251 \& 2,100^{\prime}$, Jan 21, 2011 (RAJC); 35.6 km NW Jct Rts $251 \&$ 2, 360', Jan 22, 2011 (RAJC); 71.8 km S Jct Rts 251 \& 2, $560^{\prime}$, Jan 22, 2011 (RAJC); Rt 22 at 15 km E Choele Choel, 400', Jan 2003 (RAJC); Rt 250 at 34.0 km SE Choele Choel, 380', Jan 22, 2011 (RAJC); Rt 22 at 25.3 km W Chimpay, 520', Jan 23, 2011 (RAJC); Villa Regina, Dec 20, 1946 (IFML); Corral Chico, no date (IFML); 6 km W Pelligrini Lake, Nov 21, 1995 (CRSC); San Antonio Oeste, Dec 12, 1966 (LACM); Cerro Catriel, 30 Jan, 2010 (RGPC); Roca (= General Roca), no date (MACN) (Figure 22C).

Etymology. The specific epithet, carbonarius (from Latin, carbon $=$ relating to coal, and -arius $=$ suffix added to noun stems to form adjectives denoting belonging to), derives from the black coloration of this species. In his description, Mayr noted that the worker was similar to $P$. rastratus, but black.

Discussion. Pogonomyrmex carbonarius is highly variable within and across colonies with respect to color, length of the superior propodeal spines, and patterning of rugae on the mesosoma. In regard to color, nests can contain workers with a black head and mesosoma and a ferruginous orange to blackish-orange gaster, while other colonies contain workers with multiple color patterns. Concolorous black workers are known from only Mendoza Province.

Pogonomyrmex carbonarius is separated from most congeners by: (1) striae extend over anterior one-half or more of first gastral tergum, posterior margin with striae or moderately to strongly coriarious, and posterolateral margins moderately to strongly coriarious, weakly shining to dull. These characters separate $P$. carbonarius from all but three congeners: P. mapuche, P. propinqua, and P. weiseri.


FIGURE 24. Photographs of Pogonomyrmex carbonarius worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922103). Workers of P. carbonarius are highly variable: photographs show bicolored worker (head and gaster dark reddish-orange, mesosoma black) with long superior propodeal spines. Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 25. Photographs of Pogonomyrmex carbonarius worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922157). Workers of $P$. carbonarius are highly variable: photographs show bicolored worker (head dark reddish-orange, mesosoma and gaster blackish to black) with medium length superior propodeal spines. Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 26. Photographs of Pogonomyrmex carbonarius worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922102). Workers of P. carbonarius are highly variable: photographs show concolorous black worker with short, blunt superior propodeal spines. Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 27. Photographs of Pogonomyrmex carbonarius alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922159). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 28. Photographs of Pogonomyrmex carbonarius male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922158). Photographs by Michele Esposito from www.AntWeb.org.

Pogonomyrmex carbonarius is most likely to be confused with P. propinqua. For P. carbonarius: (1) color variable: concolorous black $\boldsymbol{o r}$ with head and gaster reddish-orange to dark blackish-orange to black with a weak orangish infusion, gaster often notably darker than head, (2) at least some workers in a series with superior propodeal spines that consist of tubercles, denticles, or short spines with a length $<0.3 \times$ the distance between their bases, and (3) several to most hairs on anterior half of first gastral tergum $>0.18 \mathrm{~mm}$ long. In P. propinqua: (1) head and gaster concolorous light to dark ferruginous orange, (2) superior propodeal spines long, length usually $>0.6 \times$ the distance between their bases, and (3) most hairs on anterior half of first gastral tergum $<0.16 \mathrm{~mm}$ long. These two species are easily separated with queens or males when these castes are available (see keys). Pogonomyrmex carbonarius and $P$. propinqua have mostly non-overlapping distributions, but they occur in close proximity or in sympatry from Potrerillos to San Rafael, Mendoza Province.

Pogonomyrmex carbonarius is distinguished from P. mapuche by: (1) head and/or gaster usually orangish to orangish-black, (2) for at least some workers in a series, superior propodeal spines long, length $>0.4-0.6 \times$ the distance between their bases, and (3) height of inferior propodeal spines usually less than length of superior propodeal spines. In P. mapuche: (1) head dark red to reddish-black; rest of body black or with blackish-red gaster, (2) for all workers in a series, superior propodeal spines consist of tubercles or denticles, rarely short, acuminate teeth, and (3) height of inferior propodeal spines usually similar to or greater than length of superior propodeal spines.

Pogonomyrmex carbonarius is distinguished from P. weiseri by: (1) head and/or gaster reddish-orange to black, (2) mandibles with six to seven teeth, and (3) longitudinal rugae on dorsum of promesonotum irregular to rugoreticulate with short lateral branches that usually contact one another. In P. weiseri: (1) head and gaster ferruginous orange, (2) mandibles with six teeth, and (3) the longitudinal rugae on dorsum of promesonotum more regular, usually do not contact one another and lack short lateral branches. These two species are also separated geographically as $P$. carbonarius occurs in more southern provinces of Argentina (Mendoza to Chubut) than P. weiseri (La Rioja to Salta).

Pogonomyrmex varicolor is sometimes very similar to P. carbonarius. However, in P. varicolor one or more workers in a series has a black head and mesosoma and a ferruginous orange gaster. This color pattern is lacking in P. carbonarius. Additionally, in P. carbonarius, rugae on the posterior surface of the petiolar node and dorsum of postpetiole are often irregular to very irregular and the interrugae are dull to weakly shining, whereas these rugae are regular to wavy and the interrugae are usually smooth and shining in $P$. varicolor.

Gustav Mayr described six South American species of Pogonomyrmex, including P. carbonarius, and his collection is at NHMW. Syntypes for all of these species except $P$. carbonarius were at NHMW, and no specimens labeled as types of $P$. carbonarius were found at other museums. However, one NHMW worker was labeled $P$. rastratus, G. Mayr type, and the label reads "Pampa del Sur", Strobel (collector). Pampa del Sur was the type locality from which Mayr briefly described $P$. carbonarius based on a collection by Strobel. This specimen also fits the vague description given by Mayr (1868): "worker: length 6.5 mm , quite similar to $P$. rastratus, differs in its black color, and with tarsi (except metatarsi) more or less fulvous-ringed, and metanotum with two triangular teeth. There are numerous nests of this species in the vast plain called Gran Pampa del Sur, the worker was collected between the dry streambed of the subterranean stream Agua Caliente and the flowing river named Río Diamante in the month of February, 1866". The Pampa del Sur worker is black, and the sculpturing is similar to that of P. rastratus, which Mayr described in the same paper (Mayr, 1868). Moreover, Mayr apparently labeled this specimen as a type of $P$. rastratus after he placed $P$. carbonarius as a junior synonym of $P$. rastratus (Mayr, 1887), but curiously he never placed a label with the name P. carbonarius on the pin. The description by Mayr (1868) gives only one length measurement for P. carbonarius, suggesting that there was only one syntype, and it was the only syntype located during this study. Thus, this worker with the label "Pampa del Sur" must be a syntype of P. carbonarius, and it is considered to be the holotype, and it was labelled as such.

The holotype worker of $P$. carbonarius matches specimens collected by the author near the type locality in the western foothills of the Andes along Río Diamante, Mendoza Province, Argentina. These collections demonstrate that morphology of $P$. carbonarius is highly variable in terms of coloration, patterning of rugae, and length of the superior propodeal spines. These collections also show that coloration of the holotype worker is atypical because the vast majority of workers are bicolored. Colonies near the type locality contained concolorous black workers, but this color morph was uncommon compared to bicolored workers (head and gaster ferruginous orange to reddishorange; mesosoma black). I have also collected concolorous black workers from south of El Sosneado, Mendoza, but workers collected from the rest of the geographic range invariably were bicolored.

It appears that neither Kusnezov nor Emery examined the holotype worker of $P$. carbonarius because both authors confused P. carbonarius with what Kusnezov was later to describe as P. carbonarius sanmartini. Emery (1906) elevated $P$. carbonarius to a subspecies of $P$. rastratus using material from near Río Santa Cruz in southern Santa Cruz Province, Argentina. This location is far south of the geographic range of P. carbonarius (see Figure 22C). Emery also said that the posterior margin of the first gastral tergum was sometimes smooth and shining, which also indicates that his specimens were not $P$. carbonarius. Moreover, Emery (1906) elevated P. carbonarius to a subspecies of $P$. rastratus using misidentified specimens. To his credit, Emery (1906) indicated that there were problems with the identity and his specimens may comprise two species, but he did not have sufficient material to make this judgement. Pogonomyrmex carbonarius remained as a subspecies of $P$. rastratus until the revision by Kusnezov (1951).

Kusnezov (1951) based his concept of $P$. carbonarius on two series of workers in the collection of Dr. Bruch that were labeled P. rastratus var. carbonarius (Santa Cruz \#586: 2 workers [MACN] \& Bariloche \#1528: 7w, 1aq, 1 dq [MACN; MLPA]). It is unclear who identified these specimens. From these specimens, Kusnezov (1951) indicated that $P$. carbonarius was characterized by very regular longitudinal rugae on the dorsum of the mesonotum and mesopleura and that these rugae were more regular than those on $P$. rastratus and all other $P$. rastratus-group species. Based on this difference, Kusnezov (1951) re-elevated P. carbonarius to species rank. Unfortunately, workers that Kusnezov (1951) used to establish his concept of $P$. carbonarius were those of an undescribed species that he later described as $P$. carbonarius sanmartini. Thus, all taxonomic changes for $P$. carbonarius used specimens of $P$. sanmartini (see discussion under P. sanmartini). Moreover, Kusnezov (1951) used concolorous black with striae on the first gastral tergum as the diagnostic characters to identify P. carbonarius, and he considered P. carbonarius to include all specimens from southern Argentina that displayed these two characters. These two diagnostic characters also were used in keys by Taber (1998) and Cuezzo and Claver (2009).

Santschi (1916) described P. vermiculatus var. variabilis, naming it for its variation in color, patterning of rugae, and variable superior propodeal spines. He also indicated that fine striae completely covered the first gastral tergum. The two syntype workers that I examined displayed this variability, which was also noted by Kusnezov (1951), who elevated $P$. variabilis to species rank with much reserve because the species was highly variable in all respects. The type locality for P. variabilis is Corral Chico (Laguna), Río Negro Province (now Ministro Ramos Mexía). The author did not find specimens at Ministro Ramos Mexía, but nest series were collected both east and west of this locale. Workers from both locales matched syntype workers of $P$. variabilis, as well as bicolored workers of $P$. carbonarius collected near the type locality. Thus, $P$. variabilis is placed as a junior synonym of $P$. carbonarius.

Santschi (1922a) also described $P$. weiseri var. neuquensis, saying that it differed from the type in that the thorax was more densely punctate and that the superior propodeal spines consisted of no more than two small, rounded teeth that were smaller than the inferior propodeal spines. The two syntypes that I examined varied in color and patterning of rugae on the promesonotum, and as noted by Santschi (1922a), the superior propodeal spines consisted of teeth that were shorter than both the width at their base and the height of the inferior propodeal spines. The type locality for P. weiseri var. neuquensis was Cerro Policía, Neuquén Province (Cerro Policía is actually in Río Negro Province near the border with Neuquén Province), which is approximately midway between the type localities for $P$. carbonarius and $P$. variabilis. The two syntypes of $P$. weiseri var. neuquensis, as well as workers collected near the type locality all matched bicolored workers of $P$. carbonarius collected near the type locality along the Río Diamante. Thus, $P$. weiseri var. neuquensis is placed as a junior synonym of $P$. carbonarius.

Cuezzo and Claver (2009) described P. kusnezovi based on four workers that Kusnezov collected from General Conesa, Río Negro, Argentina, on January 10, 1950 (\#5712). In their discussion, Cuezzo and Claver (2009) indicated only that $P$. kusnezovi was closely related to $P$. andinus, which is curious given that these two species have little resemblance to one another. It is also unclear why they did not compare $P$. kusnezovi to the more geographically proximate and morphologically similar forms $P$. variabilis and $P$. weiseri var. neuquensis, or why their paper did not include the several additional IFML series that matched their types of $P$. kusnezovi (see specimens examined above), including another series collected at Conesa on the same date. The holotype and three paratype workers of $P$. kusnezovi all matched bicolored workers of $P$. carbonarius collected near the type locality. Thus, $P$. kusnezovi is placed as a junior synonym of $P$. carbonarius.

Biology. Pogonomyrmex carbonarius workers are solitary foragers. Nests of $P$. carbonarius are placed in open, exposed sites, or at the edge of rocks, or in a clump of Stipa sp . (Poaceae) or under shrubs. The nest entrance ranges from a hole in the ground to a tumulus up to 35 cm in diameter. Nests are most easily located by baiting workers
with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain approximately $500-1000$ workers. Sexuals have been collected from January 24-February 17, and one dealate queen was collected on December 12, indicating that mating flights occur during the austral summer. Several papers have examined foraging activity and natural history of P. carbonarius (Aput, Farji-Brener, \& Pirk, 2019; Lescano, Elizalde, Werenkraut, Pirk, \& Flores, 2017; Pirk, 2014; Pirk, Elizalde, Lescano, \& Werenkraut, 2020; Pirk \& Lopez de Casenave, 2017), but the species in all of these studies is now P. sanmartini (see above discussion and section on P. sanmartini).

Pogonomyrmex carbonarius inhabits sites at elevations from 20-1865 m, and it occurs in the Lower Monte, Patagonian steppe, and Southern Andean steppe ecoregions with one record in the Espinal ecoregion, as defined by Olson et al. (2001) (Figure 22C).

## Pogonomyrmex catanlilensis

(Figures 29-31)
Distribution-32A

Pogonomyrmex catanlilensis Gallardo, 1931; 187, fig. 2 (worker). Syntypes examined: 2 workers [MACN]. ARGENTINA, Neuquén: on the road from Zapala to Junín de los Andes near the Catán Lil River, \#12261 (A. Gallardo leg., 10 April 1919). See also Gallardo, 1932: 163, fig. 43; Kusnezov, 1951: 273 . MACN worker here designated LECTOTYPE [CASENT0235275].

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae cover anterior one-half or more of first gastral tergum, (2) head and mesosoma blackish to black, gaster dark ferruginous orange to orangish-black, (3) relatively large ( $\mathrm{HW}=1.67-2.04 \mathrm{~mm}$; $\mathrm{PNW}=1.15-1.42 \mathrm{~mm}$; ML $=2.01-2.76 \mathrm{~mm}$ ), (4) mandibles with six to eight teeth, (5) in profile, most hairs on cephalic dorsum short, length of most hairs $<0.2 \times \mathrm{MOD}$, (6) in dorsal view, longitudinal rugae on mesonotum weakly to strongly irregular, often nearly rugoreticulate; rugae on pronotum usually rugoreticulate-vermiculate, (7) interrugae on promesonotum usually moderately to strongly granulate, weakly dull to dull, (8) superior propodeal spines consist of short to long spines for at least some workers in a series, and (9) in profile, rugae posterior to eyes fine, dense, regular, converging at or near posterior corners; interrugae, smooth and shining to moderately coriarious, weakly shining, rarely with a beaded appearance (Figure 29).

Measurements-lectotype $(n=22)$. HL 1.74 (1.58-2.03); HW 1.87 (1.67-2.04); MOD 0.40 ( $0.36-0.44$ ); OMD 0.50 ( $0.42-0.62$ ); SL 1.37 (1.19-1.47); PNW 1.25 (1.15-1.42); HFL 1.64 (1.75-2.00); ML 2.44 (2.01-2.76); PW 0.52 ( $0.45-0.57$ ); PPW 0.69 ( $0.60-0.75$ ). Indices: SI 73.26 ( $63.73-83.83$ ); CI 107.47 ( $93.82-117.72$ ); OI 21.39 (18.27-25.15); HFI 87.70 (92.16-110.18).

Redescription. Head variable, from longer than wide to wider than long $(\mathrm{CI}=93.82-117.72)$; posterior margin flat to weakly concave in full-face view. Longitudinal rugae on cephalic dorsum prominent, weakly wavy to irregular. In full-face view, medial rugae diverging toward posterior corners of head. Interrugae on cephalic dorsum strongly granulate-punctate, dull to weakly shining; posterior corners rugose, interrugae smooth and shining to weakly granulate, weakly shining. In profile, rugae posterior to eyes fine, dense, regular, converging at or near posterior corners; interrugae smooth and shining to moderately coriarious, weakly shining, rarely with a beaded appearance. Anterior margin of clypeus moderately concave, dorsum with several subparallel longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margins of mandibles. Mandibles with six to seven, sometimes eight teeth $(46 \%$ with six teeth, $43 \%$ with seven teeth, $11 \%$ with eight teeth, $n=37$ ), one tooth occasionally as a denticle on one or both mandibles between tooth four and five; mandibular dorsum coarsely rugose. MOD ranging from $0.18-0.24 \times \mathrm{HL}$. In profile, eyes situated near middle of head, $\mathrm{OMD}=1.0-1.7 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=63.73-83.83$ ) failing to reach posterior corners of head by less than length of basal funicular segment. Antennal scapes with or without weak longitudinal striae, weakly to moderately granulate, weakly shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly convex; all mesosomal surfaces with prominent subparallel-parallel, wavy to irregular rugae. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin weakly to distinctly angulate, especially in profile. In dorsal view, longitudinal rugae on mesonotum weakly to strongly irregular, often
nearly rugoreticulate; rugae on pronotum usually rugoreticulate-vermiculate, irregular to rugoreticulate on pronotal sides; rugae on mesopleura angle posterodorsally. Promesonotal suture weakly to moderately impressed in a moderate number of workers. Superior propodeal spines consist of tubercles, denticles, short teeth, moderately long spines, or rarely long spines, spines usually connected by well defined keel; irregular transverse rugae on dorsum of propodeum traverse anteroventrally on sides. Inferior propodeal spines well developed, wider than high, apex blunt to subacute. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma densely granulate, dull to weakly shining. Legs weakly shining to shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin flat or with a weak convex process. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface shorter than posterior surface, apex angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, narrowing posterad. Sides and posterior surface of petiolar node with wavy to irregular transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, maximum width and length about equal. Wavy to irregular transverse rugae on dorsum of postpetiole finer, denser, than those on posterior surface of petiolar node; interrugae on both surfaces moderately coriarious, dull to weakly shining. First gastral tergum with striae over anterior one-half or more of segment, striae often extending to posterior margin of segment or with posterior margin strongly coriarious, dull.

Erect, mostly short, whitish pilosity moderately abundant on head, length of most hairs $<0.2 \times$ MOD, often one to few long hairs that exceed MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish setae. Rest of body with erect, moderately dense, medium-length, whitish setae. Head, mesosoma, petiolar node, postpetiole black; gaster dark ferruginous orange to orangish-black with darker bands along posterior margin of terga (Figure 29).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of small ocelli, (2) striae cover more than anterior one-half of first gastral tergum, (3) head and mesosoma black, gaster (including posterior margin of terga) concolorous ferruginous orange, and (4) longest hairs along posterior margin of first and second gastral terga notably longer than MOD (Figure 30).

Measurements- $(n=3)$. HL 1.90-1.97; HW 2.03-2.16; MOD 0.42-0.46; OMD 0.42-0.67; SL 1.41-1.49; PNW 1.60-1.63; HFL 1.80-2.06; ML 2.91-2.96; PW 0.54-0.66; PPW 0.82-0.91. Indices: SI 65.58-73.40; CI 106.84-113.09; OI 20.47-21.30; HFI 83.33-100.00.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head subquadrate to wider than long ( $\mathrm{CI}=106.84-113.09$ ), widest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy. In full-face view, medial rugae weakly diverging toward posterior corners of head; posterior corners rugose, interrugae on cephalic dorsum and posterior corners moderately granulate-punctate, weakly shining. Mandibles with seven to eight teeth (seven on one mandible, eight on the other), dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel, regular to wavy rugae, rugae irregular to rugoreticulate on pronotal sides; interrugae weakly to moderately granulate-punctate, weakly shining; superior propodeal spines minute, acuminate; inferior propodeal spines moderately well developed, wider than tall, acuminate. Peduncle of petiole about $0.8 \times$ as long as petiolar node, ventral margin flat. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate, anterior margin with a small crest. Posterior surface of petiolar node with wavy to irregular transverse rugae, crest along anterior margin weakly concave medially. In dorsal view, dorsum of postpetiole slightly wider than long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly granulate-punctate, weakly shining. Striae extend over more than anterior one-half of first gastral tergum. Most body surfaces with moderately abundant suberect to erect, short to long, yellowish setae, longest hairs on head and mesosoma $>$ MOD; longest hairs along posterior margin of first and second gastral terga notably > MOD. Head, mesosoma, peduncle of petiole black; petiolar node blackish-orange; postpetiole dark ferruginous orange; gaster (including posterior margin of terga) concolorous ferruginous orange (Figure 30).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) in dorsal view, rugae on cephalic dorsum posterior to eyes longitudinal, subparallel-parallel, continuing to posterior margin, (3) anterior one-half or more of anepisternum
and usually katepisternum smooth and shining; subparallel-parallel, longitudinal rugae present posterad, (4) bicolored: head and mesosoma black, gaster ferruginous orange to dark orange, (5) larger: $\mathrm{HW}=1.34-1.44 \mathrm{~mm}, \mathrm{PW}=$ $0.58-0.68 \mathrm{~mm}, \mathrm{PPW}=0.79-0.84 \mathrm{~mm},(6)$ rugae on posterior surface of petiolar node and dorsum of postpetiole usually regular or wavy to moderately irregular, (7) interrugae on mesoscutum, mesoscutellum, posterior surface of petiolar node, and dorsum of postpetiole usually mostly smooth and shining (Figure 31).

Measurements- $(n=5)$. HL 1.35-1.48; HW 1.34-1.44; MOD 0.48-0.53; OMD 0.15-0.28; SL $0.40-0.47$; HFL 1.82-1.97; ML 2.68-2.87; PW 0.58-0.66; PPW 0.79-0.84. Indices: SI 28.78-34.33; CI 93.92-106.67; OI 35.25-37.41; HFI 129.86-141.73.

Additional material examined. ARGENTINA: Chubut: Rt 25 at 91.7 km W Paso de Indios, 2610', Feb 22, 2014 (MCZC; RAJC). Mendoza: Rt 145 at 25.1 km W Bardas Blancas, 4830', Jan 26, 2008 (LACM; MACN; MCZC; RAJC; UCDC; USNM); Rt 145 at 33.8 km W Bardas Blancas, 5010', Jan 25, 2008 (IFML; RAJC). Neuquén: 6 km S Laguna Blanca, 4600', Dec 7, 2003 (CASC; MCZC; RAJC); Rt 46 at 8.5 km SW Zapala, 3530’, Feb 10, 2011 (RAJC); Rt 242 at 34.3 km SW Las Lajas, 3970', Feb 27, 2014 (MCZC; RAJC) (Figure 32A).

Etymology. The name of this species, catanlilensis, was derived from Gallardo collecting the syntype series either near the Catán Lil River or in Departamento Catán Lil, Neuquén Province, Argentina.

Discussion. Pogonomyrmex catanlilensis is likely to co-occur with several P. rastratus-group species, but its coloration (black head and mesosoma and light to dark ferruginous orange gaster) and striae that cover the anterior one-half or more of the first gastral tergum distinguish it from all congeners except $P$. forelii, $P$. granulatus, and $P$. varicolor. Pogonomyrmex catanlilensis is separated from P. granulatus by: (1) superior propodeal spines variable, consisting of tubercles, denticles, and short teeth to long spines, (2) relatively large (HW $=1.67-2.04 \mathrm{~mm}$; PNW $=1.15-1.42 \mathrm{~mm}$; ML $=2.01-2.76 \mathrm{~mm}$ ), (3) in profile, most hairs on cephalic dorsum short, length of most hairs $<0.2 \times$ MOD, and (4) mandibles with six to eight teeth ( $>50 \%$ with seven to eight teeth). For P. granulatus: (1) superior propodeal spines consist of tubercles, denticles, or short blunt teeth, but never moderately long to long spines, (2) relatively small ( $\mathrm{HW}=1.42-1.70 \mathrm{~mm} ; \mathrm{PNW}=0.96-1.14 \mathrm{~mm} ; \mathrm{ML}=1.67-2.12 \mathrm{~mm}$ ), (3) in profile, most hairs on cephalic dorsum moderately long, length of numerous hairs $>0.4 \times \mathrm{MOD}$, and (4) mandibles with six teeth. Pogonomyrmex catanlilensis is distinguished from P. forelii by: (1) superior propodeal spines variable, consisting of tubercles, denticles, and short teeth to long spines, and (2) rugae on anterodorsal margin of pronotum longitudinal, oblique, or rugoreticulate for most workers in a series. For P. forelii: (1) superior propodeal spines moderately long to long, and (2) one to several transverse (sometimes very irregular) rugae present on anterodorsal margin of pronotum for most workers in a series. Pogonomyrmex catanlilensis is separated from P. varicolor by: (1) larger (HW = $1.67-2.04 \mathrm{~mm} ; \mathrm{PNW}=1.15-1.42 \mathrm{~mm} ; \mathrm{ML}=2.01-2.76 \mathrm{~mm}$ ), (2) in dorsal view, longitudinal rugae on mesonotum weakly to strongly irregular, often nearly rugoreticulate; rugae on pronotum usually rugoreticulate-vermiculate, and (3) interrugae on promesonotum usually moderately to strongly granulate, weakly dull to dull. For P. varicolor: (1) smaller ( $\mathrm{HW}=1.48-1.79 \mathrm{~mm} ; \mathrm{PNW}=0.98-1.18 \mathrm{~mm} ; \mathrm{ML}=1.56-2.07 \mathrm{~mm}$ ), (2) in dorsal view, rugae on promesonotum regular to wavy, longitudinal rugae on mesonotum continue to anterodorsal margin of pronotum or diverge to humeral shoulders of pronotum with one to few transverse rugae along anterodorsal margin, and (3) interrugae on promesonotum smooth and shining to moderately granulate, weakly shining.

Pogonomyrmex catanlilensis displays morphological variation among populations. For example, compared to other series, workers from 91.7 km west of Paso de Indios, Chubut Province, were generally larger, their superior propodeal spines were reduced to tubercles or denticles, and their promesonotal suture was sometimes impressed.

Biology. Pogonomyrmex catanlilensis workers are solitary foragers. Nests of P. catanlilensis typically are placed in a clump of Stipa sp. (Poaceae), at the base of a small shrub, or under a rock; one nest had two entrances, one in the open and one in a clump of Stipa sp. The nest entrance is surrounded by a tumulus up to $10-15 \mathrm{~cm}$ in diameter. Nests are most easily located by baiting workers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain up to approximately 2000 workers. Sexuals have been collected from 25 January-27 February indicating that mating flights occur during the austral summer.

Pogonomyrmex catanlilensis inhabits elevations from 790-1520 m in the Southern Andean steppe and Patagonian steppe ecoregions, as per Olson et al. (2001) (Figure 32A).


FIGURE 29. Photographs of Pogonomyrmex catanlilensis worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0102695). Photographs by April Nobile from www.AntWeb.org.


FIGURE 30. Photographs of Pogonomyrmex catanlilensis alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0235276). Photographs by Will Ericson from www.AntWeb.org.


FIGURE 31. Photographs of Pogonomyrmex catanlilensis male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914362). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 32. Geographic distribution of: (A) Pogonomyrmex catanlilensis, and (B) P. colca, and (C) P. cusquena. The large black circle in each panel denotes the type locality.

## Pogonomyrmex colca NEW SPECIES

(Figures 7A, 33)
Distribution-32B

Holotype worker [MUSM: CASENT0923342]: PERU, Caylloma Province: Yanque, $15^{\circ} 38.9^{\prime} \mathrm{S} 71^{\circ} 39.6^{\prime} \mathrm{W}, 3425 \mathrm{~m}$, 2 April 2015 (M. Prebus \#4524). Paratypes, same data as holotype: MCZC (1 worker), MMPC (1 worker), MUSM (1 worker), RAJC (4 workers), USNM (1 worker).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum smooth and strongly shining, (2) superior propodeal spines consist of acuminate denticles to short teeth, length usually similar to or less than height of inferior propodeal spines, (3) in profile, lateral portion of head from posterior margin of eyes to posterior corners faintly rugose to mostly smooth and shining, rugae weakening posterad, posterior corners smooth and shining to strongly shining, (4) longitudinal rugae on promesonotum strongly irregular with numerous lateral branches to rugoreticulate, (5) promesonotal suture not impressed, and (6) rugae present on posterior surface of postpetiole (Figures 7A, 33).

Measurements-holotype ( $n=7$ paratypes). HL 1.53 (1.34-1.52); HW 1.58 (1.42-1.56); MOD 0.32 ( $0.32-$ 0.35); OMD 0.41 (0.32-0.40); SL 1.11 (1.00-1.10); PNW 1.03 (0.99-1.07); HFL 1.41 (1.39-1.53); ML 1.67 (1.621.71); PW 0.43 ( $0.35-0.40$ ); PPW 0.59 ( $0.50-0.56$ ). Indices: SI 70.25 ( $65.36-76.92$ ); CI 103.27 ( $100.00-109.15$ ); OI 20.25 (21.57-23.45); HFI 89.24 (92.90-02.11).

Description. Head quadrate to wider than long $(C I=100.00-109.15)$; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, regular to wavy; in full-face view, medial rugae continuing to posterior margin. Interrugae on cephalic dorsum weakly granulate, weakly shining to shining; in profile, lateral portion of head from posterior margin of eyes to posterior corners faintly rugose to mostly smooth and shining, rugae weakening posterad, posterior corners smooth and shining to strongly shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae; interrugae smooth and shining. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose, rugae sometimes absent distad. MOD ranging from $0.20-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.91-1.29 \times \mathrm{MOD}$. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=65.36-76.92$ ) just failing to reach to reaching posterior corners, scapes smooth and shining to weakly striate, interstriae weakly shining to smooth and shining. Basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent, irregular, subparal-lel-parallel rugae to rugoreticulate. Longitudinal rugae on promesonotum strongly irregular with numerous lateral branches to rugoreticulate. Rugae on pronotal sides angling posteroventrally or posterad, usually with short lateral branches to sometimes rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin rounded. Promesonotal suture not impressed. Weakly irregular to irregular rugae on mesopleura angle posterodorsally or posterad, rugae sometimes with short lateral branches; irregular transverse, oblique, or longitudinal rugae on dorsum of propodeum. Superior propodeal spines consist of acuminate denticles to short teeth, length usually less than width at base, well defined keel connecting spines usually lacking. Inferior propodeal spines slightly wider than high, broadly triangular, apex bluntly rounded to subangulate, height similar to or greater than length of superior propodeal spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately granu-late-punctate, weakly shining; pronotal sides and mesopleura usually more strongly granulate-punctate than dorsal surface. Legs smooth and shining to weakly coriarious, weakly shining.

Peduncle of petiole slightly shorter than petiolar node, anteroventral margin with a poorly developed, broadly rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface notably shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, sides subparallel anterad, widest near spatulate anterior margin, narrowing posterad. Sides and posterior surface of petiolar node with regular to irregular transverse rugae, occasionally with very regular rugae traversing in all directions or strongly coriarious with faint rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, maximum width and length about equal; transverse to arcuate, regular to wavy rugae posterad, anterad rugae concentric and traversing medially from lateral margin then curving anterad to become longitudinal; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces smooth and shining. First gastral tergum smooth and strongly shining.


FIGURE 33. Photographs of Pogonomyrmex colca holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0923342). Photographs by Michele Esposito from www.AntWeb.org.

Erect, mostly short to medium length, whitish pilosity moderately abundant on head, most hairs $\leq 0.2-0.3 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent, white setae. Rest of body with moderately dense, erect, medium-length, whitish to yellowish hairs, longest hairs on dorsum of mesosoma approximately $0.3-0.4 \times$ MOD. Head ferruginous orange to reddish-orange; mesosoma, antennae slightly darker reddish-orange; petiole, postpetiole, gaster, legs brownish-orange (Figures 7A, 33).

Queen. Unknown.
Male. Unknown.
Additional material examined. None.
Etymology. The specific epithet, colca, is derived from the type workers being collected adjacent to Colca Canyon in Peru, which is the second deepest canyon in the world.

Discussion. Pogonomyrmex colca is distinguished from all congeners except for $P$. cusquena by the combination of: (1) first gastral tergum smooth and strongly shining, (2) superior propodeal spines consist of acuminate denticles to short teeth, length usually similar to or less than height of inferior propodeal spines, (3) in profile, lateral portion of head from posterior margin of eyes to posterior corners faintly rugose to mostly smooth and shining, rugae weakening posterad, posterior corners smooth and shining to strongly shining, (4) longitudinal rugae on promesonotum strongly irregular with numerous lateral branches to rugoreticulate, and (5) promesonotal suture not impressed. Pogonomyrmex colca is most similar to P. cusquena, from which it is separated by: (1) longitudinal rugae on promesonotum strongly irregular with numerous lateral branches to rugoreticulate, and (2) promesonotal suture not impressed. In P. cusquena: (1) longitudinal rugae on promesonotum regular to moderately irregular with few lateral branches, and (2) promesonotal suture usually weakly to moderately impressed.

Biology. Nothing is known about the biology of P. colca. Pogonomyrmex colca is only known from the type locality at an elevation of approximately 3425 m in the Peruvian Yungas ecoregion, as defined by Olson et al. (2001) (Figure 32B).

## Pogonomyrmex cusquena NEW SPECIES

(Figures 7B, 34)
Distribution-32C
Holotype worker [MUSM: CASENT0922566]: PERU, Cusco Region: Moray Valle Sagrado (see below), $13^{\circ} 19.8^{\prime}$ S $72^{\circ} 11.8^{\prime} \mathrm{W}, 3000 \mathrm{~m}, 2$ May 2007 (Alain Lenoir, unnumbered). Paratypes, same data as holotype: CPDC (1w), MCZC (1w), RAJC (1w), USNM (1w).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum smooth and shining, sometimes weakly coriarious anterad, (2) superior propodeal spines consist of acuminate denticles to short teeth, length usually similar to or less than that of inferior propodeal spines, (3) in profile, lateral portion of head from posterior margin of eyes to posterior corners faintly rugose to mostly smooth and shining, rugae weakening posterad, posterior corners smooth and shining to strongly shining, (4) longitudinal rugae on promesonotum regular to moderately irregular with few lateral branches, (5) promesonotal suture usually weakly to moderately impressed, and (6) rugae present on posterior surface of postpetiole (Figures 7B, 34).

Measurements-holotype ( $n=4$ paratypes). HL 1.51 (1.50-1.61); HW1.52 (1.51-1.66); MOD 0.30 (0.32$0.35)$; OMD 0.40 ( $0.38-0.43$ ); SL 1.19 (1.12-1.30); PNW 1.05 (1.02-1.12); HFL 1.56 (1.46-1.65); ML 1.68 (1.801.95); PW 0.37 ( $0.41-0.42$ ); PPW 0.56 ( $0.55-0.57$ ). Indices: SI 78.29 (74.17-79.87); CI 100.66 (100.00-103.11); OI 19.74 (19.28-22.01); HFI 102.63 (93.98-100.61).

Description. Head quadrate to slightly wider than long $(C I=100.00-103.11)$; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, regular to wavy; in full-face view, medial rugae continuing to posterior margin. Interrugae on cephalic dorsum weakly to moderately granulate, weakly shining; in profile, lateral portion of head from posterior margins of eyes to posterior corners faintly rugose, rugae weakening posterad, posterior corners smooth and shining to strongly shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae; interrugae smooth and shining. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles
with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.19-0.22 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.08-1.35 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes $(\mathrm{SI}=74.17-79.87)$ failing to reach posterior corners of head by less than length of basal funicular segment, scapes smooth and shining to weakly striate, interstriae weakly shining to smooth and shining. Basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent, regular to weakly irregular, subparallel-parallel rugae. Rugae on dorsum of promesonotum well defined, regular to weakly irregular, subparallel, usually lacking lateral branches; longitudinal rugae on mesonotum continue onto pronotum, lateralmost rugae diverging onto humeral shoulders of pronotum and continuing ventrally on pronotal sides, medial rugae usually continue to anterior margin of pronotum or sometimes weakly rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin angulate. Promesonotal suture weakly to moderately impressed. Regular to weakly irregular rugae on mesopleura angle posterodorsally or posterad; regular to wavy, transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides or oblique or longitudinal rugae that continue posterad to superior propodeal spines. Superior propodeal spines consist of acuminate denticles to short teeth, well defined keel connecting spines present or absent. Inferior propodeal spines wider than high, broadly triangular, tips bluntly rounded to subacute, height similar to or greater than length of superior propodeal spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma smooth and shining to moderately granulatepunctate, weakly shining, pronotal sides and mesopleura usually more granulate than dorsal surface. Legs weakly to moderately coriarious, weakly shining to smooth and shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with a moderately well developed, broadly rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface notably shorter than posterior surface, apex subangulate. In dorsal view, petiolar node longer than wide, sides subparallel anterad, widest near spatulate anterior margin, narrowing slightly posterad. Sides and posterior surface of petiolar node with regular, transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, maximum width and length similar; transverse to arcuate, regular to wavy rugae posterad, anterad rugae concentric and traversing medially from lateral margin then curving anterad to become longitudinal; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces smooth and shining. First gastral tergum smooth and shining, anterad portion sometimes weakly coriarious, weakly shining.

Erect, mostly short to medium length, whitish pilosity moderately abundant on head, most hairs $\leq 0.2-0.3 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent, yellowish setae. Rest of body with moderately dense, erect, medium-length, whitish to cream-colored hairs, longest hairs on dorsum of mesosoma approximately $0.4-0.5 \times$ MOD. Head ferruginous orange to reddish-orange; mesosoma, antennae darker reddish-orange; gaster, legs blackish with a moderate orangish infusion; petiolar node and postpetiole concolorous with mesosoma or gaster (Figures 7B, 34).

Queen. Unknown.
Male. Unknown.
Additional material examined. None.
Etymology. The specific epithet, cusquena, is derived from the type workers being collected in the Cusco Region of Peru.

Discussion. Pogonomyrmex cusquena is distinguished from all congeners by the combination of: (1) psammophore well developed, (2) superior propodeal spines consist of acuminate denticles to short teeth, (3) first gastral tergum smooth and shining, sometimes weakly coriarious anterad, (4) in profile, lateral portion of head from posterior eye margin to posterior corners faintly rugose to mostly smooth and shining, rugae weakening posterad, posterior corners smooth and shining to strongly shining, and (5) rugae present on posterior surface of postpetiole (Figure 34).

The type locality given above differs from the label, which reads Maray Vale Sagrado, Peru, $300 \mathrm{~m}, 2$ May 2007, A. Lenoir. Both the location and elevation on the labels were problematic because there is no Maray in Vale Sagrado and the elevation of Vale Sagrado is approximately 3000 m . This issue was resolved by contacting Alain Lenoir, who indicated that the locality was probably the archaeological site Moray (not Maray) Valle Sagrado at an elevation of approximately 3000 m (A. Lenoir, pers. comm.).


FIGURE 34. Photographs of Pogonomyrmex cusquena holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922566). Photographs by Michele Esposito from www.AntWeb.org.

Biology. Nothing is known about the biology of P. cusquena. Pogonomyrmex cusquena is only known from the type locality at approximately 3000 m elevation, which is in the Peruvian Yungas ecoregion and probably the Central Andean wet puna ecoregion, as defined by Olson et al. (2001) (Figure 32C).

## Pogonomyrmex excelsior NEW SPECIES

(Figure 35)
Distribution-36A

Holotype worker [MACN: CASENT0922462]: ARGENTINA, Jujuy: Departamento Susques, Jct Rutas 52 \& 16 ( 16.7 km W Susques), $23^{\circ} 24.0^{\prime} \mathrm{S} 66^{\circ} 31.2^{\prime} \mathrm{W}, 13,470(4080 \mathrm{~m})$, 1 April 2015 (R.A. Johnson \#5417). Paratypes, same data as holotype: IFML (6w), MACN (12w), LACM (6w), MCZC (6w), RAJC (24w), UCDC (3w), USNM (3w). Additional paratype series from the same locality and date-RAJ \#5418: MACN (3w), RAJC (6w); RAJ \#5419: IFML (3w), MACN (3w), MCZC (3w), RAJC (9w), USNM (3w).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins usually smooth and shining, (2) head dark reddish-black to blackish-red; malar area, gaster blackish to black; mesosoma and gaster dark blackish-red to black; in dorsal view, pronotum darker than mesonotum for some to all workers in a series, and (3) restricted to high elevation and altiplano habitats ( $>3000 \mathrm{~m}$ ) of northwestern Argentina, northeastern Chile, and probably Bolivia (Figure 35).

Measurements-holotype $(n=6+6$ paratypes). HL 1.62 (1.44-1.76); HW 1.64 (1.49-1.75); MOD 0.36 ( $0.34-$ $0.39)$; OMD 0.40 ( $0.33-0.46$ ); SL 1.29 (1.01-1.36); PNW 1.12 (1.02-1.21); HFL 1.80 (1.56-1.82); ML 1.80 ( $1.67-$ 2.05); PW 0.42 (0.35-0.48); PPW 0.59 (0.53-0.65). Indices: SI 78.66 (66.89-81.17); CI 101.23 ( $97.16-105.42$ ); OI 21.95 (20.57-24.20); HFI 109.76 (97.01-106.37).

Description. Head subquadrate to quadrate $(C I=97.16-105.42)$; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, in full-face view, medial rugae diverging toward posterior corners of head; interrugae strongly granulate, with a beaded appearance, dull to weakly shining; posterior corners rugose, interrugae smooth and shining to weakly coriarious, weakly shining. Anterior margin of clypeus moderately concave, medial portion of clypeus with numerous subparallel, longitudinal rugae, occasionally rugae converge anterad to form up to several concentric narrowly rounded Vs. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and ventral side of mandibles. Mandibles with six or occasionally seven teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.97-1.25 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=66.89-81.17$ ) failing to reach posterior corners of head by width of basal funicular segment to reaching posterior corners. Antennal scapes moderately striate, striae weakening distally, interstriae weakly coriarious, weakly shining to smooth and shining; basal flange moderately well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent, regular to irregular, subparallel-parallel rugae or sometimes rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, strongly angulate. Promesonotal suture usually present. Regular to irregular longitudinal rugae on mesonotum usually with numerous short, lateral branches to weakly rugoreticulate. Rugae on mesonotum continue to anterior margin of pronotum or anterior margin with one to few transverse rugae; rugae on pronotum regular to irregular with numerous branches; rugae on pronotal sides irregular, usually with numerous secondary rugae to rugoreticulate; rugae usually weaker on pronotal sides (especially posterad) than on mesopleura. Wavy to irregular rugae on mesopleura angle posterodorsally; transverse or oblique rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines consist of acuminate denticles, teeth, or spines, longest about $0.4 \times$ the distance between their bases; spines usually connected by well defined keel. Inferior propodeal spines triangular, wider than high, apex weakly rounded to acuminate, often taller than superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma strongly granulate, dull, pronotal sides and mesopleura especially granulate. Legs weakly to moderately coriarious, weakly shining.

Peduncle of petiole about $0.8 \times$ the length of petiolar node, anteroventral margin with poorly developed rounded process to a broadly-rounded tongue-shaped process. In profile, posterior surface of petiolar node weakly convex;


FIGURE 35. Photographs of Pogonomyrmex excelsior holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922462). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 36. Geographic distribution of: (A) Pogonomyrmex excelsior, (B) P. forelii, and (C) P. granulatus. The large black circle in each panel denotes the type locality.
petiolar node asymmetrical with anterior surface shorter than posterior surface, apex weakly rounded to subangulate. In dorsal view, petiolar node longer than wide, widest near narrowly-rounded to spatulate anterior margin. Posterior surface of petiolar node with irregular, transverse, oblique, longitudinal rugae, or in a combination of directions. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, width and length similar; posterad rugae transverse, anterad rugae transverse or traversing from lateral margin then curving anterad to become longitudinal; anterolateral rugae concentric, curving from lateral to anterior margin. Rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node, interrugae weakly to moderately coriarious, weakly shining. Striae cover anterior two-thirds or more of medial portion of first gastral tergum, posterior margin smooth and shining, occasionally moderately coriarious, weakly shining; posterolateral margins smooth and shining.

Erect, short to medium length, whitish pilosity moderately abundant on head, most hairs $<0.2-0.3 \times$ MOD. Moderately abundant semidecumbent to decumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish setae. Rest of body with moderately dense, erect, medium length, whitish setae; hairs on mesosoma usually about $0.5-0.6 \times \mathrm{MOD}$; hairs on first gastral tergum shorter, more delicate than those on mesosoma. Head dark reddish-black to blackish-red, usually with part of cephalic dorsum posterior to frontal lobes blackish to black; malar area, gaster blackish to black; mesosoma dark blackish-red to black; in dorsal view, pronotum darker than mesonotum for some to all workers in a series (Figure 35).

Queen. Unknown.
Male. Unknown.
Additional material examined. ARGENTINA: Jujuy: Rt 40 at 41.5 km N Coranzuli, 13,390', Apr 3, 2015 (RAJC); Rt 52 at 28.6 km SW Susques, 13,040, Apr 1, 2015 (RAJC). CHILE: Antofagasta: Rt 27 at 3.5 km E Argentina border, 14,080', Apr 2, 2017 (RAJC); Rt 27 at 0.1 km E Argentina border, 14,090’ Apr 2, 2017 (RAJC) (Figure 36A).

Etymology. The specific epithet, excelsior, (from Latin, excelsus, for lofty, elevated, or high plus -ior, suffix forming adjectives' comparative degree) for this species occurring in high elevation altiplano habitats.

Discussion. Pogonomyrmex excelsior may co-occur with several P. rastratus-group species. However, P. excelsior is distinguished from all congeners by: (1) distinctly dark coloration-dark reddish-black to blackish red head, malar area and gaster blackish to black; mesosoma and gaster dark blackish-red to black; in dorsal view, pronotum darker than mesonotum for some to all workers in a series, but concolorous in some workers, and (2) striae extend over more than anterior two-thirds of medial portion of first gastral tergum.

Biology. Pogonomyrmex excelsior workers are solitary foragers that can travel up to $30-40 \mathrm{~m}$ from the nest. Nests of $P$. excelsior are placed in open, exposed sites, and the entrance ranges from a hole in the ground and lacking a tumulus to a tumulus up to 15 cm in diameter. Nests are most easily located by baiting workers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain approximately 500-1000 workers.

Pogonomyrmex excelsior occurs at elevations from 3950-4080 m. This species inhabits that Central Andean puna and Central Andean dry puna ecoregions, as defined by Olson et al. (2001) (Figure 36A).

## Pogonomyrmex forelii NEW SPECIES

(Figure 37)
Distribution-36B

Holotype worker [MACN: CASENT0922168]: ARGENTINA, Chubut: Departamento Mártires, Rt 25 at 11.4 km E Las Plumas, $43^{\circ} 39.3^{\prime} \mathrm{S}, 67^{\circ} 14.4^{\prime} \mathrm{W}, 1280$ feet ( 390 m ), 21 February 2014 (R.A. Johnson \#5223). Paratypes, same data as holotype: IFML (3 workers), MACN ( 6 workers), MCZC ( 6 workers), LACM ( 6 workers), RAJC ( 21 workers), UCDC ( 3 workers), USNM ( 3 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae cover more than anterior one-half of first gastral tergum, posterolateral margins smooth and shining, (2) head and mesosoma blackish to black, gaster dark ferruginous orange to orangish-black, (3) superior propodeal spines moderately long to long, length $>0.6 \times$ the distance between their bases, and (4) most workers in a series with one to several transverse, wavy to irregular rugae on anterodorsal margin of pronotum (Figure 37).


FIGURE 37. Photographs of Pogonomyrmex forelii holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922168). Photographs by Michele Esposito from www.AntWeb.org.

Measurements-holotype ( $n=13$ paratypes). HL 1.70 (1.46-1.72); HW 1.78 (1.68-1.79); MOD 0.39 ( $0.33-$ 0.38); OMD 0.42 ( $0.38-0.46$ ); SL 1.38 (1.21-1.40); PNW 1.18 (1.07-1.19); HFL 1.73 (1.61-1.84); ML 1.95 (1.802.04); PW 0.47 ( $0.40-0.47$ ); PPW 0.66 ( $0.60-0.67$ ). Indices: SI 77.53 (69.32-79.55); CI 104.71 (103.70-116.22); OI 21.91 (19.54-21.84); HFI 97.19 (91.48-102.79).

Description. Head subquadrate to wider than long $(C I=103.70-116.22)$; posterior margin flat in full-face view. Longitudinal cephalic rugae prominent; in full-face view, medial rugae usually diverging toward posterior corners of head. Interrugae on cephalic dorsum strongly granulate-punctate, dull to weakly shining, with a beaded appearance; posterior corners rugose, interrugae smooth and shining to moderately coriarious, weakly shining. Anterior margin of clypeus moderately concave, dorsum with numerous, subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margins of mandibles. Mandibles with six or rarely seven teeth; mandibular dorsum rugose. MOD ranging from $0.20-0.25 \times$ HL. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.05-1.33 \times \mathrm{MOD}$. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes $(S I=69.32-79.55)$ failing to reach posterior corners of head by less than width of basal funicular segment to reaching posterior corners of head. Antennal scapes with or without weak longitudinal striae, interstriae weakly to moderately granulate, weakly shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent subparallel-parallel, wavy to irregular rugae. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins angulate. Dorsum of mesonotum with irregular longitudinal rugae (rarely rugoreticulate) that diverge toward humeral shoulders of pronotum; most workers with one to several transverse (sometimes very irregular) rugae on anterodorsal margin of pronotum that continue ventrally on pronotal sides or pronotal sides rugoreticulate; rugae on mesopleura angle posterodorsally. Superior propodeal spines moderately long to long, length $>0.6 \times$ the distance between their bases, spines connected by a well developed keel; irregular transverse rugae on dorsum of propodeum traverse anteroventrally on sides. Inferior propodeal spines moderately developed, wider than high, tips blunt to subacuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma densely granulate, dull to weakly shining. Legs moderately coriarious, weakly shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with a weakly rounded process that usually continues posterad subparallel-parallel to dorsal surface of peduncle. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex weakly rounded to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, narrowing posterad. Sides and posterior surface of petiolar node with wavy to irregular transverse, arcuate or occasionally nearly longitudinal rugae. In profile, dorsum of postpetiole convex; in dorsal view, widest near posterior margin, narrowing anterad, width and length similar to slightly wider than long. Dorsum of postpetiole with wavy to irregular transverse rugae, occasionally with rugae on anterior one-half of postpetiole curving toward anterior margin; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces smooth and shining to moderately coriarious, weakly shining. First gastral tergum with striae over more than anterior one-half of segment, striae often extending to posterior margin of segment or with posterior margin strongly coriarious, dull; posterolateral margins usually smooth and shining.

Erect, mostly short to medium-length, whitish pilosity moderately abundant on head. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish to light yellowish setae. Rest of body with moderately dense, erect, medium-length, whitish setae. Head, mesosoma, petiolar node black, anterior portion of pronotum occasionally with a weak orangish infusion; postpetiole orangish-black; gaster dark ferruginous orange with darker bands along posterior margins of terga (Figure 37).

Queen. Unknown.
Male. Unknown.
Additional material examined. None.
Etymology. This species is named to honor Auguste Forel, who described nine South American species/subspecies of Pogonomyrmex.

Discussion. Pogonomyrmex forelii likely to co-occurs with several P. rastratus-group species, but its coloration (black head and mesosoma and light to dark ferruginous orange gaster) and striae that cover anterior one-half or more of the first gastral tergum distinguish it from all congeners except $P$. catanlilensis, $P$. granulatus, and $P$.
varicolor. Pogonomyrmex forelii is distinguished from P. catanlilensis by: (1) superior propodeal spines moderately long to long, length $>0.6 \times$ the distance between their bases, and (2) most workers in a series with one to several transverse (sometimes very irregular) rugae on anterodorsal margin of pronotum. In P. catanlilensis, (1) superior propodeal spines variable, consisting of tubercles, denticles, and short teeth to long spines, and (2) rugae on anterodorsal margin of pronotum longitudinal, oblique, or rugoreticulate for most workers in a series. Pogonomyrmex forelii is distinguished from $P$. granulatus by their moderately long to long superior propodeal spines with a length $>$ $0.6 \times$ the distance between their bases. In P. granulatus, the superior propodeal spines consist of tubercles, denticles, or short teeth with their length always less than $0.2 \times$ the distance between their bases. Pogonomyrmex forelii is distinguished from $P$. varicolor by: (1) superior propodeal spines moderately long to long, length $>0.6 \times$ the distance between their bases, (2) most workers in a series with one to several transverse (sometimes very irregular) rugae along the anterodorsal margin of pronotum, and (3) for all workers in a series, head black; gaster dark ferruginous orange. In P. varicolor, (1) superior propodeal spines consist of tubercles, denticles, or short teeth for at least some workers in a series, (2) for most workers in a series, anterodorsal margin of pronotum with longitudinal or oblique rugae or rugoreticulate, and (3) for at least some workers in a series, head usually other than black and/or gaster other than light to dark ferruginous orange.

Biology. Nothing is known regarding the biology of $P$. forelii except that the type colony had a 15 cm tumulus in an open, exposed site in a disturbed roadside, with vegetation consisting of Stipa sp. (Poaceae), Larrea sp. (Zygophyllaceae), Atriplex sp. (Amaranthaceae), and other shrubs. The type colony was at an elevation of 385 m in the extreme southern part of the Low Monte ecoregion, as defined by Olson et al. (2001) (Figure 36B).

## Pogonomyrmex granulatus NEW SPECIES

(Figures 38-39)
Distribution-36C
Holotype worker [MACN: CASENT0235302]: ARGENTINA, Salta: Departamento Cachi, Valle Encantado, 20.2 km NE Jct Rts $33 \& 2,25^{\circ} 11.3^{\prime} \mathrm{S}, 65^{\circ} 51.2^{\prime} \mathrm{W}, 10,880$ feet ( 3300 m ), 20 January 2010 (R.A. Johnson \#4340). Paratypes, same data as holotype: IFML ( 3 workers), MACN ( 9 workers), MCZC ( 4 workers, 2 males), LACM (3 workers), RAJC ( 8 workers, 1 male), USNM ( 3 workers). Additional paratype series from the same locality and date-RAJ\#4339: IFML (3 workers), MACN (4 workers, 2 males), RAJC ( 3 workers, 6 males); RAJ\#4341: MACN ( 9 workers), RAJC ( 9 workers), UCDC ( 3 workers); RAJ\#4342: IFML (3 workers), MACN (3 workers), RAJC (3 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae cover anterior one-half or more of first gastral tergum, (2) head and mesosoma blackish to black, gaster dark ferruginous orange to orangish-black, (3) relatively small ( $\mathrm{HW}=1.42-1.70 \mathrm{~mm}$; $\mathrm{PNW}=0.96-1.14 \mathrm{~mm}$; ML $=1.67-2.12 \mathrm{~mm}$ ), (4) mandibles with six teeth, (5) superior propodeal spines consist of tubercles, denticles, or short blunt teeth, (6) in profile, most hairs on cephalic dorsum moderately long, length of numerous hairs $>0.4 \times$ MOD, (7) in profile, rugae posterior to eyes coarse, irregular, sometimes circumocular or converging anterior to posterior corners, and (8) interrugae on cephalic dorsum strongly granulate, weakly dull to dull, with a beaded appearance (Figure 38).

Measurements-holotype ( $n=12$ paratypes). HL 1.57 (1.36-1.70); HW 1.57 (1.42-1.70); MOD 0.32 ( $0.28-$ 0.36); OMD 0.42 (0.38-0.49); SL 1.19 (1.11-1.29); PNW 1.08 ( $0.96-1.14$ ); HFL 1.44 (1.39-1.72); ML 1.88 (1.672.12); PW 0.41 ( $0.36-0.46$ ); PPW 0.55 ( $0.51-0.63$ ). Indices: SI 75.80 ( $67.05-78.18$ ); CI 100.00 (101.23-110.81); OI 20.38 (18.75-22.36); HFI 91.72 (94.97-104.88).

Description. Head quadrate to wider than long $(C I=100.00-110.81)$, widest just posterior to eye; posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, weakly wavy to irregular; in full-face view, medial rugae diverging toward posterior corners of head. In profile, rugae posterior to eyes coarse, irregular, sometimes circumocular or converging anterior to posterior corners, interrugae strongly granulate, weakly dull to dull, with a beaded appearance. Interrugae on cephalic dorsum strongly granulate, dull, with a beaded appearance. Posterior corners rugose; interrugae weakly to strongly granulate, weakly dull to weakly shining. Anterior margin of clypeus concave; dorsal surface with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream colored to light yellowish ammochaetae project from anterior margin of clypeus and basolateral margin of mandi-
bles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.19-0.23 \times \mathrm{HL}$. In profile, eyes situated near middle of head, $\mathrm{OMD}=1.08-1.44 \times \mathrm{MOD}$. Antennal scapes relatively long ( $\mathrm{SI}=67.05-78.18$ ), reaching posterior corners to surpassing posterior corners by less than length of basal funicular segment; entire scape with longitudinal striae, dull to weakly shining. Basal flange of scape flattened and well developed with carinate margin. Psammophore well developed.

Mesosomal profile strongly convex; all mesosomal surfaces with prominent wavy to irregular rugae. In profile and dorsal views, humeral shoulders of pronotum sometimes angulate, weakly elevated above flattened medial portion of pronotum. Promesonotal suture weakly impressed on occasional workers. Dorsum of promesonotum with irregular longitudinal rugae, lateral rugae often angling toward humeral shoulders of pronotum; rugae on humeral shoulders of pronotum and pronotal sides often weakly rugoreticulate to vermiculate. Mesopleura with wavy to irregular rugae angling posterodorsally. Dorsum of propodeum weakly rugoreticulate or with transverse to irregular rugae that traverse anteroventrally on sides. Superior propodeal spines consist of tubercles, denticles, or short blunt teeth. Inferior propodeal spines forming a broadly rounded to subangulate process, height similar to or greater than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to strongly granulate, dull to weakly shining. Legs weakly to strongly coriarious, dull to weakly shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with a broadly rounded tooth-like process. In profile, petiolar node broadly rounded with anterior surface shorter than posterior surface; apex weakly angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin; posterior surface and sides with wavy to irregular, transverse rugae that traverse ventrally on sides. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin; maximal width about equal to length; dorsum and sides with transverse to wavy rugae that are finer, denser than those on posterior surface of petiolar node; rugae near anterior margin of posterior surface of petiolar node and dorsum of postpetiole sometimes oblique; interrugae on both surfaces moderately granulate, weakly shining. First gastral tergum with striae over anterior one-half or more of segment, posterior margin with striae or strongly coriarious, dull.

Erect, whitish pilosity moderately abundant on head, variable in length, longest hairs not exceeding MOD; in profile, length of numerous hairs on cephalic dorsum $>0.4 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape, abundant decumbent hairs on funicular segments. Legs with moderately abundant semidecumbent to suberect white setae. Mesosoma, petiolar node, postpetiole, gastral terga with erect, moderately dense setae, mostly similar in length, only those on posterior gastral terga sometimes approaching MOD. Bicolored: head and mesosoma black; gaster dark ferruginous orange to orangish-black, a black transverse band often present along posterior margin of terga (Figure 38).

## Queen. Unknown.

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum, (2) subparallel-parallel, longitudinal rugae extend over most of anepisternum and katepisternum, (3) notauli present, weakly to moderately impressed, often only visible along anterior margin of mesoscutum, (4) in profile, irregular rugae immediately posterior to eyes surrounded by rugae that form circumocular whorls, and (5) bicolored: head and mesosoma black, gaster dark ferruginous orange (Figure 39).

Measurements- ( $n=11$ paratypes). HL 1.11-1.32; HW 1.15-1.29; MOD 0.40-0.47; OMD 0.19-0.29; SL $0.39-0.49$; HFL 1.49-1.70; ML 1.94-2.23; PW $0.40-0.52$; PPW $0.61-0.68$. Indices: SI $32.50-38.02$; CI $96.21-$ 109.01; OI 33.33-37.01; HFI 121.6-133.86.

Additional material examined. ARGENTINA: Salta: Valle Encantado, 1960 m, Dec 17, 2001 (RAJC; UCDC) (Figure 36C).

Etymology. The specific epithet, granulatus (from Latin, granulatus $=$ granular), is an adjective that refers to the strongly granulate interrugae on the cephalic dorsum.

Discussion. Pogonomyrmex granulatus might co-occur with one or more $P$. rastratus-group species, but its coloration (black head and mesosoma and light to dark ferruginous orange gaster) and striae that cover the anterior one-half or more of the first gastral tergum distinguish it from all congeners except $P$. catanlilensis, $P$. forelii, and P. varicolor. Pogonomyrmex granulatus is distinguished from $P$. forelii by superior propodeal spines that consist of tubercles, denticles, or short teeth with their length less than $0.5 \times$ the distance between their bases. In P. forelii, the superior propodeal spines are moderately long to long with a length $>0.6 \times$ the distance between their bases. Pogonomyrmex granulatus is separated from P. catanlilensis by: (1) superior propodeal spines consist of tubercles,


FIGURE 38. Photographs of Pogonomyrmex granulatus holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0235302). Photographs by Will Ericson from www.AntWeb.org.


FIGURE 39. Photographs of Pogonomyrmex granulatus paratype male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0235301). Photographs by Shannon Hartman \& Will Ericson from www.AntWeb.org.
denticles, or short blunt teeth, but never moderately long to long spines, (2) relatively small (HW $=1.42-1.70$ $\mathrm{mm} ; \mathrm{PNW}=0.96-1.14 \mathrm{~mm} ; \mathrm{ML}=1.67-2.12 \mathrm{~mm}$ ), (3) in profile, most hairs on cephalic dorsum moderately long, length of numerous hairs $>0.4 \times$ MOD, and (4) mandibles with six teeth. In $P$. catanlilensis: (1) superior propodeal spines consist of tubercles, denticles, or short teeth to long spines, (2) relatively large (HW $=1.67-2.04 \mathrm{~mm}$; PNW $=1.15-1.42 \mathrm{~mm} ; \mathrm{ML}=2.01-2.76 \mathrm{~mm}$ ), (3) in profile, most hairs on cephalic dorsum short, length of most hairs $<$ $0.2 \times$ MOD, and (4) mandibles with six to eight teeth ( $>50 \%$ with seven to eight teeth). Pogonomyrmex granulatus is separated from $P$. varicolor by: (1) superior propodeal spines consist of tubercles, denticles, or short blunt teeth, (2) in profile, rugae posterior to eyes coarse, irregular, sometimes circumocular or converging anterior to posterior corners, and (3) interrugae on cephalic dorsum strongly granulate, weakly dull to dull, with a beaded appearance. In P. varicolor: (1) the superior propodeal spines consist of short to long spines for at least some workers in a series, (2) in profile, rugae posterior to eyes fine, dense, regular, converging at or near posterior corners, and (3) interrugae on cephalic dorsum smooth and shining to moderately coriarious, weakly shining, rarely with a beaded appearance.

Biology. Pogonomyrmex granulatus workers are solitary foragers. Nests vary from an entrance lacking a tumulus to one that is approximately 10 cm in diameter. The easiest method to find nests is bait workers with cookie crumbs, then follow them back to the nest. Partial nest excavations indicated that colonies are relatively small and probably contain up to approximately 500 workers (R.A. Johnson, pers. obs.). Males were collected on 20 January, suggesting that mating flights occur during the austral summer.

Nests of all four type series of $P$. granulatus were in alpine habitat on a hillside with vegetation that consisted of grasses, herbaceous perennials, and composites; the substrate consisted of silty, loamy soil with gravel and small rocks. The second collection locale was on a steep rocky slope with grasses and Ephedra sp. (Ephedraceae). Pogonomyrmex granulatus inhabits elevations from 1960-3300 m. This species is only known from the Central Andean puna ecoregion, as defined by Olson et al. (2001) (Figure 36C).

## Pogonomyrmex intermedia NEW STATUS

(Figures 40-42)
Distribution-43A
Pogonomyrmex (Ephebomyrmex) bispinosus var. intermedia Menozzi, 1935: 320 (worker). Syntypes not examined. CHILE, Bíobío: Volcán de Chillan, 1700 m , \#204 (Prof. W. Goetsch leg.). GGC worker here designated LECTOTYPE [ANTWEB1008896].
Pogonomyrmex (Pogonomyrmex) bispinosus var. intermedius Menozzi: Kempf, 1972: 207, first combination in Pogonomyrmex (Pogonomyrmex). Snelling \& Hunt, 1975: 75, incorrect synonymy under vermiculatus.

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum lacking striae, (2) head and gaster ferruginous orange to reddish-orange, pronotum orangish to reddish, mesonotum and propodeum blackish to black, often with an orangish to reddish infusion on dorsum of mesonotum, (3) legs and antennal scapes usually orangish-brown, occasionally brownish to blackish, (4) clypeus orangish to orangish-red, concolorous with adjacent cephalic dorsum, (5) promesonotal suture usually present, pronotum usually lighter than adjoining mesonotum, (6) transverse rugae on posterior surface of petiolar node and dorsum of postpetiole, and (7) superior propodeal spines long, length $>0.6-0.8 \times$ the distance between their bases (Figure 40).

Measurements- $(n=12)$. HL 1.42-1.80; HW 1.43-1.84; MOD 0.33-0.39; OMD 0.30-0.44; SL 1.11-1.43; PNW 0.98-1.21; HFL 1.53-1.96; ML 1.73-2.17; PW0.38-0.49; PPW 0.54-0.68. Indices: SI 75.54-80.77; CI 97.50-106.98; OI 19.30-23.78; HFI 96.49-109.79.

Redescription. Head subquadrate to quadrate $(\mathrm{CI}=97.50-106.98)$; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, wavy to irregular; in full-face view, medial rugae diverging toward posterior corners of head. Interrugae on cephalic dorsum strongly granulate, dull, usually with a beaded appearance; posterior corners rugose, interrugae moderately granulate, weakly shining to smooth and strongly shining. Anterior margin of clypeus moderately concave, dorsum with several subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream colored to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.19-0.24 \times$ HL. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=$
0.89-1.25 $\times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes (SI $=$ $75.54-80.77$ ) reaching posterior margins of head or failing to do so by less than width of basal funicular segment. Antennal scapes with longitudinal striae, interstriae weakly to moderately granulate, weakly shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex. In dorsal view, humeral shoulders of pronotum enlarged, shoulders weakly to strongly angulate. All mesosomal surfaces with prominent rugae. Dorsum and sides of pronotum rugoreticulate, wavy to strongly irregular rugae on mesopleura angle posterodorsally. Dorsum of promesonotum with weakly to strongly irregular longitudinal rugae, sometimes weakly rugoreticulate. Promesonotal suture usually present. Superior propodeal spines long, length $>0.6-0.8 \times$ distance between their bases, connected by well defined keel; irregular transverse rugae to rugoreticulate on dorsum of propodeum. Inferior propodeal spines wider than high, apex weakly rounded to subacuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to densely granulate, dull to weakly shining. Legs moderately coriarious, weakly shining.

Peduncle of petiole about as long as petiolar node, ventral surface often with a broadly rounded process. In profile, dorsum of petiolar node weakly convex; node asymmetrical with anterior surface notably longer than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, gradually narrowing posterad. Sides and posterior surface of petiolar node with wavy to irregular transverse to arcuate rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, maximum width and length about equal. Wavy, transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces moderately to strongly granulate, dull to weakly shining. First gastral tergum smooth and shining to moderately coriarious, weakly shining, sculpturing near base sometimes appearing in a longitudinal manner giving the appearance of faint striae.

Erect, mostly short to medium length, yellowish pilosity moderately abundant on head. Moderately abundant suberect to decumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to semidecumbent yellowish setae. Mesosoma, petiolar node, postpetiole, and gastral terga with moderately dense, erect, yellowish setae that are similar in length; longest hairs about $0.6-0.7 \times$ MOD. Head and gaster ferruginous orange to reddish-orange; pronotum orangish to reddish, lighter than adjoining mesonotum; mesonotum and propodeum blackish to black, often with an orangish to reddish infusion on dorsum of mesonotum; antennae, legs, petiolar node dark orangish-brown, occasionally brownish to blackish; postpetiole blackish-orange (Figure 40).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) first gastral tergum lacking striae, smooth and strongly shining, (3) posterior surface of petiolar node and dorsum of postpetiole covered with transverse rugae, (4) superior propodeal spines moderately long, length $>0.3-0.5 \times$ the distance between their bases, (5) mesopleura, propodeum, petiolar node blackish to black; mesoscutum and mesoscutellum orangishbrown to reddish-brown, and (6) longitudinal rugae on cephalic dorsum posterior to eyes strongly irregular, often with short lateral branches, interrugae strongly granulate, with a beaded appearance, dull (Figure 41).

Measurements- $(n=9)$. HL 1.45-1.73; HW 1.51-1.77; MOD 0.30-0.38; OMD 0.34-0.40; SL 1.11-1.32; PNW 1.17-1.34; HFL 1.54-1.81; ML 2.05-2.48; PW 0.38-0.46; PPW 0.60-0.70. Indices: SI 71.19-77.42; CI 97.42-106.90; OI 19.23-23.23; HFI 97.47-108.61.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head subquadrate to slightly wider than long ( $\mathrm{CI}=97.42-106.90$ ), widest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy to irregular, rugae posterior to eyes strongly irregular, often with short lateral branches, interrugae strongly granulate, dull, with a beaded appearance; in posterodorsal view, medioposterior margin of head with a more or less triangular area that is rugoreticulatevermiculate; posterior margin rugose to rugoreticulate, interrugae weakly to strongly granulate-punctate, weakly shining to dull. Mandibles with six teeth, rarely with an additional denticle between basal and subbasal teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces with subparallel, regular, wavy, or irregular rugae, except for irregular to rugoreticu-late-vermiculate on pronotal sides; interrugae on mesoscutum and mesoscutellum weakly to moderately granulate, weakly shining, those on propodeum moderately granulate-punctate, weakly shining. Propodeum with moderately long superior spines, length approximately $0.3-0.5 \times$ the distance between their bases; inferior propodeal spines wider than tall, apex weakly to broadly rounded. Peduncle of petiolar node long, anteroventral margin with a moderately well developed, broadly rounded process that narrows and continues posterad more or less parallel to dorsal
surface of peduncle. In profile, petiolar node asymmetrical with anterior surface notably shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with transverse rugae; irregular, transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly to moderately granulate-punctate, weakly shining. First gastral tergum smooth and strongly shining. Most body surfaces with moderately abundant suberect to erect, medium-length, whitish setae, most hairs on head $>0.3-0.4 \times$ MOD. Bicolored: head, mesoscutum, mesoscutellum, gaster dark orangish-brown to reddish-brown; pronotum, mesopleura, propodeum, petiolar node, postpetiole, antennae, legs blackish to black (Figure 41).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) bicolored: head and mesosoma black, gaster ferruginous orange, (3) erect hairs lacking on first gastral tergum, (4) anterior portion to all of anepisternum and katepisternum smooth and shining, (5) posterior surface of petiolar node with irregular rugae to rugoreticulate, interrugae weakly shining, (6) dorsum of postpetiole with irregular longitudinal rugae, interrugae moderately to strongly granulate, dull to weakly shining, and (7) interrugae on mesoscutum and mesoscutellum strongly granulate, dull (Figure 42).

Measurements- $(n=3)$. HL 1.27-1.31; HW 1.19-1.28; MOD 0.42-0.46; OMD 0.14-0.20; SL 0.41-0.45; HFL 1.60-1.76; ML 2.24-2.50; PW 0.46-0.53; PPW 0.69-0.74. Indices: SI 34.38-35.43; CI 93.70-100.00; OI 35.29-35.94; HFI 129.69-138.58.

Additional material examined. CHILE: Bíobío: Las Trancas Road near Termas de Chillan, 1350 m, Feb 15, 1967 (CASC; LACM; MNHNC; RAJC) (labels list incorrect latitude-longitude); Las Trancas at Piramahuida Hotel, 4070', Mar 2, 2014 (IFML; LACM; MCZC; MNNC; RAJC; UCDC; USNM) (Figure 43A).

Etymology. Menozzi described $P$. intermedia by comparing it to two other Chilean taxa, $P$. bispinosus and $P$. bispinosus var. semistriatus, indicating that the sculpturing of $P$. intermedia was similar to that of $P$. bispinosus var. semistriatus, and much more pronounced than in $P$. bispinosus, but that the gaster was smooth and shining as in $P$. bispinosus (whereas the gaster of $P$. semistriatus was finely striate). Thus, the name intermedia appears to be derived from this species having characters intermediate to those of $P$. bispinosus and P. bispinosus var. semistriatus.

Discussion. Pogonomyrmex intermedia is not known to co-occur with any congeners. Pogonomyrmex maulensis and $P$. santschii are the only species that might be confused with $P$. intermedia, as both are bicolored, with an orangish to reddish head and gaster and blackish to black mesosoma, and both lack striae on the first gastral tergum. All other congeners that lack striae on the first gastral tergum are mostly concolorous ferruginous orange to reddishbrown. Pogonomyrmex intermedia is separated from P. maulensis based on: (1) medial portion of clypeus concolorous to adjoining cephalic dorsum, (2) legs and antennal scapes usually orangish-brown, occasionally brownish to blackish, and (3) mesosoma concolorous ferruginous orange to reddish-brown to reddish-black $\boldsymbol{o r}$ posterior portion of mesopleura and propodeum blackish to black. In P. maulensis: (1) for most to all workers in a series, medial portion of clypeus notably darker (usually blackish to black) than adjoining cephalic dorsum, (2) legs and antennal scapes black, and (3) posterior portion of mesopleura and propodeum usually reddish-black, sometimes blackish to black. Pogonomyrmex intermedia is separated from P. santschii based on: (1) pronotum to entire mesosoma ferruginous orange to reddish-brown or reddish-black, whereas in P. santschii: (1) mesosoma black, occasionally with a weak orangish to reddish infusion on pronotum, infusion rarely present on mesonotum.

For reasons that are unclear, Menozzi (1935) described the worker of $P$. intermedia as being within the subgenus Ephebomyrmex even though he placed it as a subspecies of $P$. bispinosus. His description compared $P$. intermedia to $P$. bispinosus and $P$. semistriata, indicating it as distinct from both of these forms in that the antennae, thorax, and petiolar node were black, while the head, pronotum, and gaster were dark red ( $P$. bispinosus and $P$. semistriatus are mostly concolorous dark ferruginous orange to reddish-brown). He also noted that: (1) sculpturing on $P$. intermedia was similar to that on P. semistriata and more pronounced than that on the type (bispinosus), and (2) that the gaster was smooth and shining as in the type.

I did not examine syntypes of P. intermedia, but the GGC curator (Giovanni Giorgio Bazzocchi) emailed photographs of one syntype and the label (available at http://www.asu.edu/clas/sirgtools/pogonomyrmex/in-termedia\ -\ second\ layer\ photo\ map\ template.htm \& https://www.antweb.org/specimen. do?code=antweb1008896); this syntype was designated as a lectotype (see above). Workers collected near the base of Volcán de Chillan matched photos of this syntype worker in regard to color and other discernable characters.


FIGURE 40. Photographs of Pogonomyrmex intermedia worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914380). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 41. Photographs of Pogonomyrmex intermedia alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914382). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 42. Photographs of Pogonomyrmex intermedia male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914384). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 43. Geographic distribution of: (A) Pogonomyrmex intermedia, (B) P. lagunabravensis, and (C) P. leonis. The large black circle in each panel denotes the type locality.

The only subsequent taxonomic work on $P$. bispinosus var. intermedia removed this taxon from synonymy under $P$. bispinosus and placed it as a junior synonym of $P$. vermiculatus (Snelling \& Hunt, 1975). In their discussion, Snelling \& Hunt (1975) indicated that $P$. bispinosus was a distinct species and that the several Chilean forms attributable to P. bispinosus (i.e., intermedia, semistriatus, spinolae) were more closely related to P. vermiculatus, and they then synonymized all of these taxa under $P$. vermiculatus. Snelling \& Hunt (1975) justified these synonymies saying that they could not recognize any nominate form given so many populations of indeterminate status. These authors did not examine syntypes of $P$. vermiculatus or of any other form that they synonymized under it, and they appear to have examined only one series of the true $P$. vermiculatus (from Magallanes Province, Chile). Examination of photos of one syntype and of numerous specimens collected from near the type locality demonstrate that $P$. intermedia is morphologically distinct from all other known forms. Thus, I raise $P$. intermedia from synonymy to rank as a valid species.

Biology. Nothing is known about the biology of $P$. intermedia except that workers are solitary foragers. This species appears to be restricted to areas along the western base of the Sierra Nevada of Chile. Much of this area is forested and colonies were located in forest openings and disturbed areas. Sexuals were collected from nests on March 2, suggesting that mating flights occur during the austral summer. One dealate, brachypterous queen was also collected; it is unknown if brachypterous queens are rare or common. Partial nest excavations indicated that colonies contain approximately 500-800 workers. Pogonomyrmex intermedia appears to be a mid-elevation species that inhabits elevations from $1235-1700 \mathrm{~m}$. This species occurs in the Valdivian temperate forests ecoregion, as defined by Olson et al. (2001) (Figure 43A).

## Pogonomyrmex lagunabravensis NEW SPECIES

(Figures 10B, 44-46)
Distribution-43B

Holotype worker [MACN: CASENT0249051]: ARGENTINA, La Rioja: Departamento Vinchina, Rt 76 at 64.5 km NW Alto Jagüé, $28^{\circ} 26.0^{\prime}$ S $68^{\circ} 50.6^{\prime}$ W, 12,620’ ( 3825 m ), 2 January 2006 (R.A. Johnson \#3739). Paratypes, same data as holotype: CASC ( 1 worker, 1 ergatoid queen), IFML (3 workers), LACM (3 workers), MACN (13 workers, 2 ergatoid queens), MCZC ( 3 workers), RAJC ( 12 workers, 10 ergatoid queens), UCDC ( 2 workers), USNM (3 workers). Additional paratype series from the same locality and date-RAJ \#3737: LACM (3 workers), RAJC (3 workers); RAJ \#3738: IFML (3 workers), MACN (3 workers), RAJC ( 6 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, posterolateral margins smooth and shining to moderately coriarious, weakly shining, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward pronotal shoulders; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae, (3) superior propodeal spines consist of tubercles, denticles, or minute teeth (all rounded to blunt tipped), keel connecting superior propodeal spines absent; inferior propodeal spines longer than superior spines, (4) rugae between frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle, (5) head and mesosoma mostly concolorous ferruginous orange to light orangish-black, mesosoma sometimes slightly darker than head (Figures 10B, 44).

Measurements-holotype ( $n=12$ paratypes). HL 1.60 (1.48-1.73); HW 1.65 (1.45-1.79); MOD 0.35 (0.330.40); OMD 0.39 (0.35-0.48); SL 1.25 (1.00-1.29); PNW 1.08 (0.95-1.15); HFL 1.62 (1.33-1.77); ML 1.83 (1.682.03); PW 0.41 (0.33-0.43); PPW 0.56 (0.51-0.60). Indices: SI 75.76 ( $65.79-78.21$ ); CI 103.12 ( $97.32-104.17$ ); OI 21.21 (21.23-24.83); HFI 98.18 (87.50-101.33).

Description. Head subquadrate to quadrate $(\mathrm{CI}=97.32-104.17)$; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, rugae between frontal lobes subparallel-parallel, medial rugae between frontal lobes subparallel-parallel, usually continuing onto frontal triangle. Interrugae on cephalic dorsum moderately granulate-punctate, weakly shining; posterior corners rugose, interrugae weakly granulate, weakly shining to smooth and shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream colored to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of
head, $\mathrm{OMD}=0.97-1.27 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=65.79-78.21$ ) failing to reach posterior corners of head by about the length of the basal funicular segment. Antennal scapes usually weakly to moderately striate, interstriae weakly to moderately punctate, weakly shining to smooth and shining; basal flange moderately well developed with carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent widely spaced, regular, sub-parallel-parallel rugae. For most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterior margin of pronotum with one to several straight, strong, continuous, transverse rugae that continue onto pronotal sides. In dorsal view, humeral shoulders of pronotum enlarged, strongly angulate. Promesonotal suture usually present. Regular to weakly irregular rugae on mesopleura angle posterodorsally; regular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines consist of tubercles, blunt denticles, or small, blunt, triangular teeth. Inferior propodeal spines wider than high, triangular, apex broadly rounded to acuminate, height greater than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to strongly granulate, dull to weakly shining. Legs weakly to moderately coriarious, weakly shining to smooth and shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with a weakly to well developed broadly rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, sides subparallel anterad, slightly narrower posterad, anterior margin broadly rounded. Sides and posterior surface of petiolar node with regular, transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, maximum width and length similar; transverse to weakly arcuate rugae posterad, anterad rugae traversing medially from lateral margin then curving anteriorly to become longitudinal; anterolateral rugae concentric, curving from lateral to anterior margin, or rarely with all anterad rugae transverse or weakly arcuate; rugae on dorsum of postpetiole finer, denser that those on posterior surface of petiolar node; interrugae on both surfaces weakly granulate, weakly shining to smooth and strongly shining. Striae extend over more than anterior one-half of first gastral tergum, often extending to posterior margin or posterior margin moderately to strongly coriarious, dull to weakly shining; posterolateral margins smooth and shining to moderately coriarious, weakly shining.

Erect, mostly short to medium length, yellowish pilosity moderately abundant on head, no hairs exceed about $0.7 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent yellowish setae. Rest of body with moderately dense, erect, medium-length, yellowish setae. Head light to dark ferruginous orange to dark red-orange; mandibles, antennae, clypeus, frontal lobes, anterior margin of head, petiolar node, postpetiole dark blackish-orange to blackish; mesosoma dark ferruginous orange, usually slightly darker than head; gastral terga light to dark orang-ish-black, often with darker transverse black band along posterior margins (Figures 10B, 44).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) ergatoid, (2) first gastral tergum with fine longitudinal striae, silky in appearance, (3) anterior margin of clypeus entire, and (4) in dorsal view, pronotum and mesoscutum weakly differentiated, mesoscutum with longitudinal rugae, pronotum with transverse rugae (Figure 45).

Measurements-( $n=12$ paratypes). HL 1.75-1.83; HW 1.77-1.89; MOD 0.39-0.45; OMD 0.41-0.50; SL 1.18-1.34; PNW 1.16-1.25; HFL 1.66-1.80; ML 2.08-2.20; PW $0.43-0.51$; PPW $0.68-0.74$. Indices: SI 64.4873.63; CI 99.44-104.00; OI 22.03-24.73; HFI 90.22-98.36.

Description. Ergatoid; in full face view, head quadrate to subquadrate ( $\mathrm{CI}=99.44-104.00$ ), posterior margin flat. Cephalic dorsum with wavy, longitudinal rugae, medial rugae diverging toward posterior corners along posterior margin, interrugae moderately granulate-punctate, weakly shining. Posterior margins rugose, interrugae smooth and shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

Mesosoma lacking all morphological structures related to or for inserting wings; all mesosomal surfaces with subparallel, wavy rugae; interrugae smooth and shining to moderately granulate-punctate, weakly shining. Pronotum large with wavy, transverse rugae that traverse ventrally on pronotal sides. Mesoscutum reduced in size, not extending to pronotal collar; sides subparallel, converging to bluntly acuminate to arcuate anterior margin. Dorsum of propodeum transversely rugose; superior propodeal spines reduced to denticles or small teeth; inferior propodeal spines well developed, height greater than that of superior spines, triangular, apex acuminate. Peduncle of petiole
long, anteroventral margin with a weakly to well developed rounded process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Postpetiole convex in profile; in dorsal view, maximum width about equal to length. Posterior surface of petiolar node and dorsum of postpetiole with wavy, transverse rugae; interrugae weakly punctate, weakly shining to shining. Striae extend over more than anterior one-half of first gastral tergum, often extending to posterior margin or posterior margin moderately to strongly coriarious, dull to weakly shining; posterolateral margins smooth and shining to moderately coriarious, weakly shining. Most body surfaces with moderately abundant suberect to erect, short, white to cream-colored setae, longest hairs on posterior terga. Head, pronotum, mesoscutum, first gastral tergum ferruginous orange; anterior margin of head, clypeus, frontal lobes, mandibles, antennae, legs, petiolar node, postpetiole black; pronotal collar, sides of pronotum, propodeum blackish, sometimes with an orangish infusion (Figure 45).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) ergatoid, (2) in profile, cephalic rugae forming circumocular whorls posterior to eyes, and (3) notauli present (Figure 46).

Measurements- $(n=1)$. HL 1.38; HW 1.43; MOD 0.42; OMD 0.24; SL 0.55; HFL 1.61; ML 1.92; PW 0.44; PPW 0.63. Indices: SI 38.46; CI 103.62; OI 29.37; HFI 112.59.

Additional material examined. ARGENTINA: La Rioja: 55.3 km NW Alto Jagüe, 11,430', Jan 16, 2010 (RAJC); 63.0 km NW Alto Jagüe, 12,900', Jan 16, 2010 (RAJC); Refugio de Peñon, no date (IFML) (Figure 43B).

Etymology. The specific epithet, lagunabravensis, is derived from this species occurring near Reserva Laguna Brava, La Rioja Province, Argentina.

Discussion. Pogonomyrmex lagunabravensis is not known to co-occur with any congeners, but it is similar to several high-elevation ( $>3000 \mathrm{~m}$ ) species in which the first gastral tergum is striate and longitudinal rugae on the promesonotum are very regular, subparallel-parallel. These similar species include P. apterogenos, P. longibarbis, P. pulchellus, and $P$. rastratus. Pogonomyrmex lagunabravensis can be distinguished from $P$. apterogenos based on: (1) medial rugae on the cephalic dorsum are subparallel-parallel and continue onto the clypeus, and (2) the superior propodeal spines reduced to minute, rounded denticles or tubercles. In P. apterogenos: (1) medial rugae on cephalic dorsum not subparallel-parallel, but rather they converge and end near the posterior margin of clypeus, and (2) superior propodeal spines consist of acuminate denticles, small triangular teeth, or rarely short spines. Pogonomyrmex lagunabravensis is separated from P. longibarbis by: (1) superior propodeal spines consist of tubercles, denticles, or minute teeth (all rounded to blunt tipped) with inferior propodeal spines longer than superior spines, and (2) keel connecting superior propodeal spines absent. For P. longibarbis: (1) superior propodeal spines consist of minute teeth, short triangular teeth, or short spines (all acuminate) with inferior propodeal spines shorter than to as tall as superior spines, and (2) keel connecting superior propodeal spines well developed. Pogonomyrmex lagunabravensis is distinguished from $P$. pulchellus based on: (1) superior propodeal spines consist of tubercles, denticles, or minute teeth (all rounded to blunt tipped), (2) inferior propodeal spines longer than superior spines, (3) keel connecting superior propodeal spines absent and (4) dorsum of pronotum concolorous with adjoining mesonotum. For $P$. pulchellus: (1) superior propodeal spines consist of minute teeth, short triangular teeth, or short spines (all acuminate), (2) inferior propodeal spines shorter than to as tall as superior spines, (3) keel connecting superior propodeal spines well developed, and (4) dorsum of pronotum darker than with adjoining mesonotum. Pogonomyrmex lagunabravensis is distinguished from $P$. rastratus based on: (1) superior propodeal spines consist of tubercles or denticles to rarely short spines (all rounded to blunt tipped) with inferior propodeal spines longer than superior propodeal spines. For P. rastratus: (1) superior propodeal spines consist of short triangular teeth to long spines, and (2) inferior propodeal spines shorter than superior propodeal spines.

In his description of $P$. andinus, Kusnezov (1951) listed two localities, San Antonio de los Cobres, Salta Province (designated as the type locality), and Refugio del Peñón, La Rioja Province, Argentina. The latter site is 2-3 km from the type locality for $P$. lagunabravensis, and the three workers referred to by Kusnezov (F. Monrós coll., [IFML]) were determined to be $P$. lagunabravensis.

Biology. Little is known about the biology of $P$. lagunabravensis. Type nest series were in deep sandy-silty soil with Stipa sp. (Poaceae) as the dominant plant. Nests most commonly were placed in a clump of Stipa sp. or at the edge of a stone. Nests were most easily located by baiting workers with cookie crumbs, then following them back to the nest. The nest entrance consists of a hole in the ground or with a tumulus up 15 cm in diameter. Ergatoid queens and ergatoid males have been collected from January 2-16, indicating the mating flights occur during the austral summer. Pogonomyrmex lagunabravenesis is most closely related to P. apterogenos, and both species are unique among ants because they are the only species known to have ergatoid queens and ergatoid males.


FIGURE 44. Photographs of Pogonomyrmex lagunabravensis holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0249051). Photographs by Will Ericson from www.AntWeb.org.


FIGURE 45. Photographs of Pogonomyrmex lagunabravensis paratype ergatoid queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0173126). Photographs by April Nobile from www.AntWeb.org.


FIGURE 46. Photographs of Pogonomyrmex lagunabravensis ergatoid male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0249058). Photographs by Will Ericson from www.AntWeb.org.

Pogonomyrmex lagunabravensis inhabits sites at elevations from 3465-3910 m in the Central Andean puna ecoregion, as defined by Olson et al. (2001) (Figure 43B).

## Pogonomyrmex leonis NEW STATUS

(Figure 47)
Distribution-43C
Pogonomyrmex meridionalis leonis Kusnezov, 1951: 278 (worker). Syntypes examined: 4 workers [IFML], 1 worker [LACM]. ARGENTINA, Santa Cruz: Cañadón León, \#5834 (N. Kusnezov leg.). LACM worker here designated LECTOTYPE [LACMENT273766].

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) basal area to anterior one-third or more of first gastral tergum moderately to strongly coriarious, weakly shining to dull; rest of segment smooth and shining, (2) posterior surface of petiolar node and dorsum of postpetiole with transverse to arcuate rugae, (3) interrugae on promesonotum moderately to strongly granulate, weakly shining to dull, (4) head ferruginous orange to orange-red; mesosoma, petiolar node, postpetiole blackish to black; gaster, legs orangish-brown to brownish-orange, (5) superior propodeal spines long, length $>0.7-0.8 \times$ the distance between their bases, (6) dorsum of promesonotum with $\geq 12-15$ closely spaced, weakly to strongly irregular, weakly developed, longitudinal rugae that continue to anterior margin of pronotum, (8) body size larger (HW > 1.90 mm ; ML > 2.25 mm ) (Figure 47).

Measurements-lectotype. HL 1.80; HW 1.93; MOD 0.44; OMD 0.51; SL 1.23; PNW 1.24; HFL 1.78; ML 2.29; PW 0.46; PPW 0.67. Indices: SI 63.73; CI 107.22; OI 22.80; HFI 92.75.

Redescription. Head slightly wider than long $(C I=107.22)$, widest just posterior to eye; posterior margin flat in full-face view; sides of head anterior to eyes parallel to widening weakly anterad. Longitudinal rugae on cephalic dorsum prominent in full-face view, medial rugae diverging toward posterior corners of head. Interrugae on cephalic dorsum moderately to strongly granulate with a beaded appearance, dull to weakly shining; posterior corners rugose, interrugae weakly granulate, weakly shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish ammochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.24-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.15-1.16 \times \mathrm{MOD}$. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes missing on lectotype. Psammophore well developed.

Mesosomal profile weakly convex; all mesosomal surfaces with subparallel, irregular rugae. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins weakly to moderately angulate. Dorsum of promesonotum with > 12-15 closely spaced, weakly to strongly irregular, weakly developed, longitudinal rugae that continue to anterior margin of pronotum; interrugae moderately to strongly granulate, weakly shining to dull. Irregular rugae on pronotal sides traverse ventrally; rugae on mesopleura angle posterodorsally; irregular transverse to oblique rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Promesonotal suture lacking. Superior propodeal spines long, length $>0.7-0.8 \times$ the distance between their bases, well defined keel lacking between spines; inferior propodeal spines triangular, apex rounded, height about one-third the length of superior propodeal spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to strongly granulate, dull to weakly shining. Legs weakly to moderately coriarious, weakly shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with a expansion that continues posterad. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably shorter than posterior surface, apex angulate. In dorsal view, petiolar node longer than wide, widest near broadly rounded anterior margin, gradually narrowing posterad. Posterior surface of petiolar node with irregular, transverse or arcuate rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest at or near posterior margin, narrowing to anterior margin, maximum width and length about equal. Wavy to irregular transverse to arcuate rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole smooth and shining to moderately coriarious, weakly shining. Basal area to anterior one-third or more of first gastral tergum moderately to strongly coriarious, weakly shining to dull, rest of segment smooth and shining.


FIGURE 47. Photographs of Pogonomyrmex leonis lectotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (LACMENT273766). Photographs by Shannon Hartman from www.AntWeb.org.

Erect, short, cream-colored to yellowish pilosity moderately abundant on head. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect cream-colored to yellowish setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect, medium-length setae, hairs most dense on first gastral tergum, longest hairs about $0.5-0.7 \times$ MOD. Head ferruginous orange to orange-red; mesosoma, petiolar node, postpetiole blackish to black; gaster, legs orang-ish-brown to brownish-orange (Figure 47).

Queen. Unknown.
Male. Unknown.
Additional material examined. None.
Etymology. The specific epithet, leonis, was named for Cañadón León, Santa Cruz Province, Argentina, where Kusnezov collected the syntype series. Cañadón León is now called Gobernador Gregores.

Discussion. Pogonomyrmex leonis likely co-occurs with P. sanmartini and P. vermiculatus and possibly with $P$. varicolor, and $P$. meridionalis. Pogonomyrmex leonis is distinguished from the first three species based on: (1) anterior portion of first gastral tergum moderately to strongly coriarious, rest of tergum smooth and shining, and (2) head ferruginous orange to orange-red; mesosoma, petiolar node, postpetiole blackish to black; gaster, legs orang-ish-brown to brownish-orange. Pogonomyrmex sanmartini, and P. varicolor have striae on the first gastral tergum and/or a different color pattern. Pogonomyrmex vermiculatus usually has a smooth and shining first gastral tergum or occasionally with striae along the base of the segment, but the anterior portion of the first gastral tergum is never coriarious as occurs in P. leonis. Pogonomyrmex leonis is most similar to P. meridionalis as both have a similar head shape and rugae patterning. However, $P$. leonis differs in having an orange-red head and black mesosoma and gaster, whereas $P$. meridionalis has a black head and mesosoma and a dark orangish gaster. This species was not collected by the author such that it appears to be uncommon and/or it occurs less accessible areas of central southern Patagonia.

Pogonomyrmex leonis is known only from the syntype series of five workers collected in central Santa Cruz, Argentina. The range of variation in the species is unknown given the few workers that were collected in the type series, but several morphological characters make this a distinct taxon. These characters include: (1) ferruginous orange to orange-red head and black mesosoma and gaster, $(2) \geq 12-15$ weak, irregular, longitudinal rugae on the promesonotum that continue to the anterior margin of the pronotum, (3) long superior propodeal spines, and (4) first gastral tergum moderately to strongly coriarious over the basal area to the anterior one-third or more of segment. Thus, I elevate $P$. leonis from subspecies to rank as a valid species.

Biology. Nothing is known about the biology of $P$. leonis as it is only known from the type series, which was collected about 70 years ago. The type locality is likely at an elevation of $300-600 \mathrm{~m}$ in the Patagonia Steppe ecoregion, as defined by Olson et al. (2001) (Figure 43C). This species most likely inhabits the vast, difficult to access central areas of Patagonia.

## Pogonomyrmex loaensis NEW SPECIES

(Figures 48-50)
Distribution-51A

Holotype worker [MNNC: CASENT0922560]: CHILE, Antofagasta: El Loa Province, Rt B-223 at 4.1 km S Machuca, 13,200' ( 4000 m ), 22 March 2017 (R.A. Johnson \#5833). Paratypes, same data as holotype: IFML (3 workers), LACM ( 9 workers), MACN ( 3 workers), MCZC ( 9 workers), MNNC ( 12 workers), RAJC ( 35 workers, 1 dealate queen), UCDC ( 3 workers), USNM ( 9 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum with striae extending over anterior two-thirds or more of medial portion of segment, (2) head and mesosoma concolorous ferruginous orange to reddish-orange, (3) medial rugae on dorsum of postpetiole longitudinal anterad and usually curving laterally posterad, more lateral anterior rugae curving laterally and forming concentric arcs, (4) longitudinal rugae on mesonotum diverge toward humeral shoulders of pronotum, anterior margin of pronotum with one to several transverse rugae, and (5) rugae on medial portion of clypeus converge anterad to form up to several concentric narrowly rounded V's (Figure 48).

Measurements-holotype ( $n=12$ paratypes). HL 1.59 (1.55-1.79); HW 1.70 (1.58-1.89); MOD 0.37 (0.36$0.40)$; OMD 0.39 (0.37-0.44); SL 1.19 (1.14-1.36); PNW 1.08 (1.03-1.25); HFL 1.68 (1.62-1.87); ML 1.79 (1.82-

Description. Head subquadrate to quadrate $(\mathrm{CI}=97.06-112.26)$; posterior margin flat to weakly convex in fullface view. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae weakly diverging to diverging toward posterior corners; for most workers, posterior margin with one to few transverse rugae restricted to medial area or extending along entire margin. Interrugae on cephalic dorsum moderately to strongly granulate, with a beaded appearance, dull to weakly shining; posterior corners rugose, interrugae weakly granulate, weakly shining. Anterior margin of clypeus moderately concave, rugae on medial portion of clypeus converge anterad to form up to several concentric narrowly rounded V's. Numerous long, curved, bristle-like, cream to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six to seven teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.26 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.02-1.16 \times \mathrm{MOD}$. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=70.18-80.28$ ) failing to reach posterior corners of head by width of basal funicular segment. Antennal scapes weakly to moderately striate, interstriae weakly to moderately punctate, weakly shining to smooth and shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent widely spaced, subparallelparallel rugae. Wavy to irregular rugae on dorsum of promesonotum diverge toward humeral shoulders of pronotum then continue ventrally onto pronotal sides; anterior margin of pronotum with one to several transverse rugae that continue ventrally onto sides of pronotum. In dorsal view, humeral shoulders of pronotum enlarged, strongly angulate. Promesonotal suture absent to weakly impressed. Wavy to irregular rugae on mesopleura angle posterodorsally; transverse rugae on dorsum of propodeum traverse anteroventrally on sides. Superior propodeal spines consist of short, triangular teeth to moderately long spines; spines connected by a well defined keel. Inferior propodeal spines slightly wider than high, triangular, apex weakly rounded to subacuminate, height often similar to length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma smooth and shining to weakly coriarious, weakly shining. Legs weakly to moderately coriarious, weakly shining to shining.

Peduncle of petiole approximately $0.8 \times$ as long as petiolar node, anteroventral margin with a broadly rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, widest immediately posterior to spatulate anterior margin. Posterior surface of petiolar node with transverse rugae, rugae often arcuate anterad or rugae longitudinal. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, maximum width and length similar; medial rugae on dorsum of postpetiole longitudinal anterad and usually curving laterally posterad, more lateral anterior rugae curving laterally to form concentric arcs. Rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly granulate-punctate, weakly shining to shining. Striae extend over more than anterior two-thirds of first gastral tergum, posterolateral margins smooth and shining.

Erect, short to medium length, whitish pilosity moderately abundant on head. Moderately abundant semidecumbent to decumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant, suberect to decumbent whitish setae. Rest of body with moderately dense, erect, medium length, whitish setae; longest hairs on mesosoma usually about $0.4-0.5 \times$ MOD. Head and mesosoma ferruginous orange to reddishorange; petiolar node, postpetiole orangish-black to blackish orange; gaster orangish-black to blackish; mandibles, antennae, legs blackish to black (Figure 48).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae cover anterior two-thirds or more of medial portion of first gastral tergum, (3) body mostly concolorous ferruginous orange, (4) longitudinal rugae on cephalic dorsum posterior to eyes regular, lacking short lateral branches, interrugae weakly to moderately granulate, weakly shining, (5) rugae on medial portion of clypeus sometimes converge anterad to form up to several concentric narrowly rounded V's, (6) in dorsal view, metanotum lacking longitudinal rugae, (7) superior propodeal spines moderately long, length greater than width at base, (8) inferior propodeal spines moderately well developed, triangular with height slightly less than width, and (9) transverse or longitudinal rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 49).


FIGURE 48. Photographs of Pogonomyrmex loaensis holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922560). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 49. Photographs of Pogonomyrmex loaensis paratype dealate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922561). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 50. Photographs of Pogonomyrmex loaensis male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922563). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 51. Geographic distribution of: (A) Pogonomyrmex loaensis, (B) P. longibarbis, and (C) P. mapuche. The large black circle in each panel denotes the type locality.

Measurements-( $n=1+1$ paratype). HL 1.58-1.92; HW 1.81-1.97; MOD 0.40-0.43; OMD 0.39-0.45; SL $1.22-1.34$; PNW 1.31-1.37; HFL 1.81-1.95; ML 2.34-2.49; PW $0.48-0.54$; PPW $0.70-0.75$. Indices: SI $61.93-$ 74.03; CI 102.60-114.56; OI 21.83-22.10; HFI 98.98-100.00.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of small ocelli on head. In full-face view, head quadrate to slightly wider than long ( $\mathrm{CI}=102.60-114.56$ ), broadest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy to regular; in full-face view, medial rugae diverging toward posterior corners of head; interrugae moderately to strongly granulate, weakly shining, with a beaded appearance; rugae on medial portion of clypeus converge anterad to form up to several concentric narrowly rounded V's. Mandibles with six teeth, dorsal surface rugose. Psammophore well developed.

All mesosomal surfaces with regular to wavy, subparallel rugae, interrugae weakly to moderately granulatepunctate, weakly shining; in dorsal view, metanotum lacking longitudinal rugae; superior propodeal spines moderately long, length greater than width at base; inferior propodeal spines moderately well developed, triangular with height slightly less than width. Peduncle of petiole long, anteroventral margin with a broadly rounded process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex of node angulate. Posterior surface of petiolar node with strongly arcuate to strongly oblique to longitudinal, wavy rugae, interrugae weakly granulate-punctate, weakly shining. In dorsal view, postpetiole about as long as wide, dorsum with transverse to weakly arcuate, wavy rugae posterad, anterad rugae strongly arcuate or traversing medially from lateral margin then curving anterad to become longitudinal; anterolateral rugae concentric, curving from lateral to anterior margin; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae weakly granulate-punctate, weakly shining to smooth and shining. Striae cover anterior two-thirds or more of medial portion first gastral tergum, posterolateral margins smooth and shining. Most body surfaces with moderately abundant suberect to erect, short, whitish to cream-colored setae. Legs and antennae black; parts of gaster (especially sternites) orangish-black to blackish-orange; rest of body concolorous ferruginous orange (Figure 49).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) area posterior to eyes with weakly irregular to irregular longitudinal rugae that continue to posterior margin, (3) notauli present, (4) scape lacking erect or semi-erect hairs, (5) in profile, petiolar node broadly rounded, and (6) body mostly a concolorous ferruginous orange except for blackish borders on mesosomal segments (Figure 50).

Measurements- $(n=1)$. HL 1.26; HW 1.30; MOD 0.46; OMD 0.20; SL 0.36; HFL 1.58; ML 2.06; PW 0.48; PPW 0.65. Indices: SI 27.69; CI 103.17; OI 35.38; HFI 121.54.

Additional material examined. CHILE. Antofagasta: 32.0 km E Jct Rts $23 \& 27$ (E side of San Pedro de Atacama), 13,110', Apr 22017 (RAJC); 2 km N Socaire, 3400 m , Dec 21, 2001 (RAJC); Rt 23 at 2.0 km SW Socaire, 10,490', Mar 23, 2017 (RAJC); Rt B-155 at 3.8 km E Turi, 10,380', Mar 21, 2017 (RAJC) (Figure 51A).

Etymology. The specific epithet, loaensis, is geographical in origin, and it is derived from the type series being collected in El Loa Province, Chile.

Discussion. Pogonomyrmex loaensis likely co-occurs with $P$. atacama and possibly other $P$. rastratus-group species. Pogonomyrmex loaensis and $P$. atacama are similar, but they can be distinguished based on the following characters. In P. loaensis: (1) striae extend over anterior two-thirds or more of medial portion of first gastral tergum, and (2) posterior corners of head rugose. In P. atacama: (1) striae extend over anterior one-third to one-half of medial portion of first gastral tergum, and (2) posterior corners of head usually smooth and shining to strongly shining. Pogonomyrmex loaensis is separated from other congeners by the combination of: (1) striae extending over anterior two-thirds or more of medial portion of first gastral tergum, (2) head and mesosoma concolorous ferruginous orange to reddish-orange, (3) medial rugae on dorsum of postpetiole longitudinal anterad and usually curving laterally posterad, more lateral anterior rugae curving laterally and forming concentric arcs, (4) longitudinal rugae on mesonotum diverge toward humeral shoulders of pronotum, anterior margin of pronotum with one to several transverse rugae, and (5) one to few rugae on medial portion of clypeus converge anterad to form up to several concentric, narrowly rounded V's.

Biology. Pogonomyrmex loaensis workers are solitary foragers. Nests of $P$. loaensis are placed under a stone in open, exposed sites. The nest entrance consisted of a tumulus up to 15 cm in diameter. One male was collected on Mar 21, indicating that that mating flights occur during the austral summer. Partial nest excavations indicated that colonies contain up to 1000 workers.

Pogonomyrmex loaensis inhabits sites at elevations from 3175-4040 m in the Central Andean dry puna ecoregion, as defined by Olson et al. (2001) (Figure 51A).

## Pogonomyrmex longibarbis

(Figures 3A-B, 10C, 52-55)
Distribution-51B

Pogonomyrmex longibarbis Gallardo, 1931: 185, fig. 1 (worker). Syntypes examined: 3 workers [MACN]. ARGENTINA, Territory of the Andes: Antofalla, 3600 m, \#1556 (Weiser leg., 3 March 1923). See also Gallardo, 1932: 164, fig. 44; Kusnezov, 1951: 275, fig. 12b. MACN worker here designated LECTOTYPE [CASENT0281103].

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining to moderately coriarious, weakly shining, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae, (3) superior propodeal spines consist of short, acuminate triangular teeth to short spines; inferior propodeal spines shorter than to as tall as superior spines; keel connecting superior propodeal spines well developed, (4) rugae between frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle, (5) head and mesosoma mostly concolorous ferruginous orange to light orangishblack, mesosoma sometimes slightly darker than head (Figures 10C, 52).

Measurements-lectotype ( $n=13+1$ paralectotype). HL 1.47 (1.46-1.79); HW 1.59 (1.42-1.79); MOD 0.36 ( $0.35-0.46$ ); OMD 0.39 ( $0.34-0.46$ ); SL 1.15 (1.11-1.44); PNW 1.05 (1.00-1.26); HFL 1.58 (1.42-1.90); ML 1.87 (1.70-2.20); PW 0.37 ( $0.35-0.46$ ); PPW 0.53 ( $0.51-0.66$ ). Indices: SI 72.33 ( $70.18-80.28$ ); CI 108.16 (97.26-109.04); OI 22.64 (21.24-28.00); HFI 99.37 (90.12-103.66).

Redescription. Head subquadrate to quadrate $(\mathrm{CI}=97.26-109.04)$; posterior margin flat to weakly convex in full-face view. Longitudinal ruge on cephalic dorsum prominent, rugae between frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle. Interrugae on cephalic dorsum moderately to strongly granulate, dull to weakly shining; posterior corners rugose, interrugae smooth and shining, occasionally moderately granulate-punctate, dull to weakly shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish hairs project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth, rarely seven; mandibular dorsum coarsely rugose. MOD ranging from $0.22-0.28 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.81-1.14 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=70.18-80.28$ ) failing to reaching posterior corners of head by width of basal funicular segment. Antennal scapes usually weakly to moderately striate, interstriae weakly to moderately granulate-punctate, weakly shining to smooth and shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent widely spaced, subparallelparallel rugae. For most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae that continue onto pronotal sides. In dorsal view, humeral shoulders of pronotum enlarged, strongly angulate. Promesonotal suture absent to weakly impressed. Regular to weakly regular rugae on mesopleura angle posterodorsally; transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines consist of short, acuminate triangular teeth to short, acuminate spines, length $\leq 0.3 \times$ the distance between their bases; keel connecting superior propodeal spines well developed; rugae on propodeum transverse to oblique, occasionally longitudinal. Inferior propodeal spines wider than high, triangular, tips broadly rounded to subacuminate, height shorter than to as long as superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to strongly granulate-punctate, dull to weakly shining. Legs weakly to moderately coriarious, weakly shining to smooth and shining.

Peduncle of petiole approximately $0.8 \times$ as long as petiolar node, anteroventral margin with a poorly developed broadly rounded process to well developed triangular process with broadly rounded tip. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest immediately posterior to spatulate anterior margin. Posterior surface of petiolar node with transverse rugae, rugae often arcuate anterad. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin,
width and length similar; transverse to weakly arcuate rugae posterad, anterad rugae traversing medially from lateral margin then curving anteriorly to become longitudinal; anterolateral rugae concentric, curving from lateral to anterior margin, all anterior rugae rarely transverse or weakly arcuate. Rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly to strongly granulate-punctate, dull to shining. Striae extend over anterior two-thirds or more of medial portion of first gastral tergum, often extending to posterior margin or posterior margin moderately to strongly coriarious, dull to weakly shining; posterolateral margins smooth and shining to moderately coriarious, weakly shining.

Erect, short to medium length, whitish pilosity moderately abundant on head, nearly all hairs $<0.4 \times$ MOD, one to few hairs sometimes reaching $0.7-0.8 \times$ MOD. Moderately abundant semidecumbent to decumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant, suberect to decumbent whitish setae. Rest of body with moderately dense, erect, medium length, whitish setae; hairs on mesosoma rarely $>0.5-0.6 \times$ MOD. Head ferruginous orange; mesosoma slightly darker ferruginous orange to reddish-orange; mandibles, antennae, anterior margin and frontal lobes of clypeus, legs, petiolar node, and postpetiole blackish-orange to blackish; first gastral tergum slightly lighter than petiolar node and postpetiole, often with a blackish band along posterior margin (Figures 10C, 52).

Alate queen diagnosis. Alate queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae cover anterior two-thirds or more of medial portion of first gastral tergum, posterior margin with striae or coriarious, dull, (3) head orangish to reddish-brown; in profile, pronotum concolorous with adjoining mesoscutum, anepisternum, and katepisternum, but most mesosomal segments with black borders, (4) first gastral tergum dark brownish-orange to blackish or black, (5) mandibles with seven teeth, seventh tooth rarely minute, and (6) longitudinal rugae on cephalic dorsum posterior to eyes regular, lacking short lateral branches (Figure 53).

Measurements- $(n=12$ ). HL 1.63-1.88; HW 1.73-1.99; MOD 0.40-0.44; OMD 0.41-0.50; SL 1.20-1.36; PNW 1.23-1.45; HFL 1.66-1.88; ML 2.27-2.57; PW 0.46-0.55; PPW 0.66-0.78. Indices: SI 62.18-73.91; CI 103.31-110.12; OI 21.61-24.02; HFI 90.22-100.00.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to slightly wider than long $(\mathrm{CI}=103.31-110.12)$, broadest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, regular, rugae posterior to eyes lacking short lateral branches; in full-face view, medial rugae weakly diverging to diverging toward posterior corners of head; interrugae weakly granulate, weakly shining. Mandibles with seven teeth, seventh tooth rarely minute, dorsal surface rugose. Psammophore well developed.

All mesosomal surfaces with regular, subparallel-parallel rugae, interrugae on dorsum of mesosoma weakly coriarious, weakly shining to smooth and shining; superior propodeal spines consist of short triangular denticles to short teeth; inferior propodeal spines poorly developed, height less than width, apex weakly rounded. Peduncle of petiole long, anteroventral margin with an elongate, broadly rounded process that narrows posterad and continues posterad parallel to dorsal margin. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex of node angulate. Posterior surface of petiolar node with weakly to moderately arcuate, transverse rugae. In dorsal view, postpetiole about as long as wide, dorsum with wavy, weakly arcuate, transverse rugae; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly coriarious, weakly shining to shining. Striae cover anterior two-thirds or more of medial portion of first gastral tergum, posterior margin with striae or moderately coriarious, posterolateral margin smooth and shining. Most body surfaces with moderately abundant short, suberect to erect, yellowish setae. Head and mesosoma ferruginous orange except for darker orangish-black pronotum, katepisternum, and sides of propodeum; petiolar node, postpetiole black; gaster blackish to black except for first gastral tergum orangish-black (Figure 44).

Brachypterous queen diagnosis. Brachypterous queens of this species are diagnosed by the following combination of features: (1) brachypterous; forewings minute, consisting of one cell that does not extend posterad to superior propodeal spines, (2) small, size similar to that of conspecific workers, (3) in dorsal view, pronotum enlarged, mesoscutum reduced in size, not extending to pronotal collar, (4) in dorsal view, mesoscutum, mesoscutellum, axillae, metanotum, and propodeum fused without evidence of sutures, and (5) in profile, pronotum rises at an approximately $45^{\circ}$ angle to meet the mesoscutum (Figure 54).

Measurements- $(n=2)$. HL 1.74-1.75; HW 1.75-1.88; MOD 0.39-0.42; OMD 0.38-0.42; SL 1.40-1.40;

PNW 1.11-1.25; HFL 1.52-1.75; ML 1.75-2.31; PW 0.41-0.50; PPW $0.66-0.73$. Indices: SI $74.47-80.00$; CI 100.57-107.43; OI 20.74-24.00; HFI 80.85-100.00.

Description. Brachypterous, with caste-specific morphology of the mesosoma related to wing-bearing and presence of a small anterior ocellus, posterior ocelli absent. Small, size similar to that of conspecific workers. In full-face view, head quadrate to wider than long $(C I=100.57-107.43)$, widest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae diverging toward posterior corners of head, interrugae weakly to moderately granulate-punctate, weakly shining. Posterior corners rugose, interrugae smooth and shining to weakly coriarious, weakly shining. Anterior margin of clypeus strongly concave. Mandibles with seven teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces with subparallel-parallel, regular to weakly wavy rugae; interrugae smooth and shining. Pronotum large with transverse rugae that traverse ventrally on pronotal sides. Mesoscutum reduced in size, not extending to pronotal collar; anterior margin arcuate. Forewings minute, consisting of one cell that does not extend to superior propodeal spines; hindwings consist of an elongate, threadlike membrane that reaches to near anterior surface of petiolar node. Mesoscutum, axillae, mesoscutellum, metanotum, and propodeum fused without evidence of sutures. Dorsum of propodeum with transverse to oblique rugae; superior propodeal spines reduced to short, triangular teeth; spines connected by well defined keel; inferior propodeal spines moderately well developed, apex rounded, length similar to that of superior spines. Peduncle of petiole long, anteroventral margin with well developed rounded process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate. Postpetiole convex in profile; in dorsal view, maximum width about equal to length. Posterior surface of petiolar node and dorsum of postpetiole with wavy transverse, oblique, or longitudinal rugae; interrugae smooth and shining to weakly coriarious, weakly shining. Striae extend over more than anterior one-half of first gastral tergum, often extending to posterior margin or posterior margin moderately to strongly coriarious, dull to weakly shining; posterolateral margins smooth and shining to moderately coriarious, weakly shining. Most body surfaces with moderately abundant suberect to erect, short, yellowish to golden setae, longest hairs on posterior terga. Head and mesosoma ferruginous orange; postpetiole, legs, antennae, clypeus, mandibles blackish-red; petiolar node and gaster orangish-black to blackish-orange (Figure 54).

One examined dealate queen was inferred to be brachypterous based on: (1) anterior ocelli present, posterior ocelli absent, (2) an enlarged pronotum, (3) mesoscutum reduced in size with an arcuate anterior margin, (4) pronotum meets the mesoscutum at approximately $45^{\circ}$, and (5) mesoscutellum, axilla, and metanotum fused as in the brachypterous queen (Figure 45).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum, rest of tergum with striae or moderately to strongly coriarious, (2) longitudinal rugae present on most of cephalic dorsum, rugae usually longitudinal behind eyes, occasionally circumocular, (3) most of mesoscutum with longitudinal or oblique striae, (4) notauli present, (5) head dark orang-ish-brown; mesosoma black; gaster dark ferruginous orange (Figure 55).

Measurements- $(n=9)$. HL 1.17-1.34; HW 1.25-1.38; MOD 0.45-0.51; OMD 0.18-0.21; SL 0.37-0.50; HFL 1.49-1.79; ML 2.08-2.40; PW 0.45-0.51; PPW 0.61-0.71. Indices: SI 28.24-36.23; CI 102.46-111.11; OI 35.11-36.96; HFI 111.59-137.69.

Additional material examined. ARGENTINA: Catamarca: 3.5 km SE Antofagasta de la Sierra, 10’970', Jan 27, 2019 (RAJC); 12.4 km NW Antofagasta de la Sierra (on rd to Antofalla), 11,530', Jan 28, 2019 (RAJC); 25.7 km NW Antofagasta de la Sierra (on rd to Antofalla), 12,390', Jan 28, 2019 (RAJC); 39.5 km NW Antofagasta de la Sierra (on rd to Antofalla), 13,850', Jan 28, 2019 (RAJC); 50.0 km NW Antofagasta de la Sierra (on rd to Antofalla), 14,990', Jan 28, 2019 (RAJC); 7.0 km NW Antofagasta de la Sierra (on rd to Antofalla), 11,280', Jan 28, 2019 (RAJC); 28.4 km N Antofagasta de la Sierra (on rd to San Antonio), 13,180', Jan 29, 2019 (RAJC); 59.1 km N Antofagasta de la Sierra (on rd to San Antonio), 14,480', Jan 29, 2019 (RAJC); 82.7 km N Antofagasta de la Sierra (on rd to San Antonio), 13,460', Jan 29, 2019 (RAJC); Rt 43 at 6.4 km S Antofagasta de la Sierra, 11,010', Jan 18, 2006 (RAJC); Rt 43 at 8.1 km N Antofagasta de la Sierra, 11,450', Jan 19, 2006 (RAJC); Rt 43 at 22.6 km N Antofagasta de la Sierra, 12,260', Jan 19, 2006 (RAJC). Salta: Rt 27 at 10.0 km NE Salar de Pocitos, 12,570', Mar 31, 2015 (RAJC); Rt 27 at 12.4 km SW Salar de Pocitos, 12, 150', Mar 30, 2015 (RAJC); Rt 27 at 60.1 km NE Tolar Grande, 12,120', Mar 31, 2015 (RAJC); Rt 27 at 69.6 km NE Tolar Grande, 12,170, Mar 31, 2015 (RAJC) (Figure 51B).

Etymology. Gallardo named this species longibarbis (from Latin, longi $=$ long and barbis $=$ bearded), because of the long ammochaetae, presumably referring to those on the ventral surface of the head.


FIGURE 52. Photographs of Pogonomyrmex longibarbis worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0103260). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 53. Photographs of Pogonomyrmex longibarbis alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0923349). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 54. Photographs of Pogonomyrmex longibarbis brachypterous queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922099). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 55. Photographs of Pogonomyrmex longibarbis male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0923348). Photographs by Michele Esposito from www.AntWeb.org.

Discussion. Pogonomyrmex longibarbis might occur with several P. rastratus group species, but it is known to occur proximate to or sympatric only with $P$. pulchellus. The combination of inhabiting high elevations ( $>3000$ m ), striae extend over more than anterior one-half of first gastral tergum, and very regular subparallel-parallel longitudinal rugae on promesonotum with up to several continuous, transverse rugae along the anterior margin of the pronotum separate $P$. longibarbis from all congeners except $P$. apterogenos, $P$. lagunabravensis, $P$. pulchellus, and P. rastratus. Pogonomyrmex longibarbis can be distinguished from $P$. apterogenos given that the $1-2$ most medial rugae on the frontal lobes of the cephalic dorsum are subparallel-parallel and typically continue onto the clypeus, whereas those rugae weakly converge near the posterior margin of the frontal triangle and end near the posterior margin of the clypeus in P. apterogenos. Pogonomyrmex longibarbis is separated from P. lagunabravensis by: (1) superior propodeal spines consist of minute teeth, short triangular teeth, or short spines (all acuminate) with inferior propodeal spines shorter than to as tall as superior spines, and (2) keel connecting superior propodeal spines well developed. For P. lagunabravenesis, (1) superior propodeal spines consist of tubercles, denticles, or minute teeth (all rounded to blunt tipped) with inferior propodeal spines longer than superior spines, and (2) keel connecting superior propodeal spines absent. Pogonomyrmex longibarbis is separated from P. puchellus by: dorsum and sides of pronotum concolorous with adjoining mesonotum. For P. pulchellus: dorsum and sides of pronotum orangish-black to blackish, darker than adjoining mesonotum. Pogonomyrmex longibarbis can be distinguished from P. rastrastus by: superior propodeal spines consist of minute teeth, short triangular teeth, or short spines (all acuminate) with inferior propodeal spines shorter than to as tall as superior spines. For $P$. rastratus, superior propodeal spines consist of short triangular teeth to long spines with inferior propodeal spines shorter than superior propodeal spines.

Gallardo (1931) noted that he had found two new forms in the Dr. Bruch collection at MACN while working on his revision of the Pogonomyrmex of Argentina (Gallardo, 1932). Pogonomyrmex longibarbis was one of these species, which Gallardo (1931) described from three syntype workers that Weiser collected at Antofalla, Territory of the Andes (now Catamarca Province), at 3600 m on 3 March, 1923. Gallardo (1931) did not provide a collection number for the syntype series, but Gallardo (1932) indicated that his drawing was based on a syntype labelled \#1556 from the collection of Dr. Bruch, which also contained the other two syntype workers. In total, the MACN collection contained eight workers, one dealate queen, one intercaste, and a pin with a gaster and postpetiole that all were labelled \#1556 in the same handwriting. Three of these workers were collected on 3 March, 1923 (two from 3600 m , one from 3500 m ); two of these workers were labeled as $P$. longibarbis, while the pin with the gaster and postpetiole was labeled $P$. rastratus var. pulchellus, 3600 m . The latter specimen is assumed to be a syntype as it appears to be $P$. longibarbis based on coloration of the postpetiole and gaster. The lectotype was designated as the worker labeled P. longibarbis, 3600 m , which accords with the elevation and date given by Gallardo (1931); the two other individuals collected on 3 March (one at 3600 m , one at 3500 m ) are paralectotypes. It is unclear why one putative series had pins that possessed different determinations, especially given that Gallardo (1932) treated $P$. rastratus var. pulchellus and $P$. longibarbis as different taxa. The other eight individuals in the $\# 1556$ series were collected at Antofalla by Weiser on 25 March, 1923, at 3500 m , and all of these pins have labels identifying them as $P$. rastratus var. pulchellus. All of these workers are $P$. longibarbis, but none of them are syntypes of $P$. longibarbis, and labels have been added to these pins to so designate. It also appears that Gallardo did not diagnose the dealate queen and intercaste (Figures 3A-B), probably because their size and morphology were very similar to that of the workers.

In his description, Gallardo (1931) did not compare P. longibarbis to any other species. Likewise, Kusnezov (1951) said only that $P$. longibarbis was related to P. rastratus, and he placed $P$. rastratus var. pulchella as forma incierta saying only that it probably belonged to $P$. longibarbis Santschi.

Biology. Pogonomyrmex longibarbis workers are solitary foragers. Nests were located by baiting workers with cookie crumbs, then following them back to the nest. Nests were located under stones, under shrubs, or in the open, and they consisted of a nest entrance lacking a tumulus up to having a 10 cm tumulus in soils that ranged from deep sand to a sandy-gravelly-rocky soil. Partial nest excavations indicated that colonies contain around 1000 workers.

Mating flights occur during the austral summer. Alate queens and males were in nests on January 28-29, and a brachypterous queen was found in a nest on March 30. Additionally, two dealate queens were found running on the ground and one haplometrotic queen was under a stone on January 28-29 after a rain.

Pogonomyrmex longibarbis inhabits sites at elevations from 3335-4545 m in the Central Andean puna and Southern Andean steppe ecoregions, as defined by Olson et al. (2001) (Figure 51B). Specimens collected at 4545 m are the highest known elevation record for all species of Pogonomyrmex.

## Pogonomyrmex mapuche NEW SPECIES

(Figures 2E-F, 56-57)
Distribution-51C

Holotype worker [MACN: CASENT0280988]: ARGENTINA, Neuquén: Departamento Collón Curá, 6.3 km E Jct Rts 237 \& 40, $40^{\circ} 25.1^{\prime} \mathrm{S} 70^{\circ} 36.0^{\prime} \mathrm{W}, 2800^{\prime}$ ( 850 m ), 24 January 2011 (R.A. Johnson \#4638). Paratypes, same data as holotype: IFML ( 3 workers), LACM ( 6 workers), MACN ( 6 workers), MCZC (4 workers), RAJC (4 workers), UCDC (3 workers), USNM (4 workers). Additional paratype series from the same locality and date-RAJ \#4637: IFML ( 3 workers), MACN ( 3 workers), MCZC ( 3 workers), RAJC ( 3 workers), USNM (3 workers), RAJ \#4639: IFML ( 2 dealate queens), MACN ( 3 dealate queens), RAJC ( 11 dealate queens).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum, posterior margin with striae or moderately to strongly coriarious; posterolateral margins moderately to strongly coriarious, weakly shining to dull, (2) head dark red to reddish-black, promesonotum and first gastral tergum reddish-blackish to black, more posterior terga brown, rest of body blackish to black, (3) superior propodeal spines consist of tubercles or denticles, rarely short acuminate teeth to moderately long spines, (4) inferior propodeal spines wider than high, height usually greater than length of superior propodeal spines, and (5) mandibles with seven teeth for some to most workers in a series (Figure 56).

Measurements-holotype ( $n=12$ paratypes). HL 1.83 (1.70-1.96); HW 1.97 (1.84-2.07); MOD 0.43 ( $0.37-$ 0.43); OMD 0.43 ( $0.40-0.50$ ); SL 1.44 (1.31-1.56); PNW 1.30 (1.15-1.39); HFL 2.05 (1.79-.07); ML 2.27 (1.982.34); PW 0.51 ( $0.44-0.59$ ); PPW 0.68 (0.59-0.74). Indices: SI 73.10 ( $67.35-81.25$ ); CI 107.65 (101.59-114.62); OI 21.83 (19.17-21.54); HFI 104.06 (87.44-103.65).

Description. Head quadrate to wider than long $(C I=101.59-114.62)$; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae continuing to posterior margin or diverging toward posterior corners of head. Interrugae on cephalic dorsum moderately to strongly granulatepunctate, dull to weakly shining, with a beaded appearance; posterior corners rugose, interrugae weakly to strongly granulate-punctate, weakly dull to smooth and shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel-parallel, longitudinal rugae. Numerous long, curved, bristle-like, cream colored to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six ( 9 of $34,26.5 \%$ ) to seven ( 21 of $34,61.8 \%$ ) teeth or with six on one mandible, seven on the other ( 3 of $34,8.8 \%$ ), rarely eight teeth ( 1 of $34,2.9 \%$ ); mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.24 \times$ HL. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.00-1.26 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes $(S I=67.35-81.25)$ failing to reach posterior corners of head by length of basal funicular segment; scapes with longitudinal striae, interstriae weakly shining to shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent regular to moderately irregular, subparallel-parallel rugae to rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins weakly to strongly angulate. Promesonotal suture present on occasional workers. Dorsum of mesonotum with weakly regular to strongly irregular, longitudinal rugae that diverge anterad toward humeral shoulders of pronotum or become rugoreticulate on pronotum, medial rugae on mesonotum sometimes converge at promesonotal suture. Pronotal sides rugoreticulate or with irregular rugae that traverse posteroventrally; rugae on mesopleura angle posterodorsally. Superior propodeal spines consist of tubercles to denticles, rarely short, acuminate teeth to moderately long spines; wavy to irregular transverse rugae on propodeal dorsum traverse ventrally or anteroventrally on sides. Inferior propodeal spines wider than high, apex weakly rounded to acuminate, height usually greater than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to strongly granulate-punctate, dull to weakly shining. Legs weakly to moderately coriarious, weakly shining to shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with broad, rounded process that narrows then usually continues posterad to near posteroventral margin of petiolar node. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, narrowing posterad. Sides and posterior surface of petiolar node with weakly irregular to irregular, transverse, arcuate, or oblique rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, nar-
rowing anterad, maximum width and length about equal. Wavy to irregular rugae on dorsum of postpetiole; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly granulate-punctate, weakly shining to smooth and shining. Striae extend over anterior one-half or more of first gastral tergum; posterolateral margins and other areas lacking striae moderately to strongly coriarious, dull to weakly shining.

Erect, short to medium length, white pilosity moderately abundant on head, mostly similar in length with up to several longer hairs. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent cream colored to light yellowish setae. Mesosoma, petiolar node, postpetiole, gastral terga with erect, moderately dense, white setae that are similar in length, length of longest hairs on mesosoma approach MOD. Head dark reddish to reddish-brown; dorsum of promesonotum and some to all of first gastral tergum dark reddish-black to black, more posterior terga brown to black; rest of body blackish to black (Figure 56).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) in profile, posterolateral and lateral margins of first gastral tergum with striae or moderately to strongly coriarious, weakly shining to dull, (3) in profile, striae visible over extensive parts of more medial portions of segment, (4) large ( $\mathrm{HW}=1.87-2.49 \mathrm{~mm}$; $\mathrm{PNW}=1.34-1.80 \mathrm{~mm}$; $\mathrm{ML}=2.34-3.17 \mathrm{~mm}$ ), (5) superior propodeal spines consist of denticles to minute, blunt teeth, (6) inferior propodeal spines wider than tall, weakly rounded to acuminate, height usually greater than length of superior spines, (7) head dark reddish to reddish-brown, (8) mesoscutum, mesoscutellum concolorous orangish or dark reddish to reddishbrown; pronotum, anepisternum blackish to black, (9) in profile, gaster blackish to black, and (10) mandibles with six to seven teeth (Figures 2E-F \& 57).

Measurements-( $n=12$ paratypes). HL 1.76-2.00; HW 1.92-2.31; MOD 0.37-0.48; OMD 0.42-0.53; SL 1.25-1.60; PNW 1.50-1.80; HFL 1.77-2.26; ML 2.34-3.04; PW 0.51-0.65; PPW 0.77-0.91. Indices: SI 60.6873.08; CI 103.78-120.54; OI 18.59-23.19; HFI 89.86-100.50.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to wider than long ( $\mathrm{CI}=103.78-120.54$ ), broadest just posterior to eyes, posterior margin flat to weakly convex. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae diverging or not diverging toward posterior corners of head; posterior corners rugose, interrugae on cephalic dorsum and posterior corners moderately to strongly granulate-punctate, dull to weakly shining. Mandibles with six $(n=5)$ or seven $(n=9)$ teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel-parallel, regular to wavy rugae, rugae irregular to rugoreticulate on pronotal sides; interrugae weakly to moderately granulate-punctate, weakly shining to weakly dull; superior propodeal spines consist of denticles to minute, blunt teeth, length less than width at base. Inferior propodeal spines wider than tall, weakly rounded to acuminate, height usually greater than length of superior spines. Peduncle of petiole long, anteroventral margin angles downward then continues posterad parallel to dorsal margin. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate. Posterior surface of petiolar node with wavy, transverse to oblique rugae, interrugae weakly granulate-punctate, weakly shining. In dorsal view, postpetiole slightly wider than long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae weakly granulate-punctate, weakly shining. Striae extend over more than anterior one-half of first gastral tergum; in profile, posterolateral and lateral margins of first gastral tergum with striae or moderately to strongly coriarious, weakly shining to dull; in profile, striae visible over extensive parts of more medial portions of segment. Most body surfaces with moderately abundant suberect to erect, short to medium length, whitish to cream colored setae, longest hairs on dorsum of mesosoma approximately $0.7-0.8 \times$ MOD. Head reddish to reddish-brown; mesoscutum, axilla, mesoscutellum, mesonotum concolorous with head to slightly darker; first gastral tergum dark reddish-black to blackish-red; rest of body black (Figures 2E-F \& 57).

Male. Unknown.
Additional material examined. ARGENTINA: Neuquén: Ruta Zapala-Las Lajas, Jan 28, 1999 (IFML) (Figure 51C).

Etymology. The specific epithet, mapuche, is a noun in apposition and invariant in form that is derived from a group of Indians that lived in this region of Argentina.

Discussion. Pogonomyrmex mapuche is separated from most congeners by: (1) striae extend over anterior onehalf or more of first gastral tergum, posterior margin with striae or moderately to strongly coriarious, and posterolateral


FIGURE 56. Photographs of Pogonomyrmex mapuche holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0280988). Photographs by Estella Ortega from www.AntWeb.org.


FIGURE 57. Photographs of Pogonomyrmex mapuche paratype dealate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0280985). Photographs by Estella Ortega from www.AntWeb.org.
margins moderately to strongly coriarious, weakly shining to dull. These characters separate $P$. mapuche from all but three congeners: P. carbonarius, P. propinqua, and P. weiseri. Pogonomyrmex mapuche is separated from P. propinqua and $P$. weiseri based on: (1) head dark red to reddish-black; rest of body black or with blackish-red gaster, (2) for all workers in a series, superior propodeal spines consist of tubercles or denticles, rarely short, acuminate teeth, and (3) mandibles with seven teeth for some to most workers in a series. In P. propinqua and $P$. weiseri: (1) head and gaster are ferruginous orange; mesosoma black, (2) for most workers in a series, the superior propodeal spines are long, length usually $>0.4-0.6 \times$ the distance between their bases, and (3) mandibles with six teeth.

Pogonomyrmex mapuche is separated from P. carbonarius by: (1) head dark red to reddish-black; rest of body black or with blackish-red gaster, (2) for all workers in a series, superior propodeal spines consist of tubercles or denticles, rarely short, acuminate teeth, and (3) height of inferior propodeal spines similar to or greater than length of superior propodeal spines. In P. carbonarius: (1) head and/or gaster is usually orangish to orangish-black, (2) for at least some workers in a series, superior propodeal spines long, length $>0.4-0.6 \times$ the distance between their bases, and (3) height of inferior propodeal spines usually less than length of superior propodeal spines.

Biology. Pogonomyrmex mapuche workers are solitary foragers. Nests were located by baiting workers with cookie crumbs, then following them back to nests. Two nests were observed: one was under a shrub, the other was in a clump of Stipa sp. (Poaceae). The mating flight was not observed, but dealate queens were walking on the ground during mid-afternoon on January 24, indicating that mating flights occur during the austral summer.

The type colonies of $P$. mapuche were at an elevation of 850 m . This species occurs in the Patagonian steppe ecoregion, as defined by Olson et al. (2001) (Figure 51C).

## Pogonomyrmex maulensis NEW SPECIES

(Figures 58-60)
Distribution-61A

Holotype worker [MNNC: CASENT0914363]: CHILE, Maule: Talca Province, Rt 115 at W side Laguna del Maule, $36^{\circ} 01.0^{\prime} \mathrm{S} 70^{\circ} 33.6^{\prime} \mathrm{W}, 7180^{\prime}(2175 \mathrm{~m})$, 3 March 2014 (R.A. Johnson \#5257). Paratypes, same data as holotype: IFML ( 9 workers), LACM ( 9 workers), MACN ( 12 workers), MCZC ( 9 workers), MNNC ( 12 workers), RAJC ( 22 workers, 14 alate queens, 21 males), UCDC ( 3 workers), USNM ( 9 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum lacking striae, (2) head and gaster orangish-brown to reddish-brown, pronotum red-dish-brown to reddish-black, posterior portion of mesopleura and propodeum usually reddish-black, sometimes blackish to black, (3) promesonotal suture usually absent, pronotum and mesonotum concolorous along their juncture, (4) for most to all workers in a series, medial portion of clypeus notably darker (usually reddish-black to black) than adjoining cephalic dorsum, (5) antennal scapes and legs blackish to black, (6) transverse rugae on posterior surface of petiolar node and dorsum of postpetiole, and (7) superior propodeal spines long, length $>0.6-0.8 \times$ the distance between their bases (Figure 58).

Measurements-holotype ( $n=12$ paratypes). HL 1.63 (1.59-1.79); HW 1.65 (1.65-1.81); MOD 0.36 (0.340.39); OMD 0.38 (0.35-0.42); SL 1.26 (1.19-1.37); PNW 1.08 (1.06-1.20); HFL 1.66 (1.61-1.90); ML 1.85 (1.772.12); PW 0.45 ( $0.40-0.48$ ); PPW 0.59 (0.59-0.67). Indices: SI 76.36 (72.12-79.29); CI 101.23 (99.41-106.29); OI 21.82 (20.12-22.54); HFI 100.61 (94.80-104.97).

Description. Head subquadrate to quadrate $(\mathrm{CI}=99.41-106.29)$; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, wavy to irregular; in full-face view, medial rugae diverging toward posterior corners of head. Interrugae on cephalic dorsum strongly granulate, dull, usually with a beaded appearance; posterior corners rugose, interrugae weakly to moderately granulate, weakly shining. Anterior margin of clypeus moderately concave, dorsum with several subparallel, wavy to weakly irregular, longitudinal rugae. Numerous long, curved, bristle-like, cream colored to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.24 \times$ HL. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=$ $0.89-1.18 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes $(\mathrm{SI}=$ 72.12-79.29) failing to reach posterior corners by less than width of basal funicular segment. Antennal scapes with longitudinal striae, interstriae weakly to moderately granulate, weakly shining; basal flange well developed with carinate margin. Psammophore well developed.


FIGURE 58. Photographs of Pogonomyrmex maulensis holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914363). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 59. Photographs of Pogonomyrmex maulensis paratype alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914365). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 60. Photographs of Pogonomyrmex maulensis paratype male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914366). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 61. Geographic distribution of: (A) Pogonomyrmex maulensis, (B) P. meridionalis, and (C) P. pichachen. The large black circle in each panel denotes the type locality.

Mesosomal profile weakly to moderately convex. In dorsal view, humeral shoulders of pronotum enlarged, weakly to moderately angulate. All mesosomal surfaces with prominent rugae. Dorsum and sides of pronotum rugoreticulate, wavy to irregular rugae on mesopleura angle posterodorsally. Dorsum of promesonotum with weakly to strongly irregular longitudinal rugae, sometimes weakly to moderately rugoreticulate. Promesonotal suture usually absent. Superior propodeal spines long, length $>0.6-0.8 \times$ distance between their bases, connected by well defined keel; irregular, transverse or oblique rugae to coarsely rugoreticulate on dorsum of propodeum. Inferior propodeal spines wider than high, apex weakly to broadly rounded. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to moderately granulate, weakly shining. Legs weakly coriarious, shining to smooth and strongly shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin usually with weakly to well developed broadly rounded process that continues posterad more or less parallel to dorsal surface of peduncle of petiole. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably longer than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than broad, widest near spatulate anterior margin, slightly narrower posterad. Posterior surface of petiolar node with wavy to irregular transverse rugae to rugoreticulate. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, maximum width and length about equal. Wavy to irregular transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly to moderately granulate, weakly shining. First gastral tergum smooth and shining to moderately coriarious, weakly shining anterad, sculpturing near base sometimes appearing in a longitudinal manner giving the appearance of very faint striae.

Erect, mostly short, whitish pilosity moderately abundant on head. Moderately abundant suberect to decumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to semidecumbent whitish setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect, whitish setae that are longer and coarser (especially on mesosoma) than those on cephalic dorsum; longest hairs about $0.6-0.7 \times$ MOD. Head orangish-brown to reddish-black except for blackish to black medial portion of clypeus; pronotum reddish-brown to reddish-black, pronotum and adjoining mesonotum concolorous, posterior portion of mesopleura and propodeum usually reddish-black, sometimes blackish to black; gaster dark ferruginous orange with a transverse blackish band along posterior margin of terga; antennae, legs black; petiolar node, postpetiole dark blackish-red to black (Figure 58).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining, (3) transverse rugae cover posterior surface of petiolar node and dorsum of postpetiole, (4) longitudinal rugae on cephalic dorsum posterior to eyes strongly irregular, often with short lateral branches, interrugae strongly granulate, dull, with a beaded appearance, (5) in posterodorsal view, rugae along posterior margin of head and in profile, rugae posterior to eyes moderately to strongly irregular, usually with few short lateral branches, (6) head, mesoscutellum concolorous reddish-orange to reddish-brown, (7) anterior and posterolateral portions of mesoscutum usually blackish to black, weakly to notably darker than rest of mesoscutum, which is reddish-orange to reddish-brown, and (8) part to most of anepisternum and/or katepisternum blackish to black (Figure 59).

Measurements- $(n=12)$. HL 1.71-1.84; HW 1.76-1.93; MOD 0.35-0.41; OMD 0.34-0.44; SL 1.27-1.40; PNW 1.39-1.56; HFL 1.74-1.95; ML 2.37-2.69; PW 0.52-0.58; PPW 0.71-0.80. Indices: SI 65.80-75.27; CI 102.72-110.92; OI 18.62-21.58; HFI 91.58-103.19.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of small ocelli on head. In full-face view, head subquadrate to wider than long ( $\mathrm{CI}=102.72-110.92$ ), broadest just posterior to eyes, posterior margin flat to weakly convex. Longitudinal rugae on cephalic dorsum prominent, wavy to irregular, rugae posterior to eyes strongly irregular, often with short lateral branches; in posterodorsal view, rugae along posterior margin of head and in profile, rugae posterior to eyes moderately to strongly irregular, but usually with few short lateral branches; in full-face view, medial rugae continuing to posterior margin, interrugae strongly granulatepunctate, dull, with a beaded appearance; posterior corners rugose, interrugae weakly to strongly granulate, weakly shining to dull. Mandibles with six teeth, dorsal surface rugose. Psammophore moderately well developed.

All mesosomal surfaces except pronotal sides with regular to wavy, subparallel rugae, rugae irregular to rugoreticulate on pronotal sides, interrugae weakly to moderately granulate-punctate, weakly shining; superior propodeal spines moderately long, length about $0.3-0.5 \times$ the distance between their bases, acuminate; inferior propodeal
spines moderately well developed, wider than tall, apex subangulate to angulate. Peduncle of petiolar node long, anteroventral surface with a weakly developed process that narrows posterad and continues to posterior margin. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy, transverse, oblique, or longitudinal rugae. In dorsal view, postpetiole slightly wider than long; dorsum with wavy to irregular, transverse rugae that are finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly granulate-punctate, weakly shining to smooth and shining. Striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining. Most body surfaces with moderately abundant suberect to erect, medium-length, whitish to cream-colored setae. Head, pronotum, mesoscutellum, concolorous reddish-orange to reddish-brown; mesoscutum concolorous reddish-orange to reddish-brown, except for blackish to black promesonotal suture; part to most of anepisternum and/or katepisternum blackish to black (Figure 59).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) bicolored: head and mesosoma black, gaster ferruginous orange, (3) erect hairs lacking on first gastral tergum, (4) anterior portion to all of anepisternum and katepisternum smooth and shining, (5) posterior surface of petiolar node mostly smooth and shining, (6) dorsum of postpetiole with faint, regular, transverse or longitudinal rugae, interrugae mostly smooth and shining, and (7) interrugae on mesoscutum and mesoscutellum weakly granulate, weakly shining to smooth and shining (Figure 60). Note that no characters were found to separate males of $P$. maulensis and $P$. araucania.

Measurements- $(n=12)$. HL 1.28-1.40; HW 1.30-1.44; MOD 0.47-0.55; OMD 0.19-0.25; SL 0.33-0.51; HFL 1.62-1.83; ML 2.35-2.57; PW 0.53-0.63; PPW 0.67-0.79. Indices: SI 24.26-36.96; CI 94.20-104.35; OI 34.78-39.23; HFI 121.58-136.57.

Additional material examined. CHILE: Maule: Rt 115 at 27.8 km W Paso Pehuenche, 6440 ' (RAJC) (Figure 61A).

Etymology. The specific epithet, maulensis, is derived from type series being collected in the Maule Region of Chile.

Discussion. Pogonomyrmex maulensis is not known to co-occur with any congeners. Pogonomyrmex intermedia and $P$. santschii are the only species that might be confused with $P$. intermedia. Pogonomyrmex maulensis is separated from $P$. intermedia based on: (1) for most to all workers in a series, medial portion of clypeus notably darker (usually blackish to black) than adjoining cephalic dorsum, (2) legs and antennal scapes black, and (3) posterior portion of mesopleura and propodeum usually reddish-black, sometimes blackish to black. In $P$. intermedia: (1) medial portion of clypeus concolorous to adjoining cephalic dorsum, (2) legs and antennal scapes usually orang-ish-brown, occasionally brownish to blackish, and (3) mesosoma concolorous ferruginous orange to reddish-brown to reddish-black or posterior portion of mesopleura and propodeum blackish to black. Pogonomyrmex maulensis is separated from $P$. santschii based on: (1) pronotum to entire mesosoma ferruginous orange to reddish-brown or red-dish-black. In P. santschii: (1) mesosoma black, occasionally with a weak orangish to reddish infusion on pronotum, infusion rarely present on mesonotum.

Biology. Pogonomyrmex maulensis workers are solitary foragers. The only nest that was observed had two entrances at the edge of a stone. Partial nest excavations indicated the nest contained up to 2000-3000 workers. A mating flight was observed during mid-afternoon on 3 March, indicating that mating flights occur during the austral summer.

Pogonomyrmex maulensis appears to be a mid-elevation species that is known from only two locales near Río Maule at elevations of 1950-2175 m. The type nest was in a Stipa sp. (Poaceae) grassland with scattered Berberis sp. (Berberidaceae) in sandy-rocky soil, the other nest was in a Stipa grassland. This species occurs in the Valdivian temperate forests ecoregion, as defined by Olson et al. (2001) (Figure 61A).

## Pogonomyrmex meridionalis

(Figure 62)
Distribution-61B

Pogonomyrmex meridionalis Kusnezov, 1951: 277 (worker). Holotype worker examined [IFML]. ARGENTINA, Santa Cruz: Bajo Caracoles, \#5857 (N. Kusnezov leg.).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum lacking striae, moderately to strongly coriarious anterad, dull to weakly shining, (2) head and mesosoma blackish to black, gaster light to dark ferruginous orange, (3) longitudinal rugae on cephalic dorsum widely spaced, irregular, (4) rugae on pronotum weak to moderately coarse, (5) medial rugae on mesonotum usually continue to anterior margin of pronotum, and (6) in dorsal view, promesonotal suture usually weakly to moderately impressed (Figure 62).

Measurements- $n=12$. HL 1.63-1.88; HW 1.76-2.06; MOD 0.39-0.45; OMD 0.40-0.051; SL 1.20-1.48; PNW 1.12-1.27; HFL 1.68-1.97; ML 1.88-2.18; PW 0.41-0.48; PPW 0.57-0.66. Indices: SI 64.50-73.68; CI 103.89-120.83; OI 20.41-22.83; HFI 90.43-100.00.

Redescription. Head subquadrate to wider than long ( $\mathrm{CI}=103.89-120.83$ ), widest just posterior to eyes; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, widely spaced, wavy to irregular. In full-face view, medial rugae diverging toward posterior corners of head. In profile, rugae along dorsal margins of eyes continue posterad, usually converging with more medial rugae anteromedially to posterior corners, rugae along posterior and ventral margin of eyes not converging at posterior corners but rather continue medially over posterior margin. Interrugae on cephalic dorsum strongly granulate, dull to weakly shining; posterior corners rugose, interrugae weakly coriarious, weakly shining to smooth, strongly shining. Anterior margin of clypeus concave; dorsal surface with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish ammochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.27 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.00-1.28 \times$ MOD. Antennal scapes relatively short ( $\mathrm{SI}=64.50-73.68$ ), failing to reach posterior corners by $0.5-1.0 \times$ length of basal funicular segment, strongly striate, interstriae weakly shining. Basal flange of scape moderately well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly convex; all mesosomal surfaces with prominent rugae. In profile and dorsal views, humeral shoulders of pronotum weakly enlarged, dorsolateral margin rounded. Dorsum of promesonotum with moderately coarse, irregular, longitudinal rugae that continue to anterior margin of pronotum, pronotal sides with subparallel, wavy to irregular rugae. Promesonotal suture usually weakly to moderately impressed. Mesopleura with wavy to irregular rugae angling posterad to posterodorsally, sometimes continuing onto sides of propodeum. Dorsum of propodeum with irregular longitudinal rugae to rugoreticulate. Superior propodeal spines long, length $>0.6 \times$ the distance between their bases; spines connected by weakly defined keel; tips blunt to acuminate. Inferior propodeal spines triangular, wider than tall, apex weakly rounded to angulate. Propodeal spiracles narrowly ovate facing posterad. Mesosomal interrugae moderately to strongly granulate, dull to weakly shining. Legs weakly coriarious, weakly shining to smooth and shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin flat or with a weakly developed, broadly rounded process that continues posterad more or less parallel to dorsal margin of peduncle. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably shorter than posterior surface, apex angulate. In dorsal view, petiolar node longer than wide, narrowest at posterior margin, gradually widening to spatulate anterior margin; dorsum and sides with moderately coarse, irregular, transverse, or arcuate rugae to rugoreticulate. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to rounded anterior margin; maximal width about equal to length; dorsum and sides with wavy to irregular, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces moderately granulate, weakly shining. Anterior one-third to two-thirds of first gastral tergum moderately to strongly coriarious, dull, posterior portion smooth and strongly shining to weakly coriarious, weakly shining.

Erect, short to medium length, whitish pilosity moderately abundant on head. Moderately abundant suberect to decumbent pilosity on scape, abundant decumbent hairs on funicular segments. Legs with moderately abundant semidecumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with dense, erect setae, mostly similar in length, longest usually approaching MOD. Head, mesosoma, petiolar node black; postpetiole orangishblack to blackish-orange; gaster dark ferruginous orange (Figure 62).

Queen. Unknown.
Male. Unknown.
Additional material examined. ARGENTINA: Chubut: Rt 20 at 25.2 km NW turnoff to Facundo, 1780', Jan 28, 2011 (IFML; LACM; MCZC; RAJC; UCDC; USNM); Cerro Dragón, 385 m, Jan 9-14, 2013 (RAJC) (Figure 61B).


FIGURE 62. Photographs of Pogonomyrmex meridionalis worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914368). Photographs by Michele Esposito from www.AntWeb.org.

Etymology. The specific epithet, meridionalis (Latin, from meridional-for southern) was undoubtedly derived from Kusnezov collecting the syntype worker in Santa Cruz Province, which is second most southern province in Argentina.

Discussion. The black head and mesosoma, dark ferruginous orange gaster, and lack of striae on the first gastral tergum separate P. meridionalis from all congeners except P. pronotalis and P. mendozanus. Pogonomyrmex meridionalis is separated from $P$. mendozanus based on: (1) longitudinal rugae on cephalic dorsum irregular, widely spaced, and (2) medial rugae on mesonotum usually continue to pronotal collar. In $P$. mendozanus, (1) longitudinal rugae on cephalic dorsum regular, narrow, subparallel, and deeply incised, and (2) medial rugae on mesonotum diverge toward humeral shoulders of pronotum, often with one to few transverse rugae along anterior margin of pronotum. Pogonomyrmex meridionalis is separated from P. pronotalis based on: (1) larger size (HW = 1.76-2.06 mm ), (2) first gastral tergum moderately to strongly coriarious, dull to weakly shining anterad, (3) rugae on pronotum weak to moderately coarse, (4) medial rugae on mesonotum usually continue to anterior margin of pronotum, and (5) promesonotal suture usually weakly to moderately impressed; $P$. pronotalis is: (1) smaller (HW = 1.61-1.81 mm ), (2) first gastral tergum weakly coriarious, weakly shining to smooth and strongly shining, (3) rugae on pronotum coarse, (4) medial rugae on mesonotum diverge or become transverse to rugoreticulate on pronotum but do not continue to anterior margin of pronotum, and (5) promesonotal suture usually absent.

Biology. Little is known about the biology of P. meridionalis other than that workers are solitary foragers. Partial nest excavations indicated that colonies probably contain about 500-700 workers. The two nests located by the author were in sandy-gravelly soil and had a tumulus that was $10-15 \mathrm{~cm}$ in diameter. Pogonomyrmex meridionalis appears to be a lowland species that inhabits elevations from $385-540 \mathrm{~m}$. This species occurs in the Patagonian steppe ecoregion, as defined by Olson et al. (2001) (Figure 61B).

## Pogonomyrmex pichachen NEW SPECIES

(Figures 63-64)
Distribution-61C
Holotype worker [MNNC: CASENT0922166]: CHILE, Bíobío: Bíobío Province, Rt Q-45 at Paso Pichachén, $37^{\circ} 27.2^{\prime}$ S $71^{\circ} 07.4^{\prime} \mathrm{W}, 6750$ ' (2045 m), 22 February 2014 (R.A. Johnson \#5244). Paratypes, same data as holotype: IFML ( 3 workers), LACM ( 6 workers), MACN ( 12 workers), MNNC ( 12 workers), MCZC ( 6 workers), RAJC (51 workers, 6 alate queens), UCDC ( 3 workers), USNM ( 6 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae on first gastral tergum extend over anterior one-third to one-half or more of segment, posterolateral margins mostly smooth and shining, (2) posterior surface of petiolar node and dorsum of postpetiole with transverse rugae, (3) head and gaster reddish-black to dark blackish-red, rarely reddish-orange, (4) longitudinal rugae on cephalic dorsum posterior to eyes irregular, often with secondary rugae, medioposterior margin with strongly irregular rugae to rugoreticulate, (5) interrugae on cephalic dorsum strongly granulate, dull, with a beaded appearance, (6) superior propodeal spines moderately long to long, length ranging from $0.3-0.6 \times$ the distance between their bases, and (7) restricted to the Patagonia region of Argentina and Chile (Figure 63).

Measurements-holotype ( $n=12$ paratypes). HL 1.68 (1.47-1.69); HW 1.69 (1.48-1.73); MOD 0.39 (0.330.38); OMD 0.39 ( $0.34-0.42$ ); SL 1.27 (1.13-1.35); PNW 1.07 ( $0.98-1.17$ ); HFL 1.49 (1.42-1.75); ML 1.97 (1.641.98); PW 0.43 ( $0.37-0.47$ ); PPW 0.59 ( $0.54-0.60$ ). Indices: SI 75.15 ( $74.84-82.24$ ); CI 100.60 ( $98.01-104.61$ ); OI 23.08 (21.05-232.7); HFI 88.17 (95.95-108.07).

Description. Head subquadrate to quadrate $(\mathrm{CI}=98.01-104.61)$, widest just posterior to eyes; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, rugae posterior to eyes irregular, often with secondary rugae, medioposterior margin with strongly irregular rugae to rugoreticulate. In full-face view, medial rugae diverging or not diverging toward posterior corners of head. Interrugae on cephalic dorsum moderately to strongly granulate, weakly dull to dull, with a beaded appearance, medioposterior area sometimes entirely granulate; posterior corners rugose, interrugae smooth and shining to moderately granulate, weakly dull. Anterior margin of clypeus concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.24 \times$

HL. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.91-1.17 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=74.84-82.24$ ) reaching posterior corners of head; scapes with longitudinal striae, weakly dull to weakly shining; basal flange well developed, flattened with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent irregular, subparal-lel-parallel rugae, often rugoreticulate on pronotal sides. In dorsal view, humeral shoulders of pronotum enlarged, anterolateral margins weakly to moderately angulate. Dorsum of promesonotum with weakly to strongly irregular longitudinal rugae that become strongly irregular to rugoreticulate on pronotum, or medial rugae occasionally continue to anterior margin of pronotum, lateral rugae diverge toward humeral shoulders of pronotum. Irregular rugae on pronotal sides traverse ventrally or posteroventrally or rugoreticulate; rugae on mesopleura angle posterodorsally; irregular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Promesonotal suture usually present. Superior propodeal spines moderately long to long, length ranging from $0.3-0.6 \times$ the distance between their bases, spines connected by a well defined keel; inferior propodeal spines wider than high, apex broadly rounded. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to strongly granulate, dull to weakly shining. Legs smooth and shining to weakly coriarious, weakly shining to shining.

Peduncle of petiole about $0.8 \times$ long as petiolar node, anteroventral margin with moderately to well developed rounded process that narrows posterad and continues subparallel-parallel to dorsal margin of peduncle of petiole. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, narrowing posterad. Posterior surface of petiolar node with regular to irregular, transverse to arcuate rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest at or near posterior margin, narrowing to anterior margin, maximum width and length about equal. Transverse to oblique, regular to irregular rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces smooth and shining to weakly coriarious, weakly shining. First gastral tergum with striae over anterior one-third to one-half or more of segment, posterior margin smooth and shining to moderately coriarious, weakly dull; posterolateral margins smooth and shining.

Erect, short to medium-length, white pilosity moderately abundant on head. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect, white setae, longest on mesosoma and petiolar node about $0.8 \times \mathrm{MOD}$. Head reddish-black to dark blackish-red, rarely reddish-orange; mesosoma black, rarely with a faint reddish infusion anterad; anterior portion of first gastral tergum dark brown to blackish or black, becoming lighter posterad, color of other terga similar to posterad portion of first gastral tergum with a darker transverse band along posterior margin of terga; antenna, mandibles, and legs blackish to black, mandibles often with reddish infusion (Figure 63).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae extend over more than anterior one-half of first gastral tergum, medioposterior one-quarter to one-third or more of first gastral tergum (including posterolateral margins) smooth and shining, (3) head dark reddish-black to blackish red; mesoscutum, mesoscutellum, axillae, pronotal sides, anepisternum black, (4) in posterodorsal view, posterior corners rugose, interrugae granulate-punctate, dull, (5) medial rugae along posterior margin of head strongly irregular to rugoreticulate, and (6) transverse or oblique rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 64).

Measurements-( $n=7$ paratypes). HL 1.51-1.66; HW 1.61-1.70; MOD 0.34-0.37; OMD 0.33-0.43; SL 1.18-1.39; PNW 1.20-1.30; HFL 1.64-1.76; ML 1.97-2.33; PW $0.41-0.48$; PPW $0.66-0.69$. Indices: SI $71.76-$ 82.74; CI 99.38-111.26; OI 20.24-22.22; HFI 98.80-106.21.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to wider than long $(\mathrm{CI}=99.38-111.26)$, widest just posterior to eyes, posterior margin flat to weakly convex. Longitudinal rugae on cephalic dorsum prominent, wavy to strongly irregular. In full-face view, medial rugae diverging toward posterior corners of head; medial rugae along posterior margin of head strongly irregular to rugoreticulate-vermiculate; posterior corners rugose; interrugae on cephalic dorsum and posterior corners moderately to strongly granulate-punctate, weakly dull to dull, usually with a beaded appearance. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.


FIGURE 63. Photographs of Pogonomyrmex pichachen holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922166). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 64. Photographs of Pogonomyrmex pichachen paratype alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922171). Photographs by Michele Esposito from www.AntWeb.org.

All mesosomal surfaces except pronotal sides with regular to wavy, subparallel-parallel, rugae, becoming irregular to rugoreticulate on pronotal sides; interrugae smooth and shining to weakly granulate-punctate, weakly shining; superior propodeal spines moderately long, bluntly acuminate, length $>0.5 \times$ the distance between their bases; inferior propodeal spines wider than tall, apex broadly rounded to subangulate, height less than length of superior spines. Peduncle of petiole long, anteroventral margin with a weak to moderate sized, broadly rounded triangular process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy to irregular, transverse to oblique rugae. In dorsal view, postpetiole slightly wider than long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node. Interrugae on posterior surface of petiole and dorsum of postpetiole weakly granulate-punctate, weakly shining. Striae extend over anterior one-half or more of first gastral tergum, medioposterior one-quarter to one-third or more of first gastral tergum (including posterolateral margins) smooth and shining. Most body surfaces with moderately abundant suberect to erect, medium-length, whitish setae, one to two longer hairs along posterior margin of head approach to exceed MOD. Head dark reddish-black to blackish red; mesoscutum, mesoscutellum, axillae, first gastral tergum dark brownish-black; rest of body black (Figure 64).

Male. Unknown.
Additional material examined. None.
Etymology. The specific epithet, pichachen, is derived from the type locality, Paso Pichachén, which is at the border of Chile and Argentina.

Discussion. Pogonomyrmex pichachen is distinguished from all congeners by: (1) first gastral tergum with striae over anterior one-third to one-half or more of segment, posterolateral margins smooth and shining, (2) head and gaster reddish-black to blackish-red, rarely reddish-orange; mesosoma black, (3) longitudinal rugae on cephalic dorsum posterior to eyes irregular, often with secondary rugae, medioposterior margin with strongly irregular rugae to rugoreticulate, (4) interrugae on cephalic dorsum strongly granulate, dull, with a beaded appearance, (5) superior propodeal spines moderately long to long, length $>0.3-0.6 \times$ the distance between their bases, and (6) occurring in the Patagonia region.

Biology. Little is known about the biology of P. pichachen other than that workers are solitary foragers. Partial excavation of the type nest indicated that colonies contain at least 1000-2000 workers. The type nest was under a stone in sparsely vegetated alpine habitat with scattered large rocks; soil consisted of a mixture of lava tuff and coarse gravelly soil. Sexuals (alate queens only) were collected on February 22, indicating that mating flights occur during the austral summer.

Pogonomyrmex pichachen appears to be a mid-elevation species, with the type colony occurring at an elevation of 2045 m . Pogonomyrmex pichachen undoubtedly occurs in both Argentina and Chile given that the type colony was collected along their border. This species occurs in the Valdivian Temperate forests ecoregion, as defined by Olson et al. (2001) (Figure 61C).

## Pogonomyrmex pronotalis

(Figures 65-67)
Distribution-68A

Pogonomyrmex pronotalis Santschi, 1922b: 350 (worker). Syntypes examined: 2 workers [MACN], 3 workers [NHMB]. ARGENTINA, Mendoza: Cordillera de Mendoza, Cajón de Guanaco, \#1395 (Dr. Carette). See also Gallardo, 1932: 149. MACN worker here designated LECTOTYPE [CASENT0235277].

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) head and mesosoma blackish to black, gaster light to dark ferruginous orange, (2) first gastral tergum lacking striae, weakly to moderately coriarious, weakly shining to smooth and shining, (3) longitudinal rugae on cephalic dorsum irregular, widely spaced, not deeply incised, (4) pronotal rugae coarse, (5) medial rugae on mesonotum diverging or becoming transverse to rugoreticulate on pronotum but not continuing to anterior margin of pronotum, and (6) in dorsal view, promesonotal suture usually absent (Figure 65).

Measurements-lectotype $(n=12)$. HL 1.76 (1.58-1.82); HW 1.81 (1.61-1.81); MOD 0.38 ( $0.34-0.40$ ); OMD 0.42 ( $0.41-0.49$ ); SL 1.36 (1.16-1.44); PNW 1.21 (1.10-1.22); HFL 1.75 (1.64-1.87); ML 2.10 (1.93-2.38); PW 0.40 ( $0.43-0.51$ ); PPW 0.60 ( $0.56-0.65$ ). Indices: SI 75.14 (69.14-79.63); CI 102.84 ( $95.27-106.10$ ); OI 20.99 (20.99-24.39); HFI 96.69 (97.73-106.90).

Redescription. Head subquadrate to quadrate $(C I=95.27-106.10)$, widest just posterior to eyes; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, widely spaced, wavy to irregular. In full-face view, medial rugae diverging toward posterior corners of head; medial posterior margin with transverse to oblique rugae. In profile, rugae posterior to eyes converging at or near posterior corners. Interrugae on cephalic dorsum strongly granulate, dull; posterior corners rugose, interrugae smooth to moderately granulate, weakly to strongly shining. Anterior margin of clypeus concave; dorsal surface with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish ammochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six to seven teeth ( $20 \%$ with six teeth, $46 \%$ with seven teeth) or number differing on each mandible ( $31 \%$ with six/seven teeth, $3 \%$ with seven/eight teeth; $n=35$ ); mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.26 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.07-1.35 \times$ MOD. Antennal scapes relatively long $(\mathrm{SI}=69.14-79.63)$, ranging from failing to reach posterior corners by up to length of basal funicular segment to reaching posterior corners, scape weakly striate, moderately shining to smooth and shining. Basal flange of scape moderately well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly convex; all mesosomal surfaces with prominent rugae. In profile and dorsal views, humeral shoulders of pronotum enlarged, dorsolateral margin angulate. Dorsum of promesonotum with coarse, irregular, longitudinal rugae that diverge anterad toward humeral shoulders of pronotum, anterior pronotal margin with transverse to oblique rugae or rugoreticulate, pronotal sides rugoreticulate to vermiculate. Promesonotal suture usually absent. Mesopleura with irregular rugae that angle posterodorsally. Dorsum of propodeum with irregular transverse rugae that traverse anteroventrally on sides. Superior propodeal spines long, length usually $>0.6 \times$ the distance between their bases, spines connected by well defined keel; tips blunt to acuminate. Inferior propodeal spines triangular, wider than tall, tips rounded to subacuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to strongly granulate, dull to weakly shining. Legs weakly coriarious, weakly shining to smooth and shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin usually with a rounded triangular process. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably shorter than posterior surface, apex weakly rounded to angulate. In dorsal view, petiolar node longer than wide, narrowest at posterior margin, gradually widening to spatulate anterior margin; posterior surface and sides with moderately coarse, wavy, transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin; maximal width about equal to length; dorsum and sides with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node. Interrugae on both surfaces weakly granulate, weakly shining to smooth and shining. First gastral tergum moderately coriarious, weakly shining to smooth and strongly shining.

Erect whitish pilosity moderately abundant on head, variable in length, usually with 1-2 long hairs near vertex and on frontal lobes that approach to exceed MOD. Moderately abundant suberect to semidecumbent pilosity on scape, abundant decumbent hairs on funicular segments. Legs with moderately abundant semidecumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect setae, mostly similar in length, longest about $0.7 \times$ MOD. Head, mesosoma, funicular segments, legs, petiolar node black, often with an orangish infusion on mandibles and legs; postpetiole blackish-orange; gaster ferruginous orange, often with darker transverse band on posterior margin of terga (Figure 65).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) first gastral tergum smooth and strongly shining, (3) head, mesosoma, petiolar node, postpetiole black; gaster dark ferruginous orange, and (4) superior propodeal spines moderately well developed (Figure 66).

Measurements- $(n=12)$. HL 1.58-1.79; HW 1.77-1.88; MOD 0.39-0.44; OMD 0.37-0.46; SL 1.33-1.44; PNW 1.40-1.73; HFL 1.72-1.93; ML 2.41-2.73; PW 0.49-0.58; PPW 0.77-0.83. Indices: SI 71.12-77.97; CI 102.79-116.05; OI 21.20-23.89; HFI 96.22-106.21.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head subquadrate to wider than long $(C I=102.79-112.66)$, widest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy to weakly irregular; in full-face view at least one to two medial rugae not diverging toward posterior corners of head, interrugae moderately to strongly granulate-punctate, dull to weakly shining; posterior corners rugose, interrugae weakly granulate-punctate, weakly
shining to smooth and shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces with regular, subparallel, wavy or irregular rugae, except for irregular rugae to rugoreticulate on pronotal sides; interrugae on mesoscutum and mesoscutellum weakly to moderately coriarious, weakly shining; interrugae on propodeum moderately granulate-punctate, dull. Propodeum with moderately long superior spines; inferior propodeal spines poorly developed, wider than tall, apex subangulate to rounded. Peduncle of petiole long, anteroventral margin lacking a process or with a weakly developed, broadly rounded process that continues posterad more or less parallel to dorsal margin of peduncle. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with irregular transverse, oblique, or longitudinal rugae; rugae on dorsum of postpetiole transverse, arcuate, or oblique, and finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly to moderately granulate-punctate, weakly shining. First gastral tergum smooth, strongly shining. Most body surfaces with moderately abundant suberect to erect, medium-length, white setae; moderately abundant suberect to erect hairs on first gastral tergum, those on second and third terga restricted to posterior margins. Gaster dark ferruginous orange, mandibles orangish-black to blackish-orange, rest of body black (Figure 66).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) bicolored: head and mesosoma black, gaster ferruginous orange, (3) erect hairs lacking on first gastral tergum, (4) mesopleura with longitudinal rugae, (5) in profile, lateral hairs along posterior margin of first gastral tergum $\leq 0.2-0.3 \times$ the length of longest hairs on first gastral sternum, (6) strong, irregular to regular transverse rugae on posterior surface of petiolar node, and (7) notauli absent (Figure 67).

Measurements- $(n=2)$. HL 1.36-1.44; HW 1.34-1.44; MOD 0.51-0.51; OMD 0.18-0.20; SL $0.42-0.44$; HFL 1.80-2.03; ML 2.44-2.62; PW 0.56-0.58; PPW 0.75-0.76. Indices: SI 30.56-31.34; CI 98.53-100.00; OI 35.42-38.06; HFI 134.33-140.97.

Additional material examined. ARGENTINA: Mendoza: Valle Hermosas, 7430', Dec 6, 2003 (CASC; IFML; RAJC); Rt 145 at 42.2 km W Bardas Blancas, 5380', Jan 26, 2008 (IFML; RAJC); 3.9 km W entrance Reserva Provincial Laguna Diamante, 8450', Feb 11, 2014 (IFML; LACM; MACN; MCZC; RAJC; UCDC; USNM) (Figure 68A).

Etymology. The specific epithet, pronotalis (Latin, from pronoto- for pronotum, plus - alis $=$ suffix added to noun stems, meaning pertaining to), was derived from the wide pronotum, which Santschi described as: "middle of pronotum wider than mesonotum ...".

Discussion. The color combination (black head and mesosoma, gaster ferruginous orange) and lack of striae on the first gastral tergum separate $P$. pronotalis from all congeners except for $P$. mendozanus and $P$. meridionalis. Pogonomyrmex pronotalis has been confused with $P$. mendozanus, with the latter having been misidentified as the former in several publications (see discussion under P. mendozanus in Johnson, 2015). Pogonomyrmex pronotalis is separated from P. mendozanus by the widely spaced, irregular rugae on the cephalic dorsum and mesosoma, whereas these rugae are closely spaced, regular, subparallel-parallel, and deeply incised in P. mendozanus. Pogonomyrmex pronotalis is separated from $P$. meridionalis by its: (1) smaller size $(H W=1.61-1.81 \mathrm{~mm}),(2)$ anterior portion of the first gastral tergum weakly coriarious, weakly shining to smooth and shining, (3) coarse rugae on pronotum, and (4) medial rugae on mesonotum diverging or becoming transverse to rugoreticulate on pronotum but not continuing to pronotal collar. Pogonomyrmex meridionalis is: (1) usually larger $(\mathrm{HW}=1.76-2.06 \mathrm{~mm})$, (2) first gastral tergum moderately to strongly coriarious, dull to weakly shining anterad, (3) rugae on pronotum weak to moderately coarse, and (4) medial rugae on the mesonotum usually continue to anterior margin of the pronotum.

Biology. Pogonomyrmex pronotalis workers are solitary foragers. Nests consist of a tumulus up to 15 cm in diameter that is placed in clumps of Stipa sp. (Poaceae) or under rocks in sandy soil. Partial nest excavations indicated that colonies of $P$. pronotalis probably contain 400-700 workers. Sexuals have been collected on 11 February, which suggests that mating flights occur during the austral summer.

Several papers have used the name P. pronotalis (Claver \& Fowler, 1993; Nobua-Behrmann, Lopez de Casenave, Milesi, \& Pavan, 2013; Nobua Behrmann et al., 2010; Pirk \& Lopez de Casenave, 2006; Pirk et al., 2007; Pirk et al., 2004; Pirk et al., 2009; Pol \& Lopez de Casenave, 2004; Pol, Lopez de Casenave, Feldhaar, Milesi, \& Gadau, 2008), but this name was based on a misidentification, and all of these papers should be referred to P. mendozanus (see Johnson, 2015).


FIGURE 65. Photographs of Pogonomyrmex pronotalis worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0102688). Photographs by April Nobile from www.AntWeb.org.


FIGURE 66. Photographs of Pogonomyrmex pronotalis alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914370). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 67. Photographs of Pogonomyrmex pronotalis male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914369). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 68. Geographic distribution of: (A) Pogonomyrmex pronotalis, (B) P. propinqua, (C) P. pulchellus. The large black circle in each panel denotes the type locality. See text regarding the type locality for $P$. pulchellus.

Pogonomyrmex pronotalis inhabits elevations from 1630-2560 m. This species occurs in the Southern Andean steppe ecoregion, as defined by Olson et al. (2001) (Figure 68A).

## Pogonomyrmex propinqua NEW SPECIES

(Figures 69-71)
Distribution-68B
Pogonomyrmex rastratus Mayr: Claver \& Fowler, 1993; Pirk, et al., 2004; Pirk \& Lopez de Casenave, 2006; Pirk, et al., 2007; Pol \& Lopez de Casenave, 2004; Pirk et al., 2009; Pirk \& Lopez de Casenave, 2010; Pol, et al., 2011; Pirk \& Lopez de Casanave, 2011; Nobua Behrmann et al., 2010; Nobua-Behrmann et al., 2013. Misidentifications.

Holotype worker [MACN: CASENT0922160]: ARGENTINA, Mendoza: Departamento Santa Rosa, Rt 7 at 13.9 km E La Dormida, $33^{\circ} 23.8^{\prime}$ S $67^{\circ} 46.8^{\prime} \mathrm{W}, 1760^{\prime}(535 \mathrm{~m})$, 11 April 2015 (R.A. Johnson \#5463). Paratypes, same data as holotype: IFML (6w), LACM (9w), MACN (12w), MCZ (9w), RAJC (33w), UCDC (3w), USNM (9w).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum; posterolateral margins moderately to strongly coriarious, weakly shining to dull, (2) head and gaster ferruginous orange; mesosoma black, dorsum of promesonotum often with orangish infusion to orangish-black, (5) dorsum of mesonotum with irregular longitudinal rugae to rugoreticulate-vermiculate, lateral branches usually connect adjacent rugae, (6) promesonotal suture usually present, (7) superior propodeal spines long, length $>0.6 \times$ the distance between their bases, (8) inferior propodeal spines well developed, height usually greater than that of superior spines, (9) most hairs on anterior half of first gastral tergum $<0.16 \mathrm{~mm}$ long, and (9) only known from San Luis and Mendoza Provinces (Figure 69).

Measurements-holotype $(n=13)$. HL 1.94 (1.68-2.08); HW 2.03 (1.79-2.32); MOD 0.39 ( $0.32-0.44$ ); OMD 0.47 ( $0.41-0.53$ ); SL 1.32 (1.11-1.46); PNW 1.27 (1.13-1.39); HFL 1.66 (1.50-1.91); ML 2.10 (1.89-2.27); PW 0.53 (0.42-0.57); PPW 0.70 ( $0.59-0.76$ ). Indices: SI 65.02 ( $58.88-69.23$ ); CI 104.64 ( $104.06-115.00$ ); OI 19.21 (16.96-20.33); HFI 81.77 (80.65-94.97).

Description. Head subquadrate to wider than long $(C I=104.06-115.00)$, widest just posterior to eyes; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae weakly diverging toward posterior corners of head. Interrugae on cephalic dorsum strongly granulate, dull. Posterior corners rugose, interrugae weakly to strongly granulate, dull to weakly shining. Anterior margin of clypeus strongly concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish hairs project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.24 \times \mathrm{HL}$. Eyes in profile situated slightly anterior to middle of head, $\mathrm{OMD}=1.1-1.5 \times$ MOD. In full-face view, eyes not protruding to protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=58.88-69.23$ ) failing to reach posterior corners of head by less than length of basal funicular segment. Antennal scapes with weak longitudinal striae, weakly shining to shining; basal flange well developed, flattened, partly translucent with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent subparallel, irregular rugae, occasionally rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins weakly to moderately angulate. Dorsum of promesonotum with longitudinal rugae that diverge anterad toward humeral shoulders of pronotum; promesonotal suture rarely present. Irregular rugae on pronotal sides traverse ventrally or posteroventrally; rugae on mesopleura angle posterodorsally; irregular transverse rugae on propodeal dorsum traverse ventrally or anteroventrally on sides. Superior propodeal spines long, length $>0.6 \times$ the distance between their bases, spines connected by well defined keel, tips blunt to acuminate. Inferior propodeal spines slightly wider than high, tip weakly blunt to acuminate, height less than that of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma densely granulate, dull to weakly shining. Legs weakly shining to shining.

Petiolar peduncle about as long as petiolar node, anteroventral margin often with broad, rounded expansion, but lacking triangular process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest near rounded anterior margin, narrowing to posterior margin. Sides and posterior face of petiolar node with regular to irregular transverse rugae, occasionally traversing longitudinally or obliquely near an-
terior margin. Dorsum of postpetiole convex in profile; in dorsal view, widest at or near posterior margin, narrowing to anterior margin, maximum width and length about equal. Transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly to moderately granulate-punctate, weakly shining. Striae extend over anterior one-half or more of first gastral tergum; posterolateral margins and other areas lacking striae moderately to strongly coriarious, dull to weakly shining.

Erect, white pilosity moderately abundant on head, often variable in length, longest hairs similar to MOD. Moderately abundant suberect to semidecumbent pilosity on scapes; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with erect, moderately dense, white setae that are similar in length; most hairs on anterior half of first gastral tergum $<0.16 \mathrm{~mm}$ long. Head and gaster ferruginous orange to reddish-orange; mesosoma black, often with a weak to moderate orangish infusion on dorsum of promesonotum (Figure 69).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae on first gastral tergum usually extend to posterior margin, posterolateral margins with striae or moderately to strongly coriarious, weakly shining, (3) head and gaster ferruginous orange; pronotal sides, anepisternum concolorous blackish to black, (4) interrugae on cephalic dorsum moderately to strongly granulate, dull to weakly shining, (5) queens large (HW = $2.34-2.47 \mathrm{~mm} ;$ PNW $=1.63-1.70 \mathrm{~mm} ; \mathrm{ML}=2.57-3.00 \mathrm{~mm}$ ), (6) superior propodeal spines moderately long, length usually $>0.5 \mathrm{x}$ the distance between their bases, (7) longest hairs on first gastral sternite approximately $0.2-0.4 \times$ MOD, and (8) occurring in San Luis, San Juan, and Mendoza and possibly further south (Figure 70).

Measurements- $(n=4)$. HL 2.02-2.13; HW 2.34-2.47; MOD 0.46-0.49; OMD 0.47-0.52; SL 1.45-1.56; PNW 1.63-1.70; HFL 1.76-2.08; ML 2.57-3.00; PW 0.65-0.70; PPW 0.90-0.93. Indices: SI 60.49-65.00; CI 112.50-118.81; OI 18.93-20.51; HFI 72.43-86.75.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full face view, head wider than long ( $C I=112.50-118.81$ ), broadest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae not diverging to diverging toward posterior corners of head; posterior corners rugose, interrugae on cephalic dorsum and posterior corners moderately to strongly granulate-punctate, dull to weakly shining. Mandibles with seven teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel, regular to wavy rugae, rugae on pronotal sides irregular to weakly rugoreticulate; interrugae weakly to moderately granulate-punctate, weakly shining; superior propodeal spines moderately long, length usually $>0.5 \times$ the distance between their bases, spines strongly tapered; inferior propodeal spines well developed, wider than tall, apex subangulate to acuminate, height slightly less than length of superior spines. Petiolar peduncle long, ventral surface with a poorly developed, broadly rounded process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy, transverse rugae. In dorsal view, postpetiole about as wide as long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae on posterior surface of petiolar node and dorsum of postpetiole moderately coriarious, weakly shining. Striae on first gastral tergum usually extend to posterior margin, posterolateral margins with striae or moderately to strongly coriarious, weakly shinning. Most body surfaces with moderately abundant suberect to erect, short to long, whitish to cream colored setae; longest hairs on first gastral sternite approximately $0.2-0.4 \times \mathrm{MOD}$, rarely slightly longer. Head, gaster ferruginous orange; mesoscutum, axilla, mesoscutellum orangish-black to blackish-orange; rest of body blackish to black (Figure 70).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum, (2) mesoscutum mostly smooth and shining, and (3) notauli absent (Figure 71). Note that the males are unknown for the closely related P. mapuche.

Measurements- $(n=4)$. HL 2.02-2.13; HW 2.34-2.47; MOD 0.46-0.49; OMD 0.47-0.52; SL 1.45-1.56; HFL 1.76-2.08; ML 2.57-3.00; PW 0.65-0.70; PPW 0.90-0.93. Indices: SI 60.49-65.00; CI 112.50-118.81; OI 18.93-20.51; HFI 72.43-86.75.

Additional material examined. ARGENTINA: Mendoza: Hwy 144 at 5 km SW San Rafael, 2800', Dec 4, 2003 (CASC; MCZC; RAJC); Rt 143 at 37.8 km NW San Rafael, 3280', Jan 21, 2008 (RAJC); Reserva Nancuñan, 1800', Dec 12, 2003 \& Oct 31, 2008 \& Feb 13, 2009 (MCZC; RAJC; RGPC); Rt 7 at 5.8 km W Desaguadero, 1530', Dec 28, 2005 (MCZC; RAJC); Rt 7 at 21.7 km E La Dormida, 1740', Dec 28, 2005 (RAJC); Rt 7 at 9.8 km


FIGURE 69. Photographs of Pogonomyrmex propinqua holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922160). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 70. Photographs of Pogonomyrmex propinqua alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922465). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 71. Photographs of Pogonomyrmex propinqua male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922460). Photographs by Michele Esposito from www.AntWeb.org.

E La Dormida, 1720', Jan 23, 2008 (RAJC); Portrerillos, Nov 21, 2009 (RGPC), no date (USNM); Dec 9-19, 1950 (IFML); Rt 7 at 3.0 km SE Potrerillos, 4710', Dec 29, 2005 (RAJC); La Pampa de la Carrera, 4760', Dec 30, 3005 (RAJC); Rt 39 in Valle de Uspallata, 7040', Dec 31, 2005 (RAJC); Uspallata, Dec 29, 2005 (RGPC); Rt 143 at 4 km SE Pareditas, 3610', Jan 21, 2008 (RAJC); Rt 143 at 44.8 km SE Pareditas, 4450', Jan 21, 2008 (IFML; RAJC); Rt 7 at 19.8 km E La Paz, 1520', Jan 23, 2008 (RAJC); 38.4 km S Jct Rts 7 \& 153, 1870', Jan 23, 2008 (IFML; RAJC); Alto Pencoso, no date (MHNG); 138.1 km S Jct Rts 7 \& 153, 1690', Jan 24, 2008 (RAJC); El Salto, Dec 17, 1950 (IFML; LACM; MCZC); no loc., no date (IFML). San Juan: Rt 12 at 82.0 km NE Calingasta, 6580’, Feb 6, 2010 (RAJC). San Luis: Rt 188 at 32.0 km W Union, 1360', Jan 27, 2008 (RAJC); no loc, no date (MHNG; MLPA) (Figure 68B).

Etymology. The specific epithet, propinqua (from Latin, propinquus $=$ near, neighboring, close), is derived from this species having morphology and coloration that is very similar to that of $P$. carbonarius.

Discussion. Pogonomyrmex propinqua is separated from most congeners by: (1) striae extend over anterior one-half or more of first gastral tergum, posterior margin with striae or moderately to strongly coriarious, and posterolateral margins moderately to strongly coriarious, weakly shining to dull. These characters separate $P$. propinqua from all but three congeners: P. carbonarius, $P$. mapuche, and $P$. weiseri.

Pogonomyrmex propinqua is most closely related to $P$. weiseri, from which it is separated by: (1) longitudinal rugae on dorsum of promesonotum irregular to rugoreticulate, with short lateral branches that usually contact one another, and (2) interrugae on cephalic dorsum strongly granulate-punctate, dull, with a beaded appearance. In $P$. weiseri: (1) longitudinal rugae on dorsum of promesonotum more regular, usually do not contact one another and lack short lateral branches, and (2) interrugae on cephalic dorsum weakly to moderately granulate-punctate, weakly shining, with a weakly beaded appearance. These two species are also separated geographically as P. propinqua occurs in more southern provinces (San Luis and Mendoza) than P. weiseri (La Rioja to Salta).

Pogonomyrmex propinqua is separated from P. mapuche based on: (1) ferruginous orange head and gaster and a black mesosoma, (2) long superior propodeal spines, length usually $>0.6 \mathrm{x}$ the distance between their bases, and (3) mandibles with six teeth. In P. mapuche: (1) head is dark red to reddish-black, rest of body black, (2) the superior propodeal spines reduced to tubercles or denticles, rarely as short teeth, and (3) mandibles with seven teeth for some to most workers in a series.

Pogonomyrmex propinqua is separated from P. carbonarius by: (1) head and gaster concolorous light to dark ferruginous orange, (2) superior propodeal spines long, length usually $>0.6 \times$ the distance between their bases, and (3) most hairs on anterior half of first gastral tergum $<0.16 \mathrm{~mm}$ long. In $P$. carbonarius: (1) color variable: concolorous black $\underline{\text { or }}$ with head and gaster reddish-orange to dark blackish-orange to black with a weak orangish infusion, gaster often notably darker than head, (2) at least some workers in a series with superior propodeal spines that consist of tubercles, denticles, or short spines with a length $<0.3 \times$ the distance between their bases, and (3) several to most hairs on anterior half of first gastral tergum $>0.18 \mathrm{~mm}$ long. These two species are easily separated with queens or males when these castes are available (see keys). Pogonomyrmex propinqua and $P$. carbonarius have mostly non-overlapping distributions, but they co-occur or occur in close proximity in Mendoza Province from Potrerillos south to San Rafael.

Kusnezov (1951) placed the then undescribed P. propinqua under P. rastratus for reasons that were not all his fault (see discussion under P. rastratus). Most importantly, Kusnezov did not examine syntypes of $P$. rastratus, but rather indicated that he identified his specimens based on workers from Alto Pencoso (San Luis Province) that A. Forel had identified as P. rastratus (specimens at MHNG); these specimens were actually P. propinqua. To his credit, Kusnezov (1951) indicated that he had several hundred workers from the type locality for P. rastratus (the surroundings of Mendoza) that did not completely correspond to the original description. Kusnezov also discussed the very different descriptions of $P$. rastratus given in Mayr (1870) and Mayr (1887). He also indicated that $P$. weiseri var. neuquensis was a synonym of $P$. rastratus without further discussion, believing that this variety was what is herein named $P$. propinqua. In synonymizing these two forms, Kusnezov indicated only that $P$. weiseri was actually a synonym of $P$. rastratus, and that Santschi used Mayr's incorrect description of $P$. rastratus. I have examined syntypes of $P$. rastratus, $P$. weiseri, and $P$. weiseri var. neuquensis (the latter is a junior synonym of $P$. carbonarius-see above), and it is clear that all three forms comprise distinct species.

Biology. Workers of this species are solitary foragers. Colony size of P. propinqua averages $997 \pm 114$ plus 268 larvae and pupae (Nobua Behrmann et al., 2010). Reproductive sexuals have been collected in nests from December 28-February 4. Founding queens forage in the field (R. Pol, pers. comm.), but it is not known if they are obligate
or facultative foragers (see Johnson, 2006). Mating flights occur during the austral summer, and they appear to be triggered by rain (R. Pol, pers. comm., R.A. Johnson, pers. obs.).

As noted in above the taxonomic history, several papers have studied P. propinqua (Claver \& Fowler, 1993; Nobua-Behrmann et al., 2013; Nobua Behrmann et al., 2010; Pirk \& Lopez de Casenave, 2006, 2010, 2011; Pirk et al., 2007; Pirk et al., 2004; Pirk et al., 2009; Pol \& Lopez de Casenave, 2004; Pol et al., 2011), but all of these papers misidentified the species as $P$. rastratus, and all papers should be referred to $P$. propinqua.

Pogonomyrmex propinqua appears to be restricted to Mendoza, San Luis, and San Juan Provinces at elevations from 30-2135 m, but its distribution may extend further south and east in the Lower Monte Desert. This species occurs in the Lower Monte and Dry Chaco ecoregions, as defined by Olson et al. (2001) (Figure 68B).

## Pogonomyrmex pulchellus NEW STATUS

(Figures 72-74)
Distribution-68C

Pogonomyrmex rastratus var. pulchellus Santschi, 1925: 223 (worker). Syntypes examined: 1 worker [MACN], 1 worker [NHMB]. ARGENTINA, Catamarca: Corral Quemado, (Weiser leg.). See also Gallardo, 1932; 137. NHMB worker here designated LECTOTYPE [CASENT0281097].

Worker diagnosis. Workers of P. pulchellus can be variable, and thus are characterized twice. This species is uniquely characterized by the following combination of features: (1) striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins mostly smooth and shining, (2) rugae on dorsum of promesonotum strongly irregular, often continuing to anterodorsal margin of pronotum, sometimes becoming rugoreticulate on pronotum, (3) dorsum of pronotum notably darker than adjoining mesonotum, (4) head orang-ish-brown, rest of body mostly blackish to black except for an orangish infusion on dorsum of mesonotum and sometimes anterior portion of mesopleura, and (5) regular to irregular rugae on mesopleura longitudinal or angle posterodorsally, rarely with short lateral branches.

Alternatively, (1) for most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae, (2) superior propodeal spines consist of short, acuminate triangular teeth to short spines; height of inferior propodeal spines usually similar to or greater than superior spines, (4) rugae between frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle, (5) head and mesosoma mostly concolorous ferruginous orange to light orangish-black, mesosoma sometimes slightly darker than head (Figure 72).

Measurements-lectotype ( $n=13+1$ paralectotype). HL 1.59 (1.44-1.83); HW 1.59 (1.51-1.89); MOD 0.36 (0.35-0.46); OMD 0.39 ( $0.38-0.48$ ); SL 1.15 (1.15-1.43); PNW 1.05 (1.00-1.23); HFL 1.58 (1.51-1.82); ML 1.87 (1.74-2.16); PW 0.37 ( $0.34-0.48$ ); PPW 0.53 ( $0.52-0.64$ ). Indices: SI 72.33 (68.57-77.84); CI 108.16 (96.69-105.85); OI 22.64 (22.99-25.71); HFI 99.37 (90.42-103.31).

Redescription. Head subquadrate to quadrate $(C I=96.69-108.16)$; posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, weakly irregular to regular; rugae between frontal lobes subparallel-parallel, medial rugae continuing onto frontal triangle. In full-face view, medial rugae diverging to posterior corners; in posterodorsal view, posterior margin with one to few irregular, arcuate rugae, usually with strongly irregular, discontinuous rugae with short lateral branches medially. Interrugae on cephalic dorsum moderately to strongly granulate, with a beaded appearance, dull to weakly shining; posterior corners rugose, interrugae smooth and shining, occasionally moderately granulate-punctate, dull to weakly shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish hairs project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six or seven teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.23-0.26 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.90-1.11 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=68.57-77.84$ ) failing to reaching posterior corners of head by width of basal funicular segment. Antennal scapes usually weakly to moderately striate, interstriae weakly to moderately granulate-punctate, weakly shining to smooth and shining; basal flange well developed with carinate margin. Psammophore well developed.


FIGURE 72. Photographs of Pogonomyrmex pulchellus worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0172692). Photographs by Ryan Perry from www.AntWeb.org.


FIGURE 73. Photographs of Pogonomyrmex pulchellus alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0249053). Photographs by Will Ericson from www.AntWeb.org.


FIGURE 74. Photographs of Pogonomyrmex pulchellus male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0172691). Photographs by April Nobile from www.AntWeb.org.

Mesosomal profile weakly convex; all mesosomal surfaces with prominent widely spaced, subparallel-parallel irregular to regular rugae. For most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, short lateral branches mostly lacking; medial longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum, anterodorsal margin of pronotum with one to several transverse rugae or longitudinal rugae on promesonotum with or without several to numerous short lateral branches, medial rugae on mesonotum continue to anterior margin of pronotum. In dorsal view, humeral shoulders of pronotum enlarged, strongly angulate. Promesonotal suture usually weakly impressed, occasionally absent. Regular to irregular rugae on mesopleura longitudinal or angle posterodorsally, rarely with short lateral branches; transverse regular to irregular rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines consist of short, acuminate triangular denticles or short teeth, width at base usually greater than height; keel connecting superior propodeal spines moderately well developed. Inferior propodeal spines wider than high, triangular, tips broadly rounded to subacuminate, height usually similar to or greater than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to strongly granulate-punctate, often with a beaded appearance, dull to weakly shining. Legs weakly to moderately coriarious, weakly shining to smooth and shining.

Peduncle of petiole approximately $0.8 \times$ as long as petiolar node, anteroventral margin with a poorly to moderately developed broadly rounded process with broadly rounded apex. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest immediately posterior to spatulate anterior margin. Posterior surface of petiolar node with transverse rugae, sometimes irregular and discontinuous arcuate rugae anterad, or with oblique to nearly longitudinal rugae anterad, rarely oblique to nearly longitudinal over entire surface. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, width and length similar; transverse to weakly arcuate rugae posterad, anterad rugae transverse or traversing medially from lateral margin then curving anterad to become longitudinal; anterolateral rugae concentric, curving from lateral to anterior margin. Rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly to moderately coriarious, weakly shining to shining. Striae extend over anterior one-half to two-thirds or more of first gastral tergum, posterior and posterolateral margins smooth and shining.

Erect, mostly short, whitish pilosity moderately abundant on head, most hairs $<0.2 \times$ MOD. Moderately abundant semidecumbent to decumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant, suberect to decumbent whitish setae. Rest of body with moderately dense, erect, medium length, whitish setae; longest hairs on mesosoma, petiolar node, and postpetiole approximately $0.5 \times$ MOD. Head orangish-brown with blackish to black mandibles, malar area, antennae, and anterior margin of clypeus; mesosoma mostly blackish to black except for dark orangish to orangish-brown mesonotum, sides and/or dorsum of pronotum notably darker than adjoining mesonotum and mesopleura; legs, petiolar node, postpetiole blackish to black; gaster blackish-orange to black, occasionally with a dark orangish infusion (Figure 72).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae on first gastral tergum extend over anterior one-half or more of segment, medioposterior one-quarter to one-third or more of first gastral tergum (including posterolateral margins) smooth and shining, (3) mesoscutum, mesoscutellum, axillae, and anepisternum light to dark ferruginous orange, and (4) in posterodorsal view, medial rugae diverge to posterior corners of head; posterior portion of head with moderately irregular, longitudinal rugae and one or more irregular transverse rugae that usually continue laterally to posterior corners of head (Figure 73).

Measurements- $(n=12$ ). HL 1.79-1.99; HW 1.88-2.04; MOD 0.44-0.48; OMD 0.43-0.52; SL 1.21-1.47; PNW 1.38-1.50; HFL 1.53-1.97; ML 2.39-2.73; PW 0.49-0.58; PPW 0.71-0.83. Indices: SI 64.36-73.74; CI 96.98-106.70; OI 22.06-24.61; HFI 79.69-98.94.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to slightly wider than long ( $\mathrm{CI}=96.98-106.70$ ), broadest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, weakly irregular to regular, interrugae moderately to strongly granulate, dull to weakly shining, with a beaded appearance; in posterodorsal view, longitudinal rugae along posterior margin irregular, diverging to posterior corners of head; posteromedial margin with a triangular area with one to few irregular, transverse rugae that sometimes continue to posterior margins;
interrugae on posteromedial margin moderately to strongly granulate, dull. Mandible with six teeth, dorsal surface rugose. Psammophore well developed.

All mesosomal surfaces with regular to wavy, subparallel rugae, interrugae weakly to moderately granulatepunctate, weakly shining; superior propodeal spines consist of short, triangular denticles to short teeth, tips bluntly acuminate to acuminate, inferior propodeal spines wider than tall, apex broadly rounded to subacuminate. Peduncle of petiole long, ventral surface with a weakly to moderately well developed, broadly rounded process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex of node subangulate to angulate. Posterior surface of petiolar node with transverse or longitudinal rugae, interrugae weakly granulate-punctate, weakly shining to smooth and shining. In dorsal view, postpetiole slightly wider than long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae weakly granu-late-punctate, weakly shining to smooth and shining. Striae cover anterior one-half or more of first gastral tergum, posterolateral margins smooth and shining. Most body surfaces with moderately abundant suberect to erect, me-dium-length, whitish to cream-colored setae. Head, mesoscutum, mesoscutellum, anepisternum ferruginous orange to reddish-orange; pronotal sides concolorous blackish-orange to black; first gastral tergum ferruginous orange to reddish or reddish-brown with a black posterior margin, rest of gaster blackish to black (Figure 73).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) smaller: $\mathrm{HW}=1.26-1.35 \mathrm{~mm}, \mathrm{PW}=0.44-0.48 \mathrm{~mm}$, PPW $=0.60-0.67 \mathrm{~mm}$, (3) in profile, apex of petiolar node angulate or node shaped irregularly, (4) in profile, anepisternum and katepisternum mostly smooth and shining to strongly shining, if rugae present posterad then interrugae smooth and shining, and (5) in profile, posterior surface of petiolar node irregular (Figure 74).

Measurements- $(n=6)$. HL 1.28-1.46; HW 1.26-1.35; MOD 0.44-0.48; OMD 0.16-0.23; SL 0.39-0.45; HFL 1.52-1.81; ML 2.12-2.42; PW 0.44-0.48; PPW 0.60-0.67. Indices: SI 29.77-34.35; CI 91.97-101.56; OI 34.35-37.30; HFI 118.75-134.07.

Additional material examined. ARGENTINA: Catamarca: Rt 43 at 133.1 km SE Antofagasta de la Sierra, 10,450', Jan 18, 2006 (RAJC); Rt 43 at 101.5 km SE Antofagasta de la Sierra, 12.630', Jan 18, 2006 (MCZC; RAJC; UCDC; USNM); Rt 43 at 4.4 km W turnoff to Laguna Blanca, 11,050', Jan 27, 2019 (RAJC); Rt 43 at 15.2 km W turnoff to Laguna Blanca, 12,320', Jan 27, 2019 (RAJC); Rt 43 at 25.3 km W turnoff to Laguna Blanca, 12.880', Jan 27, 2019 (RAJC); Rt 43 at 42.0 km W turnoff to Laguna Blanca, 13,090', Jan 27, 2019 (RAJC); Laguna Blanca, no date (MACN) (Figure 68C).

Etymology. Santschi did not discuss naming this species pulchellus (from Latin, pulchellus = beautiful), but he apparently thought that this was a beautiful ant.

Discussion. Pogonomyrmex pulchellus likely co-occurs with P. longibarbis and possibly other P. rastratusgroup species that are restricted to high elevation habitats in the Andes. Pogonomyrmex pulchellus is separated from most congeners by: (1) striae on the first gastral tergum extend over more than anterior one-half of segment, posterior and posterolateral margins smooth and shining, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; lateral longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae, and (3) superior propodeal spines consist of acuminate denticles, short triangular teeth, or short spines. These characters separate $P$. pulchellus from all species except $P$. apterogenos, P. lagunabravensis, and P. longibarbis. Pogonomyrmex pulchellus can be distinguished from P. apterogenos based on the following characters: (1) rugae on cephalic dorsum between frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle, and (2) head and mesosoma mostly concolorous ferruginous orange to light orangish-black or reddish-brownish, mesosoma sometimes darker than head. In P. apterogenos: (1) rugae on cephalic dorsum between frontal lobes weakly converge, 1-2 pairs of medial rugae usually converging together near posterior margin of frontal triangle, and (2) head ferruginous orange, dorsum of pronotum and mesonotum concolorous orangish-black, rest of mesosoma blackish-orange to blackish. Pogonomyrmex pulchellus is distinguished from P. lagunabravensis based on: (1) superior propodeal spines consist of minute teeth, short triangular teeth, or short spines (all acuminate), (2) inferior propodeal spines shorter than to as tall as superior spines, (3) keel connecting superior propodeal spines well developed, and (4) dorsum and sides of pronotum concolorous with adjoining mesonotum. For P. lagunabravensis: (1) superior propodeal spines consist of tubercles, denticles, or minute teeth (all rounded to blunt tipped), (2) inferior propodeal spines longer than superior spines, (3) keel connecting superior propodeal spines absent, and (4) dorsum and sides of pronotum concolorous with adjoining mesonotum. For $P$. pul-
chellus: (1) superior propodeal spines consist of minute teeth, short triangular teeth, or short spines (all acuminate), (2) inferior propodeal spines shorter than to as tall as superior spines, (3) keel connecting superior propodeal spines well developed, and (4) dorsum and sides of pronotum concolorous with adjoining mesonotum. Pogonomyrmex pulchellus is distinguished from P. longibarbis based on: dorsum and sides of pronotum concolorous with adjoining mesonotum. For P. pulchellus: dorsum and sides of pronotum orangish-black to blackish, darker than adjoining mesonotum.

Some series of $P$. pulchellus contain workers with wavy to irregular rugae on the mesosoma that continue to anterodorsal margin of pronotum, sometimes becoming rugoreticulate on pronotum. Series containing such workers are most similar to $P$. tafi as workers of both species usually have a pronotum darker than the adjoining mesonotum. For $P$. pulchellus: rugae on mesopleura usually regular to wavy, lacking lateral branches; posterior margin of first gastral tergum smooth and shining. For $P$. tafi: rugae on mesopleura wavy to irregular, usually with numerous lateral branches that often connect with adjacent rugae; posterior margin of first gastral tergum usually with striae or moderately to strongly coriarious, rarely smooth and shining.

The brief description of P. rastratus var. pulchellus by Santschi (1925) separated it from P. rastratus as follows: "different from the type by the black gaster, the mesonotum a little more narrow and red like the head. The rest of the thorax, clypeus, frontal carina, mandibles, and legs black. Sides of the pronotum horizontally striate-rugoreticulate". The description also compared $P$. rastratus var. pulchellus to $P$. rastratus var. caracola Santschi, but the latter form was never described. Other differences between $P$. pulchellus and $P$. rastratus include: (1) superior propodeal spines of $P$. pulchellus consist of short triangular teeth to short spines, whereas in P. rastratus they are usually long, with a length $>0.5 \times$ the distance between their bases, and (2) pronotum usually notably darker than adjoining mesonotum and mesopleura in P. pulchellus, whereas the pronotum and mesosoma are concolorous in P. rastratus. Thus, I raise P. rastratus var. pulchellus from synonymy to rank as a valid species.

Pogonomyrmex pulchellus appears to be restricted to higher elevations ( $>3100 \mathrm{~m}$ ) in the Andes. Consequently, it seems doubtful that Corral Quemado, Catamarca Province, Argentina, is the type locality. Corral Quemado is at the western base of the Andes at an elevation of approximately 2050 m , while all series collected by the author have been at $>3150 \mathrm{~m}$. The author also searched in the area of Corral Quemado and nearby foothill areas of the Andes without finding P. pulchellus. Most likely, the syntypes were collected higher in the Andes and Corral Quemado was the closest reference point to that locale.

Biology. Pogonomyrmex pulchellus workers are solitary foragers. Nests are placed in open, exposed sites, at the edge of grass clumps, or under shrubs in deep sand to gravelly-rocky soil, with the entrance consisting of a tumulus that ranges up to 15 cm in diameter. Partial nest excavations indicated that colonies consist of 500-1000 workers. Sexuals have been collected on January 18, indicating that mating flights occur during the austral summer.

Pogonomyrmex pulchellus inhabits elevations from 3165-3965 m. This species occurs in the High Monte, Central Andean puna, and Southern Andean steppe ecoregions, as defined by Olson et al. (2001) (Figure 68C).

## Pogonomyrmex rastratus

(Figures 75-77)
Distribution-78A

Pogonomyrmex rastratus Mayr, 1868: 171 (worker). Syntypes examined: 2 workers [NHMW]. ARGENTINA, Mendoza: Pampa de Canota, in the mountains near Mendoza (Strobel leg., January 1866). See also Gallardo, 1932: 134, fig. 20. NHMW worker here designated LECTOTYPE [CASENT0173352].

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) longitudinal striae on first gastral tergum usually extending to posterior margin or posterior margin moderately to strongly coriarious, dull to weakly shining; posterolateral margins smooth and shining to weakly coriarious, weakly shining, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, regular to very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum, (3) anterior margin of pronotum with one to several straight, strong, continuous, transverse rugae, (4) superior propodeal spines consist of short triangular teeth to long spines, length $>0.5-0.6 \times$ the distance between their bases for some to all workers in a series, (5) height of inferior propodeal spines less than to rarely similar to length of superior spines, and (6) head, mesosoma, gaster mostly to completely ferruginous orange; mesopleura, petiole, postpetiole often with a blackish infusion to blackish (Figure 75).


FIGURE 75. Photographs of Pogonomyrmex rastratus worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0103268). Photographs by April Nobile from www.AntWeb.org.


FIGURE 76. Photographs of Pogonomyrmex rastratus alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922458). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 77. Photographs of Pogonomyrmex rastratus male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0172673). Photographs by April Nobile from www.AntWeb.org.


FIGURE 78. Geographic distribution of: (A) Pogonomyrmex rastratus, (B) P. sanmartini, and (C) P. santschii. The large black circle in each panel denotes the type locality.

Measurements-lectotype $(n=12)$. HL 1.81 (1.39-1.89); HW 1.84 (1.43-1.98); MOD 0.44 ( $0.34-0.46$ ); OMD 0.44 ( $0.36-0.47$ ); SL 1.31 (1.11-1.39); PNW 1.33 ( $0.97-1.27$ ); HFL 1.86 (1.42-1.93); ML 2.45 (1.69-2.23); PW 0.46 ( $0.35-0.46$ ); PPW 0.63 ( $0.50-0.63$ ). Indices: SI 71.20 ( $68.18-78.57$ ); CI 101.66 ( $98.72-104.91$ ); OI 23.91 (22.08-24.48); HFI 101.09 (87.20-100.00).

Redescription. Head subquadrate to quadrate $(\mathrm{CI}=98.72-104.91)$; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, regular to weakly wavy. In full-face view, medial rugae diverging toward posterior corners of head. Interrugae on cephalic dorsum moderately to strongly granulate-punctate, weakly shining to dull, usually with a beaded appearance. Posterior corners rugose, interrugae weakly to moderately granulate, weakly shining to smooth and shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.26 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=$ $0.92-1.18 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes (SI $=68.18-78.57$ ) failing to reach posterior corners of head by less than to about the length of basal funicular segment. Antennal scapes moderately to strongly striate, interstriae weakly to moderately granulate, weakly shining to smooth and shining; basal flange with a well developed carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent regular, subparallel-parallel rugae. For most to all workers in a series, rugae on dorsum of promesonotum well defined, regular to very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum and continue onto pronotal sides; anterior margin of pronotum with one to several straight, strong, continuous, transverse rugae, rarely only one transverse rugae restricted to medial portion of anterior margin. Occasional workers with irregular rugae on promesonotum. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margin strongly angulate. Promesonotal suture present or absent. Regular to weakly irregular rugae on mesopleura angle posterodorsally; regular transverse rugae on dorsum of propodeum traverse anteroventrally on sides, rugae on dorsum of propodeum rarely longitudinal. Superior propodeal spines consist of triangular teeth to long spines, length $>0.5-0.6 \times$ the distance between their bases for some to all workers in a series, spines connected by well defined keel. Inferior propodeal spines wider than high, apex broadly rounded to acuminate; height less than to rarely similar to length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma moderately to densely granulate, dull to weakly shining. Legs moderately coriarious, weakly shining to smooth and shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with a weakly to well developed, weakly angulate to broadly rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, sides subparallel anterad, gradually narrowing posterad, anterior margin spatulate to broadly rounded. Sides and posterior surface of petiolar node with regular to moderately irregular transverse rugae that are sometimes weakly arcuate anterad. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, maximum width and length about equal; regular to moderately irregular transverse rugae posterad, anterad rugae transverse to more commonly weakly arcuate or concentric rugae that curve from lateral to anterior margin. Rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly granulate, weakly shining to smooth and strongly shining. Longitudinal striae on first gastral tergum usually extending to posterior margin or posterior margin moderately to strongly coriarious, dull to weakly shining; posterolateral margins smooth and shining to weakly coriarious, weakly shining.

Erect, mostly short to medium length, whitish pilosity moderately abundant on head, most hairs $<0.3 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scapes; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent, whitish setae. Rest of body with erect, moderately dense, medium-length, whitish setae, length of most $>0.4-0.5 \times \mathrm{MOD}$. Head, mesosoma, gaster mostly to completely ferruginous orange; mesopleura, petiole, postpetiole often with a blackish infusion to blackish; legs blackish (Figure 75).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae cover anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining, (3) head and first gastral tergum ferruginous orange, first gastral tergum often with a black, transverse band along posterior
margin, (4) in profile, pronotum usually lighter than adjoining anepisternum and/or katepisternum, (5) longitudinal rugae on cephalic dorsum posterior to eyes regular, lacking short lateral branches, interrugae weakly to moderately granulate, weakly shining, (6) superior propodeal spines consist of triangular denticles to long acuminate spines, and (7) rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 76).

Measurements- $(n=12)$. HL 1.66-2.00; HW 1.70-2.13; MOD $0.42-0.50$; OMD $0.40-0.54$; SL 1.24-1.48; PNW 1.27-1.57; HF 1.66-1.96; ML 2.34-2.92; PW 0.43-0.60; PPW 0.67-0.84. Indices: SI 66.50-74.71; CI 101.74-109.57; OI 22.22-25.88; HFI 84.91-100.58.

Description. With caste-specific morphology of the mesosoma related to wing-bearing, presence of ocelli on head. In full face view, head subquadrate to wider than long $(\mathrm{CI}=101.74-109.57)$, broadest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, regular, rugae posterior to eyes lacking short, lateral branches. In full-face view, medial rugae weakly diverging to diverging toward posterior corners of head; posterior corners rugose, interrugae on cephalic dorsum and posterior corner weakly to moderately granulate, dull to weakly shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces with subparallel, irregular to regular rugae; interrugae on mesoscutum, axilla, and mesoscutellum moderately to strongly granulate-coriarious, weakly shining to dull; superior propodeal spines consist of triangular denticles to long acuminate spines; inferior propodeal spines moderately well developed, wider than tall, apex weakly to broadly rounded, height usually less then length of superior spines. Peduncle of petiole long, anteroventral margin with a very broadly rounded process. In profile, petiolar node asymmetrical with anterior surface notably shorter than posterior surface, apex of node angulate. Posterior surface of petiolar node with irregular transverse to longitudinal rugae. In dorsal view, postpetiole wider than long; dorsum with wavy to irregular, transverse to arcuate rugae that are finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly to moderately granulate-coriarious, weakly shining. Striae cover anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining. Most body surfaces with moderately abundant suberect to erect, short to medium-long, whitish to cream-colored setae. Head and first through third gastral terga ferruginous orange, gastral terga often with a transverse black band along posterior margin; in profile, pronotum usually lighter than adjoining anepisternum and/or katepisternum (Figure 76).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum or strongly coriarious, dull, (2) petiolar node and postpetiole ferruginous orange, concolorous or nearly so with gaster, (3) in profile, regular, subparallel-parallel rugae posterior to eyes curve medially rather than continuing to posterior margin, and (4) notauli absent (Figure 77).

Measurements- $(n=9)$. HL 1.15-1.43; HW 1.15-1.38; MOD 0.40-0.55; OMD 0.15-0.27; SL 0.36-0.43; HFL 1.53-1.76; ML 2.18-2.44; PW 0.46-0.60; PPW 0.65-0.76. Indices: SI 27.41-33.59; CI 91.34-112.50; OI 33.33-40.74; HFI 122.46-136.29.

Additional material examined. ARGENTINA: Mendoza: 19.7 km W Villavicencio, 8860', Jan 18, 2008 (MCZC; RAJC); 31.5 km W Villavicencio, 8540', Jan 18, 2008 (RAJC); 33.9 km E Rt 39 on road to Los Berros, 8980', Jan 19, 2008 (IFML; RAJC); Quebrada Santa Elena, 7160', Dec 30, 2005 (MCZC; RAJC); Sierra de Uspallata, 8630', Dec 30, 2005 (RAJC), 9590’ \& 10,040', Dec 30, 2005 (CASC; IFML; LACM; MACN; MCZC; RAJC; UCDC; USNM); Quebrada de Cueva del Toro, 8850', Dec 30, 2005 (IFML; RAJC); Quebrada de Manantiales, 8230', Dec 30, 2005 (RAJC); Uspallata, Dec 29, 2005 (RGPC); Departamento Uspallata, Estancia Yaguaráz, Jan 25, 2014 (RGPC); Departamento Uspallata, Estancia Tambillos, Jan 25, 2014 (RGPC) (Figure 78A).

Etymology. The specific epithet, rastratus (Latin, from rastrat = covered as if with longitudinal scratches), is derived from the very fine, dense, longitudinal striae on the first gastral tegum. As noted by Mayr, "anterior half of first abdominal segment with dense, shallow longitudinal striae (rastrato) that often diverge laterally toward the posterior in an irregular fashion".

Discussion. Pogonomyrmex rastratus is not known to co-occur with any congeners. Pogonomyrmex rastratus is distinguished from all congeners except $P$. sanmartini by the following characters: (1) striae that extend over the anterior one-half or more of the first gastral tergum, posterolateral margin smooth and shining to weakly coriarious, dull to weakly shining, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, regular to very regular, continuous, lacking short lateral branches, (3) anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae, and (4) superior propodeal spines consist of short triangular teeth to long spines, length $>0.5-0.6 \times$ the distance between their bases for some to all workers in a series. Pogonomyrmex rastratus can be distinguished from $P$. sanmartini based on coloration: the head and gaster are mostly light
to dark ferruginous orange to reddish-orange in $P$. rastratus, whereas in $P$. sanmartini the head is reddish, reddish black, or black and the gaster is black.

The identity of $P$. rastratus has been one of the more confusing taxonomic problems among South American Pogonomyrmex, despite the fact that it was one of three species that Mayr (1868) described when erecting the genus (along with P. coarctatus and P. carbonarius). At least three problems have confounded understanding the identity of $P$. rastratus: (1) Mayr gave two contrasting descriptions for this species, (2) Mayr appears to have been the only author to have examined syntypes of $P$. rastratus, which resulted in an erroneous synonymy and subsequent misunderstanding the identity of $P$. rastratus, and (3) Kusnezov misinterpreted the type locality.

The problem of contrasting descriptions was created by Mayr, who gave similar descriptions of $P$. rastratus in Mayr (1868) and Mayr (1870), but gave a contrasting description in Mayr (1886). Mayr (1868) noted that $P$. rastratus was "red-orange with mandibles, antennae, part of the pronotum before the collar (neck) and feet black". In a key, Mayr (1870) again described P. rastratus as, "red except for black mandibles, antennae and legs, the ends of the tarsi brown, and the metanotum with two small spines which are longer than broad at the base". These two descriptions coincided, but the description in his next paper (Mayr, 1887) conflicted with the two previous papers, indicating "black or red, mandibles, antennae, and legs red-brown or black-brown". The conflicting description of color appears to have resulted from Mayr believing that fine, longitudinal striae on the first gastral tergum diagnosed $P$. rastratus. As such, the conflicting description of color in Mayr (1887) appears to have resulted in his placing $P$. carbonarius (the holotype is concolorous black with fine, dense, longitudinal striae on the first gastral tergum) as a junior synonym of $P$. rastratus without explanation (see also Kusnezov, 1951). This interpretation is supported by the labels on syntype workers of $P$. rastratus-one of which was determined to be a syntype of $P$. carbonarius because the locale on the label "Pampa del Sur" is the type locality for $P$. carbonarius (see discussion under $P$. carbonarius).

The second problem arose because neither Forel nor Kusnezov examined syntypes of $P$. rastratus. Consequently, Kusnezov based his concept of $P$. rastratus on specimens from Alto Pencoso, San Luis Province, Argentina, that Forel had misidentified as $P$. rastratus. These specimens were actually those of the undescribed species $P$. propinqua (see above). To his credit, Kusnezov (1951) was aware of possible problems with the identification noting that IFML contained "abundant material (more than 400 workers) from the type locality (surroundings of Mendoza) that do not correspond in all details to the original description of $P$. rastratus". This use of misidentified specimens also resulted in Kusnezov (1951) erroneously placing $P$. weiseri and $P$. weiseri var. neuquensis as junior synonyms of $P$. rastratus.

Lastly, Kusnezov (1951) appears to have misunderstood the type locality for $P$. rastratus. In his description of $P$. rastratus, Mayr (1868) indicated that the type locality was the area surrounding Mendoza, but explicitly stated that it was in the mountains near the city of Mendoza in a plain called Pampa de Canota-this plain is approximately 40 km northwest of the Mendoza at an elevation of approximately 3000 m . However, Kusnezov (1951) referred to the type locality as the "surroundings of Mendoza", even though he had quoted the locality from the original description (in Latin) in the previous paragraph. This misunderstanding created a problem because $P$. propinqua inhabits low desert areas surrounding the city of Mendoza, which is the area that Kusnezov assumed to be the type locality for $P$. rastratus. However, $P$. rastratus is a montane species that occurs at elevations well above those inhabited by P. propinqua.

Mayr (1887) described the male of $P$. rastratus from one specimen without workers, and he gave the collecting locale as "Argentina". I did not find or examine this male, but the description given by Mayr does not match that of males collected from nest series by the author. All males collected from nest series had: (1) 3-4 teeth in contrast to 5 as described by Mayr, (2) rugae on the head anterior to the ocelli were longitudinal and regular, but the interrugae lacked the reticulations described by Mayr, (3) wavy to regular rugae were present on the thorax (= mesosoma), with none of the males displaying the rugoreticulate or granulate sculpture described by Mayr, and (4) wavy to regular transverse rugae covered the posterior surface of the petiolar node, with none of the males displaying the rugoreticulate sculpture described by Mayr. Thus, it is doubtful that Mayr (1887) described the male of P. rastratus.

Biology. Pogonomyrmex rastratus workers are solitary foragers. Nests of $P$. rastratus are located in open, exposed sites, under shrubs, and at the edge of rocks. Nests are most common in gravelly soils, but they also occur in loose, silty soils. The nest entrance consists of a tumulus that ranges from $5-15 \mathrm{~cm}$ in diameter. Nests are most easily located by baiting workers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain approximately 500-1000 workers. Sexuals have been collected on December 30, indicating that mating flights occur during the austral summer.

Pogonomyrmex rastratus appears to be restricted to the Pre-Cordillera at elevations that range from 2170-3045 m . This species occurs in the Southern Andean steppe and High Monte ecoregions as defined by Olson et al. (2001) (Figure 78A).

## Pogonomyrmex sanmartini NEW STATUS

(Figures 3C-D, 10D, 10H, 79-83)
Distribution-78B

Pogonomyrmex carbonarius sanmartini Kusnezov, 1953: 110 (worker, in key). Syntypes examined: 8 workers, 1 intercaste? [USNM], 3 workers [LACM], 5 workers, 2 intercastes [IFML]. ARGENTINA, Neuquén: in the area surrounding San Martín de los Andes, in the zone of cypress trees, \#3980 (N. Kusnezov leg., 24 January 1949). See also Gallardo, 1932: 136, fig. 23; Kusnezov, 1960: 358. USNM worker here designated LECTOTYPE [CASENT0906503].
Pogonomyrmex rastratus var. carbonaria: Emery, 1906: 157, misidentified sanmartini.
Pogonomyrmex carbonarius: Kusnezov, 1951: 271, misidentified sanmartini.

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) restricted to the Patagonia region of Argentina, (2) concolorous black, (3) striae extend over anterior one-half or more of first gastral tergum, (4) some to all striae on first gastral tergum oblique and/or transverse, and (5) posterolateral margins of first gastral tergum smooth and shining.

Note that in Neuquén Province workers occasionally have an orangish-red to reddish or reddish-black head; mesosoma and gaster blackish to black with one or both rarely reddish to reddish-black. This color morph is uniquely characterized by the combination of: (1) superior propodeal spines long, length $>0.5-0.6 \times$ the distance between their bases for most to all workers in a series, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; lateral longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum, and (3) anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae (Figures 10D, 10H, 79-81).

Measurements-lectotype $(n=26)$. HL 1.74 (1.40-1.86); HW 1.73 (1.51-1.92); MOD 0.36 ( $0.31-0.39$ ); OMD 0.44 ( $0.34-0.44$ ); SL 1.36 (1.16-1.45); PNW 1.16 (1.01-1.33); HFL 1.82 (1.44-1.96); ML 2.09 (1.60-2.22); PW 0.49 ( $0.35-0.51$ ); PPW 0.59 ( $0.51-0.70$ ). Indices: SI 78.61 ( $71.35-79.87$ ); CI 99.43 ( $98.10-113.48$ ); OI 20.81 (18.95-2.81); HFI 78.61 (88.89-108.18).

Redescription. Head subquadrate to wider than long $(\mathrm{CI}=98.10-113.48)$, widest just posterior to eyes; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent. In full-face view, medial rugae continuing to posterior margin to diverging toward posterior corners of head. Interrugae on cephalic dorsum smooth and shining to strongly granulate, with a beaded appearance, weakly shining to dull; posterior corners rugose, interrugae smooth and shining. Anterior margin of clypeus concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth, rarely with an additional subtooth between the fourth and fifth teeth; mandibular dorsum coarsely rugose. MOD ranging from 0.19-0.26× HL. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.97-1.25 \times \mathrm{MOD}$. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=71.35-79.87$ ) failing to reaching posterior corners of head by less than length of basal funicular segment to barely surpassing posterior corners of head; scapes smooth and shining or with weak longitudinal striae, weakly shining to shining; basal flange well developed, flattened with carinate margin. Psammophore well developed.

Mesosomal profile flat to moderately convex; all mesosomal surfaces with prominent regular to weakly irregular, subparallel-parallel rugae, rarely irregular to weakly rugoreticulate. Rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum; anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae that continue onto pronotal sides $\underline{\boldsymbol{o r}}$ rugae on dorsum of mesonotum wavy to rarely strongly irregular, lateral rugae diverging to humeral shoulders of pronotum; rugae on pronotum regular to irregular, rarely rugoreticulate, regular to occasionally strongly irregular rugae traversing ventrally, posterad, or posteroventrally or rarely weakly rugoreticulate on pronotal sides. In dorsal view, humeral shoulders of pronotum enlarged, weakly to moderately angulate. Wavy to rarely strongly irregular rugae on mesopleura angle posterodorsally; regular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Promesonotal suture absent to
moderately impressed. Superior propodeal spines consist of tubercles, denticles, short teeth, or short to long spines, bases connected by well defined keel; inferior propodeal spines wider than high, apex narrowly rounded to acuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma smooth and shining to strongly granulate, weakly shining. Legs weakly to strongly coriarious, weakly shining to shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with weakly to well developed, rounded process that often narrows slightly then often continues posterad subparallel-parallel to dorsal margin of peduncle. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably shorter than posterior surface, apex weakly rounded to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, gradually narrowing posterad. Posterior surface of petiolar node with regular to wavy transverse rugae, rugae often weakly arcuate anterad. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, maximum width and length about equal, dorsum with transverse to weakly arcuate rugae, occasionally anterad rugae traversing medially from lateral margin then curving anterad to become longitudinal; anterolateral rugae concentric, curving from lateral to anterior margin. Rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole smooth and shining to moderately coriarious, weakly shining. First gastral tergum with striae that extend over anterior one-half or more of segment, some to most striae oblique and/or transverse, posterolateral margins smooth and shining to weakly coriarious, weakly shining.

Erect, short to medium-length, white pilosity moderately abundant on head, longest hairs along posterior margin, rest of hairs rarely $>0.2-0.3 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scapes; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white setae. Mesosoma, petiolar node, postpetiole with moderately dense, erect, white setae, longest on mesosoma and petiolar node, longest hairs usually $0.4-0.5 \times \mathrm{MOD}$, hairs on gastral terga slightly shorter. Concolorous black, but occasional workers (in only Neuquén Province) have an orangish-red to reddish or reddish-black head. The mesosoma and gaster typically are black on these workers, but one or both are occasionally reddish to reddish-black (Figures 10D, 10H, 79-81).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) first gastral tergum with striae extending over anterior one-half or more of segment, (3) body concolorous black, (4) dorsum of propodeum with 4-6 widely spaced transverse rugae, and (5) transverse or oblique rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 82).

Measurements- $(n=7)$. HL 1.44-1.78; HW 1.62-1.85; MOD 0.31-0.43; OMD 0.36-0.43; SL 1.12-1.42; PNW 1.27-1.47; HFL 1.58-1.91; ML 1.95-2.66; PW $0.47-0.54$; PPW $0.67-0.80$. Indices: SI 64.29-77.58; CI 98.80-112.50; OI 18.79-23.64; HFI 85.41-106.06.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to wider than long $(\mathrm{CI}=98.80-112.50)$, widest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae not diverging to diverging toward posterior corners of head; interrugae on cephalic dorsum weakly to moderately granulate-punctate, weakly shining to shining; posterior corners rugose, interrugae weakly to moderately granulatecoriarious, weakly shining to smooth and shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel, regular to wavy rugae, pronotal sides occasionally with irregular rugae; dorsum of propodeum with 4-6 widely spaced transverse rugae; interrugae weakly to moderately granulate-coriarious, weakly shining; superior propodeal spines consist of short, triangular teeth to moderately long, acuminate spines; inferior propodeal spines wider than tall, apex weakly rounded to subangulate. Peduncle of petiole long, anteroventral margin with a small, broadly rounded process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy, transverse, oblique, or longitudinal rugae. In dorsal view, postpetiole slightly wider than long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly granulate-coriarious, weakly shining to smooth and shining. Striae cover anterior one-half or more of first gastral tergum, posterolateral margins smooth and shining. Most body surfaces with moderately abundant suberect to erect, medium-length, whitish setae. Body concolorous black, but note that queens are unknown from parts of Neuquén Province where workers sometimes have a reddish-head, so it is unknown if these queens have a reddish head (Figure 82).


FIGURE 79. Photographs of Pogonomyrmex sanmartini lectotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0906503). Workers of P. sanmartini are highly variable: photographs show worker with reddish-black head and gaster and black mesosoma, long superior propodeal spines, and very regular rugae on dorsum of mesosoma. Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 80. Photographs of Pogonomyrmex sanmartini worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0280977). Workers of P. sanmartini are highly variable: photographs show concolorous black worker with long superior propodeal spines and very regular rugae on dorsum of mesosoma. Photographs by Estella Ortega from www.AntWeb.org.


FIGURE 81. Photographs of Pogonomyrmex sanmartini worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922478). Workers of P. sanmartini are highly variable: photographs show concolorous black worker with long superior propodeal spines and strongly irregular rugae to weakly rugoreticulate on dorsum of promesonotum. Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 82. Photographs of Pogonomyrmex sanmartini alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922477). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 83. Photographs of Pogonomyrmex sanmartini male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922480). Photographs by Michele Esposito from www.AntWeb.org.

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) first gastral tergum blackish to black (Figure 83).

Measurements- $(n=11)$. HL 1.11-1.33; HW 1.08-1.30; MOD 0.40-0.47; OMD 0.13-0.25; SL 0.27-0.48; HFL 1.45-1.71; ML 1.93-2.35; PW 0.42-0.59; PPW 0.62-0.74. Indices: SI 23.48-38.10; CI 95.49-112.50; OI 33.86-38.39; HFI 125.20-138.89.

Additional material examined. ARGENTINA: Chubut: 28.3 km N Jct Rts 71 \& 40 (near El Trebol), 1880', Jan 26, 2011 (IFML; LACM; MACN; MCZC; RAJC; UCDC; USNM); Rt 20 at 25.2 km NW turnoff to Facundo, 1780', Jan 28, 2011 (RAJC); Rt 40 at 41.2 km N Tecka, 2010', Feb 22, 2014 (RAJC); Jct Rts $60 \& 40$ ( 0.5 km E Tecka), 2440', Feb 22, 2014 (RAJC); 19.5 km E Shaman, 650 m, Nov 19, 1966 (CASC); Sierra San Bernardo, Jan 16, 1999 (IFML); Koluel Kayke, 295 m, Jan 16, 2013 (RAJC). Neuquén: Rt 234 near Bazán, Jan 25, 2014 (RGPC); 27 km S Rahue, 2560', Dec 8, 2003 (RAJC); 54 km NE Rahue, 3400’, Dec 8, 2003 (CASC; IFML; LACM; MACN; MCZC; RAJC; UCDC; USNM); 16.9 km W Rahue, 3030', Feb 8, 2011 (RAJC); 19 km E Rahue, 4680’, Dec 8, 2003 (CASC; MCZC; RAJC); 0.7 km W Confluencia, 2630', Feb 24, 2014 (RAJC); Rt 67 at 0.2 km W Confluencia, 2630', Jan 25, 2011 (MCZC; RAJC); Aluminé, Jan 19-22, 1949 (IFML; MCZC); 1.0 km S Aluminé, 2930’, Feb 9, 2011 (RAJC); Rt 23 at 10.8 km SE Lonco Luan, 3390', Feb 9, $2011 \&$ Feb 26, 2014 (MCZC; RAJC); 2.4 km W Jct Rts 231 \& 237, 2680', Jan 25, 2011 (MCZC; RAJC); Rt 23 at 20.6 km S Pilolil, 3230', Feb 8, 2011 (MCZC; RAJC); Rt 40 at 10.2 km NE Junín de Los Andes, 3340', Feb 6, 2011 (MCZC; RAJC); Rt 46 at 13.2 km SW Nireñco, 4210’, Feb 10, 2011 (RAJC); Rt 231 at 0.7 km W Jct Rt 40, 2670', Feb 4, 2014 (RAJC); Río Chimehuin Larminotte Estancia, Apr 9, 1980 (CASC); Parque Nacional Lanin, Orillas del Huechulafquen, Jan 28, 1999 (IFML); Huachulafquen, Feb 2, 1949 (IFML); Junín de los Andes, Jan 29, 2010 (RGPC); Quillen, no date (IFML). Río Negro: Bariloche, Feb 10, 1949 \& no date (IFML; LACM; MACN; MLPA; MZSP); Bariloche Airport, 2740', Jan 13, 2008 (MCZC; RAJC); 3 km S Bariloche Airport, 2820', Jan 12, 2008 (RAJC); 5 km S Bariloche Airport, 2760', Jan 12, 2008 \& Feb 25, 2014 (MCZC; RAJC). Santa Cruz: San Julian, Mar 1915 (LACM; MACN; MLPA); 42.1 km N Jct Rt 23 \& 40, 940 ', Feb 1, 2011 (MCZC; RAJC); 1.3 km S Jct Rt 23 \& 40, $960^{\prime}$, Feb 1, 2011 (RAJC); 30.9 km S Jct Rt 23 $\& 40,770$ ', Feb 1, 2011 (RAJC); 75.0 km S Jct Rt $23 \& 40,610^{\prime}$, Feb 1, 2011 (RAJC); Jct Rt $11 \& 40,700^{\prime}$, Feb 2, 2011 (RAJC); Jct Rt 29 \& 40 (E of Lago Cardiél), 1340’, Feb 1, 2011 (RAJC); Rt 25 at 0.9 km E Tamil Aike, 1760’, Jan 31, 2011 (RAJC); Rt 25 at 34.4 km E Tamil Aike, 1530', Jan 31, 2011 (RAJC); Rt 25 at 59.1 km SE Tamil Aike, 1410', Jan 31, 2011 (RAJC); Rt 25 at 15.2 km W Gobernador Gregores, 1110', Jan 31, 2011 (RAJC); Rt 29 at 21.8 km SW Gobernador Gregores (route to Lago Cardiél), 1260', Feb 1, 2011 (RAJC); Cañadon Leon (=Gobernador Gregores), Jan 28, 1950 (IFML; LACM; USNM); Rt 3 at 37.2 km N Piedra Buena, 50', Feb 3, 2011 (RAJC); 2.4 km S Fitz Roy, 210 m, Dec 12, 1966 (CASC; LACM); Rt 3 at 57.2 km N Caleta Olivia, 110’, Feb 4, 2011 (RAJC); 55.6 km S Perito Moreno, 690 m , Nov 24, 1966 (LACM); Río Deseado, Rt 3, no date (IFML); Tres Lagos, Jan 8 \& 14, 1999 (IFML); 2.8 km E Los Antiguos, Nov 21, 1967 (CASC; LACM); Rt 3 at 3 km S Río Chico, 90 m , Dec 11, 1966 (CASC); Río Santa Cruz, no date (MCZC); no loc, no date (MACN; USNM). Indefinite locales: Patagonia (MACN). Locations not found: Neuquén?: Cerro Tilloga?, no date (MLPA); Rt 23, Jan 16, 1999 (IFML) (Figure 78B).

Etymology. Kusnezov (1953) described P. carbonarius sanmartini in a key without additional information, but he undoubtedly derived the name sanmartini from the type locality, which is San Martín de los Andes, Neuquén Province, Argentina.

Discussion. Morphology of P. sanmartini is a highly variable in terms of color, length of the superior propodeal spines, and patterning of rugae on the dorsum of the promesonotum. All three characters display geographic variation. In regard to color, workers are concolorous black throughout their range except in parts of Neuquén Province, where some workers in a series can have a dark reddish to reddish-black head (see also Kusnezov, 1951). Additionally, workers from Neuquén and sometimes Río Negro Province have: (1) long superior propodeal spines with a length $>0.6 \times$ the distance between their bases, and (2) dorsum of the promesonotum with very regular, longitudinal rugae that lack lateral branches with one to several continuous, transverse rugae along the anterior margin of pronotum. Alternatively, in southern parts of their range (Chubut and Santa Cruz Provinces), rugae on the dorsum of the promesonotum are regular to irregular, sometimes rugoreticulate, and the superior propodeal spines range from denticles or tubercles to long spines; all three characters can vary intranidally. Lastly, striae are invariably present on the first gastral tergum of $P$. sanmartini, but one series from Bariloche (Santa Cruz \#586, MACN) contained specimens ( 7 of 9 workers, 2 of 2 queens) with the first gastral tergum smooth and strongly shining. These variations account for $P$. sanmartini keying out in two separate couplets.

Pogonomyrmex sanmartini is restricted to and is common throughout much of Patagonia, including southeastern Neuquén, eastern Río Negro, eastern and southern Chubut, and throughout Santa Cruz Province. This species is readily distinguished from congeners despite its high level of morphological variability. The combination of: (1) concolorous black, (2) striae extend over anterior one-half or more of first gastral tergum, (3) some to most striae on first gastral tergum oblique and/or transverse, and (4) posterolateral margins of first gastral tergum smooth and shining distinguish $P$. sanmartini from all congeners. Workers that are black with a reddish head (these occur in only Neuquén Province) can be distinguished by the combination of: (1) superior propodeal spines long, length > $0.5-0.6 \times$ the distance between their bases for most to all workers in a series, (2) for most to all workers in a series, rugae on dorsum of promesonotum well defined, very regular and continuous, lacking short lateral branches; lateral longitudinal rugae on mesonotum diverging toward humeral shoulders of pronotum, and (3) anterodorsal margin of pronotum with one to several straight, strong, continuous, transverse rugae.

The status of $P$. sanmartini as a subspecies of $P$. carbonarius resulted from not knowing the identity of $P$. carbonarius. Emery (1906), Gallardo (1932), and Kusnezov (1951) provided treatments of P. carbonarius (as $P$. rastratus var. carbonarius in the former two), but problematically, none of these authors examined the holotype of $P$. carbonarius. Rather, all three authors based their concept of $P$. carbonarius on series of $P$. sanmartini that were misidentified as $P$. carbonarius. The treatment by Emery (1906) discussed specimens that he had examined from near Río Santa Cruz, Santa Cruz Province. Gallardo (1932) mentioned these same specimens, also saying that there were numerous workers in MACN and the collection of Dr. Bruch from Patagonia and Santa Cruz. However, $P$. carbonarius is not known to occur in Santa Cruz Province (see above). Kusnezov (1951, pg. 272) was more specific, saying that he based his concept of $P$. carbonarius on two series of workers in the collection of Dr. Bruch that were labeled P. rastratus var. carbonarius (Santa Cruz \#586: 2 workers [MACN] \& Bariloche \#1528: 2w, 1aq [MACN], $5 \mathrm{w}, 1 \mathrm{dq}$ [MLPA], both series examined). From these specimens, Kusnezov indicated that $P$. carbonarius was characterized by very regular longitudinal rugae on the dorsum of the mesonotum and mesopleura and that these rugae were more regular than those on P. rastratus and all other species in the P. rastratus-group. Based on this difference, Kusnezov (1951) re-elevated P. carbonarius to species rank.

It is unknown who identified these two series from Bariloche and Santa Cruz, but it appears that concolorous black and striae on the first gastral tergum were the two diagnostic characters used to identify $P$. carbonarius. Moreover, it appears that Kusnezov identified all workers from southern Argentina as P. carbonarius if they were concolorous black and had striae on their first gastral tergum.

Unfortunately, the two series of workers that Kusnezov (1951) used to establish his concept of P. carbonarius were actually $P$. sanmartini. In his discussion of $P$. carbonarius, Kusnezov (1951) discussed a color variant of $P$. carbonarius indicating only that it had been collected in the cypress zone (Libocedrus chilensis $[=$ Austrocedus chilensis]) on north-facing slopes in the area surrounding San Martín de los Andes, Neuquén Province. In a subsequent paper on ants in the national parks of Patagonia, Argentina, Kusnezov (1953) described this color variant in a key as P. carbonarius sanmartini. The key separated the two forms as follows: P. carbonarius entirely black, while there are red spots or reddish coloration on the head and mesosoma of $P$. carbonarius sanmartini. This paper gave no other information on P. carbonarius sanmartini, but a later paper on the ants of western Patagonia (Kusnezov, 1960) indicated that the syntype series of $P$. carbonarius sanmartini was \#3980. Workers from this series were located in several museums (see above), but none of the pins had a syntype label.

Syntype workers of $P$. carbonarius sanmartini display two consistent differences from P. carbonarius. Most notably, the posterolateral and usually posterior margin of the first gastral tergum are moderately to strongly coriarious, dull to weakly shining in $P$. carbonarius, while both areas are smooth and shining to strongly shining in $P$. sanmartini. Coloration also varies: workers of $P$. sanmartini are typically concolorous black, while those of $P$. carbonarius most commonly are bicolored (head and sometimes gaster light to dark reddish-orange; mesosoma black), rather than concolorous black as was the holotype worker (see discussion under $P$. carbonarius). Thus, I raise $P$. sanmartini from synonymy to rank as a valid species.

Biology. Several studies have examined foraging behavior of $P$. sanmartini, but all were published using the name P. carbonarius (Aput et al., 2019; Lescano et al., 2017; Pirk, 2014; Pirk et al., 2020; Pirk \& Lopez de Casenave, 2017). Workers are solitary foragers. Nests of P. sanmartini are in open, exposed sites, within clumps of Stipa sp. (Poaceae), or under rocks in a range of soil types. The nest entrance ranges from a hole in the ground to a tumulus up to 15 cm in diameter. Nests are most easily located by baiting wokers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain approximately $500-1000$ workers. Sexuals have been collected from December 8 through February 25, and Kusnezov (1951) discussed finding alates
in nests and single (haplometrotic) founding queens in Neuquén, Río Negro, and Santa Cruz Provinces in January and February, demonstrate that mating flights occur during the austral summer. The type series also contained three intercastes (see Figures 3C-D).

Pogonomyrmex sanmartini inhabits elevations from 15-1420 m. This species occurs in the Patagonian steppe and Valdivian temperate forests ecoregions, as defined by Olson et al. (2001) (Figure 78B).

## Pogonomyrmex santschii NEW SPECIES

(Figures 84-86)
Distribution-78C

Holotype worker [MACN: CASENT0281099]: ARGENTINA, Mendoza: Departamento Malargüe, Rt 45 at 54.7 km W Bardas Blancas, $35^{\circ} 55.8^{\prime} \mathrm{S} 70^{\circ} 12.9^{\prime} \mathrm{W}$, $6060^{\prime}$ ( 1835 m ), 25 January 2008 (R.A. Johnson \#4109). Paratypes, same data as holotype: IFML ( 6 workers), LACM ( 6 workers), MACN ( 9 workers), MCZC ( 3 workers), MNNC ( 6 workers), RAJC (17 workers), UCDC (3 workers), USNM (3 workers). Additional paratype series from the same locality and date-RAJ \#4108: IFML ( 2 workers, 3 alate queens, 3 males), (MACN ( 3 workers, 3 alate queens, 9 males), MCZC ( 3 workers, 3 males), RAJC ( 7 workers, 6 alate queens, 14 males).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) first gastral tergum smooth and shining or striae present along base to extending over anterior one-third of segment, striae rarely extending over anterior one-half of segment; posterior margin smooth and shining, (2) head and gaster ferruginous orange to reddish-orange; mesosoma black, occasionally with a weak orangish to reddish infusion on pronotum, infusion rarely present on mesonotum, (3) superior propodeal spines long, length $>0.6 \times$ the distance between their bases, (4) posterior surface of petiolar node and dorsum of postpetiole with transverse rugae, (5) interrugae on cephalic dorsum strongly granulate, dull, with a beaded appearance, and (6) rugae on frontal lobes subparallel-parallel, medial rugae usually continuing onto frontal triangle (Figure 84).

Measurements-holotype $(n=12)$. HL $1.52(1.41-1.76)$; HW 1.60 (1.34-2.02); MOD 0.35 ( $0.33-0.41$ ); OMD 0.35 (0.32-0.47); SL 1.19 (1.16-1.38); PNW 1.05 (0.91-1.24); HFL 1.63 (1.41-1.81); ML 1.88 (1.63-2.11); PW 0.38 (0.34-0.44); PPW 0.54 ( $0.49-0.65$ ). Indices: SI 74.37 (67.33-86.57); CI 105.26 ( $94.81-119.53$ ); OI 21.87 (19.80-26.28); HFI 101.87 (89.60-106.85).

Description. Head subquadrate to wider than long $(\mathrm{CI}=94.81-119.53)$, widest just posterior to eyes; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent. In full-face view, medial rugae diverging toward posterior corners of head; interrugae strongly granulate, dull, with a beaded appearance. Posterior corners rugose, interrugae weakly granulate, weakly shining to smooth and shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.26 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.88-1.21 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes relatively long ( $\mathrm{SI}=67.33-86.57$ ), reaching posterior corners of head or failing to do so by less than length of basal funicular segment. Antennal scapes with weak longitudinal striae, interstriae weakly shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent subparallel-parallel, irregular rugae. In dorsal view, humeral shoulders of pronotum enlarged, weakly to moderately angulate. Dorsum of promesonotum with irregular, sometimes branching, longitudinal rugae; pronotum rugoreticulate or mesonotal rugae diverge anterad toward humeral shoulders of pronotum, medial rugae diverge weakly and continue to anterior margin of pronotum, rugae on anteromedial portion of pronotum strongly irregular to rugoreticulate; promesonotal suture weakly to moderately impressed. Irregular rugae on pronotal sides traverse ventrally or posteroventrally or rugoreticulate; rugae on mesopleura angle posterodorsally; irregular transverse rugae on propodeal dorsum traverse ventrally or anteroventrally on sides. Superior propodeal spines long, length $>0.6 \times$ the distance between their bases, tips bluntly acuminate, connected by well defined keel. Inferior propodeal spines wider than high, apex weakly rounded to bluntly acuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to strongly granulate-punctate, dull to weakly shining. Legs weakly shining to shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with a triangular, broadly rounded process that narrows along posterior margin, then continues posterad subparallel-parallel to dorsal margin of pe-
duncle. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest near rounded anterior margin, narrowing posterad. Sides and posterior surface of petiolar node with regular to irregular transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, maximum width and length about equal. Transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly to moderately granulate-punctate, weakly shining to smooth and shining. First gastral tergum smooth and shining or striae present along base to extending over anterior one-third of segment, striae rarely extending over anterior one-half of segment; rest of segment smooth and shining

Erect white pilosity moderately abundant on head, mostly similar in length, most hairs $0.2-0.4 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scapes; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish to light yellowish setae. Head, petiole, postpetiole, gastral terga with moderately dense, erect whitish to yellowish setae that are similar in length, most hairs $\geq 0.5 \times$ MOD. Head and gaster light to dark ferruginous orange to reddish-orange, gaster sometimes slightly darker than head; mesosoma, petiole, postpetiole black, pronotum occasionally with a weak orangish to reddish infusion, infusion rarely present on mesonotum (Figure 84).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) fine striae cover more than anterior one-half of medial portion of first gastral tergum, (3) in profile, posterolateral and lateral margins of first gastral tergum smooth and shining; in profile, striae not visible or visible over a very limited part of more medial portions of segment, (4) head and gaster light to dark ferruginous orange to reddish-brown; pronotum, mesopleura, propodeum blackish to black; anterior and lateral portions of mesoscutum blackish to black, central and posteromedial portions of mesoscutum orangish-brown to reddish-brown, (5) superior propodeal spines moderately long, length approximately $0.3 \times$ the distance between their bases, (6) relatively small ( $\mathrm{HW}=1.43-1.87 \mathrm{~mm}$; PNW $=1.15-1.42 \mathrm{~mm}$; $\mathrm{ML}=1.89-2.55 \mathrm{~mm}$ ), (7) in posterodorsal view, medial rugae on cephalic dorsum continue to near posterior margin before diverging to posterior corners of head, (8) in posterolateral view, posterior margin of head with mostly longitudinal, regular to weakly irregular rugae that lack short lateral branches, and (9) transverse or oblique rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 85).

Measurements- $(n=12$ ). HL 1.37-1.63; HW 1.43-1.75; MOD 0.30-0.37; OMD 0.33-0.39; SL 1.00-1.26; PNW 1.15-1.42; HFL 1.39-1.72; ML 1.89-2.36; PW 0.42-0.51; PPW 0.60-0.77. Indices: SI 66.89-79.74; CI 99.32-107.36; OI 20.27-24.50; HFI 93.92-106.85.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to wider than long $(C I=99.32-107.36)$, broadest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy; interrugae moderately to strongly granulate, with a beaded appearance, dull to weakly shining; cephalic dorsum posterior to ocelli with regular rugae that usually lack short lateral branches; in full-face view, medial rugae not diverging to weakly diverging toward posterior corners of head; in posterolateral view, posterior margin of head with up to several regular medial rugae that traverse to posterior corners; posterior corners rugose, interrugae moderately granulate, weakly shining to smooth and shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel-parallel, regular to wavy rugae, rugae strongly irregular to rugoreticulate on pronotal sides; interrugae weakly to moderately granulate-punctate, weakly shining; superior propodeal spines medium-long, as long as to slightly longer than width at base, length approximately $0.3 \times$ the distance between their bases, tips bluntly acuminate; inferior propodeal spines wider than tall, apex rounded to angulate. Peduncle of petiole long, ventral surface flat or with a very weak, broadly rounded expansion. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy transverse rugae. In dorsal view, postpetiole slightly wider than long, dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly granulate-punctate, weakly shining. Fine striae cover more than anterior one-half of medial portion of first gastral tergum; in profile, posterolateral and lateral margins of first gastral tergum smooth and shining; in profile, striae not visible or visible over a very limited part of more medial portions of segment. Most body surfaces with moderately abundant suberect to erect, medium-length whitish setae, numerous hairs on head, mesosoma, and gaster $>0.3-0.4 \times$ MOD. Head and gaster light to dark ferruginous orange; mesopleura, propodeum blackish to black; anterior and lateral portions of mesoscutum blackish to black, often with an orangish tint (Figure 85).


FIGURE 84. Photographs of Pogonomyrmex santschii holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0281099). Photographs by Shannon Hartman from www.AntWeb.org.


FIGURE 85. Photographs of Pogonomyrmex santschii paratype alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922093). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 86. Photographs of Pogonomyrmex santschii paratype male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0281106). Photographs by Shannon Hartman from www.AntWeb.org.

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) head dark brown; gaster dark ferruginous orange; mesosoma black, occasionally with a brownish infusion anterad, (3) erect hairs lacking on first gastral tergum, (4) in profile, longest hairs along posterolateral margin of first gastral tergum $>0.5 \times$ as long to approaching length of longest hairs on first gastral sternum, and (5) notauli absent (Figure 86).

Measurements- $(n=12)$. HL $0.98-1.28$; HW 1.14-1.28; MOD $0.42-0.47$; SL $0.31-0.42$; HFL $1.30-1.63$; ML 1.82-2.32; PW 0.37-0.52; PPW 0.63-0.71. Indices: SI 24.22-34.43; CI 102.52-120.75; OI 34.43-40.35; HFI 106.56-139.47.

Additional material examined. ARGENTINA: Mendoza: 4.5 km NE Las Leñas, 7680', Dec 6, 2003 (CASC; MCZC; RAJC); eastern peak of Valle Hermosas, 8700’, Dec 6, 2003 (RAJC); Valle Hermosas, 7430’, Dec 6, 2003 (RAJC). CHILE: Maule: Rt 115 at 0.6 km W Paso Pehuenche, 8320', Mar 3, 2014 (RAJC) (Figure 78C).

Etymology. This species is named to honor Dr. Felix Santschi, who was one of the most prolific ant taxonomists. Santschi described more South American forms of Pogonomyrmex (17) than any other person.

Discussion. Pogonomyrmex santschii might occur with several P. rastratus-group species. This species might be confused with several species because striae can be present or absent on the first gastral tergum. For workers lacking striae on the first gastral tergum, $P$. santschii is diagnosed by having head and gaster ferruginous orange, mesosoma black, occasionally with a weak orangish to reddish infusion on pronotum, infusion rarely present on mesonotum. Pogonomyrmex araucania, P. intermedia, P. maulensis, P. spinolae might be confused with P. santschii, but all of these species have a lighter reddish to reddish-brown mesosoma. For workers with striae on the first gastral tergum: (1) head and gaster ferruginous orange, mesosoma black, and (2) striae on first gastral tergum occur along base to extending over anterior one-third of segment, striae rarely extending over anterior one-half of segment, posterior margin usually smooth and shining. The only species with these characters are $P$. bolivianus and $P$. vermiculatus. Pogonomyrmex santschii is separated from P. bolivianus by: (1) superior propodeal spines long, length > $0.6 \times$ the distance between their bases, (2) inferior propodeal spines taller than length of superior propodeal spines, and (3) mesosoma blackish to black. In P. bolivianus: (1) superior propodeal spines consist of denticles to short triangular teeth with height less than width at their base, (2) in profile, inferior propodeal spines taller than length of superior propodeal spines, and (3) mesosoma dark ferruginous orange to orangish-brown. Pogonomyrmex santschii is separated from P. vermiculatus by its ferruginous orange head and gaster. In $P$. vermiculatus, the head is dark red to reddish-black and the gaster black.

Biology. Pogonomyrmex santschii workers are solitary foragers. Nests of P. santschii most commonly are placed under a rock or in a clump of Stipa sp. (Poaeceae) or other shrub. The nest entrance ranges from a hole in the ground to a tumulus up to 15 cm in diameter. Nests are most easily located by baiting workers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain approximately 500-1000 workers. Sexuals have been collected on January 25, indicating that mating flights occur during the austral summer.

Pogonomyrmex santschii occurs at elevations from 1835-2635 m, near the border of Chile and Argentina, and it occurs in the Southern Andean steppe and Valdivian temperate forests ecoregions, as defined by Olson et al. (2001) (Figure 78C).

## Pogonomyrmex semistriata NEW STATUS

(Figures 87-89)
Distribution-90A
Pogonomyrmex bispinosus var. semistriata Emery, 1906: 158 (worker, queen). Syntypes examined: 1 worker, 1 queen [MCZC], 3 workers [MHNG], 1 worker, 2 queens [MSNG]. CHILE, Valparaíso: Talca Province, Viña del Mar. MHNG worker here designated LECTOTYPE [CASENT0281100].
Pogonomyrmex brevispinosus var. spinolae Emery: Santschi, 1925: 223, misidentified workers.
Pogonomyrmex vermiculatus Emery: Snelling \& Hunt, 1975:75, incorrect synonymy.
Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) occurring in Chile, (2) concolorous medium to dark brownish-orange, and (3) first gastral tergum with striae along part to most of base to extending over anterior one-half of tergum, rest of tergum moderately to strongly coriarious, dull (Figure 87).


FIGURE 87. Photographs of Pogonomyrmex semistriata worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922466). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 88. Photographs of Pogonomyrmex semistriata alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0923352). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 89. Photographs of Pogonomyrmex semistriata male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0923351). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 90. Geographic distribution of: (A) Pogonomyrmex semistriata, (B) P. spinolae, and (C) P. strioligaster. The large black circle in each panel denotes the type locality.

Measurements-lectotype $(n=12)$. HL 1.51 (1.42-1.69); HW 1.64 (1.47-1.83); MOD 0.34 (0.29-0.39); OMD 0.35 ( $0.35-0.44$ ); SL 1.11 (1.04-1.31); PNW 1.07 ( $0.99-1.16$ ); HFL 1.67 (1.41-1.80); ML 1.91 (1.54-2.00); PW 0.38 ( $0.35-0.42$ ); PPW 0.53 ( $0.50-0.60$ ). Indices: SI 67.68 ( $61.20-79.39$ ); CI 108.61 ( $99.40-109.58$ ); OI 20.73 (18.07-23.64); HFI 101.83 (85.45-107.43).

Redescription. Head subquadrate to wider than long $(C I=99.40-109.58)$; posterior margin flat to weakly convex; in full-face view, medial rugae diverging toward posterior corners of head. Longitudinal rugae on cephalic dorsum weak to moderately prominent, wavy to moderately irregular. Interrugae on cephalic dorsum strongly to very strongly granulate-punctate, dull, with a beaded appearance; posterior corners rugose, interrugae moderately granulate, weakly shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.19-0.24 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=$ $1.00-1.34 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes (SI $=61.20-79.39$ ) reaching posterior corners or failing to do so by less than length of basal funicular segment; scape weakly to moderately striate, interstriae weakly to moderately punctate, weakly shining; basal flange moderately well developed with carinate margin. Psammophore well developed.

Mesosomal profile moderately convex; all mesosomal surfaces with prominent rugae to rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins rounded to weakly angulate. Promesonotal suture rarely present. Wavy to irregular longitudinal rugae to weakly rugoreticulate on mesonotum, rugae diverging anterad toward humeral shoulders of pronotum. Irregular transverse rugae to rugoreticulate on dorsum and sides of pronotum. Irregular rugae on mesopleura angle posterodorsally; irregular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines long, acuminate, length usually $>0.7 \times$ the distance between their bases. Inferior propodeal spines wider than high, triangular, apex broadly rounded to acuminate, height less than length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to moderately granulate, weakly shining. Legs weakly to moderately coriarious, weakly shining to smooth and shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with a weakly to well developed, broadly rounded process. In profile, posterior surface of petiolar node weakly convex; anterior surface notably shorter than posterior surface, apex angulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest near spatulate to broadly rounded anterior margin, narrowing posterad. Irregular transverse rugae (rarely oblique to longitudinal) on sides and posterior surface of petiolar node; interrugae weakly to moderately granulate, weakly shining. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, width and length similar; irregular, transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae moderately to strongly granulate, dull to weakly shining. First gastral tergum variable with longitudinal striae across part to most of base, or with striae extending over anterior one-third to one-half of tergum, rest of segment strongly coriarious, dull, or moderately coriarious posterior margin.

Erect, short to medium-length, whitish pilosity moderately abundant on head, no hairs $>0.7-0.8 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish setae. Rest of body with erect, moderately dense, medium-length, whitish setae, longest about $0.8-1.0 \times$ MOD. Body concolorous medium to dark brownish-orange or with petiolar node, postpetiole, gaster, and legs slightly darker than rest of body (Figure 87).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) first gastral tergum lacking striae $\underline{\boldsymbol{o r}}$ striae extending to posterior margin or portion lacking striae coriarious, (3) small (HW = 1.41-1.58 mm ), only slightly larger than conspecific workers, (4) transverse rugae on posterior surface of petiolar node and dorsum of postpetiole, (5) superior propodeal spines consist of short, acuminate, triangular denticles to long spines, and (6) body concolorous brownish-orange (Figure 88).

Measurements- $(n=2+3$ paralectotypes). HL 1.32-1.51; HW 1.41-1.58; MOD 0.31-0.36; OMD 0.32-0.42; SL 1.02-1.22; PNW 1.06-1.29; HFL 1.32-1.65; ML 1.83-2.22; PW 0.37-0.45; PPW 0.55-0.67. Indices: SI 64.5686.52; CI 102.17-112.88; OI 21.99-23.23; HFI 85.16-117.02.

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum moderately to strongly coriarious over anterior two-thirds or more of segment, (2) bicolored: head and mesosoma black, gaster dark orange to orangish-black, and (3) numerous delicate, long, nearly flexuous hairs on first gastral tergum (Figure 89). 36.36; HFI 122.58-138.18.

Additional material examined. CHILE: Bíobío: Talcahuano, no date (MCZC). Coquimbo: 30 km N Illapel, 5000 ', Nov 30, 1950 (CASC); Fray Jorge Forest, Dec 11, 1950 (CASC; LACM); Fray Jorge Forest, 5 km W Pachingo, 550 m, Apr 30, 1966 (CASC); Parque Nacional Fray Jorge, 15 km SW Pachingo, 100-200 m, Oct 20, 1966 (CASC); 35 mi S Ovalle, Nov 30, 1950 (CASC; LACM); Rt D-540 at 1.0 km W Rt 5, Jan 16, 2019 (RAJC); Valle de Encantado, 6700', Feb 17, 2019 (RAJC). Maule: Curicó, 1300', Oct 1, 1909 (USNM), Carrizalillo, 250 m, Jan 30-Feb 5, 1981 (RAJC; USNM). Metropolitan: Peñaflor, no date (MSNG); Pirque, 2660', Apr 9-27, 2017 (RAJC). Valparaíso: 10 km E Papudo, Nov 28, 1950 (CASC); E entrance to tunnel 90 km S Illapel, Nov 28, 1950 (CASC; LACM; RAJC); Punta Molles, Oct 26, 1971 (LACM), Algarrobo, Oct 24, 1923 (MZSP); 8 km SE Quintay, 150 m , Feb 17, 1967 (CASC; LACM); Viña del Mar, Feb 1931 (MACN); Marga Marga (= Estero Marga Marga), Dec 15, 1929 (IFML; MCZC; USNM) (Figure 90A).

Etymology. Emery did not discuss derivation of the name semistriata (Latin, from semi- $=$ half and striatus $=$ furrowed, striated), but his description suggests that it was derived from the first gastral tergum of the worker having longitudinal striae, while that of the queen lacked these striae.

Discussion. Pogonomyrmex semistriata is endemic to Chile, and it is readily separated from Chilean congeners by: (1) body concolorous medium to dark brownish-orange, (2) first gastral tergum with striae along part to most of base to extending over anterior one-half of tergum, rest of tergum moderately to strongly coriarious, dull or first gastral tergum (including posterior margin) moderately to strongly coriarious, dull, (3) irregular transverse rugae to rugoreticulate on dorsum and sides of pronotum. Pogonomyrmex araucania, P. bispinosus, and P. spinolae are the only Chilean congeners in which the body is concolorous or nearly concolorous light to dark ferruginous orange to reddish-brown, but all three species lack striae on the first gastral tergum and the posterior margin is usually smooth and shining.

Emery (1906) described the worker and queen of P. bispinosus var. semistriata from coastal Chile, indicating that this variety differed from the type by: (1) presence of transverse rugae on the posterior surface of the petiolar node and dorsum of the postpetiole (transverse rugae lacking in P. bispinosus; see Johnson, 2015), (2) presence of subtle striae near the base of first gastral tergum and opaque near the middle (entire tergum smooth and shining in P. bispinosus), and (3) petiolar node and postpetiole of queen as in workers, whereas the entire first gastral tergum was smooth and shining. The only subsequent taxonomic work on P. bispinosus var. semistriata removed this taxon from synonymy under $P$. bispinosus and placed it as a junior synonym of $P$. vermiculatus (Snelling \& Hunt, 1975). In their discussion, Snelling \& Hunt (1975) indicated that $P$. bispinosus was a distinct species and that $P$. bispinosus var. semistriata and several Chilean forms usually assigned to $P$. bispinosus (i.e., intermedia, spinolae) were more closely related to $P$. vermiculatus. Consequently, Snelling \& Hunt (1975) synonymized all three forms under $P$. vermiculatus, saying "there are no appreciable differences between Patagonian $P$. vermiculatus and the several Chilean infraspecific forms usually assigned to P. bispinosus. There are so many populations of indeterminate status that recognition of any of these nominate forms is impossible, hence the synonymy". Problematically, these authors did not examine syntypes of $P$. vermiculatus, and it appears that they examined only one series $P$. vermiculatus from Magallanes Province, Chile.

Workers and queens of $P$. semistriata display several morphological differences from $P$. vermiculatus that include: (1) both castes are concolorous medium to dark brownish-orange, whereas those of $P$. vermiculatus are bicolored (dark red head and black mesosoma and gaster), and (2) queens of $P$. semistriata are diminutive (similar in size to conspecific workers) compared to those of $P$. vermiculatus, which are significantly larger than their workers. Thus, I raise $P$. bispinosus var. semistriata from synonymy to rank as a valid species.

Santschi (1925) described the worker of P. bispinosus var. spinolae (misspelled as P. brevispinosus var. spinolae), placing it as conspecific with sexuals (queens and males) that Emery (1906) had moved from P. bispinosus to P. bispinosus var. spinolae. Santschi (1925) took this action without having sexuals to match with his workers, and it appears that he described these workers as var. spinolae because they differed from workers of $P$. semistriata. The description by Santschi compared his newly described workers with $P$. semistriata, saying "almost all of the first gastral tergum striate, both nodes of the petiole with transverse rugae as in var. semistriata Emery. It differs from the latter (var. semistriata) because it has slightly longer spines and longer pilosity. It is darker red, turning darker towards the mandibles, the front of the cheeks, and top of the gaster. Size a little larger ( 6 to 6.2 mm .)". Most workers of the series that Santschi identified as P. bispinosus var. spinolae had relatively long superior propodeal spines
and pilosity, but pilosity on some workers was shorter with a length similar to that on syntypes of $P$. semistriata. The morphology of $P$. semistriata syntypes also varied as the MCZC and MSNG workers had short superior propodeal spines, while the NHMW worker had longer spines whose length was similar to that of Santschi's worker series. The author collected nest series of $P$. spinolae that contained workers and sexuals, and workers lacked striae on their first gastral tergum that characterize P. semistriata. Lastly, Santschi's worker series was collected in Valparaíso (no details were given as to whether this was the city or region), which is near the type locality of $P$. semistriata, but outside the known geographic range for $P$. spinolae (see below). Moreover, syntypes of $P$. semistriata and Santschi's workers display considerable variation, but there are no consistent morphological differences between them.

Biology. Several studies have examined foraging, activity patterns, and recruitment chemistry for $P$. vermiculatus in Chile (Medel \& Fuentes, 1995; Torres-Contreras, Olivares-Donoso, \& Niemeyer, 2007, 2009). Vouchers from these studies have not been examined, but it is doubtful that $P$. vermiculatus was the species investigated because these studies used workers from Las Chinchillas National Reserve and Fray Jorge National Park, both of which are in central Chile, several hundred kilometers north of the known range of $P$. vermiculatus. It is probable that all of these studies were conducted on P. semistriata. Two alate queens (paralectotypes) were collected on 26 March, and two other alate queens were collected on 21 April, suggesting that mating flights occur during the austral summer.

Pogonomyrmex semistriata is restricted to coastal and low elevation habitats ( $0-2100 \mathrm{~m}$ ) in central Chile in the Valdivian temperate forests and Chilean matorral ecoregions, as defined by Olson et al. (2001) (Figure 90A).

## Pogonomyrmex spinolae NEW STATUS

(Figures 2G-H, 91-93)
Distribution-90B
Pogonomyrmex bispinosus var. spinolae Emery, 1906: 158 (queen, male). Syntypes examined: 1 queen, 1 male [MSNG]. CHILE, Bíobío: Tucapel (Claude Gay leg.). MSNG queen here designated LECTOTYPE [CASENT0280987].
Pogonomyrmex vermiculatus Emery: Snelling \& Hunt, 1976: 75, incorrect synonymy.

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) well developed psammophore, (2) first gastral tergum lacking striae, weakly to strongly coriarious along base or extending over anterior one-half of segment or with faint, barely visible, unincised striae on anterior one-third to one-half of segment, (3) posterior margin and usually posterior one-third or more of first gastral tergum smooth and shining to strongly shining, rarely weakly coriarious, (4) transverse rugae on posterior surface of petiolar node and dorsum of postpetiole, (5) head and mesosoma concolorous to nearly concolorous light to dark ferruginous orange to reddish-brown, (6) clypeus ferruginous orange to reddish-brown, concolorous with adjacent cephalic dorsum, (7) legs and antennal scapes usually orangish-brown, occasionally brownish to blackish, and (8) superior propodeal spines long, length $>0.6 \times$ the distance between their bases, (8) legs and antennal scapes usually orangish-brown, occasionally brownish to blackish, and (9) for most to all workers in a series, at least several hairs on dorsum of mesosoma $\geq 0.7-0.8 \times \mathrm{MOD}$ and greater than length of superior propodeal spines (Figure 91).

Measurements- $(n=25)$. HL 1.33-1.72; HW 1.47-1.84; MOD 0.28-0.36; OMD 0.31-0.45; SL 1.06-1.39; PNW 0.96-1.21; HFL 1.44-1.92; ML 1.68-2.10; PW 0.33-0.47; PPW 0.52-0.65. Indices: SI 67.03-79.41; CI 101.20-111.97; OI 17.83-21.43; HFI 85.29-109.09.

Redescription. Head subquadrate to wider than long $(C I=101.20-111.97)$, broadest just posterior to eyes; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent, sometimes becoming more irregular to weakly rugoreticulate posterior to eyes; in full-face view, medial rugae usually diverging toward posterior corners of head. Posterior corners rugose, interrugae weakly to moderately granulate, weakly shining to dull, occasionally smooth and shining. Cephalic interrugae strongly granulate, dull, with a beaded appearance. Anterior margin of clypeus concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and ventral side of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.18-0.23 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.94-1.41 \times \mathrm{MOD}$. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=67.03-79.41$ ) failing to reach posterior corners of head by less than length of basal funicular segment. Antennal scapes smooth and shining to moderately coriarious, weakly shining, often with weak longitudinal striae, basal flange moderately well developed, flattened, with carinate margin. Psammophore well developed.


FIGURE 91. Photographs of Pogonomyrmex spinolae worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914359). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 92. Photographs of Pogonomyrmex spinolae alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914360). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 93. Photographs of Pogonomyrmex spinolae male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0914361). Photographs by Michele Esposito from www.AntWeb.org.

Mesosomal profile weakly to moderately convex. All mesosomal surfaces with prominent subparallel, irregular rugae to rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, anterolateral margins angulate. Dorsum of mesonotum with strongly irregular, longitudinal rugae that diverge toward humeral shoulders of pronotum, anteromedial portion of pronotum rugoreticulate or anterad portion to all of pronotum and sometimes anterad portion of mesonotum rugoreticulate. Pronotal sides rugoreticulate. Irregular rugae on mesopleura angle posterodorsally, secondary rugae sometimes present; irregular transverse to oblique rugae on dorsum of propodeum traverse anteroventrally onto mesopleura. Promesonotal suture usually absent. Superior propodeal spines long, length $>0.6 \times$ the distance between their bases, spines connected by well defined keel; inferior propodeal spines broader than high, apex weakly rounded to acuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to moderately granulate-punctate, weakly shining. Legs weakly to moderately coriarious, weakly shining.

Peduncle of petiole about $0.8 \times$ long as petiolar node, anteroventral margin with moderately to well developed rounded process that narrows posterad, then continues subparallel-parallel to near posteroventral margin of petiolar node. In profile, posterior surface of petiolar node weakly convex, node asymmetrical with posterior surface longer than anterior surface, apex weakly rounded to subangulate. In dorsal view, petiolar node longer than broad, widest near spatulate anterior margin, gradually tapering posterad. Posterior surface of petiolar node with regular to irregular, wavy or arcuate, transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest at or near posterior margin, tapering to anterior margin, maximum width and length about equal. Wavy to irregular, transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on both surfaces weakly to moderately coriarious, weakly shining. First gastral tergum weakly to strongly coriarious along base to extending over anterior one-half of segment, sculpturing sometimes appearing as faint, barely visible, unincised striae on anterior one-third to one-half of segment; posterior margin and usually posterior one-third or more of first gastral tergum smooth and shining to strongly shining, rarely weakly coriarious.

Erect, medium-length, white to cream colored pilosity moderately abundant on head, most hairs approximately $0.3-0.4 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white to yellowish setae. Mesosoma, petiolar node, postpetiole, and gastral terga with erect, moderately dense, medium-length to long, white setae, longest hairs on mesosoma and posterior surface of petiolar node. For most to all workers in a series, at least several hairs on dorsum of mesosoma $\geq 0.7-0.8 \times \mathrm{MOD}$ and greater than length of superior propodeal spines. Body concolorous dark reddish-brown or with mesosoma and gaster slightly darker reddish-brown to reddish-black (Figure 91).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae and coriaceous sculpture cover more than anterior two-thirds of medial portion of first gastral tergum, posterolateral margins smooth and shining $\underline{\boldsymbol{r}}$ first gastral tergum smooth and shining, (3) transverse rugae cover posterior surface of petiolar node and dorsum of postpetiole, (4) longitudinal rugae on cephalic dorsum posterior to eyes strongly irregular, often with short lateral branches; interrugae strongly granulate, dull, with a beaded appearance, (5) head, pronotum, mesoscutum, mesoscutellum, anepisternum, katepisternum nearly concolorous to concolorous ferruginous orange, reddish-brown to brownish-red, or reddish-black, and (6) in profile, most hairs on dorsum of mesoscutum and mesocutellum approach to exceed MOD (Figures 2G-H \& 92).

Measurements-lectotype $(n=12)$. HL 1.71 (1.37-1.56); HW 1.80 (1.43-1.61); MOD 0.40 ( $0.31-0.37$ ); OMD 0.44 ( $0.31-0.43$ ); SL 1.20 (1.01-1.13); PNW 1.34 (1.13-1.28); HFL 1.79 (1.30-1.60); ML 2.45 (2.03-2.36); PW 0.53 ( $0.38-0.45$ ); PPW 0.73 ( $0.59-0.71$ ). Indices: SI 66.67 ( $64.38-73.82$ ); CI 105.26 ( $99.72-111.11$ ); OI 22.22 (20.13-25.17); HFI 99.44 (89.66-103.40).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) first gastral tergum with several to numerous suberect to erect hairs, (3) mesoscutum mostly smooth and shining, and (4) notauli absent (Figure 93).

Measurements-paralectotype $(n=12)$. HL 1.42 (1.12-1.25); HW 1.35 (1.15-1.32); MOD 0.47 ( $0.41-0.49$ ); OMD 0.16 ( $0.13-0.25$ ); SL 0.41 ( $0.31-0.51$ ); HFL 1.81 (1.41-1.74); ML 2.37 (1.87-2.29); PW 0.48 ( $0.40-0.50$ ); PPW * (0.62-0.72). Indices: SI 30.37 (26.50-41.80); CI 95.07 ( $96.69-106.45$ ); OI 34.81 ( $33.33-41.18$ ); HFI 134.07 (118.49-151.30). * = missing.

Additional material examined. CHILE: Bíobío: Rt N-31 at 5.8 km E San Fabián de Alico, 1580’, Mar 2, 2014 (MNNC; RAJC); Rt Q-45 at 9.2 km E Antuco, 2310', Feb 28, 2014 (IFML; LACM; MACN; MCZC; MNNC;

RAJC; UCDC; USNM); Rt Q-59 at 5.8 km S Tucapel, 1050', Mar 1, 2014 (RAJC); Penco, Mar 14, 1945 (USNM). Maule: Rt 115 at Paso Nevado (pueblo), 1500', Mar 3, 2014 (RAJC); Hwy 115 at 5.0 km E Lago Colbún, 1520', Sep 11, 2014 (RAJC); 115 at 51.4 km W Paso Pehuenche, 3550', Mar 3, 2014 (RAJC). Metropolitan: Camino Embalse El Yeso at 9.5 km ENE turnoff from Camino Al Volcán, 5700', Feb 8, 2019 (RAJC) (Figure 90B).

Etymology. Emery did not give information regarding the naming of this taxon in his description, but it is apparent that the name honored Spinola, who first described the queen and male as Atta bispinosus.

Discussion. Pogonomyrmex spinolae is distinguished from congeners by: (1) first gastral tergum lacking striae, weakly to strongly coriarious along base or extending over anterior one-half of segment $\underline{\boldsymbol{o r}}$ with faint, barely visible, unincised striae on anterior one-third to one-half of segment, (2) superior propodeal spines long, length $>0.6 \times$ the distance between their bases, (3) transverse rugae on posterior surface of petiolar node and dorsum of postpetiole, and (4) head and mesosoma concolorous to nearly concolorous light to dark ferruginous orange to reddish-brown. Pogonomyrmex araucania is the only congener that also fits this diagnosis. Length of hairs on the dorsum of the mesosoma separates $P$. spinolae and P. araucania. In P. spinolae these hairs are longer, with most hairs approaching to exceeding the MOD, while in $P$. araucania these hairs are shorter with most hairs $\leq 0.6-0.7 \times$ MOD. Note that hair length varies among individuals such that determinations should be made after examining several or more workers.

Pogonomyrmex bispinosus var. spinolae was described from queens and males that Gay collected at a mating aggregation near Tucapel, Chile. These were among the syntypes of Spinola's $P$. bispinosus, but Emery separated them from the bispinosus worker syntype, which was from Santa Rosa, a site approximately 500 km north of Tucapel (see also Johnson, 2015). In his discussion, Emery (1906) noted that syntype queens from the Spinola collection had a streaked (= striate) basal segment (= first gastral tergum) and that this character did not coincide with the description for the syntype worker. Therefore, Emery reidentified the sexuals as the new variety P. bispinosus var. spinolae. That Emery separated the queen from P. bispinosus was correct given that $P$. bispinosus queens are ergatoid (Johnson, 2015). Consequently, determining the identity of $P$. bispinosus var. spinolae necessitated examining series that contained workers and sexuals from the type locality.

Riso Patron (1924) indicated that there are two Tucapels in the Bíobío Region of Chile, one near the coastal town of Concepción and one in Bíobío Province. Baeza (2012) gave an account of travels by Gay saying that he visited Tucapel, which was near Antuco in Bíobío Province; this Tucapel is presumed to be the type locality. Queens and males collected from colonies near Tucapel and Antuco matched the lectotype queen and male that I examined with the exception that the lectotype queen is larger and lighter in color than the other more recently collected queens (see queen measurements above). These collections also associated workers with queens and males. Santschi (1925) described putative workers of $P$. brevispinosus var. spinolae, but examination of these workers revealed that they were $P$. semistriata and not $P$. spinolae (see discussion under $P$. semistriata).

It is also notable that queens of $P$. spinolae displays colony level variation in regard to striae on the first gastral tergum. In two colonies, all queens had striae that extended over most of their first gastral tergum, while all queens in a third colony lacked striae on their first gastral tergum.

The seven workers from Penco, Concepción Province, Chile (USNM, examined) were identified as P. spinolae, but their ferruginous orange coloration was very light compared to the dark red to reddish-black workers collected by the author. It seems likely that color of these workers faded in the $60+$ years since they were collected by Chapin (see CASENT0103404 at http://www.antweb.org/), as also apparently occurred in the lectotype queen. Regardless, workers should be recollected from this area to verify their identity.

Biology. Pogonomyrmex spinolae workers are solitary foragers, but workers have also been observed to forage in loose columns of scattered foragers. Nests are placed in open, exposed sites or in a grass clump or under a stone. Nests have one or two entrances that are typically surrounded by a tumulus up to 25 cm in diameter; most nests also have an external chaff midden up to 20 cm in diameter. Sexuals have been collected from February 28-March 3 indicating that mating flights occur during the austral summer. The syntype series of sexuals was collected by Gay, who said only that he observed numerous winged queens and males during a mating flight (Spinola, 1851), but he did not indicate a date. Partial nest excavations indicated that colonies probably contain up to 1000 workers.

Pogonomyrmex spinolae inhabits sites at elevations from 320-1690 m. This species occurs in the Valdivian temperate forests and Chilean matorral ecoregions, as defined by Olson et al. (2001) (Figure 90B).

## Pogonomyrmex strioligaster NEW SPECIES

(Figures 94-96)
Distribution-90C

Holotype worker [MACN: CASENT0922162]: ARGENTINA, Neuquén: Departamento Catán Lil, 54 km NE Rahue, $39^{\circ} 21.6^{\prime} \mathrm{S} 70^{\circ} 40.2^{\prime} \mathrm{W}, 3400^{\prime}(1030 \mathrm{~m})$, 8 December 2003 (R.A. Johnson \#3315). Paratypes, same data as holotype: IFML ( 3 workers), MACN ( 6 workers), LACM ( 6 workers), MCZC ( 5 workers), RAJC ( 2 workers, 2 alate queens), UCDC (3 workers), USNM (3 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum, posterolateral margins smooth and shining, (2) superior propodeal spines long, length $>0.7 \times$ the distance between their bases, (3) bicolored: head and gaster dark ferruginous orange to reddish-orange; mesosoma black or with pronotum and sometimes dorsum of mesonotum dark reddish-orange, (4) rugae on dorsum of promesonotum irregular to rugoreticulate, and (5) promesonotal suture usually present (Figure 94).

Measurements-holotype ( $n=6+6$ paratypes). HL 1.62 (1.36-1.65); HW 1.63 (1.38-1.75); MOD 0.35 (0.290.37); OMD 0.37 ( $0.30-0.41$ ); SL 1.35 (1.16-1.39); PNW 1.05 ( $0.94-1.19$ ); HFL 1.77 (1.42-1.86); ML 1.88 (1.392.04); PW 0.44 ( $0.40-0.46$ ); PPW 0.61 ( $0.47-0.63$ ). Indices: SI 83.07 ( $75.30-84.62$ ); CI 100.62 ( $99.31-108.33$ ); OI 21.47 (19.19-22.56); HFI 108.59 (93.59-113.79).

Description. Head quadrate to wider than long $(C I=99.31-108.33)$, widest just posterior to eyes; posterior margin flat in full-face view. Longitudinal cephalic rugae prominent, wavy to irregular. In full-face view, medial rugae diverging toward posterior corners of head. Interrugae on cephalic dorsum strongly granulate, dull, with a beaded appearance; posterior corners rugose, interrugae smooth and shining to weakly coriarious, weakly shining. Anterior margin of clypeus concave, dorsum with subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and basolateral margins of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.23 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.92-1.21 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=75.30-84.62$ ) ranging from failing to reach or surpassing posterior corners of head by less than width of basal funiculus; scapes with moderately strong, longitudinal striae, interstriae weakly coriarious, weakly shining to smooth and shining. Basal flange of scapes well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly convex. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins angulate. All mesosomal surfaces with prominent, coarse rugae; strongly irregular, longitudinal rugae to rugoreticulate on mesonotum, rugae diverging anterad toward humeral shoulders of pronotum, medial rugae sometimes continuing to anterior margin of pronotum or pronotum rugoreticulate; pronotal sides with strongly irregular rugae traversing ventrally or posteroventrally, with numerous lateral branches to rugoreticulate. Promesonotal suture usually present. Rugae on mesopleura angle posterodorsally; irregular transverse to oblique rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines long, length about $0.7 \times$ the distance between their bases, spines connected by well developed keel. Inferior propodeal spines wider than high, apex broadly rounded to subacuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to strongly granulate, weakly shining to dull. Legs smooth and shining to moderately coriarious, weakly shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with a well developed, rounded process that often continues posterad subparallel-parallel to dorsal margin of peduncle. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex weakly rounded to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, gradually tapering posterad. Posterior surface of petiolar node with regular, wavy, or irregular transverse rugae. In profile, dorsum of postpetiole convex; in dorsal view, widest at or near posterior margin, tapering anterad, maximum width and length about equal. Wavy to irregular transverse to arcuate rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole smooth and shining to weakly coriarious, weakly shining. Striae extend over anterior one-half or more of first gastral tergum; posterolateral margins smooth and shining.

Erect, mostly short to medium-length, yellowish pilosity moderately abundant on head, one to several longer
hairs along posterior margin approximately $0.8 \times$ MOD. Moderately abundant semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to semidecumbent yellowish setae. Mesosoma, petiolar node, postpetiole, and gastral terga with erect, moderately dense, medium-length, creamy to yellowish setae, mostly similar in length, longest approximately $0.8 \times$ MOD. Head and gaster dark ferruginous orange to reddish-orange, darker transverse band often present along posterior margin of terga; mesosoma black or with pronotum and sometimes dorsum of mesonotum dark reddish-orange; petiolar node and postpetiole blackish to black; antennal scapes and legs blackish-orange to blackish (Figure 94).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) striae extend over anterior one-third to one-half of medial portion of first gastral tergum, in occasional individuals striae and/or coriarious sculpture extending over slightly more than anterior one-half of tergum, rest of tergum smooth and shining, (2) head, mesoscutum, mesoscutellum, gaster ferruginous orange to orangish-black; mesopleura, propodeum blackish to black, (3) posterior corners rugose, interrugae weakly shining to dull, (4) in dorsal view, interrugae on mesoscutum moderately to strongly granulate, weakly shining to dull, and (5) transverse rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 95).

Measurements-( $n=1+2$ paratypes). HL 1.61-1.69; HW 1.65-1.73; MOD 0.36-0.38; OMD 0.34-0.41; SL 1.24-1.31; PNW 1.34-1.44; HFL 1.67-1.79; ML 2.33-2.40; PW $0.47-0.52$; PPW $0.70-0.79$. Indices: SI $71.68-$ 79.39; CI 100.59-105.49; OI 21.18-21.97; HFI 98.27-105.29.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to subquadrate $(\mathrm{CI}=100.59-105.49)$, widest just posterior to eyes, posterior margin flat to weakly convex. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae diverging toward posterior corners of head; interrugae on cephalic dorsum weakly to moderately gran-ulate-punctate, with a beaded appearance, weakly shining to shining; posterior corners rugose, interrugae weakly granulate, weakly shining to dull. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel, regular to wavy rugae, rugae irregular to rugoreticulate on pronotal sides; interrugae on mesoscutum moderately to strongly granulate, weakly shining to dull, interrugae on other parts of mesosoma weakly granulate-punctate, weakly shining; superior propodeal spines moderately long, bluntly tipped; inferior propodeal spines wider than tall, apex weakly rounded to subangulate. Peduncle of petiole long, anteroventral margin with a well developed, broadly rounded process that narrows, then continues posterad parallel to dorsal surface of peduncle. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate. Posterior surface of petiolar node with wavy to irregular, transverse rugae, weakly shining. In dorsal view, postpetiole wider than long; dorsum with wavy to irregular, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly granulate-punctate, weakly shining. Striae extend over anterior one-third to one-half of medial portion of first gastral tergum, in occasional individuals striae and/or coriarious sculpture extending over slightly more than anterior one-half of tergum, rest of tergum smooth and shining. Most body surfaces with moderately abundant suberect to erect, medium-length, whitish setae. Head, mesoscutum, mesoscutellum, gaster ferruginous orange to orangish-black, blackish transverse band often present along posterior margin of terga; pronotum blackish-orange; mesopleura, propodeum, antennae blackish to black (Figure 95).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) head and mesosoma black, gaster ferruginous orange, (3) erect hairs lacking on first gastral tergum, (4) anterior portion of anepisternum and katepisternum smooth and shining, (5) posterior surface of petiolar node with weak irregular rugae, (6) dorsum of postpetiole with weak irregular rugae, interrugae weakly shining to dull (Figure 96).

Measurements- $(n=1)$. HL 1.23; HW 1.24; MOD 0.45; OMD 0.18; SL 0.42; HFL 1.71; ML 2.24; PW 0.52; PPW 0.70. Indices: SI 33.87; CI 100.81; OI 36.29; HFI 137.90.

Additional material examined. ARGENTINA: Neuquén: 1.0 km W entrance to Parque Nacional Lanin, 3160', Feb 2, 2011 (MCZC; RAJC); Aluminé, Jan 19-20, 1949 (IFML; LACM; MZSP); Caviahue, Jan 18, 2010 (RAJC); Loncopue-Caviahue, Jan 18, 2010 (RGPC); 6 km S Laguna Blanca, 4600', Dec 7, 2003 (MCZC; RAJC); Las Lajas-Pino Hachado, no date (MACN) (Figure 90C).

Etymology. The specific epithet strioligaster (Latin, strioli $=$ very fine striae, plus gaster $=$ gaster) is derived from the fine striae that extend over the anterior one-half or more of the first gastral tergum.


FIGURE 94. Photographs of Pogonomyrmex strioligaster holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922162). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 95. Photographs of Pogonomyrmex strioligaster alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922163). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 96. Photographs of Pogonomyrmex strioligaster male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922164). Photographs by Michele Esposito from www.AntWeb.org.

Discussion. Pogonomyrmex strioligaster is distinguished from all congeners by: (1) striae extending over anterior one-half or more of first gastral tergum, posterolateral margins smooth and shining, (2) head and gaster ferruginous orange, mesosoma black or with pronotum and sometimes dorsum of mesonotum dark reddish-orange, (3) superior propodeal spines long, length $>0.7 \mathrm{x}$ the distance between their bases, and (4) dorsum of pronotum rugoreticulate.

Biology. Little is known about the biology of $P$. strioligaster. The few nests that have been observed were under a stone or in a clump of grass; one colony had three entrances at the edge of a large stone. Sexuals have been collected from 8 December (callow queens) through 18 January, suggesting that mating flights occur during the austral summer. Partial nest excavations indicated that colonies contain up to 2000 or more workers.

Pogonomyrmex strioligaster inhabits sites at elevations from 955-1030 m. This species occurs in the Valdivian temperate forests and Patagonian steppe ecoregions, as defined by Olson et al. (2001) (Figure 90C).

## Pogonomyrmex tafi NEW SPECIES

(Figures 3E-F, 10G, 97-99)
Distribution-100A

Holotype worker [MACN: CASENT0235307]: ARGENTINA, Tucumán: Departamento Tafi de Valle, 2.2 km N El Infiernillo, $26^{\circ} 44.3^{\prime} \mathrm{S}, 65^{\circ} 46.9^{\prime} \mathrm{W}$, 9920 feet ( 3005 m ), 18 January 2010 (R.A. Johnson \#4331). Paratypes, same data as holotype: IFML (3w), MACN (6w), LACM (3w), MCZ (6w), USNM (3w), RAJC (11w, 1dq, 12m), UCDC (3w). Additional paratype series from the same locality and date or on 26 January 2010—RAJ \#4330: RAJC (1 dq); RAJ \#4332: RAJC (4w); RAJ \#4333: IFML (3w), MACN (3w), MCZ (6w), RAJC (6w); RAJ \#4334: MACN (9w), RAJC (12w); RAJ \#4336: MACN (3W), RAJC (9w); RAJ \#4337: IFML (3w), MACN (3w), RAJC (6w); RAJ \#4358: MACN (3W), RAJC (5w, 2m).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins mostly smooth and shining, (2) rugae on dorsum of promesonotum strongly irregular, often becoming rugoreticulate on pronotum, (3) dorsum of pronotum notably darker than adjoining mesonotum, (4) head ferruginous orange, rest of body mostly blackish to black except for an orangish infusion on dorsum of mesonotum and sometimes anterior portion of mesopleura, and (5) rugae on mesopleura wavy to irregular, usually with numerous lateral branches that often connect with adjacent rugae (Figures 10G, 97).

Measurements-holotype ( $n=12$ paratypes). HL 1.28 (1.54-1.62); HW 1.62 (1.50-1.62); MOD 0.33 (0.340.38); OMD 0.38 (0.38-0.45); SL 1.24 (1.11-1.31); PNW 1.09 (0.99-1.11); HFL 1.51 (1.39-1.70); ML 1.93 (1.742.02); PW 0.40 (0.37-0.47); PPW 0.54 (0.52-0.58). Indices: SI 76.54 (72.08-81.01); CI 102.53 (96.77-101.94); OI 20.37 (21.52-23.72); HFI 93.21 (90.26-105.70).

Description. Head subquadrate to quadrate $(\mathrm{CI}=96.77-102.53)$; posterior margin flat in full-face view. Longitudinal irregular rugae on cephalic dorsum prominent, in full-face view, medial rugae not diverging to diverging toward posterior corners of head with one to few irregular to strongly irregular, discontinuous transverse rugae along medioposterior margin in the latter case; interrugae moderately to strongly granulate, dull to weakly shining, with a beaded appearance; posterior corners weakly rugose, interrugae smooth and shining to strongly shining. Clypeus with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, yellowish macrochaetae project from anterior margin of clypeus and ventral side of mandibles. Mandibles with six to seven teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.24 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=1.02-1.29 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=72.08-81.01$ ) failing to reaching posterior corners of head by width of basal funicular segment. Antennal scapes weakly to moderately striate, interstriae moderately punctate, weakly shining; basal flange moderately well developed with carinate margin. Psammophore well developed.

Mesosomal profile moderately convex; all mesosomal surfaces with prominent, weakly to strongly irregular, subparallel-parallel rugae. In dorsal view, humeral shoulders of pronotum enlarged, strongly angulate. Promesonotal suture usually weakly impressed. Irregular longitudinal rugae on mesonotum, irregular on pronotum to occasionally rugoreticulate-vermiculate anteromedially, lateral rugae diverging toward humeral shoulders of pronotum and continuing in various configurations on pronotal sides; one to several transverse to oblique rugae usually present


FIGURE 97. Photographs of Pogonomyrmex tafi holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0235307). Photographs by Estella Ortega from www.AntWeb.org.


FIGURE 98. Photographs of Pogonomyrmex tafi paratype dealate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922473). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 99. Photographs of Pogonomyrmex tafi paratype male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0235303). Photographs by Shannon Hartman and Will Ericson from www.AntWeb.org.


FIGURE 100. Geographic distribution of: (A) Pogonomyrmex tafi, (B) P. varicolor, and (C) P. vermiculatus. The large black circle in each panel denotes the type locality.
along anterior margin of pronotum. Wavy to strongly irregular rugae on mesopleura traverse posterad or angle posterodorsally, usually with numerous lateral branches that sometimes connect to adjacent rugae; transverse, oblique, or longitudinal rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines consist of weakly subangulate to acuminate denticles, small triangular teeth, or moderately long spines, longest spines $<0.4 \times$ the distance between their bases; spines usually connected by well defined keel. Inferior propodeal spines triangular, wider than high, apex broadly rounded to subangulate, height slightly less than to similar to length of superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to moderately granulate-punctate, dull to weakly shining. Legs moderately coriarious, weakly shining.

Peduncle of petiole slightly shorter than petiolar node, anteroventral margin with poorly developed broadly rounded process to well developed triangular process, apex broadly rounded. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface longer than posterior surface, apex subangulate to weakly rounded. In dorsal view, petiolar node longer than wide, widest immediately posterior to spatulate anterior margin. Posterior surface of petiolar node with wavy to irregular transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing to anterior margin, width and length similar; dorsal surface with weakly to strongly irregular transverse rugae. Rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node, interrugae weakly to moderately punctate, dull to smooth and shining. Striae extend over anterior two-thirds or more of medial portion of first gastral tergum, posterolateral margins smooth and shining to weakly coriarious, weakly shining.

Erect, short to medium length, whitish to yellowish pilosity moderately abundant on head, longest hairs usually along posterior margin, most hairs $<0.4 \times \mathrm{MOD}$, one to few hairs sometimes reaching $0.7-0.8 \times \mathrm{MOD}$. Moderately abundant semidecumbent to decumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish setae. Rest of body with moderately dense, erect, medium length, whitish setae; hairs on mesosoma rarely $>0.6-0.7 \times$ MOD. Head dark ferruginous orange to dark reddishorange or orangish-brown except for black mandibles, clypeus, and antennal scapes; mesonotum blackish to black except for an orangish infusion on mesonotum and sometimes anterior one-half of mesopleura; rest of body blackish to black, except for occasional brownish-black posterior gastral terga (Figures 10G, 97).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae cover more than anterior one-half of medial portion of first gastral tergum, (3) in lateral view, posterolateral and lateral margins of first gastral tergum smooth and shining; in lateral view, striae not visible or visible over a very limited part of more medial portions of segment, (4) head ferruginous orange to orangish-brown; mesoscutum, mesoscutellum dark orangish-brown or dark reddish to reddish-brown; pronotum, anepisternum, gaster blackish to black, first gastral tergum often with a weak orangish infusion, (5) relatively small ( $\mathrm{HW}=1.43-1.87 \mathrm{~mm}$; PNW $=1.15-1.42 \mathrm{~mm}$; ML $=1.89-2.55 \mathrm{~mm})$, (6) cephalic dorsum posterior to ocelli with irregular rugae, often with lateral branches to rugoreticulate, (7) in posterodorsal view, posterior margin of head with up to several transverse, strongly irregular, medial rugae with short lateral branches, and (8) transverse rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 98).

Measurements-( $n=1+2$ paratypes). HL 1.47-1.90; HW 1.48-1.87; MOD 0.29-0.41; OMD 0.31-0.44; SL $0.99-1.31$; PNW 1.17-1.40; HFL 1.40-1.84; ML 1.90-2.55; PW $0.43-0.55$; PPW $0.60-0.75$. Indices: SI 66.8970.72; CI 100.68-106.47; OI 19.59-21.58; HFI 90.06-96.84.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full face view, head subquadrate ( $\mathrm{CI}=100.68-106.47$ ), broadest just posterior to eyes, posterior margin flat. Longitudinal cephalic rugae prominent, wavy to irregular; cephalic dorsum posterior to ocelli with irregular rugae, often with lateral branches to rugoreticulate; in full-face view, medial rugae weakly diverging toward posterior corners of head, in posterodorsal view, posterior margin of head with up to several transverse, irregular rugae; interrugae on cephalic dorsum moderately to strongly granulate-punctate, with a beaded appearance, dull to weakly shining; posterior corners rugose, interrugae moderately granulate-punctate, weakly shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel, regular to wavy rugae, rugae irregular to rugo-reticulate-vermiculate on pronotal sides; interrugae weakly to moderately granulate-punctate, weakly dull to weakly shining; superior propodeal spines consist of short, triangular teeth, length similar to or less than width at base; inferior propodeal spines wider than tall, apex broadly rounded. Peduncle of petiole long, anteroventral margin with a weakly to moderately well developed, broadly rounded process. In profile, petiolar node asymmetrical with anterior
surface shorter than posterior surface, apex of node subangulate to angulate. Posterior surface of petiolar node with wavy to irregular, transverse rugae to partly rugoreticulate. In dorsal view, postpetiole wider than long; dorsum with wavy to irregular, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae on both surfaces weakly granulate-punctate, weakly shining. Striae cover more than anterior one-half of medial portion of first gastral tergum; in lateral view, posterolateral and lateral margins of first gastral tergum smooth and shining; in lateral view, striae not visible or visible over a very limited part of more medial portions of segment. Most body surfaces with moderately abundant suberect to erect, short to long, cream-colored to yellowish setae. Head ferruginous orange to orangish-brown; mesoscutum, axilla, mesoscutellum concolorous to head to orangish-black; gaster orangish-brown or reddish-brown to blackish-red; rest of body blackish to black (Figure 98).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) smaller: $\mathrm{HW}=1.16-1.29 \mathrm{~mm}, \mathrm{PW}=0.41-0.51 \mathrm{~mm}$, PPW $=0.62-0.66 \mathrm{~mm},(3)$ in profile, petiolar node broadly and smoothly rounded, (4) in profile, anepisternum and katepisternum usually granulate or moderately to strongly coriarious, dull to weakly shining, and (5) in profile, posterior surface of petiolar node usually continuous to weakly irregular (Figure 99).

Measurements- ( $n=10$ paratypes). HL 1.15-1.35; HW 1.16-1.29; MOD 0.38-0.47; OMD 0.17-0.26; SL $0.34-0.47$; HFL 1.43-1.63; ML 1.90-2.22; PW $0.41-0.51$; PPW $0.62-0.66$. Indices: SI $26.98-38.52$; CI $85.93-$ 109.57; OI 30.16-40.52; HFI 115.08-133.61.

Additional material examined. ARGENTINA: Tucumán: Infiernillo, $3100 \mathrm{~m} \& 3200 \mathrm{~m}$, no date (IFML; LACM; MCZC; MZSP) (Figure 100A).

Etymology. The specific epithet, tafi, is a noun in apposition and invariant in form that is derived from a small, localized group of Indians that lived in the area that is now Tafi de Valle, Tucumán Province, Argentina.

Discussion. Pogonomyrmex tafi is known only from the type locality, and $P$. weiseri is the only congener known to occur in nearby areas. These two species are easily separated based on color and rugae pattern on the first gastral tergum. For P. tafi: (1) gaster blackish to black, and (2) posterolateral margins of first gastral tergum smooth and shining, whereas in $P$. weiseri: (1) gaster ferruginous orange, and (2) posterolateral margins of first gastral tergum usually strongly coriarious, dull to weakly shining. Pogonomyrmex tafi is separated from other altiplano congeners by: (1) irregular rugae on promesonotum, and (2) dorsum and sides of pronotum darker than the adjoining mesonotum and mesopleura. Pogonomyrmex tafi is most likely to be confused is with P. pulchellus given that the dorsum and sides of the pronotum are darker than the adjoining mesonotum and mesopleura in both species. However, rugae on the mesopleura are regular to wavy, and usually lack lateral branches in P. pulchellus, whereas in P. tafi these rugae are wavy to strongly irregular, usually with numerous lateral branches that sometimes connect with adjacent rugae.

Biology. Little is known about the biology of $P$. tafi. Workers are solitary foragers. Nests were placed in open, exposed sites and consisted of a tumulus up to 10 cm in diameter. Partial nest excavations indicated that colonies contain up to approximately 2000 workers. Sexuals have been collected from January 18-26 indicating that mating flights occur during the austral summer. One intercaste also was collected (Figures 3E-F).

Pogonomyrmex tafi is only known from the type locality which is at 3005 m . The type colonies were in an alpine grassland in the Central Andean Puna ecoregion, as defined by Olson et al. (2001) (Figure 100A).

## Pogonomyrmex varicolor NEW SPECIES

(Figures 101-105)
Distribution-100B
Holotype worker [MACN: CASENT0922468]: ARGENTINA, Chubut: Departamento Escalante, Jct Rts 37 \& 26, $45^{\circ} 46.8^{\prime}$ S, $68^{\circ} 03.8^{\prime}$ W, $2380^{\prime}(720 \mathrm{~m})$, 19 February 2014 (R.A. Johnson \#5195). Paratypes, same data as holotype: IFML ( 3 workers), LACM ( 3 workers, MACN ( 9 workers), MCZC ( 12 workers), RAJC ( 29 workers, 6 alate queens, 9 males). Additional paratype series from the same locality and date-RAJ \#5196: IFML ( 6 workers), LACM ( 9 workers), MACN (3 workers), RAJC ( 6 workers), UCDC (3 workers), USNM (6 workers); RAJ \#5197: RAJC (7 workers).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae on first gastral tergum extend over one-half or more of segment, posterolateral margins smooth and shining to weakly coriarious, weakly shining, (2) all striae on first gastral tergum longitudinal, (3) restricted to the Patagonia region of Argentina, (4) workers in a series often with head and mesosoma black, or with head and gaster
ferruginous orange to blackish-orange, (5) superior propodeal spines consist of tubercles, denticles, or short teeth, sometimes moderately long to long spines, length $<0.5 \times$ the distance between their bases for some to all workers in a series, (6) rugae on promesonotum regular to wavy, longitudinal rugae on mesonotum continue to anterodorsal margin of pronotum or diverge to humeral shoulders of pronotum with one to few transverse rugae along anterodorsal margin, and (7) interrugae on promesonotum smooth and shining to moderately granulate, weakly shining (Figures 101-103).

Measurements-holotype $(n=7+5$ paratypes). HL 1.70 (1.42-1.73); HW 1.74 (1.48-1.79); MOD 0.39 ( $0.32-$ 0.39); OMD 0.42 (0.33-0.45); SL 1.27 (1.00-1.32); PNW 1.13 (0.98-1.18); HFL 1.70 (1.49-1.77); ML 1.98 (1.562.07); PW 0.42 ( $0.38-0.44$ ); PPW 0.59 ( $0.56-0.63$ ). Indices: SI 72.99 (67.57-80.13); CI 102.35 ( $96.89-108.64$ ); OI 22.41 (20.11-23.08); HFI 97.70 ( $96.65-105.13$ ).

Description. Head subquadrate to wider than long $(C I=96.89-108.64)$, widest just posterior to eyes; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, in full-face view, medial rugae continuing to posterior margin of head or diverging toward posterior corners of head. Interrugae on cephalic dorsum moderately to strongly granulate, weakly shining to dull; posterior corners rugose, interrugae smooth and shining to weakly granulate, weakly shining. Anterior margin of clypeus concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth, rarely with an additional denticle between the fourth and fifth teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.20-0.24 \times$ HL. In profile, eyes situated slightly anterior to middle of head, $O M D=0.97-1.36 \times$ MOD. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=67.57-80.13$ ) failing to reaching posterior corner of head by less than length of basal funicular segment; scapes with weak to moderately strong longitudinal striae, weakly shining to shining; basal flange well developed, flattened with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent subparallel, regular to irregular rugae to rugoreticulate-vermiculate. In dorsal view, humeral shoulders of pronotum enlarged, weakly to moderately angulate. Dorsum of promesonotum with moderately regular to strongly irregular longitudinal rugae that continue to anterior margin of pronotum or diverge toward humeral shoulders of pronotum; anterior margin of pronotum occasionally with one to several irregular transverse rugae. Irregular rugae on pronotal sides traverse ventrally or posterad or rugoreticulate; rugae on mesopleura angle posterodorsally; irregular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Promesonotal suture absent to weakly impressed. Superior propodeal spines consist of tubercles, denticles, short teeth, or occasionally moderately long to long spines, bases connected by well defined keel; inferior propodeal spines wider than high, apex broadly rounded to weakly acuminate, inferior spines usually as long as to longer than superior spines. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma smooth and shining to moderately granulate, weakly shining. Legs smooth and shining to weakly coriarious, weakly shining to shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin with poorly developed, broadly rounded process. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably longer than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, gradually narrowing posterad. Posterior surface of petiolar node with regular to wavy transverse rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest at/near posterior margin, narrowing to anterior margin, maximum width and length about equal. Transverse to weakly arcuate rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole smooth and shining to weakly coriarious, weakly shining. First gastral tergum with longitudinal striae that extend over anterior one-half or more of segment, posterolateral margins smooth and shining to moderately coriarious, weakly shining.

Erect, short to medium-length, white pilosity moderately abundant on head, longest hairs along posterior margin, rest of hairs rarely $>0.3 \times$ MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect, white setae, longest on mesosoma and petiolar node, length usually $0.4-0.5 \times$ MOD. Color is highly variable, even within a colony. Most commonly, head, mesosoma, petiole, postpetiole blackish to black; gaster dark ferruginous orange to blackish orange, anterior margin of first gastral tergum and posterior margin of all terga sometimes blackish. Other observed color patterns include: (1) head ferruginous orange, reddish-orange to dark reddish-black with rest of body black, and (2) concolorous black (Figures 101-103).


FIGURE 101. Photographs of Pogonomyrmex varicolor holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922468). Workers of $P$. varicolor are highly variable: photographs show the typical bicolored worker (head and mesosoma black, gaster dark orangish-black) with superior propodeal spines consisting of short, triangular teeth. Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 102. Photographs of Pogonomyrmex varicolor paratype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922470). Workers of P. varicolor are highly variable: photographs show the less common concolorous black color pattern with short superior propodeal spines. Photographs by Michele Esposito from www. AntWeb.org.


FIGURE 103. Photographs of Pogonomyrmex varicolor paratype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922471). Workers of $P$. varicolor are highly variable: photographs show the less common bicolored pattern (head and gaster dark reddish, mesosoma black) with superior propodeal spines consisting of short, triangular teeth. Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 104. Photographs of Pogonomyrmex varicolor paratype alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922467). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 105. Photographs of Pogonomyrmex varicolor paratype male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922469). Photographs by Michele Esposito from www.AntWeb.org.

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli, (2) striae cover more than anterior one-half of first gastral tergum, (3) head and mesosoma black, gaster ferruginous orange to orangish-black with blackish to black transverse band across posterior margin of terga and sterna, base of first gastral tergum sometimes blackish or body concolorous black, (4) hairs along posterior margin of first and second gastral terga shorter, longest hairs usually $\leq$ MOD, and (5) dorsum of propodeum with 7-12 narrowly-spaced transverse rugae (Figure 104).

Measurements-( $n=6$ paratypes). HL 1.70-1.86; HW 1.83-1.96; MOD 0.36-0.42; OMD 0.40-0.48; SL 1.22-1.39; PNW 1.38-1.51; HFL 1.66-1.90; ML 2.37-2.73; PW $0.40-0.55$; PPW $0.71-0.80$. Indices: SI 62.5672.13; CI 102.23-108.33; OI 19.67-21.69; HFI 90.71-96.94.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head subquadrate to wider than long ( $\mathrm{CI}=102.23-108.33$ ), widest just posterior to eyes, posterior margin flat. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae not diverging to weakly diverging toward posterior corners of head; interrugae moderately to strongly granulate, with a beaded appearance; posterior corners rugose, interrugae weakly granulate-punctate, weakly shining. Mandibles with six to seven teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces with subparallel, regular to weakly irregular rugae, rugae sometimes irregular to rugoreticulate on pronotal sides; dorsum of propodeum with 7-12 closely spaced transverse rugae; interrugae weakly to moderately granulate-punctate, weakly shining, interrugae on pronotal sides usually more strongly granulate; superior propodeal spines consist of short, triangular teeth to moderately long, tapered, acuminate spines; inferior propodeal spines moderately well developed, wider than tall, apex weakly rounded. Peduncle of petiole about $0.8 \times$ as long as petiolar node, ventral margin flat. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate. Posterior surface of petiolar node with wavy transverse rugae. In dorsal view, dorsum of postpetiole about as wide as long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole weakly granulate-punctate, weakly shining. Striae extend over more than anterior one-half of first gastral tergum. Most body surfaces with moderately abundant suberect to erect, short to long, yellowish setae; longest hairs along posterior margin of first and second gastral terga usually shorter than MOD. Head, mesosoma, petiole, postpetiole black; gaster ferruginous orange to orangish-black, with blackish to black transverse band across posterior margin of terga and sterna, base of first gastral tergum sometimes blackish or body concolorous black (Figure 104).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) striae extend over more than anterior one-half of first gastral tergum, (2) in profile, rugae forming circumocular whorls posterior to eyes, (3) notauli absent, and (4) head and mesoscutellum black (Figure 105).

Measurements- $(n=8$ paratypes). HL $0.95-1.31$; HW 1.10-1.33; MOD 0.40-0.49; OMD 0.15-0.21; SL $0.36-0.43$; HFL 1.49-1.75; ML 2.09-2.65; PW $0.46-0.53$; PPW $0.64-0.80$. Indices: SI $30.83-35.83$; CI 101.53117.86; OI 35.04-37.12; HFI 117.29-150.00.

Additional material examined. ARGENTINA: Chubut: Cerro Dragón, 730 m, Jan 10-15, 2013 (RAJC); Rt 3 at 10.0 km N Jct Rt 37, 2060', Feb 16, 2014 (RAJC); Rt 37 at 34.9 km SW Jct Rt 3, 2190', Feb 19, 2014 (RAJC); Rt 25 at 107.1 km WSW Dolavon, 1090', Feb 21, 2014 (RAJC); Rt 25 at 11.4 km E Las Plumas, 1280', Feb 21, 2014 (RAJC) (Figure 100B).

Etymology. The specific epithet, varicolor (from Latin, varius $=$ different, varying, and color $=$ color), is derived from the variable color patterns displayed by workers of this species, both within and across colonies.

Discussion. Morphology of P. varicolor is highly variable in terms of color, length of superior propodeal spines, and patterning of rugae on the mesosoma. In regard to color, nests can contain workers with a black head and mesosoma and a ferruginous orange to blackish-orange gaster, while other colonies contain workers with multiple color patterns. Color is a diagnostic character used to identify P. varicolor, and because of this variability workers key out in two separate couplets.

Pogonomyrmex varicolor is not known to co-occur with any other $P$. rastratus-group species, but additional collecting may show it co-occurs with P. carbonarius, $P$. sanmartini, and other congeners. The most common color morph is head and mesosoma blackish to black, occasionally with a weak orangish infusion on dorsum of promesonotum; gaster light to dark ferruginous orange to orangish-black. This coloration combined with striae on first gastral tergum extending over more than anterior one-half of segment separate $P$. varicolor from all congeners except P. catanlilensis, P. forelii, and P. granulatus.

Pogonomyrmex varicolor can be distinguished from P. catanlilensis based on: (1) smaller (HW = 1.48-1.79 mm; PNW $=0.98-1.18 \mathrm{~mm} ; \mathrm{ML}=1.56-2.07 \mathrm{~mm}),(2)$ in dorsal view, rugae on promesonotum regular to wavy, longitudinal rugae on mesonotum continue to anterodorsal margin of pronotum or diverge to humeral shoulders of pronotum with one to few transverse rugae along anterodorsal margin, (3) interrugae on promesonotum smooth and shining to moderately granulate, weakly shining, and (4) striae on first gastral tergum longitudinal. In P. catanlilensis: (1) larger $(H W=1.67-2.04 \mathrm{~mm} ; \mathrm{PNW}=1.15-1.42 \mathrm{~mm} ; \mathrm{ML}=2.01-2.76 \mathrm{~mm}),(2)$ in dorsal view, longitudinal rugae on mesonotum weakly to strongly irregular, often nearly rugoreticulate; rugae on pronotum usually rugoreticulatevermiculate, (3) interrugae on promesonotum usually moderately to strongly granulate, weakly dull to dull, and (4) some to most striae on first gastral tergum usually oblique and/or transverse. Pogonomyrmex varicolor can be distinguished from P. forelii based on the superior propodeal spines. In P. varicolor, the superior propodeal spines consist of tubercles, denticles, short teeth, or rarely moderately long to long spines, with a length $<0.5 \times$ the distance between their bases for some to all workers in a series. In $P$. forelii, the superior propodeal spines are consistently moderately long to long, with a length $>0.6 \times$ the distance between their bases. Pogonomyrmex varicolor can be distinguished from P. granulatus based on the following characters: (1) superior propodeal spines consist of short to long spines for some workers in a series, (2) in profile, rugae posterior to eyes fine, dense, regular, converging at or near posterior corners, and (3) interrugae on cephalic dorsum smooth and shining to moderately coriarious, weakly shining, rarely with a beaded appearance. In P. granulatus: (1) superior propodeal spines consist of tubercles, denticles, or short blunt teeth, (2) in profile, rugae posterior to eyes coarse, irregular, sometimes circumocular or converging anterior to posterior corners, and (3) interrugae on cephalic dorsum strongly granulate, weakly dull to dull, with a beaded appearance. Pogonomyrmex varicolor might also be confused with P. mendozanus and P. pronotalis because of the similar color pattern. However, the first gastral tergum lacks striae in both species, whereas longitudinal striae are present in $P$. varicolor.

Other color variants of $P$. varicolor include head and/or gaster ferruginous orange to dark reddish-black to blackish-orange, mesosoma usually blackish to black or occasionally concolorous black. Bicolored workers can be distinguished by the combination of: (1) striae on first gastral tergum extending over more than anterior one-half of segment, (2) all striae on first gastral tergum longitudinal, (3) posterolateral margins of first gastral tergum usually smooth and shining to strongly shining, (4) rugae on dorsum of promesonotum usually wavy, irregular, or rugoreticulate, and (5) superior propodeal spines consist of denticles, tubercles or short teeth, rarely long spines. These characters distinguish $P$. varicolor from all congeners except for $P$. carbonarius and $P$. strioligaster, while series that contain only concolorous black workers might be confused with $P$. atratus and P. sanmartini. Pogonomyrmex varicolor is distinguished from $P$. strioligaster by: (1) some workers typically have other color patterns, and (2) superior propodeal spines consist of denticles to short teeth, rarely long spines. In P. strioligaster: (1) head and gaster ferruginous orange for all workers in a series, part to all of mesosoma black, and (2) superior propodeal spines long, length $>0.6 \times$ the distance between their bases. Pogonomyrmex varicolor is distinguished from $P$. carbonarius based on the posterolateral margins of the first gastral tergum, which are usually smooth and shining in P. varicolor, while they are moderately to strongly coriarious, dull to weakly shining in P. carbonarius. However, in some colonies of $P$. varicolor the posterolateral margin of the first gastral tergum is moderately coriarious, weakly shining. In these cases, $P$. varicolor is distinguished by one or more workers with a black head and mesosoma and rugae on posterior surface of petiolar node and dorsum of postpetiole regular to wavy and interrugae usually smooth and shining. In P. carbonarius, workers with a black head and mesosoma are lacking, rugae on posterior surface of petiolar node and dorsum of postpetiole often irregular to very irregular and interrugae usually granulate, weakly shining to dull. Concolorous black workers of $P$. atratus lack striae on the first gastral tergum, whereas $P$. varicolor have longitudinal striae that extend over the anterior one-half or more of the segment. In P. sanmartini, striae extend over more than anterior one-half of first gastral tergum, but some to most of these striae are oblique to transverse, whereas all striae are longitudinal in $P$. varicolor.

Biology. Pogonomyrmex varicolor workers are solitary foragers. Nests of $P$. varicolor are commonly placed at the base of a grass clump, but they also occur in open, exposed sites. Nests were in sandy-loamy-gravelly soils to sandy-gravelly-rocky soils, and they often lacked a tumulus or the tumulus ranged up to $5-15 \mathrm{~cm}$ in diameter. Nests are most easily located by baiting workers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain more than 2000 workers. Sexuals have been collected on February 19, indicating that mating flights occur during the austral summer.

Pogonomyrmex varicolor inhabits sites at elevations from 330-730 m in the Patagonian steppe and Low Monte ecoregions, as defined by Olson et al. (2001) (Figure 100B).

## Pogonomyrmex vermiculatus

(Figures 3G-H, 106-108)
Distribution-100C
Pogonomyrmex vermiculatus Emery, 1906: 157 (worker). Holotype examined [MSNG: CASENT0280978]. ARGENTINA, Santa Cruz Province: near the Santa Cruz River, 5-7 station (southern Patagonia). See also Gallardo, 1932: 138, fig. 24.
Pogonomyrmex vermiculatus var. chubutensis Forel, 1913: 218 (worker). Holotype [MHNG: CASENT0907120]. ARGENTINA, Chubut: mountains of Chubut. See also Gallardo, 1932: 140, fig. 26. NEW SYNONYMY
Pogonomyrmex vermiculatus var. jorgenseni Forel, 1915: 353 (worker). Syntypes examined: 2 workers [MACN], 6 workers [MHNG], 12 workers [MLPA], 1 worker [USNM]. ARGENTINA, Santa Cruz: to the east of Lago Argentina, \#284 (Jörgensen leg.). See also Gallardo, 1932: 141, fig. 27; Kusnezov, 1951: 253 (synonymy under vermiculatus var. chubutensis). MACN worker here designated LECTOTYPE [CASENT0281102]. NEW SYNONYMY

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) most workers lack striae on first gastral tergum, rare workers with striae on anterior one-third to one-half of segment, (2) posterior surface of petiolar node and dorsum of postpetiole with transverse rugae, (3) interrugae on cephalic dorsum moderately to strongly granulate, dull, (4) bicolored with head dark reddish-brown to reddish-black, rest of body blackish to black, (5) superior propodeal spines long, length $>0.6-0.8 \times$ the distance between their bases, (6) dorsum of promesonotum usually with $<12$ moderately coarse to coarse, irregular, longitudinal rugae that usually diverge toward humeral shoulders of pronotum or become transverse or rugoreticulate to vermiculate along anterior margin of pronotum, (7) in frontal view, frontal lobes and part to most of medial portion of clypeus and clypeal lobes usually blackish to black, notably darker than rest of cephalic dorsum, and (8) (HW < 1.70 mm ; $\mathrm{ML}<2.05 \mathrm{~mm}$ ) (Figure 106).

Measurements-holotype $(n=12)$. HL 1.49 (1.40-1.63); HW 1.61 (1.42-1.69); MOD 0.35 ( $0.30-0.37$ ); OMD 0.35 (0.32-0.41); SL 1.27 (1.04-1.35); PNW 1.12 (0.95-1.12); HFL 1.53 (1.37-.61); ML 1.82 (1.52-2.01); PW 0.45 ( $0.37-0.47$ ); PPW postpetiole missing ( $0.50-0.61$ ). Indices: SI 78.88 ( $65.09-80.50$ ); CI 108.05 ( $99.34-106.96$ ); OI 21.74 (18.34-24.03); HFI 95.03 (86.39-103.90).

Redescription. Head subquadrate to quadrate $(C I=99.34-106.96)$, widest just posterior to eyes; posterior margin flat to weakly convex in full-face view. Longitudinal rugae on cephalic dorsum prominent, in full-face view, medial rugae weakly diverging toward posterior corners of head. Interrugae on cephalic dorsum moderately to strongly granulate, dull; posterior corners rugose, interrugae smooth and shining to weakly granulate, weakly shining. Anterior margin of clypeus strongly concave, medial portion incised to depth of lateral lobes, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.19-0.25 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, $\mathrm{OMD}=0.91-1.23 \times \mathrm{MOD}$. In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes ( $\mathrm{SI}=65.09-80.50$ ) failing to reach posterior corner of head by less than length of basal funicular segment; weakly striate longitudinally, interstriae weakly shining to shining; basal flange well developed, flattened with carinate margin. Psammophore well developed.

Mesosomal profile moderately convex; all mesosomal surfaces with prominent subparallel, irregular rugae, occasionally rugoreticulate on pronotal sides. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins weakly to moderately angulate. Dorsum of promesonotum with $<12$ moderately coarse to coarse, irregular, longitudinal rugae that usually diverge toward humeral shoulder of pronotum or become transverse or rugoreticulate to vermiculate along anterior margin of pronotum. Irregular rugae on pronotal sides traverse ventrally or posteroventrally or rugoreticulate; rugae on mesopleura angle posterodorsally; irregular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Promesonotal suture often weakly to moderately impressed. Superior propodeal spines long, length $>0.6-0.8 \times$ the distance between their bases, spines connected by well defined keel; inferior propodeal spines slightly wider than high, apex weakly blunt to acuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma smooth and shining to strongly granulate, dull to weakly shining. Legs smooth and shining to weakly coriarious, weakly shining to shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin with a well developed, rounded process. In profile, posterior surface of petiolar node weakly convex; node asymmetrical with anterior surface notably shorter than posterior surface, apex subangulate to angulate. In dorsal view, petiolar node longer than wide, widest near spatulate anterior margin, gradually narrowing posterad. Posterior surface of petiolar node with regular to ir-
regular transverse or oblique rugae. Dorsum of postpetiole convex in profile; in dorsal view, widest at/near posterior margin, narrowing to anterior margin, maximum width and length about equal. Transverse rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole smooth and shining to weakly coriarious, weakly shining. First gastral tergum variable, most commonly smooth and shining to weakly or moderately coriarious at or near the base, weakly shining ( 62 of $71 ; 87.3 \%$ ), with striae at base ( 7 of $71 ; 9.9 \%$ ), or with striae covering up to anterior one-half of tergum (2 of $71 ; 2.8 \%$ ).

Erect, short to medium-length, white pilosity moderately abundant on head, longest occasionally approaching MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with moderately dense, erect, white setae, longest hairs on mesosoma and petiolar node. Head dark reddish-brown to reddish-black; antenna, frontal lobes, mandibles, medial portion of clypeus blackish to black; rest of body black except for occasional reddish infusion on dorsum of promesonotum (Figure 106).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae absent on first gastral tergum or present along base to sometimes extending over anterior one-third to one-half of segment, medioposterior one-quarter to one-third or more of first gastral tergum (including posterolateral margins) smooth and shining, (3) interrugae on cephalic dorsum weakly to moderately granulate-punctate, weakly shining to shining, (4) head reddish-brown to reddish-orange, mesosoma and gaster usually black, (5) pronotal sides concolorous blackish to black, anepisternum black, (6) in posterodorsal view, posterior corners smooth and shining to rugose, interrugae smooth and shining, (7) medial rugae along posterior margin of head regular to irregular, and (8) transverse or oblique rugae cover posterior surface of petiolar node and dorsum of postpetiole (Figure 107).

Measurements- $(n=13$ ). HL 1.42-1.83; HW 1.59-1.87; MOD 0.34-0.41; OMD 0.34-0.47; SL 1.16-1.41; PNW 1.24-1.50; HFL 1.47-1.79; ML 2.19-3.01; PW 0.47-0.61; PPW 0.69-0.84. Indices: SI 65.19-78.86; CI 100.55-117.53; OI 18.58-23.27; HFI 85.25-98.16.

Description. With caste-specific morphology of the mesosoma related to wing-bearing and presence of ocelli on head. In full-face view, head quadrate to wider than long $(\mathrm{CI}=100.55-117.53)$, widest just posterior to eyes, posterior margin flat to weakly convex. Longitudinal rugae on cephalic dorsum prominent, wavy; in full-face view, medial rugae diverging toward posterior corners of head; medial rugae along posterior margin of head regular to irregular; interrugae on cephalic dorsum weakly to moderately granulate-punctate, weakly shining to shining; posterior corners smooth and shining to rugose, interrugae smooth and shining. Mandibles with six teeth, dorsal surface coarsely rugose. Psammophore well developed.

All mesosomal surfaces except pronotal sides with subparallel, regular to wavy rugae, rugae irregular to rugoreticulate on pronotal sides, interrugae smooth and shining to weakly granulate-punctate, weakly shining; superior propodeal spines range from short, triangular teeth to moderately long, acuminate spines; inferior propodeal spines wider than tall, apex broadly rounded to subangulate. Peduncle of petiole long, anteroventral margin with weakly rounded process. In profile, petiolar node asymmetrical with anterior surface shorter than posterior surface, apex subangulate to angulate. Posterior surface of petiolar node with wavy, transverse to oblique rugae, interrugae weakly granulate-punctate, weakly shining. In dorsal view, postpetiole slightly wider than long; dorsum with wavy, transverse rugae that are finer, denser than those on posterior surface of petiolar node, interrugae weakly granu-late-punctate, weakly shining. Striae absent on first gastral tergum or present along base to rarely extending over anterior one-third to one-half of segment, medioposterior one-quarter to one-third or more of first gastral tergum (including posterolateral margins) smooth and shining. Most body surfaces with moderately abundant suberect to erect, medium-length, whitish setae, one to two longer hairs along posterior margin of head approach MOD. Head reddish-brown to reddish-orange, rest of body black; mesoscutum, mesoscutellum, first gastral tergum sometimes with an orangish infusion (Figure 107).

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) body concolorous black to weakly bicolored, gaster sometimes slightly lighter than rest of body, but largely dark blackish orange to black, (3) erect hairs lacking on first gastral tergum, (4) in full face view, clypeus mostly to completely smooth and shining, polished, often with bluish to purplish reflections, and (5) notauli absent to faintly impressed (Figure 108).

Measurements- $(n=13)$. HL 1.10-1.29; HW 1.16-1.37; MOD 0.42-0.51; OMD 0.13-0.21; SL 0.41-0.52;

Additional material examined. ARGENTINA: Chubut: 19.5 km E Shaman, 650 m , Nov 19, 1966 (CASC); Esquel, Feb 19, 1949 (IFML); 17.4 km S Dr Ricardo Rojas, 1870', Jan 29, 2011 (RAJC); Rt 26 at 2.3 km E Alto Río Mayo, 2050’, Jan 29, 2011 (IFML; LACM; MACN; MCZC; RAJC; UCDC; USNM); Rt 259 at 23.9 km SW Tervelin, 1920', Feb 22, 2014 (RAJC). Río Negro: Cerro Chall-huaco, 1805 m, Jan 2005 (RAJC); El Bolsón, Feb 13, 1949 \& Feb 20, 1971 (IFML; LACM; MZSP). Santa Cruz: 2.3 km S Cueva de las Manos, 2100', Jan 31, 2011 (RAJC); Ruta 40 at Estancia los Toldos (=Hostería Cueva de las Manos), Jan 8, 1999 (IFML); 53.7 km S Jct Rt 40 \& 29, 2080', Feb 1, 2011 (RAJC); El Calafete, 200 m , Jan 20, 1995 (MCZ; UCDC); Rt 11 at 10.9 km E El Calafete, 830', Feb 2, 2011 (RAJC); Rt 11 at 19.3 km W El Calafete, $720^{\prime}$, Feb 2, 2011 (RAJC); Rt 25 at 0.9 km E Tamil Aike, 1760', Jan 31, 2011 (RAJC); Rt 40 at 2.6 km N Bajo Caracoles, 1940', Jan 30, 2011 (RAJC); Rt 40 at 20.6 km S Bajo Caracoles, 2380', Jan 31, 2011 (RAJC); Rt 40 at 58.2 km S Bajo Caracoles, 2350’, Jan 31, 2011 (RAJC); Rt 40 at 94.8 km S Bajo Caracoles, 2000', Jan 31, 2011 (RAJC); Rt 40 at 30.9 km S Perito Moreno, 1970', Jan 30, 2011 (IFML; RAJC); Rt 40 at 48.0 km S Perito Moreno, 1970', Jan 30, 2011 (RAJC); Rt 40 at 76.9 km S Perito Moreno, 2260', Jan 30, 2011 (RAJC); Rt 12 at 215.1 km SSW Pico Truncado, 2360’, Mar 10, 2017 (RAJC); Meseta de la Vizcachas, Dec 1, 1943 (IFML); no loc, no date (MACN). CHILE: Magallenes: Río Bagueles, Estancia Cerro Guido, Jan 7, 1955 (IFML; LACM) (Figure 91C). Questionable locales (appear to be outside of geographic range): ARGENTINA: Chubut: Comodoro Rivadavia, no date (MACN). Santa Cruz: Rivadavia (= Comodoro Rivadavia?) (MACN) (Figure 100C).

Etymology. In his description, Emery (1906) indicated that the mesosoma was covered with rugae that meander irregularly, hence the name vermiculatus (from Latin, vermiculatus = worm-shaped) (see also Kusnezov, 1951).

Discussion. Pogonomyrmex vermiculatus can be distinguished from other P. rastratus-group species based on: (1) first gastral tergum smooth and shining, striae rarely extending over more than anterior one-third of segment, (2) head dark reddish-brown to reddish-black, mesosoma and gaster black, and (3) superior propodeal spines long. Other $P$. rastratus-group species have striae that extend over more than one-half of the first gastral tergum and a different color pattern.

The identity of $P$. vermiculatus has been misunderstood since its description because of the paucity of verified material combined with the fact that no authors examined the holotype worker. It appears that Kusnezov (1951) examined only material from Meseta de las Vizcachas, Santa Cruz Province (IFML; \#6756), and his description of P. vermiculatus followed that of Emery (1906), indicating that longitudinal striae were present along the base of the first gastral tergum with the rest of the segment smooth and shiny. Kusnezov $(1951 ; 1978)$ also used "fine longitudinal striae along base of the first gastral tergum" to key out $P$. vermiculatus. I could not examine this character on the holotype worker because it was missing the postpetiole and gaster.

That Emery (1906) described P. vermiculatus based on one worker resulted in misunderstanding intra- and internidal variation in characters such as striae on the first gastral tergum. Collections made during this study demonstrate that workers display a range of character states within a colony and that the holotype worker of $P$. vermiculatus was not representative of the species because most workers lack striae along the base of the first gastral tergum (see above).

Confusion over the identity of $P$. vermiculatus continued into recent times when Snelling \& Hunt (1975) synonymized three Chilean taxa, $P$. semistriata and $P$. intermedia, and $P$. spinolae under $P$. vermiculatus without knowing the actual identity of $P$. vermiculatus. In reality, $P$. vermiculatus appears to be rare in Chile where it is probably restricted to the extreme south; I have seen specimens from only Magdallenes Region.

Forel (1913) described $P$. vermiculatus var. chubutensis as a variety of $P$. vermiculatus because it differed from the type in: (1) lacking striae along the base of the first gastral tergum, and (2) rugae on the sides of the mesonotum traverse obliquely from posterodorsal to anteroventral while those on the pronotal sides traverse from the anterodorsal to posteroventral. As noted above, most workers of $P$. vermiculatus lack striae along the base of the first gastral tergum. Emery (1906) did not discuss patterning of rugae on the sides of the mesonotum and pronotal sides for the holotype of $P$. vermiculatus, but my examination of the holotype shows that rugae on the mesosoma traverse from anteroventral to posterodorsal while the pronotal sides are rugoreticulate. In the numerous series collected by the author, rugae on the pronotal sides are variable, and workers within a colony exhibit the range of patterns displayed by the holotypes of $P$. vermiculatus and $P$. vermiculatus var. chubutensis. Thus, I synonymize $P$. vermiculatus var. chubutensis under $P$. vermiculatus.


FIGURE 106. Photographs of Pogonomyrmex vermiculatus worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0280983). Photographs by Estella Ortega from www.AntWeb.org.


FIGURE 107. Photographs of Pogonomyrmex vermiculatus alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0280982). Photographs by Estella Ortega from www.AntWeb.org.


FIGURE 108. Photographs of Pogonomyrmex vermiculatus male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0280981). Photographs by Estella Ortega from www.AntWeb.org.

Lack of available material likely resulted in Forel (1915) describing $P$. vermiculatus var. jorgenseni from workers that were collected near the type locality of $P$. vermiculatus. Forel was apparently unaware of the proximity of these localities given that he compared $P$. vermiculatus var. jorgenseni to $P$. vermiculatus var. chubutensis, but not to $P$. vermiculatus. This omission may also have occurred because Forel assumed that striae along the base of the first gastral tergum were diagnostic for $P$. vermiculatus. Consequently, $P$. vermiculatus var. jorgenseni and $P$. vermiculatus var. chubutensis were compared because both forms were described as having a smooth and shining first gastral tergum (i.e., lacking striae near the base).

I examined 15 syntype workers of $P$. vermiculatus var. jorgenseni finding that the first gastral tergum varied in a manner similar to that described above for $P$. vermiculatus: the base of the first gastral tergum was smooth and shining on seven workers, weakly coriarious on six workers, weak longitudinal striae were present on one worker, and one worker had striae that extended over the anterior one-half of the segment.

Gallardo (1932) was the only author that directly compared P. vermiculatus and P. vermiculatus var. jorgenseni noting that the former form had punctures between the cephalic rugae whereas the latter form lacked depressed punctures between the cephalic rugae. This character also varied across syntypes of $P$. vermiculatus var. jorgenseni with punctures on the interrugae ranging from weak and weakly shining to lacking and smooth and shining. Thus, I synonymize $P$. vermiculatus var. jorgenseni under $P$. vermiculatus.

Biology. Workers of this species are solitary foragers. Nests of $P$. vermiculatus most commonly are placed in a clump of Stipa sp. (Poaceae) or at the edge of a rock and occasionally in an open, exposed site. The nest entrance ranges from a hole in the ground to a tumulus up to 15 cm in diameter; an external chaff midden is present on rare occasions. Nests are most easily located by baiting workers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain up to approximately 2000 workers. Sexuals have been collected from January 29-February 22 indicating that mating flights occur during the austral summer. One intercaste also was collected (Figures 3G-H). Several studies have examined foraging and recruitment biology of $P$. vermiculatus, but all of these studies probably used $P$. semistriata (see discussion under $P$. semistriata).

Pogonomyrmex vermiculatus inhabits sites at elevations from $220-1805 \mathrm{~m}$ in the Valdivian temperate forests, Patagonian steppe, and Magellanic subpolar forests ecoregions, as defined by Olson et al. (2001) (Figure 100C).

## Pogonomyrmex weiseri REVIVED STATUS

(Figures 109-111)
Distribution-112A

Pogonomyrmex weiseri Santschi 1922b: 348 (worker, queen, male). Syntypes examined: 1 worker [MCZC], 1 worker [MHNG], 1 worker [MZSP], 3 workers, 2 alate queens [MACN] ( 1 worker NHMB, not examined). ARGENTINA, Catamarca: Valle San María, Ampajango, \#1362 (Ing. Weiser leg.). See also Gallardo, 1932: 145, figs. 30, 31. MCZC worker here designated LECTOTYPE [CASENT0217261].
Pogonomyrmex rastratus Mayr: Kusnezov, 1951: 252, incorrect synonymy.

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) striae extend over anterior one-half or more of first gastral tergum, posterior margin with striae or moderately to strongly coriarious; posterolateral margins roughened or weakly to strongly coriarious, weakly shining to dull, (2) head and gaster ferruginous orange; mesosoma black, dorsum of promesonotum often with an orangish infusion, (3) superior propodeal spines long, length $>0.6 \times$ the distance between their bases, (4) longitudinal rugae on dorsum of mesonotum regular to moderately irregular, subparallel-parallel, lateral branches usually absent and adjacent rugae rarely contacting one another, (5) mandibles with six teeth, (6) promesonotal suture usually present, and (7) occurs from La Rioja to Salta (Figure 109).

Measurements-lectotype $(n=13)$. HL 1.91 (1.62-1.98); HW 2.01 (1.63-2.05); MOD 0.44 ( $0.36-0.44$ ); OMD 0.51 ( $0.45-0.59$ ); SL 1.30 (1.17-1.49); PNW 1.25 (1.04-1.31); HFL 1.82 (1.46-1.90); ML 2.24 (1.86-2.45); PW 0.51 ( $0.40-0.56$ ); PPW 0.73 ( $0.59-0.76$ ). Indices: SI 64.68 ( $62.57-74.58$ ); CI 105.24 ( $100.00-107.37$ ); OI 21.89 (19.51-23.93); HFI 90.55 (84.88-96.22).

Redescription. Head quadrate to wider than long $(C I=100.00-107.37)$; posterior margin flat in full-face view. Longitudinal rugae on cephalic dorsum prominent; in full-face view, medial rugae diverging toward posterior corners of head. Interrugae on cephalic dorsum moderately granulate, dull, with a weakly beaded appearance. Rugae
on posterior corners absent to weak, interrugae smooth to moderately granulate, weakly shining to shining. Anterior margin of clypeus strongly concave, dorsum with numerous subparallel-parallel, longitudinal rugae. Numerous long, curved, bristle-like, cream colored to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margins of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.21-0.24 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, OMD $=1.1-1.4 \times \mathrm{MOD}$. In full-face view, eyes not protruding to protruding slightly beyond lateral margins of head. Antennal scapes (SI = 62.57-74.58) failing to reach posterior corners of head by less than length of basal funicular segment. Antennal scapes with weak longitudinal striae, weakly shining to shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile weakly to moderately convex; all mesosomal surfaces with prominent subparallel-parallel, regular to moderately irregular rugae. In dorsal view, humeral shoulders of pronotum enlarged, dorsolateral margins weakly to strongly angulate. Dorsum of mesonotum with regular to moderately irregular, subparallel-parallel, longitudinal rugae, lateral branches usually absent and adjacent rugae rarely contacting one another; rugae diverge anterad toward humeral shoulders of pronotum. Irregular rugae on pronotal sides traverse ventrally or posteroventrally; rugae on mesopleura angle posterodorsally. Promesonotal suture usually present. Superior propodeal spines long, length usually $>0.6 \times$ the distance between their bases, tips blunt, spines connected by well defined keel; irregular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Inferior propodeal spines slightly wider than high, apex weakly blunt to acuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma densely granulate-punctate, weakly dull to weakly shining. Legs weakly shining to shining.

Peduncle of petiole about as long as petiolar node, anteroventral margin often with a broad, rounded expansion, but lacking triangular process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex angulate to moderately rounded. In dorsal view, petiolar node longer than wide, widest near rounded anterior margin, narrowing posterad. Sides and posterior surface of petiolar node with weakly to moderately irregular transverse rugae, occasionally traversing longitudinally or obliquely near anterior margin. Dorsum of postpetiole convex in profile; in dorsal view, widest at or near posterior margin, narrowing to anterior margin, maximum width and length about equal. Rugae on dorsum of postpetiole transverse or more often curving anterad; rugae on dorsum of postpetiole finer, denser than those on posterior surface of petiolar node; interrugae on posterior surface of petiolar node and dorsum of postpetiole smooth and shining. First gastral tergum with striae that extend over anterior one-half or more of segment, posterolateral margins roughened or weakly to strongly coriarious, weakly shining to dull.

Erect white pilosity moderately abundant on head, mostly similar in length with up to several longer hairs, longest not exceeding MOD. Moderately abundant suberect to semidecumbent pilosity on scape; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent white setae. Mesosoma, petiolar node, postpetiole, gastral terga with erect, moderately dense, white setae that are similar in length. Head and gaster ferruginous orange; mesosoma black, dorsum of promesonotum often with an orangish infusion; peduncle of petiole, petiolar node, anterior portion of postpetiole dark orangish-black, ventral and posterior portion of postpetiole weakly to moderately ferruginous orange; frontal lobes, mandibles, antennae, legs dark orange-black to nearly black (Figure 109).

Queen diagnosis. Queens of this species are diagnosed by the following combination of features: (1) castespecific morphology of the mesosoma related to wing-bearing and presence of ocelli on head, (2) striae on first gastral tergum usually extend to posterior margin, posterolateral margins with striae or moderately to strongly coriarious, weakly shining, (3) head and gaster ferruginous orange; pronotal sides, anepisternum concolorous blackish to black, (4) interrugae on cephalic dorsum strongly granulate, dull, (5) queens large ( $\mathrm{HW}=1.95-2.21 \mathrm{~mm}$; PNW $=1.42-1.56 \mathrm{~mm} ; \mathrm{ML}=2.55-2.91 \mathrm{~mm}$ ), (6) superior propodeal spines moderately long, length usually $>0.5 \times$ the distance between their bases, (7) longest hairs on first gastral sternite approximately $0.2-0.4 \times \mathrm{MOD}$, and (8) occurs from La Rioja to Salta (Figure 110).

Measurements-( $n=8+2$ paralectotypes). HL 1.77-2.11; HW 1.95-2.21; MOD 0.41-0.48; OMD 0.45-0.54; SL 1.16-1.46; PNW 1.42-1.56; HFL 1.79-1.97; ML 2.55-2.91; PW 0.51-0.61; PPW 0.78-0.86. Indices: SI 55.7770.53; CI 99.49-117.51; OI 20.09-21.72; HFI 86.96-98.46.

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum mostly smooth and shining, lacking striae or striae extend over anterior one-half or more of first gastral tergum, (2) mesoscutum mostly smooth and shining, and (3) notauli present, sometimes weakly impressed (Figure 111).


FIGURE 109. Photographs of Pogonomyrmex weiseri worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0172679). Photographs by April Nobile from www.AntWeb.org.


FIGURE 110. Photographs of Pogonomyrmex weiseri alate queen: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922459). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 111. Photographs of Pogonomyrmex weiseri male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0172680). Photographs by April Nobile from www.AntWeb.org.


FIGURE 112. Geographic distribution of: (A) Pogonomyrmex weiseri, and (B) P. wilsoni. The large black circle in each panel denotes the type locality.

Measurements- $(n=12)$. HL 1.15-1.66; HW 1.25-1.55; MOD 0.48-0.54; OMD 0.14-0.26; SL 0.34-0.51; HFL 1.38-1.75; ML 2.15-2.96; PW 0.49-0.66; PPW 0.68-0.89. Indices: SI 26.36-35.88; CI 92.14-117.39; OI 34.84-38.40; HFI 102.99-132.56.

Additional material examined. ARGENTINA: Catamarca: Rt 40 at 13.3 km S Punta Balasto, 7360 ', Feb 2, 2010 (IFML; RAJC). La Rioja: Rt 11 at 4.3 km SE Angulos, 6100', Jan 4, 2006 (IFML; MCZC; RAJC). Salta: Rt 40 at 32.3 km N Cafayate, 5460', Jan 11, 2006 (MCZC; RAJC); 20.3 km W Angastaco, 8280', Jan 12, 2006 (MCZC; RAJC); Rt 40 at 41.6 km NW Angastaco, 6670', Jan 12, 2006 (RAJC); Rt 33 at 6.2 km SE Payogasta, 8620', Jan 12, 2006 (RAJC); Rt 33 at 14.6 km SE Payogasta, $9340^{\prime}$, Jan 12, 2006 (CASC; IFML; MCZC; RAJC; UCDC); 6.2 km SE Jct Rts 33 \& 42, 9610', Jan 20, 2010 (RAJC); San Pedro de Yacochuya, 1875 m, Feb 2, 2012 (RAJC); Rt 40 at 11.7 km S Seclantas turnoff, 7250', Mar 26, 2015 (RAJC); Rt 40 at 42.0 km N Jct Rt 33, 10,070’, Mar 27, 2015 (RAJC); Rt 40 at 34.9 km N Jct Rt 33, 9370', Mar 27, 2015 (RAJC). Tucumán: Rt 307 at 6.8 km NW Amaiche, 6080', Jan 27, 2010 (RAJC); 7 km SW Amaiche de Valle, 2100 m , Feb 3, 1995 (MCZ; UCDC); Rt 40 at 8.4 km NW Amaiche del Valle, 6050', Mar 24, 2015 (RAJC); Rt 307 at 8.0 km NW El Infiernillo, 9100', Jan 18, 2010 (RAJC) (Figure 112A).

Etymology. The specific epithet, weiseri (Latinization of Weiser), was derived from Weiser, who collected the syntype series of workers.

Discussion. Pogonomyrmex weiseri is separated from most congeners by: (1) striae extend over anterior onehalf or more of first gastral tergum, posterior margin with striae or moderately to strongly coriarious, and posterolateral margins moderately to strongly coriarious, weakly shining to dull. These characters separate $P$. weiseri from all but three congeners: P. carbonarius, P. mapuche, and P. propinqua. Pogonomyrmex weiseri is most similar to P. propinqua, from which it is separated by: (1) longitudinal rugae on dorsum of promesonotum more regular, usually do not contact one another, and lack short lateral branches, and (2) interrugae on cephalic dorsum weakly to moderately granulate-punctate, weakly shining, with a weakly beaded appearance. In P. propinqua, (1) longitudinal rugae on dorsum of promesonotum irregular to rugoreticulate, with short lateral branches that usually contact one another, and (2) interrugae on cephalic dorsum strongly granulate-punctate, dull, with a beaded appearance. These two species are also separated geographically as $P$. weiseri occurs in more northern provinces (La Rioja to Salta) than P. propinqua (San Luis and Mendoza).

Pogonomyrmex weiseri is separated from P. mapuche by: (1) for at least some workers in a series, superior propodeal spines long, length $>0.4-0.6 \times$ the distance between their bases, (2) head and/or gaster ferruginous orange or reddish-orange, and (3) mandibles with six teeth. In P. mapuche: (1) superior propodeal spines consist of tubercles or denticles, rarely short acuminate teeth, (2) head dark red to reddish-black; gaster reddish-blackish to black, and (3) mandibles with seven teeth for some to most workers in a series.

Pogonomyrmex weiseri is separated from P. carbonarius by: (1) head and gaster ferruginous orange, (2) mandibles with six teeth, and (3) longitudinal rugae on dorsum of promesonotum more regular, usually not contacting one another, and lack short lateral branches. In P. carbonarius: (1) head and/or gaster usually reddish-orange to black, (2) mandibles with six to seven teeth, and (3) longitudinal rugae on dorsum of promesonotum irregular to rugoreticulate with short lateral branches that usually contact one another. These two species are also separated geographically as $P$. weiseri occurs in more northern provinces (La Rioja to Salta) than P. carbonarius (Mendoza to Chubut). Based on the above morphological differences and its distinct geographic range, I revive $P$. weiseri from synonymy to rank as a valid species.

Pogonomyrmex weiseri was described by Santschi (1922b), and Kusnezov (1951) synonymized P. weiseri under $P$. rastratus explaining that Santschi mistakenly identified his specimens using the incorrect description of $P$. rastratus given by Mayr (1887). A complete account is given in the discussion under P. carbonarius.

In regard to the type locality, the MHNG and MZSP specimens were labeled Catamarca, while the MCZC specimen was labeled Catamarca, Ampango, Valle San María, and the MACN specimens were labeled as Ampajango, Catamarca. Santschi (1922b) listed the type locality as Ampajanga, Valle Santa María, but the type locality is Ampajango, Valle Santa María; both Ampajanga and Ampango are misspellings.

Biology. Pogonomyrmex weiseri workers are solitary foragers. Nests of $P$. weiseri most commonly are placed in open, exposed sites. The nest entrance ranges from a hole in the ground to a tumulus up to 15 cm in diameter. Nests are most easily located by baiting workers with cookie crumbs, then following them back to the nest. Partial nest excavations indicated that colonies contain approximately $600-1000$ workers. Sexuals have been collected on January 12, and a mating flight was observed at $15: 30 \mathrm{~h}$ on that same day, indicating that mating flights occur
during the austral summer. The mating aggregation consisted of approximately 200-300 sexuals near the top of a Trichocereus sp. (Cactaceae).

Pogonomyrmex weiseri inhabits sites at elevations from 1655-3050 m, but seems to be more common at higher elevations. This species is largely restricted to the High Monte ecoregion with one record from the Central Andean puna ecoregion, as defined by Olson et al. (2001) (Figure 112A).

## Pogonomyrmex wilsoni NEW SPECIES

(Figure 113)
Distribution-112B

Holotype worker [MNNC: CASENT0923341]: CHILE, Atacama Region, Huasco Province: Fdo. Marañón, 26 September 1977 (O. León coll.).

Worker diagnosis. Workers of this species are uniquely characterized by the following combination of features: (1) bicolored: head and gaster ferruginous orange; mesosoma blackish to black except for orangish to dark orangish pronotum, (3) anterior one-half to most of first gastral tergum moderately coriarious, dull to weakly shining, lacking striae, (4) superior propodeal spines long, length greater than distance between their bases, (5) rugae on cephalic dorsum relatively closely spaced, rugae on frontal lobes weakly converging, $1-2$ pairs of medial rugae meet and end at posterior margin of frontal triangle, and (6) eyes relatively small ( $\mathrm{MOD} / \mathrm{HL}=0.18-0.19$ ) and situated relatively far from malar area ( $\mathrm{OMD} / \mathrm{MOD}=1.52-1.53$ ) (Figure 113).

Measurements—holotype. HL 2.10; HW 2.27; MOD 0.38; OMD 0.58; SL 1.54; PNW 1.20; HFL 2.24; ML 2.25; PW 0.35; PPW 0.78. Indices: SI 67.84; CI 108.10; OI 16.74; HFI 98.68.

Description. Head wider than long $(\mathrm{CI}=108.10)$, widest just posterior to eyes; posterior margin flat in fullface view. Longitudinal rugae on cephalic dorsum prominent, wavy to irregular, narrowly spaced; rugae on frontal lobes weakly converging, medial 1-2 pair of rugae meet and end at posterior margin of frontal triangle. In full-face view, medial rugae continuing to posterior margin of head; interrugae strongly granulate, dull, with a weakly beaded appearance. Posterior corners rugose, interrugae weakly granulate, weakly shining. Anterior margin of clypeus moderately concave, dorsum with numerous subparallel, longitudinal rugae. Numerous long, curved, bristle-like, cream-colored to light yellowish macrochaetae project from anterior margin of clypeus and basolateral margin of mandibles. Mandibles with six teeth; mandibular dorsum coarsely rugose. MOD ranging from $0.18-0.19 \times \mathrm{HL}$. In profile, eyes situated slightly anterior to middle of head, but relatively far from malar base ( $\mathrm{OMD}=1.52-1.53 \times$ MOD). In full-face view, eyes protruding slightly beyond lateral margins of head. Antennal scapes relatively long $(S I=67.84)$, just failing to reach to reaching posterior corners of head. Antennal scapes with weak longitudinal striae, interstriae weakly shining; basal flange well developed with carinate margin. Psammophore well developed.

Mesosomal profile flat to weakly convex; all mesosomal surfaces with prominent subparallel-parallel, irregular rugae to rugoreticulate. In dorsal view, humeral shoulders of pronotum enlarged, rounded. Dorsum of mesonotum rugoreticulate, pronotum rugoreticulate posterad with up to several irregular, transverse rugae along anterior margin that continue posteroventrally on pronotal sides. Promesonotal suture absent. Rugae on most of anepisternum traversing in various directions to weakly rugoreticulate; irregular, posterodorsally trending rugae on rest of mesopleura; irregular transverse rugae on dorsum of propodeum traverse ventrally or anteroventrally on sides. Superior propodeal spines long, length greater than distance between their bases, tips bluntly acuminate, spines connected by well defined keel. Inferior propodeal spines wider than high, apex weakly rounded to bluntly acuminate. Propodeal spiracles narrowly ovate facing posterad. Interrugae on mesosoma weakly to strongly granulate-punctate, dull to weakly shining. Legs weakly shining to shining.

Peduncle of petiole about $0.8 \times$ as long as petiolar node, anteroventral margin flat to weakly curved, lacking a rounded process. In profile, posterior surface of petiolar node weakly convex; petiolar node asymmetrical with anterior surface shorter than posterior surface, apex weakly rounded. In dorsal view, petiolar node longer than wide, widest near rounded anterior margin, narrowing posterad. Posterior surface of petiolar node rugoreticulate posterad, anterior portion with irregular oblique to arcuate rugae the meet medially. Dorsum of postpetiole convex in profile; in dorsal view, widest near posterior margin, narrowing anterad, maximum width and length about equal. Rugae on dorsum of postpetiole weak, finer than those on posterior surface of petiolar node; rugae mostly longitudinal anterad, diverging to posterior corners posterad; interrugae on both surfaces weakly to moderately coriarious, weakly dull to weakly shining. First gastral tergum moderately to strongly coriarious over anterior one-half to most of segment, posterior margin mostly weakly shining to smooth and shining.


FIGURE 113. Photographs of Pogonomyrmex wilsoni holotype worker: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0923341). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 114. Photographs of Pogonomyrmex abdominalis male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0922554). Photographs by Michele Esposito from www.AntWeb.org.


FIGURE 115. Photographs of Pogonomyrmex naegelii male: (A) frontal view of head, (B) lateral view of body, and (C) dorsal view of body (CASENT0172688). Photographs by April Nobile from www.AntWeb.org.

Erect, delicate, cream-colored pilosity moderately abundant on head, variable in length, many hairs $0.3-0.4 \times$ MOD. Moderately abundant suberect to semidecumbent hairs on scapes; abundant decumbent hairs on funicular segments. Legs with moderately abundant suberect to decumbent whitish to light yellowish setae. Head, petiole, postpetiole, gastral terga with moderately dense, erect whitish to yellowish setae that vary in length, at least several hairs approaching to exceeding MOD. Head and gaster orangish-brown; pronotum orangish to orangish-black; rest of mesosoma, petiolar node, postpetiole, legs blackish to black (Figure 113).

Queen. Unknown.
Male. Unknown.
Additional material examined. None.
Etymology. The species is named to honor Dr. E. O. Wilson, who has made numerous contributions to the study of ants, and for his support to study Pogonomyrmex in South America.

Discussion. Pogonomyrmex wilsoni is a distinctive species that is not likely to be confused with any congeners. The combination of: (1) head and gaster orangish; mesosoma black with an orangish pronotum, (2) long superior propodeal spines, and (3) anterior one-half or more of first gastral tergum moderately coriarious, lacking striae, separate $P$. wilsoni from all congeners except $P$. santschii. Pogonomyrmex wilsoni is separated from $P$. santschii by: (1) larger ( $\mathrm{HW}>2.25 \mathrm{~mm}$ ), (2) eyes placed relatively far from malar area ( $\mathrm{OMD} / \mathrm{MOD}>1.50$ ), (3) rugae between frontal lobes weakly converging, 1-2 pair of medial rugae meet and end at posterior margin of frontal triangle, (4) up to several irregular transverse rugae along anterior margin of pronotum that continue posteroventrally on sides of pronotum. In P. santschii: (1) smaller ( $\mathrm{HW}<2.05 \mathrm{~mm}$ ), (2) eyes placed relatively close to malar area (OMD/MOD < 1.25 ), (3) rugae between frontal lobes subparallel-parallel, and (4) rugae along anterior margin of pronotum strongly irregular to rugoreticulate, never transverse, sides of pronotum rugoreticulate.

The type locality is uncertain as it was only given as Atacama: Fdo. Marañón. Fdo. is an abbreviation for Fundo, which is a country estate or farm. Riso Patron (1924) lists four locations for Marañon in Chile, but none of them are given as Fundo. All four locales are proximate to one another ( $70^{\circ} 43-47^{\prime} \mathrm{S} ; 28^{\circ} 27-30^{\prime} \mathrm{W}$ ), and all are indicated to be a short distance north of Vallenar. Muñoz-Schick (2008) also shows Marañon to be approximately 10 kilometers north of Vallenar, and this is presumed to be the type locality.

Biology. Nothing is known about the biology of $P$. wilsoni. Based on the above estimate, the type locality is at an elevation of approximately 570 m . This species occurs in the Chilean matorral ecoregion, as defined by Olson et al. (2001) (Figure 112B).

## P. naegelii-group

## Pogonomyrmex abdominalis

Male diagnosis. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) small ( $\mathrm{HW}<1.10 \mathrm{~mm}$; $\mathrm{ML}<2.00 \mathrm{~mm}$ ), (3) in dorsal view, posterior surface of petiolar node rugoreticulate, (4) in profile, petiolar node rounded, (5) pronotal sides rugoreticulate, (6) in profile, inferior propodeal spines moderately well developed, broadly rounded, (7) notauli present, (8) in profile, length of most hairs on dorsum of mesosoma much longer than MOD, and (9) posterior declivitous surface of cephalic dorsum with longitudinal rugae, interrugae shining (Figure 114).

Measurements- $(n=2)$. HL $0.99-1.06$; HW 1.01-1.04; MOD 0.44-0.47; OMD 0.15-0.16; SL 0.25-0.29; HFL 1.30-1.34; ML 1.84-1.98; PW 0.39-0.40; PPW 0.59-0.60. Indices: SI 24.04-28.71; CI 95.28-105.05; OI 42.31-46.53; HFI 128.71-128.85.

A more detailed diagnosis of $P$. naegelii is given herein so as to separate males of these two closely related species (Johnson, 2015). Note that the male of closely related $P$. tenuipubens remains undescribed.

Diagnosis of $\boldsymbol{P}$. naegelii male. Males of this species are diagnosed by the following combination of features: (1) first gastral tergum lacking striae, (2) small (HW $<1.10 \mathrm{~mm}$; $\mathrm{ML}<2.00 \mathrm{~mm}$ ), (3) in dorsal view, posterior surface of petiolar node rugoreticulate, (4) in profile, petiolar node rounded, (5) pronotal sides rugoreticulate, (6) in profile, inferior propodeal spines moderately well developed, broadly rounded, and (7) notauli present, (8) in profile, length of most hairs on dorsum of mesosoma approaching to slightly longer than MOD, and (9) posterior declivitous surface of cephalic dorsum rugoreticulate, interrugae dull (Figure 115).

## New geographic records

P. inermis: Argentina: Catamarca: Rt 48 at 8.0 km SSW Buena Vista, 5,550' (RAJC). This record extends the range of $P$. inermis more than 400 km north of previous records in the Provinces of Mendoza, San Luis, and Córdoba.

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