

**A New, High Altitude Colombian Species of the Ant Genus
Camponotus with Dimorphic Males and Females
(Hymenoptera: Formicidae)**

by

William P. Mackay¹, Camilo López-Castro² & Fernando Fernández³

ABSTRACT

We describe a new, black carpenter ant (*Camponotus polymorphicus*) from the high altitude and páramo in the Andes Mountains of Colombia. This species is unusual in that it is extremely variable in size. We separate the workers into majors, intermediates and minors. The females and males are dimorphic in size. This species is unlikely to be confused with any other species in the Neotropics. It is much shinier than most other species, and is additionally black in color. It has abundant, erect, golden hairs on the cheeks, clypeus and malar area, but is without erect hairs along the sides of the head or on the scapes. It is one of the few tropical species found at high elevations, the only other relatively common tropical *Camponotus* at such elevations is *C. nitens*, which is much smaller and has a heart-shaped head.

RESUMEN

Se describe la nueva especie de hormiga *Camponotus polymorphicus* de zonas altas y páramo en los Andes de Colombia. Esta especie es inusual por su tamaño muy variable. Arbitrariamente se separan las obreras en mayores, intermedias y menores. Hembras y machos son dimórficos. *C. polymorphicus* no se confunde con cualquier otra especie neotropical. Es más brillante y negra, con pelos dorados, erectos, abundantes sobre las mejillas, clípeo y area malar, sin pelos erectos en los lados de la cabeza y escapos. Es una de las pocas camponotinas que se encuentran en elevaciones cercanas a páramo, junto con *C. nitens*, la cual es más pequeña y tiene la cabeza en forma de corazón.

INTRODUCTION

One of us (WPM) is currently revising the New World ants of the genus *Camponotus*, and about 70 new species have been found (<http://>

¹Centennial Museum, Department of Biological Sciences, The University of Texas, El Paso, TX 79968 USA

²Laboratorio de Zoología y Ecología Animal, Departamento de Ciencias Biológicas, Universidad de Los Andes, Apartado Aéreo 12340, Bogotá D.C., Colombia

³Instituto Humboldt, Apartado Aéreo 8693, Bogotá D.C., Colombia

www.utep.edu/leb/antgenera.htm). One of these is being subjected to intensive biological studies by Camilo López C. (López-Castro 2001), and a name needs to be made available. The purpose of this paper is to describe this biologically and morphologically unusual species.

MATERIALS AND METHODS

Specimens were collected in the field, stored in alcohol and mounted on triangles. Type material will be deposited in the following collections:

CASC California Academy of Sciences,

CWEM Collection of W. and E. Mackay, University of Texas at El Paso
IAVH Instituto Humbolt, Villa de Leyva, Colombia

LACM Los Angeles County Museum of Natural History,

MCZC Museum of Comparative Zoology, Harvard University,

MZSP Museu de Zoologia da Universidade de São Paulo,

USNM United States National Museum of Natural History, Smithsonian Institution.

Specimens were measured using an ocular micrometer in a Zeiss dissection microscope at 40 and 64X. The following abbreviations are used (all measurements in mm):

HL Head length, anterior of median lobe of clypeus to mid point of posterior margin.

HW Head width, maximum excluding eyes, at posterior edge of eyes.

EL Eye length, maximum dimension.

SL Scape length, excluding basal condyle.

CL Clypeus length, maximum length, including posterior lobes (if present).

CW Clypeus width, maximum width of clypeus at tentorial pits.

WL Weber's length, anterior border of pronotum to posterior border of lobe of metapleural gland.

CI Cephalic Index, $HW/HL \times 100$.

SI Scape index, $SL/HL \times 100$ (note HL used instead of HW).

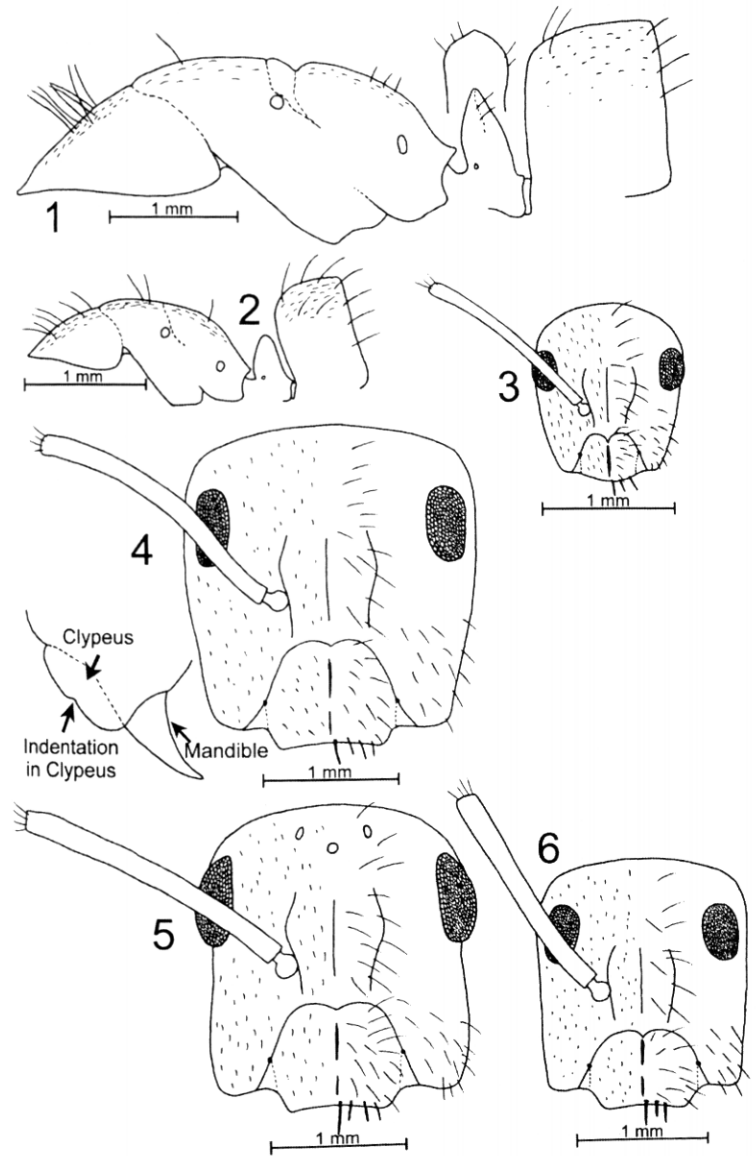
CLI, width/length $\times 100$.

FFI, width/length $\times 100$.

RESULTS AND DISCUSSION

Camponotus (Tanaemyrmex) polymorphicus new species

Diagnosis. This high altitude, shiny black *Camponotus* is unlikely to be confused with any other species. They head of the major is elongate, with the sides nearly straight (Fig. 4), converging anteriorly. The clypeal carina is indented about midway along the length. The metanotum is well defined, and the metanotal suture is depressed below the level of the remainder of the mesosoma (Fig. 1). The cheeks, malar areas, and



Figs. 1-6. *Camponotus polymorphicus*. 1. Mesosoma, petiole and first gastral tergite of the holotype major worker. The inset shows the petiole as seen from the front; 2. Mesosoma, petiole and first gastral tergite of a paratype minor worker; 3. Head of a paratype minor worker; 4. Head of the holotype major worker. The inset shows the indented clypeus as seen from the side; 5. Head of a paratype female; 6. Head of a paratype intermediate worker. The appressed hairs are shown on the left sides of the heads, the erect hairs on the right.

the entire surface of the clypeus are covered with bristly, golden, erect hairs (Figs. 3, 4 & 5). The scape is without erect hairs, except at the apex. It is polymorphic, with many sizes of workers. We have divided workers into 3 size classes, although there may actually be four, found in colonies of all ages (López-Castro *et al.* 2002). The males and females are both dimorphic in size.

Distribution. Known only from the state of Cundinamarca in central Colombia (Map 1).

Description.

Major worker measurements (mm): HL 2.42, HW 2.26, SL 2.45, EL 0.56, CL 0.85, CW 1.00, WL 3.10, FFL 2.16, FFW 0.55. Indices: CI 93, SI 101, CLI 118, FFI 25.

Mandible with 6 teeth; anterior border of clypeus concave, clypeal carina poorly defined, distinctly indented with outline broken about $\frac{1}{2}$ length; head narrowed anteriorly (Fig. 4), sides of head nearly straight, posterior border weakly concave; eyes failing to reach sides of head by about $\frac{1}{4}$ minimum diameter; scape extending about 2 funicular segments past posterior lateral corner; maxillary palps extending 3 segments past posterior border of buccal cavity; mesosoma arched throughout, weakly depressed at promesonotal suture (Fig. 1); metanotum well-defined, metanotal suture well depressed below dorsal outline of mesosoma; dorsal face of propodeum slightly longer than posterior face, spiracle oval-shaped; petiole narrow as seen in profile, apex pointed as seen from front (Fig. 1).

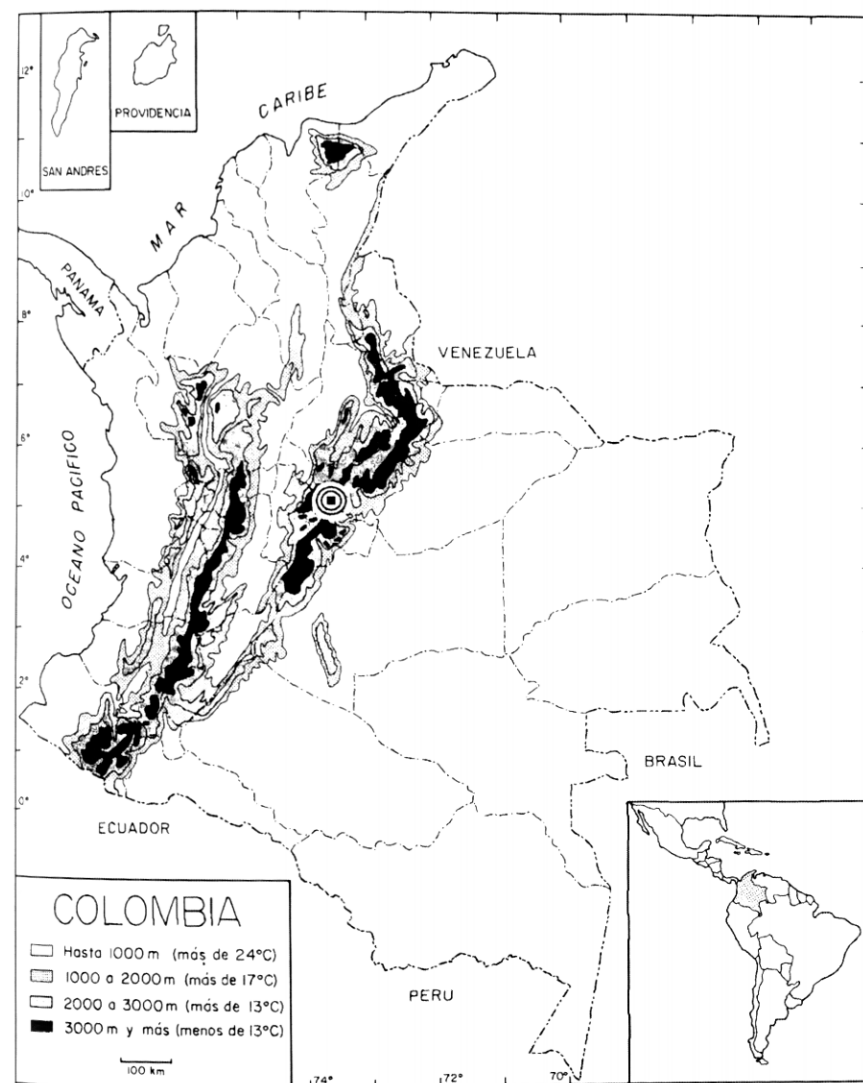
Erect hairs abundant on most surfaces, including clypeus, cheeks, malar area, area between frontal carinae, mesosoma, and gaster, hairs on tibiae appressed; appressed pubescence sparse, few hairs on dorsum of head, dorsum of mesosoma, and dorsum of gaster.

Moderately to strongly shining, head with scattered circular punctures intermixed with coarse elongate punctures, mesosoma coriaceous, gaster very finely, transversely striolate, smooth and predominantly glossy.

Black.

Intermediate worker measurements (mm): HL 1.82 - 1.98, HW 1.44 - 1.68, SL 2.00 - 2.26, EL 0.49 - 0.53, CL 0.63 - 0.70, CW 0.80 - 0.90, WL 2.48 - 2.74, FFL 1.72 - 1.88, FFW 0.40 - 0.45. Indices: CI 79 - 85, SI 110 - 114, CLI 128 - 129, FFI 23 - 24.

Mandible with 6 teeth, anterior border of clypeus concave (Fig. 6), clypeal carina moderately developed, and indented as in major worker; sides of head straight, parallel, posterior border convex; eyes nearly reach sides of head; scape extends about $\frac{1}{2}$ length past posterior lateral corner (Fig. 6); mesosoma and petiole as in major worker. Pilosity,



Map 1. Distribution of *Camponotus polymorphicus*.

sculpture, and color as in major worker.

Minor worker measurements (mm): HL 1.30 - 1.64, HW 1.06 - 1.36, SL 1.42 - 1.56, EL 0.34 - 0.40, CL 0.41 - 0.58, CW 0.60 - 0.69, WL 1.72 - 2.06, FFL 1.06 - 1.24, FFW 0.28 - 0.35. Indices: CI 82 - 83, SI 95 - 109, CLI 120 - 145, FFI 27 - 28.

Mandible with 6 teeth; anterior border of clypeus convex (Fig. 3); head

slightly narrowed anteriorly; eyes extend past sides of head; scape extends about $\frac{1}{2}$ length past posterior lateral corner; mesosoma rounded, metanotum not defined, sutures little depressed below level of mesosoma (Fig. 2); pilosity, sculpture, and color as in major worker.

Female measurements (mm): HL 1.80 - 2.28, HW 1.56 - 1.96, SL 1.64 - 2.44, EL 0.51 - 0.68, CL 0.64 - 0.80, CW 0.76 - 0.96, WL 3.40 - 4.06, FFL 1.52 - 2.08, FFW 0.40 - 0.53. Indices: CI 86 - 87, SI 91 - 107, CLI 120, FFI 26.

Mandible with 6 teeth; anterior border of clypeus concave, carina moderately defined (Fig. 5); head widened anteriorly, sides nearly straight, posterior border convex; eyes extend past sides of the head; scape extends nearly $\frac{1}{2}$ length past posterior lateral border; petiole narrow as seen in profile, apex nearly flat as seen from front.

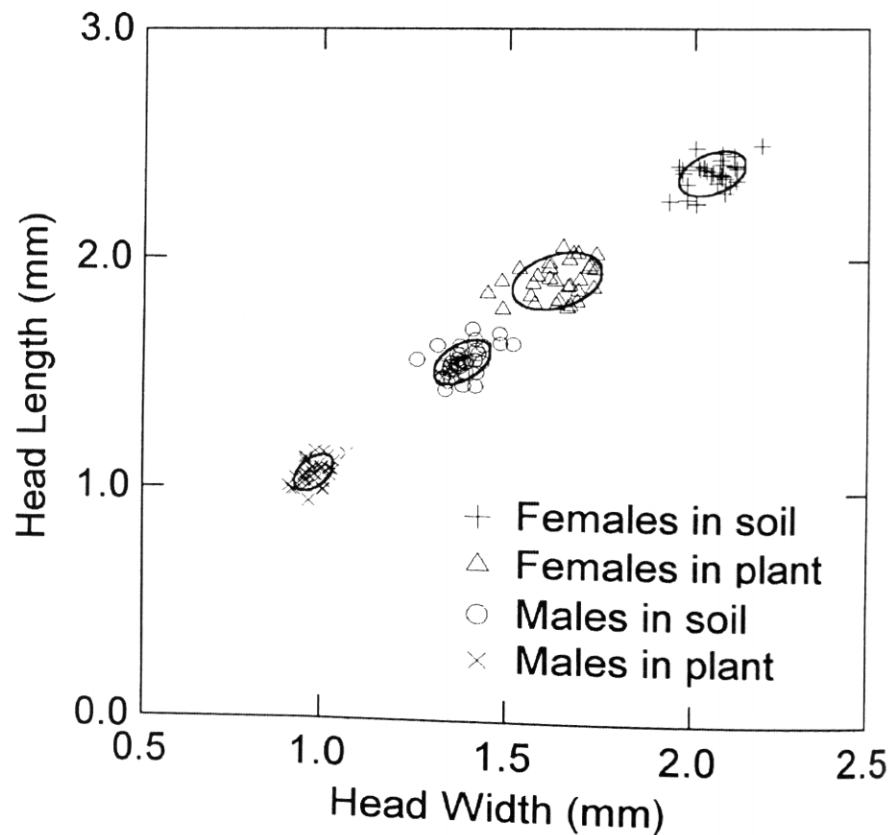


Fig. 7. Plots of the head lengths Vs. the head widths of females and males of *Camponotus polymorphicus*. The ellipses are Gaussian bivariate confidence intervals on the centroids, and are centered on the sample means of both variables. The lengths of the ellipses are basically 1 standard deviation, and the ellipses include 68% of the observations.

Golden, erect hairs present across disk of clypeus, malar area, cheek, region between frontal carinae, mesosoma, dorsum of petiole, scattered across dorsum of gaster. Sculpture and color as in major worker.

Male measurements (mm): HL 1.06 - 1.44, HW 0.94 - 1.24, SL 1.78 - 1.86, EL 0.41 - 0.53, CL 0.33 - 0.42, CW 0.45 - 0.64, WL 2.28 - 3.42, FFL 1.54 - 2.28, FFW 0.23 - 0.35. Indices: CI 86 - 89, SI 129 - 168, CLI 138 - 152, FFI 15.

Males are dimorphic (slightly over 5 mm and slightly over 8 mm total length), black, with abundant hair on the clypeus, cheek, malar area, posterior border of head, mesosoma, petiole, and gaster. The hairs on the tibiae are appressed to decumbent. The frontal carina is poorly marked.

Type series. Holotype major worker (IAVH), 4 paratype intermediate workers, 24 paratype minor workers, 3 paratype females (2 small, 1 larger), and 9 (8 small and 1 large) paratype males, Colombia, Cundinamarca, Municipio Chocontá, 5°1'N 73°42'W, 2700 - 2800 m, viii-2000, C. López-C. (CASC, CWEM, IAVH, LACM, MCZC, MZSP, USNM).

Material examined. Type series. Additional specimens were collected in the Municipio de Guasca, Cundinamarca, at elevations above 2600 m.



Fig. 8. Typical habitat of *Camponotus polymorphicus*.



Fig. 9. An example of *Espeletia grandiflora*, nesting site of young colonies of *Camponotus polymorphicus*.

Etymology. From Greek, *polys* for many, and *morphe* for form, indicating the polymorphic workers, and dimorphic females and males of this unusual, high altitude species

Discussion. This is the most polymorphic species of *Camponotus* in the Neotropics. The workers can be arbitrarily divided into majors, intermediate workers, and minors, although as stated above, there may be 4 separate size classes. The females are dimorphic (Fig. 7), with the head length of the smaller size class ranging from 1.70 - 1.90 and head widths of 1.50 - 1.65; the larger size class has HL of 2.22 - 2.35, with a head width 2.0. The males are also dimorphic (Fig. 7), with the smallest size class having head lengths ranging from 1.70 - 1.90 mm, with head widths of 1.5 - 1.65; the largest size class has head lengths from 2.22 - 2.35, head width of 2.0. The smallest sexuals were taken from the youngest nests, which are found in frailejón plants. The description is based on a mixture of two nests. The two size classes of sexuals are not found together in a single nest, based on the complete excavation of three nests.

This species is easily recognized as being one of the few species which is shiny and black. Additionally they occur at high elevations, where few tropical ants are found. They could be confused with *Camponotus bonariensis* (which are also shiny and polished), but can be separated by color (*C. polymorphicus* is black, *C. bonariensis* is brown) and by the shape of the head (elongate, that of *C. bonariensis* nearly as wide as long). The only other species of high elevation *Camponotus* in Colombia is *C. nitens*, which are much smaller, have a heart-shaped head, and are brown. Therefore this new species can be easily separated from all other Neotropical species of *Camponotus*.

Biology. The ant was studied in Andes Mountains between 2600 and 3300 meters in elevation. The habitat comprises high Andean forest to páramo vegetation (Fig. 8). This species nests in the soil, rotten logs and in living and dead "frailejón" (Fig. 9) páramo plants (Asteraceae: *Espeletia grandiflora*, *Espeletopsis corymbosa* and *E. bogotensis*). This is an unusual habitat for tropical ants, and few species are found higher than 2000 meters. This makes *C. polymorphicus* an especially interesting ant. A mature colony has more than 3700 workers. Apparently, the young colonies inhabit living and dead frailejones and the older colonies become subterranean (López-Castro, 2001). The nests have a grouped distribution, and are polydomous, and they establish new nests by budding.

ACKNOWLEDGMENTS

We thank Emma Mackay for a critical review of the manuscript and

for providing the map. The publication was supported by the National Institutes of Health, grant # 5 G12RR08124.

REFERENCES

- López-Castro. C. 2001 Distribución y estructura de una población de *Camponotus (Tanaemyrmex)* sp. (Hymenoptera: Formicidae) de Alta Montaña. Tesis de Grado Biólogo, Universidad de Los Andes, Bogotá D.C., Colombia.
- López-Castro, C., J. Estévez-Varon, C. Sarmiento, & Emilio Realpe. 2002. Polymorphism in a high altitude Colombian ant species *Camponotus polymorphicus* (Hymenoptera: Formicidae). *Sociobiology* 40(2):431-436.

