The Genus *Prenolepis* Mayr, 1861 (Formicidae) in the Greater Antilles, with an Outline of Phylogenetic Relationships

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**ABSTRACT.**—This paper reviews the genus *Prenolepis* in the Antilles based on specimens (including females and males) deposited in collections as well as fresh material. Results include the synonymy of *P. gibberosa rogeri*, the rising to new status of *P. gibberosa albimaculata*, and the description of a new species. The Antillean species form a monophyletic group which is apparently the most derived of the genus. The group is characterized by large size, slender morphology, and arboreal or limestone habitats. *Prenolepis karstica* is apparently involved in a mimetic relationship with *Leptothorax poeji*. *Paratrechina longicornis*, used as outgroup together with *Paratrechina fulva* and *Lasius niger*, was the sister taxon of the Antillean clade. The topology of the phylogenetic relationships was: ((((*karstica-albimaculata*) gibberosa*) longicornis*) naoroji-jerdoni emmaei*) impars, nitens) acuminata). These results support Trager’s (1984) suggestion of a close relationship between the *Paratrechina longicornis* group and *Prenolepis* species, as well as the general relations of Cuban species presented by Wheeler (1930).

**INTRODUCTION**

The genus *Prenolepis* Mayr is a small group of ants with nine species whose distribution covers areas in the Palearctic, Neartic, Neotropic, Oriental, and Indo-Australian regions (Bolton, 1995a). No species have been reported from South America, Africa or Australia. *Prenolepis gibberosa* Roger, 1863, is the only species reported from the Greater Antilles (Cuba and Haiti). Mann (1920) emphasized that the typical form of this species had the “apices of femora, bases of tibiae, tarsi and apical half of the antennae funiculi white”. Thus, he erected *P. gibberosa rogeri* and characterized it by its larger size and uniformly dark reddish-brown to almost black coloration. However, Mann confused the original description of Roger (1863), which actually corresponded to Mann’s new subspecies. Santschi (1930) amended that mistake and synonymized *P. gibberosa rogeri*, creating *P. gibberosa var. albimaculata* for Mann’s supposed typical form. Aguayo (1932) examined Haitian specimens collected by Mann and considered them as belonging to *P. gibberosa*; creating thereby *P. gibberosa var. rogeri*. This was distinguished from the typical form by its larger size, darker coloration, more abundant pilosity, and shinier gaster. Aguayo demonstrated that there are transitions between the states of those characters. Wheeler (1937) conferred subspecific rank to Santschi’s variety.

In more recent references to these taxa, Alayo (1974) treated all of them as subspecies but belonging to the genus *Paratrechina*. Kempf (1972) and Bolton (1995b) recognized *P. gibberosa*, *P. gibberosa albimaculata* and *P. gibberosa rogeri*. Fontenla (1997) gave without discussion specific rank to *P. gibberosa albimaculata*.

This paper proposes a new arrangement for the Antillean segment of the genus, including the formal suppression of the subspecific taxa, the raising to species status of *P. gibberosa albimaculata*, and the description of a new species. Elements of the phylogenetic relationships and the evolution of the Cuban group are also discussed.

**MATERIALS AND METHODS**

The revision and phylogenetic analysis are based primarily on worker morphology. Specimens were examined from or are deposited in the following collections: MNHNCU- Museo Nacional de Historia
Natural de Cuba. IES- Instituto de Ecología y Sistematión, La Habana, Cuba. MCZ- Mu-
seum of Comparative Zoology, Harvard University. NMNH- National Museum of Na-
tional History, Washington, DC. USA.

7 Measurements and indices. Measurements were made up to 312.5x with an ocular micrometer on a WILD M5 stereoscope. HW. Head width: maximum width of head, measured in full-face view (dorsal frontal), excluding the eyes. HL. Head length: midline length of head in full-face dorsal view, from anterior clypeal margin to midpoint of a line drawn across vertex margin. SL. Scape length: length of first antennal segment, excluding neck and basal condyle. ED. Eye diameter: measured along its long axis in lateral view. ML. Mesosoma length: diagonal distance from anterior margin of pronotum to posterior ex-
tremity of metapleural lobe. PH. Pronotum height: maximum height measured in lat-
eral view. PW. Pronotum width: maximum transverse span of pronotum in dorsal view. PL. Pronotum length: midline length of pronotum in dorsal view. MH. Mesonotum height: measured as in pronotum. MW. Mesonotum width: measured as in pronotum. FL. Femur length: posterior length in dorsal view. CI. Cephalic index: HW/HL. SI. Scape index: SL/HL. OI. Oc-
ular index: ED/HW. PI. Pronotum index: PW/PL. MHI. Mesonotum height index: MH/PH. MWI. Mesonotum width index: MW/PW. FI. Femur index: FL/ML.

Taxa. Six additional species of Prenolepis were studies at the NMNH to test the
monophyly of Cuban species and to obtain an idea of the general relationships of the
group. It was impossible to study all the species of the genus, but those examined
come from the major geographic areas in-
habit by these ants.

Characters and outgroups. Characters and coding are listed in Appendix 1. The data matrix appears in Table 1. Multi-
stated characters were treated initially as unor-
dered. Character polarity was made through a simultaneous and unconstrained
analysis (Nixon and Carpenter, 1993), with
several outgroups as suggested by Barriell
and Tassy (1998). Tribal placing of Prenol-
epis has undergone several shifts (Wheeler
and Wheeler, 1985; Hölldobler and Wilson,
1990; Bolton, 1995b) and interspecific rela-
tionships are not well studied. In his re-
vision of North American Paratrechina,
Trager (1984) suggested that Prenolepis and
Paratrechina (both within the Tribe Lasini,
according to Bolton, 1995b) formed a monophyletic group. In fact, he stated that
any species could be placed indistinctly in
one genus or the other. On the other hand,
and based on some characters of the hel-
cium, Agosti (1991) associated both genera
with different genus-groups within the
Lasini. Trager’s conclusions are based on a
more profound and convincing analysis
and provide the criteria followed here. Ac-
cordingly, Lasius niger, Paratrechina fulva
(formerly in Nylanderia) and Paratrechina
longicornis were chosen as outgroups.

<table>
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<th>Species</th>
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These last two species represent two major species groups within Paratrechina (Trager, 1984).

Parsimony analysis were performed in PAUP version 3.1.1 (Swofford, 1993) using the exact branch and bound algorithm, and in NONA version 1.5.1 (Goloboff, 1996), which was also employed for branch support or Bremer support: the number of extra steps required before a clade is lost from the strict consensus tree of near-minimum-length cladogram (Kitching et al. 1998), using the following commands: h200; w100; mulf15; mswap5; ma*; j4; t*; ne; bsupport 5; PAUP was also used to perform bootstrap analysis and to generate equiprobable random trees. Tree manipulation was done with MacClade version 3.05 (Maddison and Maddison, 1995).

RESULTS

Phylogenetic analysis

Cladistic analysis (PAUP and NONA runs) yielded two equally most parsimonious trees (L= 67, CI= 0.49, RI= 0.69). Application of successive weighting produced two trees with the same topology (L= 21 769, CI= 0.67, RI= 0.82). The strict consensus tree (Fig. 1) is identical to one of the most parsimonious trees (irresolution in P. imparis-nitens relationships) and is considered the preferred hypothesis. The alternative cladogram depicts P. imparis and P. nitens as sister species. The three Antillean species form a monophyletic group supported by two autoapomorphies: oval pronotum and nesting behavior in trees or limestone substrates. The global topology of the cladogram indicates a basal position for P. acuminata and a closer relationship of the Cuban clade with the Asian species. This result agrees with Wheeler (1930), who expressed that Cuban species (P. gibberosa) formed a group with Asian species, distinct from P. imparis-P. nitens, and that P. acuminata should belong in Paratrechina and not in Prenolepis.

Paratrechina longicornis does not group adjacent to the other outgroup species. Instead, it occupies a position within the ingroup as the sister taxon of the Antillean clade. Barriel and Tassy (1998) emphasized that when certain outgroups appear to belong to the ingroup, the obtained tree should not be considered informative of sister group relationships. They recommended treating each outgroup alternatively as the primary outgroup and making a strict consensus of the resulting topologies. The consensus tree produced by this manipulation (with MacClade) depicts a basal polytomy of the three outgroups with an increase of four steps. Displacing P. longicornis to a sister group position of the ingroup, a process also recommended by Barriel and Tassy (1998), increased the total length of the tree to 75 steps (eight more than the most parsimonious topology). That increase represents 12 % of the most-parsimonious cladogram length.

A total of 10 000 random equiprobable trees were generated and their lengths determined based on the original data matrix (Table 1). This yielded a tree length frequency between 81 and 128 steps, with a median value of 110.3 steps and a modal value of 112 steps. Thus, the optimal parsimony topology (67 steps) is far from trees generated by chance. Inversely, displacing P. longicornis from the ingroup shortens the distance to the point that it is closer to a chance topology. Bootstrap analysis with 100 replicates gave a majority consensus tree with a frequency of over 50 % for all the clades. Bremer’s support values vary from one to three (Fig. 2). Total Bremer’s support is 0.24. The clade P. longicornis + Antillean species is one of the highest supported by both indicators.

If the topology selected as the hypothesis of phylogenetic relationships reflects a true history, it might imply that Paratrechina and Prenolepis are paraphyletic genera; a possibility already contemplated by Trager (1984), who emphasized the apparent close similarity between P. longicornis and Prenolepis species. The cladogram with P. longicornis as part of the ingroup contains the maximal explanatory power and must be the right choice, considering Trager’s study and the background knowledge of these groups. Still, by themselves maximal explanatory power and background knowledge do not necessarily measure the truth
of a hypothesized sister-group relationship (Kluge, 1998).

According to their terminal position in the cladogram, the Antillean species are the most derived. Their greatest patristic distance (taking them as a measure of specialization, as in Baroni Urbani et al. 1992) from the outgroups reinforces this highly derived status (author’s data). Aside from the Antillean species, *P. longicornis* is the taxon with the highest distance values from the remaining outgroups. This position is not altered by considering the characters as ordered or unordered, or even by performing a parsimony analysis with an hypothetical outgroup with all characters coded as zero. The latter yielded a unique cladogram with the same general topology (CI= 0.77; RI= 0.89 after successive weighting). The Antillean clade is characterized by larger body and eye sizes, lengthening of appendages, and a shift in nesting behavior (Appendix 1 and Table 1).

The Indian species *Prenoilepis naoroji* is the sister species of the clade *P. longicornis* (which according to Fowler et al., 1994 may be of African origin) + Antillean species. This suggests an ancient common ancestry

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**Fig. 1.** Strict consensus tree of Prenoilepis’s phylogenetic relationships.
of Gonwanaland origin, but such ancestry presumes a correlation between the age of the groups involved and the paleogeographic events. It has been estimated that ants originated about 130 millions of years ago (Brandão et al., 1991; Agosti et al., 1997; Grimaldi et al., 1997) and at that time some communication must have persisted throughout Gondwanaland, even a long time after break-up (Monge-Nájera; 1996). Lattke (1994, 1995) invokes a Gondwanaland origin for the Ectatommini and Gnaptogenys, while Gotwald (1979, 1995) does the same for the Ecitonini and Dorylinae. Andrade (1994, 1995) and Baroni Urbani (1995) found closer relationships between fossil ants species from the Greater Antilles and species from Indo-Malaysia, Madagascar and Australia.

The preceding statements must be qualified as pertaining only to the species included in the current analysis. This qualification must not alter the fact that Prenolepis could be paraphyletic with respect to one or more Paratrechina species. A clade of New World taxa (Prenolepis spp. + Paratrechina spp.) may be more closely related to Asian Paratrechina than to other
New World *Prenolepis* or *Paratrechina* species.

Absence of *Prenolepis* in South America could be due to extinction. Colonization of Cuban or Proto-Cuban land was possible since the Upper Eocene, and especially since the Early Oligocene (Iturralde-Vincent, 1988; Iturralde-Vincent and MacPhee, 1999). Any alternative hypothesis assuming overwater dispersal from Africa or Asia must be extremely improbable due to the huge distances and prohibitive time required for that hypothetical voyage, even considering the somewhat shorter distances between the New and Old Worlds during early Tertiary times. However, it has been observed several times insects in Puerto Rico, specifically the migratory locust, carried by dust from Africa (J. A. Marimuth, pers. com.).

**Diagnosis of workers of Antillean Prenolepis**


**Key for workers of Antillean Prenolepis**

1. Areas of funiculus, junction of femora and tibiae, and tarsi white; pubescence absent ——— *albinaculata*.
   - Without the above color pattern; pubescence present ——— ——— ——— 2

2. Antennal club filiform; pronotum longer than broad; pilosity scarce, pronotal setae thick and paired; body uniform brown ——— *karstica*.
   - Antennal club more defined; pronotum broader than long; pilosity abundant, pronatal setae thin and unpaired; head and mesosoma orange or reddish brown ——— *gibberosa*

**Antillean species of Prenolepis**

*Prenolepis albinaculata* Santschi, new status

*Prenolepis gibberosa* Mann 1920: 433.

*Prenolepis gibberosa* var. *albinaculata* Santschi 1930: 81.

*Prenolepi* *gibberosa* *albinaculata* Wheeler 1937: 463; Kempf 1972: 210; Bolton 1995b: 364.

*Paratrechina gibberosa* *albinaculata* Alayo 1974: 44.

**Workers.**—Measurements and indices. HW 0.55-0.60; HL 0.9-1.02; SL 1.75-1.85; ED 0.28-0.30; ML 1.55-1.65; PH 0.40-0.48; PW 0.50-0.57; PL 0.68-0.75; MH 0.20-0.24; MW 0.20-0.24; FL 1.77-1.89; CI 50.8-60.1; SI 175.6-181.8; OI 57.7-59.0; PI 76.0-94.3; MHI 50.0; MWI 40.0-42.1; FI 110.3-112.1.

**Specimens examined** (n=122): Pinar del Rio Province: Ceja de Francisco, Sierra de Mesa. Holguin Province: Pinares; Ojito de Agua; Loma de la Mensura; Meseta Cabezadas del Rio Piloto. Guantánamo Province: Monte Iberia, Baracoa; Nuevo Mundo; Yunque de Baracoa; Nibujón; Cueva de La Patana, Maisí; Piedra Gorda, Baracoa (type locality). IES, MNHN, MCZ, NMNH.

**Diagnosis:** Head, mesosoma and petiole dark brown, reddish, or dark orange. Gaster dark brown or black. Distal area of funiculus, junction of femora and tibiae, and tarsi always whitish. Antennal club filiform; scapes very long, more than 175 % of head length. Eyes slightly prominent; mesosoma very slender, pronotum longer than broad. Mesosoma width <45 % of pronotum width. Pilosity very scarce; pronotum with 2-3 pairs of coarse setae, mesosoma with 2 pairs; pubescence absent. Petiole cuneiform and slender, rounded in dorsal view.

**Female.** Measurements and indices. HW 1.23; HL 1.70; SL 2.43; ED 0.41; ML 1.98; PH 0.79; PW 1.11; PL 1.61; MH 1.92; MW 1.46; FL 2.88; CI 72.0; SI 142.7; OI 33.3; PI 109.5; MHI 142.9; MWI 82.5; FI 86.2.

**Specimens examined** (n=1) Meseta de
las cabezadas del Río Piloto, Moa, Holguín Province. MNHNCU.

**Diagnosis.** Body brown, gaster black and opaque; whitish areas as in workers. Scapes proportionally shorter than in workers and head more rounded. Mandibles five-toothed. Palpi relatively short, eyes and ocelli bigger than in workers. Mesosoma very robust and not constricted; mesonotum higher than pronotum; propodeal gibbosity absent. Petiole lower than in workers. Femora do not surpass mesosoma length. Pilosity consists of short, erect and thin, black unpaired hairs.

**Male.** Measurements and indices. HW 0.45; HL 0.60; SL 1.05; ED 0.28; ML 1.11; PH 0.57; PW 0.90; PL 0.69; MH 0.66; MW 0.75; FL 1.68; CI 75.0; SI 175.0; OI 65.1; PI 130.4; MHI 115.8; MWI 83.3; FI 119.1.

**Specimens examined (n=1).** Data as for female.

**Diagnosis.** Head rounded and proportionally small. Eyes very large, bulging, black; three translucid ocelli on a black spot of variable size present on a protuberance of the vertex. Scapes very long. Mandibles weaker than in workers, with one apical tooth. Mesosoma robust, with mesonotum higher than pronotum and no propodeal gibbosity; all sutures conspicuous. Gaster lengthened. Pilosity more abundant than in workers; hairs black and thin, erect or suberect, unpaired; antennae with many short erect hairs; pubescence present. Wings translucent, with borders fringed by short white hairs. Body light brown; gaster darker; palpi, antennae and legs whitish. Genitalia as in Fig. 3. Genital capsule is smaller than that of *P. gibberosa* and has a different shape and proportions of the various structures. Parameres hairy.

**Comments.** This species is very abundant in the Nipe-Sagua-Baracoa Massif (Holguín and Guantánamo Provinces). It forages on trees and occasionally on the ground, with the rapid motions typical of "crazy ants". The species is apparently very scarce in the west portion of the island.

**Prenolepis gibberosa** Roger

**Prenolepis gibberosa** Roger 1863: 161; Wheeler 1937: 463.


**NEW SYNONYM**

**Prenolepis gibberosa** var. rogeri Aguayo 1932: 224.

**Paratrechina gibberosa** Alayo 1974: 44.

**Workers.** Measurements and indices. HW 0.65-0.78; HL 1.20-1.50; SL 1.80-2.10; ED 0.31-0.36; ML 1.60-2.10; PH 0.55-0.63; PW 0.66-0.82; PL 0.60-0.66; MH 0.33-0.45; MW 0.36-0.39; FL 2.0-2.30; CI 55.0-59.5; SI 155.0-164.2; OI 46.1-50.8; PI 109.5-122.7; MHI 62.5-68.7; MWI 48.1-55.4; FI 116.4-125.0.

**Specimens examined (n=117).** Pinar del Río Province: Vereda del Berraco and Cabo Corrientes (Peninsula of Guanahacabibes); Sierra de San Carlos; Ceja de Francisco (Sierra de Mesa); Sierra de San Vicente; Mogote La Fonte (Sierra de San Andrés); Sierra Azul (Consolación del Sur); Los Pinos, San Diego de los Baños; Rancho Mundito; Sierra de la Güira; Cueva Los Portales, Sierra de la Güira; Hoyo del Aire and Hoyo de Fanías, Sierra de Queimados; Loma del Mulo, Sierra del Rosario; Pan de Guajabón, Sierra del Rosario. **Cienfuegos Province:** Buenos Aires, Alturas de Trinidad; San Blas (cotypes of *P. gibberosa rogeri*), Alturas de Trinidad. **Sancti Spiritus Province:** Cayo de Los Ensenachos. **Santiago de Cuba Province:** La Mula, Pico Turquino, and Subida a la Nigua, Sierra Maestra; La Gran Piedra, Sierra de la Gran Piedra. **Guantánamo Province:** Jagueyón; La Matazón; Yateras (cotypes of *P. gibberosa rogeri*); Loma del Gato, Baracoa. **Haití:** Hacienda "Diquiní". IES, MNHNCU, MCZ, NMNH.

**Diagnosis.** Head, mesosoma, and petiole with different tones of reddish brown or orange; antennae and legs always darker; gaster dark brown or black; petiole with same color of mesosoma, gaster or legs. Eyes smaller than in other species; ocelli sometimes absent. Mesosoma robust, pronotum broader than long. Petiole cuneiform, broad and beveled in dorsal view. Pilosity abundant; hairs thin, erect or suberect, unpaired. Some specimens, especially those from Pico Turquino, with mesosomal pilosity very reduced. Antennae and legs with a dense pilosity of short de-
cumbent hairs. Pubescent scarce, more concentrated on head.

**Description.** Antennae with 12 segments; scapes very long, surpassing cephalic length by more than 175 %; funiculus filiform. Head proportionally big and broad, broader between the mandibles. Three ocelli on vertex. Clypeus prominent and convex, with a feeble central carina; posterior border concave. Eyes big and convex. Frontal carina extends to level of first half of the eyes. Mandibles strong, with five teeth. Labial palpi very long. Mesosoma slender, with a long neck. Pronotum oval, longer than broad, depressed laterally. Mesonotal constriction sharp, slightly over half of pronotum height and half of its width. Propodeum with well defined gibbosity. Petiole cuneiform, high and narrow; anterior face straight

**Female.** Measurements and indices. HW 1.23; HL 1.70; SL 2.43; ED 0.41; ML 1.98; PH 0.79; PW 1.1 PL 1.61; MH 1.92; MW 1.46; FL 2.88; CI 72.0; SI 142.7; OI 33.3; PI 109.5; MHI 142.9; MWI 82.6; FI 86.2.

**Specimens examined** (n= 1). Subida a la Nigua, Sierra Maestra. Santiago de Cuba Province. MNHNCAU.

**Diagnosis.** Mandibles with five teeth; head not as slender as in workers, with three big ocelli and eyes proportionally smaller. Scapes also proportionally smaller and femora do not surpass mesosoma length. Mesosoma much more robust, without mesonotal constriction or propodeal gibbosity. Petiole very low. Pilosity as in
workers, with black, short, erect thin hairs. Color brown, gaster black and opaque; whitish areas as in workers.

**Male.** Measurements and indices. HW 0.75; HL 1.05; SL 1.56; ED 0.30; ML 2.13-2.20; PH 0.96; PW 1.20; PL 1.04; MH 0.90; MW 0.90; FL 2.31-2.40; CI 71.4; SI 148.6; OI 40.0; PI 115.4; MHI 93.8; MWI 75.0; FI 108.4-109.5.

**Specimens examined** (n= 5). Pico turquino, Sierra Maestra. La Gran Piedra, Sierra de la Gran Piedra. Santiago de Cuba Province. Subida a la Nigua, Sierra Maestra. MNHNCU

**Diagnosis.** Color brown-orange, gaster dark brown, wings brownish. Head proportionally small; scapes very long but proportionally shorter than worker's. Eyes big and bulging; ocelli conspicuous, placed on a prominence in vertex. Mandibles with an apical tooth and two denticles in the dentary border. Mesosoma massive, pronotum and mesosonotum convex, with neither mesonotal constriction nor propodeal gibbosity. Petiole broader than in workers. Posterior femora surpassing mesosoma length. Integument with feeble micropunctuations throughout and slightly shiny. Pilosity abundant, hairs black. Wing borders fringed by short hairs. Genitalia as in Fig. 4. Parameres hairy.

**Comments.** This species is abundant throughout its range. It can be observed on trees, fallen trunks, and occasionally on the ground. There is no geographical or morphological support for retaining subspecies rogeri. The specimens from La Mula, Sierra Maestra, are the largest, least hairy and lightest in color, but male body and genitalia morphology are identical to those of the male from Subida a la Nigua, Sierra Maestra, whose workers are more “classical”.

This species is the biggest and most robust of the Antillean *Prenolepis*. It is also easily distinguished by its color pattern and denser pilosity of thin hairs.

*Prenolepis karstica* new species

(Fig. 5)

**Workers.** Measurements and indices (paratypes). HW 0.63 (0.60-0.63); HL 1.14 (1.05-1.100); SL 2.01 (92.01-2.04); ED 0.33 (90.33); ML 1.77 (1.77-1.800); PH 0.51 (0.48-0.51); PW 0.60 (90.58-0.60); PL 0.66 (0.66-0.72); MH 0.33 (90.30-0.33); MW 0.30 (0.30); FL 2.0 (2.0-2.04); CI 55.3 (55.3-57.1); SI 176.3 (176.3-185.5); OI 52.4 (52.4); PI 90.0 (83.3-88.0); MHI 64.7 (62.5-64.7); MWI 50.0 (50.0-51.7); FI 112.9 (113.3-115.2).

**Specimens examined.** Holotype. “Mogotes” (dome-like limestone hills) near Ceja de Francisco, Sierra de Mesa, Pinar del Rio Province. Col. J.L. Fontenla. March 1994. IES. Paratypes (n= 20), same data as holotype. IES, MNHN, NMNH.

**Diagnosis.** Color uniform dark brown, gaster darker; mandibles with reddish dentary border. Head proportionally large. Eyes relatively large and convex; three ocelli on vertex. Scapes very long, surpassing cephalic length by over 175 %. Funiculum filiform. Mesosoma very slender and with a long neck. Pronotum oval and laterally depressed, dorsally longer than broad. Mesonotal constriction and propodeal gibbosity conspicuous. Petiole cuneiform, high and narrow, anterior face straight and posterior face declined, roundish in dorsal view. Pilosity scarce, more abundant on head and gaster but always absent on mesonotum and propodeum; pronotum thick, with two or three pairs of black setae; scapes and tibiae without hairs; pubescence whitish and dispersed throughout.

**Etimology.** Derived from karst, which means limestone landscape.

**Comments.** *Prenolepis karstica* differs from its sister species, *P. albimaculata*, by its size, pilosity and color pattern. All the specimens were collected on limestone hills “mogotes”, where their behavior differed from that of classic “crazy ants”. Specimens foraged individually and in very low density. “Frozen” posses were common and movements were generally slow. The species is sympatric with *Leptothorax gundlachi* and *L. poeyi*, and generally resembles the latter in shape and motion. “Macromischoids” leptothoracine ants are thought to be aposomatic (Wilson, 1988; Fontenla, 1995), and *L. poeyi* is dark like *P. karstica*. All these species are diurnal and very visible to ant-eating predators like *Anolis* lizards. *Prenolepis gibberosa* was very abundant in the surrounding forests, but only a few specimens
were observed on exposed surfaces, where leptotheoracines were dominant. A non-
casual association of *P. karstica* and *L. poeyi* is suggested.

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LITERATURE CITED

Agosti, D. 1991. Revision of the Oriental genus *Clado-
Alayo, P. 1974. Introducción al estudio de los Hyme-
Andrade, M. L. 1994. Fossil Odontomachini (Hyme-
Andrade, M. L. 1995. The ant genus *Aphaenogaster* in
Baroni Urbani, C. 1995. Invasion and extinction in the
West Indian ant fauna revised: the example of *Phle-
tics, 14: 193-200.
Bolton B. 1995a. A taxonomic and zoogeographical
census of the extant ant taxa (Hymenoptera: For-
Bolton, B. 1995b. A new general catalogue of the ants
of the world. Harvard University Press, Cam-
bridge, Massachusetts, 503 pp.
Brandão, C. R. F., R. G. Martins-Neto, and M. A. Vul-
cano. 1991. The earliest known fossil ant (first
Fontenla, J. L. 1995. Mimetismo entre hormigas endé-
Fontenla, J. L. 1997. Lista preliminar de las hormigas
Fowler, H. G., M. N. Schindwein, and M. A. Medei-
ros. 1994. Exotic ants and community simplifica-
ção in Brasil: A review of the impact of exotic ants
Goloboff, P. A. 1996. Pee-Wee (Ver. 2.5.1)/Noname
(NONA)Version 1.5.1 (August 10, 199G). Computer
programs and manuals distributed by the author.
Gotwald, W. H. 1979. Phylogenetic implications of
Gotwald, W. H. 1995. Army Ants. The biology of so-
New and rediscovered primitive ants (Hymenop-
Hölldobler B. and E. O. Wilson. 1990. The ants. Har-
vard University Press, Cambridge, Massachusetts,
732 pp.
Iturralde-Vinent, M. 1988. Naturaleza geológica de
Iturralde-Vinent, M. and R. MacPhee. 1999. Paleoge-
da Região Neotropical (Hymenoptera: Formici-
dae). Studia Entomol., 15: 3-341.
Kluge, A. G. 1998. Total evidence or taxonomic con-
gruence: cladistic or consensus classification. Cladis-
tics, 14: 151-158.
Lattke, J. 1994. Phylogenetic relationships and classi-
fication of ecitommine ants (Hymenoptera: For-
Lattke, J. 1995. Revision of the ant genus Gnampto-
Maddison, W. P., and D. R. Maddison. 1995. Mac-
Clade. Analysis of phylogeny and character evolu-
Mann, W. M. 1920. Additions to the ant fauna of the

Roger, J. 1863. Die neu aufgeführten Gattungen und Arten meines Formicidea verzeichnisses, Nebis Er
genaizungen einiger früher gegebenen beschreib
Santschi, F. 1930. Quelques formis de Cuba et du Bra
Swofford, D. L. 1993. PAUP: Phylogenetic Analysis
Using parsimony, Version 3.1.1. Computer pro
gram and user manual. Distributed by the Illinois
Natural History Survey, Champaign, Illinois, 257
pp.
Trager, J. C. 1984. A revision of the genus Paratroch
ing (Hymenoptera: Formicidae) of the continental
Wheeler, W. M. 1937. Ants mostly from the mountains
спектus of the Formicidae. Trans. Amer. Entomol.
Wilson, E. O. 1988. The biogeography of the West In
dian ants (Hymenoptera: Formicidae). In: J. Lieb
er (ed.), Zoogeography of Caribbean Insects, pp:
Appendix 1. List of characters and codification.
1. Antennal club: 0= well defined, 1= fili
form or subfiliform
2. Scape length: 0= does not surpass cephalic
length≤140 %, 1= surpassing cephalic
length >145 %
3. Occipital diameter: 0= <100 %, 1= >100 %
4. Cephalic index. 0= >65 %, 1= <65 %
4. Ocular index: 0= 40 %, 1= ≤40 %
5. Occeli: 0= absent, 1= present
6. Eyes shape: 0= flat, 1= convex
7. Mandibles teeth number: 0=5, 1= 6, 2= 8
8. Maxillary palps: 0= short, 1= very long
9. Mesonotum height index: 0= >65 %, 1= <65 %
10. Mesonotum width index: 0= >55 %, 1= <55 % > 45 %, 2= <45 %
11. Pronotum index: 0= <100 %, 1= >100 %
2= >140 %
12. Pronotum shape in profile: 0= globular,
1= oval
13. Mesosoma shape in profile. 0= short
and stout, 1= long and slender (oval)
14. Petiolar node width (dorsal view)/
Petiolar node height (profile): 0= >50 %
1= <50 %
15. First gastric segment width/ Petiolar
node width: 0= >50 %, 1= < 50 %
16. Posterior femur length. 0= does not
surpass mesosoma length, 1= surpasses
mesosoma length
17. Size (mesosoma length only) 0= <2.0
mm, 1= >2.0 mm
18. Segmenent: 0= opaque, 1= shiny (lightly
or conspicuously)
19. Segmenentary micropunctuations: 0= absent, 1= present
20. Body color: 0= uniform, 1= no uniform.
21. Pubescence in mesosoma and head. 0= absent, 1= present.
22. Pilosity: 0= abundant, 10 scarce.
23. Mesosoma and head hairs. 0= thin, 1= coarse.
24. Mesosoma hairs arrangement: 0= not
paired, 1= paired.
25. Scapes pilosity: 0= absent, 1= present.
26. Femora pilosity (erect or suberect
hairs): 0= absent, 1= present.
27. Nesting habitat: 0= soil, 1= arboreal, 2= limestone formations.