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# Revisionary studies on the attine ant genus *Trachymyrmex* Forel. Part 3: The Jamaicensis group (Hymenoptera: Formicidae)

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## Abstract

We hereby revise the Jamaicensis group of species of *Trachymyrmex* (Myrmicinae: Attini), as the third part of our taxonomic revisionary studies on this fungus-growing ant genus. The species group we deal with here includes six taxa that share exclusively the antennal scrobes always reaching the posterior margin of the head and ending as two separate projections arising from the preocular and frontal carinae, giving the scrobe posterior region an "opened" appearance and an angular profile to the posterolateral corners, in frontal view. The Jamaicensis group is composed of *Trachymyrmex atlanticus* **n. sp.** (eastern Brazil), *Trachymyrmex haytianus* Wheeler & Mann, 1914 n. st. (Haiti, Jamaica), *Trachymyrmex isthmicus* Santschi, 1931 (Colombia, Ecuador, Panama), *Trachymyrmex ixyodus* **n. sp.** (northern Brazil, Suriname), *Trachymyrmex jamaicensis* (André, 1893) (Caribbean islands and southern USA), its synonyms (*Trachymyrmex sharpii* Forel, 1893; *Trachymyrmex maritimus* Wheeler, 1905 n. syn.**;** *Trachymyrmex jamaicensis* var. *frontalis* Santschi, 1925 n. syn., and *Trachymyrmex jamaicensis cubaensis* Wheeler, 1937 n. syn.), and *Trachymyrmex zeteki* Weber, 1940 (Colombia, Costa Rica, Ecuador, Panama). *Trachymyrmex jamaicensis antiguensis* Weber, 1938 is excluded from the Jamaicensis species group because it belongs to the *Trachymyrmex* Urichi species group. The only known *Trachymyrmex* fossil, *T. primaevus* Baroni Urbani, 1980, from the Dominican amber, does not belong to the Jamaicensis species group, as hypothesized earlier.

**Key words:** Revision, Formicidae, *Trachymyrmex*

## Introduction

In the third part of our taxonomic studies on the New World fungus-growing *Trachymyrmex* ants, we hereby revise a relatively small assemblage of six species, that we call the Jamaicensis group. In Kempf´s sketches of a *Trachymyrmex* revision deposited in the Museu de Zoologia da Universidade de São Paulo, this group of species was included in the Urichi species group. Like the species that will be treated in the next papers of the series, that belong to the Cornetzi, Urichi and Septentrionalis groups, taxa in the Jamaicensis group lack the main diagnostic characters of the Opulentus and Iheringi groups, respectively the fine silky pubescence on tergum I of gaster and hind femora, and the basal lobe on the antennal scapes (Mayhé-Nunes & Brandão 2002, 2005).

The antennal scrobes of females in species of the Jamaicensis group always reach the posterior margin of the head and end as two separated projections arising from the subparallel preocular and frontal carinae, giving to the scrobe posterior region an "opened" appearance and an angular profile to the posterolateral corners, in frontal view (Fig. 5). Although species in the Iheringi group also may present "opened scrobes," both or at least one of the carinae never attain the posterolateral corners. Two species in the Opulentus group, *T. com-*

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*pactus* and *T. opulentus*, have the antennal scrobes' posterior region projecting as a single protuberance, but these species lacks occipital spines, always present in the females of the Jamaicensis group.

No other *Trachymyrmex* or even other Attini shows this character state, that we then consider synapomorphic for the group. The Jamaicensis group seems to be restricted to South America north of the Equator, Central America, the Caribbean islands and Florida in the United States of America, except for one species recorded from eastern Brazil.

## Methods

We have adopted the terminology used in the previous two *Trachymyrmex* revision parts already carried out by us (Mayhé-Nunes & Brandão 2002, 2005). Reference citations follow Ward *et al*. (1996). Acronyms for collections follow Brandão (2000).

Workers were cleaned in acetone using a Thornton ultra-sound equipment cleaner for 30 minutes, then coated with gold in a Balzer critical point dryer for 90 seconds at 50 mA. The scanning electron micrographs were prepared in a Leo 440 Scanning Electron Microscope. Measurements were taken using a Leica MZ 9.5 stereomicroscope at 60X magnification. All measurements in mm are presented as averages, followed by the range in parentheses:

DCI: Cephalic index: HW/DHL x 100 (see explanation for DHL below).

DHL: Diagonal head length: Maximum length, diagonal in full face view, from the median notch of the clypeal anterior margin to the tip of the posterolateral lobe. Note: in *Trachymyrmex* gynes, the ocellar protuberance may prevent a clear view of the posterior margin in frontal view, and so we have decided to take this measurement in a slightly angled diagonal line.

FLI: Frontal lobes index: IFW/HW x 100.

GL: Gaster length: From the anteriormost point of the tergo-sternal gaster suture to the visible tip of the gaster, in lateral view.

HfL: Hind femora length: Maximum chord length of the hind femora, in lateral view.

HW: Head width. Maximum width in full face view (including eyes).

HWL: Head width in lateral view: Maximum width of head in lateral view at its maximum width, at the level of the middle of the frontal carinae.

IFW: Interfrontal width: Maximum distance between the lateral margins of the frontal lobes.

MeL: Mesosoma length (= Weber's length): Maximum distance between the inflexion of anterior dorsal margin of pronotum to the flange of the metapleural gland, in lateral view.

PL: Petiole length: From the visible insertion point of the petiole in the mesosoma to the insertion of the postpetiole, in lateral view.

PPL: Postpetiole length: From the insertion point of the postpetiole in petiole to the insertion of the gaster, in lateral view.

ScL: Scape length: Maximum chord distance from the base (excluding condyle) to the apex of scape, with the head in frontal view.

TL: Total length (the sum of HWL, MeL, PL, PPL and GL).

Depositories

CECL Coleção Entomológica Angelo Moreira da Costa Lima. Instituto de Biologia, Universidade Federal Rural do Rio de Janeiro Seropédica, RJ, Brazil. Note: cited as IBUS in Brandão (2000).

CPDC Centro de Pesquisas do Cacau, Comissão Executiva do Plano da Lavoura Cacaueira (CEPLAC), Ilhéus, BA, Brazil.

IAVL Instituto Humboldt, Villa de Leyva, Santa Fé de Bogotá, D.C. Colômbia.
INBC Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Heredia, Costa Rica.
INPA Instituto Nacional de Pesquisas da Amazônia, Manaus, AM, Brazil.
IZAV Instituto de Zoologia Agrícola, Facultad de Agronomia, Universidad Central de Venezuela, Maracay, Aragua, Venezuela.
JTLC John T. Longino Private Collection.
LACM Los Angeles County Museum of Natural History, Los Angeles, CA, USA.
MCZC Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA.
MZSP Museu de Zoologia da Universidade de São Paulo, São Paulo, SP, Brazil.
QCAZ Museo Zoológico de la Pontificia Universidad Católica del Equador, Quito, Ecuador.
USNM United States National Museum of Natural History, Washington, D.C. USA.

## Taxonomic synopsis

***Trachymyrmex* genus group. Jamaicensis species group. Neotropics, Neartic.**

*T. atlanticus* (Brazil) **new species.**
*T. haytianus* Wheeler & Mann, 1914 (Haiti, Jamaica) **new status.**
*T. isthmicus* Santschi, 1931 (Colombia, Costa Rica, Ecuador, Panama).
*T. ixyodus* (Brazil, Suriname, Venezuela) **new species.**
*T. jamaicensis* (André, 1893) (Antilles, USA).
= *Atta* (*T.*) *sharpii* Forel, 1893: Wheeler, 1907 (synonymy).
= *Atta* (*T.*) *maritima* Wheeler, 1905: Wheeler, 1907 (synonymy), Mann, 1920 (revived from synonymy) **new synonymy.**
= *T. jamaicensis* var. *frontalis* Santschi, 1925 **new synonymy**.
= *T. jamaicensis cubaensis* Wheeler, 1937 **new synonymy**
*T. zeteki* Weber, 1940 (Costa Rica, Ecuador, Panama).
= *T. balboai* Weber, 1940: Weber, 1958 (synonymy).

## Excluded species

*Trachymyrmex jamaicensis antiguensis* Weber, 1938

Weber (1938) described *T. jamaicensis antiguensis* based on a "dozen" workers taken on Long Island, Antigua, British West Indies, in May 7, 1936, by Mr. H. E. Box, in "mound nest on ground." Weber compared these specimens with "topotypes" of *T. jamaicensis* and "cotypes" of its subspecies. We examined two *T. jamaicensis antiguensis* "cotypes" (syntypes) deposited in the MZSP and noticed that both workers lack the main diagnostic feature of *Trachymyrmex* of the Jamaicensis group, the posteriorly opened antennal scrobe. We believe that these specimens actually belong to a species of the *Trachymyrmex* Urichi group, to be dealt with in a forthcoming paper.

## Taxonomic account

***Trachymyrmex* Jamaicensis species group**
(Figs. 1–30)

**Diagnosis:** Monomorphic attine ants with the antennal scrobe margins always reaching and even surpassing the posterior margin of the head; frontal and preocular carinae well marked, subparallel throughout their

whole extension, limiting the impressed antennal scrobe; extremities of frontal and preocular carinae always separate and with up to three triangular or rounded compressed tubercles or vertical teeth close to the posterior margin (figs 1, 5, 9, 13, 15, 19, 23, 27); preocular carina not curved mesad above eyes. Frontal lobes from moderately approximate to moderately expanded laterad, but in most species the interfrontal width near 2/3 of the head width across the eyes (FLI 50–70). Occipital projections (teeth or spines) always present on head. Posterior margin in full-face view smoothly concave, notched in the middle. The paired vertexal carinae indicated by a series of weakly connected piligerous denticles, flanking the shallowly impressed sagital furrow, which in front joins the transverse impression of frons, behind the frontal area. Outer border of mandibles sinuous. Mandibles with discal area smooth and shining, the fine striae confined to the mandibular bases and sides. All funicular segments, including 2$^{nd}$, longer than broad.

**Key to *Trachymyrmex* of the Jamaicensis species group (workers)**

1 With the body in side view, length of lateral pronotal and anterior mesonotal projections notably different, either the mesonotal is much bigger than pronotal (Fig. 10), or appears as a multitubercular low tumulus (Fig. 16) ..... 2

- Lateral pronotal and anterior mesonotal projections almost of the same size or the mesonotal a little shorter, but always spine-like ..... 3

2 Lateral pronotal spine-like projections shorter and slenderer than anterior mesonotal ones; midpronotal projections present; pronotal inferior corner and anterior margin of katepisternum unarmed; postpetiole in dorsal view trapezoidal, little broader behind than in front, its postero-dorsal border straight ..... ..... *T. isthmicus* Santschi (Figs 9–14, 30)

- Lateral pronotal spine-like projections longer than tumuliform and multituberculated anterior mesonotal ones; midpronotal projections absent or obsolete; pronotal inferior corner and anterior margin of upper region of katepisternum armed with a notable triangular tooth; postpetiole in dorsal view broader than long, its posterior border concave.....*T. ixyodus* **n. sp.** (Figs. 15–18, 30)

3 Apically spatulate curved coarse hairs distributed over the whole body (Figs. 3, 26) ..... 4

- Curved coarse hairs apically spatulate absent over the whole body, except gaster ..... 5

4 Antennal scape scarcely surpassing the posterior margin of head when lodged in the scrobe, with head in frontal view; anterior margin of the crenate frontal lobe with a protruded pointed tooth; propodeal spines distinctly longer than the distance between their inner bases (better seen in postero-dorsal view) ..... ..... *T. zeteki* Weber (Figs 23–26, 30)

- Antennal scape surpassing the posterior margin by nearly a third of its length, when lodged in the scrobe, with head in frontal view; anterior margin of the smooth frontal lobe unarmed; propodeal spines distinctly shorter than the distance between their inner bases (better seen in postero-dorsal view) ..... ..... *T. atlanticus* **n. sp.** (Figs 1–5, 30)

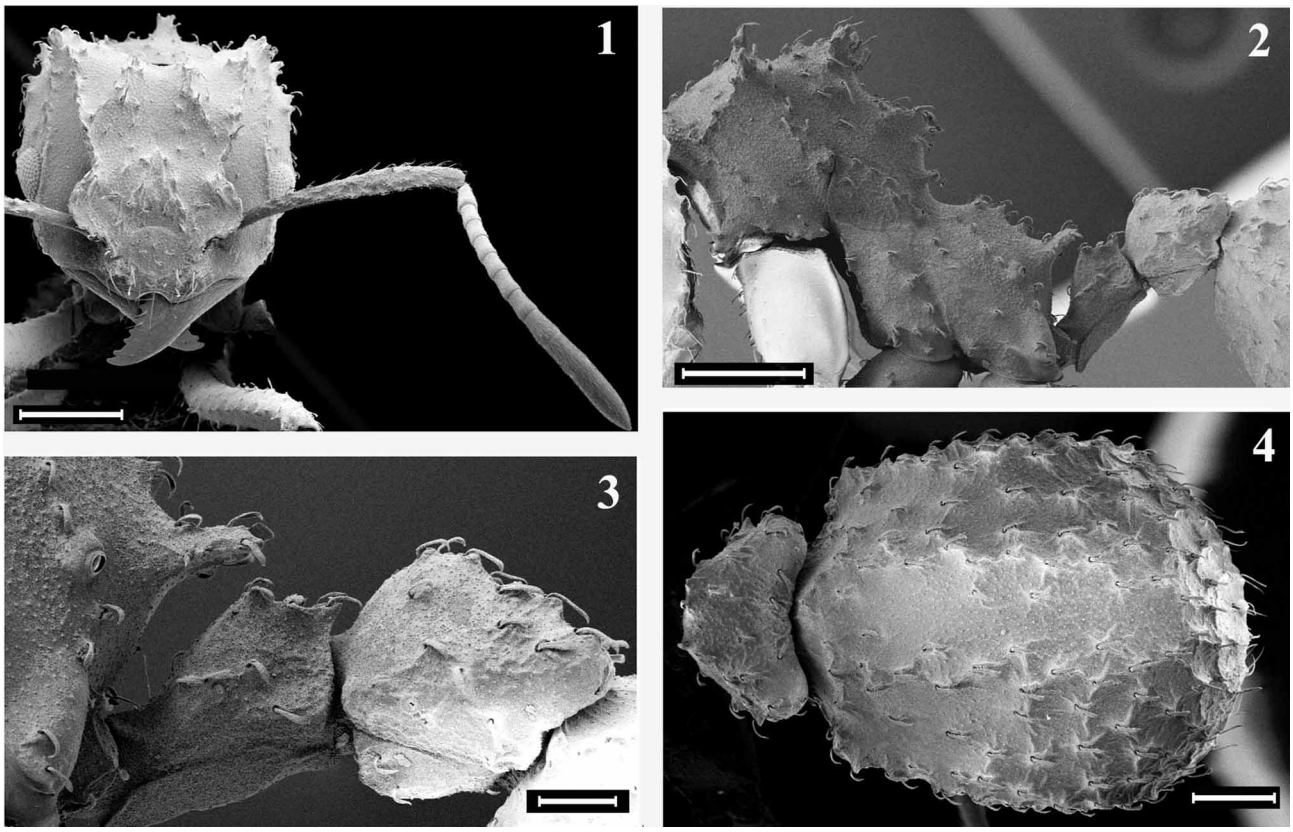
5 Base of the anterior mesonotal spine thicker than the base of lateral pronotal ones; midpronotal projections absent or rarely represented by a pair of minute separate spines; supraocular projection spine-like; head and gaster darker than yellowish brown mesosoma; last funicular segments as dark as antennal scapes..... *T. jamaicensis* (André) (Figs 19–22, 29)

- Base of the anterior mesonotal spine almost as thin as the base of lateral pronotal ones; midpronotal projection represented by a single truncate tooth; supraocular projection absent or vestigial; the whole body dark reddish brown; last funicular segments lighter than other antennal segments ..... ..... *T. haytianus* Wheeler & Mann (Figs 5–8, 29)

***Trachymyrmex atlanticus* new species**
(Figs. 1–4, 30)

*Worker measurements* (n = 9). TL 5.2 (4.3–5.6); DHL 1.51 (1.31–1.58); HW 1.39 (1.11–1.47); IFW 0.89 (0.78–0.93); ScL 1.14 (1.00–1.24); HWL 0.95 (0.71–1.09); MeL 2.02 (1.78–2.13); PL 0.37 (0.27–0.42); PPL 0.49 (0.40–0.56); GL 1.37 (1.18–1.44); HfL 2.14 (1.78–2.22).

*Worker description***:** Light yellow to yellowish-brown, with darker spots on the head dorsum, mesosoma and gaster, giving to overall body a smudge appearance in lighter specimens; darker funiculus, tarsi and shiny mandibles. Integument opaque and finely granulose. Pilosity: short, bristly spatulate dark hairs confined to body projections, strongly curved or hook-like hairs on other parts of the body.




**FIGURES 1–4.** Scanning electron micrograph of *Trachymyrmex atlanticus*, paratype worker from Brazil, RJ: Restinga da Marambaia. 1. Head in frontal view; scale bar = 500 µm. 2. Mesosoma and waist in lateral view; scale bar = 500 µm. 3. Waist in lateral view (detail); scale bar = 125 µm. 4. Postpetiole and gaster in dorsal view; scale bar = 250 µm.

Head in full face view (Fig. 1) a little longer than broad to as long as broad (DCI average 93; 90–99). Outer border of mandible feebly sinuous; masticatory margin with two apical and five teeth, with a diastema between the subapical and third teeth. Clypeus median apron without projections. Frontal area impressed. Frontal lobe semicircular, moderately expanded (FLI average 63; 62–67), with smooth free border, lacking prominent denticles on the slightly crenulate antero-lateral border. Frontal carina moderately diverging caudad, reaching the antennal scrobe posterior end in a small tooth at the posterior margin of head; preocular carina posteriorly ending in the posterior margin as a tubercle larger than the frontal carina projection. Occipital spine almost as long as preocular carina projection. Supraocular projection indistinct. Inferior corner of occiput, in side view, with a small blunt spine. Eye faintly convex, not surpassing the head lateral border, with 14 facets in a row across the greatest diameter. Antennal scape, when lodged in the scrobe, projecting beyond the tip of the preocular carina projection; gradually thickened toward apex, covered with small piligerous tubercles.

Mesosoma (Figs. 1, 2). Pronotal dorsum faintly marginate in front and on sides; antero-inferior corner with a strong and blunt flattened spine; inferior margin smooth; median pronotal tooth tip truncate, projected above the tip of the longer lateral pronotal spines, which points outwards from the pronotum, in frontal view. Anterior pair of mesonotal spines a little longer and stouter than lateral pronotal ones, directed upwards; the second and third pairs gradually smaller, almost tooth-like. Anterior margin of katepisternum smooth, with a minute tooth on the superior third. Metanotal constriction shallowly impressed. Basal face of propodeum laterally marginate by a row of 3–4 denticles on each side; propodeal spines shorter than the distance between their inner bases. Hind femora longer than mesosoma length.

Waist and gaster (Figs. 2–4). Dorsum of petiolar node with two pairs of minute spines, the sides parallel in dorsal view, with a series of lateral denticles; sternum without sagital keel. Postpetiole broader than long in dorsal view, broader behind than in front, and shallowly impressed dorsally, with concave postero-dorsal border. Gaster, when seen from above, suboval. Tergum I (=abdominal tergum IV) with straight lateral faces separated from the dorsal face by a longitudinal row of piligerous tubercles on each side; anterior two thirds of dorsum with three glabrous shallow longitudinal furrows separated by a pair of piligerous tubercles rows. Sternum I with a small anterior sagital keel.

*Gyne and male*: Unknown.

*Holotype worker:* **BRAZIL, Rio de Janeiro**: Restinga da Marambaia [23º 02’ S, 43º 36’ W], 15.iii.2005, A.B. Vargas col., pitfall trap # P2G3S16 (deposited in CECL).

*Paratype workers*: same data as holotype, pitfalls # P2G3S16 (2 workers deposited in CECL, 3 deposited in MZSP), 2 workers # P3G2S6 (deposited in CECL), 2 workers # P2G2S14 (deposited in MZSP).

*Etymology*: This species shows a distribution restricted to the Atlantic forest domain (Fig. 30), and hence its name.

*Material examined:* **BRAZIL, Bahia**: Ilhéus, Fazenda Comodoty, 03.xii.1991, A.M.V. Encarnação leg., 5 workers (CPDC), 3 workers (MZSP); Teixeira de Freitas, 10.xii.1992, [col. unknown], in *Eucalyptus* plantation, 2 workers (CECL; MZSP). **Espírito Santo**: Itaúnas, 23.vii.1989, J. Diniz col. 2 workers (CECL; MZSP). **Rio de Janeiro**: Ilha da Marambaia, Praia Grande, 20.ix.1985, R. Xerez col. 1 worker (CECL); Restinga da Marambaia, [no date], P. S. Meneguete col. 1 worker (CECL).

*Comments*. Workers of this species may be confounded with those of *T. zeteki*, but can be separated because *T. atlanticus* workers lack conspicuous teeth on the anterior lateral margin of the frontal lobes, and also by the longer antennal scapes, shorter propodeal spines, sagital keel on sternum I of gaster and lighter color. They differ from *T. jamaicensis* and *T. ixyodus* by the projecting midpronotal tooth, which bears much shorter anterior mesonotal projections. From *T. haytianus* workers of *T. atlanticus* can be distinguished by coarse spatulate hairs all over the body and the lighter coloration. *Trachymyrmex isthmicus* lacks the inferior pronotal projection and has the lateral pronotal projections shorter than mesonotal anterior ones.

This is the most common *Trachymyrmex* in the Restinga da Marambaia. We base our description on a series captured in pitfall traps, but we were not able to find their nests. Samples from other localities were also exclusively collected near the beach at the Brazilian coast, but unfortunately the labels do not contain further biological data. Workers of *T. atlanticus* may build their nests in sandy soils in the coastal dunes.

### ***Trachymyrmex haytianus*** **Wheeler & Mann new status**
(Figs. 5–8, 29)

*Atta* (*Trachymyrmex*) *jamaicensis haytiana* Wheeler & Mann, 1914: 41 (worker).
*Trachymyrmex jamaicensis haytianus*: Kempf, 1972: 253 (catalog). Bolton, 1995: 420 (catalog).
[Type material: lectotype and 8 paralectotypes examined]

*Worker measurements* (n = 3). TL 4.7 (4.5–4.9); DHL 1.28 (1.26–1.31); HW 1.28 (1.25–1.32); IFW 0.70 (0.69–0.71); ScL 1.08 (1.05–1.11); HWL 0.74 (0.68–0.78); MeL 1.82 (1.77–1.85); PL 0.34 (0.32–0.35); PPL 0.48 (0.45–0.51); GL 1.32 (1.25–1.37); HfL 1.84 (1.82–1.86).

*Worker description:* Uniformly dark ferruginous, with lighter tip of tarsi and funiculi. Integument opaque and finely granulose. Pilosity scarce; very short hook-like hairs confined to body projections, more abundant on antennal scapes and gaster tip.

Head, in full face view (Fig. 5), as long as broad (DCI average 100; 99–101). Outer border of mandible feebly sinuous; masticatory margin bears two apical and seven equally smaller teeth. Clypeus median apron without projections. Frontal area shallowly impressed. Frontal lobes semicircular, moderately approximate (FLI average 54; 54–55), with faintly crenulate free border, lacking prominent denticles on the antero-lateral border. Frontal carina moderately diverging caudad, reaching the antennal scrobe posterior end in a small tooth at its posterior end at the vertexal margin; preocular carina posteriorly ending in the posterior margin of the head as one or two small teeth of almost the same size of frontal carinae projections. Occipital spines longer and stouter than carinae projections. Supraocular projections absent or vestigial. Inferior corner of occiput with a small ridge, in side view. Eye convex, surpassing the head lateral border, with 13 facets in a row across the greatest diameter. Antennal scape, when lodged in the scrobe, projecting beyond the tips of the preocular carinae projections by nearly one fourth of its length; gradually thickened towards apex, covered with small piligerous tubercles.

Mesosoma (Figs. 5–7). Pronotal dorsum emarginated in front and on sides; antero-inferior corner with a strong and truncated tooth; inferior margin with small piligerous denticles; median pronotal tooth tip rather truncate, not projected above the tips of the stronger lateral pronotal spines, which point obliquely upwards, with the pronotum in frontal view. Anterior pair of mesonotal spines a little shorter than the lateral pronotal projections, directed upwards; the spine-like second and third pair gradually smaller and thinner. Anterior margin of katepisternum smooth, without a projecting tooth. Metanotal constriction shallowly impressed. Basal face of propodeum laterally marginated by a row of three denticles on each side; propodeal spines pointing obliquely and laterad, as long as the distance between their inner bases. Hind femora almost of the same length of mesosoma.

Waist and gaster (Figs. 6–8). Dorsum of petiolar node with a pair of minute spines, the sides subparallel in dorsal view, the spiracles produced as small tubercular projections; sternum without sagital keel. Postpetiole trapezoidal in dorsal view, two times broader behind than in front, and shallowly impressed dorsally, with straight postero-dorsal border. Gaster, when seen from above, globose to suboval. Tergum I with convex lateral faces separated from the dorsal face by a longitudinal row of piligerous tubercles on each side; anterior two thirds of dorsum with three shallow longitudinal furrows separated by a pair of piligerous tubercles rows. Sternum I without an anterior sagital keel or prominent tubercles.

*Gyne and male*: Unknown.

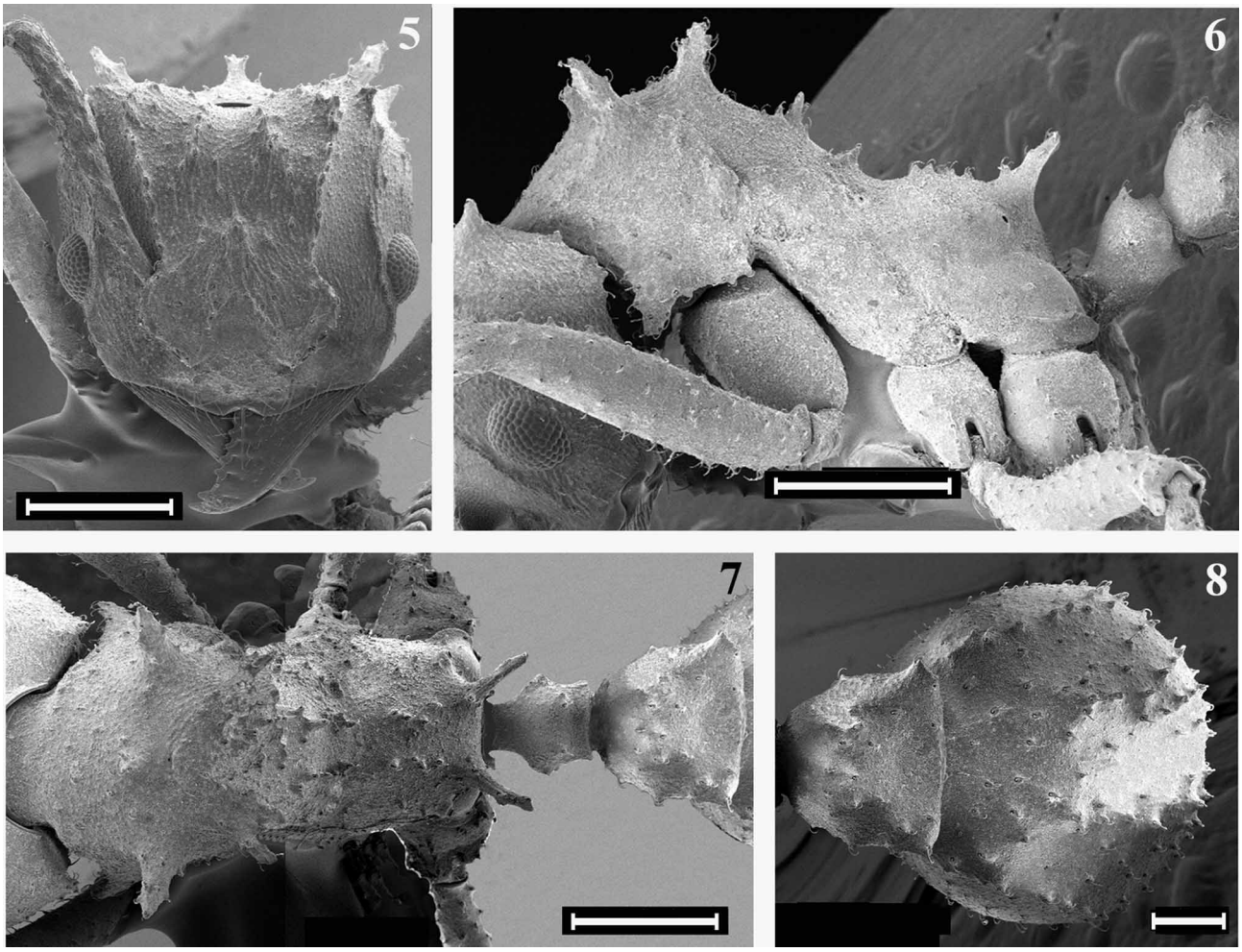
*Lectotype worker*: **HAITI**: Petionville, Mann leg. [no date] ("cotype" deposited in USNM, examined, here designated).

*Paralectotype workers*: same data as lectotype (5 deposited in USNM, 2 deposited in MZSP, 1 deposited in CECL).

*Material examined:* **JAMAICA**: St. Eliz., Malvern, 380m [18° 57´N, 77° 43´W], 12.iii.1984, J. Longino, specimen code JTLC000007615, 1 worker (JTLC); St. James, Great R., 0–80m [18° 26´N, 77° 59´W], 17.iii.1984, J. Longino, specimen code JTLC000007616, 1 worker (JTLC).

*Comments:* Wheeler & Mann (1914) say that this species was described from several workers collected from a single colony. Although we found only three individuals clearly labeled as "cotypes", the other six workers bear identical locality labels, and so were considered as paralectotypes. *T. haytianus* was originally proposed as a subspecies of *T. jamaicensis*. The brief description of Wheeler & Mann (1914) contained only characters that distinguished it from the typical form, such as shorter spines and tubercles on the posterior cor-

ners of the head, well-developed median pronotal tooth, and black coloration. The colony was found in a canyon; its nest was briefly described as follows: "The nest entrance opened directly on the surface of the ground and was not surrounded by a crater." Jack Longino kindly sent us additional samples of this species, from Jamaica, so *T. haytianus* and *T. jamaicensis* are sympatric, strengthening our argument for the recognition of this form as a good species.




**FIGURES 5–8.** Scanning electron micrograph of *Trachymyrmex haytianus*, paralectotype worker from Haiti, Pettionville. 5. Head in frontal view; scale bar = 500 µm. 6. Mesosoma and waist in lateral view; scale bar = 500 µm. 7. Mesosoma in dorsal view; scale bar = 500 µm. 8. Waist and gaster in dorsal view; scale bar = 250 µm.

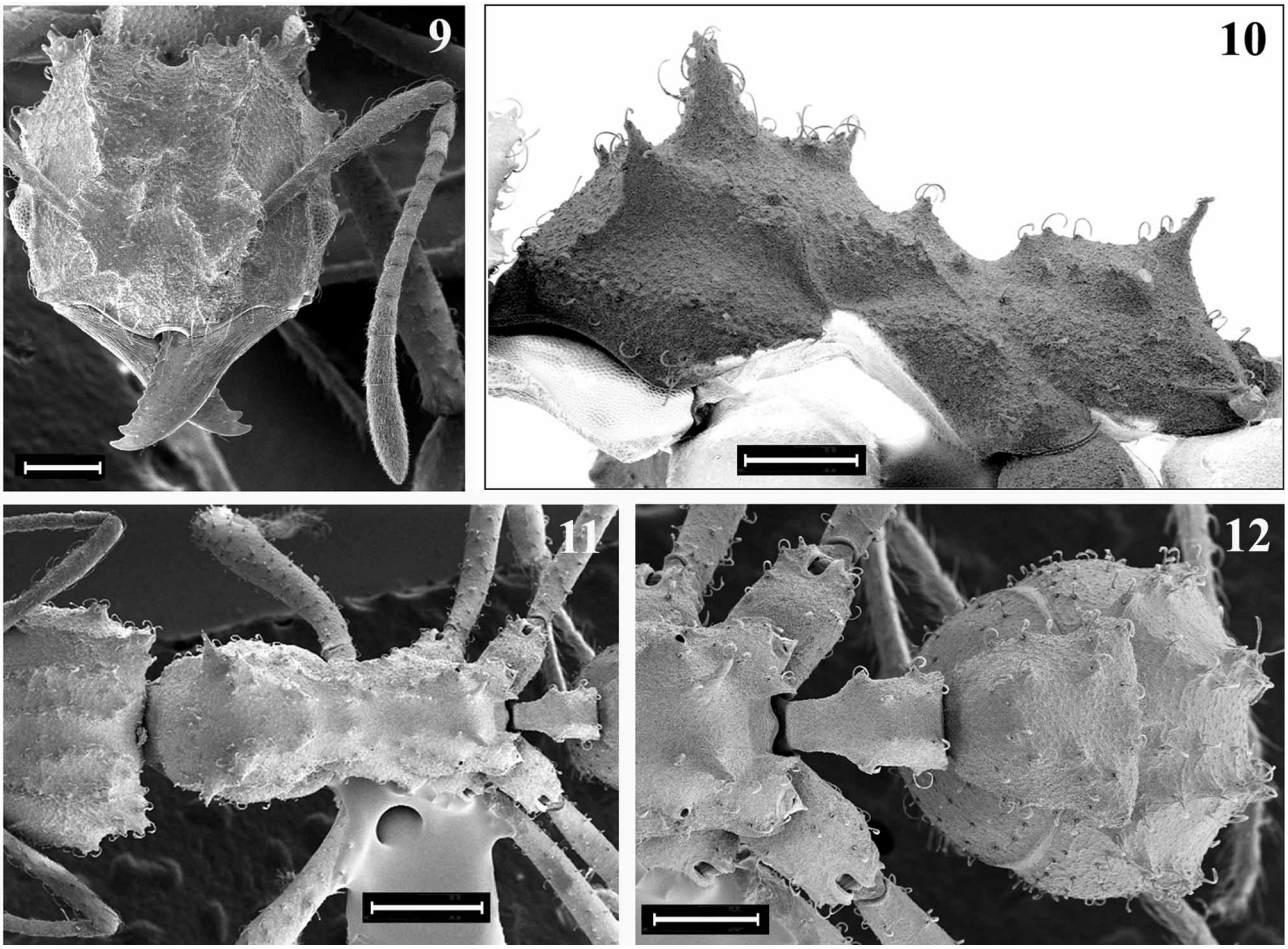
### ***Trachymyrmex isthmicus*** **Santschi**
(Figs. 9–14, 30)

*Trachymyrmex isthmicus* Santschi, 1931: 280–281, figs 13–15 (worker). Weber, 1941: 118–122 (biology). Kempf, 1972: 253 (catalog). Bolton, 1995: 420 (catalog).
[Type not examined].

*Worker measurements* (n = 4). TL 4.2 (4.0–4.6); DHL 1.22 (1.14–1.29); HW 1.28 (1.25–1.32); IFW 0.66 (0.62–0.68); ScL 1.00 (0.94–1.08); HWL 0.67 (0.60–0.74); MeL 1.56 (1.49–1.68); PL 0.36 (0.32–0.38); PPL 0.45 (0.43–0.49); GL 1.17 (1.08–1.29); HfL 1.64 (1.48–1.78).

*Worker description:* Reddish-brown to yellowish-brown; cheeks, frons, and furrow on vertex slightly darker. Integument finely and indistinctly shagreened, opaque. Pilosity: not very abundant bristly hairs with variable length; most of the longest hairs strongly recurved; tergum I of gaster hairs mostly uniform; tarsi with straight and oblique hairs. Fine pubescence confined to antennal funiculi, flexor face of tibiae and tarsi.

Head in full face view (Fig. 9) a little longer than broad to about as long as broad (DCI average 93; 86–97). Outer border of mandible sinuous; masticatory margin with two apical and seven uniform smaller teeth. Clypeus median apron without projections. Frontal area impressed. Frontal lobe semicircular, moderately expanded (FLI average 59; 56–61), with crenate free border; the antero-lateral border with one prominent denticle. Frontal carina moderately diverging caudad, reaching the antennal scrobe posterior end in a small tooth at the vertexal margin; preocular carinae briefly interrupted or fading out just above the supraocular projections, becoming again more distinct further behind, reaching the projected apical multispinose tuberosity, a little longer and stouter than frontal carinae projections. Occipital tooth as strong as preocular carina projection, but truncate and shorter. Supraocular projection well developed, tuberculiform. Inferior corner of vertex, in side view, with a low truncate tooth, similar in size to the vertexal projections. Eye convex, faintly surpassing the lateral border of head, with 12 facets in a row across the greatest diameter. Antennal scape when lodged in the scrobe, projecting beyond the scrobe tip by a distance near one forth of its length; gradually but very little thickened towards apex, without sharp, piligerous tubercles.




**FIGURES 9–12.** Scanning electron micrograph of *Trachymyrmex isthmicus*, worker from Colombia, Valle, Andaluzia. 9. Head in frontal view; scale bar = 250 µm. 10. Mesosoma in lateral view; scale bar = 250 µm. 11. Habitus in dorsal view; scale bar = 500 µm. 12. Waist and gaster in dorsal view; scale bar = 250 µm.

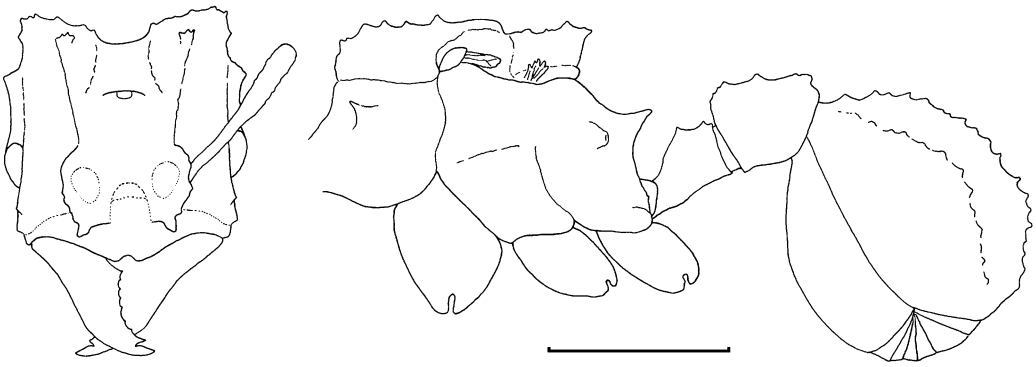
Mesosoma (Figs. 10–11). Pronotal dorsum marginate in front and on sides; antero-inferior corner bluntly rounded, without a projecting tooth; inferior margin weakly crenulate; paired median pronotal teeth widely separated from each other, not arising from a common tubercular base, their tips not conspicuously projecting above the tips of the stronger lateral pronotal spines, which point upwards. Anterior pair of mesonotal spines, stouter and higher than pronotal projections; the spine-like second and third pair gradually smaller. Anterior margin of katepisternum smooth, without a projecting tooth. Metanotal constriction impressed. Basal face of

propodeum laterally margined by a row of 2–3 denticles on each side; propodeal spines shorter and slender than lateral spines of pronotum, pointing obliquely upwards and laterad, as long as the distance between their inner bases. Hind femora a little longer than mesosoma length.

Waist and gaster (Figs. 11, 12). Dorsum of petiolar node with two pairs of minute denticles, the sides parallel in dorsal view, with one minute spine near the posterior border, and spiracles projected as small tubercles; sternum without sagital keel. Postpetiole trapezoidal in dorsal view, two times broader behind than in front, and shallowly impressed dorsally, with straight postero-dorsal border. Gaster, when seen from above, rather trapezoidal than suboval, posteriorly subtruncate. Tergum I with the flattened yet scarcely excavate lateral faces separated from the dorsal face by a sharp serrate keel; anterior two thirds of dorsum with three longitudinal furrows separated by a pair of median keels consisting of serially arranged and loosely connected piligerous tubercles. Sternum I without an anterior sagital keel or prominent tubercles.

*Gyne* (undescribed; Figs. 13, 14): TL 5.3; DHL 1.46; HW 1.28; IFW 0.80; ScL 0.86; HWL 0.82; MeL 1.86; PL 0.51; PPL 0.43; GL 1.63; HfL 1.72. Resembling the worker with the usual caste differences. The median anterior ocellus partially concealed above by a down curved ridge, and the two lateral ones fully hidden by the longitudinal carinae of vertex. Pronotum with a pair of small and acute scapular spines on each side, directed out and obliquely upwards, but lacking inferior ones. Mesoscutum surmounted by conspicuous tubercles, but without notable dorsal projections, superficially impressed on posterior region, with the anterior margin straight in the middle, in dorsal view. Shallowly impressed parapses delimited by the inconspicuous parapsidial furrows; dorsum of mesothoracic paraptera almost vertical in relation to the scutellum dorsum in side view, with a narrow median portion when seen from above; scutellum ending in a pair of small stout and acute spines, directed backwards, with the sides converging obliquely inwards; metathoracic paraptera concealed by the scutellum in dorsal view; propodeal spiracle orifice visible. Two moderately strong and acute spines on propodeum, little longer than pronotal ones. Petiolar dorsum with two pairs of minute teeth near the anterior and posterior margins. First gastric tergite with a longitudinal ridge on each side; disk with two longitudinal series of small piligerous tubercles, absent in the middle of the segment. Wings unknown.

*Male:* Unknown.



**FIGURES 13–14.** Gyne of *Trachymyrmex isthmicus* from Ecuador, Pichincha, Rio Palenque. 13. head in frontal view. 14. Mesosoma and metasoma in lateral view. Scale bar = 1000 μm.

*Material examined:* **COLOMBIA: Nariño**, La Espriella, 50m, int. Bosque, bp-T, F. Escobar, viii.1994, 1 worker (IAVL # 522); **Valle**, Andaluzia, Quebr. El Naranjo, M. Baena, v.1990 (N-05) 1 worker (IAVL). **COSTA RICA: Heredia**, Est. Biol. La Selva, 50–150m [10º 26´N, 84º 01´W], iv. 1994, N. Barger & J. Longino "baiting study" NNB/PST/10, specimen code INBIOCRI001243006, 1 worker (JTLC); *ibidem*, 100m, 3.iii.1989, J. Longino#2456, specimen code INBIOCRI001281191, 1 worker (JTLC); *ibidem*, 13.xii.1997, J. Longino # 3875, specimen code LACM ENT 140773, 1 worker (JTLC). **ECUADOR: Pichincha**, Centr. Cient. Rio Palenque, S. Sandoval (several dates) 14 workers, 4 dealate gynes (MZSP, CECL, QCAZ). **PANAMA Canal Zone**, Barro Colorado Island, 22.x.1957, 30.iii, 1957, 21.vi, 1957. N.A. Weber leg. 3 workers (MZSP).

*Comments:* Distinguished from all other species of the Jamaicensis group by the completely rounded, not dentate nor angulate antero-inferior corner of pronotum, and by the lateral pronotal spines notably smaller and more slender than the mesonotal anterior projections. Other species of the group present lateral pronotal spines longer than mesonotal projections (*T. ixyodus*) or of nearly the same length (*T. atlanticus*, *T. haytianus*, *T. jamaicensis* and *T. zeteki*). This species was hitherto known only from Barro Colorado Island, where it is fairly common, but the discovery of several samples significantly expands its geographical range (Fig. 30). In Kempf´s notes we found the information that he studied additional material of this rather distinctive species in the MCZC, which we were not able to see. According to him, they come from the following localities: **PANAMA Canal Zone**, Barro Colorado Island, 31.vii.1924, W.M. Wheeler leg., 2 workers, 1 gyne (n. 770); same locality, i.1960, W.L. Brown and E.S. McCluskey leg., 1 worker; same locality, 29.iii.1967, P.S. Kannowski, H.B. Root and W.L. Brown leg. 1 worker. Mt. Hope near Colón, 8.vi.1924, W.M. Wheeler leg. 3 workers (n. 610). **ECUADOR, Guajas**, 3km SW of Bucay, 24.vii.1973. W.L. Brown leg., 2 workers.

A nest observed by Neal Weber (1941:122) had an entrance surrounded by a crater or an erect friable turret. Weber recorded the migration of a colony from the old to a new nest 37cm away, with the workers carrying the nest material piece by piece: fungus garden, insect feces, and mycelium covered larvae. According to him "the history of this migration may be reconstructed as follows: This colony of ants probably nested successfully during the preceding dry season, and perhaps for a long period, in a slight depression on this steep clay slope. During the seven-day period, June 14–20 inclusive, 8.4 inches of rain fell and this depression became water-soaked, inundating the nest or at least soaking the walls of the chamber and wetting the garden. June 21 was a rainless day and the ants started to move the fungus garden and brood to a higher, less water-soaked situation. When I found the nest on June 22 the moving was well underway. By the morning of June 24 the entire nest had been moved. Three days were thus probably consumed in moving. Assuming for rough purposes of calculation that the ants worked steadily the entire time and that 2.2 trips per minute represented an average number, the total number of trips in the 72 hours would be of the order of magnitude of 10,000."

***Trachymyrmex ixyodus* new species**
(Figs. 15–18, 30)

*Worker measurements* (n = 8). TL 4.8 (4.4–5.1); DHL 1.47 (1.38–1.54); HW 1.32 (1.25–1.43); IFW 0.86 (0.78–0.88); ScL 1.03 (0.97–1.09); HWL 0.78 (0.65–0.88); MeL 1.85 (1.74–1.97); PL 0.42 (0.38–0.46); PPL 0.44 (0.40–0.46); GL 1.29 (1.20–1.38); HfL 1.91 (1.83–1.95).

*Worker description:* Light ferruginous; mandibles and tarsi darker. Integument finely and indistinctly shagreened, opaque. Pilosity: short bristly hairs recurved or hook-shaped; all hairs shorter than maximum depth of fore femora except hairs on clypeus which are longer and straight; gastric tergum with both longer curved and shorter hook-like hairs; tarsi with straight and subdecumbent hairs. Pubescence confined to the tips of antennal scapes, funiculi, sides and flexor face of tibiae, and all tarsomeres.

Head in full face view (Fig. 15), a little longer than broad (DCI average 90; 88–94). Outer border of mandible feebly sinuous; masticatory margin with two apical and uniform smaller seven teeth. Clypeus median apron with a tubercle near the frontal lobe base. Frontal area deeply impressed. Frontal lobe semicircular, moderately expanded (FLI average 65; 62–67), with free border crenulate, and anteriorly notched between its insertion and a prominent antero-lateral tooth. Frontal carinae moderately diverging caudad, reaching the antennal scrobe posterior end in a small tooth at the posterior margin of head; preocular carina fading out halfway between posterior orbit of eye and tip of antennal scrobe, posteriorly ending in the posterior margin of head as one tubercle, larger than the frontal carinae projections. Supraocular tumulus blunt, microscopically spinous, the head gradually constricted behind the supraocular tumulus, in full-face view. Posterior margin of head flanked by a series of tubercles, continuing forwards to vertex, where it bifurcates and each branch

reaches the frontal carinae at the level of the superior eyes orbit. Inferior corner of occiput, in side view, bluntly dentate. Eye faintly surpassing the lateral border of head, with about 13 facets across the greatest diameter. Antennal scape not conspicuously projecting beyond the scrobe when fully lodged, gradually thickened towards apex, its dorsal and anterior face rough by virtue of the minute piligerous tubercles covering.

Mesosoma (Figs. 16, 17). Pronotum dorsum laterally marginate but without distinct transverse carina on the anterior border; inferior margin weakly crenulate; antero-inferior corner with an often apically rounded tooth; paired median teeth absent or represented by a pair of minute widely spaced denticles, which do not differ from other sparse denticles on the pronotum surface; lateral spines much longer than mesonotal projections. Mesonotum with the first and second pair of spines represented by low, multidentate tumescences or ridges that circumscribe a more or less flattened to slightly excavate mesonotal shield; third pair as minute tubercles. Anterior border of katepisternum sharply marginate, with a strong and flattened triangular tooth at its upper third. Metanotal constriction deeply impressed in profile. Basal face of propodeum with a bi or tridentate longitudinal ridge on each side, followed by one to several isolated denticles in front of the bases of the short propodeal spines, which usually bear a subapical accessory tooth; propodeal spines shorter than the distance between their inner bases. Hind femora a little longer than mesosoma length.

Waist and gaster (Figs. 16–18). Dorsum of petiolar node with a bigger anterior pair of teeth or two rows of simple teeth pairs; sternum with a sharp sagital keel; the sides smoothly convex in dorsal view, with minute piligerous tubercles. Postpetiole broader than long, dorsally flat, its posterior border distinctly concave. Gaster, seem from above, subtrapezoidal, little broader behind than in front. Tergum I with the shallowly excavate lateral faces separated from the dorsal surface by strong denticulate longitudinal keels, which fade before reaching the posterior end of the tergite. Between these lateral keels there is another pair of medial longitudinal keels, which divide the dorsum into three longitudinal shallowly excavate furrows, the lateral ones bear piligerous tubercles. Sternum I with a vestigial sagital keel anteriorly.

*Gyne and Male*: Unknown.

*Holotype worker*: **BRAZIL: Amazonas**: Ponta Negra, N. of Manaus, 3.ix.1962, W.L. Brown leg. (deposited in MZSP).

*Paratype workers:* same data as holotype, 1 worker (deposited in MZSP), Manaus, Br 174, Km 44, EEST S2, 25.ix.1991, A. Harada and A.G. Bandeira leg. 2 workers (deposited in INPA); same locality, *campus* Fund. Univ. Amaz., 1.x.1987, Brandão and Cancello leg. 1 worker (deposited in MZSP); same locality, BR 174, 2F3, Km 41, Res. 1501 PDBFP, 4.ix.1991, G.A.R. Mello leg. 3 workers (2 deposited in CECL, 1 in INPA); same locality, # 4832-RS1301, 16.xii.1993, A.B. Casimiro col., 1 worker (deposited in CPDC).

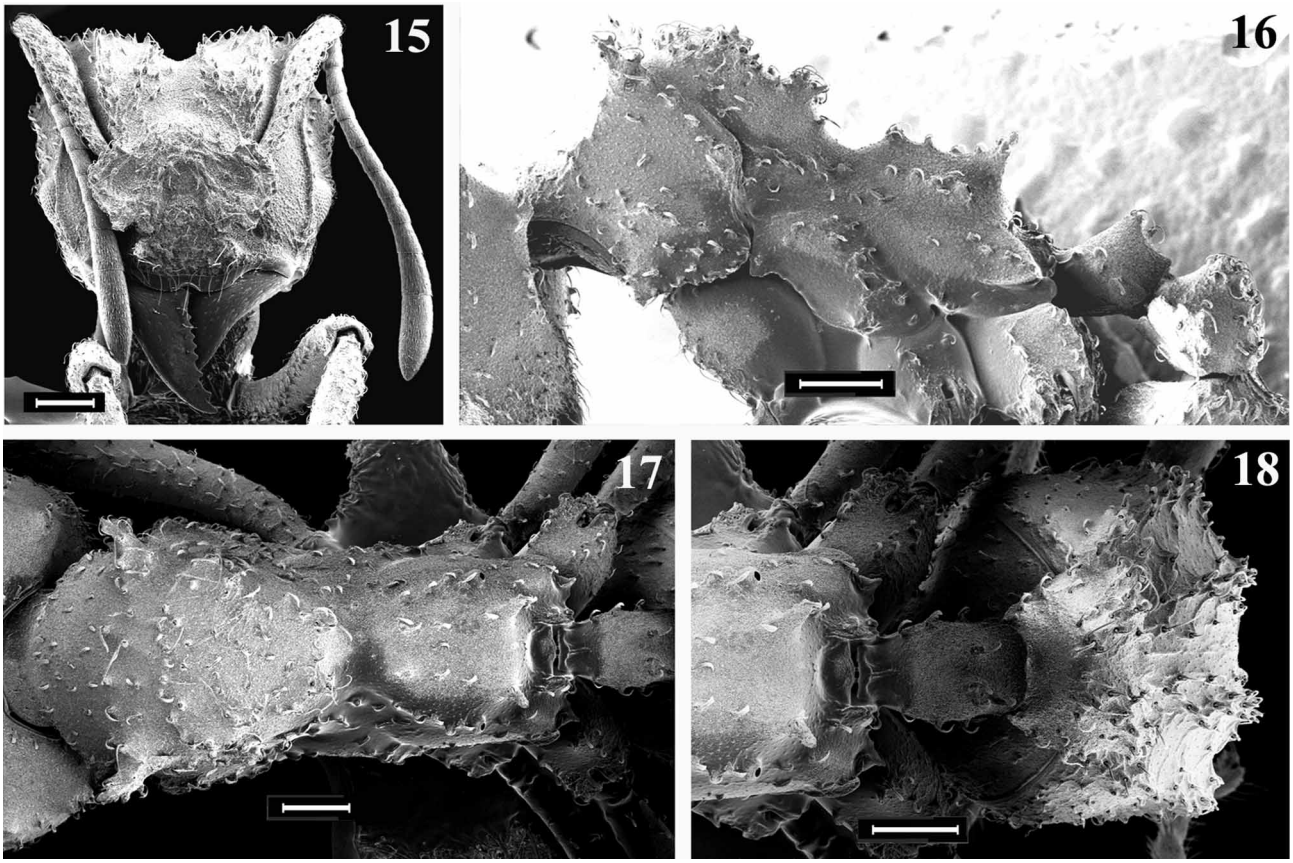
*Etymology:* We found the Latinized greek name ixyodus in Kempf´s notes for the samples we describe here, *ιξψσ*, meaning "side," and *οδδ*, "triangle," in reference to the triangular spine on the anterior margin of the katepisternum.

*Material examined:* **SURINAME**: Maripahelvel, ix.1959, I. v. d. Drift col. 1 worker (MZSP). **VENEZUELA: Amazonas**, Rio Negro, XII.1981, L. Gorion leg. 2 workers (IZAV).

*Comments:* This species is easily recognized by the large plate-like triangular tooth projecting from the upper corner of the sharply marginate anterior border of the katepisternum, pronotal spines much longer than mesonotal projections, mid-pronotal projections absent, and by the lack of a well-formed supraocular tumulus.

The Brazilian specimens from the vicinity of Manaus are slightly larger than other specimens, and lack the reddish hues in the integument; the Suriname series has infuscated antennal scrobes; the vertical furrow, disc of mesonotal shield, longitudinal furrows and sides of tergum I of gaster are masked by an overlying film of a material which renders the integument uniform in color (*Pseudonocardia* bacteria ? see Currie *et al*., 1999). These specimens have also the tubercles in front of antennal socket on the median apron of clypeus much larger, upright, almost spine-like; the dorsal disc of pronotum lacks the median pair of teeth, and the mesonotal armature is also likewise low, appearing in dorsal view as depressed spines, the anterior pair pointing lat-

erad, and the posterior pair pointing backwards. Finally, the dorsal armature of the petiolar node consists of two pairs of simple denticles widely separated from each other. Still, they belong to the same species, as shown by the strong tooth on katepisternum, and the main distinguishing characters of the species already referred to above.




**FIGURES 15–18.** Scanning electron micrograph of *Trachymyrmex ixyodus*, paratype worker from Brazil, AM: Manaus. 15. Head in frontal view. 16. Mesosoma and waist in lateral view. 17. Mesosoma in dorsal view. 18. Waist and gaster in dorsal view. All scale bars = 250 μm.

### ***Trachymyrmex jamaicencis*** **(André)**
(Figs. 19–22, 29)

*Atta* (*Acromyrmex*) *jamaicensis* André, 1893:149 (worker). Wheeler, 1907: 712 (gyne and male). Weber, 1966: 588 (figures of gyne and worker head). Kempf, 1972: 253 (catalog). Bolton, 1995: 420 (catalog).
*Atta (Trachymyrmex) sharpii* Forel, 1893: 372 (worker). Wheeler, 1907: 712 (synonymy).
*Atta (Trachymyrmex) maritima* Wheeler, 1905: 107 (worker). Wheeler, 1907: 712 (synonymy).
*Acromyrmex (Trachymyrmex) jamaicensis* var. *maritima:* Mann, 1920: 428 (revived from synonymy). Kempf (1972: 253) catalog. Bolton (1995: 420) catalog NEW SYNONYMY.
*Trachymyrmex jamaicensis* var. *frontalis* Santschi, 1925 (worker) NEW SYNONYMY.
*Trachymyrmex jamaicensis cubaensis* Wheeler, 1937 (worker). NEW SYNONYMY.
[Types not examined]

*Worker measurements* (n = 10). TL 5.3 (4.5–5.7); DHL 1.42 (1.23–1.49); HW 1.38 (1.25–1.48); IFW 0.83 (0.69–0.94); ScL 1.17 (1.08–1.31); HWL 0.86 (0.78–0.92); MeL 2.03 (1.75–2.18); PL 0.42 (0.32–0.48); PPL 0.53 (0.45–0.58); GL 1.48 (1.23–1.58); HfL 2.04 (1.75–2.18).

*Worker description***:** Dark ferruginous, with lighter spots on coxae and inferior margin of pronotum; in most specimens, the head and gaster are darker than the rest of the body. Integument opaque and finely granu-

lose. Pilosity: scarce very short curved hairs confined to body projections, more abundant on antennal scapes and gaster tip.

Head, in full face view (Fig. 19), from a little longer than broad to a little broader than long (DCI average 100; 92–117). Outer border of mandible feebly sinuous; eight teeth on chewing border, gradually diminishing in size towards base. Clypeus median apron without conspicuous projections. Frontal area shallowly impressed. Frontal lobe semicircular, moderately approximate to moderately expanded (FLI average 60; 50–67), with faintly crenulated free border, lacking prominent denticles on the antero-lateral border. Frontal carina moderately diverging caudad, reaching the antennal scrobe posterior end in a small tooth at the posterior margin of head; preocular carina posteriorly ending in the posterior margin of head as a stout blunt spine larger than the frontal carinae projections. Occipital spine slender and as long as the preocular carinae projections. Supraocular projection tuberculiform. Paired denticulate vertexal carinae indicated by a series of weakly connected piligerous denticles, flanking the shallowly impressed sagital furrow, which in front joins the transverse impression of frons behind the frontal area. Inferior corner of occiput, in side view, with a small denticulate ridge. Eye convex, weakly surpassing the head lateral border, with 13 facets in a row across the greatest diameter. Antennal scape, when lodged in the scrobe, projecting beyond the tip of the preocular carinae projections by nearly one fourth of its length; gradually thickened towards apex, covered with small piligerous tubercles.

Mesosoma (Figs. 20, 21). Pronotal dorsum marginate in front and on sides; antero-inferior corner with a strong and blunt tooth; inferior margin smooth; pair of median pronotal teeth absent or, when present, very small and arising from a common or separate bases, their tip microtuberculated or acute, not projected above the tip of the stronger lateral pronotal spines, which point obliquely upwards (with the pronotum in frontal view). Anterior pair of mesonotal spines nearly of the same length of the lateral pronotal pojections, with more robust base and upward directed; the second smaller, but much stronger than the almost always absent third pair. Anterior margin of katepisternum smooth, without a projecting tooth. Metanotal constriction impressed. Basal face of propodeum laterally marginated by a row of two denticles on each side; propodeal spines as long as the distance between their inner bases. Hind femora varying from a little shorter to a little longer than mesosoma length.

Waist and gaster (Figs. 20, 22). Dorsum of petiolar node with one pair of truncate teeth, the sides parallel in dorsal view, with a series of lateral denticles; sternum without sagital keel. Postpetiole almost as long as broad in dorsal view, and shallowly impressed dorsally, with straight postero-dorsal border. Gaster, when seen from above, suboval. Tergum I with convex lateral faces separated from the dorsal face by a weak longitudinal row of piligerous tubercles on each side; anterior two thirds of dorsum with three glabrous shallow longitudinal furrows, separated by a pair of rows of piligerous tubercles. Sternum I without an anterior sagital keel.

*Gyne and Male*. See Wheeler (1907).

*Material examined*: **BAHAMAS**, Andros Island, Mangrove Cay, Mann col. 27 workers (MZSP, USNM, CECL); *ibidem*, v–vi, 1904, W.M. Wheeler col. 4 workers (MZSP); Fresh Creek, Mann col. 15 workers (MZSP, USNM, CECL); Spanish Wells, Mann col. 6 workers (USNM); Blutt, Mann col. 9 workers (MZSP, USNM, CECL); South Bimini, 2.ix.1951, C. & P. Vaurie, 1 worker (USNM). **CUBA**, Soledad, 12.vi.1927, W.S. Creighton, 6 workers (MZSP); Nueva Gerona Island, 12.xi.1927, Creighton col. 6 workers (MZSP, USNM). **HAITI**, Manneville, Mann col. 10 workers (MZSP, USNM, CECL); Diquini, Mann col. 6 workers (MZSP, USNM). **JAMAICA**, Kingston, M. Grabham (?), 3 workers (USNM); St. Eliz., Malvern, 380m [18º 57´N, 77º 43´W], 12.iii.1984, J. Longino, specimen code JTLC000006114, 2 workers (JTLC). **PUERTO RICO**, Mona Island, 31.xi.1944, H.A. Beatty col., 4 workers (MZSP, USNM). **USA: Florida**, Dania, (several dates in 1945), W.F. Buren, 35 workers (MZSP, USNM, CECL); Marathon, 28.ii.1946, W.F. Buren, 9 workers (MZSP, USNM); Big Pine Key, 10m, 16.ix.1982, P.S.Ward # 5745, “ground forager, hard wood, hammock”, specimen code JTLC000006115, 2 workers (JTLC).

*Comments*: The described infraspecies of *T. jamaicensis* are, in our view, local varieties based more on the degree of development of character states than in their presence or absence. Wheeler (1907) proposed the first two synonymies of *T. jamaicensis* (*T. sharpii* Forel and *T. maritima* Wheeler) at a time when he believed that this was a single species of the genus widely distributed in the West Indies. Some years later, however, Wheeler (1937) described other varieties of *T. jamaicensis*, and Mann (1922) revalidated *T. jamaicensis* var. *maritima* in a new concept. Although we were not able to study type material of all these varieties, in our comparative studies of the many available Antillean samples of *T. jamaicensis*, we were not able to discern samples that could merit specific recognition. Based on this and on the minor characters the authors used to differentiate infraspecies forms of *T. jamaicensis*, we are proposing the synonymies above.

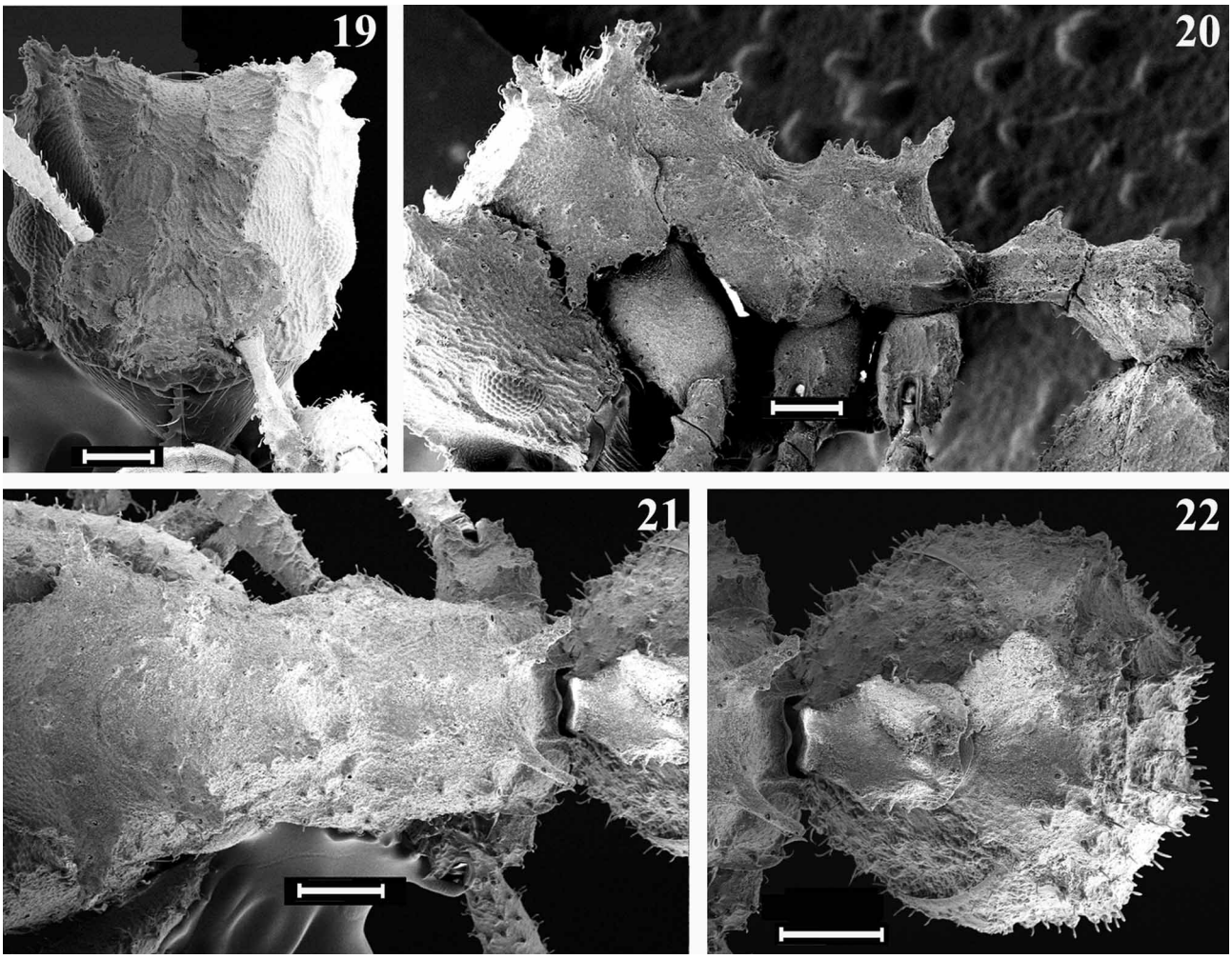
*Trachymyrmex jamaicensis* presents noticeable variation in color and several morphological characters. In relation to the typical Jamaican form, specimens from Haiti, Cuba, and Florida are darker and present more slender and a little longer lateral pronotal spines. Specimens from the Bahamas may have, in relation to the other localities, very slender lateral pronotal spines, relatively short projections on the tip of frontal and preocular carinae, as well as smaller second mesonotal projection pair, thinner occipital projections, and longer petioles. Some specimens from Cuba and Puerto Rico also present relatively long petioles. Workers from Cuba and Florida may have two midpronotal teeth, and in the case of some Florida specimens, arising from separate bases. All Florida specimens present mesosomal projections stouter than in other samples and more expanded frontal lobes in relation to specimens from other localities, but agree in all other details with the description we provide above.

Wheeler (1905) described the nesting habits of *T. jamaicensis* (cited by him as *Atta* [*T.*] *maritima*), that prefer to nest in pure foraminiferous sand of the seashore at or just above the high water mark, but may be found more inland as well. The inconspicuous nests are surmounted by very flat moundlets, with a single somewhat eccentric entrance, leading to one to many small ovoid chambers. The fungus is nourished with buds, small flowers, bits of dead and living leaves and caterpillar excrement. The workers feign death when disturbed. Weber (1967) visited Bimini Islands in 1959 to examine nests of this species and to secure fungus cultures. He only found nests in the northwestern portion of the South Island among scrub vegetation. He described the nest entrance crater, which may attain up to 50mm height and 3 to 8 chambers, which can extend to a depth of 70cm. Not all chambers were filled with fungus gardens, that when present were in the form of friable lamellae suspended from rootlets. The ants foraged at night or early mornings, ceasing when the sun shone on nests. The workers feigned death or quickly ran into the crater when disturbed. The largest workers in the colony were responsible for the foraging or for bringing up sand from the nest, while the smallest and palest stayed inside the nest and took care of the fungus garden, to which they brought yellowish flower stamens, woody particles, green dicot leaf sections and possibly insect feces. Weber (1972) depicted a cluster of inflated hyphal ends freshly removed from a garden of *T. jamaicensis* and presented a drawing of ends of two hyphae, showing stages in the development of inflations.

*Atta (Trachymyrmex) sharpi* Forel, 1893 was synonymyzed with *Trachymyrmex jamaicensis* by Wheeler in 1907. Notwithstanding, Kempf (1972) cited this name as valid in his catalog, and so Bolton (1995) considered Kempf´s move as a revalidation of the name *T. sharpi*. However, Kempf commented on all taxonomic novelties he proposed in the catalog, not citing any *Trachymyrmex* in this list. Also, the Museu de Zoologia da USP keeps the original cards Kempf used to construct the catalog, but the information regarding Wheeler´s synonymy is missing in the cards related to *T. sharpi*. We interpret the citation in the catalog as an error and are thus not proposing again the synonymy of *T. sharpi*, with which we fully agree. This is not the case of *T. maritimus*, which was revived from synonymy by Mann (1920), cited by Kempf (1972) as a subspecies of *T. jamaicensis*, and that we consider now a synonym of *T. jamaicensis*.

The first known fossil of any fungus-growing ant, *Trachymyrmex primaevus*, was described by Baroni Urbani (1980) from several Dominican amber pieces. He compared this species with *T. jamaicensis*, the only known valid species of the island of Hispaniola at the time of the description, although he stated that the defi-

nite relationships of the fossil to the known recent *Trachymyrmex* species were not clear. Baroni Urbani´s reconstruction of *T. primaevus* workers clearly shows heavily longitudinally striate mandibles and preocular carinae curved inwards, characters shared with *Trachymyrmex* of the Septentrionalis group, distributed today all over the Americas, but hitherto unknown in Caribbean localities. We will deal formally with the fossil species and the Septentrionalis species group in a forthcoming paper.




**FIGURES 19–22.** Scanning electron micrograph of *Trachymyrmex jamaicensis*, worker from USA: Florida, Marathon. 19. Head in frontal view. 20. Mesosoma and waist in lateral view. 21. Mesosoma, waist and gaster in dorsal view. 22. Waist and gaster in dorsal view. All scale bars = 250 μm.

***Trachymyrmex zeteki* Weber**
(Figs. 23–28, 30)

*Trachymyrmex zeteki* Weber, 1940: 422 (worker). Kempf, 1972: 254 (catalog). Weber, 1972: 12 (dorsal female drawing). Bolton, 1995: 421 (catalog).
*Trachymyrmex balboai* Weber, 1940: 424 (worker). Weber, 1958: 55 (synonymy).
[Type material: one "cotype" worker, examined]

*Worker measurements* (n = 3). TL 5.0 (4.7–5.2); DHL 1.44 (1.40–1.48); HW 1.44 (1.42–1.48); IFW 0.83 (0.80–0.86); ScL 1.00 (0.97–1.02); HWL 0.85 (0.77–0.92); MeL 1.92 (1.88–1.98); PL 0.44 (0.38–0.49); PPL 0.42; GL 1,33 (1.26–1.42); HfL 2.01 (1.97–2.05).

*Worker description*: Ferruginous. Integument opaque and finely granulose. Pilosity: bristly spatulate dark hairs with lighter tips, confined to body projections; short, strongly curved and hook-like hairs in other parts of the body.

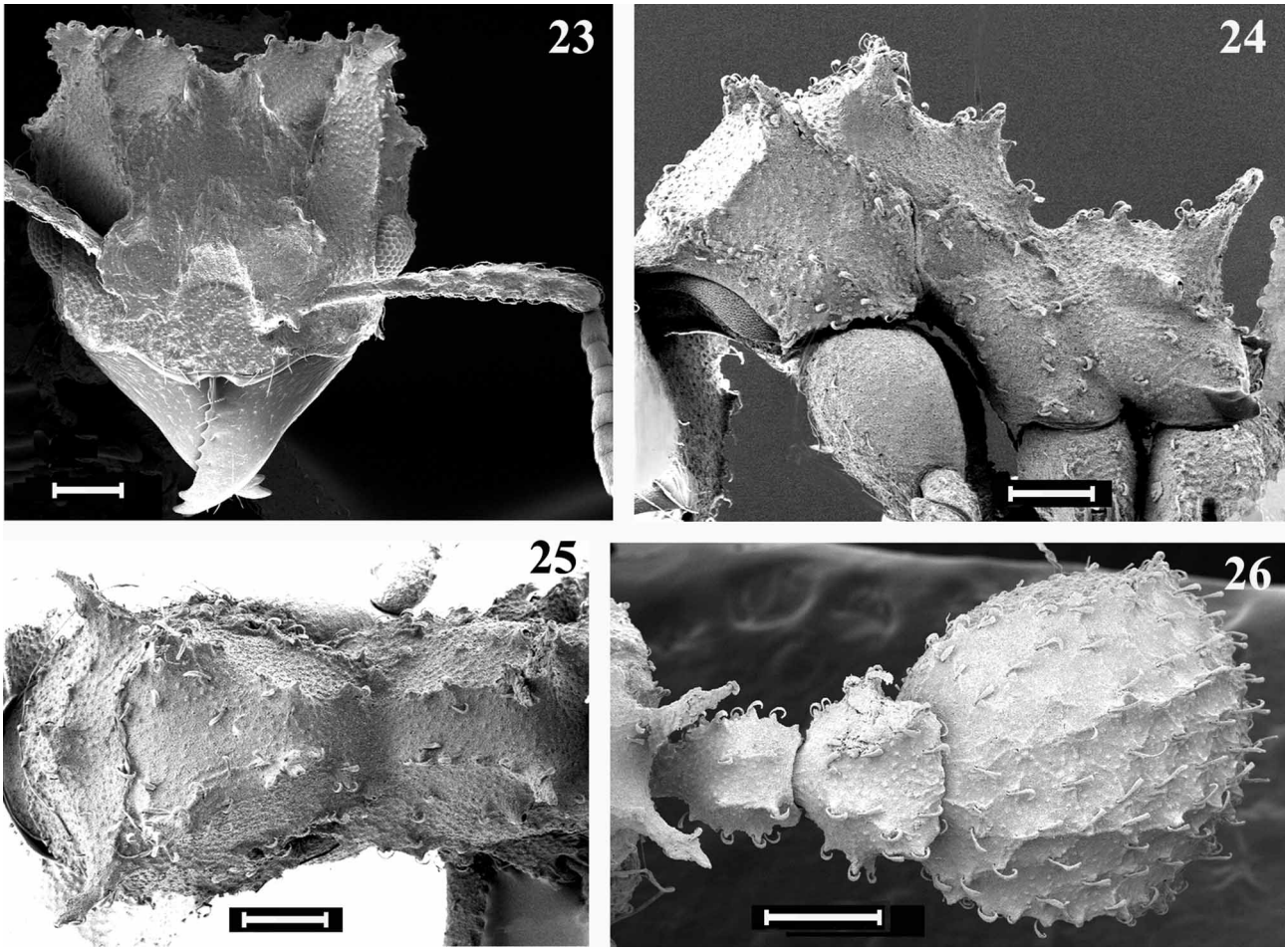
Head in full face view (Fig. 23) as long as broad (DCI average 100; 99–101). Outer border of mandible feebly sinuous; chewing border with 8 teeth, with a diastema between the second and third teeth, the last six approximately of the same size, smaller than apical and sub-apical teeth. Clypeus median apron without projections. Frontal area impressed. Frontal lobe semicircular, moderately expanded (FLI average 57; 56–58), with weakly crenate free border and one prominent denticle on the antero-lateral border. Frontal carina marked, moderately diverging caudad, reaching the antennal scrobe posterior end in a single tooth at the vertexal margin; preocular carina posteriorly ending in one multituberculated and stout tubercle, with the tip outwards directed near the posterior margin of head. Occipital spine almost as long as preocular carina projection. Supraocular projection tuberculiform. Inferior corner of occiput, in side view, with a minute tooth. Eye faintly convex, only its anterior half surpassing the lateral border of head; 11 facets in a row across the greatest diameter. Antennal scape short, when lodged in the scrobe not surpassing the tip of the preocular carina projection; gradually thickened towards apex, covered with small piligerous tubercles.

Mesosoma (Figs. 24, 25). Pronotal dorsum marginate in front and on sides; antero-inferior corner with a small triangular and acute flattened spine; inferior margin weakly crenulated; median pronotal tooth with bifid tip, projected bellow the tip of the longer lateral pronotal spines, which point obliquely upwards from the pronotum, in frontal view. Anterior pair of mesonotal spines almost as long and stout as the lateral pronotal projections, directed upwards; the second pair smaller, but spine-like and longer than the tooth-like third pair. Anterior margin of katepisternun smooth, without a projecting tooth. Metanotal constriction very impressed. Basal face of propodeum laterally marginated by a row of 3–4 denticles on each side; propodeal spines longer than the distance between their inner bases. Hind femora a little longer than mesosoma length.

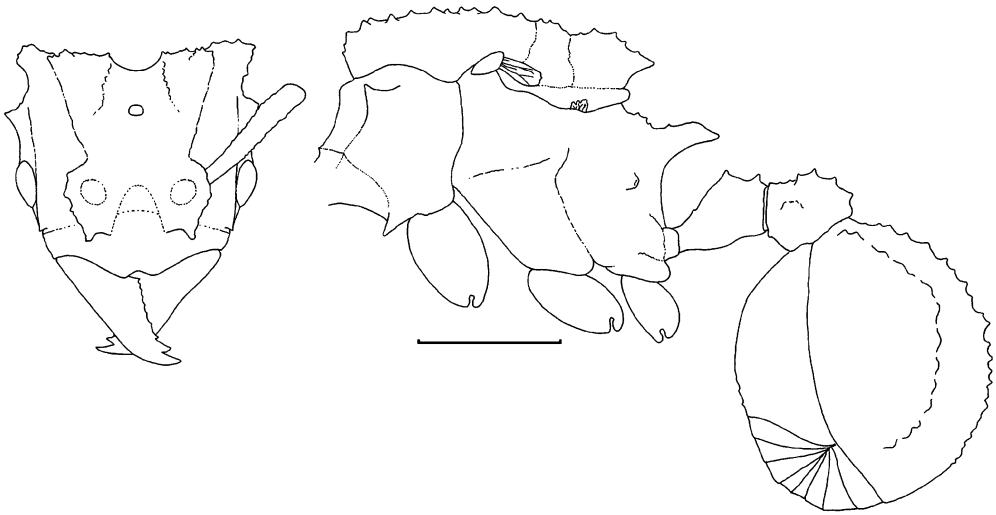
Waist and gaster (Fig. 26). Dorsum of petiolar node with two pairs of minute spines, the sides subparallel in dorsal view, with a series of lateral denticles. Postpetiole almost as long as broad in dorsal view, and impressed dorsally, with straight postero-dorsal border; sternum without sagital keel. Gaster, when seen from above, suboval. Tergum I with straight lateral faces separated from the dorsal face by a longitudinal row of piligerous tubercles; anterior two thirds of gaster dorsum with three piligerous shallow longitudinal furrows, separated by a pair of tubercles rows. Sternum I without an anterior sagital keel.

*Gyne* (undescribed; Figs. 27, 28): TL 6.9; DHL 1.74; HW 1.63; IFW 1.02; ScL 1.14; HWL 1.05; MeL 2.43; PL 0.68; PPL 0.57; GL 2.17; HfL 2.20. Resembling the worker with the usual caste differences. The median anterior ocellus without a down curved ridge above, and the two lateral ones partially concealed by the longitudinal carinae of vertex. Pronotum with a pair of strong and acute scapular spines on each side, directed out and forwards, the inferior ones pointed down and forwards. Mesoscutum surmounted by conspicuous tubercles, but without notable dorsal projections, superficially impressed on posterior region, with a median notch in the middle of anterior margin in dorsal view. Shallowly impressed parapses delimited by the conspicuous parapsidial furrows; dorsum of mesothoracic paraptera more or less impressed, oblique in relation to scutellum dorsum in side view, with a narrow median portion when seen from above; scutellum ending in a pair of moderately stout and acute spines, directed backwards, with the sides converging obliquely inwards; metathoracic paraptera concealed by the scutellum in dorsal view; propodeal spiracle orifices on a tubercular projection. Two massive and acute spines on propodeum, longer than pronotal ones. Petiolar dorsum with two pairs of minute teeth near the anterior and posterior margins. First gastric tergite with a longitudinal ridge on each side; disk with two longitudinal series of small piligerous tubercles, absent in the middle of the segment. Wings unknown.

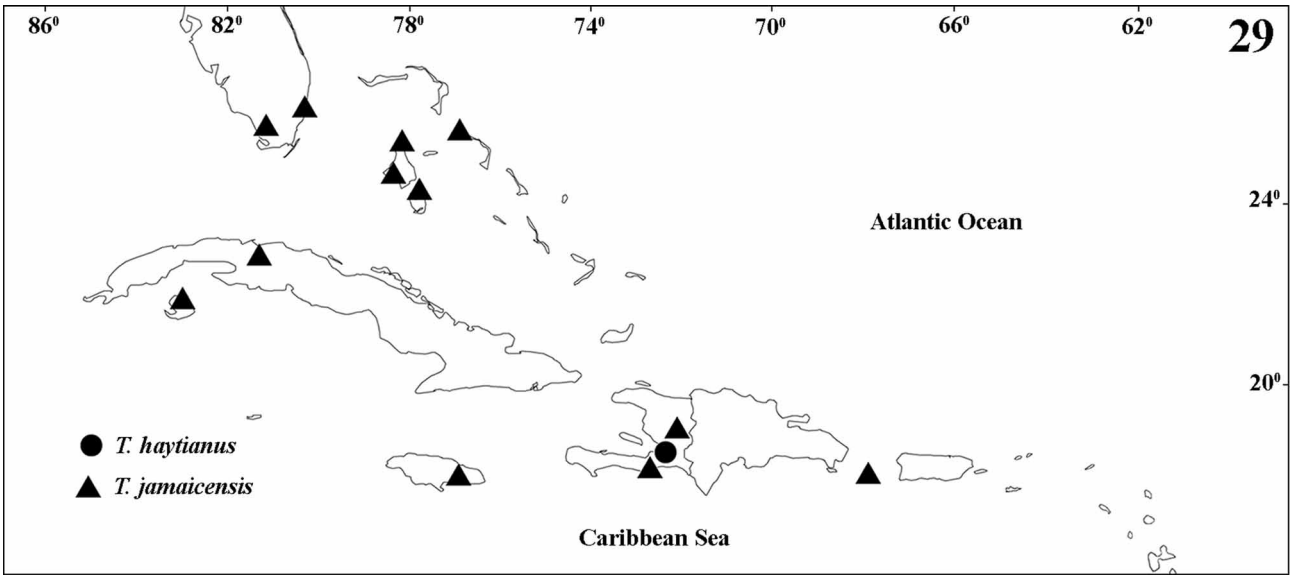
*Male*: Unknown.

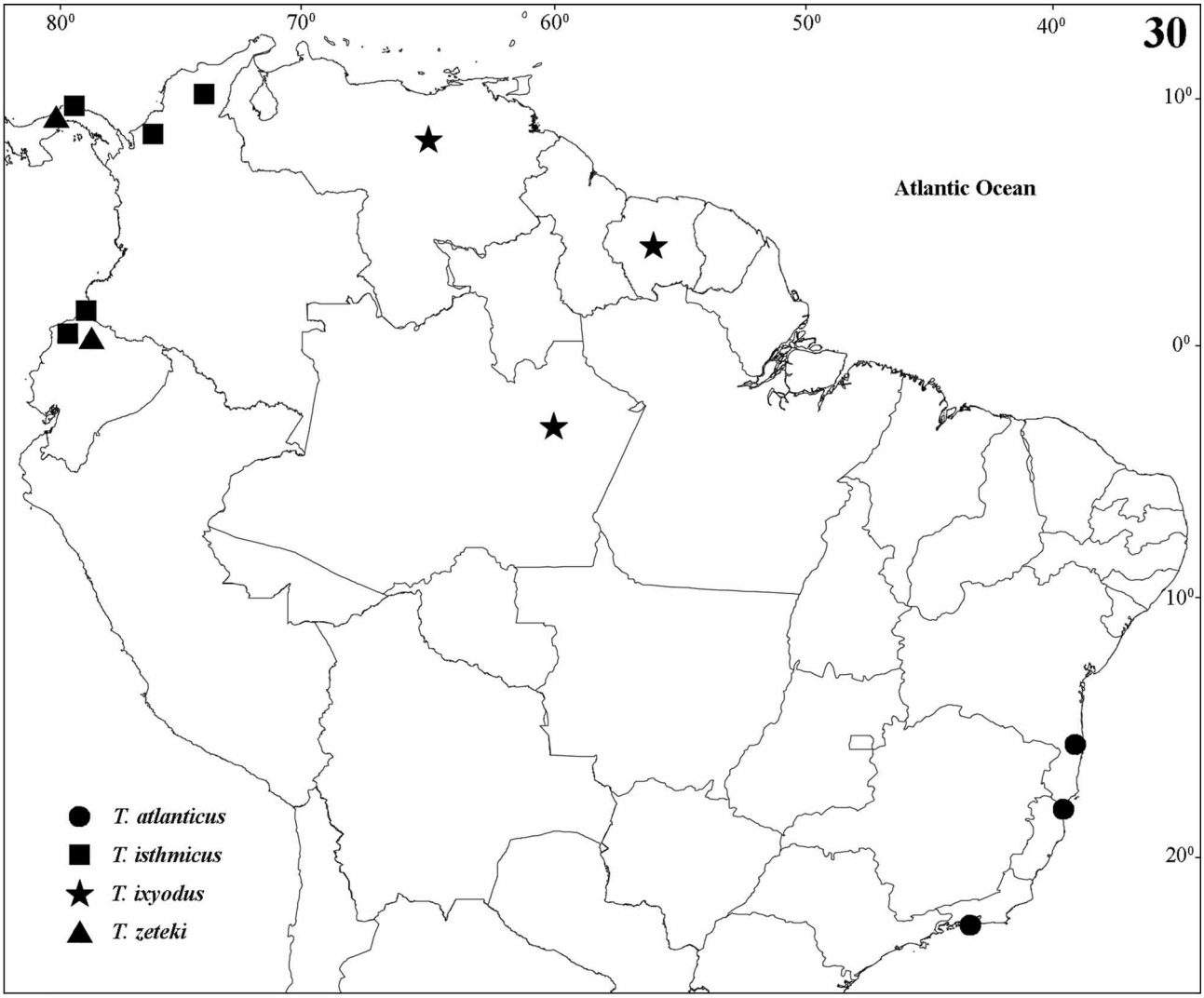



**FIGURES 23–26.** Scanning electron micrograph of *Trachymyrmex zeteki*, worker from Panama, Canal Zone, Barro Colorado. 23. Head in frontal view; scale bar = 250 µm. 24. Mesosoma in lateral view; scale bar = 250 µm. 25. Mesosoma in dorsal view; scale bar = 250 µm. 26. Waist and gaster in dorsal view; scale bar = 500 µm.



**FIGURES 27–28.** Gynes of *Trachymyrmex zeteki* from Ecuador, Pichincha, Rio Palenque. 27. Head in frontal view. 28. Mesosoma and metasoma in lateral view. Scale bar = 1000 µm.




**FIGURES 29–30.** Distribution map of *Trachymyrmex* of the Jamaicensis species group. 29. Greater Antilles and part of Florida, USA. 30. Parts of Central and South America.

*Syntype worker*: **PANAMA Canal Zone**, Barro Colorado Island, 25.vi.1938, N.A. Weber leg., 1 worker ("cotype" # 59827 deposited in USNM).

*Material examined*: **COSTA RICA: Alajuela,** Rio Peñas Blancas [10º 19´N, 84º 43´W], 800m, 22.v.1987, J. Longino#1684-s "wet forest, worker on ground, at night," specimen code INBIOCRI001284172, 1 worker (JTLC); **Heredia**, Est. Biol. La Selva, 50–150m [10º 26´N, 84º 01´W], 27.iv. 1999, E. Sarnat, specimen code INBIOCRI002739914, 1 worker (JTLC); *ibidem*, specimen code INBIOCRI002739913, 1 worker JTLC). **ECUADOR: Pichincha**, Centr. Cient. Rio Palenque, S. Sandoval (several dates) 40 workers, 5 dealate gynes (MZSP, CECL, QCAZ, USNM). **PANAMA Canal Zone**, Barro Colorado Island, 13.vi.1958, N.A. Weber leg. (3 syntypes workers of *T. balboai* deposited in MZSP); *ibidem*, Feb–Mar; Jul–Aug. 1944, J.A.S. Zetek leg., respectively 2 and 1 worker (MZSP); *ibidem*, 15. ii. 1960, N.A. Weber col. 2 workers (MZSP).

*Comments*: See comments for *T. atlanticus*. *Trachymyrmex zeteki* females share with *T. isthmicus* and *T. ixyodus* projecting teeth at the anterior margin of the frontal lobes, but differ from females of *T. ixyodus* by the presence of a single midpronotal denticle, while females of *T. isthmicus* show double midpronotal denticles. Weber (1940) found a nest at the slope of a hill in the back of the Barro Colorado island laboratory in dense shade, with a single chamber about 67mm deep in the soil, horizontally elliptical, 42 X 80mm. In 1972, Weber described briefly the population and male flights in the laboratory.

## Discussion

As we revise the taxonomy of the *Trachymyrmex* groups of species, the resolution of our phylogenetical analysis increases, allowing some interesting inferences (Brandão & Mayhé-Nunes, in press). If the groups still not revised, Cornetzi and Urichi, prove to be monophyletic, then *Trachymyrmex* ants must have invaded the Caribbean islands several times during their known 30 million years history, as some of their species occur today in the Antilles and in near continental islands, along with species in the group revised here, Jamaicensis. The only fossil thus far known, *T. primaevus* Baroni Urbani (1980) belongs to the Septentrionalis group, as we discussed above, that has more endemic species in North America.

Because the species in the Jamaicensis group that occur in northern South America, Central America and the Caribbean islands greatly outnumber those occurring elsewhere (actually only the newly described *T. atlanticus* occurs in eastern Brazil, see Fig. 30), the Jamaicensis group could have arisen in the archipelago and invaded the south and north continents subsequently. This will be tested when we have a sound phylogeny for the genus and for its species.

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