



## A taxonomic revision of the *Strumigenys nitens* and *simulans* groups (Hymenoptera: Formicidae), two Caribbean radiations of leaf litter ants

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### Abstract

In this study, we revise two groups of cryptic leaf litter ants, the *Strumigenys nitens* and *Strumigenys simulans* species groups. These two groups are restricted to the Greater Antilles and the Bahamas. We redefine the species groups, provide a key for the five species in the *S. nitens* group, and differentiate the two species in the *S. simulans* group. Four new species are described: *Strumigenys caiman* **sp. nov.**, *S. economoi* **sp. nov.**, *S. hubbewayorum* **sp. nov.**, and *S. zemi* **sp. nov.** We review and provide a key for the *Strumigenys* fauna of Hispaniola, which comprises the two endemic species *S. economoi* and *S. zemi*, six more broadly distributed Neotropical species, and three pan-tropical “tramp” species.

**Key words:** Biodiversity, Cuba, Hispaniola, Bahamas, Formicidae, trap jaw, key

### Introduction

*Strumigenys* is an exceptionally diverse genus of myrmicine ants with more than 840 described species, the majority occurring in the tropics and subtropics (Bolton 2000, 2016), typically nesting and foraging in moist terrestrial microhabitats such as leaf litter, soil, or rotten wood (Creighton 1937; Wilson 1953; Deyrup and Cover 2009; Kitahiro et al. 2014). Once thought to be relatively rare, their small size, cryptic coloration, and propensity to curl up and lie still when disturbed led *Strumigenys* to be undercollected by earlier generations of tropical ant biologists. The widespread adoption of specialized litter sampling techniques such as the Berlese funnel and Winkler extraction bags have led to a renaissance in our understanding of the general abundance and true diversity of this genus (AntWeb 2018, Fisher 1999, Macfadyen 1953). Our recent faunal survey of Hispaniola, which included the use of Winkler sampling, yielded new geographic records of known *Strumigenys* species and specimens of undescribed endemic species. These samples provided the impetus for a review of Hispaniola’s *Strumigenys*. The accumulated Caribbean *Strumigenys* material that was brought together for this study prompted a revision of the *S. nitens* and *simulans* groups as a whole, throughout their range.

Prior to this study, nine *Strumigenys* species were known from Hispaniola, all of which were either well known pantropical tramp species or widely ranging Neotropical species (Lubertazzi, 2019). The two new Hispaniola species described below are thus the first endemic *Strumigenys* known from the island.

### Material and methods

**Abbreviations of depositories.** The collection abbreviations below follow Evenhuis (2018). The material upon which this study is based is located and/or was examined at the following institutions:

CASC	California Academy of Sciences, San Francisco, U.S.A.
DBBC	Collection of Dr. Doug Booher, Athens, Georgia, U.S.A.
IIBZ	Investigaciones Botánicas y Zoológicas, Universidad Autónoma de Santo Domingo, Santo Domingo, Dominican Republic.
JTLC	Collection of Dr. John Longino, University of Utah, Salt Lake City, Utah, U.S.A.
LACM	Los Angeles County Museum of Natural History, Los Angeles, California, USA
MCZC	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
MNHN	Museo Nacional de Historia Natural Cubana, Havana, Cuba.
MNHNSD	Museo Nacional de Historia Natural “Prof. Eugenio de Jesús Marcano”, Santo Domingo, Dominican Republic.
NHMB	Naturhistorisches Museum, Basel, Switzerland.
PSWC	Collection of Dr. Philip Ward, University of California, Davis, California, U.S.A.
UCDC	Bohart Museum of Entomology, University of California, Davis, California, U.S.A.
UGCA	University of Georgia Collection of Arthropods, Athens, Georgia, U.S.A.

The type material of the new species and all imaged specimens can be uniquely identified with specimen-level codes affixed to each pin. Digital color images were created using a JVC KY-F75 digital camera and Syncroscopy Auto-Montage software (version 5.0). All images presented are available online and can be viewed on AntWeb (<http://www.antweb.org>) and Antwiki (<http://www.antwiki.org>) under their respective species names. The measurements and indices used in this study are based on those used by Bolton (2000) or defined here. The measurements were taken using Measurement Application module of Leica Application Suite X version 3.4.1.17822 using a Leica IC90 E digital camera and Leica M165 C microscope. Measurements and indices are presented as minimum and maximum values with arithmetic means in parentheses; measurements are expressed in millimeters to two decimal places. We prepared the distribution map with a custom R script using the libraries ‘raster’, ‘maps’, ‘mapdata’, ‘maptools’, and ‘scales’ and formatted the map using Adobe Illustrator (R Core Team 2019).

### Measurements & indices:

HL	Head length: the length of the head capsule excluding the mandibles, measured in full-face view in a straight line from the mid-point of the anterior clypeal margin to the mid-point of the cephalic margin. In species where one or both of these margins are concave, the measurement is taken from the mid-point of a transverse line that spans the apices of the projecting portions.
HW	Head width: the maximum width of the head in full-face view, excluding the eyes.
ML	Mandible length: the straight-line length of the mandible at full closure, measured in the same plane for which the HL measurement is taken (i.e. full face view), from the mandibular apex to the anterior clypeal margin, or to the transverse line connecting the anteriormost points of the clypeus in taxa where the anterior clypeal margin is concave medially.
PW	Pronotal width: the maximum width of the pronotum in dorsal view.
SL	Scape length: the maximum straight-line length of the scape, excluding the basal constriction or neck that occurs just distal of the condylar bulb. In taxa with a hypertrophied subbasal lobe on the scape SL is measured from the tip of the subbasal lobe to the scape apex.
FL	Femoral length: the length of metafemur from junction with trochanter to apex.
HT	Head thickness: the maximum thickness of head in profile.
EL	Eye length: in profile, the maximum diameter of the compound eye.
TL	Total length: the total outstretched length of the ant from the mandibular apex to the gastral apex; when measured in profile the sum of ML + HL + WL + petiole length + postpetiole length + gaster length.
WL	Weber’s length: diagonal length of mesosoma in profile, from anterior declivity of pronotum (exclusive of pronotal “neck”) to apex of metapleural lobe.
CI	Cephalic index: $HW/HL * 100$ .
MI	Mandibular index: $ML/HL * 100$ .
SI	Scape index: $SL/HW * 100$

## Results

### Redefinition of the *nitens* species group, adapted from Bolton (2000)

Mandibles in full-face view and at full closure triangular to elongate-triangular, strongly tapering apically. Either extreme apices of mandibles alone engage, in which case a broad subovate gap is present between them basally, or apices of basal teeth more closely approximated, but never fully interlocking. In profile mandibles narrowing basally, the dorsal surface sloping downward where it passes beneath the clypeus. In ventral view curvature of mandibles continuous from apex to base. MI 23–40.

Dentition. Inner mandibular margin with 2–3 small triangular teeth distal of the lamella in full-face view; apices of the basal one or two not meeting at full closure. Distally, mandibles with a strongly down-curved to nearly vertical series of 4–6 teeth, the uppermost two longer and spiniform, the lower 2–4 shorter and triangular, with a total dental count of 6–9.

Basal lamella with an oblique anterior margin that is visible in full-face view with mandibles fully closed; the oblique margins form a pair of sloping edges that diverge from the midpoint of the anterior clypeal margin. The oblique anterior margins of basal lamella fitting into a lateral cornula or indentation on lateral anterior position of clypeus when mandibles are fully open.

Labrum terminates in a pair of apically truncated broad, flat lobes. Apices of labrum with several broad, fan-shaped, translucent cuticular setae.

Anterior margin of clypeus broad; flat to shallowly concave across its width. Lateral margins of clypeus short but strongly convex. Distinct notch between the posterolateral angle of clypeus and frontal lobe. In full-face view, outer margins of mandibles meeting the anterior clypeal margin at or very close to the clypeal anterolateral angles.

Clypeus dorsum usually with minute adpressed setae, only *S. zemi* has short fine simple setae that are decumbent, but not adpressed; lateral and anterior clypeal margins usually without projecting setae of any form, if present setae are simple and not differentiated from setae on clypeal dorsum.

Frontal lobes and anterior portions of frontal carinae strongly expanded laterally and divergent posteriorly; in full-face view their outer margins form an uninterrupted outline between head and clypeus.

Preocular carina not visible in full-face view, completely overhung and concealed by the expanded frontal lobes and frontal carinae.

Ventrolateral margin of head not marginate immediately in front of eye, but sharp margination commences on posterior border of postbuccal impression, forms a high arch whose apex is higher than the level of the eye, then continues anteroventrally to base of mandible. Postbuccal impression narrow and deeply incised.

Cuticle on side of head within scrobe mostly smooth, with some faint punctulate sculpture on lower half of scrobe in front of level of eye.

Scape short, SI 46–68, not strongly dorsoventrally flattened, without a strongly defined subbasal angle.

Leading edge of scape with minute adpressed or decumbent setae that are all directed toward the apex of the scape.

Pronotal dorsum without dorsolateral margination.

Propodeum in profile with a pair of triangular teeth. Immediately below the teeth, lamella of propodeal declivity is interrupted by the broad annulus of the propodeal spiracle. The maximum diameter of the propodeal spiracle, measured from the outside edge, is approximately as large as the compound eye (0.04–0.07 mm).

Lamella of propodeal declivity narrow, following the declivitous lateral margin of propodeum and bulb of metapleural gland. Lamella is cuticular, never spongiform, and never approaching a depth equal to length of propodeal teeth.

Spongiform appendages present on petiole (as a flange along the ventral surface of petiole and along lateral surface of petiolar node) and postpetiole (as a sub-postpetiolar lobe as deep as exposed postpetiolar disc in lateral view, and as a lateral expanded cuticular-spongiform flange encompassing the postpetiolar disc in dorsal view). Base of first gastral sternite in profile with a pad of spongiform material.

Postpetiole transversely broad, 1.5 to 2.25 times as wide as long with a broadly and evenly concave anterior margin and with a medial concave impression along posterior margin in dorsal view.

Glands apparent as oval patches on the ventrolateral portions of scapes and as oval patches of lighter integument on the dorsal surfaces on the apical third of the pro-, meso-, and meta-femur.

Pilosity. Pronotal humeral setae simple or flagellate. One to three scrobal setae present. Apicoscrobal setae curved, from short and slightly expanded to simple, filiform to subflagellate. Dorsal (outer) surfaces of meso- and metatibiae with apically curved, short, fine, decumbent setae. Elongate setae absent on basitarsi, tibiae, and femora.

Ground pilosity of head and body short, adpressed, simple setae to narrowly enlarged, spatulate, shallowly curved, suberect setae.

Sculpture. Dorsum of head behind clypeus not reticulate-punctate, but often with weak striate or punctate sculpture. Mesosoma without sculpture, smooth and shining both dorsally and laterally. Disc of petiole and postpetiole smooth and shining.

### Synopsis of the *Strumigenys nitens* group

*Strumigenys caiman* sp. nov.

*Strumigenys convexiceps*, Santschi 1931

*Strumigenys hubbewatyorum* sp. nov.

*Strumigenys nitens*, Santschi 1932

*Strumigenys zemi* sp. nov.

*Strumigenys caiman* sp. nov.

(Figs. 1 & 2)

urn:lsid:zoobank.org:act:900DA333-C7F6-4CCE-A2E4-E9D6753BEE8F

*Pyramica nitens*: Bolton 2000: 208, figs. 144, 184 (misidentification).

**Holotype worker: CUBA: Camagüey:** Soledad, L.V., Blanco's Woods, E.O. Wilson, #Berl., VII.20–53 [MCZC: MCZ-ENT00644268].

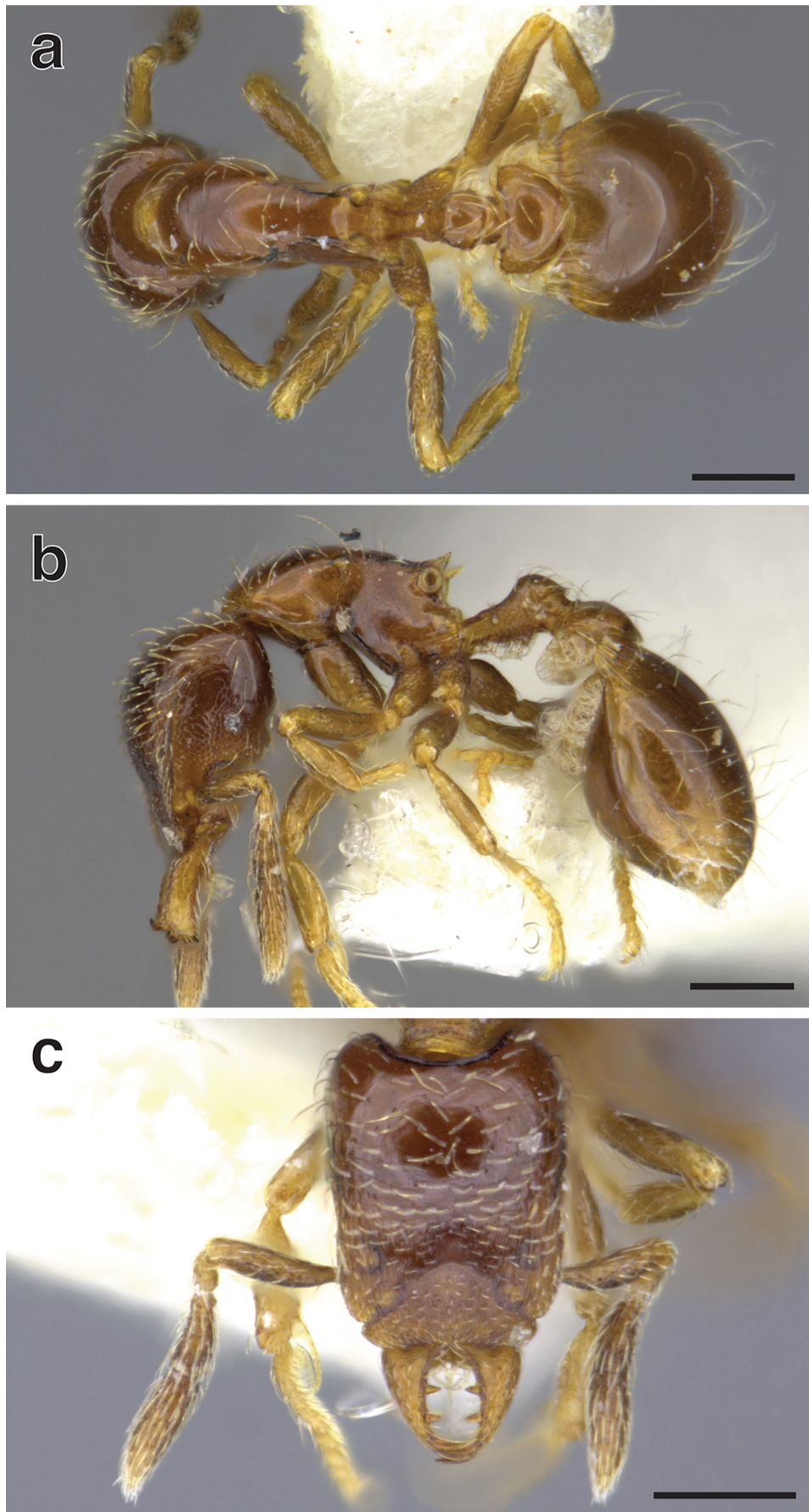
**Paratypes: CUBA:** same data as holotype: 1 worker (MCZ-ENT00644267) [MCZC]; 1 worker (MCZ-ENT00644269) [LACM].

**Non-type material examined: CUBA: Camagüey:** Baragua, Bates & Fairchild, # 137, 1932 (MCZ-ENT00644270) [MCZC].

**Diagnosis.** *Strumigenys caiman* can be distinguished from congeners in the *nitens* group by the dental count of six. This species is closely related to *S. nitens* and *S. hubbewatyorum*, but can be distinguished by the following additional characters: inner mandibular margin with two teeth; apex of mandibles with four teeth vertically arranged: the uppermost two are spiniform, while the lowermost are shorter and triangular (Fig. 2c); mandibles longer (MI 38–39 vs. 31–33 in *S. nitens* and *S. hubbewatyorum*); antennal scape is shorter (SI 56–60 vs. 61–74); mesosoma slightly more compact (WL 2.1–2.2 times PW vs. 2.3); eye smaller, less than or equal to the maximum width of the antennal scape. The following characters separate *S. caiman* from *S. zemi* and *S. convexiceps*: mandibles relatively long (MI 24–29 in *S. zemi* and *S. convexiceps*), petiolar node narrow in dorsal view, approximately half the width of postpetiole; mesosoma relatively elongate (WL 1.7–1.8 times PW in *S. zemi* and *S. convexiceps*).

**Worker measurements (n=4).** HL = 0.45–0.48 (0.46); HW = 0.33–0.36 (0.34); ML = 0.17–0.18 (0.17); PW = 0.22–0.24 (0.23); SL = 0.19–0.20 (0.20); FL = 0.29–0.33 (0.31); HT = 0.30–0.33 (0.31); EL = 0.04–0.05 (0.04); TL = 2.01–2.07 (2.04); WL = 0.46–0.52 (0.49); CI = 74–75 (75); MI = 38–39 (39); SI = 56–60 (58).

**Worker description.** Adapted from the description of *Pyramica nitens* in Bolton (2000). Mandibles in full face view and at full closure elongate-triangular and strongly tapering apically; MI 38–39. Extreme apices of mandibles alone engage, and a broad subovate gap is present between them through which the broad labral lobes are visible. Inner mandibular margin with two small conical teeth whose apices are widely separated at full closure; the first about one-third of the margin length from the base, the second about two-thirds the way along the margin. Apices of mandibles with a more or less vertical series of four teeth, the upper two longer and spiniform, the lower two shorter and triangular, giving a total dental count of six (see Fig. 2c). Clypeus and upper scrobe margins have fine faint longitudinal striolate sculpture, traces of which are also present on the cephalic dorsum between the frontal carinae. Antennal scapes long: SI 56–60. Lateral margins of the head roughly parallel and the posterior margin shallowly



**FIGURE 1.** Holotype worker of *Strumigenys caiman* (MCZ-ENT00644268): a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.

concave in full-face view. Dorsum of head with elongate, spatulate setae which curve toward the midline. Compound eye small: diameter less than or equal to the maximum width of the antennal scape. In profile view, dense punctate sculpture present between the compound eye and the postbuccal impression.

Mesosoma elongate: WL 2.1–2.2 times PW. Uniformly smooth and shining. Dorsal surface of pronotum and mesonotum 4–5 pairs elongate, simple to blunt setae which shallowly curve toward the midline.

Petiolar node narrow, roughly 1/2 as broad as postpetiole in dorsal view. Postpetiole 1.75–2.10 times as broad as long. Petiolar peduncle covered in dense punctate sculpture, but dorsal surface of petiole and postpetiole smooth and shining. Dorsal surfaces of petiole and postpetiole with 2–3 pairs long, fine, tapering setae.

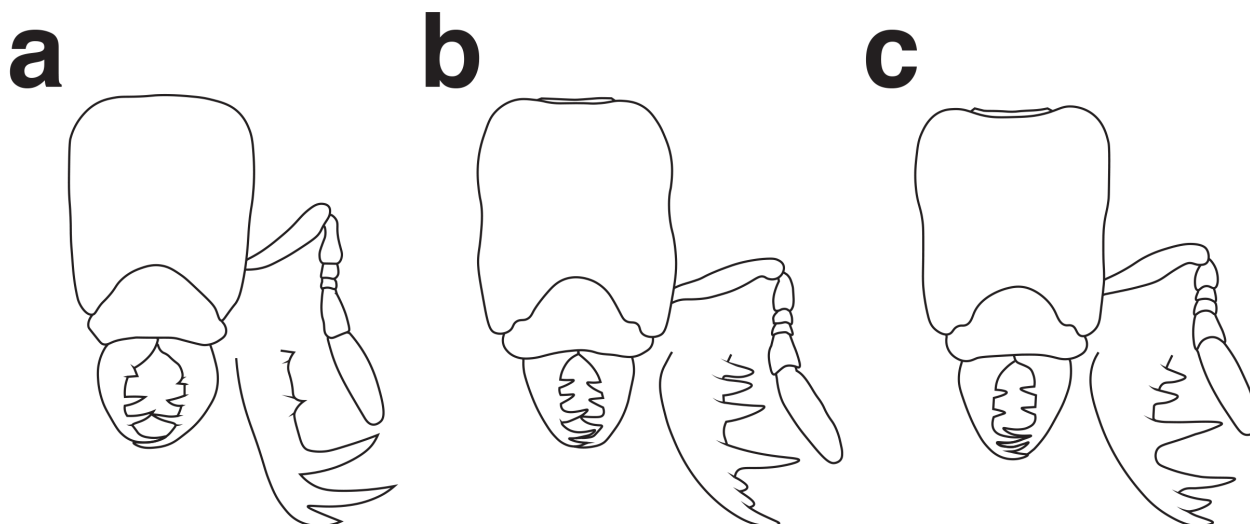
Six to ten basigastral costulae present only on the limbus and the extreme base of the first gastral tergite, covering less than 0.15 of the length of the first gastral tergite, the remainder of which is smooth and shining. First gastral tergite with four to five rows of four long, fine, filiform to flagellate tapering setae.

Head, mesosoma, and gaster uniformly dark reddish brown. Appendages lighter brown.

**Distribution and ecology.** Known from two localities in Cuba, both of which were lowland mature coastal forest in south-central Cuba (Figure 9). The holotype worker and two paratypes were collected from leaf litter extracted in a Berlese funnel.

**Taxonomic notes.** Originally described in Bolton (2000) as *S. nitens*, this species differs from the original description and illustration by Santschi (1932); see Fig. 2c and the taxonomic notes for *S. nitens* below.

**Etymology:** a small ant with long mandibles armed with many slender teeth, this species is reminiscent of the crocodilians of the genus *Caiman*. The name is a noun in apposition.



**FIGURE 2.** Comparison of full-face view and mandibles in oblique antero-dorsal view of: a) reproduction of original Santschi (1932) illustration of *Strumigenys nitens* b) *Strumigenys nitens* (CASENT0914607) c) *Strumigenys caiman* (MCZ-ENT00644270).

### *Strumigenys convexiceps*, Santschi 1931

(Fig. 3)

*Strumigenys (Codiomyrmex) convexiceps* Santschi 1931: 277, figs. 9, 10. Syntype workers, CUBA: Havana, Playa Marianao, 27.iv.1930, A. Bierig (CASENT0912830) [NHMB]. Images examined on [www.antweb.org](http://www.antweb.org).

*Codiomyrmex convexiceps* Santschi: Weber 1934: 52. First combination in *Codiomyrmex*.

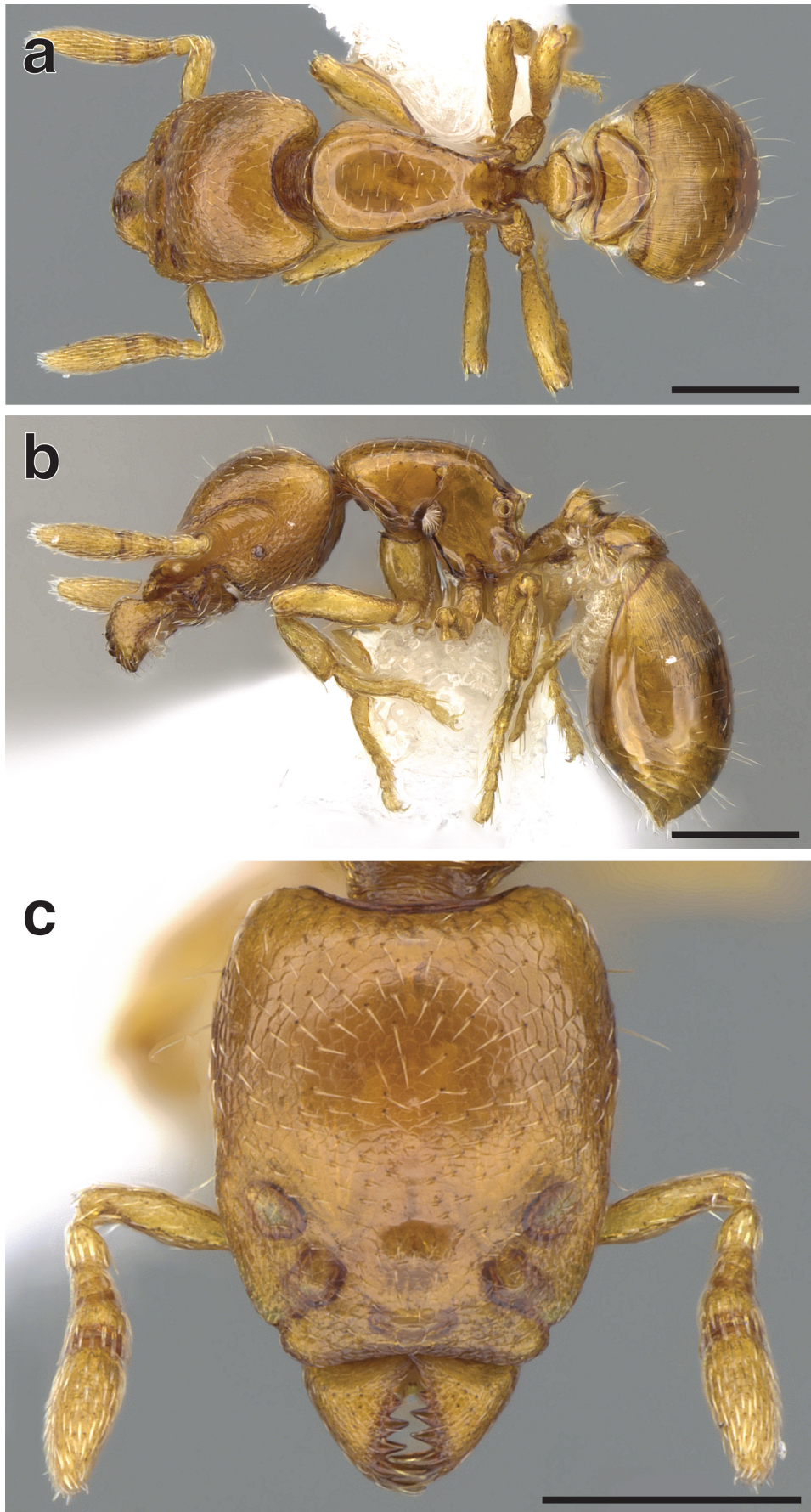
*Glamyromyrmex convexiceps* Santschi: Brown 1948: 116. First combination in *Glamyromyrmex*.

*Pyramica convexiceps* Santschi: Bolton 1999: 1672. First combination in *Pyramica*.

*Pyramica convexiceps* Santschi: Bolton 2000: 208, fig. 143. Redescription of syntype worker.

*Strumigenys convexiceps* Santschi: Baroni Urbani & de Andrade 2007: 177. Combination reinstated.

**Non-type material examined: CUBA: Holguín:** 6km S Yamanigüey, 20 33 N, 74 44 W, 25m, 23.viii.2001, P. S. Ward#14437-7, sifted litter (leaf mold, rotten wood), pine forest, 2 workers mounted on same pin (CASENT0914683) [PSWC].



**FIGURE 3.** Worker of *Strumigenys convexiceps* (CASENT0914683; photographer Zach Lieberman): a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.

**Diagnosis.** This species can be distinguished from all other *nitens* group species by the abundance and length of basigastral costulae. In *S. convexiceps* the basigastral costulae are longer (extending beyond the basal third of tergite vs. limited to the basal fifth of tergite) and more abundant (>30 in vs. <20). This species is most closely related to *S. zemi*, but is distinguished by mandibular tooth count of 8–9 vs. 7 in *S. zemi*, pilosity (adpressed setae on clypeal dorsum and antennal scape in *S. zemi* and adpressed in *S. convexiceps*, and shape of basal three mandibular teeth (spiniform in *S. zemi* and triangular in *S. convexiceps*). *Strumigenys convexiceps* is distinguished from *S. hubbetyorum*, *S. nitens* and *S. caiman* in having shorter relative scapes (SI = 47–49 vs. 56–74); and relatively broad petiole (3.0–3.1 times wider vs. < 1.3 times wider than long).

**Holotype worker measurements (taken from imaged specimen).** HL = 0.33; HW = 0.40; ML = 0.11; PW = 0.22; SL = 0.16; FL = 0.25; HT = 0.27; EL = 0.02; TL = 1.62; WL = 0.38; CI = 82; MI = 29; SI = 49.

**Non-type worker measurements (n=2).** HL = 0.41–0.42 (0.42); HW = 0.34 (0.34); ML = 0.10 (0.10); PW = 0.22–0.23 (0.23); SL = 0.16–0.16 (0.16); FL = 0.23–0.24 (0.23); HT = 0.26–0.26 (0.26); EL = 0.02–0.03 (0.03); TL = 1.63–1.65 (1.64); WL = 0.39 (0.39); CI = 82; MI = 23–24 (24); SI = 47–48 (48)

**Worker description.** Adapted from the description of *Pyramica convexiceps* in Bolton (2000). Mandibles in full face view and at full closure triangular, evenly and strongly convex in profile beyond the anterior clypeal margin; MI 23–24. Mandibles with 6 enlarged teeth basally + 2–3 denticles apically for a tooth count of 8–9. The mandibles with a small basal triangular tooth followed by two larger triangular teeth that do not meet, or barely meet when mandibles are closed. Tooth four, five, and six are spiniform with tooth five being the longest and followed by two to three smaller crowded denticles at the apex. The basal tooth is much smaller than teeth two and three. If a third denticle is present, it is located just apical of tooth six and is much smaller than following two denticles.

In full face view lateral margins of head narrowing slightly from apicoscrobal seta position to insertion of mandibles with a small concave impression between clypeus and frontal lobes. Antennal scapes short (SI = 47–49). Eye small, having 3–4 ommatidia and narrower than greatest thickness of scape (EL = 0.02–0.03 vs. scape thickness 0.05).

Antennal scapes with simple adpressed pilosity directed toward the apex. Clypeal dorsum with sparse, minute, simple adpressed setae directed anteriorly toward midline of head. Dorsum of head with weakly flattened short adpressed setae that are as long, or slightly longer than the space that separates them at their bases. Frontal triangle and area directly posterior to the frontal triangle smooth and shining and bearing minute simple to slightly expanded adpressed setae smaller than those on posterior dorsum of head. Scrobal margins with at least one pair of laterally projecting simple to slightly expanded setae in apicoscrobal positions. Vertex of head with 1–2 pairs of similar erect setae and posterior margin with 2–3 pairs of similar erect setae.

Mesosoma short, 1.7 times the length of the pronotal width. Pronotal humeral setae present, stiff and fine to slightly expanded. Sculpture smooth and shining on dorsum and sides of mesonotum. Anterior pronotal dorsum with a pair of erect setae. Mesonotal and propodeal dorsum with 2–3 pairs similar erect setae present. Sparse, adpressed, minute pilosity on dorsum of mesonotum.

Petiole width at least three times as wide as long. Postpetiole greatly expanded, as wide as pronotum and 2.3–2.5 times as wide as long. Petiolar and postpetiolar disc smooth and shining with 2–3 pairs of erect elongate simple setae.

First gastral tergite with numerous fine basal costulae that extend further than 1/3 the length of the sclerite. Erect setae on gaster present and similar to those on mesonotum as two to four rows in four columns (see taxonomic notes).

**Distribution and ecology.** Known from only two collections from the island of Cuba. The conditions under which the syntype specimens were collected are unknown, but Playa de Marianao has the climate of a typical subtropical dry forest, with a pronounced dry season from November to April (Bulto et al. 2006). The non-type specimens were collected via Winkler sifting in low elevation coastal pine forest on the extreme eastern side of the island. This area of the island has no pronounced dry season and is subject to continuous precipitation throughout the year.

**Taxonomic notes.** Bolton (2000) does not provide morphological measurements for *S. convexiceps* and provides only the MI provided by Santschi (1931) in his original description. We examined images and estimated measurements of a syntype specimen on antweb.org in order to compare it with other members of the *nitens* group and our non-type *S. convexiceps* specimens. We found that the syntype differed from the non-type specimens in the following characters: the syntype lacked apparent anterior erect setae along the scrobal margin, and only bears rows



of erect setae on the anterior and posterior margins of first gastral tergite. Because erect setae are easily abraded and otherwise the holotype matches the non-type workers examined here, we consider non-type and type specimens are representative of *S. convexiceps*.

***Strumigenys hubbewatyorum* sp. nov.**

(Fig. 4)

urn:lsid:zoobank.org:act:91723572-070D-4074-944A-AF8ADA8C5CD3

**Holotype worker:** CUBA: **Guantanamo**, El Yunque Peak, 20.31300 -74.57400 150m, 540m, 31-Jan-2012, collected by F. Cala #RSA2012-018. Winkler extraction of sifted litter, wet rainforest, 1 worker (CASENT0630256) [MCZC, secondary specimen code MCZ-ENT00036130].

**Paratype worker:** CUBA: **Cienfuegos**: Parco Nacional Pico San Juan, near road, 21.98542 -80.14873 50m, 1026m 20m, 19-May-2013, collected by R. S. Anderson #RSA2013-023, Winkler extraction of sifted litter, hardwood forest, 1 worker (CASENT0636117) [CASC].

**Diagnosis.** The head pilosity (2 elongate apicoscrobial setae), larger size (WL > 0.56 mm), and longer femur (> 0.38mm) separates *S. hubbewatyorum* from all other species in the *S. nitens* group. Otherwise the morphology of *S. hubbewatyorum* is allometrically similar to *S. nitens*, the only other species in the *nitens* group with a dental count of five + two intercalary denticles. Pilosity and coloration also separate this species from closely related congeners *S. nitens* and *S. caiman* (see *S. nitens* for diagnostic characters separating them, and also from other members of the *nitens* group).

**Holotype worker measurements.** HL = 0.52; HW = 0.41; HT = 0.33; ML = 0.18; PW = 0.27; SL = 0.27; FL = 0.39; EL = 0.07; TL = 2.36; WL = 0.62; CI = 79; MI = 35; SI = 66.

Paratype worker measurements (n = 1). HL = 0.53; HW = 0.39; HT = 0.32; ML = 0.17; PW = 0.25; SL = 0.25; FL = 0.40; EL = 0.06; TL = 2.21; WL = 0.57; CI = 74; MI = 32; SI = 64.

**Worker description.** Mandibles in full face view and at full closure elongate-triangular and strongly tapering apically; MI 32–35. Distalmost third tooth of the inner mandibular margin and extreme apices of mandibles engage, and a broad subovate gap is present between them through which the broad labral lobes are visible. Inner mandibular margin with two elongate conical teeth whose apices are widely separated in addition to a third elongate-triangular tooth whose apices touch at full closure; the first about one-quarter of the margin length from the base, the second about one-half way along the margin, and the third at three-quarters the way along the margin. Mandibular apex with two teeth arranged vertically: the upper long and spiniform, and the lower elongate-triangular; two large intercalary denticles arise between these apical teeth along the upper margin of the lowermost tooth, these teeth stout-triangular (see figure 4). Lateral corners of clypeus and cephalic dorsum between the frontal carinae may have fine faint longitudinal striolate-punctate sculpture, but dorsum of head and clypeus otherwise smooth and shining. Antennal scapes long: SI 64–66. Lateral margins of the head roughly parallel; posterior margin shallowly concave in full-face view. Dorsum of head with elongate, simple to narrowly expanded setae which curve toward the midline of the head. In profile view, faint punctate sculpture present between the compound eye and the postbuccal impression. Compound eye large: diameter greater than to the maximum width of the antennal scape having 12–15 ommatidia.

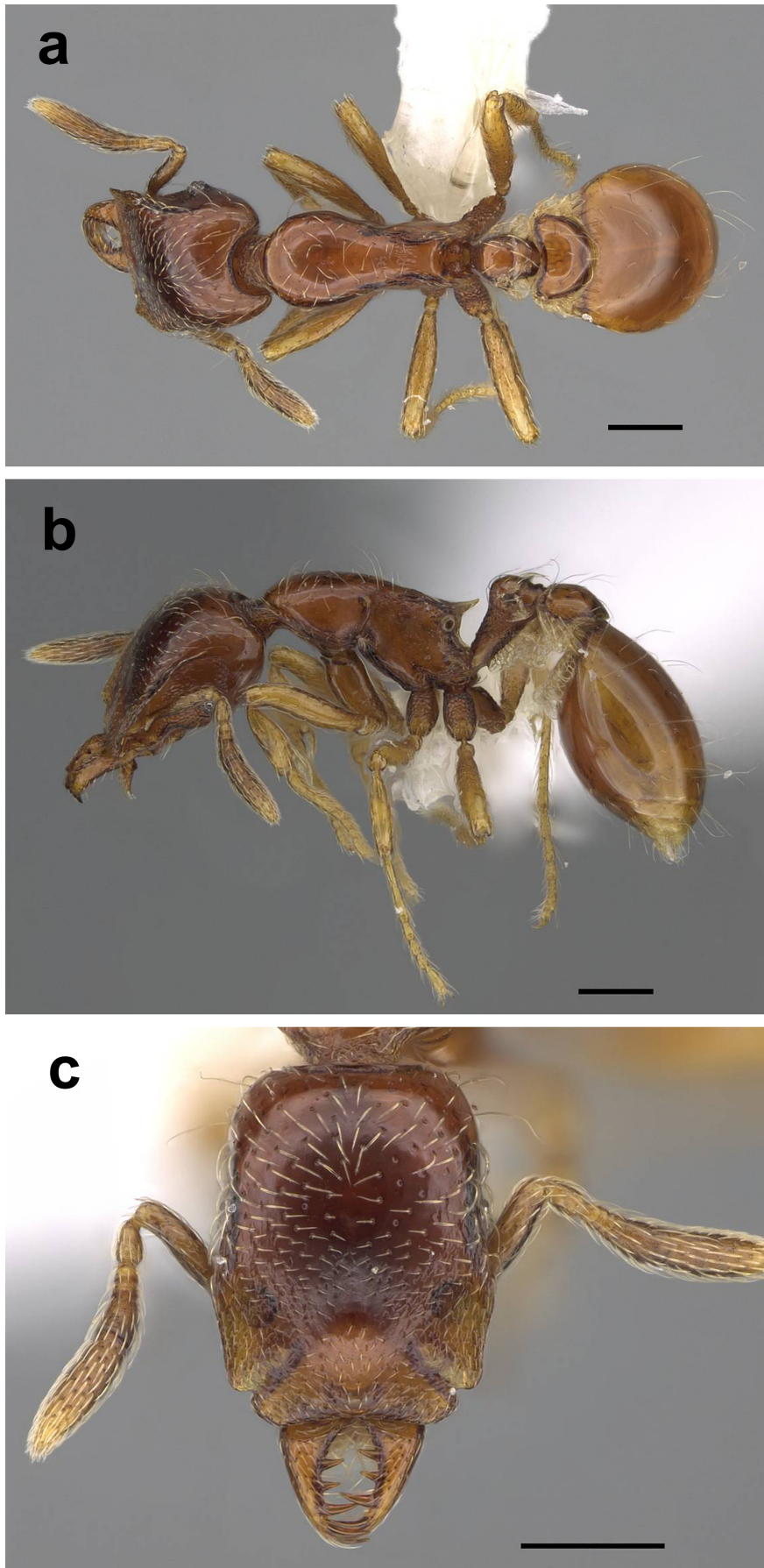
Mesosoma elongate: WL 2.3 times PW. Uniformly smooth and shining, with faint traces of punctate sculpture at the dorsolateral margins and anterior dorsal surface of propodeum. Dorsal surface with elongate, simple to slightly expanded decumbent setae which curve toward the midline of the mesosoma.

Petiolar node narrow, roughly 1/2 as broad as postpetiole in dorsal view. Petiolar peduncle covered in light punctate sculpture, but dorsal surface of petiole and postpetiole smooth and shining. Dorsal surfaces of petiole and postpetiole with elongate, spatulate setae.

Basigastral costulae sparse (six counted in paratype and holotype workers) and present only on the limbus and the extreme base of the first gastral tergite, the remainder of which is smooth and shining. First gastral tergite with numerous long, fine, tapering setae.

Head, mesosoma, gaster, and appendages uniformly dark reddish to piceous-brown.

**Distribution and ecology.** Known from two localities in southeast and central Cuba, both of which were higher elevation (540 and 1026 m) mature wet forest. The holotype worker and paratype were collected from leaf litter extractions.



**FIGURE 4.** Holotype worker of *Strumigenys hubbewatyorum* (CASENT0630256/MCZ-ENT00036130; photographer Michele Esposito: a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.

**Taxonomic notes.** Etymology: This species name is a portmanteau of a couple's names, tropical ecologist Stephen P. Hubbell and behavioral ecologist Patricia Adair Gowaty, who were PhD co-advisors to D. B. Booher. It is in honor of their love of natural history and for their support of taxonomic endeavors outside of Booher's dissertation research.

### *Strumigenys nitens*, Santschi 1932

(Figs. 2b, 5 & 6)

*Strumigenys nitens* Santschi 1932: 413, fig. 2. Neotype worker (here designated): **CUBA: Holguín:** 2km N La Melba, 20 28 N, 74 49 W, 400 m, 22.viii.2001, P. S. Ward#14424-5, sifted litter (leaf mold, rotten wood), rainforest (CASENT0106246) [MCZC, secondary specimen code MCZ-ENT00681484].

*Codiomyrmex nitens* Santschi: Weber 1934: 52. First combination in *Codiomyrmex*.

*Dorisidris nitens* Santschi: Brown 1948: 116. First combination in *Dorisidris*.

*Pyramica nitens* Santschi: Bolton 1999: 1672. First combination in *Pyramica*.

*Strumigenys nitens* Santschi: Baroni Urbani & de Andrade 2007: 125. Combination reinstated.

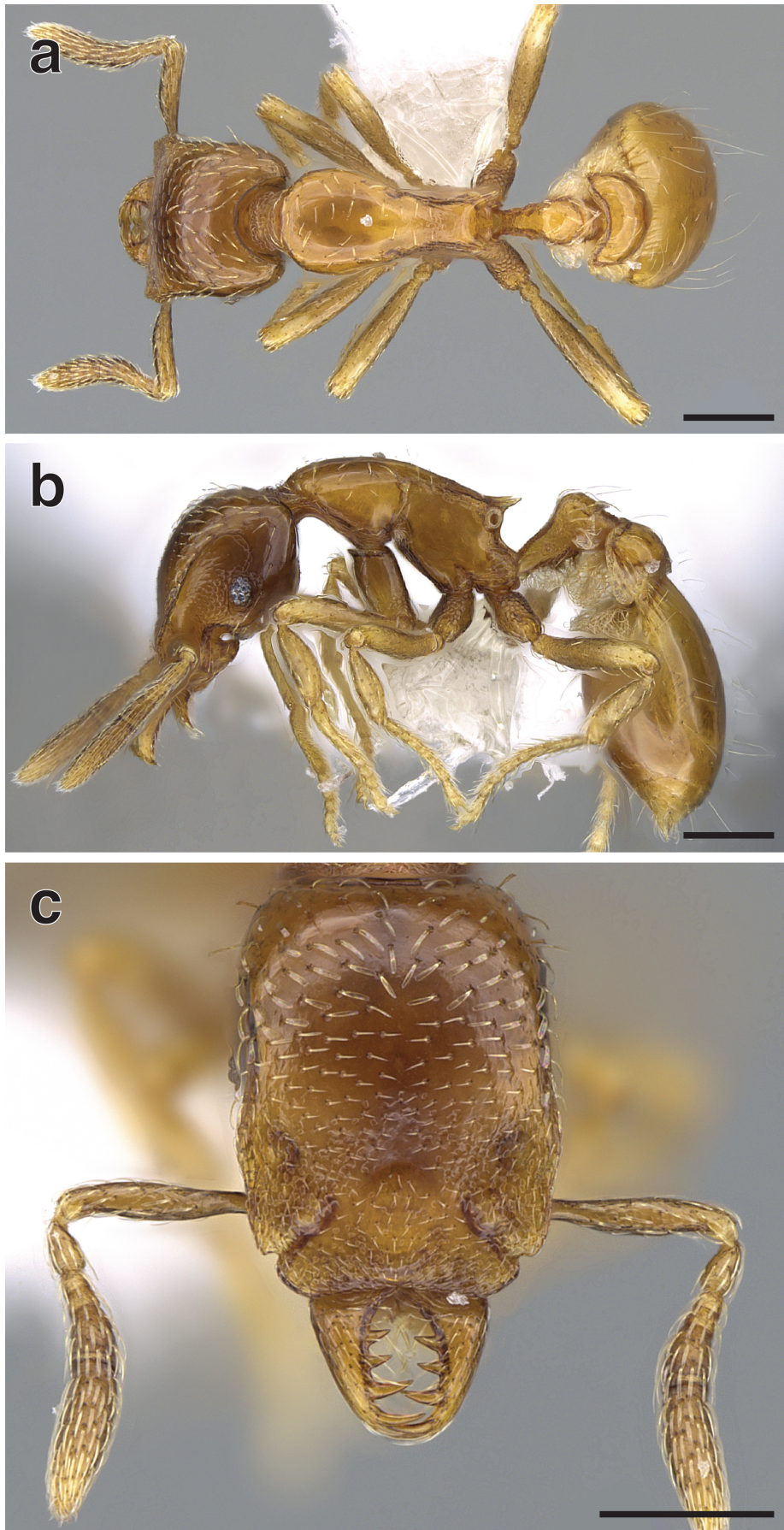
**Non-type material examined. BAHAMAS: North Andros Island:** north of Stafford Creek Bridge, 24.9052 - 77.9394, 11m, 14-Nov-1996, M. Deyrup & L. Davis, rocky roadside area, 1 worker (CASENT0799748) [DBBC]. **CUBA:** Same data as neotype: 2 workers (bottom and middle point) and 1 dealate gyne (top point) on same pin (CASENT0914607) [CASC]; 3 workers (MCZENT00594122) [MCZC]. **Pinar del Rio:** 14km WSW Viñales 22 34 N, 83 50 W, 150 m, 30.viii.2001, P.S. Ward#14473-7, sifted litter (leaf mold, rotten wood), trop. moist forest, 1 worker (CASENT0758246) [PSWC].

**Diagnosis.** *Strumigenys nitens* can be distinguished from other congeners in the *nitens* group, except for *S. hubbewayorum*, by the dental count of five + two intercalary denticles. This species is most closely related to *S. hubbewayorum* but can be distinguished from it by lighter coloration (*S. nitens* is orange to light yellowish brown and *S. hubbewayorum* is dark brown), absence of elongate differentiated setae on vertices of their cephalic margin (two elongate filiform to subflagellate erect and differentiated setae present in *S. hubbewayorum*), short decumbent ground pilosity on mesosoma (shorter than eye width and simple in *S. nitens* and longer than eye width and wavy ground pilosity in *S. hubbewayorum*), smaller size, and shorter femur (WL = 0.51–0.56 HL = 0.47–0.50 FL = 0.27–0.36 vs. *S. hubbewayorum* WL = 0.57–0.62, HL = 0.52–0.53, FL = 0.39–0.42). This species is also closely related to *S. caiman*, but can be distinguished from it by the following additional characters: inner mandibular margin with three teeth; apex of mandibles with two teeth and two intercalary denticles vertically arranged: the uppermost is spiniform, followed by two small intercalary denticles that appear to arise from the margin of the lowermost tooth, which is elongate-triangular (see Fig. 2b); mandibles shorter (MI 31–33 vs. 38–39 in *S. caiman*); antennal scape is longer (SI 61–74 vs. 56–60); mesosoma slightly more elongate (WL 2.3 times PW vs. 2.1–2.2); eye larger, diameter greater than the maximum width of the antennal scape. The following characters separate *S. nitens* from *S. zemi* and *S. convexiceps*: mandibles relatively long (MI 24–29 in *S. zemi* and *S. convexiceps*) petiolar node narrow in dorsal view, about half the width of the postpetiole; mesosoma relatively elongate (WL 1.7–1.8 times PW in *S. zemi* and *S. convexiceps*).

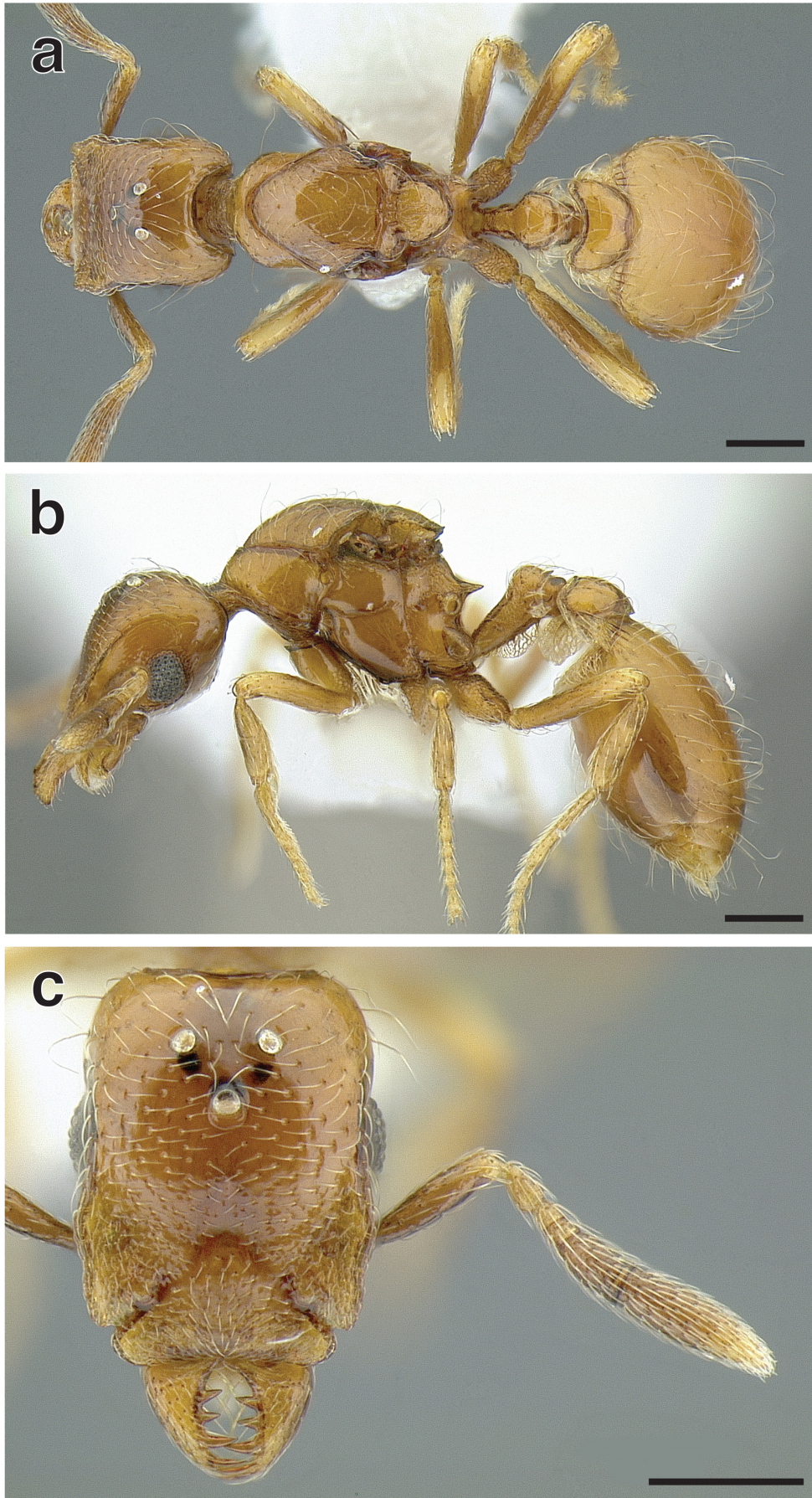
**Neotype worker measurements.** HL = 0.47; HW = 0.36; ML = 0.16; PW = 0.23; SL = 0.23; FL 0.33; HT = 0.30; EL = 0.06; TL = 2.02; WL = 0.52; CI = 77; MI = 33; SI = 62

**Non-type worker measurements (n=6).** HL = 0.43–0.50 (0.48); HW = 0.32–0.38 (0.36); ML = 0.13–0.16 (0.15); PW = 0.22–0.25 (0.23); SL = 0.19–0.24 (0.22); FL = 0.27–0.36 (0.34); HT = 0.28–0.32 (0.3); EL = 0.06–0.07 (0.07); TL = 1.84–2.19 (2.06); WL = 0.44–0.56 (0.53); CI = 74–78 (75); MI = 30–33 (32); SI = 59–68 (61)

**Worker description.** Mandibles in full face view and at full closure elongate-triangular, strongly tapering apically, and longer than the apical antennal segment in full face view; MI 30–33. Distalmost third tooth of the inner mandibular margin and extreme apices of mandibles engage, and a broad subovate gap is present between them through which the broad labral lobes are visible. Inner mandibular margin with two conical teeth whose apices are widely separated in addition to a third elongate-triangular tooth whose apices touch at full closure; the first about one-quarter of the margin length from the base, the second about one-half way along the margin, and the third at three-quarters the way along the margin. Apex of mandibles two teeth arranged vertically, with the upper long and spiniform and the lower elongate-triangular; two intercalary denticles arise between these apical teeth along the



**FIGURE 5.** Worker of *Strumigenys nitens* (CASENT0914607; photographer Zach Lieberman): a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.



**FIGURE 6.** Dealate queen of *Strumigenys nitens* (CASENT0914607): a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.

margin of the apicoventral tooth (see Fig. 2b). Clypeus and upper scrobe margins have fine faint longitudinal striolate-punctate sculpture, traces of which are also present on the cephalic dorsum between the frontal carinae. Antennal scapes long: SI 58–68. Lateral margins of the head roughly parallel and the posterior margin shallowly concave in full-face view. Dorsum of head with elongate, spatulate setae which curve toward the midline. Scrobal margin with a single pair of short slightly expanded setae at apicoscrobal position. Compound eye large: diameter greater than to the maximum width of the antennal scape. In profile view, faint punctate sculpture present between the compound eye and the postbuccal impression.

Mesosoma elongate: WL 2.3 times PW. Uniformly smooth and shining, with faint traces of sculpture around the propodeal spiracle and lamellae. Dorsal surface with elongate, spatulate setae which curve toward the midline.

Petiolar node narrow, roughly 1/2 as broad as postpetiole in dorsal view. Petiolar peduncle covered in light punctate sculpture, but dorsal surface of petiole and postpetiole smooth and shining. Dorsal surfaces of petiole and postpetiole with elongate, spatulate setae.

Basigastral costulae present only on the limbus and the extreme base of the first gastral tergite, the remainder of which is smooth and shining. First gastral tergite with numerous long, fine, tapering setae.

Head, mesosoma, gaster, and appendages uniformly light reddish or yellowish brown.

**Distribution and Ecology.** The lost type of *S. nitens* was collected from Sierra del Rosario, located in present-day Artemisia province, which reaches an elevation of 450 meters. Other specimens have been collected in Pinar del Rio province in Valle Viñales National Park from lowland tropical moist forest, and from lowland tropical rainforest in Holguín province. In both of the latter localities, specimens were collected from leaf litter extracted via the Winkler method. The single specimen collected on North Andros Island is also from a low elevation habitat and generally matches *S. nitens* as described here. It does differ slightly in having a pair of elongate pronotal setae and is smaller than any of the other *S. nitens* we examined. However, without additional material to determine the stability of size and pilosity characters that differ slightly from the Cuban *S. nitens* material, we conservatively identify this specimen as a worker of *S. nitens*.

**Taxonomic notes.** The type of *S. nitens* is missing from its mount at NHMB, so we rely on Santschi's original description of the species as a guide to designate a neotype. Bolton (2000) redescribed *S. nitens* from specimens collected during later expeditions (*S. caiman* in the present study), but his description was at odds with the original description (Santschi 1932), specifically with respect to dental count. Santschi noted that the total dental count was five, with two short teeth along the inner margin of the mandible and three teeth apically (the upper two long, and the lower one shorter). An illustration of the mandibles in full face view and oblique antero-dorsal view accompanied the description (reproduced in Fig. 2a). It appears that the third tooth from the base, or uppermost apical tooth, is shifted toward the base, away from the mandibular apex. This matches the specimens that we describe as *S. nitens*, but not those of *S. caiman*, where the third tooth from the base is shifted forward, in line with the three other apical teeth when in full-face view (see Fig. 2c). Additionally, in *S. nitens*, the diastema between the lower teeth at the mandibular apex is interrupted by two minute intercalary denticles (see Fig. 2b), which may have been overlooked by Santschi (1932).

### *Strumigenys zemi* sp. nov.

(Figs. 7 & 8)

urn:lsid:zoobank.org:act:43F84A3A-F960-4716-8721-B6F3D90EF48F

**Holotype worker: DOMINICAN REPUBLIC: María Trinidad Sánchez:** Loma Guaconejo, 19.29529 -69.94941 60m, 150 m, 23/24 July 2015, Lubertazzi/Prebus, Tr4 S#9, mature secondary broadleaf forest, sifted leaf litter (MCZ-ENT00036126) [MCZC].

**Paratypes: DOMINICAN REPUBLIC: María Trinidad Sánchez:** same data as holotype dealate gyne (MCZ-ENT00595663) [MCZC]; same data as holotype, except Tr4 S#8, 1 worker (MCZ-ENT00681482) [MCZC], 1 worker (DL-Form00003) [MNHN]; Loma Guaconejo, 19.30372 -69.95536 60m, 295m, 22/23 July 2015, Lubertazzi/Prebus, Tr3 S#6, mature secondary broadleaf forest, sifted leaf litter 1 worker (CASENT0758244) [MNHN-SD], 1 worker (CASENT0875769) [UGCA].

**Non-type material. DOMINICAN REPUBLIC: Duarte:** 12.5km NE San Francisco de Macoris, 19.35682 -70.14773 5m, 965m 5m, 25 July 2015, M.M. Prebus#02096, cloud forest, under moss mat on boulder, 1 worker (MCZENT00539558) [MCZC], 1 worker (CASENT0755485) [UCDC].

**Diagnosis.** *Strumigenys zemi* can be distinguished from other *Strumigenys* in the *nitens* group by the dental

count of seven and enlarged occipital lobes, which gives this species a distinctive sub-cordate head shape in full face view. Both of these characters independently separate *S. zemi* from all other members of the *nitens* group. This species can also be distinguished from *S. convexiceps* by the basigastral costulae, which extend only to the very anteriormost part of the first gastral tergite in *S. zemi*, while they extend beyond the basalmost quarter of the tergite in *S. convexiceps*. Additional characters that can be used to separate *S. zemi* from *S. caiman* and *S. nitens* are the comparatively broad petiolar node in dorsal view, which is approximately 2/3 of the width of the postpetiole (roughly 1/2 in *S. caiman* and *S. nitens*), the lack of spatulate setae anywhere on the body, as well as the short mandibles (MI 28–32 vs. 31–39 in *S. caiman* and *S. nitens*), short antennal scapes (SI 46–54 vs. 56–74), and compact mesosoma (WL approximately 1.8 times PW vs. 2.0–2.3).

**Holotype worker measurements.** HL = 0.43; HW = 0.38; ML = 0.13; PW = 0.27; SL = 0.18; TL = 1.83; WL = 0.48; CI = 89; MI = 30; SI = 48

**Paratype worker measurements (n=2).** HL = 0.41–42 (0.42); HW = 0.36–0.36 (0.36); ML = 0.13–0.13 (0.13); PW = 0.25–0.26 (0.26); SL = 0.19–0.20 (0.20); TL = 1.71–1.73 (1.72); WL = 0.44–0.46 (0.45); CI = 87–89 (88); MI = 30–32 (31); SI = 52–54 (53)

**Non-type worker measurements (n=4).** HL = 0.39–0.45 (0.42); HW = 0.33–0.4 (0.37); ML = 0.12–0.13 (0.13); PW = 0.25–0.27 (0.26); SL = 0.18–0.19 (0.18); FL = 0.23–0.23 (0.23); HT = 0.29–0.29 (0.29); EL = 0.04–0.05 (0.05); TL = 1.73–1.83 (1.79); WL = 0.45–0.49 (0.47); CI = 84–90 (87); MI = 28–33 (30); SI = 46–53 (50)

**Worker description.** Mandibles in full face view and at full closure triangular and tapering apically; MI 28–33. Inner mandibular margin with a series three evenly spaced teeth, incrementally increasing in length distally, with the apices of the basal two teeth failing to meet when the mandibles are fully closed. Apices of mandibles with four teeth arranged vertically: the upper two long and spiniform, and the lower two shorter and triangular, giving a total dental count of seven. Antennal scapes short: SI 46–54. Occipital lobes enlarged, with the lateral margins of the head converging anteriorly and the posterior margin broadly concave in full-face view. Clypeus smooth and shining. Cephalic dorsum with a smooth and shining central strip that is flanked by finely punctate-striolate sculpture, which extends from the border of the clypeus and frontal carinae nearly to the apex of the occipital lobes. Dorsum of head with elongate, fine, tapering setae which curve toward the midline. Compound eye small: diameter less than the maximum width of the antennal scape. In profile view, head with dense punctate sculpture that extends from the apex of the antennal scrobe to postbuccal impression, and uniformly covers the ventral surface of the head capsule.

Mesosoma compact: WL approximately 1.8 times PW. Uniformly smooth and shining except for faint punctae around the propodeal spiracle and lamellae. Dorsal surface with sparse elongate, fine, tapering setae which curve toward the midline.

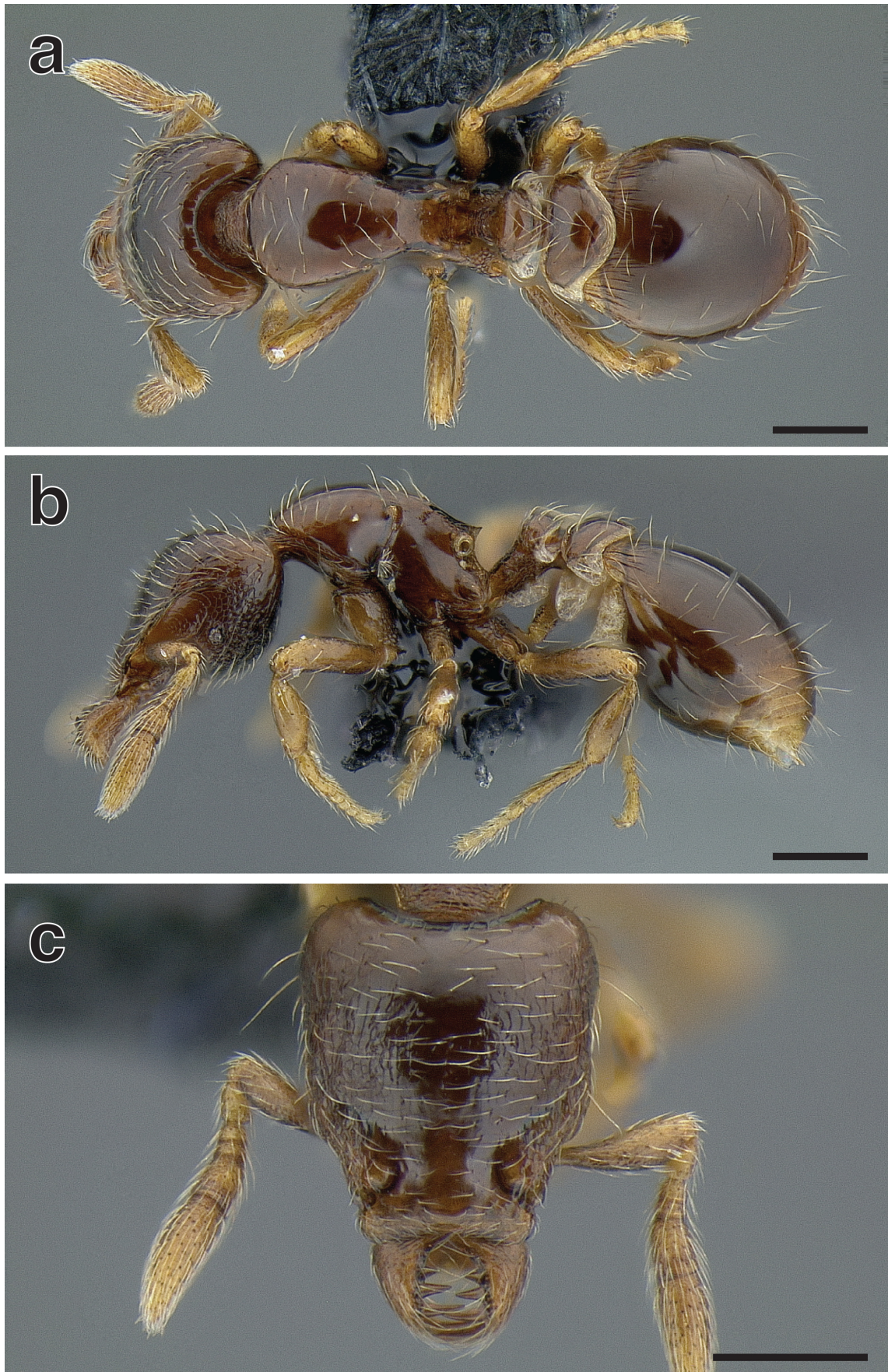
Petiolar node broad, roughly 2/3 as broad as postpetiole in dorsal view. Petiolar peduncle covered in dense reticulate sculpture, but dorsal surface of petiole and postpetiole smooth and shining. Dorsal surfaces of petiole and postpetiole with long, fine, tapering setae which curve toward the midline.

Basigastral costulae present only on the limbus and the extreme base of the first gastral tergite, the remainder of which is smooth and shining. First gastral tergite with numerous long, fine, tapering setae.

Head, mesosoma, and gaster uniformly dark brown. Appendages light brown.

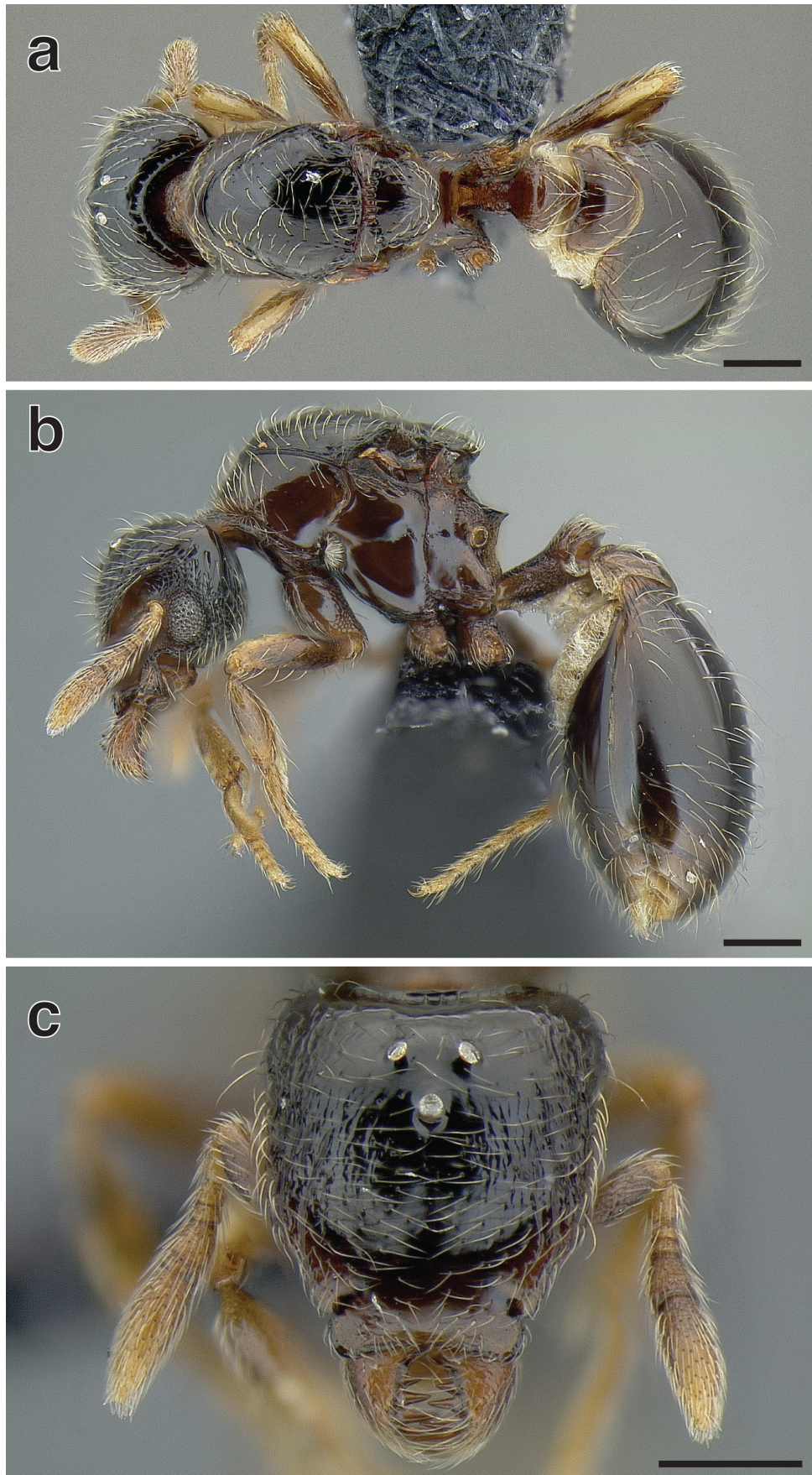
**Distribution and Ecology.** This species is known from two localities in the Dominican Republic, both of which were mature forest located in the Cordillera Septentrional, which is found on and near the northern coast of the Dominican Republic. The type locality is lowland mature secondary broadleaf moist forest in the Toro Palomo sector of the Loma Guaconejo Scientific Reserve, near the village of La Peonía. The holotype worker, a dealate gyne, and several paratype workers were collected at Loma Guaconejo from sifted leaf litter extracted via the Winkler method. These specimens were found in two areas slightly more than a kilometer apart. Two additional workers and brood were collected by hand from mid-elevation broadleaf moist forest, under a moss mat covering a small boulder on the summit of Loma Quita Espuela in Duarte province.

**Taxonomic notes.** Etymology: in the theology of the Caribbean Taíno people who occupied pre-Colombian Hispaniola, zemis were ancestral spirits, typically housed in sculptural objects. By the account of Christopher Columbus's ethnographer, Fray Ramón Pan, sculptural zemis were buried in Taíno manioc gardens to aid soil fertility. Often these were in the shape of an isosceles triangle, somewhat reminiscent of the head of *S. zemi* in full-face view. The name is a noun in apposition.



**FIGURE 7.** Holotype worker of *Strumigenys zemi* (MCZ-ENT00036126): a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.





**FIGURE 8.** Paratype dealate queen of *Strumigenys zemi* (MCZ-ENT00595663): a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.

## Redefinition of the *simulans* species group based on workers, adapted from Bolton (2000)

Basal tooth follows basal lamella without a diastema. Mandibles with 9–10 serially dentate short conical interlocking teeth (in *S. simulans* there may be a small space between teeth when mandibles are closed). Basal lamella of mandibles with its anterior margin and part of its mesial margin visible immediately in front of the anterior clypeal margin in full-face view with mandibles fully closed. Lamella slightly taller than basal tooth.

Clypeus with anterior margin between mandible insertions broadly to narrowly concave, the anterolateral angles rounded and the lateral margins weakly divergent posteriorly. Outer margins of mandibles intersect anterior clypeal margin mesad of the anterolateral clypeal angles. Lateral clypeal margins project laterally far beyond outer margins of mandibles and posteriorly are confluent with the expanded frontal lobes, the outline only interrupted by a minute impression where they meet. Clypeal dorsum with numerous very short fine setae that are either erect or adpressed; lateral margins of clypeus fringed with similar setae.

Frontal lobes and frontal carinae strongly expanded laterally, their dorsolateral margins almost straight, weakly divergent posteriorly and in full-face view continuous with the dorsolateral margins of the occipital lobes.

Preocular carina not visible in full-face view, completely concealed by the expanded frontal lobe and frontal carina.

Ventrolateral margin of head not marginate immediately in front of eye, with a shallowly concave margination at the postbuccal impression; the latter forming a conspicuous notch in profile. Cuticle of side of head within the scrobe smooth in the upper half.

Scape short, SI 61, but quite slender, broadening from base to about the midlength and without a subbasal angle; not dorsoventrally flattened and with a weakly defined leading edge.

Antenna with only 4 segments (funicular segments 3–5 fused but can be seen under high magnification when backlit). Leading edge of scape without projecting setae of any form.

Pronotum not marginate dorsolaterally, the dorsum convex and rounding broadly into the sides.

Propodeum with a pair of triangular teeth that are subtended by a narrow lamella.

Spongiform appendages fully developed, with a ventral curtain and lateral lobes on the petiole, ventral lobes on the postpetiole and a large spongiform pad basally on the first gastral sternite. Lateral lobes of the postpetiole cuticular flanges to cuticular-spongiform flanges.

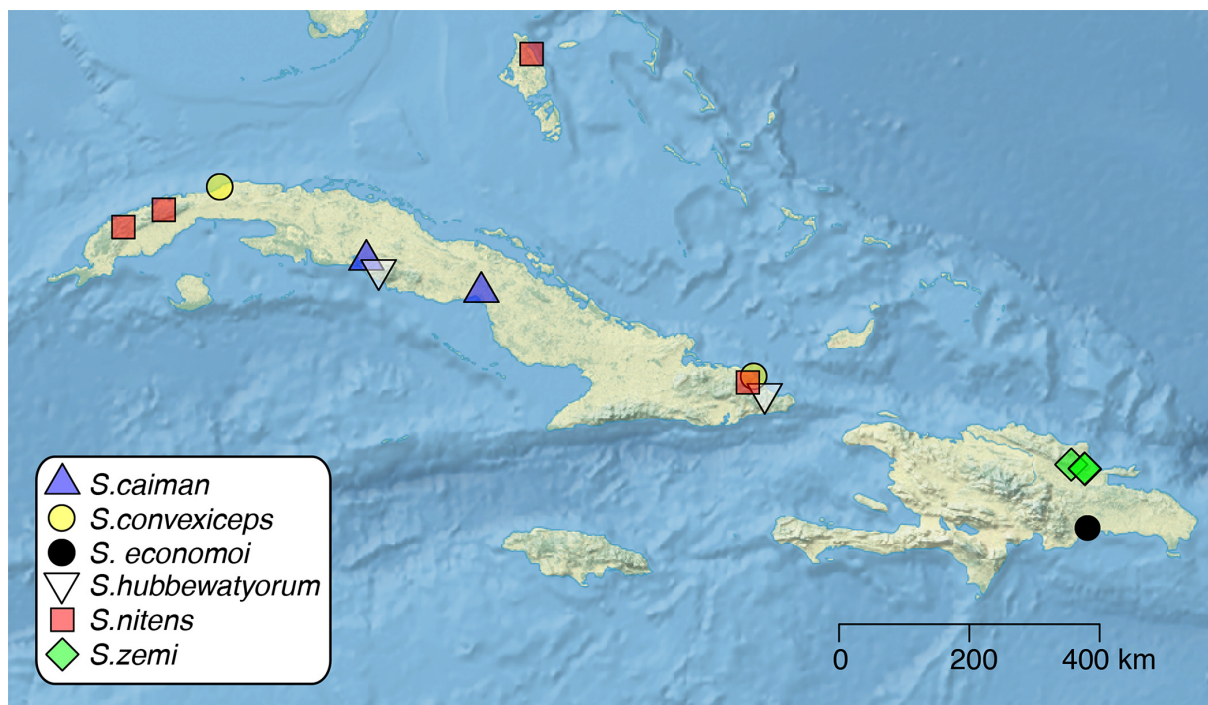


FIGURE 9. Distribution of the species of the *Strumigenys nitens* group and *Strumigenys economoi*.

## Notes on *simulans* group

*Strumigenys economoi* shares a number of key characters (dentition, anterior outline of clypeus, four-segmented antennae, shape of the disc of postpetiole, and spongiform tissue) with *S. simulans*. These features readily accommodate placing *S. economoi* into the *simulans* group. The common characteristics of the group separate these ants from other *Strumigenys* species groups with a similarly expanded clypeus and frontal lobes e.g. *excisa*, *nitens*, and *beebei* groups (Bolton 2000). Bolton's description of the *simulans* group (Bolton 2000) only requires a slight amendment of the group description to incorporate pilosity character differences between *S. simulans* and the new species described here.

## Synopsis of the *Strumigenys simulans*-group

*Strumigenys economoi* sp. nov.

*Strumigenys simulans* (Santschi 1931)

*Strumigenys economoi* sp. nov.

(Fig. 10)

urn:lsid:zoobank.org:act:24571A74-9B2E-47E5-B8A4-5F70C2974430

**Holotype worker:** DOMINICAN REPUBLIC: Distrito Nacional. Jardín Botánico Nacional, Santo Domingo. 18.49361 -69.95397 20m. 45 m elev. July 13, 2017. Navarro ant diversity study. Mature lowland forest. Winkler sample: T41 Q6 (DL-Form00001) [IIBZ].

**Diagnosis.** The two *simulans* group species *S. economoi* and *S. simulans* are the only Antillean species sharing the combined traits of four antennal segments and triangular shaped mandibles having interlocking teeth. *Strumigenys economoi* can be separated from *S. simulans* by pilosity and anterior outline of the clypeus when the head is in full frontal view. *Strumigenys simulans* has short standing curved setae on the dorsum of head and mesosoma, and a pair of elongate differentiated erect setae on the mesonotum, whereas *S. economoi* has only extremely short adpressed pilosity on these regions. The anterior outline of *S. simulans* between mandible insertions is shallowly concave whereas in *S. economoi* the outline is sinuate with anterior and posterior borders similarly shaped.

**Holotype worker measurements.** HL = 0.52; HW = 0.37; ML = 0.07; PW = 0.23; SL = 0.22; FL = 0.28; HT = 0.21; EL = 0.04; TL = 2.22; WL = 0.48; CI = 71.1; MI = 12.8; SI = 60.7.

**Worker description.** Mandibles in full face view and at full closure triangular. Mandibles relatively short; MI 12.8. In profile, base mandibles flat and inclined above dorsal profile of clypeus then abruptly arching ventrally with the apex of mandibles directed ventrally. Basal process of mandibles divided by a deeply incised transverse carina that fits into the dorsal anterior edge of clypeus when shut; the basal half a translucent thin lamella that fits under the anterior clypeal edge and the apical half a heavily sclerotized opaque process; inner margin truncate and flattened across basal (ventral) and apical (dorsal) portions. Basal process followed by ten teeth, three to four teeth along the basal flattened portion that are slightly smaller ( $\leq 0.01$ ) than the 6–7 following teeth along apical arched portion (0.01–0.02). Angle of mandibles opening when basal process of mandibles rests in complementary labral pocket 59.6. Labral lobes truncate with a medial concave impression separating them. Anterior border of lobes with translucent spoon-shaped setae. Head in full face with lateral margins evenly converging from posterior scrobal margin to anterolateral corners of clypeus. Head elongate CI 71.1. Anterior margin curving posteriorly from mandible insertions towards the midline with a small medial concave impression where mandibles meet; the outline of the anterior and posterior borders similarly contoured. Eye smaller than maximum width of antennal scape (EL 0.04, scape thickness 0.06), but obviously larger than greatest length across propodeal spiracle (0.03). In profile ventral margin of head with deeply and broadly incised postbuccal groove with outline of anterior and posterior ventral portions diverging. Scapes relatively short SI 60.7. Exposed disc of postpetiole 1.99 times as broad as long. Mesosoma elongate: WL 2.07 times PW. Mesosoma evenly convex in profile. Propodeal spines developed (0.07) as lamellate triangular appendages that up-curve at their apices in profile. Cuticular flange on declivitous face of propodeum narrows evenly below spine to bulla of metapleural gland. Petiolar node narrow, 0.56 times as broad as postpetiole in dorsal view. Head, mesosoma, and gaster uniformly dark reddish brown. Appendages lighter brown.



**FIGURE 10.** Holotype worker of *Strumigenys economoi* (DL-Form00001): a) dorsal view b) profile view c) full-face view. Scale bars 0.2 mm.

Sculpture. Medial and postero-medial portion of dorsum of head without sculpture and shining. Anterior clypeus and lateral portions of frontal lobes with fine punctate to punctate-striolate sculpture. In profile view, punctate sculpture weak to absent between the compound eye and the postbuccal impression. Dorsum and side of mesosoma mostly without sculpture, when present sculpture is faint superficial punctations and sparse striations. Petiolar peduncle covered in dense punctate sculpture. Dorsal surfaces of petiolar nodes and first gastral tergite evenly covered with extremely faint superficial punctations. Basigastral costulae limited to extremely fine striations on the lateral portions of first gastral tergite.

Pilosity. Dorsum of head with sparse minute simple to adpressed and shallowly expanded spatulate setae. No standing setae anywhere on head, mesosoma, legs, petiole, postpetiole, or gaster. Ground pilosity on these surfaces similar to those on head.

Color dark piceous-brown.

**Distribution and ecology.** This species is only known from the Jardín Botánico Nacional, Santo Domingo. The holotype worker, currently the only specimen of this species, was collected in a mini-Winkler sample of forest litter from the botanical garden's mature lowland forest.

**Taxonomic notes.** Etymology: Named after myrmecologist and biodiversity scientist Dr. Evan Economo in recognition of his work on evolutionary patterns of biomechanically complex trap-jaws in *Strumigenys*.

### Key to the workers of Hispaniolan *Strumigenys*:

With the description of *S. zemi* and *S. economoi*, the Hispaniola ant fauna now consists of eleven species (*S. economoi*, *S. eggersi*, *S. emmae*, *S. gundlachi*, *S. lanuginosa*, *S. louisianae*, *S. membranifera*, *S. nigrescens*, *S. rogeri*, *S. silvestrii*, and *S. zemi*). What is known about the biology and distribution of the non-*nitens* group species from the island is detailed in *The Ants of Hispaniola* (Lubertazzi, 2019). Here we provide a key to the *Strumigenys* of the island.

- 1 Dorsum of pronotum without sculpture . . . . . 2
- Dorsum of pronotum variously sculptured, at least some striations or punctuation . . . . . 4
- 2 Dorsum of head smooth and shining medially and posteriorly; propodeal spines present; darker brown species . . . . . 3
- Dorsum of head heavily punctate over entire surface; propodeum without spines; dull and light orange . . . . . *membranifera*
- 3 Mandibular teeth elongate and spiniform with first two teeth not overlapping or interlocking when shut . . . . . *zemi* **sp. nov.**
- Mandibles with small, conical, serially dentate teeth that interlock when shut . . . . . *economoi* **sp. nov.**
- 4 In full face view mandibles shorter ( $MI \leq 25$ ), with a series of alternating, bluntly rounded, triangular teeth that interlock in closed position; outline of mandibles triangular . . . . . *nigrescens*
- In full face view mandibles longer ( $MI \geq 26$  and usually much longer,  $MI > 50$ ), meeting only at the distal tip, never with a basal series of interlocking teeth in closed position; outline of mandibles not triangular. . . . . 5
- 5 Antenna with 4 segments; in full face view mandibles strongly convex, bow-like, with a single pair of long spiniform teeth, just distal to midpoint of mandible, that are much longer than the maximum width of mandible; mandibles relatively short ( $MI \leq 40$ ). In full frontal view, entire dorsal surface of head and anterior margin of scape with apically expanded, orbicular setae . . . . . *emmae*
- Antenna with 6 segments; In full face view mandibles elongate ( $MI > 50$ ), linear, and not bow-like; without spiniform teeth near midpoint of mandible; setae on head and scape fine to spoon-shaped, but never orbicular . . . . . 6
- 6 Petiole, postpetiole, and gaster with abundant, long, filiform to flagellate setae; absent of shorter laterally expanded clavate setae; dorsal margin of antennal scrobe with two long flagellate setae, one at mid-scrobal position just above the compound eye and another at apicoscrobal position . . . . . *lanuginosa*
- Erect setae, when present on the petiole, postpetiole, or gaster, are short and stiff and/or laterally expanded, never flagellate; erect scrobal setae, when present, are limited to a single pair of clavate to flagellate setae in apicoscrobal position. . . . . 7
- 7 Setae on leading edge of scape all curve away from the base of the scape; petiole with ventral spongiform tissue; mandibles with two preapical teeth arising in the distal third of mandibles and subequal in length to the width of the mandibles at the point at which they arise . . . . . *rogeri*
- Setae on leading edge of scape with one to many setae that curve toward the base of the scape; petiole without ventral spongiform tissue; if more than one preapical tooth or denticle is present, they never approach the width of mandibles where they arise. . . . . 8
- 8 Entire surface of first gastral tergite punctate to reticulopunctate; postpetiole in profile with the ventral spongiform lobe absent or reduced to a minute nonspongiform vestige and without lateral flange of spongiform tissue . . . . . *eggersi*
- Surface of first gastral tergite without punctate sculpture, or if present, punctate sculpture is limited to the anterior margin; postpetiole in profile with ventral and lateral spongiform tissue present. . . . . 9
- 9 Dorsum of head covered with broadly spatulate to spoon-shaped setae; mandibles with a single preapical tooth arising just

- anterior of apical tooth; without denticles ..... *louisianae*
- In full face view, setae present across anterior portion of the head and leading edge of scape are curved and flattened or expanded apically, but are not spatulate or spoon shaped; mandibles with at least two preapical teeth or denticles on the distal halves of mandibles ..... 10
- 10 In full face view, mandibles long with linear to slightly concave outer margin; distal half of mandibles with 4-9 preapical teeth (may be difficult to see); eye larger, usually with 5-6 ommatidia ..... *gundlachi*
- In full face view, mandibles long and noticeably convex along their outer margin; two preapical teeth present, one near the midpoint of mandibles and one positioned just anterior the dorsoapical tooth; eye small usually with 4 or less ommatidia . . . . . *silvestrii*

### Key to the workers of the *Strumigenys nitens* group:

- 1 Basigastral costulae extending beyond the basal quarter of the first gastral tergite; Mandibles in full face view short, MI 23-30; Cuba ..... *convexiceps*
- Basigastral costulae not extending beyond the basal quarter of the first gastral tergite; Mandibles in full face view longer, MI 27-39 ..... 2
- 2 Occipital lobes enlarged: lateral margins of head in full face view converging anteriorly; mandibles more compact, shorter than apical antennal segment, MI 27-32; petiolar node broad, roughly 2/3 times as wide as postpetiole in dorsal view. Hispaniola . . . . . *zemi* **sp. nov.**
- Occipital lobes not enlarged: lateral margins of head in full face view approximately parallel; mandibles elongate, about the length of the apical antennal segment, MI 31-39; petiolar node narrow, about half as wide as postpetiole in dorsal view. Bahamas, Cuba . . . . .
- 3 Mandibles bearing six teeth, four arranged vertically at the apex of the mandible, and two along the inner mandibular margin (Fig. 2c); mandibles longer, MI 38-39; antennal scape shorter, SI 56-60; mesosoma more compact, WL 2.1-2.2x PW; eyes small, maximum compound eye length less than the width of the antennal scape; Cuba ..... *caiman* **sp. nov.**
- Mandibles bearing five teeth, two arranged vertically at the apex of the mandibles with two intercalary denticles between them, and three along the inner mandibular margin (Fig. 2b); mandibles shorter, MI 31-35; antennal scape longer, SI 61-74; mesosoma elongate, WL ~ 2.3x PW; eyes large: maximum compound eye length greater than the width of the antennal scape. Bahamas, Cuba . . . . . 4
- 4 Head with two elongate simple to subflagellate scrobal setae, one at position of eye and one at apicoscrobal position; erect setae on humeral shoulders and mesosoma elongate to subflagellate; ground pilosity of dorsum of mesonotum elongate (larger than length of eye) simple to wavy decumbent setae that are not adpressed, larger species, WL 0.57-0.62mm; dark reddish brown to dark brown in color; Cuba ..... *hubbewatyorum* **sp. nov.**
- Head with one stiff to expanded scrobal seta at apicoscrobal position; erect setae on humeral shoulders and mesosoma stiff, slightly expanded to remiform; ground pilosity on dorsum of mesonotum mostly adpressed expanded setae that are shorter than the length of eye; smaller species, WL 0.44-0.56mm; light yellowish brown to light reddish brown in color. Bahamas, Cuba . . . . . *nitens*

### Discussion

*Strumigenys* does not show a high degree of endemism in the Caribbean. The only endemic species are the two species groups revised here and one additional species, *S. jamaicensis*. *Strumigenys jamaicensis* is endemic to Jamaica and belongs to the widespread Neotropical *gundlachi* group. The discovery of *S. zemi* and *S. economoi* on Hispaniola, and the Bahamian specimen of *S. nitens*, newly show that both of these groups occur beyond Cuba (Figure 9). The *simulans* group is now known from the two largest islands of the region, Cuba and Hispaniola. Interestingly, no *nitens* group species are known from two other large Caribbean islands, Puerto Rico and Jamaica, but this may simply be due to a lack of litter sampling for ants on these islands.

*Strumigenys zemi* is the first species of the *nitens* group to be found in Hispaniola. It is also, along with *S. economoi*, endemic to the island. That there have been only a small number of specimens collected for both species groups suggests these ants are either rare or poorly sampled. In terms of rarity, it is possible this was not true in the past. *Strumigenys zemi* was sampled in numerous Winkler samples within a relatively small area, and two workers were subsequently hand collected further west of the preserve where the types were collected. Both locations are some of the better-preserved natural areas in the Cordillera Septentrional. If this species, and all of the ants in these two species groups, are dependent on fairly well-preserved native habitat it is possible they have now become rare due to the pervasive habitat degradation and land conversion found across the Caribbean. As for sampling intensity, it is clear that most species in the genus *Strumigenys* were, and remain, poorly represented in hand collected samples. The more widespread adoption of litter sampling has been vital in revealing the remarkable diversity of this genus

throughout the world's tropical and subtropical regions. For the two species groups treated in this study, collection records show the majority of specimen are from passively extracted litter collections, i.e., Berlese and Winkler samples. Prior to our 2015 sampling, we are not aware of any Winkler sampling occurring on Hispaniola. Previous ant collectors may have casually searched the litter by hand or utilized a few portable Berlese funnels, but even if searching of the litter was done it was likely limited in its extent. More expansive litter sampling across the larger islands of the Caribbean will help better understand the distribution and abundance of these ants, and potentially reveal additional species.

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