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NEW SPECIES FROM PUERTO RICO
(HYMENOPTERA: FORMICIDAE)

ROY R. SNELLING AND JUAN A. TORRES



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CAMPONOTUS USTUS FOREL AND TWO SIMILAR NEW SPECIES FROM PUERTO RICO (HYMENOPTERA: FORMICIDAE)

ROY R. SNELLING¹ AND JUAN A. TORRES²

ABSTRACT. Although *Camponotus ustus* Forel, originally described from St. Thomas, now a part of the American Virgin Islands, has been long considered common in Puerto Rico, we found that such specimens are misidentified and actually represent two distinct species, both previously undescribed. These are described herein as *C. kaura* and *C. taino*. Based on the types and additional material from Mona Island, we have redescribed *C. ustus*. The following new synonymy is proposed: *C. ustus* = *C. ulysses* Forel = *C. furnissi* Wheeler and Mann = *C. sublautus* Wheeler and Mann = *C. depolitus* Wheeler = *C. larvigerus* Wheeler and Mann = *C. larvigerus maculifrons* Menozzi. One purported Colombian variety, *arhuacus* Forel, is tentatively elevated to species. All three species are illustrated, and a key is provided, in English and Spanish, for the separation of the *Camponotus* of Puerto Rico and the Virgin Islands.

RESUMEN. Aunque *Camponotus ustus* Forel, originalmente descrita de la Isla de St. Thomas, se ha considerado común en Puerto Rico, hemos encontrado que estos especímenes had sido identificados incorrectamente y actualmente representan dos especies diferentes y sin describir. Estas nuevas especies son descritas aquí como *C. kaura* y *C. taino*. Basado en los tipos de *C. ustus* y material adicional de la Isla de Mona, hemos redescrito esta especie; las subespecies de *C. ustus* de La Española (*ulysses* Forel, *furnissi* Wheeler y Mann, *sublautus* Wheeler y Mann, y *depolitus* Wheeler) son tratadas como sinónimos. Una variedad presumiblemente Colombiana, *arhuacus* Forel es tentivamente elevada a especie. Las tres especies son ilustradas y una clave es presentada, en inglés y español, para identificar las especies de *Camponotus* de Puerto Rico y las Isla Virgenes.

INTRODUCTION

Wheeler (1908) recorded specimens from several Puerto Rican localities as *Camponotus ustus*, and subsequent researchers (e.g., Smith 1937) have been content to accept that identification. We examined many of the specimens seen by Wheeler, Smith, and others; it quickly became apparent that we were dealing with a mixed lot that actually consisted of two species. In order to determine which was the true *C. ustus*, described from St. Thomas, Virgin Islands, RRS examined the syntypic series in the Museum d'Histoire Naturelle, Geneva (MHNG). Despite the unusually poor condition of the few specimens available, it became clear that neither of the Puerto species was conspecific with those syntypes. We were further able to determine, after examining type material of similar-appearing taxa described from other Greater Antillean islands, that neither had been previously described from elsewhere and that both appear to be Puerto Rico Bank endemics.

In order that the names might be available for use by other researchers, in advance of our general treatment of the Puerto Rican ants, we here recharacterize *C. ustus* and describe as new the two Puerto Rican species.

SPECIMENS EXAMINED

In addition to the abundant Puerto Rican material deposited in the Los Angeles County Museum of Natural History (LACM), we have studied important syntypic and other specimens in the collections of the Museum of Comparative Zoology (MCZ), the Museum d'Histoire Naturelle, Geneva (MHNG), and the National Museum of Natural History (USNM).

TERMINOLOGY

The morphological terminology used below is consistent with most recent literature on ant systematics (e.g., Bolton 1994). We differ from Bolton in some respects. For example, we consider the ant head to be hypognathous; therefore, the vertex ("occiput" of some authors) is dorsal, rather than "posterior" and the mandibles are ventral, rather than "anterior." It follows, then, that the antennal sockets and frontal lobes are on the front of the head, not on the "dorsum." The following acronyms and special terms are used in the descriptions:

Cephalix Index (CI)—The ratio of head length

1. Entomology Section, Emeritus, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007.

2. Departamento de Biología, Universidad de Puerto Rico, P.O. Box 23360, San Juan, PR 00931-3360, and Instituto Internacional de Dasonomía Tropical, USDA Forest Service, P.O. Box 25000, Río Piedras, PR 00928-2500.

(HL) to head width (HW), as expressed by the formula: $(HL/HW)(100)$.

Clypeal Apex—The lower, free margin of the clypeus.

Eye Length (EL)—The maximum diameter of the eye as measured in lateral view.

Head Length (HL)—The maximum length of the head, from the lower clypeal margin to the summit of the vertex, not including the mandibles.

Head Width (HW)—The maximum width of the head, in frontal view, *exclusive of the compound eyes*.

Interocellar Distance (IOD)—For gynes and males only: the shortest distance between the inner margins of the lateral (or posterior) ocelli.

Lower Head Width (LHW)—In frontal view, the width of the head at the level of the *apparent* mandibular insertions.

Malar Area—With the head in lateral view, that area that lies between the lower end of the compound eye and the base of the mandible.

Metasoma—The segments following the petiole are described as T1, T2, etc. (= tergum 1, tergum 2, etc.).

Minimum Ocular Diameter (MOD)—With the head in lateral view, the least diameter of the eye perpendicular to the eye length.

Ocellar Diameter (OD)—For gynes and males only: the transverse diameter of the anterior (or middle) ocellus with the head in full frontal view.

Ocellovertexal Distance (OVD)—For gynes and males only: with the head in full frontal view, the distance between the upper margins of the lateral (or posterior) ocelli and the dorsal margin of the vertex.

Ocular Index (OI)—The ratio of eye length to head length, as expressed by the formula: $(EL/HL)(100)$.

Oculomandibular Distance (OMD)—With the head in lateral view, the shortest length of the malar area.

Oculomandibular ratio (OMR)—The ratio of eye length to the oculomandibular distance, as expressed by the formula: $(EL/OMD)(100)$.

Scape Index (SI)—The ratio of scape length to head length, as expressed by the formula: $(SL/HL)(100)$.

Scape Length (SL)—The greatest length of the antennal scape, excluding the basal condyle.

Total Length (TL)—The sum of HL + WL = length of metasoma.

Weber's Length (WL)—The diagonal length of the mesosoma, from the anterior margin of the pronotum (exclusive of pronotal neck) to the propodeal valvule.

In the descriptions below, the appropriate measurement or ratio within parentheses is that of the type specimen. The diagnoses are intended to distinguish among the species of *Camponotus* found in Puerto Rico and other islands of the Puerto Rico Bank; they are not diagnostic within the genus as a whole.

Camponotus ustus Forel

Figures 1–6

Camponotus ustus Forel 1879:75; soldier, worker, gyne, male. St. Thomas, B.W.I.; syntypes MHNG, *examined*. Torres and Snelling 1995:94.

Camponotus ustus var. *ulysses* Forel 1907:11; soldier, gyne, male. Lago Assuei, Dominican Republic; syntypes MCZ, MHNG, *examined*. NEW SYNONYMY.

Camponotus larvigerus Wheeler and Mann 1914:52; soldier, worker, gyne. Grande Rivière, Haiti; syntypes MCZ, *examined*. NEW SYNONYMY.

Camponotus larvigerus var. *maculifrons* Menozzi, in Menozzi and Russo 1930:167; major, worker. Pueblo Viejo, Dominican Republic. *Not examined*. NEW SYNONYMY.

Camponotus ustus var. *furmissi* Wheeler and Mann 1914:55; soldier, worker, gyne. Pétionville, Haiti; syntypes MCZ, *examined*. NEW SYNONYMY.

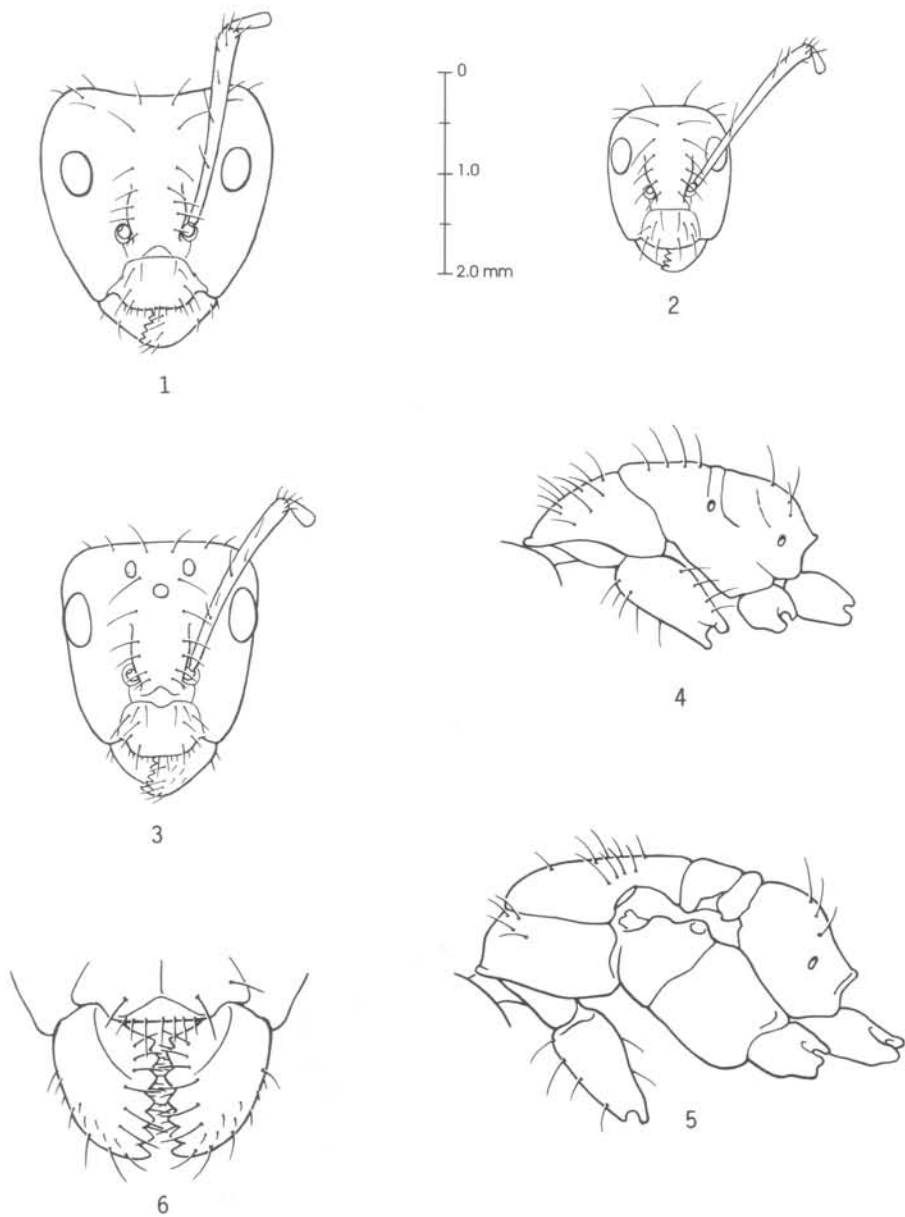
Camponotus ustus var. *sublautus* Wheeler and Mann 1914:55; soldier, worker, male. Diquini, Haiti; syntypes MCZ, *examined*. NEW SYNONYMY.

Camponotus ustus var. *depolitus* Wheeler 1936:205; soldier, worker, male. Sánchez, Dominican Republic; syntypes MCZ, *examined*.

DISCUSSION. The subgeneric placement of *C. ustus* has been uncertain. Forel (1879) originally thought that it might be related to *C. fumidus*, currently placed in *Tanaemyrmex*. Emery (1920), however, removed it to *Pseudocolobopsis*, where it remained until Kempf (1972) returned it to *Tanaemyrmex*. The specimens that Emery had available to him were, however, misidentified individuals of the species described below as *C. kaura*; in the absence of a discussion, it is unclear why Kempf (1972) returned *C. ustus* to *Tanaemyrmex*. While the limits of the various subgenera of New World *Camponotus* are somewhat vague, this species does seem to accord better with the features of *Tanaemyrmex* than with those of *Pseudocolobopsis*.

Features that *C. ustus* shares with *Tanaemyrmex*, but not with *Pseudocolobopsis*, include the following (based on worker caste unless otherwise noted): (1) Head margins of major worker strongly convergent below rather than parallel or subparallel, and differing from both the media and minor workers in which the head margins are usually parallel or nearly so. (2) Head shape of gyne similar to that of media worker rather than that of major worker. (3) Frontal carinae relatively close to one another and far removed from inner eye margins. (4) Clypeal apex relatively thick and with broadly triangular beveled area above margin; margin without median tooth. (5) Mandible with 7, rather than 6, teeth. (6) Media workers present and clearly transitional between majors and minors. (7) Profile of propodeum long and low, without differentiated dorsal and posterior faces.

The two new species described below, on the other hand, differ from *Tanaemyrmex* in each of the



Figures 1-6. *Camponotus ustus*. 1. Major worker, frontal view of head, 2. Minor worker, same. 3. Gyne, same. 4. Major worker, lateral view of mesosoma. 5. Gyne, same. 6. Major workers, mandibles and lower clypeus, enlarged ca. 2 \times , slightly oblique view. Figures 1-5 to same scale.

features listed above and are more like species of *Pseudocolobopsis*. One of these species, *C. kaura*, is somewhat transitional in some features. The head shape of the major worker, while similar to that of the gyne, is not quite typical for *Pseudocolobopsis*, since the margins are a little more convergent below than is usual in that group. The distal portion of the antennal scape is not abruptly broadened, a common feature of *Pseudocolobopsis* species. Poorly defined media workers are present, a subcaste

that is often, but not always, absent in *Pseudocolobopsis*.

In addition to the synonyms listed above, Forel (1902) described *C. ustus* var. *arhuacus* from San Antonio, Colombia. The type, and only known specimen, is a minor worker and is in the Forel collection at the MHNG. This specimen has been examined, and we conclude that it is not conspecific with *C. ustus*. When compared with minors of *C. ustus* in the same size range (HW ca. 1.0 mm) the

head of the var. *arhuacus* type is proportionately broader (CI 81 versus CI ca. 77–78); in profile, the frontal area is abruptly elevated above the base of the clypeus in *C. ustus* but gradually sloping in the var. *arhuacus* type. In the latter, along the side of the head, from the base of the mandible to a point above the lower eye margin, there are conspicuous erect setae. In *C. ustus*, on the other hand, there usually are no such setae, but when present they are limited to one or two situated near the base of the mandible. The type of var. *arhuacus* also has numerous short erect setae on the clypeus in addition to about 6 long erect setae. Six to eight long erect setae are also present in *C. ustus*, but there are no very short setae on the clypeal disc.

In general, the head of the var. *arhuacus* type is much hairier than that of similar-sized individuals of *C. ustus*. Our view at present is that var. *arhuacus* should be considered a separate species, *C. arhuacus* (NEW STATUS), in the subgenus *Tanaemyrmex*. It may ultimately prove to be synonymous with some other Colombian species. In addition, it should be noted that all other known forms assigned to *C. ustus* are limited to the Greater Antilles, far removed from the one known locality for *C. arhuacus*.

Wheeler and Mann (1914) briefly discussed a major worker specimen from Port-au-Prince, Haiti, received from Forel and, perhaps, identified by him as *C. ustus*. This individual was not available to us but is evidently notably hairy and not at all similar either to *C. ustus* syntypes or to other material we have studied. Whatever species this may be, it would seem to be something other than *C. ustus*. In fact, it is possible that this could be the species described below as *C. taino*, although we have seen no specimens of *C. taino* from Hispaniola.

The remaining forms described as varieties of *C. ustus*, all from Hispaniola, are based on trivial differences in color, sculpture, and pilosity. There are, moreover, no consistencies among the material we have been able to examine, with some colony samples including two or more of these varieties. Under the circumstances, any attempt to segregate these seems futile, and all are here reduced to synonymy.

Finally, we have examined syntypes of *C. larvigerus*, described by Wheeler and Mann (1914) from Grand Rivière, Haiti. Although they compared it to the very different *C. ramulorum* Wheeler, no comparison was made to *C. ustus*. We have made that comparison and conclude that the two are conspecific. We have not seen Menozzi's var. *maculifrons*, but the scanty description suggests that this, too, is nothing more than a minor color variant of a species that, like so many *Camponotus*, exhibits considerable variability in color.

In addition to the various syntypes from Hispaniola, we have collected *C. ustus* at a *bona fide* Puerto Rican locality: Mona Island, lying between Hispaniola and Puerto Rico.

The following redescription of the female castes of *C. ustus* is based primarily on our material col-

lected at Mona Island. These specimens have been compared with the type material and, in our opinion, are conspecific. Vouchers are deposited in the BMNH, LACM, MCZC, and MHNG.

DIAGNOSIS. *Female castes.* Head margins (major) distinctly convergent below or (media, minor, gyne) subparallel, without standing setae between mandible and dorsolateral angle; antennal scape with sparse erect setae along shaft; free clypeal margin transverse, thick and with median, broadly triangular beveled area; mandible with seven teeth (sometimes obscurely so). *Male.* See Discussion below.

DESCRIPTION. *Major worker, measurements* (mm) ($n = 30$): HW 1.64–2.26 (2.04); HL 1.95–2.46 (2.14); SL 1.95–2.05 (–); WL 2.6–3.1 (–); TL 7.5–8.7. *Ratios and indices:* CI 105–119 (105); SI 83–103 (–); OI 20–25 (24); OMR 48–60 (56). Note: due to the poor condition of the one major worker in the syntypic series some measurements were not possible, hence the (–).

Head (Fig. 1) slightly longer than wide in frontal view, sides gently curved and strongly convergent below, LHW about $0.68 \times$ HW; vertex concave between distinct dorsolateral lobes. Eyes relatively small and, in frontal view, outer margins short of lateral head margins by more than minimum diameter of scape. Frontal lobes narrow, greatest intercarinal distance about $0.32 \times$ HW; upper intercarinal distance about $0.8 \times$ greatest intercarinal distance. Clypeal midline weakly subangulate for most of its length, terminating below in broadly triangular median beveled area (Fig. 6); free (ventral) margin thick, straight between obtuse lateral angles. Antennal scape moderately broadened distad, apex well beyond summit of dorsolateral lobes; mandible with 7 teeth.

Front of head shiny, surfaces coarsely tessellate, clypeus and lower malar area less shiny, more finely tessellate; entire front of head sparsely and minutely punctate, clypeus with few fine punctures but with coarser setigerous punctures. Mandible about as shiny as clypeus, with obscure minute punctures and scattered coarser setigerous punctures. Posterior surface of head shinier between sparse to scattered minute punctures and coarser piligerous punctures.

Side of head (including malar area) without erect setae; eyes bare; vertex and upper frons with 3–5 erect setae on each side, outermost shortest; frontal lobes with 5 long erect setae along each margin and shorter submedian dorsal pair. Clypeus with usual basal seta pair and 4–6 similar discal hairs; usual fringe of widely spaced long curled setae along free margin; hypostomal area with 2–4 short erect setae. Distal two-thirds of scape shaft with variable number of short erect setae that are shorter than distance between them.

Mesosoma (Fig. 4) robust, dorsum moderately convex in profile, metanotal depression absent; propodeum strongly curved and without definite posterior declivity. Pronotal dorsum about $1.1 \times$ as

wide as long and almost 4× as wide as propodeum at summit of “declivity.” Profemur about 3.5× as long as deep.

Pronotum with 4–6 long erect setae on each side that are weakly inclined forward, longest about 0.9 × MOD; mesonotum with (usually) 3 seta pairs, middle pair longest; summit of propodeal “declivity” with 4 or 5 long setae. Profemur with 1–3 long setae on posterior face and about 6 well-spaced, short setae along ventral margin, longest about 0.20 × depth of femur; meso- and metafemora each with variable number of ventral setae on basal one-fourth to one-third; tibiae without erect or suberect setae; meso- and metatibiae without row of graduated bristles along flexor surface.

Petiole scale thin-cuneate in profile, summit acute; summit, in posterior view, broadly and evenly convex; summit with 3–4 long setae on each side, longest at least subequal to longest pronotal setae.

Gaster moderately shiny, weakly transversely lineolate. T1 with 2 or 3 weakly defined rows of long discal setae in addition to marginal row; longest setae at summit of basal declivity longer than MOD; each following tergum with 1–3 ill-defined transverse rows of long setae.

Color yellowish to brownish or reddish yellow, usually with lower face and frons conspicuously darker; mesosoma with varying degrees of infuscation; terga more or less brown banded.

Media and minor workers, measurements (mm) ($n = 45$): HW 1.07–1.41; HL 1.49–1.80; SL 1.79–1.96; WL 2.3–2.7; TL 6.2–7.7. *Ratios and indices*: CI 127–141; SI 109–122; OI 27–28; OMR 65–71. Generally similar to major workers, but more slender and with more elongate and parallel-sided heads that lack defined dorsolateral lobes (Fig. 2).

Female, measurements (mm) ($n = 6$): HW 1.58–1.86; HL 1.84–2.12; SL 1.68–1.90; WL 3.4–3.8; TL 10.1–10.7. *Ratios and indices*: CI 114–119; SI 87–90; OI 29–32; OMR 83–91.

Head (Fig. 3) margins less convergent below than in major worker, LHW about 0.74 × HW; vertex weakly convex and without defined dorsolateral lobes. Eyes large and extending slightly beyond head margins in frontal view; ocelli small, IOD about 3 × OD; OVD (frontal view) about 2.5 × OD. Scape surpassing vertex margin by about 0.3 × SL. Sculpture and pilosity about as described above for major.

Mesosoma (Fig. 5) normal-shaped for alate female. Propodeum with short dorsal face, broadly rounded into declivity and with several (4–6) long setae slightly above middle of declivity. Legs as described above.

Petiole and gaster about as described above.

Male: see Discussion below.

DISCUSSION. Males of the 3 species treated here are similar: all are yellowish to brownish yellow, often with limited darker brownish areas on the head and mesosoma. They are similar in size, about 4.5–5.5 mm long. The smallest of the 3 species is *C. taino*, in which males are seldom over 4.6

mm long, but some individuals up to 4.9 mm long have been seen; HW usually falls between 0.69–0.73 mm and occasionally reaches 0.76 mm. Males of the 2 remaining species, *C. kaura* and *C. ustus*, are usually about 5.4–5.6 mm long, but with some individuals above and below that range. In *C. ustus*, HW ranges between 0.88 and 0.95 mm; too few are available for a trend to be clear, but HW is usually over 0.90 mm. Males of *C. kaura* are a little smaller, with a HW ranging between 0.78 and 0.91 mm, and in over 90% of the 54 males measured it exceeded 0.80 mm, with over 70% falling between 0.82 and 0.91 mm.

The ocelli of *C. kaura* males are generally larger, and the IOD ranges between 1.5–2.5 × OD; in most examples, it is 2.2 or less. In both *C. ustus* and *C. taino*, the ocelli are smaller, and the IOD is 2.3–2.6 × OD, usually about 2.5 × OD.

Pilosity of the antennal scape is consistently different between the 3 species. In *C. kaura*, it consists exclusively of fine, fully appressed pubescence, except for several long, suberect distal setae. The scapal pubescence of *C. taino*, in contrast, is abundant, coarse, and subdecumbent to suberect; the setae are quite short, less than 0.025 mm long. *Camponotus ustus* is also provided with an abundance of similar short setae, but in addition there are scattered fine suberect setae that are about 0.08 mm long.

The metatibiae reflect similar differences: setae are fine and fully appressed in *C. kaura*, relatively coarse and subdecumbent to suberect and uniformly short in *C. taino*, and, finally, similar to *C. taino*, but with additional scattered longer setae in *C. ustus*.

Camponotus kaura

Snelling and Torres, new species

Figures 7–12

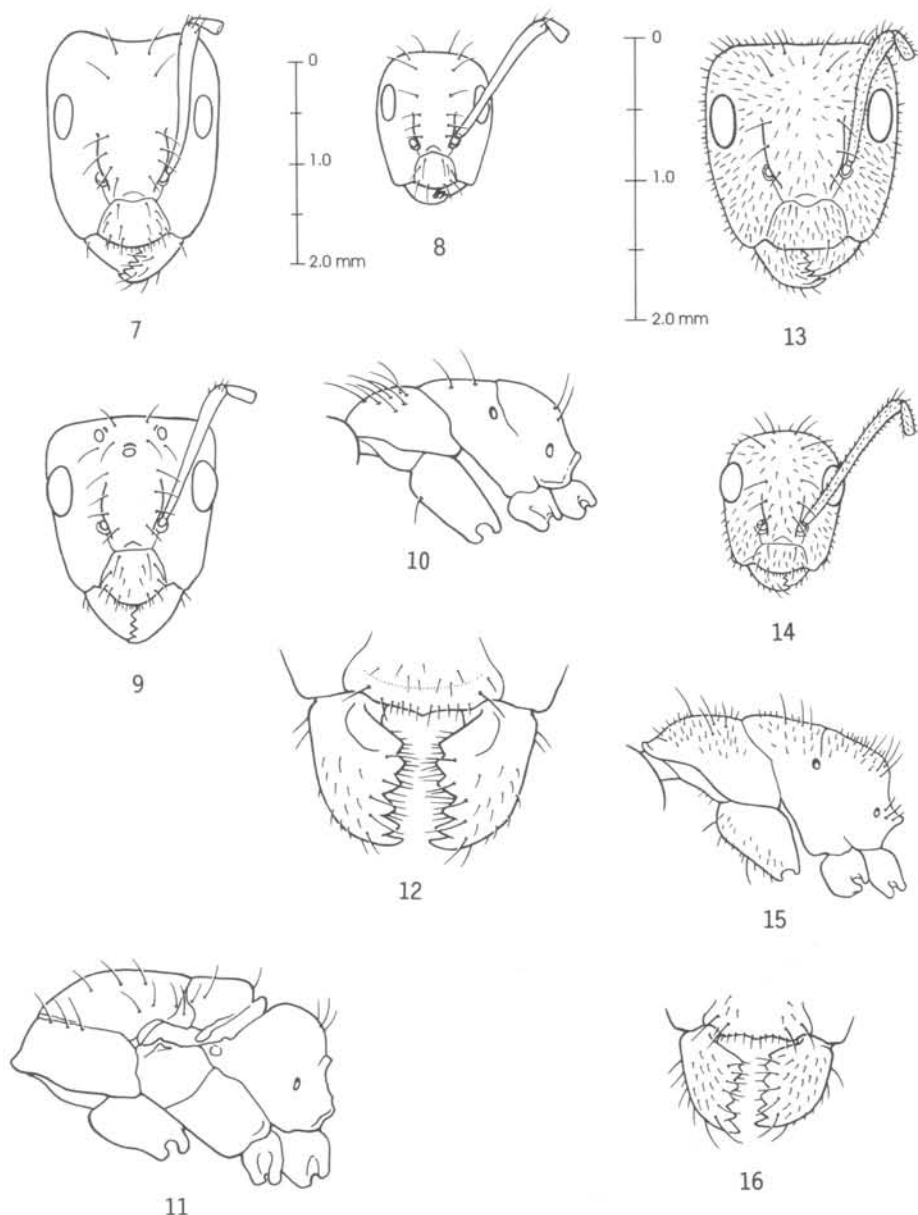
Camponotus ustus: Wheeler, 1908:156. M. Smith, 1937:871–872. In part, misidentification.

Camponotus (Pseudocolobopsis) ustus: Wheeler and Wheeler, 1974:61. Misidentification.

DIAGNOSIS. *Female castes.* Head margins, in frontal view, subparallel and without standing setae between mandible base and dorsolateral angle; antennal scape without standing setae along shaft; free clypeal margin transverse, thin, and without median beveled area above margin; mandible with 6 teeth. *Male*: See Discussion under *C. ustus*.

DESCRIPTION. *Major worker, measurements* (mm) ($n = 53$): HW 1.88–2.16 (2.16); HL 2.10–2.48 (2.44); SL 1.45–1.66 (1.66); WL 2.5–2.9 (2.9); TL 7.5–10.5 (10.5). *Ratios and indices*: CI 105–123 (113); SI 67–72 (68); OI 20–22 (20); OMR 45–50 (50).

Head (Fig. 7) longer than wide in frontal view, sides straight or nearly so, weakly converging below, HW about 0.8 × UHW; dorsolateral lobes distinct and margin between them deeply concave. Eyes large and flat, their outer margins failing to attain lateral head margins by less than minimum



Figures 7–12. *Camponotus kaura*. 7. Major worker, frontal view of head. 8. Minor worker, same. 9. Gyne, same. 10. Major worker, lateral view of mesosoma. 11. Gyne, same. 12. Major worker, mandibles and lower clypeus, enlarged ca. $2\times$, slightly oblique view. Figures 13–16. *C. taino*. 13. Major worker, frontal view of head. 14. Minor worker, same. 15. Major worker, lateral view of mesosoma. 16. Major worker, mandibles and lower clypeus, enlarged ca. $1.2\times$, slightly oblique view. Figures 7–11 to same scale; Figures 13–15 to same scale.

diameter of antennal scape. Frontal lobes broad, greatest intercarinal distance about $0.4 \times HW$; upper intercarinal distance about $0.9 \times$ greatest intercarinal distance. Clypeal midline subangular for most of its length; disc slightly depressed on either side above lower margin; free margin shallowly concave and with blunt median tooth (Fig. 12); in profile, evenly sloping to ventral margin.

Antennal scape distinctly widened distad, extending to, or nearly to, level of dorsolateral lobe. Mandible with 6 teeth.

Front of head slightly to moderately shiny, surfaces finely tessellate; entire front of head sparsely and minutely punctate, clypeus least obviously punctate; mandibles moderately shiny between sparse fine punctures that become finer, closer, and

more elongate basad and along lower margin; short costae present distad at base of dentate margin. Posterior surface of head shinier, with sparse to scattered minute punctures and coarser, piligerous punctures.

Side of head (including malar area) in frontal view without erect setae; eyes bare; vertex and upper frons with several long setae on each side, outermost longest; frontal lobes with 3 long erect setae widely spaced along carinae. Clypeus with usual basal seta pair and 2 or 3 similar setae along each lateral margin; 4–8 short, erect submedian setae present; 4–6 long, slightly curled, flattened bristles present along ventral margin, extending over closed mandibles. Scape shaft without erect setae. Hypostomal area with 0–4 short erect setae.

Mesosoma (Fig. 10) robust, dorsum moderately convex in profile, metanotal depression weak; posterior declivity weakly concave. Pronotal dorsum about $1.2\times$ as wide as long and about $2.2\times$ as wide as propodeum at summit of declivity. Profemur about $3\times$ as long as deep.

Pronotum with about 10 long suberect to erect setae; longest about $0.4\times$ minimum eye diameter (MOD); mesonotum with (usually) 4 similar setae; summit of propodeal declivity with 1 pair of long, erect setae. Profemur with 2 or 3 widely spaced erect setae along ventral margin, longest no more than $0.5\times$ depth of femur; meso- and metafemora without erect setae along either dorsal or ventral margins; all femora with several setae at their apices; all tibiae without erect or suberect setae, but each with several bristles at apex; meso- and metatibiae without row of graduated bristles on flexor surfaces.

Petiole scale thin-cuneate in profile, summit narrowly rounded; summit, in posterior view, varying from weakly concave across middle one-half to weakly convex; summit with 2 or 3 erect setae on each side, longest subequal to longest pronotal setae.

Gaster moderately shiny, weakly transversely lineolate. T1 with 2 long submedian suberect setae at summit and usual marginal row; following segments with transverse median band of wide spaced erect setae in addition to marginal row, setae progressively longer on succeeding segments; appressed pubescence of terga widely scattered and extremely short (<0.03 mm long).

Color basically yellow; areas of varying extent on the head may be darker reddish or even brownish; similarly, metasomal terga may be weakly brown-banded.

Media workers, measurements (mm) ($n = 6$): HW 1.29–1.70; HL 1.38–1.84; SL 1.17–1.35; WL 1.8–2.2; TL 5.8–6.7. *Ratios and indices*: CI 101–108; SI 74–89; OI 23–31; OMR 54–72.

Generally similar to major workers but head more quadrate and without pronounced dorsolateral lobes.

Minor workers, measurements (mm) ($n = 45$): HW 0.85–1.27; HL 1.09–1.56; SL 1.19–1.62; WL

1.6–2.4; TL 4.6–6.6. *Ratios and indices*: CI 117–138; SI 104–113; OI 27–33; OMR 62–90.

Distinctly more slender bodied and with more elongate and parallel-sided heads, vertex evenly convex in frontal view (Fig. 8); antennal scape clearly longer than head; free clypeal margin broadly convex.

Gyne, measurements (mm) ($n = 11$): HW 1.56–1.71; HL 1.78–1.94; SL 1.37–1.49; WL 3.0–3.4; TL 8.8–9.7. *Ratios and indices*: CI 111–117; SI 73–78; OI 28–33; OMR 79–97.

Head (Fig. 9) in frontal view less convergent below than in major worker, LHW about $0.75\times$ HW; vertex nearly straight across middle. Eyes large and extending slightly beyond head margins; EL about $0.8\times$ OMD; ocelli small, IOD about $4\times$ OD; OVD about $3\times$ OD (frontal view). Scape surpassing vertex by about $0.17\times$ SL. Sculpture and pilosity about as described above for major.

Mesosoma (Fig. 11) normally shaped for alate female. Dorsal face of propodeum only slightly shorter than declivitous face, abruptly rounded onto it and with 4–6 long setae near summit of declivity. Legs as described above.

Petiole and gaster about as described above.

TYPE MATERIAL. Holotype major worker, PUERTO RICO: Caño Gorda, 0–20 m, vic. Guánica, 26 Oct. 1991 (Snelling, Torres, and Canals, RRS #91-14), ex dead wood of black mangrove (*Avicennia germinans*), deposited in LACM. Paratypes: numerous workers, gynes, and males, same data, RRS #'s 91-14 to 91-17; workers, same data except from dead wood of *Coccoloba* (RRS #91-18); paratypes in BMNH, LACM, MCZ, USNM.

ETYMOLOGY. The specific name is a Taino (Arawak) word for a forest dweller; it is to be treated as a noun in apposition.

DISCUSSION. In addition to the above paratype material from Puerto Rico, we have seen specimens of all castes from nearly 50 additional sites in Puerto Rico, as well as samples collected by RRS on Tortola and Guana Island, British Virgin Islands.

As noted above in the Discussion under *C. ustus*, we believe that this species is probably a member of the subgenus *Pseudocolobopsis* as that taxon is currently defined.

The material available is generally quite uniform in its features, the most obvious variation being in color. While the color is basically yellow or brownish yellow, the amount and intensity of infuscation of the head of the majors is quite variable. In some individuals, the lower two-thirds of the head may be blackish, but more usually the lower portions of the head are distinctly brown and the remainder is somewhat reddish.

One major worker, from the type nest sample, is unusual in that the head, the longest of any measured, is disproportionately slender for the major subcaste, with a CI of 123. This is the only major examined in which the CI exceeds 113.

This is by far the more common of the two species previously misidentified by Wheeler (1908) and

all subsequent authors as *C. ustus*. It is readily separated from *C. taino* by the smooth malar area and lateral margins of the head, since both are devoid of erect setae. This species is separable from true *C. ustus* by the differences in head shape and clypeal structure as noted in the key and figures. In Puerto Rico, *C. ustus* is presently known only from Mona Island.

Camponotus taino
Snelling and Torres, new species

Figures 13–16

Camponotus ustus: Wheeler, 1908:156. M. Smith, 1937:871–872. In part, misidentification.

DIAGNOSIS. *Female castes.* Head margins in frontal view subparallel and provided with numerous short erect setae; free clypeal margin concave and with small median process, thin and without triangular beveled area above margin; antennal scape with numerous fully erect short and long setae; mandible with 6 teeth. *Male.* See Discussion under *C. ustus*.

DESCRIPTION. *Major worker, measurements* (mm) ($n = 25$): HW 1.23–1.54 (1.35); HL 1.39–1.68 (1.49); SL 0.97–1.09 (1.01); WL 1.8–2.3 (2.0); TL 5.8–6.8 (6.3). *Ratios and indices:* CI 109–113 (110); SI 63–70 (68); OI 24–27 (26); OMR 54–66 (57).

Head (Fig. 13) longer than wide in frontal view, sides straight or nearly so, weakly converging below, LHW about $0.8 \times$ HW; dorsolateral lobes weak and margin between them weakly concave or flat. Eyes large and flat, outer margins failing to attain head margins by less than minimum scape diameter. Frontal lobes broad, greatest intercarinal distance almost $0.5 \times$ HW; upper intercarinal distance subequal to intercarinal distance. Clypeal midline weakly obtuse; free margin thin and shallowly concave between rounded lateral angles and with small median tooth (Fig. 16). Antennal scape surpassing vertex margin by about its apical width or slightly less. Mandible with 6 teeth.

Front of head slightly to moderately shiny, surfaces finely tessellate; entire front and sides of head with sparse fine setigerous punctures that become closer in malar area adjacent to clypeus; clypeal punctures finer and less distinct. Mandible shiny between fine sparse setigerous punctures. Posterior surface of head shinier, punctures coarser than on malar area.

All surfaces of head with numerous short erect setae and sparser, variably longer setae; usual long setae of margins of frontal lobes and vertex present but inconspicuous; mandible with many short erect setae; scape shaft with numerous very short setae, mostly on frontal and dorsal surfaces; eyes with sparse very short setae.

Mesosoma (Fig. 15): Profile of pronotum and mesonotum nearly flat; propodeum broadly rounded onto distinct declivitous face that is usually slightly concave; metanotal depression absent.

Pronotal dorsum about $1.3 \times$ as wide as long and about $3.5 \times$ as wide as propodeum at summit of declivity. Profemur about $2.3 \times$ as long as deep.

Dorsum of mesosoma with numerous very short to short erect setae; pronotum with 8–10 longer erect setae that are only weakly inclined cephalad, longest about $0.6 \times$ MOD; mesonotum with 2 similar longer setae; propodeum, at summit of declivity, with 6–8 longer setae, longest subequal to MOD. Profemur with sparse short and longer setae along outer face and 6–8 longer well-spaced setae along ventral margin; meso- and metafemora and tibiae with sparse suberect, very short setae, femora with scattered longer setae; meso- and metatibiae with row of bristles along flexor surface.

Petiole scale thin-cuneate in profile, summit acute; summit, in posterior view, straight or weakly convex and with 3 or 4 long setae on either side, longest distinctly longer than longest pronotal setae.

Gaster shiny, finely transversely lineolate. T1 with transverse band of 4–8 long setae at summit of declivity, submedian pair longest; disc with transverse band of shorter, widely spaced setae at midlength in addition to usual marginal band; T2–T4 with subbasal bands; all terga with sparse short erect setae.

Color about as described above for *C. kaura*, but head commonly largely brownish.

Minor workers, measurements (mm) ($n = 45$): HW 0.77–1.05; HL 0.95–1.19; SL 1.07–1.21; WL 1.4–1.7; TL 4.2–5.4. *Ratios and indices:* CI 11–129; SI 100–111; OI 32–34; OMR 76–89. No workers comparable to the *media workers* of *C. kaura* have been seen. The minor workers are similar to the major, but are more slender, with proportionately longer antennal scapes; vertex evenly convex in frontal view, shortest setae proportionately shorter and less abundant (Fig. 14).

Gyne, measurements (mm) ($n = 10$): HW 1.23–1.37; HL 1.41–1.57; SL 1.10–1.11; WL 2.4–2.8; TL 6.8–8.1. *Ratios and indices:* CI 113–115; SI 71–79; OI 33–47; OMR 96–104.

Head about as in major worker, but eyes larger, extending slightly beyond head margins in frontal view; EL about $0.8 \times$ OMD; ocelli small, IOD about $3 \times$ OD, OVD about $2.5 \times$ OD. Scape surpassing vertex margin by about its apical width.

Mesosoma about as in *C. kaura* but dorsum additionally with numerous very short setae.

Petiole and *gaster* about as described for major.

Male: see Discussion under *C. kaura*.

TYPE MATERIAL. Holotype major worker, PUERTO RICO: El Verde Field Station (Río Grande), 200 m, 25 July 1989 (Snelling & Torres, RRS #89-28b), ex dead branch in tree, “Tabonuco” rain-forest, in LACM. Paratypes: numerous workers with same data, as well as additional workers collected at same locality, 19 Feb. 1988 (T. Gush, #TG-1050), in BMNH, LACM, MCZ, USNM.

ETYMOLOGY. This species is dedicated to the Taino Arawak people, the original inhabitants of

Puerto Rico and adjacent islands at the time of the European arrival in the Western Hemisphere; the name is a masculine noun in apposition.

DISCUSSION. As noted above, in the discussion under *C. ustus*, the evidence supports placement of this species in the subgenus *Pseudocolobopsis* as that taxon is currently defined.

As far as is currently known, *C. taino* is limited to Puerto Rico. In addition to the type material, we have seen specimens from a dozen additional Puerto Rican localities. This species appears to be the less common of the two Puerto Rican ants previously misidentified as *C. ustus* by Wheeler (1908) and all subsequent authors. The presence of numerous short, erect setae on the malar area and along the sides of the head will permit easy recognition of *C. taino*.

KEYS

Workers of the 3 species of *Camponotus* treated here may be separated by means of the following key, given in both English and Spanish language versions. This key is for the species of *Camponotus* known to occur in Puerto Rico and the Virgin Islands and does not include several similar-appearing yellowish species on Hispaniola, Cuba, and Jamaica.

CAMPONOTUS OF PUERTO RICO AND VIRGIN ISLANDS

1. Mesosoma, in profile, not deeply depressed at rear of mesonotum (Figs. 4, 10); color largely yellowish and gaster without pale spots 2
- Mesosoma, in profile, deeply depressed at rear of mesonotum; head reddish, body reddish to blackish and gastral terga with sublateral pale spots *C. sexguttatus* (Fabricius)
- 2(1). Workers dimorphic and head of female similar to that of major; in frontal view, head of major with sides nearly parallel (Figs. 7, 13); apical margin of clypeus thin and depressed (Figs. 12, 16) 3
- Workers polymorphic and head of female similar to that of worker media; in frontal view, head of major distinctly narrowed below (Fig. 1); apical margin of clypeus thick and with triangular median beveled area (Fig. 6) *C. ustus* Forel
- 3(2). In frontal view, numerous short, erect setae present along side of head from mandible base to dorsolateral angles of vertex (Fig. 13); eyes with very short, sparse erect setae *C. taino*, n. sp.
- Side of head without erect setae (1 or 2 may be present near base of mandible) (Fig. 7); eyes without erect setae *C. kaura*, n. sp.

CAMPONOTUS DE PUERTO RICO Y LAS ISLAS VIRGENES

1. Mesosoma, en perfil, no profundamente rebajado en la parte de atrás del mesonoto (Figs. 4, 10); color generalmente amarillento y el gáster sin manchas pálidas 2
- Mesosoma, en perfil, profundamente rebajado en la parte de atrás del mesonoto; cabeza rojiza, cuerpo de rojizo a negruzco y las tergas gastrales tienen manchas pálidas sublaterales *C. sexguttatus*
- 2(1). Obreras dimórficas y la cabeza de la hembra similar a la de los mayores; visto frontalmente la cabeza de los mayores con los lados casi paralelos (Figs. 7, 13); margen apical del cípeo delgado y rebajado (Figs. 12, 16) 3
- Obreras polimórficas y la cabeza de la hembra similar a la de las obreras medianas; visto frontalmente la cabeza de los mayores distintamente estrecha abajo (Fig. 1); margen apical del cípeo grueso y con un área triangular angulada en la región medial (Fig. 6). *C. ustus*
- 3(2). En vista frontal, pequeños y numerosos pelos erectos presentes a la largo de la cabeza desde la base de las mandíbulas a los ángulos dorsolaterales del vértex (Fig. 13); ojos con pelos erectos muy cortos y esparcidos *C. taino*
- Lados de la cabeza sin pelos erectos (uno a dos pueden estar presentes cerca de la base de la mandíbula) (Fig. 7); ojos sin pelos erectos *C. kaura*

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LITERATURE CITED

Bolton, B. 1994. *Identification guide to the ant genera of the World*. Cambridge, Mass.: Harvard University Press, 222 pp.

Emery, C. 1920. Le genre *Camponotus* Mayr. Nouvel essai de sa subdivision en sous-genres. *Revue Zoologique Africaine* 8:229-260.

Forel, A. 1879. Etudes myrmécologiques en 1879. *Bulletin*

- de la Société Vaudois des Sciences Natureles 16:53–128.
- . 1902. Quatre notices myrmécologiques. *Annales de la Société Entomologique de Belgique* 46:170–182.
- . 1907. Formiciden aus dem Naturhistorischen Museum in Hamburg. *Mitteilungen der Naturhistorischen Museum Hamburg* 24:1–20.
- Kempf, W.W. 1972. Catálogo abreviado das formigas de Regiao Neotropical. *Studia Entomologica* (N.S.) 15: 3–344.
- Menzio, C., and G. Russo. 1930. Contributo all conoscenza della mirmecofauna della Repubblica Dominicana (Antille). *Bollettino del Laboratorio di Zoologia Generale e Agraria della Reale Scuola Superiore d'Agricoltura*. Portici. 24:148–173.
- Smith, M.R. 1937. The ants of Puerto Rico. *Journal of Agriculture of the University of Puerto Rico* 20:819–875.
- Torres, J.A., and R.R. Snelling. 1995 (1992). Los Himenópteros de Isla de Mona. *Acta Científica* 6:87–102.
- Wheeler, G.C., and J. Wheeler. 1974. Ant larvae of the subfamily Formicinae: Third supplement. *Journal of the Georgia Entomological Society* 9:59–64.
- Wheeler, W.M. 1908. The ants of Porto Rico and the Virgin Islands. *Bulletin of the American Museum of Natural History* 24:117–158.
- . 1936. Ants from Hispaniola and Mona Island. *Bulletin of the Museum of Comparative Zoology at Harvard College* 80:195–211.
- Wheeler, W.M., and W.M. Mann. 1914. The ants of Haiti. *Bulletin of the American Museum of Natural History* 33:1–61.

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NATURAL HISTORY MUSEUM
OF LOS ANGELES COUNTY
900 EXPOSITION BOULEVARD
LOS ANGELES, CALIFORNIA 90007