

Taxonomy of the ant genus *Pheidole* Westwood (Hymenoptera: Formicidae) in the Afrotropical zoogeographic region: definition of species groups and systematic revision of the *Pheidole pulchella* group

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Abstract

This paper is a starting point towards a much needed comprehensive taxonomic treatment of the genus *Pheidole* in the Afrotropical region. Despite its hyperdiversity, the taxonomy of this globally distributed ant genus is limited to important revisions for the New World and several Asian faunas. However, *Pheidole* of the Afrotropical zoogeographic region has never been revised. The most recent Afrotropical *Pheidole* species descriptions are fifty years old and many are considerably older. Identification keys are not available and many species descriptions are of limited diagnostic value. This calls for a series of taxonomic revisions in order to resolve the complicated taxonomic situation for the complete Afrotropical *Pheidole* fauna. In this paper the following preliminary morphological species groups for the Afrotropical region are defined: *P. aurivillii* group, *P. excellens* group, *P. megacephala* group, *P. nigeriensis* group, and *P. speculifera* group. We also establish and revise the *P. pulchella* group, which currently contains eleven species, of which seven are new. The four spe-

cies described prior to this study are: *P. pulchella* Santschi, *P. dea* Santschi, *P. nimba* Bernard, and *P. batrachorum* Wheeler **stat. rev.**, which is removed from synonymy under *P. dea* and regains species status. The following **new synonymy** is proposed (senior synonym listed first): *P. pulchella* Santschi = *P. pulchella achantella* Santschi. The following seven species are described as new: *P. christinae* **sp. n.**, *P. darwini*, **sp. n.**, *P. glabrella* **sp. n.**, *P. heliosa* **sp. n.**, *P. rebecca* **sp. n.**, *P. semidea* **sp. n.** and *P. setosa*, **sp. n.** An illustrated key combining the minor and major worker subcastes is presented.

Key words: Myrmicinae, *Pheidole*, new species descriptions, *Pheidole pulchella* group, Africa, Guineo-Congolian rain-forest belt, taxonomic revision

Introduction

The ant genus *Pheidole* Westwood (1839) is an evolutionary success story, both ecologically and in terms of species diversity. With more than 1100 valid species names it represents the ant genus with the highest species richness worldwide (Longino, 2009). Taxonomic interest in this genus increased relatively recently, especially within the last decade. Wilson's (2003) monograph on the New World fauna was particularly important since it more than doubled the number of described *Pheidole* species for the New World. However, recent material from Central America made an updated taxonomic treatment necessary, which was provided by Longino (2009). Different oriental faunas were revised by Eguchi and colleagues (Eguchi, 2000, 2001a, 2001b, 2008; Eguchi & Bui, 2005; Eguchi *et al.*, 2007), and Sarnat (2008) provided a taxonomic treatment of the *P. roosevelti* group from Fiji.

In most ecological studies within the tropics, *Pheidole* is one of the most abundant and diverse ant taxa (Ward, 2000; Wilson, 2003). In Africa, it is also one of the genera with very high rates of unidentifiable morphospecies (Belshaw & Bolton, 1993; Deblauwe & Dekoninck, 2007; Fisher, 2004; Hita Garcia *et al.*, 2009). For the Afrotropical region, this is due to both a large number of undescribed species, and a lack of modern revisionary treatments and identification keys for described species. In an attempt to revise the *Pheidole megacephala* group, Emery (1915) tried to shed light on the unclear taxonomic situation in this network of species, subspecies and variations, but with limited success. Since then, Afrotropical *Pheidole* have been neglected by ant taxonomists. Instead, tri- and quadrimorphs assigned to many valid biological species remain unchanged, frustrating attempts to identify specimens based on taxonomic literature. In addition, the majority of African *Pheidole* was described between 150 to 50 years ago, mostly by A. Forel, F. Santschi, G. Mayr and C. Emery, at a time when subspecies and infrasubspecific taxa were still frequently used in ant taxonomy. Forel and Santschi alone, the two most productive taxonomists for the Afrotropical region, described more than half of their 95 *Pheidole* taxa as varieties, subspecies and races. Unfortunately, a lot of the descriptions are no longer sufficient for accurate species diagnosis. In several cases the differences between subspecies are poorly documented whereas in others different subspecies possess relatively little resemblance with each other. The most recent species to be described from the Afrotropical region were authored by Bernard (1953). Arnold (1960) described a new variation of *Pheidole shultzei*, and since then, one junior homonym was renamed by Wilson (1984).

The long neglect of the African *Pheidole* fauna and the large amount of new material and undescribed taxa calls for a comprehensive taxonomic treatment in order to provide the identification tools needed to promote and facilitate ecological, biogeographical, and evolutionary studies. These studies are strongly underrepresented and comparatively rare in the Afrotropical region. Without a good taxonomic knowledge of Afrotropical species, it will remain difficult to gain any qualified information about endemism, species turnover, evolutionary patterns, and biogeography for this remarkable and important ant genus. For other African and Malagasy ant taxa, the taxonomic situation improved considerably during the last decades (Ward, 2007), beginning with Bolton's extensive taxonomic treatments (listed in Bolton, 2003). Other authors followed his efforts and several revisions for the two regions have been published in the last few years, showing that the interest in Afro-Malagasy ant taxonomy is undiminished (Blaimer, 2010; Bolton & Fisher, 2008a, 2008b, 2008c, 2011; Fisher, 2009; Fisher & Smith, 2008; Heterick, 2006; Hita Garcia *et al.*, 2010; LaPolla *et al.*, 2010; Snelling, 2007; Yoshimura & Fisher, 2007, 2009, 2011). Nevertheless, the way towards a comprehensively documented ant fauna of the world is still long and full of challenges, especially in the case of the largest and hyperdiverse genera *Pheidole* and *Camponotus* (Wilson, 1976).

This paper provides a first attempt to define species groups for the Afrotropical *Pheidole* fauna, and it revises one of those groups at the species level. Our species groups are clusters of phenetically similar species. Wilson (2003) took a similar approach to defining New World species groups, and Moreau (2008) showed them to be largely artificial. Phylogenetic analysis will be necessary to test the monophyly of our groups, but in the mean time they serve a useful function to aid identification and to break the species into clusters for revision. We recognize six species groups altogether and revise one of them: the *P. pulchella* group. This group currently contains 11 species, seven of which are described here as new. We provide an illustrated identification key to the 11 species, combining the minor and major worker subcastes.

Material and Methods

List of abbreviations of museum collections follow Evenhuis (2009) and Bolton & Fisher (2011).

BMNH	The Natural History Museum (British Museum, Natural History), London, U.K.
CASC	California Academy of Sciences, San Francisco, California, U.S.A.
MHNG	Muséum d'Histoire Naturelle, Geneva, Switzerland
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NHMB	Naturhistorisches Museum, Basel, Switzerland
SAMC	Iziko Museums of Cape Town (= South African Museum), South Africa
USNM	National Museum of Natural History (United States National Museum), Washington, D.C., U.S.A.
ZFMK	Zoologisches Forschungsinstitut und Museum Alexander König, Bonn, Germany

All observations and measurements were taken at 32x to 90x magnification with an Olympus SZX12 dissecting microscope and a dual-axis micrometer, at an accuracy of approximately 0.006 mm (half a scale mark). Minimal and maximal values, as well as the arithmetic mean in parentheses, are listed in the measurements, which are presented in mm units with three decimal digits. Most of the material is located at the BMNH, CASC and ZFMK entomological collections. All images were made with a QImaging Micropublisher 5.0 RTV camera on a Leica Z6 APO stereomicroscope in combination with Syncroscopy Auto-Montage software (version 5.03), and are available online at AntWeb (<http://www.antweb.org>). Measurements and most indices are following or derived from Bolton & Fisher (2011), Eguchi (2008), Güsten *et al.* (2006), and Longino (2009). The general morphological terminology follows Bolton (1994) and Longino (2009). Special terminology used in this revision includes the following: ‘lateral clypeal carina’ (Fig. 1A) for the outermost longitudinal carina at the side of clypeus near the antennal insertion, ‘metapleural gland scrobe’ (Serna & Mackay, 2010) (Fig. 1C–7), referring to the ventral-most longitudinal carina near the metapleural gland bulla, and ‘metapleural carina(e)’ (Fig. 1C–6), which is/are situated above the metapleural gland scrobe.

Measurements and indices

Measurements

HL	<i>head length</i> : maximum distance from the mid-point of the anterior clypeal margin to the mid-point of the posterior margin of the head, measured in full-face view; in majors from midpoint of tangent between anteriormost position of clypeus to midpoint of tangent between posteriormost projection of the vertex.
HW	<i>head width</i> : measured at widest point of the head, in full-face view behind eye-level.
SL	<i>scape length</i> : maximum scape length, excluding basal condyle and neck.
EL	<i>eye length</i> : maximum diameter of compound eye measured in oblique lateral view.
MFL	<i>metafemur length</i> : measured from the junction with the trochanter to the junction with the tibia.
MTL	<i>metatibia length</i> : measured from the junction with femur to the junction with first tarsal segment.

MDL	<i>mandible length</i> : maximum length, measured in oblique frontolateral view, from apex to lateral base.
PW	<i>pronotal width</i> : maximum width of pronotum measured in dorsal view.
WL	<i>Weber's length</i> : diagonal length of mesosoma in lateral view from the anterior point of the pronotal slope and excluding the neck, to the posteroventral margin of the propodeum.
PSL	<i>propodeal spine length</i> : in dorsocaudal view, with the apex of the measured spine, its base, and the center of the propodeal concavity between the spines in focus: measurement is taken from apex to base along the one axis of a dual-axis micrometer, which is aligned along the length of the spine, crossing the second axis at the base of the measured spine, and the latter connecting the base with the center of the propodeal concavity (Fig. 1D).
PTL	<i>petiole length</i> : maximum diagonal length of petiole, measured in lateral view, from most anteroventral point of the peduncle to most posterodorsal point at the junction to first helcial tergite.
PTH	<i>petiolar node height</i> : maximum height of petiolar node measured in lateral view from the highest (median) point of the node, orthogonally, to the ventral outline of the node.
PTW	<i>petiolar node width</i> : maximum petiolar node width, measured in dorsal view.
PPL	<i>postpetiole length</i> : maximum length of postpetiole, measured in lateral view, from anterior beginning of the dorsal slope to the posterior juncture of postpetiole and second helcial tergite.
PPH	<i>postpetiole height</i> : maximum height of postpetiole, measured in lateral view, from the highest (median) point of the node to the lowest point of the ventral process, often in an oblique line.
PPW	<i>postpetiole width</i> : maximum width of postpetiole, measured in dorsal view.

Indices

CI	<i>cephalic index</i> : $HW / HL * 100$
EI	<i>eye index</i> : $EL / HW * 100$
SI	<i>scape index</i> : $SL / HW * 100$
MDI	<i>mandible index</i> : $MDL / HW * 100$
PSLI	<i>propodeal spine index</i> : $PSL / HW * 100$
PWI	<i>pronotal width index</i> : $PW / HW * 100$
FI	<i>metafemur index</i> : $MFL / HW * 100$.
PeI	<i>petiole index</i> : $PTW / PW * 100$ (major only)
PpI	<i>postpetiole index</i> : $PPW / PW * 100$ (major only)
PpWI	<i>postpetiole width index</i> : $PPW / PTW * 100$
PpLI	<i>postpetiole length index</i> : $PTL / PPL * 100$

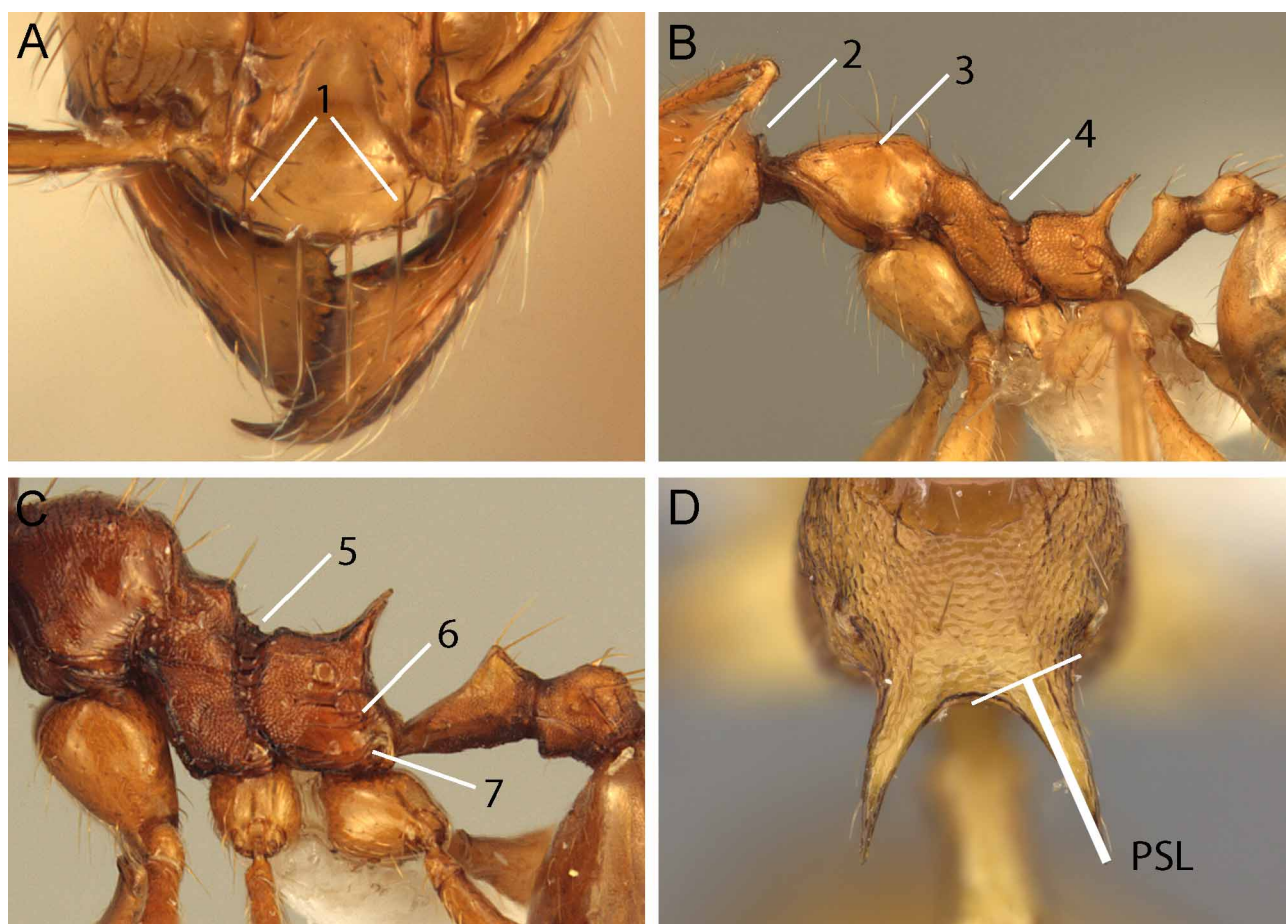


FIGURE 1 **A)** *Pheidole pulchella*, full-face view of minor worker: the two lines show the lateral clypeal carinae on the sides of the clypeus (1). **B)** *P. pulchella*, lateral view of minor worker: illustrating posterior head margin with a weakly developed occipital carina (2), promesonotum with inconspicuous humeri (3), and second mesonotal process not reduced (4). **C)** *P. pulchella*, lateral view of major worker: illustrating second mesonotal process reduced to a small ridge anterior of the metanotal groove (5) and well-developed metapleural carina (6) situated above the metapleural gland scrobe (7). **D)** *P. pulchella*, in oblique fronto-dorsal (dorsocaudad) view (Will Ericson 2011): measurement of propodeal spine length (PSL), the bold line representing the measurement, bordered by the perpendicular line across the base of the spine.

Taxonomy of Afrotropical *Pheidole* species groups

The Afrotropical *Pheidole* fauna is unlikely to be as species rich as the New World or Oriental faunas. Currently, 136 valid taxa are listed for the Afrotropical region (Bolton & Alpert, 2009), with the actual number of species being undoubtedly higher. Most of the tropical forests and other species rich habitats remain unsampled, and museum collections already store many undescribed species.

We provide diagnostic definitions for six species groups based on morphology. Species within these groups share important characteristics in shape and proportions of head and mesosoma, relative length of appendages in general, and scape and metafemur length in particular. These are related to life history traits and ecology of the species (Weiser & Kaspari, 2006). Furthermore, important diagnostic characters include postpetiole proportions and modifications (i.e. ventral and lateral processes), and the overall pattern of body sculpture. The latter is generally variable within species groups and between species, ranging from densely punctate to almost completely smooth and shiny. Nevertheless, intraspecifically the sculpture-patterns are consistent, except for some minor and sporadic differences in the expression among different populations. Pilosity is another good diagnostic character, and is suitable for the division of species into groups with major differences in length, thickness, and overall abundance of hairs. Our species group definitions are provisional and are likely to change when more material is available. The proposed species groups are:

***P. aurivillii* group:**

Larger species (minor worker HW: 0.52–0.79 mm, n=52) with relatively long appendages (SI: 107–145, FI: 142–247). Minor workers: characterized by oval head that is longer than wide, long promesonotum, declining slowly to metanotal groove, absent or inconspicuous mesonotal process. Sculpture on mesonotum, mesopleuron and propodeum uniform, pilosity relatively long, erect and flexuous. Postpetiole with shallow ventral process. Major workers: head with mostly irregular rugose-punctate sculpture. Frontal carinae and antennal scrobe absent or inconspicuous, inner hypostomal teeth developed to large, mesonotal process and postpetiole ventral process present. Pilosity as in minor and very abundant. Four described subspecies (*Pheidole aurivillii* Mayr, *P. aurivillii attenuata* Santschi, *P. aurivillii kasaiensis* Forel, *P. aurivillii rubricalva* Forel), plus other potentially related species and several undescribed morphospecies probably belong to this group.

***P. excellens* group:**

Species with square-like heads in both, minor and major workers, shorter appendages (minor worker SI: 86–115, n=32), often extensive and coarse body sculpture (sometimes only on pronotum), abundant and fine pilosity and small postpetioles, in major workers with a lateral process.

Minor workers: characterized by wide, square head with straight posterior margin and subangulate to angulate corners, relatively short scape, barely to moderately exceeding occipital margin. Postpetiole very short, lower than petiole, about as wide as long. Body often deeply punctate-rugulose/rugose [e.g. *excellens* Mayr, *liengmei* Forel], with coarse ridges along dorsopropodeum, but some species mostly smooth [*sculpturata rhodesiana* Forel], to superficially sculptured [*sculpturata*]. Usually with high amount of very thin and moderately short body pilosity, often pelt-like, at least on the head. Spines short to long, linearly spinose. Major workers: head usually elongate, much longer than wide, or at least square-like with parallel to subparallel sides, sometimes wider anteriorly than posteriorly. Submedian and outer hypostomal teeth well-developed to large, median tooth absent. Promesonotal dome high, spines quasi-vertical, often thick, blunt or truncated. Postpetiole laterally with an (often strongly) extended, wing-like, posteriorly curved process. Pilosity and sculpture similar to minor workers. The group can be subdivided into two different complexes, one with small species (*katonae* complex; minor worker HW: 0.57–0.63, n=8), possessing short legs and spines, and relatively larger eyes [*katonae* Forel, *sculpturata zambeziana* Forel]. The other complex consists of larger species (*excellens* complex; minor worker HW: 0.69–0.93, n=24), which possess longer legs and spines, and relatively smaller eyes [*excellens* Mayr, *liengmei* Forel, *njassae* Viehmeyer, *sculpturata* Mayr, *sculpturata welgelengensis* Forel]. The described species belonging to this group are: *Pheidole arnoldi* Forel, *P. excellens* Mayr, *P. excellens weissii* Santschi, *P. katonae* Forel, *P. liengmei* Forel, *P. liengmei micrartifex* Forel, *P. liengmei shinsendensis* Forel, *P. njassae* Viehmeyer, *P. sculpturata* Mayr, *P. sculpturata areolata* Forel, *P. sculpturata berthoudi* Forel, *P. sculpturata dignata* Santschi, *P. sculpturata rhodesiana* Forel, *P. sculpturata welgelengensis* Forel, *P. sculpturata zambeziana* Forel. Several probably undescribed morphospecies are located in the collections of BMNH, CASC and ZFMK.

***P. megacephala* group:**

Relatively small species (minor worker HW: 0.51–0.66 mm, n=18), with relatively short appendages (SI: 117–122, FI: 106–129) and spines. Minor workers: posterior head margin weakly rounded and eyes with eight or more ommatidia in the longest row. Promesonotum without mesonotal process and often smoothly declining towards metanotal groove, spines very short or minute. Petiole relatively short, postpetiole comparatively large with ventral process. Major workers: head in full-face view often broadest at mid-point or posterior, anteriorly often narrower, head sometimes slightly heart shaped. Longitudinal rugulae mostly ending on frons, upper half of head usually smooth and shiny, antennal scrobe weak to inconspicuous, inner hypostomal teeth mostly very small or inconspicuous and medium tooth absent. Mesosoma, petiole and postpetiole similar to minor workers. A number of described species and infraspecific taxa exist for this group (*Pheidole megacephala costauriensis* Santschi, *P. megacephala duplex* Santschi, *P. megacephala ilgi* Forel, *P. megacephala impressifrons* Wasmann, *P. mega-*

cephala melancholica Santschi, *P. megacephala nkomoana* Forel, *P. megacephala rotundata* Forel, *P. megacephala rotundata* Forel, *P. megacephala scabrior* Forel, *P. megacephala speculifrons* Stitz, *P. megacephala talpa* Gerstäcker, *P. picata* Forel, *P. picata bernhardae* Emery, *P. picata gietleni* Forel, *P. punctulata* Mayr, *P. punctulata atrox* Forel, *P. punctulata spinosa* Forel), which is in high need of revision.

***P. nigeriensis* group:**

Very small species (minor worker HW: 0.41–0.56 mm, n=60), with short scapes and legs (SI: 90–114, FI: 95–122). Minor workers: posterior head margin straight to weakly concave and eyes small with a maximum of six ommatidia in the longest row. Promesonotal dome well-rounded to slightly angulate in profile view, propodeum, spines and postpetiole relatively short. Postpetiole not higher than petiolar node and without ventral process. Major worker: head longer than wide, very large compared to the rest of the body, anteriorly weakly longitudinally rugulose. Upper half of head mostly smooth (similar to *megacephala* group), inner hypostomal teeth well-developed to relatively large. Mesosoma, petiole and postpetiole similar to minor workers. The group contains *Pheidole nigeriensis* Santschi and several morphospecies collected from different localities.

***P. pulchella* group:**

Relatively large species (minor worker HW: 0.66–0.97 mm (n=154), major worker HW: 1.63–2.35 (n=53)), with relatively long spines in both, minor (PSLI: 21–40) and major workers (PSLI: 11–19), which are usually curved backwards, except in *P. diomandei*. Minors always with a distinct promesonotal process, followed by a well-developed or conspicuous smaller process (Fig. 1B–4) and a distinctly impressed metanotal groove. Majors always with a distinct promesonotal process and hypostomal margin of the head always with two conspicuous inner and two outer submedian teeth, but lacking the median process.

Both worker subcastes with a well-developed postpetiolar ventral process, similar to the species of the *megacephala* complex, but distinctly separated from them by the previous character combination.

Minor workers: head shape in full-face view variable among species, but never square with angulate posterolateral corners, from short and rounded (CI: 85–98) with sides of head strongly convex, posterior margin convex [*dea*], or almost straight [*rebecca*], to long-elliptical (CI: 73–84), sub-angular at eye-level and posteriorly elongate towards occipital carina (Fig. 1B–2) [*christinae*, *heliosa*]. Mandibles smooth and shiny, sometimes with very superficial rugulae, laterally with weak longitudinal rugulae. Eyes situated near midlength of the head, of medium size (EI: 19–29). Scapes moderately to very long (SI: 102–174) and surpassing posterior head margin by one quarter to approximately one third of their length. Occipital carina always conspicuous in full-face view. Mesonotal declivity interrupted by promesonotal process, followed by a smaller process between promesonotal process and metanotal groove. The second, smaller, process is reduced and less conspicuous in some species. Propodeal spines long and spinose, much longer than distance between their bases (PSLI: 21–40), curved posteriorly towards petiole, rarely straight. Promesonotum, in lateral view, with angulate to subangulate edges, pronotal dorsum flat to weakly rounded, never strongly convex. Petiole longer than postpetiole (PpLI: 117–223), and in dorsal view usually about half as wide (PpWI: 152–232). Postpetiole also with well-developed convex ventral process and about as high as long, with subglobular to globular shape in profile. In dorsal view postpetiole about as long as wide, with a roughly trapezoidal shape. Pilosity with few to many long acute standing hairs, some species with hair apices truncate (or bifurcate), but in some species almost completely absent from dorsum of head, meso- and metasoma. Mesonotum and propodeum often with shorter, suberect to subdecumbent hairs. Standing hairs never very short and stiff. Between long erect hairs on head often shorter suberect to subdecumbent hairs present. Sculpture variable between species, with relatively little intraspecific variation, from completely and strongly punctate [*nimba*] to mostly smooth and shiny [*rebecca*], but mesonotum and propodeum never completely smooth and shiny, at least partly punctate.

Major workers: head about as wide as long (CI: 96–105), broadest always between eye level and occipital margin, frons and sides of head rugose-punctate to varying degrees. Posterolateral lobes often differently sculptured. Dorsal surface of mandible smooth, laterally longitudinally rugulose. Clypeus with median longitudinal carina

present. Scapes moderately long (SI: 49–58). Hypostomal margin always with two inner and two outer submedian teeth present, median process absent to inconspicuous. In full-face view, and for all species but *P. heliosa*, head margin without projecting hairs of any kind, only with relatively short appressed pilosity and long erect hairs, that are visible in lateral view. Pilosity on scape appressed to subdecumbent. Humeral area laterally not or weakly produced, mesonotal process always developed and with posterior steep declivity towards metanotal groove, which, in lateral view, is barely to broadly impressed. Propodeal spines relatively long and spinose, longer than distance between their bases. Petiole longer than postpetiole (PpLI: 131–176). Postpetiole considerably wider than petiole (PpWI: 177–252), wider and higher than long, in lateral view with anteriorly produced ventral process. Pilosity and sculpture similar to minor workers.

Comments on the *P. pulchella* group:

The *Pheidole pulchella* species group was defined in the process of our identification efforts of two very distinct groups of specimens from the Kakamega Forest in Western Kenya and from the Budongo and Rabongo Forests in Uganda. Both were at first identified as *P. pulchella* Santschi. Comparison with type material later revealed the dark colored morphospecies to be conspecific with *P. dea* Santschi from the Democratic Republic of Congo. We are now able to describe the previously unknown major workers. The orange colored specimens from Budongo Forest belong to a previously undescribed species and are likely to be closely related to *P. pulchella* Santschi. In subsequent type material examinations and museum visits, additional undescribed material was found from the Ivory Coast in the West, along the equatorial rainforest belt to Gabon, Central African Republic, towards Kenya and Tanzania in the East. In their general morphology the species in this group are well separated from those of other groups (see group definition above, first paragraph).

Most of the collection localities for species of the *P. pulchella* group are in rainforests; habitats of a few are not indicated on the labels. Specimens were caught in pitfall-traps, leaf-litter extractions, by beating of the lower vegetation, or by hand-collection. Thus, the species in this group are most likely forest specialists living and/or foraging on the ground and in the lower vegetation. Their conspicuous morphology with the relatively large size, long spines and appendages, and well-developed eyes indicates that these species are not living within, but rather upon or above the leaf-litter layer. They possibly nest in dead wood, because several of the specimens, especially the more rarely observed majors, were collected from rotten logs. Still, the biology of this species group is largely unknown and there are no records or observations available, other than the collection data mentioned on the labels.

P. speculifera group:

Medium to large species (minor worker HW: 0.52–0.81 mm, n=26), the minor workers characterized by large relatively long appendages (SI: 111–123), and both worker subcastes with large postpetiole that is 2–3 times wider than long. Minor workers: long antennal scapes, surpassing the posterior head margin by about ¼ of their length. Posterior head margin compressed, weakly rounded [*prelli* complex] to evenly rounded [*crassinoda*, *speculifera*]. Postpetiole large and voluminous, as long as [*prelli* complex] or longer [*crassinoda*, *speculifera*] than petiole and more than twice as wide. Pilosity moderately abundant, either short and stout, with blunt or split apices [*crassinoda*, *prelli*] or longer and flexuous [*speculifera*]. Major workers: head either massive and thick, with sculpture variable, frontal carinae & antennal scrobes absent, inner hypostomal teeth strongly reduced and median tooth absent [*speculifera* complex] or head less massive, with strong longitudinal and transverse rugose-punctate sculpture, long, curved and broadly extended frontal carinae, inner hypostomal teeth and median tooth present and conspicuous [*prelli* complex]. Spines thick and short, almost lobate. Postpetiole very massive, in dorsal view about 2–3 times wider than petiole, with a conspicuously spiked lateral process. The group can be subdivided into *prelli* complex and *speculifera* complex, the former with slightly smaller species (minor worker HW: 0.52–0.56 mm, n=5), which possess relatively large eyes (EI: 31–33) (*Pheidole caffra* Emery, *P. caffra abyssinica* Forel, *P. caffra amoena* Forel, *P. caffra bayeri* Forel, *P. caffra montivaga* Santschi, *P. caffra senilifrons* Wheeler, *P. prelli* Forel, *P. prelli ingenita* Santschi, *P. prelli redbankensis* Forel). The *speculifera* complex includes slightly to considerably larger species (minor worker HW: 0.60–0.81 mm, n=21) with smaller eyes (EI: 22–28) (*P. crassinoda* Emery, *P.*

crassinoda pluto Arnold, *P. crassinoda ruspolii* Emery, *P. crassinoda sordidula* Santschi, *P. occipitalis* André, *P. occipitalis adami* Santschi, *P. occipitalis neutralis* Santschi, *P. speculifera* Emery, *P. speculifera ascara* Emery, *P. speculifera bispectula* Santschi, *P. speculifera cubangensis* Forel). New material and undescribed species from different localities can be found in the collections of BMNH, CASC and ZFMK.

Synopsis of *pulchella* group species of the Afrotropical region

Pheidole batrachorum Wheeler 1922 **stat. rev.**
Pheidole christinae Fischer, Hita Garcia & Peters 2011 **sp. n.**
Pheidole darwini Fischer, Hita Garcia & Peters 2011 **sp. n.**
Pheidole dea Santschi 1921
Pheidole glabrella Fischer, Hita Garcia & Peters 2011 **sp. n.**
Pheidole heliosa Fischer, Hita Garcia & Peters 2011 **sp. n.**
Pheidole nimba Bernard 1953
Pheidole pulchella Santschi 1910
 = *Pheidole niapuana* Wheeler 1922
 = *Pheidole pulchella* var. *achantella* Santschi 1939 **syn. n.**
Pheidole rebecca Fischer, Hita Garcia & Peters 2011 **sp. n.**
Pheidole semidea Fischer, Hita Garcia & Peters 2011 **sp. n.**
Pheidole setosa Fischer, Hita Garcia & Peters 2011 **sp. n.**

Key to the *pulchella* group species (minors and majors combined)

- 1a. **Minor:** in full-face view lateral head margin with abundant projecting hairs, both anterior and posterior of eye-level (Fig. 2A). **Minor and major:** color yellow to orange.2
- 1b. **Minor:** in full-face view either without laterally projecting hairs at head margin (Fig. 2C), or if present, then only posterior of eyes (Fig. 2B). **Minor and major:** color light, reddish brown to very dark brown, sometimes black.4



FIGURE 2 A) *P. christinae* sp. n., B) *P. batrachorum* Wheeler, C) *P. glabrella* sp. n. Full-face view of minor workers: examples of laterally projecting hairs anterior and posterior of eye-level (A), posterior of eye-level only (B) and completely without (C).

- 2a. **Minor:** head evenly rounded at sides and posterior margin; head relatively shorter (CI: 82–90); pilosity on scape and metatibia decumbent (Fig. 3A). **Major:** antennal scrobe conspicuous; sides of head without laterally projecting hairs in full-face view (Fig. 3B). (Congo, Gabon) *P. pulchella* Santschi
- 2b. **Minor:** sides of head posterior of eyes sublinear and elongated; head relatively longer (CI: 73–84); pilosity on scape and metatibia suberect-erect (Fig. 3C). **Major** (of *P. heliosa*; major of *P. christinae* unknown): antennal scrobe absent or inconspicuous; head in full-face view with laterally projecting hairs (Fig. 3D).3

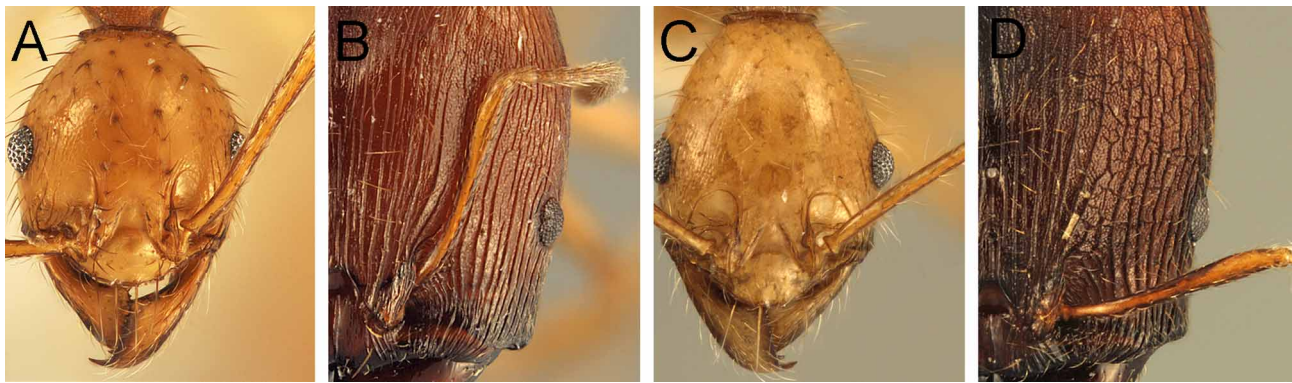


FIGURE 3 A, B) *P. pulchella* Santschi. Full-face view of minor and major worker: showing sides of head rounded towards posterior head margin in the minor (A), and presence of antennal scrobe and absence of laterally projecting hairs in the major (B). **C, D)** *P. heliosa* sp. n. Full-face view of minor and major worker: illustrating elongated posterior sides of head in the minor worker (C), and absence of antennal scrobe and presence of laterally projecting hairs in major worker (D).

- 3a. **Minor:** head, scapes and legs very long (CI: 73–76, SI: 162–174, FI: 206–213); occipital carina broadly extended and collar-like; standing hairs acute and very abundant (Fig. 4A), present also on lower meso- and metapleuron, visible in dorsal view. **Major:** head without antennal scrobe; in full-face view hairs projecting beyond lateral margin. (Cameroon, Ivory Coast). (Major of *P. christinae* unknown). *P. heliosa*
- 3b. **Minor:** head, scape and legs relatively shorter (CI: 79–84, SI: 143–164, FI: 175–198); occipital carina narrow, not collar-like; standing hairs often apically truncated or split, generally less abundant (Fig. 4B), absent on lower meso- and metapleuron. (D.R. Congo, Gabon, Uganda) *P. christinae*

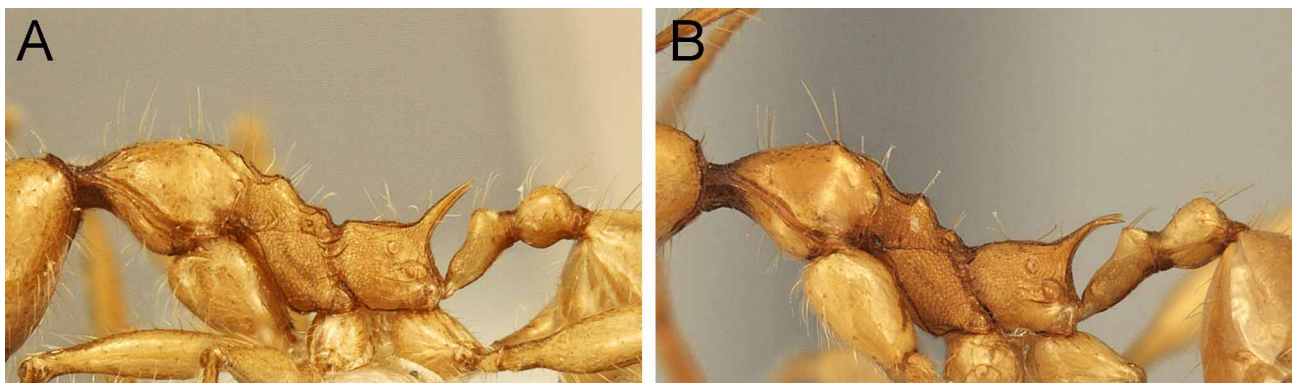


FIGURE 4 A) *P. heliosa* sp. n. Lateral view of minor worker, illustrating mesosoma with long second mesonotal process, highest point of dorsopropodeum immediately at metanotal groove and postpetiole shape spheroidal. **B)** *P. christinae* sp. n. Lateral view of minor worker, showing shorter second mesonotal process, highest point of dorsopropodeum midway between metanotal groove and base of spines, postpetiole shape not spheroidal.

- 4a. **Minor:** head with several relatively long, laterally projecting hairs posterior of eye-level (Fig. 5A). **Major:** either posterolateral lobes partly smooth and shiny and scape with erect hairs in addition to decumbent pilosity (Fig. 5B), or posterolateral lobes uniformly punctate with weak rugulae and posterior dorsopropodeum with oblique to longitudinal rugulae (Fig. 5C). . 5
- 4b. **Minor:** head completely without or at most with one or two moderately long projecting hairs near eyes or towards posterior margin (Fig. 5D). **Major:** head sculpture various; scape never with several erect hairs in addition to appressed or decumbent pilosity (Fig. 5E); sculpture on posterior dorsopropodeum transversely rugulose, punctate or smooth, and never with oblique or longitudinal rugulae (Fig. 5F) 7

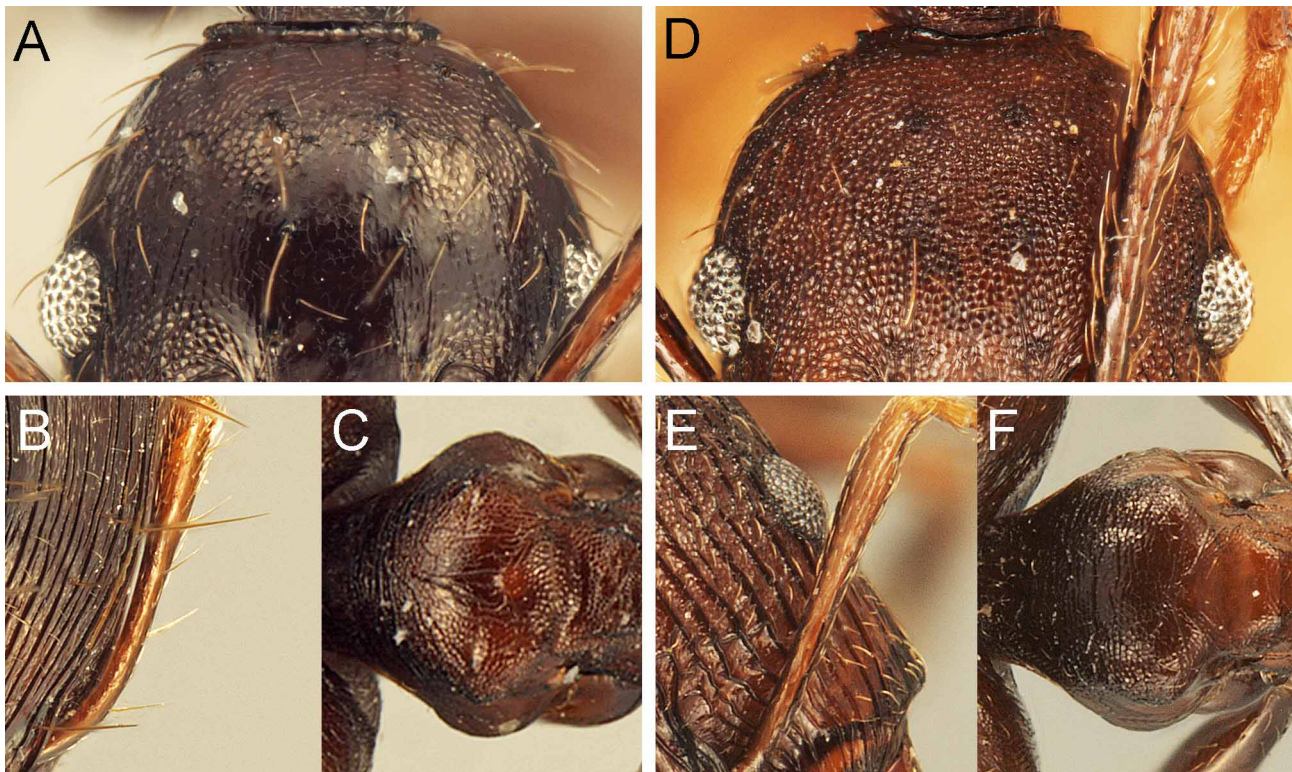


FIGURE 5 **A)** *P. setosa*, sp. n. Minor worker in full-face view: illustrating head margin with several laterally projecting and long hairs; **B)** *P. darwini* sp. n. Major worker in oblique frontolateral view: scape with erect, long hairs in addition to decumbent pilosity; **C)** *P. batrachorum* Wheeler. Major worker in dorsal view: pronotum with several oblique to longitudinal rugulae. **D)** *P. nimba* Bernard. Minor worker in full-face view: illustrating head margin with a maximum of two laterally projecting and short hairs; **E, F)** *P. glabrella* sp. n. Major worker in oblique full-face view and in dorsal view: illustrating uniform scape pilosity without additional erect hairs (E) and transverse rugulae on dorsal pronotum (F).

- 5a. **Minor:** head shape elliptical (CI: 79–89); posterior margin relatively narrow and evenly convex; occipital carina with weak median impression; scapes moderately long (SI: 139–172), with pilosity uniformly suberect or decumbent (Fig. 6A). **Major:** posterolateral lobes partly smooth and shiny and scape with erect hairs in addition to decumbent pilosity, or posterolateral lobes uniformly punctate with weak rugulae and posterior dorsopropodeum with oblique to longitudinal rugulae. (Major of *P. setosa* unknown) 6
- 5b. **Minor:** head shape broadly rounded, posterior margin not evenly convex (CI: 87–90); occipital carina without median impression; scapes relatively shorter (SI: 129–135); scape pilosity decumbent with additional suberect hairs on outer edge (Fig. 6B). (D.R. Congo) *P. setosa*

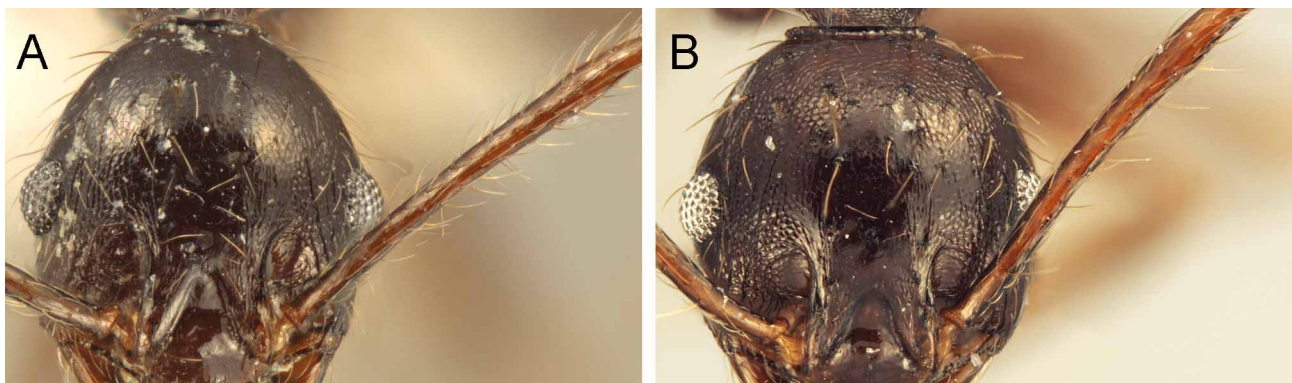


FIGURE 6 **A, B)** *P. darwini* sp. n. and *P. setosa* sp. n. Full-face view of minor workers: illustrating narrow posterior head margin and uniformly subdecumbent to suberect scape pilosity (A) versus wider posterior head margin and scape with erect to suberect hairs additional to decumbent pilosity (B).

- 6a. **Minor:** head relatively narrow (CI: 79–86); scapes long (SI: 153–172); scape pilosity uniformly decumbent; face almost completely and distinctly punctate (Fig. 7A). **Major:** posterolateral lobes uniformly punctate with some weak rugulae; scape with uniformly appressed to decumbent pilosity; posterior dorsopronotum with oblique to longitudinal rugulae (Fig. 7B). (Central African Republic, D.R. Congo, Gabon) *P. batrachorum* Wheeler
- 6b. **Minor:** head relatively wider (CI: 84–89); scapes slightly shorter (SI: 139–160); scape pilosity uniformly subdecumbent to suberect; face smooth and shiny, hexagonally microsculptured to very faintly punctate (Fig. 7C). **Major:** posterolateral lobes partly smooth and shiny; scape with some erect hairs additional to decumbent pilosity; posterior dorsopronotum weakly to superficially rugulose-punctate (Fig. 7D). (Cameroon, Central African Republic, Gabon). *P. darwini*

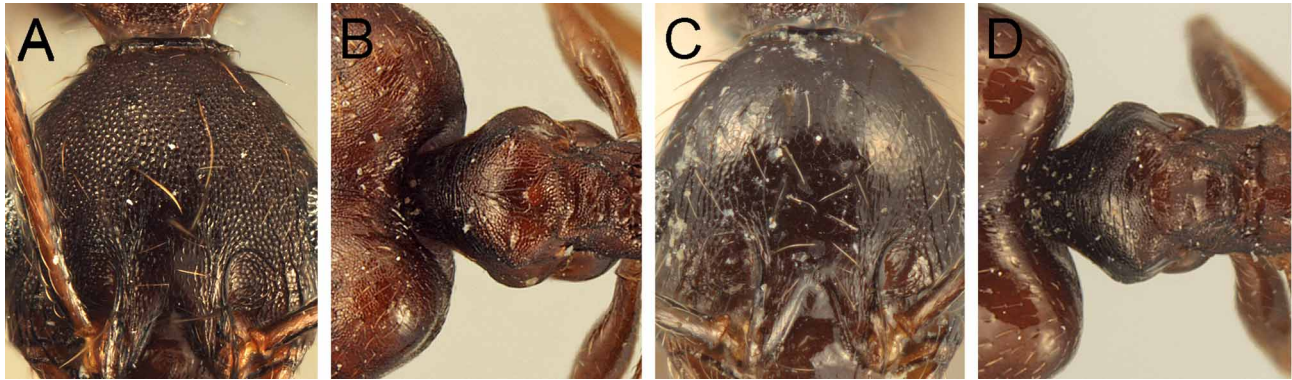


FIGURE 7 A, B) *P. batrachorum* Wheeler. Full-face view of minor worker and dorsal view of major worker: showing distinctly punctate face of the minor worker (A) and head with distinctly sculptured posterolateral lobes, and posterior dorsopronotum with longitudinal rugulae for the major worker (A). **C, D)** *P. darwini* sp. n. Full-face view of minor and dorsal view of major worker: illustrating superficially punctate (hexagonally microsculptured) face in the minor worker (C) and head with smooth & shiny posterolateral lobes, and posterior dorsopronotum without longitudinal, or oblique rugulae for the major worker (D).

- 7a. **Minor:** sculpture variable, but head and mesosoma never completely and coarsely punctate; at least medially between eyes and on posterior dorsopronotum superficially sculptured to smooth and shiny (Fig. 8A). **Major:** head sculpture variable, but never distinctly punctate on frons, vertex and posterolateral lobes; gaster never entirely shagreened. (Major of *P. nimba* unknown). 8
- 7b. **Minor:** head and mesosoma almost completely and coarsely punctate (Fig. 8B). (Guinea). *P. nimba* Bernard

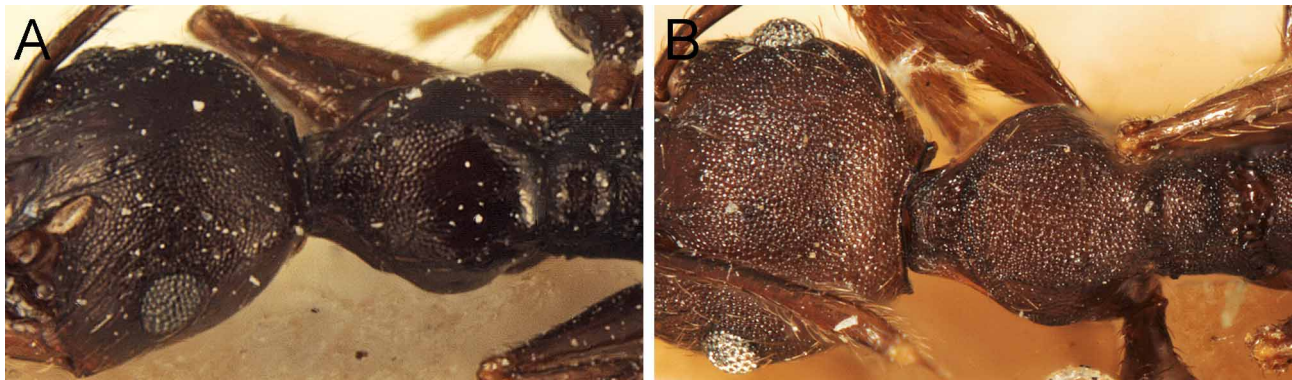


FIGURE 8 A, B) *P. dea* Santschi and *P. nimba* Bernard. Minor workers with dorsal view of head and promesonotum: illustrating smooth to superficially punctate areas medially between eyes and posteriorly on dorsal promesonotum (A) versus uniformly expressed sculpture in face and on promesonotum (B).

- 8a. **Minor:** head longer than wide (CI: 85–95), posterior margin roundly or slightly convex (Fig. 9A); scapes and mandibles moderately long (SI: 123–150, MDI: 72–79). **Major:** posterolateral lobes variably sculptured, never smooth and shiny; face with distinct and moderately long to long rugae; dorsal promesonotum mostly weakly to superficially sculptured (Fig. 9B). 9
- 8b. **Minor:** head almost as wide as long (CI: 94–98), posterior margin not convex, but almost straight (Fig. 9C); scapes and mandibles shorter (SI: 114–121, MDI: 69–73). **Major:** posterolateral lobes smooth and shiny; face with weak and relatively short rugae; dorsal promesonotum mostly smooth and shiny, with superficial rugulae anteriorly (Fig. 9D). (Ghana, Ivory Coast) *P. rebecca*



FIGURE 9 A, B) *P. glabrella* sp. n. Full-face view of minor worker (A), showing rounded head shape and rounded occipital margin; dorsal view of major worker (B), illustrating obliquely rugulose-punctate sculpture on posterolateral lobes, and regular transversely rugulose-punctate sculpture on dorsopronotum. **C, D)** *P. rebecca* sp. n. Full-face view of minor worker (C), showing wider head shape and less convex head margin; dorsal view of major worker (D), illustrating smooth and shiny posterolateral lobes, and dorsopronotum grading from anteriorly superficially rugulose to posteriorly mostly smooth & shiny.

- 9a. **Minor:** long or moderately long hairs completely absent on mesosoma and waist segments; petiole and postpetiole without laterally projecting hairs in dorsal view; metatibia pilosity appressed; second mesonotal process and sculpture on propodeum reduced; metanotal groove wide in profile (Fig. 10A); spines long (PSLI (mean): 33). **Major:** scape and metatibia pilosity fine and inconspicuous, mostly fully appressed (Fig. 10B); long standing hairs absent on promesonotum. (Cameroon, Central African Republic, Gabon) *P. glabrella*
- 9b. **Minor:** moderately long hairs at least present on waist segments, sometimes also on promesonotum; on petiole and/or postpetiole some laterally projecting hairs in dorsal view; metatibia pilosity decumbent; second mesonotal process and sculpture on propodeum not reduced; metanotal groove relatively narrow in profile (Fig. 10C); spines slightly shorter (PSLI (mean): 29). **Major:** scape and metatibia pilosity conspicuous and decumbent (Fig. 10D); standing hairs often present on promesonotum. 10

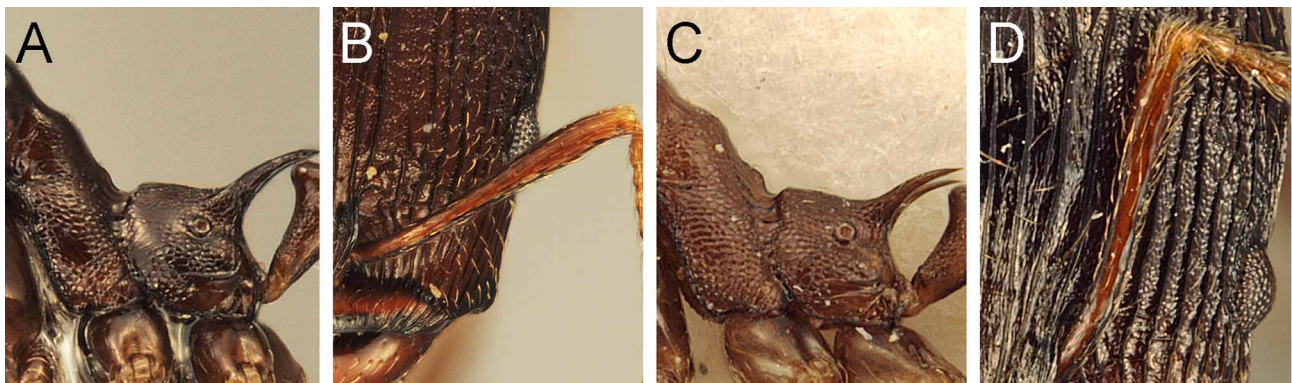


FIGURE 10 A, B) *P. glabrella* sp. n. Lateral view of minor worker (A), showing reduced second mesonotal process and sculpture on propodeum, metanotal groove relatively wide; full-face view of major worker (B), showing scape pilosity appressed. **C, D)** *P. semidea* sp. n. Lateral view of minor worker (C), illustrating well-defined second mesonotal process and sculpture on propodeum, metanotal groove narrower; full-face view of major worker (D), showing decumbent scape pilosity.

- 10a. **Minor:** posterior head margin roundly convex; face and dorsal promesonotum mostly superficially punctate to punctate; second mesonotal process not raised above the level of dorsopropodeum (Fig. 11A); postpetiole relatively short (PpLI: 155–223). **Major:** posterolateral lobes of head longitudinally rugose (Fig. 11B), with spaces between rugae weakly to superficially punctate; second mesonotal process at same level as dorsopropodeum. (D.R. Congo, Kenya, Tanzania, Uganda). *P. dea* Santschi
- 10b. **Minor:** posterior head margin weakly convex, with small median impression; face and promesonotum smooth and shiny, with very few superficial punctures; in lateral view second mesonotal process distinctly raised above the level of dorsopropodeum (Fig. 11C); postpetiole relatively longer (PpLI: 126–167). **Major:** posterolateral lobes of head punctate, overlain by oblique and superficial rugulae (Fig. 11D); in lateral view second mesonotal process raised above level of dorsopropodeum. (Nigeria). *P. semidea*

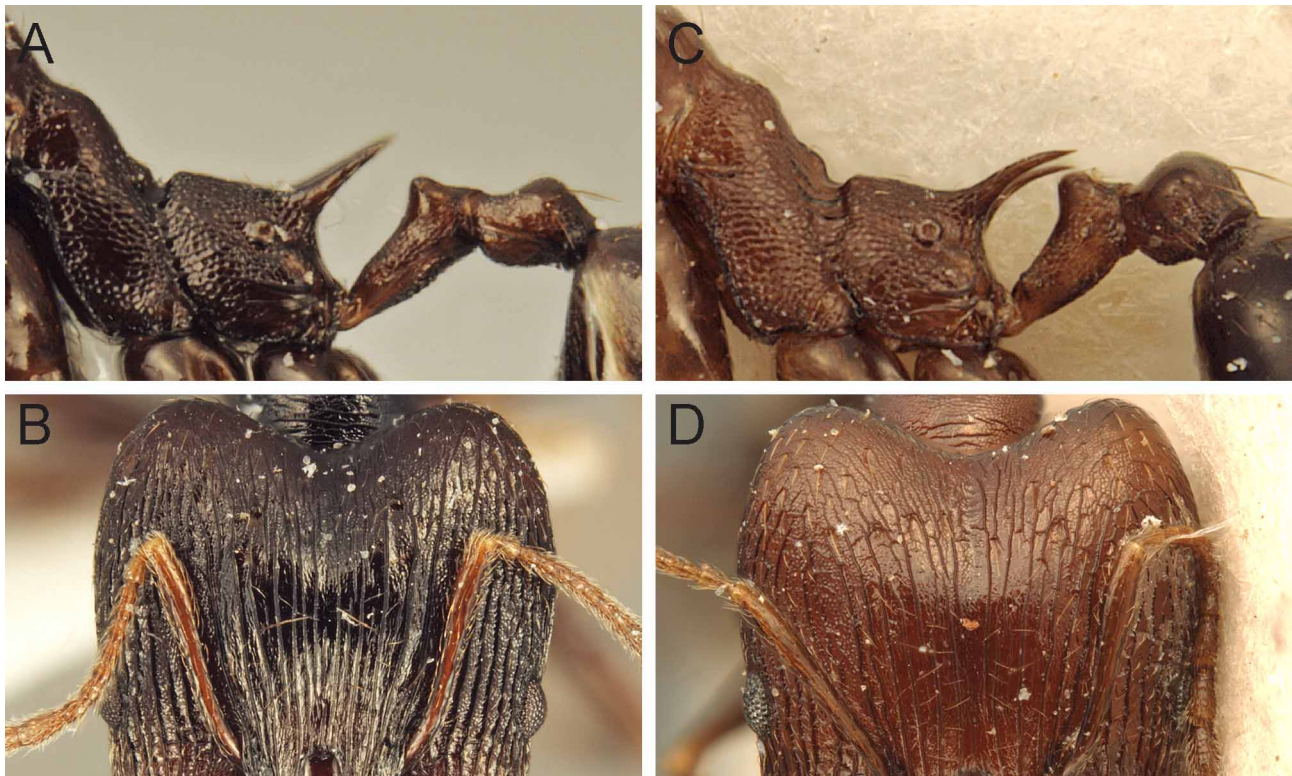


FIGURE 11 A, B) *P. dea* Santschi. Lateral view of minor worker (A), illustrating second mesonotal process at same level as dorsopropodeum, postpetiole relatively small in relation to petiole; full-face view of major worker (B): vertex without cross-meshes and posterolateral lobes longitudinally rugose. **C, D)** *P. semidea* sp. n. Lateral view of minor worker (C), showing second mesonotal process raised at slightly higher level than dorsopropodeum, postpetiole relatively larger in relation to petiole; full-face view of major worker (D): vertex with cross-meshes and posterolateral lobes obliquely and irregularly rugulose.

Review of species

Pheidole batrachorum Wheeler

(Figures 12–17)

Pheidole batrachorum Wheeler, W.M. 1922: 128. Lectotype (minor worker) [designated here]: D.R. CONGO, Akenge, stomach *Bufo polycerus* (H.O. Lang); paralectotypes (1 major worker, 3 minor workers): Akenge, stomach *Arthroleptis variabilis* (H.O. Lang) (USNM) [examined]. [Previously synonymized with *Pheidole dea* by Santschi, 1930: 59.] **Stat. rev.**

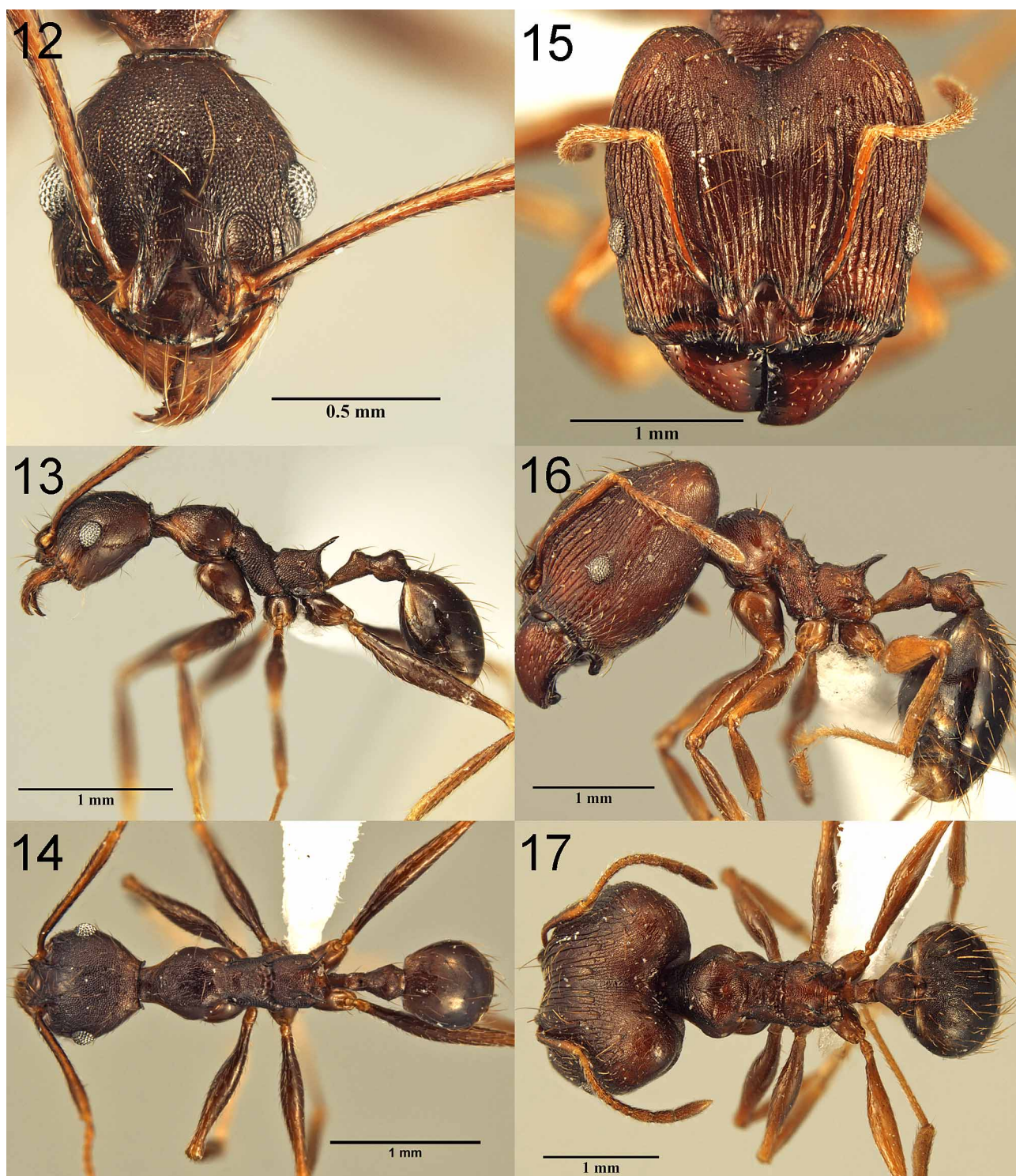


FIGURE 12–17 *P. batrachorum* Wheeler: full-face, lateral & dorsal view of minor (Fig. 12–14) (Central African Republic, CASENT0401882) and major worker (Fig. 15–17) (Central African Republic, CASENT0415367).

Diagnosis: Both subcastes reddish brown to dark brown. Minor workers: head shape elliptical and relatively narrow (CI: 79–86), antennal scapes long (SI: 153–172), head margin posterior of eye-level with laterally projecting hairs. Frons, vertex and most of mesosoma uniformly punctate, except smooth spots medially between eyes and on posterior lateropronotum. Head and body with long standing and shorter decumbent to subdecumbent hairs, scape and metatibia pilosity mostly decumbent. Major workers: head sculpture rugose-punctate with relatively long rugae, scape relatively long. Sculpture on anterior portion of dorsopropodeum transversely rugulose-punctate, posteriorly with obliquely curved or longitudinal rugulae and superficial punctures to partly smooth. Long standing hairs present on promesonotum, pilosity on scape and metatibia appressed to decumbent.

Description of minor worker: Measurements (lectotype): HW: 0.744, HL: 0.867, SL: 1.133, MDL: 0.556, EL: 0.183, MFL: 1.381, MTL: 1.078, WL: 1.206, PSL: 0.244, PTH: 0.178, PPH: 0.233, PTL: 0.322, PPL: 0.256, PTW: 0.133, PPW: 0.244, PW: 0.478; CI: 86, SI: 152, MDI: 75, PSLI: 28, PWI: 64, FI: 186, PpWI: 183, PpLI: 126

Measurements (n=15): HW: 0.589–0.722 (0.675), HL: 0.683–0.867 (0.816), SL: 0.900–1.122 (1.085), MDL: 0.456–0.567 (0.540), EL: 0.156–0.189 (0.177), MFL: 1.011–1.317 (1.267), MTL: 0.789–1.033 (0.970), WL: 0.956–1.167 (1.119), PSL: 0.144–0.244 (0.213), PTH: 0.144–0.189 (0.174), PPH: 0.172–0.233 (0.214), PTL: 0.256–0.367 (0.329), PPL: 0.178–0.267 (0.233), PTW: 0.100–0.133 (0.119), PPW: 0.189–0.244 (0.226), PW: 0.400–0.511 (0.471); CI: 79–86 (83), SI: 153–172 (161), MDI: 77–83 (80), PSLI: 21–29 (26), PWI: 67–72 (70), FI: 172–196 (188), PpWI: 181–200 (189), PpLI: 125–160 (141)

Head shape in full-face view elliptical (CI: 79–86), head margin posterior of eye-level rounded towards well-developed occipital carina, with weak to absent medial impression. Mandible dorsally unsculptured and smooth. Clypeus smooth or superficially punctate, median carina absent to inconspicuous, lateral carinae weak and irregular. Most of face uniformly punctate, except smooth to superficially sculptured central spot at eye-level. Malar area punctate, overlain by some irregular rugulae, ending at posterior eye-level. Scapes long (SI: 152–172) with decumbent to subdecumbent pilosity. Promesonotal outline in lateral view subangular, dorsopronotum flat. First and second mesonotal process conspicuously produced and subangular. Mesosoma mostly punctate, save for smooth central area on lateropronotum. Punctures on anteropronotum partly overlain with weak irregular transverse to diagonal rugulae, posteriorly sometimes with weak longitudinal rugulae. Propodeal spines relatively short (PSLI: 21–29). Metafemur long (FI: 172–196), metatibia with decumbent pilosity. Petiole and postpetiole densely punctate, weaker dorsally than ventrally. Anterior margin on gaster weakly shagreened, rest smooth and shiny. Standing hairs on head, pronotum and waist segments moderately long and acute, longer on gaster. Face with four to five pairs of long standing hairs, in addition with shorter subdecumbent hairs, in full-face view projecting laterally over head margin posterior of eye-level. One hair immediately above eye curved in weak S-shape. Mesonotum, propodeum and waist segments with short subdecumbent hairs. Color dark brown, mandibles and appendages lighter colored.

Description of major worker: Measurements (paralectotype): HL: 2.000, HW: 2.040, SL: 1.133, MDL: 0.944, EL: 0.278, MFL: 1.700, MTL: 1.302, WL: 1.700, PSL: 0.322, PTH: 0.378, PPH: 0.456, PTL: 0.511, PPL: 0.389, PTW: 0.278, PPW: 0.511, PW: 0.889; CI: 98, SI: 57, MDI: 47, PSLI: 16, PWI: 44, FI: 85, PeI: 31, PpI: 58, PpWI: 184, PpLI: 131

Measurements (n=5): HL: 1.860–1.920 (1.888), HW: 1.800–1.880 (1.860), SL: 1.011–1.089 (1.053), MDL: 0.889–1.000 (0.951), EL: 0.233–0.267 (0.247), MFL: 1.476–1.603 (1.546), MTL: 1.111–1.254 (1.181), WL: 1.444–1.587 (1.508), PSL: 0.278–0.322 (0.304), PTH: 0.300–0.344 (0.324), PPH: 0.367–0.422 (0.394), PTL: 0.511–0.567 (0.542), PPL: 0.333–0.378 (0.358), PTW: 0.222–0.244 (0.233), PPW: 0.483–0.556 (0.514), PW: 0.800–0.844 (0.820); CI: 97–100 (99), SI: 55–58 (57), MDI: 49–53 (51), PSLI: 14–17 (16), PWI: 44–45 (44), FI: 79–85 (83), PeI: 27–30 (28), PpI: 60–66 (63), PpWI: 212–235 (221), PpLI: 144–160 (152)

Frons longitudinally rugose-punctate, some rugae moderately long, others shorter and irregular, posterolateral lobes weakly rugulose-punctate. Sides lateral of antennal scrobe and posterior of eye-level irregularly rugose-reticulate, with punctate ground sculpture. Scape pilosity appressed-decumbent and shorter than maximum scape diameter. Pronotal outline in profile relatively rounded to subangular, in dorsal view laterally angulate and weakly produced. Promesonotal and mesonotal declivity steep, mesonotal process right-angled. Second mesonotal process small and dorsally narrow, sometimes only a short median ridge (Fig. 1C–5), but usually raised above level of dorsal propodeum. Anteropronotum transversely rugulose-punctate, posteropronotum with irregular oblique to longitudinal rugulae and superficial to smooth ground-sculpture, and posterior lateropronotum with smooth central area. Meso- and metapleuron punctate, except smooth areas around metapleural carinae and metapleural gland scrobe. Dorsopropodeum anteriorly punctate, grading from weak to superficial punctures posteriorly, transverse rugulae in dorsal view visible between spines and on posteropropodeum. Metatibia pilosity appressed to decumbent. Petiole and postpetiole densely punctate, sides of postpetiole in dorsal view angulate, posteriorly with a conspicuous flange. Punctures on posterodorsal face partly overlain by short oblique to longitudinal rugulae. Anterior half of first gastral tergite weakly punctate, posterior half shagreened or microsculptured. Standing hairs of moderate length, relatively stiff and truncated, on mesonotum and propodeum short, subdecumbent to decumbent. Color reddish brown to brown, gaster darker.

Discussion: Santschi (1930) synonymized *Pheidole batrachorum* with *P. dea*, yet the similarities are superficial (see below), which is the reason why species status is revived in this revision. Another strongly punctate species is *P. nimba*. Both *P. dea* and *P. nimba* were described only from minor workers. These two species are best separated from *P. batrachorum* by their wider heads and more rounded posterior head margins (CI: 86–93 [*dea*] and CI: 90 [*nimba*] versus CI: 79–86 [*batrachorum*]), at most one or two laterally projecting hairs at eye-level or posterior margin versus several, and significantly shorter antennal scapes (SI: 134–147 and SI: 129 versus SI: 153–172). A unique character for *P. nimba* is the uniformity and strength of its punctate sculpture without any superficially punctate or smooth dorsal surfaces on the head, mesosoma and metasoma. In the Central African Republic *P. batrachorum* co-occurs with *P. darwini*, from which minors are separated by shorter spines (PSLI: 29–35 versus PSLI: 21–29), slightly longer scapes (SI: 153–172 versus SI: 139–160) and narrower head (CI: 79–86 versus CI: 84–89); majors are separated by slightly shorter scapes (SI: 49–53 versus SI: 55–58), mandibles (MDI: 42–51 versus MDI: 47–53) and metafemur (FI: 75–80 versus FI: 79–85); both worker castes have significantly more sculpture in the face and dorsopronotum.

Wheeler described *Pheidole batrachorum* from four major and twenty-one minor workers, found in stomachs of toads and frogs in the rainforest of Akenge in the D.R. Congo. Of the eight minor and two major workers loaned from the NMNH, the two majors are concordant with Wheeler's description, but only three of the minors are; the rest belong to *P. glabrella* and are treated as such. Additional non-type material listed below was collected in Gabon and the Central African Republic, from within rotten logs and sifted leaf-litter in rainforest habitat.

Additional material examined: CENTRAL AFRICAN REPUBLIC: (1 minor worker) Reserve Dzanga-Sangha, 12.7 km 326° NW Bayanga, 03° 00.27' N, 16° 11.55' E, 420 m, 11–17.v.2001 (*S. van Noort*); (1 minor worker) P.N. Dzanga-Ndoki, 21.4 km 53° NE Bayanga 03° 02.01' N, 16° 24.57' E, 510 m, 1–7.v.2001 (*S. van Noort*); (1 minor worker) P.N. Dzanga-Sangha, 38.6 km 173° S Lidjombo, 02° 21.60' N, 16° 03.20' E, 350 m, 21–27.v.2001 (*S. van Noort*); (4 major workers, 13 minor workers) Reserve Dzanga-Ndoki, Mabea Bai, 21.4 km 53° NE Bayanga, 03° 02' N, 16° 25' E, 510 m, 1–07.v.2001 (*B.L. Fisher*); (1 minor worker) Reserve Dzanga-Sangha, 12.7 km 326° NW Bayanga, 03° 00' N, 16° 12' E, 470 m, 10–17.v.2001 (*B.L. Fisher*); (2 major workers, 6 minor workers) Reserve Dzanga-Ndoki, Mabea Bai, 21.4 km 53° NE Bayanga, 03° 02' N, 16° 25' E, 510 m, 1–07.v.2001 (*B.L. Fisher*); GABON: (4 minor workers) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 11.ii.1998 (*B.L. Fisher*); (1 major worker) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 7.ii.1998 (*B.L. Fisher*)

Pheidole christinae sp. n.

(Figures 18–20)

Holotype: (minor worker) UGANDA, 01° 45' N, 31° 34' 59" E, Budongo Forest Reserve, 900 m, 30.vi.2004 (*M. Peters*) (ZFMK: CASENT0227935). Paratypes: (6 minor workers) same data as holotype (BMNH: CASENT0227938, CASC: CASENT0227939, CASENT0227940, SAMC: CASENT0227941, ZFMK: CASENT0227936, CASENT0227937); (3 minor workers) 01° 43' N, 31° 33' E, Bunyoro District, Budongo Forest, 1000 m, hand collection, 30.vi.2004 (*M. Peters*) (ZFMK: CASENT0227942, CASENT0227943, CASENT0227944).

Diagnosis: *Pheidole christinae* is known from minor workers only. Color orange. Head elliptical, posterior of eye-level slightly elongated (CI: 79–84). Occipital carina very narrow, scape relatively long (SI: 143–164) and with erect to suberect pilosity. Promesonotum at humeri with small dent, in lateral view slightly raised above dorsal outline. Spines and metafemur long (PSLI: 26–36, FI: 175–198), metatibia with pilosity on inner edge subdecumbent, on outer edge subdecumbent to suberect. Standing hairs of variable lengths, mostly blunted or truncated.

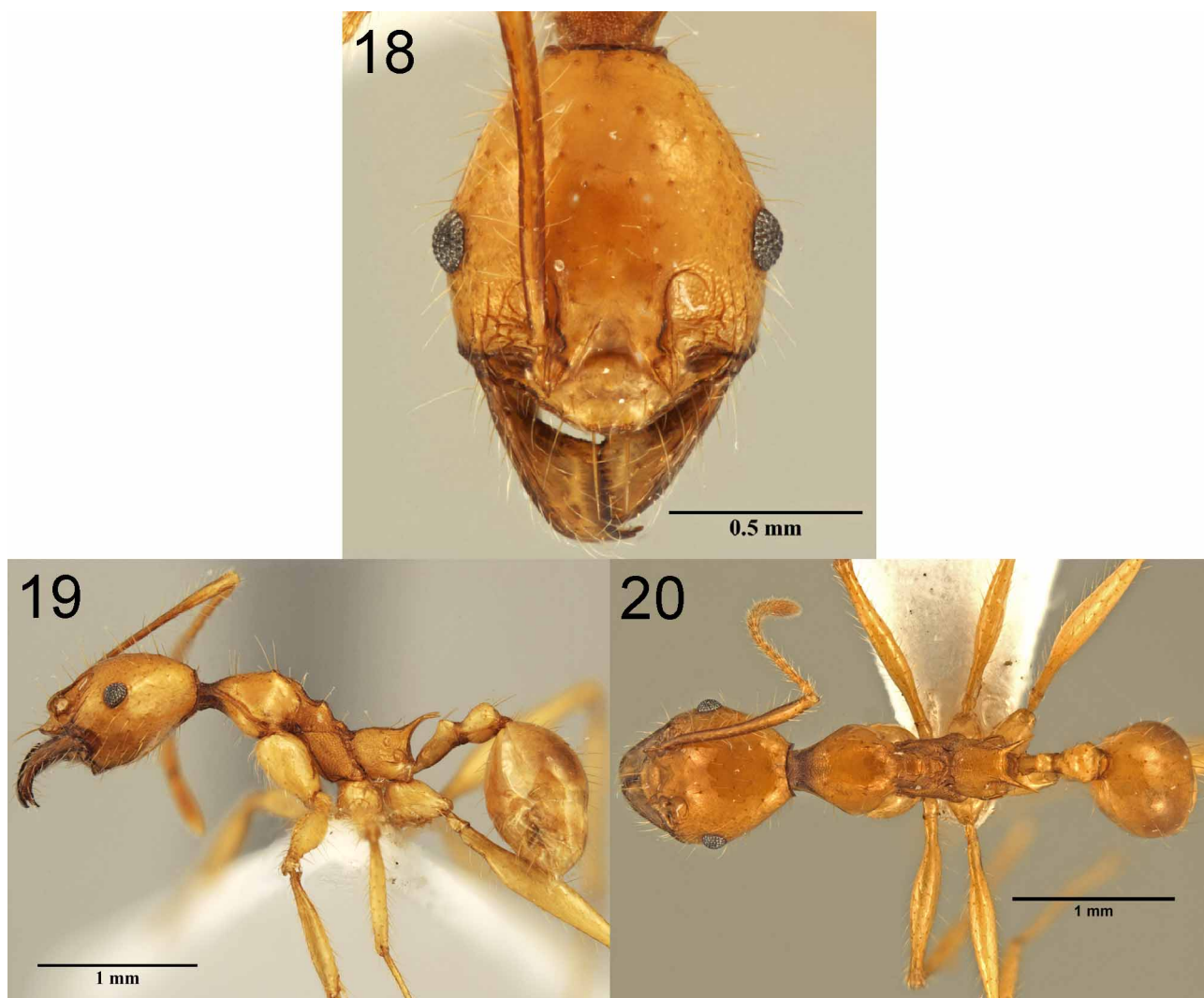


FIGURE 18–20 *P. christinae* sp. n.: full-face, lateral & dorsal view of minor worker (Uganda, CASENT0227940).

Description of minor worker: Measurements (holotype): HL: 0.989, HW: 0.811, SL: 1.302, MDL: 0.633, EL: 0.167, MFL: 1.508, MTL: 1.167, WL: 1.286, PSL: 0.278, PTH: 0.178, PPH: 0.244, PTL: 0.367, PPL: 0.256, PTW: 0.122, PPW: 0.256, PW: 0.533, CI: 82, SI: 160, MDI: 78, PSLI: 28, PWI: 66, FI: 186, PpWI: 209, PpLI: 143.

Measurements (n=21): HW: 0.733–0.833 (0.798), HL: 0.878–1.022 (0.977), SL: 1.100–1.349 (1.244), MDL: 0.578–0.678 (0.643), EL: 0.156–0.178 (0.166), MFL: 1.333–1.635 (1.497), MTL: 1.044–1.333 (1.187), WL: 1.144–1.556 (1.315), PSL: 0.256–0.344 (0.304), PTH: 0.144–0.206 (0.188), PPH: 0.222–0.267 (0.247), PTL: 0.333–0.411 (0.378), PPL: 0.233–0.278 (0.254), PTW: 0.122–0.133 (0.129), PPW: 0.222–0.267 (0.251), PW: 0.489–0.567 (0.538); CI: 79–84 (82), SI: 143–164 (156), MDI: 77–83 (81), PSLI: 26–36 (31), PWI: 64–70 (67), FI: 175–198 (188), PpWI: 182–209 (195), PpLI: 136–168 (149).

Head elongated elliptical, about 1.2 times longer than wide (CI: 79–84), with sides posterior of eye-level elongate, converging evenly towards posterior margin. Occipital carina narrow, clypeus smooth and lateral carinae absent. Face smooth, only malar area weakly punctate and irregularly rugulose near antennal insertion, with some cross-meshes present, rugulae ending at anterior eye-level. Hairs on face relatively slender and of varying lengths, longer and shorter hairs uniformly distributed, often apically truncated or split. Scaepes long (SI: 143–164), in full face view and when laid back, surpassing posterior head margin by about one third of its length, with pilosity erect to suberect and almost twice as long as maximum scape diameter. Promesonotum anteriorly punctate towards neck, smooth and shiny to superficially punctate, anteriorly towards neck weakly punctate, posteriorly towards mesonotum superficially punctate. Humeri with a tiny, prominent peak in profile, representing highest point of pronotum. Pronotal declivity smooth and long, midway between humeral peak and mesonotal process obtusely angular,

mesonotal process conspicuously produced, dorsal face often marginate and smooth or weakly and irregularly rugulose-punctate. Second mesonotal process conspicuously produced, similarly shaped and sculptured. Metanotal groove in lateral view shallowly to conspicuously impressed, highest point of dorsopropodeum at about midlength towards base of propodeal spines. Mesopleuron and propodeum weakly punctate, spines long and slender (PSLI: 26–36), strongly curved posteriorly. Metafemur long (FI: 175–198). Pilosity of metatibia on inner edge subdecumbent, outer edge with subdecumbent to suberect hairs and slightly longer hairs. Standing hairs of variable lengths, not very abundant, apices often blunted or split. Color yellow to light orange.

Discussion: *Pheidole christinae* is a readily recognizable species by its color, head shape and pilosity. In color it is similar to *P. pulchella* and *P. heliosa*, and in general appearance it is very close to the latter and with an intermediate head shape (CI: 79–84 [*christinae*], versus CI: 82–90 [*pulchella*] and CI: 73–76 [*heliosa*]). From *P. heliosa* it can be separated best by its shorter appendages, a significantly narrower occipital carina, less abundant pilosity (especially by its lack of laterally projecting hairs ventrally on meso- and metapleuron), different kinds of metatibial pilosity on inner and outer edges, and asymmetrically shaped postpetiole in lateral view. From *P. pulchella* it can be distinguished by longer propodeal spines (PSLI (mean): 31 versus 27), erect versus decumbent scape pilosity, the small peaks at the humeri which are raised above the pronotal outline, and the shape of the dorsopropodeum in profile view, which has its highest point at about midlength versus immediately at the metanotal groove in *P. pulchella*. The population in Gabon differs from the Ugandan *P. christinae* type specimens in a deeper, conspicuously impressed, metanotal groove, and longer, more spinose, propodeal spines. The minor workers of *P. christinae* were collected in the Budongo Forest, Uganda, in Gabon and in D.R. Congo from sifted leaf-litter, pitfalls and hand-collects. Majors have not yet been collected.

Etymology: This species is named in honor of the first author's wife Christina.

Additional material examined: D.R. CONGO: (1 minor worker) Epulu, 01° 23' N, 28° 35' E, 750 m, xi.1995 (*S.D. Torti*); GABON: (18 minor workers) Prov. Woleu-Ntem, 31.3km, 108° ESE Minvoul, 2°04.8'N, 12°24.4'E, 600m, 7.ii.1998 (*B.L. Fisher*); UGANDA: (1 minor worker) 01° 43.583' N, 31° 33.142' E, Budongo Forest FS, 1081 m, 08.vii.09 (*W. Freund & T. Klug*).

Pheidole darwini sp. n.

(Figures 21–26)

Holotype: (major worker) GABON, Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 7.ii.1998 (*B.L. Fisher*) (CASC: CASENT0218307). Paratypes: (8 major workers) same data as holotype (BMNH: CASENT0218300, CASC: CASENT0218303, CASENT0218304, CASENT0218306, CASENT0218308, MHNG: CASENT0218301, SAMC: CASENT0218302); (12 minor workers) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 11.ii.1998 (*B.L. Fisher*) (BMNH: CASENT0218313, CASENT0218315, CASC: CASENT0218311, CASENT0218317, CASENT0218318, MHNG: CASENT0218316, SAMC: CASENT0218319); (18 minor workers) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 12.ii.1998 (*B.L. Fisher*) (CASC: CASENT0218324, CASENT0218325, CASENT0218326, CASENT0218327, CASENT0218328).

Diagnosis: Color medium to dark brown, appendages slightly lighter. Minor worker: head shape elliptical (CI: 84–89), posterior of eye-level with laterally projecting hairs. Posterior head margin relatively narrow, vertex smooth. Scapes moderately long (SI: 139–160) with suberect pilosity. Dorsopronotum punctate anteriorly, partly overlain with irregular rugulae, posteriorly smooth. Spines relatively long (PSLI: 29–35), metatibia pilosity subdecumbent. Major worker: head sculpture weakly rugose-punctate, with moderately long rugae. Posterolateral lobes smooth and shiny, scape with appressed to decumbent pilosity plus a few erect hairs along outer edge. Dorsopropodeal sculpture weakly and irregularly transversely rugulose-punctate. In profile, dorsopropodeum anterior to propodeal spines shorter than or subequal to horizontal width of base of spine. Standing hairs long and thick, present everywhere except propodeum. Metatibia pilosity appressed to decumbent with additional subdecumbent to suberect hairs along outer edge.

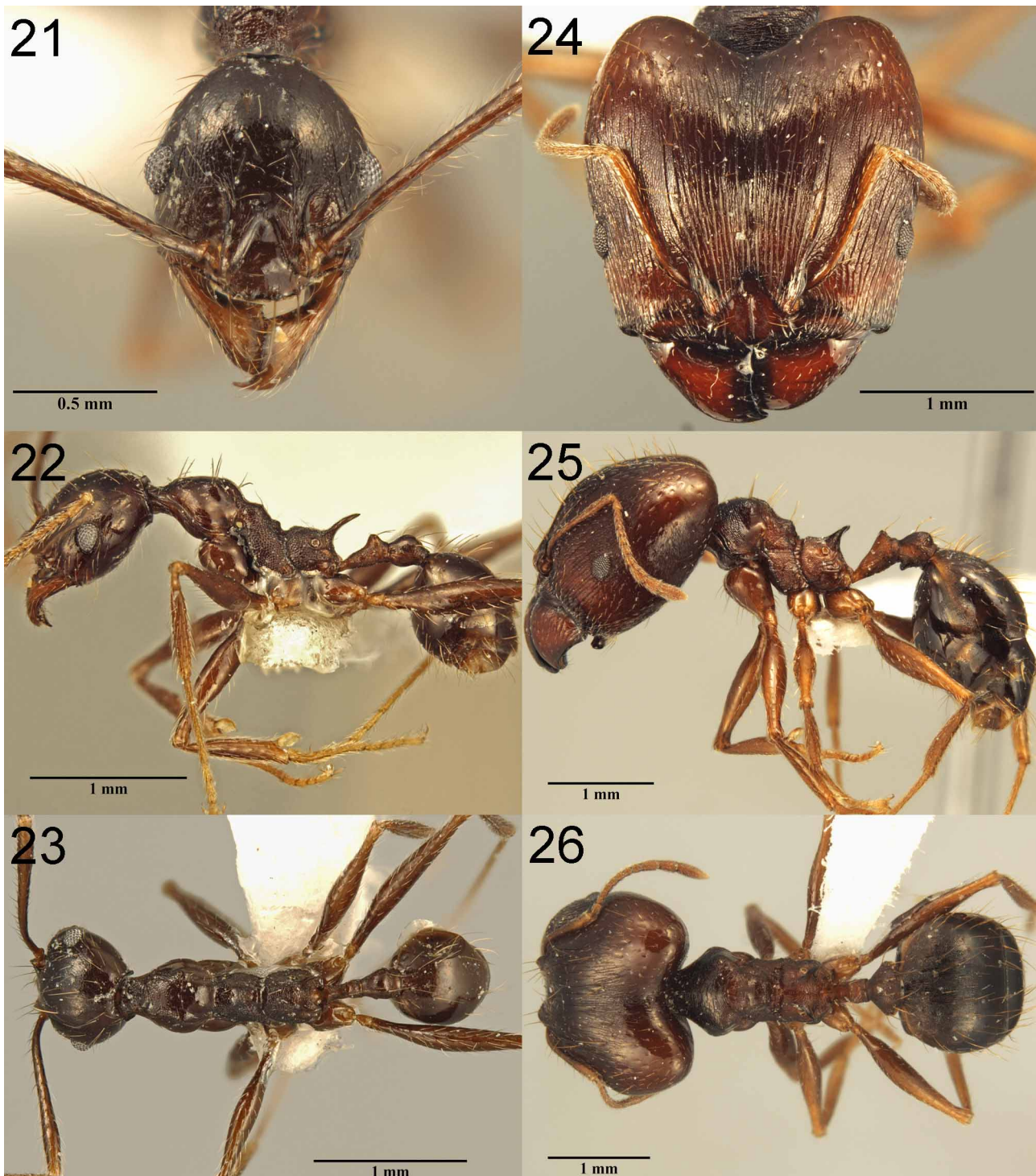


FIGURE 21–26 *P. darwini* sp. n.: full-face, lateral & dorsal view of minor (Fig. 21–23) (Cameroon, CASENT0227962) and major worker (Fig. 24–26) (Gabon, CASENT0218332).

Description of minor worker: Measurements (n=17): HL: 0.772–0.878 (0.838), HW: 0.667–0.756 (0.721), SL: 0.989–1.206 (1.076), MDL: 0.522–0.611 (0.562), EL: 0.161–0.189 (0.171), MFL: 1.133–1.381 (1.277), MTL: 0.878–1.067 (0.981), WL: 1.078–1.254 (1.163), PSL: 0.244–0.300 (0.271), PTH: 0.167–0.189 (0.179), PPH: 0.189–0.222 (0.210), PTL: 0.300–0.356 (0.332), PPL: 0.189–0.244 (0.220), PTW: 0.106–0.128 (0.118), PPW: 0.211–0.256 (0.225), PW: 0.444–0.511 (0.484); CI: 84–89 (86), SI: 139–160 (149), MDI: 75–82 (78), PSLI: 29–35 (32), PWI: 66–68 (67), FI: 169–189 (177), PpWI: 165–211 (191), PpLI: 135–176 (151).

Head elliptical, longer than wide (CI: 84–89), with sides of head rounded towards relatively narrow posterior margin and head margin posterior of eye-level in full-face view with laterally projecting hairs. Occipital carina conspicuous, medially with a weak concavity in full-face view. Dorsum of head smooth and shiny, hexagonally micropunctate to very faintly punctate. Malar space with few short carinae next to antennal insertion ending at posterior eye-level. Scapes moderately long (SI: 139–160), pilosity basally subdecumbent to decumbent, apically subdecumbent to suberect. Dorsopronotum in lateral view flat, anteriorly towards neck weakly punctate, partly overlain by some weak irregular rugulae, posteriorly grading to smooth and relatively steep posterior declivity. Lateropronotum partly to completely smooth and shiny. Both metanotal processes conspicuous and well-developed, sharply angulate, metanotal groove deep and broad. Mesopleuron and propodeum uniformly punctate, dorsopropodeum in lateral view level to declining gently towards base of spines. Propodeal spines moderately long (PSLI: 29–35). Petiole and postpetiole punctate, dorsally superficially and partly smooth. Gaster smooth and shiny, anteriorly with superficially punctate central area, in size not larger than dorsal surface of postpetiole. Pilosity generally abundant with long erect setae and shorter suberect to subdecumbent hairs present. Metatibia with appressed to decumbent pilosity on inner edge, subdecumbent on outer edge. Color medium to dark brown.

Description of major worker: Measurements (holotype): HL: 1.960, HW: 1.960, SL: 1.044, MDL: 1.000, EL: 0.239, MFL: 1.571, MTL: 1.190, WL: 1.476, PSL: 0.356, PTH: 0.322, PPH: 0.400, PTL: 0.556, PPL: 0.356, PTW: 0.222, PPW: 0.500, PW: 0.878; CI: 100, SI: 53, MDI: 51, PSLI: 18, PWI: 45, FI: 80, PeI: 25, PpI: 57, PpWI: 225, PpLI: 156.

Measurements (n=9): HL: 1.980–2.200 (2.099), HW: 1.960–2.225 (2.120), SL: 1.011–1.133 (1.056), MDL: 0.944–1.056 (1.011), EL: 0.239–0.267 (0.251), MFL: 1.556–1.714 (1.623), MTL: 1.206–1.667 (1.293), WL: 1.492–1.651 (1.570), PSL: 0.333–0.389 (0.354), PTH: 0.322–0.378 (0.341), PPH: 0.367–0.467 (0.422), PTL: 0.544–0.667 (0.590), PPL: 0.333–0.389 (0.360), PTW: 0.211–0.267 (0.236), PPW: 0.467–0.589 (0.546), PW: 0.856–0.978 (0.931), CI: 99–104 (101), SI: 49–53 (50), MDI: 42–51 (48), PSLI: 16–18 (17), PWI: 43–45 (44), FI: 75–80 (77), PeI: 24–27 (25), PpI: 55–63 (59), PpWI: 219–252 (231), PpLI: 151–176 (164).

Frons and sides of head weakly to superficially rugose-punctate, grading weaker on anterior posterolateral lobes, posteriorly smooth and shiny, median excavation with a narrow superficially sculptured strip. Laterally and in profile view smooth area extending anteriorly, almost towards eye-level. Pilosity on scape basally appressed, apically decumbent, in addition with three to five erect hairs, distributed along outer edge. Promesonotal outline slightly rounded, mesonotal process subangulate, with relatively steep posterior declivity. Second process inconspicuous, weakly raised carina or narrow ridge present instead. Pronotum transversely to irregularly rugulose-punctate, posterodorsally less rugulose, punctures either slightly weaker or superficial, posterolaterally smooth and shiny or superficially punctate-rugose. Humeral area slightly processed to subangulate laterally, promesonotal declivity smooth, with hexagonal microsculpture. Meso- and metapleuron punctate, dorsopropodeum weakly punctate. In profile, dorsopropodeum anterior to propodeal spines shorter than horizontal width of base of spine. Area between spines and posteropropodeum punctate or weakly punctate, overlain by weak or superficial transverse rugulae, also posterolateral rugae towards metapleural carinae present. Petiole and postpetiole densely punctate, except smooth anterodorsal petiole. Postpetiolar ventral process significantly anteriorly produced. Punctures on anterior half of first gastral tergite grading to hexagonal microsculpture on second half. Long standing, often truncated, hairs relatively abundant on dorsal body, but absent from propodeum. Metatibia with appressed to decumbent pilosity and with subdecumbent to suberect hairs along outer edge. Color brown to dark brown, appendages lighter.

Discussion: *Pheidole darwini*, *P. batrachorum*, and *P. setosa* are the only darkly colored species with minor workers possessing several laterally projecting hairs on the head margin posterior of the eye-level. *Pheidole darwini* can be distinguished from *P. batrachorum* by the following characters: lack of [*darwini*] versus presence of [*batrachorum*] conspicuously impressed punctures on frons and vertex, wider head, shorter scapes, and longer spines (CI: 84–89, SI: 139–160, PSLI: 29–35 [*darwini*] versus CI: 79–86, SI: 153–172, PSLI: 21–29 [*batrachorum*]). From minor workers of *P. setosa* it is separated by: significantly narrower head margin, mostly decumbent to subdecumbent scape pilosity versus decumbent pilosity with additional erect to suberect hairs along outer edge, metatibia pilosity with subdecumbent hairs along outer edge versus uniform pilosity without subdecumbent hairs, and metafemur marginally longer (FI: 169–189 versus 167–168). The major workers are unique in their combination of diagnostic characters, in particular by the three to five erect hairs along the outer edge of the scape. *Pheidole darwini* occurs in Cameroon, Central African Republic and Gabon. The specimens have been collected from sifted leaf-litter and rotten logs.

Additional material examined: CAMEROON: (2 minor workers) Nkoemvon, 1980, M175 (*D. Jackson*); (2 minor workers) Prov. Sud, P.N. Campo, 43.3 km 108° ESE Campo, 290 m, 7.iv.2000, 02° 17.0' N, 10° 12.4' E (*B.L. Fisher*); CENTRAL AFRICAN REPUBLIC: (1 major worker, 2 minor workers) Reserve Dzanga-Ndoki, 37.9 km 169° S Lidjombo, 02° 22' N, 16° 10' E, 360 m, 21.v.2001 (*B.L. Fisher*); GABON: (3 minor workers) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 12.ii.1998 (*B.L. Fisher*); (2 minor workers, 2 major workers) Prov. Ogooue Maritime, Reserve Monts Doudou, 24.3 km 103° NW Doussala, 02° 13.4' S, 10° 24.4' E, 6–11.iii.2000, 375 m (*B.L. Fisher*); (4 major workers) Prov. Ogooue Maritime, Reserve Monts Doudou, 24.3 km 103° NW Doussala, 02° 13.4' S, 10° 24.4' E, 6.iii.2000, 375 m (*B.L. Fisher*); (3 minor workers) Prov. Ogooue Maritime, Reserve Monts Doudou, 24.3 km 303° WNW Doussala, 02° 14.0' S, 10° 23.9' E, 18.iii.2000, 630 m (*B.L. Fisher*).

Pheidole dea Santschi

(Figures 27–35)

Pheidole dea Santschi, 1921: 115. Lectotype (minor worker) [here designated]: D.R. CONGO, Lugombe (*Gérard*) (NHMB) [examined].

Diagnosis: Color brown to dark blackish brown. Minor workers: head shape broadly rounded (CI: 86–93), posterior head margin evenly rounded to weakly compressed. Central area between eyes and posterior pronotum smooth and shiny to superficially punctate or hexagonally microsculptured. Scape and metafemur moderately long (SI: 134–147, FI: 158–174), pilosity decumbent to subdecumbent. Mesopleuron and propodeum uniformly punctuate, edge of first mesonotal process in lateral view rounded. Second process not higher than level of dorsopropodeum, metanotal groove narrow. Postpetiole relatively narrowly developed and short (PpLI: 155–223). Standing hairs almost completely absent from mesosoma, but at least few scattered hairs on head and metasoma. Major workers: rugae in face very strong, almost parallel, some continuing uninterrupted towards posterior head margin. Mesonotal process in lateral view obtuse. Second process conspicuous to reduced, not raised higher than level of dorsopropodeum. In profile, dorsopropodeum anterior to propodeal spines longer than horizontal width of base of spine. Postpetiole relatively narrow, on average less than twice as wide as petiole (PpWI: 177–210). Standing hairs on pronotum mostly absent.

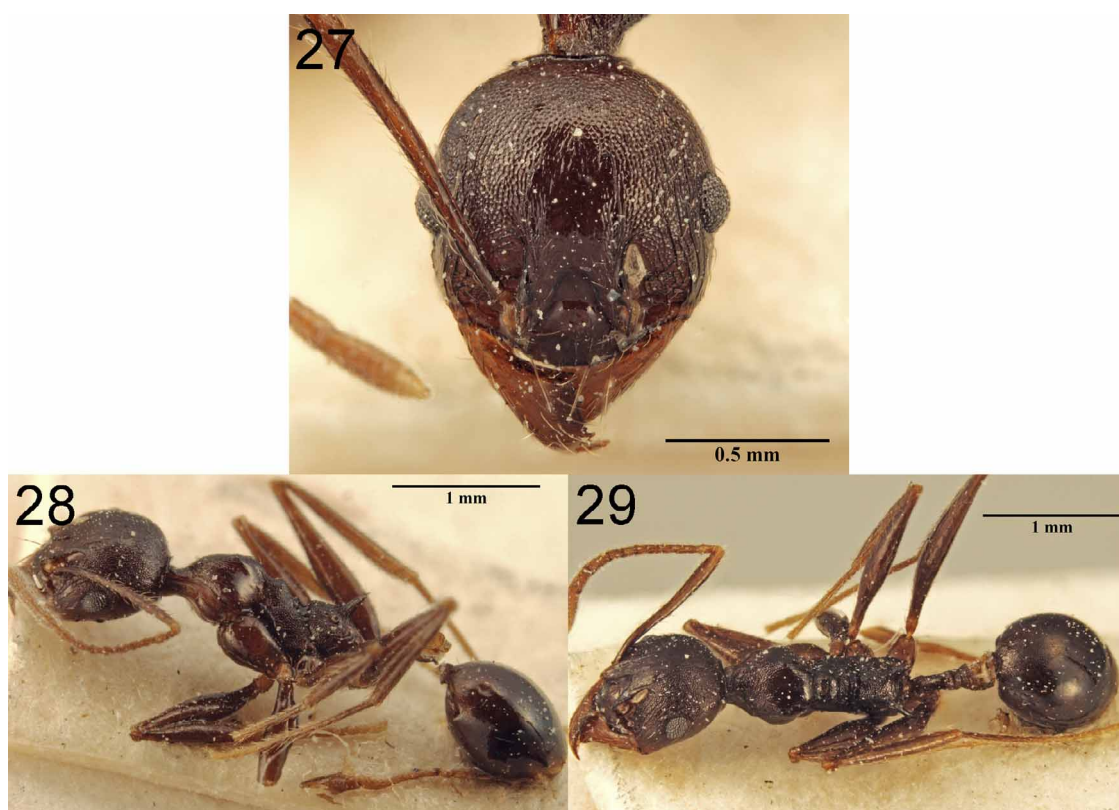


FIGURE 27–29 *P. dea* Santschi lectotype: full-face, lateral & dorsal view of minor worker (Congo, CASENT0227966).

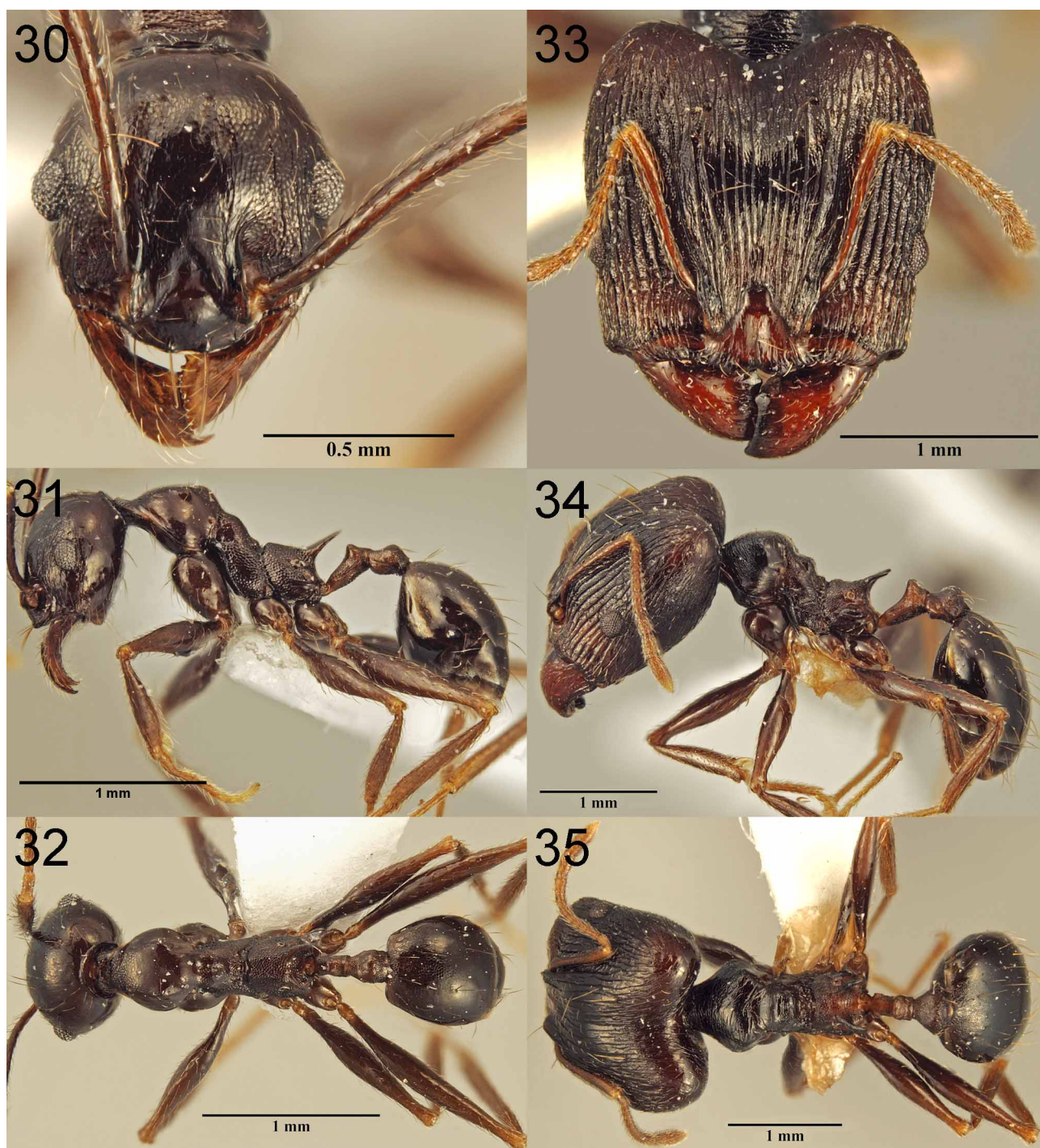


FIGURE 30–35 *P. dea* Santschi non-type: full-face, lateral & dorsal view of minor (Fig. 30–32) (Kenya, CASENT0227964) and major worker (Fig. 33–35) (Kenya, CASENT0227965).

Description of minor worker: Measurements (lectotype): HL: 0.856, HW: 0.944, SL: 1.156, MDL: 0.667, EL: 0.200, MFL: 1.444, MTL: 1.100, WL: 1.333, PSL: 0.278, PTH: 0.200, PPH: 0.244, PTL: 0.367, PPL: 0.222, PTW: 0.144, PPW: 0.244) PW: 0.567, CI: 91, SI: 135, MDI: 78, PSLI: 29, FI: 169, PWI: 66, FI: 169, PpWI: 169, PpLI: 165.

Measurements (n=32): HL: 0.733–0.922 (0.849), HW: 0.656–0.833 (0.759), SL: 0.944–1.144 (1.070), MDL: 0.500–0.611 (0.571), EL: 0.167–0.198 (0.179), MFL: 1.089–1.397 (1.262), MTL: 0.811–1.100 (0.968), WL: 1.011–1.317 (1.159), PSL: 0.200–0.278 (0.243), PTH: 0.156–0.200 (0.178), PPH: 0.156–0.222 (0.195), PTL: 0.256–0.367 (0.318), PPL: 0.144–0.200 (0.182), PTW: 0.106–0.135 (0.121), PPW: 0.167–0.233 (0.204), PW:

0.422–0.533 (0.487); CI: 86–93 (89), SI: 134–147 (141), MDI: 72–79 (75), PSLI: 25–32 (29), PWI: 61–67 (64), FI: 158–174 (166), PpWI: 152–191 (169), PpLI: 156–223 (175).

Head shape broadly rounded (CI: 86–93), convex sides evenly rounding into uncompressed or weakly compressed posterior margin. Occipital carina narrow, face distinctly to superficially punctate, medially at eye-level smooth, hexagonally microsculptured. Punctures laterally on malar area and near eyes slightly stronger, malar carinae long, often faintly continuing towards posterolateral head margin, ending between latter and eye-level. Scape moderately long, in full face view and when laid back, surpassing posterior head margin by about one third of its length (SI: 134–147), with decumbent to subdecumbent pilosity. Pronotal outline in lateral view slightly angulate, humeral area flat to faintly convex. First mesonotal process obtusely angulate to weakly flattened, subangulate and appearing worn. Second process small to almost inconspicuous, with angle at same level as anterior dorsopropodeum. Metanotal groove conspicuous, narrowly impressed, anteropronotum punctate or weakly punctuate. Dorsopronotum, lateropronotum and mesonotum mostly smooth, hexagonally microsculptured. Mesopleuron and propodeum punctuate, dorsopropodeum flatly declining to base of spines. Propodeal spines relatively short (PSLI: 25–32) and often weakly curved or almost straight. Metafemur moderately long (FI: 158–174), metatibia with decumbent pilosity. Petiole and postpetiole lateroventrally and posterodorsally weakly to superficially punctate, upper dorsum smooth. Gaster smooth and shiny, anteriorly with small shagreened to microsculptured spot. Standing hairs moderately long and scarce, sometimes missing on mesosoma, rarely completely absent from dorsal surfaces, except on end of first gastral tergite and posteriorly, also with few shorter subdecumbent hairs on waist segments. In every specimen except holotype, petiole and postpetiole in dorsal view with short, laterally projecting hairs present. Color medium to dark blackish brown.

Description of major worker (previously undescribed): Measurements (n=7): HL: 1.760–1.980 (1.867), HW: 1.780–1.980 (1.873), SL: 1.011–1.089 (1.046), MDL: 0.822–1.000 (0.888), EL: 0.222–0.244 (0.232), MFL: 1.460–1.603 (1.515), MTL: 1.111–1.254 (1.172), WL: 1.460–1.587 (1.519), PSL: 0.294–0.356 (0.326), PTH: 0.267–0.322 (0.307), PPH: 0.322–0.378 (0.347), PTL: 0.456–0.567 (0.507), PPL: 0.289–0.333 (0.309), PTW: 0.200–0.244 (0.222), PPW: 0.378–0.500 (0.431), PW: 0.800–0.878 (0.830); CI: 99–102 (100), SI: 54–57 (56), MDI: 42–51 (47), PSLI: 16–19 (17), PWI: 43–46 (44), FI: 79–83 (81), PeI: 25–29 (27), PpI: 46–58 (52), PpWI: 177–210 (194), PpLI: 155–176 (164).

Face rugose-punctate, with long, subparallel and uninterrupted rugae, continuing (more weakly) to posterolateral lobes. Punctures lateral of frons weak, grading to superficial on frons and corners of lobes. Scape pilosity decumbent. Promesonotal outline rounded dorsally, weakly subangulate posteriorly towards pronotal declivity. Anteropronotum irregularly and weakly rugose-punctate, grading to superficially sculptured or almost smooth on posteropronotum and pronotal declivity, posterior lateropronotum smooth and shiny. First mesonotal process strongly produced, obliquely angulate. Dorsal mesonotum partially to completely smooth, or faintly rugulose on posterior mesonotal process. Second mesonotal process in some specimens low and conspicuous, in others short and reduced to a weakly raised ridge. Metanotal groove narrow and conspicuously impressed. In profile, dorsopropodeum anterior to propodeal spines of equal length or slightly longer than horizontal width of base of spines, in dorsal view sometimes with smooth median area. Propodeal spines strongly and massively developed, posteropropodeum weakly to superficially transversely rugulose-punctate. Punctures on mesopleuron and metapleuron weak to superficial, posterior metapleuron ventrally of spiracle smooth. Metapleural gland scrobe and carinae weak. Metatibia pilosity relatively short, appressed to decumbent. Smooth median strip on anterodorsal petiole very narrow. Postpetiole usually relatively narrow (PpWI: 177–210), on average almost twice as wide as petiole, laterally weakly angulate to rounded, posterolateral flange narrow to inconspicuous, ventral process short and weakly developed. Gaster anteriorly, near articulation to postpetiole, weakly punctate or shagreened, rest smooth and shiny, hexagonally microsculptured. Long standing hairs present on head, postpetiole, and gaster, absent to almost absent on mesosoma, rarely with one pair present on posterolateral dorsopronotum, absent on petiole.

Discussion: *Pheidole dea* was described from two minor workers, one of which is destroyed except for the postpetiole and gaster. Unfortunately the postpetiole of the lectotype is also partly destroyed, thus the postpetiole measurements of the lectotype may be not as accurate as the other measurements. New material from three East African countries reveals distinct variation in head sculpture of the minor worker among the different localities. The *P. dea* lectotype most closely resembles the minor workers from Tanzania. Both possess the same distinct punctures (excluding the smooth central area at eye-level) in the face on frons and vertex, in which they differ from the minor workers found in Kenya and Uganda, which have only weak to superficial sculpture on frons and vertex.

The *P. dea* lectotype lacks conspicuous pilosity, other than short decumbent to subdecumbent pubescence, and a few long hairs on the third gastral tergite, but this could be due to abrasion of this old specimen. Although standing hairs in the new material of *P. dea* can be strongly reduced, some hairs usually remain on the head or first gastral tergite. Additionally, the waist segments are endowed with some shorter, posteriorly and laterally projecting hairs, which are also absent in the lectotype. However, in a closer examination of the latter, the typical and faintly elevated punctures, where standing hairs are inserted, were found on head and mesosoma. This suggests the hairs were probably lost prior to or after its collection. Other significantly differentiating characters could not be observed. The species most similar to *P. dea* is *P. semidea*. Minor workers of the latter possess a relatively broader and longer postpetiole (PpWI: 173–200 and PpLI: 126–167 [*semidea*] versus PpWI: 152–191 and PpLI: 156–223 [*dea*]). In *P. semidea* the second mesonotal process in lateral view is slightly raised above the level of the dorsopropodeum and usually up to three pairs of centrally inclined, moderately long hairs are found on the anterior, lateral and posterior corners of the promesonotal dorsum. The major workers of *P. semidea* possess an irregular pattern of longitudinal rugae on the frons, joined by a few cross-meshes on the vertex and oblique rugulose-punctate sculpture on the posterolateral lobes versus regular longitudinal rugae from frons to vertex in *P. dea*. They also have a higher situated second mesonotal process and, on average, a slightly longer and wider postpetiole (PpLI: 154, PpWI: 211 versus PpLI: 164, PpWI: 194).

The new material of *P. dea* has been collected in four forests in Eastern Africa: Kakamega Forest in Western Kenya, Rabongo Forest and Budongo Forest in Uganda, and Gombe in Tanzania. In Kakamega *P. dea* is among the more rarely collected *Pheidole* species, only found in 26 out of 800 pitfall-traps, where it constituted 2.2 % of all *Pheidole* individuals collected (in winkler samples 0.2 %). Stable isotope measurements of several Kakamega specimens revealed that *P. dea* had the highest $\delta^{15}\text{N}$ value among its congeners from the same location (unpublished). Its trophic position is in the third trophic level of the local food network, indicating that it is probably a more specialized predator than other *Pheidole* species. Details about its diet, however, remain unknown.

Additional material examined: KENYA: (4 major workers, 8 minor workers) Kakamega District: Isecheno Forest Reserve, 1600 m 8.ii.2002 (*R.R. Snelling*); (1 minor worker, 1 major worker) Kakamega Forest, Colobus, 00° 21' 4.9" N, 34° 51' 41.1" E, 12.vi.2007, 1650 m (*M. Peters*); (1 minor worker, 1 major worker) Kakamega Forest, Buyangu, 00° 20' 53.6" N, 34° 51' 54.1" E, 12.vii.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Isecheno B, 00° 14' 52.3" N, 34° 52' 5.3" E, vi.2008, 1650 m (*F. Hita Garcia*); (1 minor worker) Kakamega Forest, Salazar, 00° 19' 36" N, 34° 52' 14.6" E, 21.vi.2007, 1650 m (*S. Maurer*); (1 minor worker) Kakamega Forest, Malawa East, 00° 27' 15.7" N, 34° 51' 48.8" E, 03.vii.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Yala, 00° 12' 9" N, 34° 52' 6" E, v.2008, 1650 m (*M. Peters*); (2 minor workers) Kakamega Forest, Udo's camp, 00° 21' 7.9" N, 34° 52' 2.6" E, 02.vii.2007, 1650 m (*G. Fischer*); (2 minor workers) Kakamega Forest, Malawa West, 00° 27' 0.9" N, 34° 50' 52.9" E, 03.vii.2007, 1650 m (*G. Fischer*); (1 minor worker) Kakamega Forest, Kisere, 00° 23' 6.2" N, 34° 53' 37.8" E, 16.vii.2007, 1650 m (*F. Hita Garcia*); (1 minor worker) Kakamega Forest, Salazar, 00° 19' 36" N, 34° 52' 14.6" E, 21.vi.2007, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Yala, 00° 12' 09.9" N, 34° 52' 52.6" E, 19.vi.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Salazar, 00° 19' 36" N, 34° 52' 14.6" E, 09.iii.2009, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Colobus, 00° 21' 05" N, 34° 51' 41" E, vii.2009, 1650 m (*G. Fischer*); (9 minor workers) Kakamega Forest, Malawa East, 00° 27' 10.6" N, 34° 51' 48.7" E, 19.vi.2007, 1650 m (*G. Fischer*); (1 minor worker) Kakamega Forest, Kisere, 00° 23' 07" N, 34° 53' 32.7" E, 24.vi.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Malawa East, 00° 27' 13.8" N, 34° 51' 44.6" E, 26.vi.2002, 1650 m (*M. Peters*); (3 minor workers) Kakamega Forest, Yala, 00° 13' 15.5" N, 34° 55' 52.3" E, 23.viii.2007, 1650 m (*F. Hita Garcia*); (1 minor worker) Kakamega Forest, Colobus, 00° 21' 18.5" N, 34° 51' 30.1" E, 14.vi.2007, 1650 m (*M. Peters*); (1 minor worker) 00° 12' 58.5" N, 34° 55' 56.6" E, Kakamega Forest, Ikuywa, 20.vi.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Ikuywa, 00° 13' 13.8" N, 34° 55' 52.1" E, 20.vi.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, vi./vii.2002, 1653 m (*M. Peters*); Kakamega Forest, (2 minor workers) Kisere, 00° 23' 6.2" N, 34° 53' 37.8" E, 16.vii.2007, 1650 m (*F. Hita Garcia*); (1 minor worker) Kakamega Forest, Ikuywa, 20.vi.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Isecheno B, 00° 15' 16.6" N, 34° 52' 06.1" E, 18.vi.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Isecheno B, 00° 14' 52.3" N, 34° 52' 5.3" E, vi.2008, 1650 m (*F. Hita Garcia*); (1 minor worker) Kakamega Forest, Kisere, 00° 23' 07" N, 34° 53' 32.7" E, 17.vi.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Kisere, 00° 23' 07" N, 34° 53' 32.7" E, 01.vii.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Kisere, 00° 23' 03.1" N, 34° 53' 38.8" E, 24.vi.2002, 1650 m (*M. Peters*); (6 minor workers)

Kakamega Forest, Malawa East, 00° 27' 20.2" N, 34° 51' 39.1" E, 26.vi.2002, 1650 m (*M. Peters*); (5 minor workers) Kakamega Forest, Malawa East, 00° 27' 20.2" N, 34° 51' 39.1" E, 03.vii.2002, 1650 m (*M. Peters*); (2 minor workers) Kakamega Forest, Malawa East, 00° 27' 13.8" N, 34° 51' 44.6" E, 03.vii.2002, 1650 m (*M. Peters*); (1 minor worker) Kakamega Forest, Malawa East, 00° 27' 15.7" N, 34° 51' 48.8" E, 19.vi.2002, 1650 m, (*M. Peters*); TANZANIA: (3 major workers, 16 minor workers) Gombe Stream N.P., 04° 42' S, 29° 37' E, 790 m, 11.i.2010 (*R. O'Malley*); UGANDA: (3 minor workers) Bunyoro District, Budongo Forest FS, 01° 43.583' N, 31° 33.142' E, 1081 m, 08.vii.09 (*W. Freund & T. Klug*); (2 minor workers) Murchinson Falls NP, Rabongo Forest, 02° 04.431' N, 31° 51.974' E, 958 m, 11.vii.09 (*W. Freund & T. Klug*).

***Pheidole glabrella* sp. n.**

(Figures 36–41)

Holotype: (major worker) CAMEROON, Ebodije, 4.xi.91 (*A. Dejean*) (BMNH: CASENT0227950). Paratypes: (2 major workers, 6 minor workers) same data as holotype (BMNH: CASENT0227951, CASENT0227952, CASENT0227953).

Diagnosis: Color reddish brown to dark brown. Minor workers: head shape broadly rounded, with rounded to slightly compressed posterior head margin (CI: 88–95). Scares short to moderately long (SI: 123–141) with appressed to decumbent pilosity. Promesonotum and parts of meso- and metapleuron smooth and shiny to superficially punctate, second mesonotal process usually shallow, spines relatively long and massive (PSLI: 28–40). Pilosity on metatibia mostly appressed, standing hairs scarce to practically absent from dorsum of entire body, completely absent from mesosoma. Major workers: head irregularly rugose-punctate, rugae of varying lengths, punctures weak to superficial with smooth areas between rugae. Scares relatively short (SI: 49–53), with appressed pilosity. Pronotum irregularly and transversely rugulose, declivity smooth and shiny. Metanotal groove broad, in profile view, dorsopropodeum anterior to propodeal spines shorter than horizontal width of base of spines. Metatibia pilosity fully appressed, standing hairs rare, absent from mesosoma.

Description of minor worker: Measurements (n=26): HL: 0.722–0.922 (0.851), HW: 0.667–0.856 (0.779), SL: 0.876–1.133 (1.022), MDL: 0.511–0.633 (0.576), EL: 0.167–0.194 (0.181), MFL: 1.044–1.349 (1.224), MTL: 0.789–1.044 (0.951), WL: 1.011–1.286 (1.162), PSL: 0.200–0.356 (0.282), PTH: 0.167–0.206 (0.185), PPH: 0.183–0.239 (0.212), PTL: 0.267–0.367 (0.336), PPL: 0.178–0.233 (0.198), PTW: 0.106–0.133 (0.121), PPW: 0.183–0.267 (0.225), PW: 0.456–0.557 (0.506); CI: 88–95 (92), SI: 123–141 (131), MDI: 71–78 (74), PSLI: 28–40 (33), PWI: 61–68 (65), FI: 143–170 (157), PpWI: 165–210 (186), PpLI: 142–206 (170).

Head shape in full-face view posterior of eyes roundly convex to compressed, posterior margin rounded to weakly flat (CI: 88–95). Occipital carina narrow, mandibles smooth and shiny dorsally. Clypeus without or rarely with short submedian carinae and with inconspicuous and short lateral carinae. Face smooth with hexagonal microsculpture, weakly to superficially punctate laterally near eyes, malar carinae weak, disappearing posterior of eyes. Scape, when laid back, surpassing posterior head margin by more than one quarter of its length (SI: 123–141) and with appressed to decumbent pilosity. Promesonotum in lateral view flat and subangular, completely smooth and shiny to superficially punctate. First mesonotal process conspicuously produced, with worn appearance, due to complete lack of sculpture, other than hexagonal microsculpture. Second process shallow and worn, very rarely more conspicuous. Mesopleuron and propodeum weakly to superficially punctate to almost smooth, intensity also varying with viewing-angle. Episternum, anterior lateropropodeum, and dorsopropodeum often with smooth spots, metapleural carina and gland scrobe developed. Spines mostly very long (PSLI: 28–40), relatively massive basally, short rugulae radiating medially and posteroventrally from their bases. Metanotal groove conspicuously U-shaped in lateral view. Metafemur moderately to relatively long (FI: 143–170), metatibial pilosity appressed. Petiole and postpetiole punctate laterally and ventrally, peduncle and nodes dorsally polished smooth. First gastral tergite shagreened anteriorly, grading to smooth and shiny posteriorly. Mesosoma lacking long standing hairs dorsally, but moderately long hairs present on posterior end of gaster, in some specimens also on anterior gaster and on head. Head or postpetiole or both with additional appressed inconspicuous pubescence, sometimes with very few short decumbent to subdecumbent hairs. Color reddish brown, appendages and head margin near lateral base of mandibles in lighter shade.

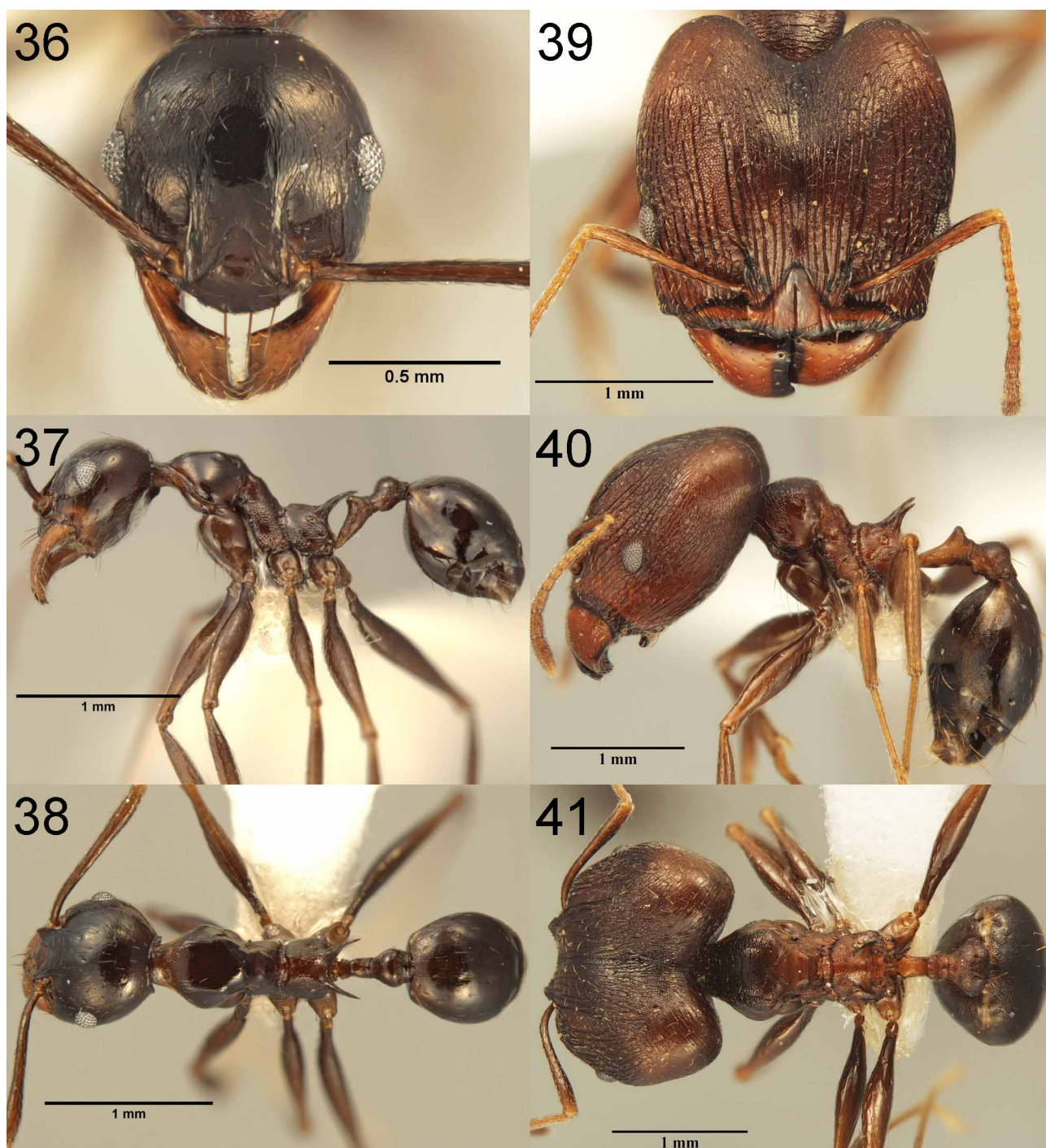


FIGURE 36–41: *P. glabrella* sp. n.: full-face, lateral & dorsal view of minor (Fig. 36–38) (Cameroon, CASENT0227951) and major worker (Fig. 39–41) (Cameroon, CASENT0227950).

Description of major worker: Measurements (holotype): HL: 1.800, HW: 1.800, SL: 0.956, MDL: 0.778, EL: 0.222, MFL: 1.397, MTL: 1.067, WL: 1.349, PSL: 0.311, PTH: 0.300, PPH: 0.333, PTL: 0.489, PPL: 0.300, PTW: 0.200, PPW: 0.411, PW: 0.744; CI: 100, SI: 53, MDI: 43, PSLI: 17, PWI: 41, FI: 78, PeI: 27, PpI: 55, PpWI: 206, PpLI: 163.

Measurements (n=5): HL: 1.820–2.125 (1.974), HW: 1.840–2.150 (2.015), SL: 0.944–1.078 (1.024), MDL: 0.778–0.967 (0.878), EL: 0.228–0.267 (0.246), MFL: 1.429–1.635 (1.537), MTL: 1.089–1.270 (1.192), WL: 1.381–1.619 (1.524), PSL: 0.311–0.367 (0.342), PTH: 0.300–0.356 (0.333), PPH: 0.344–0.444 (0.392), PTL: 0.467–0.567 (0.536), PPL: 0.311–0.344 (0.329), PTW: 0.200–0.261 (0.232), PPW: 0.428–0.544 (0.483), PW: 0.800–0.944 (0.880); CI: 99–105 (102), SI: 49–53 (51), MDI: 42–45 (44), PSLI: 16–18 (17), PWI: 42–44 (44), FI: 75–79 (76), PeI: 24–28 (26), PpI: 50–59 (55), PpWI: 186–222 (209), PpLI: 145–170 (163).

Some rugae on frons long and others short or interrupted, posterolateral lobes weakly and obliquely rugulose-punctate to smooth on corners or weakly reticulate. Sides of head laterally of antennal scrobe weakly rugose-reticulate or irregularly rugose, punctures weak to superficial and sometimes smooth areas present between sculpture. Scapes relatively short (SI: 49–53), with appressed pilosity. Promesonotum in lateral view in some specimens short, dorsally nearly flat and posteriorly slightly compressed, with steep and long declivity, in other specimens longer and rounding into posterior declivity. Anteropronotum dorsally and laterally with irregularly distributed transverse rugulae, in between with weak to superficial punctures, grading to smooth and shiny promesonotal declivity dorsally and posteropronotum laterally. Humeral area laterally weakly processed and angulate, mesonotal process shallow to well-produced, dorsally smooth with oblique angle or right-angled and steeply declining. Second mesonotal process inconspicuous, at most visible as weak ridge, metanotal groove broad and shallow. Dorso-propodeum very short and in profile view anterior to propodeal spines significantly shorter than horizontal width of base of spines, weakly punctate, but with dense punctures lateroventrally. Meso- and metapleuron weakly to superficially punctate, smooth and shiny around metapleural carina, metapleural gland scrobe absent or inconspicuous. Transverse rugula(e) present posteriorly between spines, posteropropodeum otherwise weakly punctate. Metatibia with fully appressed pilosity. Petiole (except anterodorsally) and postpetiole punctate to weakly punctate, the latter posterodorsally with weak irregular rugulae. First gastral tergite shagreened, posteriorly hexagonally microsculptured. Long standing hairs very rare on head, postpetiole and dorsal gaster, their apices blunt or truncate, on mesosoma completely absent. Color reddish brown, gaster dark brown.

Discussion: Minor and major workers show a relatively great degree of variability in size and sculpture, especially between the type specimens from Cameroon and the material from the Central African Republic and Gabon. Minors from the Central African Republic differ from the types in a more variable sculpture on the mesonotum, mesopleuron and propodeum. The latter is almost smooth in some specimens versus strongly punctate in others. The minor workers of the type series possess a smooth mesonotum and superficially sculptured mesopleuron and propodeum. Majors from Gabon are differentiated from the type majors by the absence of punctate sculpture between the rugae on the head, and in lateral view a longer, rounded promesonotum. They are also more than 10 percent larger than the majors from the type series, although the indices are not significantly different between the two populations. Other than these differences, all specimens share the same morphometric profile and overall habitus. This, and the fact that intermediate forms are present in the minor subcaste, is in support of a one-species hypothesis. Still, there is a small probability that the different populations could turn out to be heterospecific, if more material from other sites and particularly from the major worker subcaste becomes available.

The species most similar to *Pheidole glabrella* is *P. rebecca*. The minor workers of the latter are separated from those of the former by a slightly less convex posterior head margin, and shorter scapes (SI: 114–121 versus SI: 123–141), spines (PSLI: 25–30 versus PSLI: 28–40) and legs (FI: 133–139 versus FI: 143–170). The major workers of *P. rebecca* differ from those of *P. glabrella* by longer and uninterrupted rugae in the face, a narrow versus broad metanotal groove, and significantly more standing hairs on all dorsal surfaces, except the propodeum. *P. glabrella* has a West to Central African distribution, from Cameroon to the D.R. Congo, where several minor workers were collected by the American Museum Congo Expedition together with and included in the type series of *P. batrachorum*. The other material has been collected in rainforests from sifted leaf-litter, rotten logs, and beating of the lower vegetation.

Additional material examined: CAMEROON: (7 minor workers) Prov. Sud, P.N. Campo, 43.3 km 108° ESE Campo, 290 m, 7.iv.2000, 02° 17.0' N, 10° 12.4' E (*B.L. Fisher*); (1 minor worker) Mbalmayo, xi.1993 (*N. Stork*); CENTRAL AFRICAN REPUBLIC: (1 minor worker) Reserve Dzanga-Sangha, 12.7 km 326° NW Bayanga, 03° 00.27' N, 16° 11.55' E, 420 m, 11–17.v.2001 (*S. van Noort*); (2 minor workers) P.N. Dzanga-Sangha, 38.6 km 173° S Lidjombo, 02° 21.60' N, 16° 03.20' E, 350 m, 21–27.v.2001 (*S. van Noort*); (1 minor worker) P.N. Dzanga-Ndoki, 21.4 km 53° NE Bayanga, 03° 02.01' N, 16° 24.57' E, 510 m, 3.v.2001 (*S. van Noort*); (5 minor workers) Reserve Dzanga-Ndoki, Mabea Bai, 21.4 km 53° NE Bayanga, 03° 02' N, 16° 25' E, 510 m, 1–07.v.2001 (*B.L. Fisher*); (2 minor workers) Reserve Dzanga-Ndoki, 37.9 km 169° S Lidjombo, 02° 22' N, 16° 10' E, 360 m, 21.v.2001 (*B.L. Fisher*); (1 minor worker) Reserve Dzanga-Sangha, 12.7 km 326° NW Bayanga, 03° 00' N, 16° 12' E, 470 m, 10–17.v.2001 (*B.L. Fisher*); D.R. CONGO: (5 major workers, among syntypes of *P. batrachorum*) Akenge (*H.O. Lang*); GABON: (2 minor workers) Prov. Ogooue Maritime, Reserve Moukalaba, 12.2 km 305° NW Doussala, 110 m, 02° 17.0' S, 10° 29.8' E, 24.ii.2000 (*B.L. Fisher*); (5 minor workers) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 12.ii.1998 (*B.L. Fisher*); (2 major workers, 4 minor workers)

Prov. Ogooue Maritime, Reserve Monts Doudou Moukalaba, 12.2 km 305° NW Doussala, 110 m, 02° 17.0' S, 10° 29.8' E, 24.ii.–3.iii.2000 (*B.L. Fisher*); (1 minor worker, 1 major worker) Prov. Ogooue Maritime, Reserve Monts Doudou, 25.2 km, 304° NW Doussala, 02° 13.60' S, 10° 23.70' E, 14.iii.2000, 640 m (*B.L. Fisher*).

***Pheidole heliosa* sp. n.**

(Figures 42–47)

Holotype: (major worker) IVORY COAST, vic. Abidjan, 1976, no. 10 (*T. Diomande*) (BMNH: CASENT0227945). Paratypes: (8 minor workers) same data as holotype (BMNH: CASENT0227946, CASENT0227947, CASENT0227948, CASENT0227949).

Diagnosis: *Pheidole heliosa* is the largest species in the *P. pulchella* group, with a long mesosoma and a wide pronotum. Color orange, major worker darker. Minor workers: head shape elongated, 1.25 times longer than wide. Occipital carina strongly developed and relatively broad. Scapes, legs and mandibles longest within the group, scape pilosity subdecumbent to suberect. Highest number of standing hairs on head and mesonotum within the group, also with laterally projecting hairs on meso- and metapleuron. Second metanotal process long and pronounced, postpetiole spheroidal in lateral view. Major worker: antennal scrobe absent, head margin with laterally projecting hairs. Promesonotal dome lower and longer than in other species of this group, in lateral view almost continuous with mesonotal processes. Propodeal spines straight, not curved posteriorly. Standing hairs abundant everywhere, including on dorsopropodeum and laterally on meso- and metapleuron.

Description of minor worker: Measurements (n=8): HL: 1.056–1.089 (1.074), HW: 0.778–0.822 (0.798), SL: 1.302–1.429 (1.353), MDL: 0.639–0.800 (0.685), EL: 0.167–0.200 (0.176), MFL: 1.600–1.740 (1.678), MTL: 1.381–1.476 (1.427), WL: 1.600–1.740 (1.678), PSL: 0.294–0.400 (0.324), PTH: 0.189–0.211 (0.198), PPH: 0.233–0.278 (0.249), PTL: 0.367–0.422 (0.385), PPL: 0.267–0.283 (0.276), PTW: 0.122–0.133 (0.128), PPW: 0.261–0.300 (0.273), PW: 0.567–0.611 (0.594); CI: 73–76 (74), SI: 162–174 (170), MDI: 79–99 (86), PSLI: 28–37 (30), PWI: 73–76 (74), FI: 206–213 (210), PpWI: 200–232 (214), PpLI: 129–152 (140).

Head about 1.25 times longer than wide, longest within group (CI: 73–76), sides of head posterior of eye level elongated and converging evenly towards posterior margin. Occipital carina conspicuous and broad, almost collar-like. Mandibles very long (MDI: 79–99), with strong rugulae laterally, grading to smooth masticatory margin. Clypeus smooth with short to inconspicuous lateral carinae. Face smooth, hexagonally microsculptured, malar carinae interrupted, ending posterior of eye level. Frontal carina developed but weak, ending at eye-level, space near antennal insertion surrounded by conspicuous carina. Scape long, longest within group (SI: 162–174), in full face view and when laid back, surpassing posterior margin by more than one quarter to one third of its length, with subdecumbent to suberect pilosity, about twice as long as scape diameter. Pronotum wide (PWI: 73–76), outline in lateral view elongate convex, rounded towards posterior declivity, smooth, only neck weakly punctured. Humeral area laterally with short superficial carina, in dorsal view posterior of highest point of pronotum lacking lateral process. Mesonotal processes conspicuous and well-developed, second process almost as long as first. Both processes, mesopleuron and propodeum weakly punctate. Metanotal groove relatively narrow, conspicuously impressed, dorsopropodeum with highest point immediately at metanotal groove, weakly declining towards base of spines. Propodeal spines moderately long (PSLI: 28–37), metafemur very long (FI: 206–213), and metatibial pilosity on inner edge subdecumbent, outer edge with longer suberect to subdecumbent hairs. Petiole and postpetiole smooth dorsally, weakly to superficially punctate ventrally. Postpetiole in lateral view spheroidal and widest within *pulchella* group (PpWI: 200–232). Gaster smooth, hexagonally micropunctate. Standing hairs very abundant, slender and acute, of varying lengths, on mesonotum, propodeum and waist segments relatively short, on mesosoma not restricted to dorsal surfaces, also abundant lateroventrally (best visible in oblique dorsolateral view). Color yellow to light orange.

Description of major worker: Measurements (holotype): HL: 2.450, HW: 2.350, SL: 1.238 MDL: 1.300, EL: 0.267, MFL: 1.980, MTL: 1.640, WL: 2.100, PSL: 0.272, PTH: 0.422, PPH: 0.544, PTL: 0.611, PPL: 0.422, PTW: 0.311, PPW: 0.700, PW: 1.067; CI: 96, SI: 53, MDI: 55, PSLI: 11, PWI: 45, FI: 84, PeI: 29, PpI: 66, PpWI: 225, PpLI: 145.

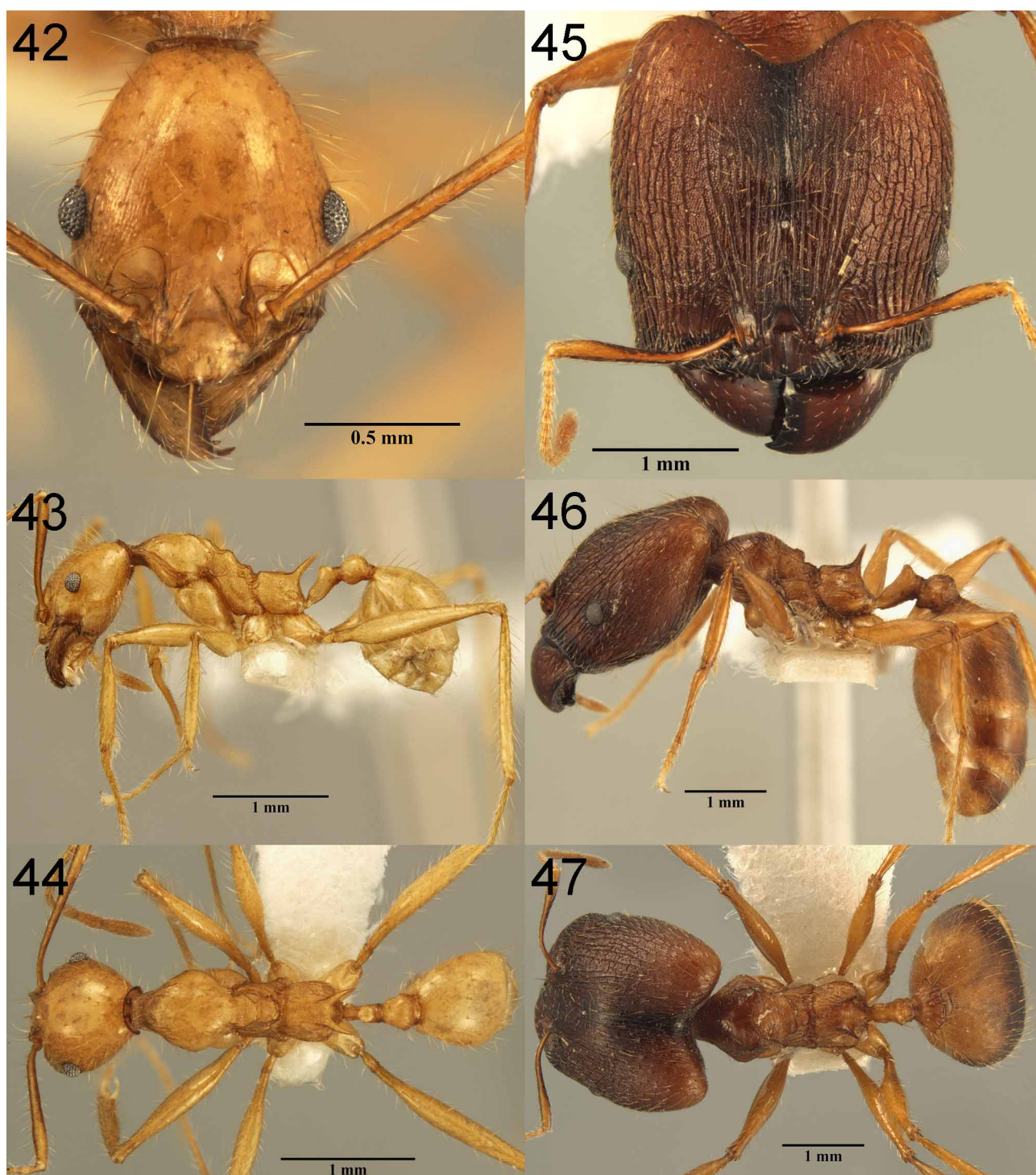


FIGURE 42–47 *P. heliosa* sp. n.: full-face, lateral & dorsal view of minor (Fig. 42–44) (Ivory Coast, CASENT0227945) and major worker (Fig. 45–47) (Ivory Coast, CASENT0227946).

Head longer than wide (CI: 96), mostly rugose-punctate, with short appressed to decumbent pubescence and in frontal view with several laterally projecting hairs. Median ocellus developed, small. Mandible relatively long (MDI: 55). Median part of clypeus smooth, with conspicuous median and several weak submedian carinae. Frons longitudinally rugose-punctate, spaces in between weakly punctate, rugae reaching posterior margin only at median emargination, grading from weak to superficial rugulae on posterolateral lobes. Sides of head laterally of frons rugose-reticulate, punctate, in full-face view with several standing hairs projecting beyond lateral margin. Frontal carinae inconspicuous and short, antennal scrobe absent to inconspicuous. Promesonotum, in lateral view elongated and medially raised, dorsally, antero- and dorsolaterally rugose-reticulate, mediodorsally and posterolaterally

mostly smooth with few short rugae present. Humeri weakly vertically processed, sharply marginate and rugose-reticulate. Mesonotal process uniquely shaped, broadly and squarely raised above shallowly declining mesonotal declivity, marginate and partly punctate, partly rugose-reticulate, and falling steeply to a shallow, but extensively produced, medially flexed, and posteriorly marginate second mesonotal process. Metanotal groove very narrowly impressed in lateral view. Meso- and metapleuron weakly punctate, with several weak to superficial irregular rugulae, metapleural carinae very conspicuous, flange-like produced laterally. In lateral view dorsopropodeum anterior to propodeal spines almost level and about as long as spines, weakly punctate, laterodorsally very densely punctate. Propodeal spines relatively short (PSLI: 11), facing almost straight up, not curved posteriorly. Posteropropodeum punctate, partly overlain by superficial rugulae. Petiole laterodorsally and ventrally densely punctate, smooth dorsal area on peduncle laterally marginate. Postpetiole relatively wide compared to pronotal width (PpI: 66) and with strong ventral process, densely punctate, anterodorsally with short longitudinal, on highest point with interrupted longer transversal rugulae. First gastral tergite densely shagreened. Whole body with abundant, long, slender fili-form standing hairs of varying lengths. Lateroventrally on pronotum and laterodorsally on propodeum with abundant suberect hairs, best visible in dorsal view. Scape with relatively short decumbent pilosity, metafemur with longer subdecumbent pilosity. Color of antennae, mesosoma, metasoma and occipital corners reddish orange, rest of head darker.

Discussion: The species most similar to *Pheidole heliosa* are *P. christinae* and *P. pulchella*, especially in color (yellow to orange). All of them share the laterally projecting hairs on the head margin anterior and posterior of eye-level, which separates them from the group of darkly colored species with laterally projecting hairs only posterior of eye-level or completely without. Minor workers of *P. christinae* and *P. pulchella* differ from *P. heliosa* in shape of the promesonotum, in lateral and dorsal view (PWI: 64–70 and 64–68 versus PWI: 73–76), especially in the development of the second mesonotal process, which in dorsal view is short and narrow [*christinae*] or inconspicuous [*pulchella*] versus long and broad [*heliosa*]. *Pheidole pulchella* differs from the other two orange colored species in scape and metafemur pilosity, which is short and decumbent [*pulchella*] versus longer and subdecumbent to erect [*christinae* and *heliosa*]. The *P. heliosa* type series has been collected in the Ivory Coast, additional minor workers are from Cameroon and were found in sifted leaf-litter.

Additional material examined: CAMEROON: (1 minor worker) Prov. Sud Ouest, Korup NP, 6.9 km 417° NW Mundemba, 19.iv.2000, 110 m, 05° 1.0' N, 8° 51.8' E (B.L. Fisher).

Pheidole nimba Bernard

(Figures 48–50)

Pheidole nimba Bernard, 1953: 224, fig. 8. Syntypes (2 minor workers): GUINEA, Nion, 1300 m, maqun crête lamothe (F. Bernard) “No. 228 types” (MNHN) [examined].

Diagnosis: *Pheidole nimba* is the species with the most extensive and strongest sculpture in this group. Color is dark brown. Minor worker: head shape rounded (CI: 90), with medially impressed occipital carina. Uniformly and coarsely punctate on all dorsal surfaces from clypeus to anterior half of first gastral tergite, except smooth triangular spot between frontal carinae, and spaces between cross-ribs of metanotal groove. Standing hairs present on head, meso- and metasoma, moderately long and stiff. Scape and metatibia pilosity decumbent.

Description of minor worker: Measurements (syntype): HL: 0.856, HW: 0.767, SL: 0.989, MDL: 0.578, EL: 0.189, MFL: 1.133, MTL: 0.889, WL: 1.156, PSL: 0.233, PTH: 0.178, PPH: 0.211, PTL: 0.356, PPL: 0.233, PTW: 0.122, PPW: 0.222, PW: 0.517; CI: 90, SI: 129, MDI: 75, PSLI: 27, PWI: 67, FI: 148, PpWI: 182, PpLI: 152.

Head longer than wide (CI: 84–90), almost elliptical, with posterior margin weakly compressed. Face strongly punctate, median part of clypeus weakly punctate, median carina conspicuous and short, lateral carinae well-developed. Punctures on malar area overlain by weak to irregular rugulae, ending at eye-level. Occipital carina narrow, medially conspicuously impressed, scapes relatively short (SI: 129), with decumbent pilosity. Promesonotal outline weakly convex in lateral view, subangulate towards posterior declivity. Mesonotal process flatly produced, angulate, declivity long and straight. Second mesonotal process more shallowly produced, similar in shape to first process, metanotal groove conspicuous and deep. Dorsopropodeum in lateral view distinctly declining towards propodeal declivity. Mesosoma strongly punctate except small superficially sculptured spot on posterior lateropronotum, punctures on anteropronotum overlain with weak and irregular transverse rugulae. Propodeal spines and

metafemur moderately short (PSLI: 27, FI: 148), metatibia with decumbent pilosity. Petiole and postpetiole densely punctate dorsally, except anterodorsal surface of petiole ventrally punctate. Anterior half of first gastral tergite punctate, posterior half shagreened. Standing hairs moderately long and stiff, partly with blunt to truncate apices and relatively scarce on head and on pronotum. Pilosity on mesonotum and propodeum subdecumbent and shorter, additional short decumbent to subdecumbent pubescence present. Color uniformly brown.

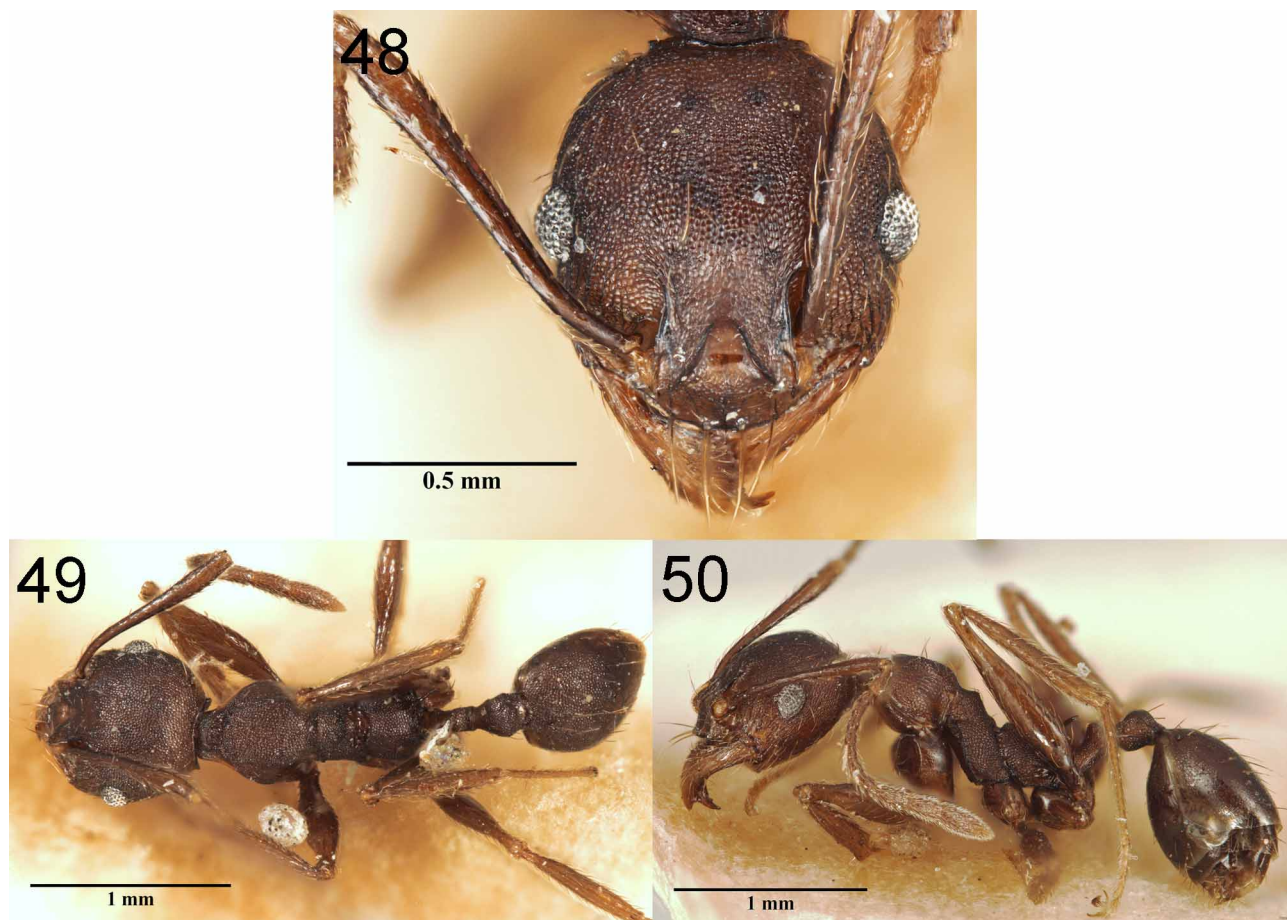


FIGURE 48–50 *P. nimba* Bernard: full-face, lateral & dorsal view of minor worker (Guinea, CASENT0227967).

Discussion: In habitus and amount of punctate sculpture *Pheidole dea* is the species that most closely resembles *P. nimba*. However, the clypeus, central area on frons, and posterior dorsopropodeum are smooth to superficially punctate, and standing hairs are relatively rare to almost absent in *P. dea*. *Pheidole nimba* was found in the Mount Nimba Nature Reserve in Guinea, close to the border of Ivory Coast, on the Nion crest and at an altitude of 1300 m. It was described on the basis of four minor workers, two of which were examined for this redescription (one was without head, and thus was not measured). Major workers remain unknown, but one specimen from Ghana, which did not match with any of the other species presented here, might be conspecific with *P. nimba*, although the differences in sculpture to the type specimens are relatively strong. Until additional material from the different localities becomes available the description of major workers will not be possible.

***Pheidole pulchella* Santschi**

(Figures 51–56)

Pheidole pulchella Santschi, 1910: 360. Syntype workers: D.R. CONGO, Brazzaville, 1907 (A. Weiss) (NHMB) [2 major workers and 4 minor workers examined]. [Misspelled as *P. putchella* by Emery, 1921: 89.]

Pheidole niapuana Wheeler 1922: 136, fig. 34. Syntype workers: CONGO, Niapu, vi.1913 (H.O. Lang) (USNM) [7 major workers and 5 minor workers examined]. [Junior synonym of *P. pulchella*: Santschi, 1930: 59; confirmed here].

Pheidole pulchella var. *achantella* Santschi 1939: 242. Holotype worker: D.R. CONGO, Brazzaville, 1907 (A. Weiss) (NHMB) [examined]. **syn. n.**

Diagnosis: Color orange (minor) to dark orange with lighter appendages (major). Minor workers: head shape rounded and relatively wide (CI: 82–90), occipital carina narrow. Scape and metafemur relatively long (SI: 147–161, FI: 169–194), pilosity decumbent. Promesonotal outline in lateral view flat, without raised peak at humeri. Mesonotal processes relatively shallow, metanotal groove broad and deep in lateral view. Dorsopropodeum straight, propodeal spines relatively short (PSLI: 25–29). Standing hairs comparatively thick. Major workers: frontal carinae and antennal scrobes present, rugae in face of varying lengths, grading into weak oblique rugulae on posterolateral lobes, ground sculpture weakly to superficially punctate. Dorsal promesonotum transversely rugulose and weakly punctate, posteriorly towards mesonotum partly smooth and shiny. Mesonotal process strongly produced, right-angled. In lateral view dorsopropodeum anterior to propodeal spines longer than horizontal width of base of spines. Standing hairs relatively long and thick, absent from propodeum.

Description of minor worker: Measurements (n=15): HL: 0.856–0.944 (0.895), HW: 0.733–0.800 (0.766), SL: 1.133–1.254 (1.192), MDL: 0.578–0.644 (0.610), EL: 0.167–0.189 (0.173), MFL: 1.317–1.508 (1.414), MTL: 1.056–1.133 (1.092), WL: 1.156–1.317 (1.258), PSL: 0.222–0.267 (0.244), PTH: 0.172–0.211 (0.190), PPH: 0.206–0.244 (0.221), PTL: 0.289–0.389 (0.347), PPL: 0.211–0.256 (0.237), PTW: 0.111–0.133 (0.122), PPW: 0.222–0.267 (0.235), PW: 0.478–0.544 (0.506); CI: 82–90 (86), SI: 147–161 (156), MDI: 75–83 (80), PSLI: 25–29 (27), PWI: 64–68 (66), FI: 169–194 (185), PpWI: 182–218 (193), PpLI: 117–175 (147).

Head longer than wide (CI: 82–90), with sides posterior of eye-level evenly rounded towards posterior margin. Occipital carina conspicuous, medially and laterally faintly impressed. Mandibles of moderate length (MDI: 75–83), dorsally smooth to superficially rugulose. Clypeus smooth, median and submedian carinae absent, lateral carinae conspicuous, sometimes short. Frons and vertex smooth, hexagonally micropunctate, with superficial punctures on malar area and near eyes. Malar carinae weak and interrupted, disappearing at posterior eye-level. Scape relatively long (SI: 147–161) in full-face view and when laid back surpassing posterior margin by more than one third of its length with decumbent pilosity. Promesonotal outline in lateral view flat, obtusely angulate at posterior declivity. First and second mesonotal process weakly produced, at edges slightly rounded, not marginate dorsally. Humeri with small, weakly marginate angle, not peaked in lateral view. Pronotal and mesonotal declivities shallow and flatly declining towards deeply and broadly impressed metanotal groove. Promesonotum anteriorly on neck weakly punctate, with short to moderately long, irregular rugulae, remainder smooth and shiny to superficially punctate. Mesonotum dorsally smooth to superficially punctate. Mesopleuron and propodeum weakly punctate, with superficially sculptured or almost smooth spots on anepisternum, katepisternum, and posterior dorsopropodeum. Spines relatively short (PSLI: 25–29), in dorsal view, at apices almost parallel. Metafemur relatively long (FI: 169–194), metatibia pilosity decumbent. Petiolar node and postpetiole weakly punctate lateroventrally and ventrally, dorsum with superficially punctate to smooth and shiny area, peduncle also weakly to superficially punctate dorsally, without smooth strip medially. First gastral tergite smooth and shiny, except very narrow, superficially punctate anterior strip. Standing hairs relatively stiff and of varying lengths, longest hairs on pronotum, gaster and head. Mesonotum and propodeum with shorter subdecumbent hairs, also present on head and projecting beyond lateral margin anterior and posterior of eye-level. Color yellow to light orange.

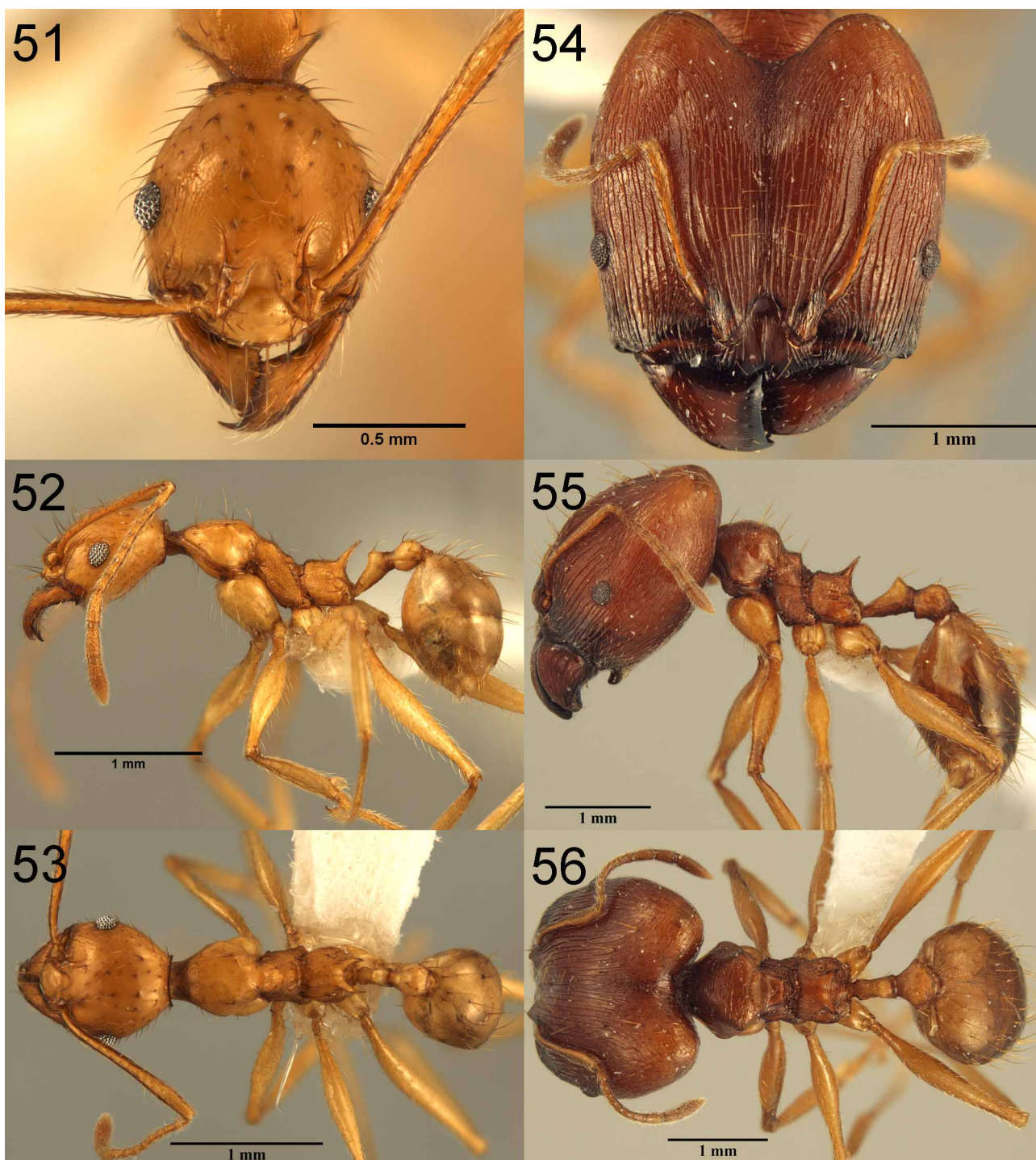


FIGURE 51–56: *P. pulchella* Santschi: full-face, lateral & dorsal view of minor (Fig. 51–53) (Gabon, CASENT0227963) and major worker (Fig. 54–56) (Gabon, CASENT0218336).

Description of major worker: Measurements (n=13): HL: 1.940–2.225 (2.140), HW: 2.000–2.275 (2.162), SL: 1.056–1.167 (1.134), MDL: 0.900–1.111 (1.016), EL: 0.233–0.256 (0.243), MFL: 1.667–1.840 (1.738), MTL: 1.286–1.429 (1.353), WL: 1.397–1.740 (1.651), PSL: 0.244–0.378 (0.316), PTH: 0.333–0.389 (0.357), PPH: 0.367–0.500 (0.443), PTL: 0.533–0.644 (0.594), PPL: 0.333–0.411 (0.378), PTW: 0.200–0.267 (0.240), PPW: 0.422–0.611 (0.524), PW: 0.811–1.033 (0.950); CI: 98–103 (101), SI: 51–56 (53), MDI: 43–50 (47), PSLI: 11–17 (15), PWI: 39–47 (44), FI: 76–90 (80), PeI: 22–29 (25), PpI: 47–61 (55), PpWI: 200–239 (218), PpLI: 141–167 (157).

Head about as long as wide (CI: 98–103), frontal carinae and antennal scrobes conspicuous. Frons longitudinally rugose, with irregular pattern of moderately long to shorter rugae, spaces between rugae weakly punctate to almost smooth. Rugae grading weaker posteriorly and curving towards posterolateral lobes, or replaced by oblique, weak, rugulose-punctate sculpture. Scape pilosity appressed. Promesonotal outline in lateral view rounded or very weakly subangulate, dorsally and anterolaterally with transverse and irregular rugulose and weakly punctate sculpture. Posterolaterally with smooth area, posterodorsally towards well-produced, right-angled mesonotal process weakly sculptured and partly smooth, at its edges weakly marginate, steeply declining towards small or inconspicuous second mesonotal process, terminating in narrow and short transverse ridge. Metanotal groove in lateral view narrow and shallow, dorsopropodeum weakly to superficially punctate. In profile, dorsopropodeum anterior to propodeal spines subequal to horizontal width of base of spine. Propodeal spines weakly curved posteriorly, posteropropodeum with weak transverse rugulae overlaying punctures. Punctures on mesopleuron and metapleuron weak and dense, posterobasally around long and conspicuous metapleural carina and gland scrobe superficial to smooth and shiny. Metatibia with short appressed pilosity. Petiole and postpetiole very densely punctate, anterodorsal petiole superficially sculptured, posterodorsal postpetiole with short irregular rugulae. Anterior half of first gastral tergite shagreened, posterior half smooth and hexagonally microsculptured. Long standing hairs acute, relatively slender, abundantly present on dorsal head, promesonotum, waist segments, and gaster, with additional short appressed pubescence. Color orange to darker orange, legs lighter.

Discussion: Type specimens of the three synonyms *Pheidole pulchella*, *P. pulchella achantella* and *P. niapuana* are conspecific. All of them were collected from only two different localities in Congo and in the D.R. Congo. As they share the same morphometric and diagnostic characters, measurement values for the junior synonym specimens were combined with those for the *P. pulchella* types and the new material from Gabon. The latter was collected in rainforest habitat from sifted leaf-litter. Minor workers of *P. pulchella* can be differentiated easily from those of *P. christinae* and *P. heliosa* by the relatively wider, more circular, head (CI: 82–90 [*P. pulchella*] versus CI: 79–84 [*P. christinae*] and CI: 73–76 [*P. heliosa*]), less abundant and thicker standing hairs, short, decumbent scape and metatibia pilosity versus suberect to erect hairs, and shorter propodeal spines (PSLI: 25–29 versus PSLI: 26–36 and PSLI: 28–37). Major workers of *P. pulchella* are separated from those of *P. heliosa* by presence of frontal carinae and antennal scrobes. They have a less coarsely sculptured face and promesonotum, a mesonotal processes which is separated from the pronotum by an obtuse angle, and curved versus straight propodeal spines. Majors from the *P. niapuana* types and the newer material from Gabon differ slightly in coloration from the *P. pulchella* and *P. pulchella achantella* type material. The latter are somewhat darker which might be a result of age or former storage conditions. Most of the material from Gabon was collected from pitfall traps and sifted leaf-litter within rainforests.

Additional material examined: GABON: (1 major worker, 2 minor workers) La Makande, Forêt des Abeilles, i–ii.1999 (*S. Lewis*); (2 major workers, 2 minor workers) Prov. Ogooue Maritime, Réserve Monts Doudou, 24.3 km 103° NW Doussala, 02° 13.4' S, 10° 24.4' E, 6–11.iii.2000, 375 m (*B.L. Fisher*); (3 minor workers) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 12.ii.1998 (*B.L. Fisher*); (1 major worker, 1 minor worker) Prov. Woleu-Ntem, 31.3 km 108° ESE Minvoul, 02° 04.8' N, 12° 24.4' E, 600 m, 11.ii.1998 (*B.L. Fisher*).

Pheidole rebecca sp. n.

(Figures 57–62)

Holotype: (major worker) IVORY COAST, vic. Abidjan, 1976, no. 15 (*T. Diomande*) (BMNH: CASENT0227954). Paratypes: (3 major workers, 8 minor workers) same data as holotype (BMNH: CASENT0227955, CASENT0227956, CASENT0227957, CASENT0227958).

Diagnosis: Color reddish brown (major) to brown (minor). Minor workers: head shape rounded, almost as broad as long (CI: 94–98), posterior margin compressed to almost straight. Scapes short (SI: 114–121), pilosity mostly decumbent. Most dorsal surfaces superficially punctate (sides of head, propodeum, anterior gaster) to smooth and shiny (posterior head margin, promesonotum, waist segments partly). Metafemur relatively short (FI: 133–139), metatibia pilosity decumbent. Major workers: head and promesonotum with short and weak superficial rugulae, posteriorly largely smooth and shiny. Sculpture on meso- and metapleuron also reduced, with several smooth spots. Metanotal groove barely impressed in lateral view and length of dorsopropodeum anterior to propodeal spines equal to horizontal width of base of spine. Standing hairs abundant, but absent from propodeum, sometimes also from rest of mesosoma.

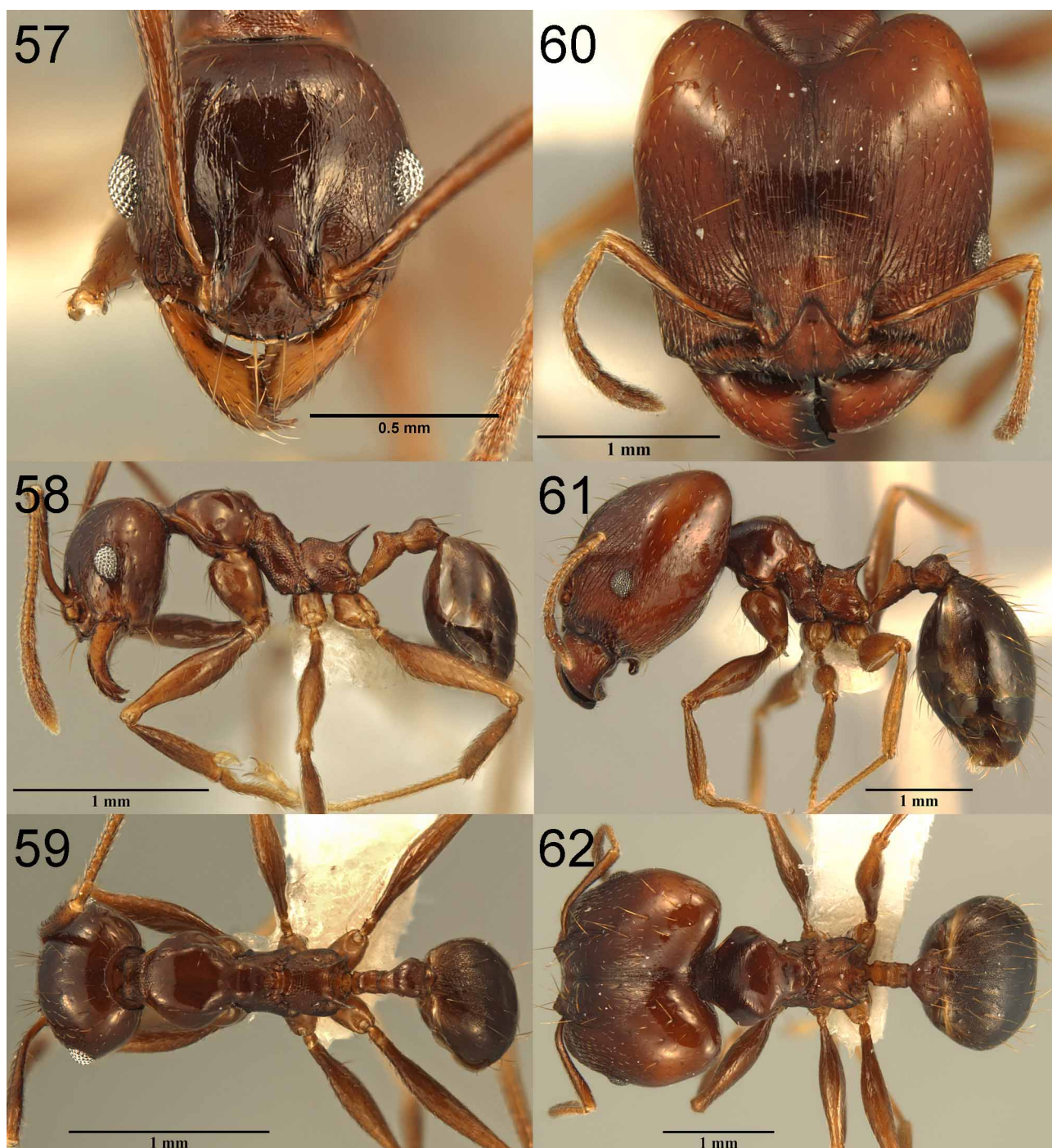


FIGURE 57–62 *P. rebecca* sp. n.: full-face, lateral & dorsal view of minor (Fig. 57–59) (Ivory Coast, CASENT0227955) and major worker (Fig. 60–62) (Ivory Coast, CASENT0227954).

Description of minor worker: Measurements (n=11): HL: 0.756–0.811 (0.785), HW: 0.717–0.778 (0.754), SL: 0.856–0.900 (0.885), MDL: 0.511–0.556 (0.531), EL: 0.167–0.178 (0.171), MFL: 0.967–1.067 (1.024), MTL: 0.756–0.867 (0.809), WL: 1.011–1.078 (1.035), PSL: 0.194–0.233 (0.217), PTH: 0.167–0.178 (0.170), PPH: 0.183–0.206 (0.194), PTL: 0.267–0.333 (0.303), PPL: 0.189–0.222 (0.197), PTW: 0.106–0.111 (0.110), PPW: 0.189–0.217 (0.204), PW: 0.456–0.500 (0.475); CI: 94–98 (96), SI: 114–121 (117), MDI: 69–73 (70), PSLI: 25–30 (28), PWI: 62–64 (63), FI: 133–139 (136), PpWI: 170–195 (185), PpLI: 133–176 (154).

Head shape in full-face view compactly rounded, posterior margin of head compressed to almost straight. Occipital carina narrow, mandibles relatively short (MDI: 69–73). Clypeus smooth, with two very faint median carinae, lateral carinae usually more strongly developed. Face smooth and shiny with faint hexagonal microstructure.

Malar carinae short, ending at midlevel of eyes. Scapes relatively short, shortest within group (SI: 114–121), pilosity decumbent, partly subdecumbent to suberect apically. Promesonotum smooth and shiny, without sculpture, mostly without standing hairs, but occasionally with two pairs of long, blunted hairs on anterior corners of humeral area or one pair on Humeri. Meso- and metapleuron weakly to superficially punctate, katapisternum and anterior metapleuron with smooth central spots. First mesonotal process conspicuous, roundly angulate. Second process reduced to a shallow, obliquely angulate projection or ridge, metanotal groove wide and deep. Dorsopropodeum weakly punctate, descending smoothly from highest point after metanotal groove towards propodeal declivity. Propodeal spines relatively short (PSLI: 25–30) and slender, almost straight to well-curved posteriorly. Metafemur relatively short, shorter than in other species from this group (FI: 133–139), metatibial pilosity decumbent. Petiole and postpetiole weakly punctate laterally and ventrally, dorsally smooth and shiny. Anterior half of first gastral tergite shagreened, rest smooth, hexagonally microsculptured or whole gaster weakly punctate. Long standing hairs often truncated, present on head, postpetiole and gaster, number on dorsal head variable, up to five pairs, absent to very scarce on mesosoma and petiole, both usually with shorter decumbent hairs. Pubescence inconspicuous, mostly fine and appressed. Color brown, mandibles and appendages lighter.

Description of major worker: Measurements holotype: HL: 1.960, HW: 1.980, SL: 0.978, MDL: 0.911, EL: 0.250, MFL: 1.476, MTL: 1.133, WL: 1.556, PSL: 0.278, PTH: 0.333, PPH: 0.411, PTL: 0.556, PPL: 0.344, PTW: 0.239, PPW: 0.522, PW: 0.900; CI: 101, SI: 49, MDI: 46, PSLI: 14, PWI: 45, FI: 75, PeI: 27, PpI: 58, PpWI: 219, PpLI: 161.

Measurements (n=3): HL: 1.820–1.980 (1.900), HW: 1.860–1.960 (1.927), SL: 0.944–0.967 (0.956), MDL: 0.833–0.889 (0.859), EL: 0.233–0.267 (0.256), MFL: 1.476–1.556 (1.503), MTL: 1.078–1.122 (1.104), WL: 1.444–1.524 (1.487), PSL: 0.244–0.300 (0.278), PTH: 0.322–0.344 (0.337), PPH: 0.361–0.400 (0.378), PTL: 0.467–0.500 (0.489), PPL: 0.311–0.356 (0.330), PTW: 0.211–0.233 (0.226), PPW: 0.456–10.533 (0.493), PW: 0.856–0.900 (0.881); CI: 99–103 (102), SI: 49–51 (50), MDI: 42–45 (44), PSLI: 13–16 (15), PWI: 45–46 (46), FI: 75–84 (78), PeI: 25–26 (26), PpI: 53–59 (56), PpWI: 210–229 (218), PpLI: 141–161 (149).

Frons with relatively weak, irregular, very short or interrupted rugae, spaces between rugae superficially punctate, only a narrow, sculptured strip continuing towards median emargination of posterior margin. Posterolateral lobes and sides of head posterior of eye-level smooth and shiny, on most hexagonally microsculptured. Scape pilosity appressed. Pronotum anteriorly weakly to superficially and transversely rugulose-punctate and posteriorly smooth, or in some specimens with superficial punctures and/or with weak to superficial rugulae. Humeri with weak and subangulate lateral process, pronotal declivity rounded to subangulate. Mesonotal process almost right-angled, second mesonotal process inconspicuous, at most represented as weak, quasi-vertical ridge. Metanotal groove forming broad constriction between mesonotum and propodeum in dorsal view, shallow to unimpressed in profile. Meso- and metapleuron weakly to superficially punctate, with several smooth spots (extent of sculpture strongly varies with viewing-angle). In profile, dorsopropodeum anterior to propodeal spines shorter than horizontal width of base of spine, in dorsal view anteromedially smooth, lateroventrally densely punctate, posteriorly between spines transversely and weakly rugulose. Posteropropodeum weakly and transversely rugose-punctate, laterally with vertical curved rugae from spines towards metapleural carina(e). Metatibial pilosity appressed. Anterior face of petiole broadly smooth and shiny, rest of petiole and postpetiole densely punctate. Postpetiole with short irregular rugulae posterodorsally and conspicuous lobate flange posterolaterally. Gaster weakly punctate. Long standing hairs acute, present everywhere, except on propodeum. Mesonotum with shorter subdecumbent hairs and sometimes mesosoma completely without hairs other than short appressed pubescence.

Discussion: *Pheidole rebecca* specimens were collected in the Ivory Coast and in Ghana. The minor workers from Ghana differ slightly from those from the Ivory Coast in the extent of sculpture on the first gastral tergite. Minor workers of *P. rebecca*, in overall habitus and reduced body sculpture, are closest to those of *P. glabrella*, and best differentiated from the latter by wider head shape (CI: 94–98 [*rebecca*] versus CI: 88–95 [*glabrella*]), shorter scapes, propodeal spines and metafemur (SI: 114–121, PSLI: 25–30, FI: 133–139 versus SI: 123–141, PSLI: 28–40, FI: 143–170), and more abundant standing hairs. Major workers of *P. rebecca* are distinctively separated from those of other species by the short and weak longitudinal rugulae in face, largely smooth and shiny surfaces on the posterior half of face and pronotum, and reduced sculpture on meso- and metapleuron. Major workers of *P. darwini* also feature a reduced punctate sculpture in face and on posterior pronotum and partly smooth posterolateral lobes, but the longitudinal rugae are longer and more conspicuous, the punctures between the rugae are stronger, smooth surfaces on the head and mesosoma are restricted to significantly smaller areas and promesonotal

standing hairs are long and erect versus shorter and decumbent in *P. rebecca*. A unique character in *P. darwini* is the small number of erect hairs in combination with the appressed to decumbent pilosity along the outer edge of the scape, that is absent in the majors of *P. rebecca*.

Etymology: This species is named after the first author's daughter Rebecca.

Additional material examined: GHANA: (3 minor workers) Atewa Forest Reserve, nr. Kibi, 26.ii.1992 (*R. Belshaw*).

***Pheidole semidea* sp. n.**

(Figures 63–68)

Holotype: (major worker) NIGERIA, Gambari, 22.vii.69, in log (*B. Bolton*) (BMNH: CASENT0227959). Paratypes: (2 major workers, 5 minor workers) same data as holotype (BMNH: CASENT0227960, CASENT0227961).

Diagnosis: Color light to dark brown. Minor workers: head shape rounded (CI: 85–89), with medially impressed occipital carina. Dorsal surfaces of head, promesonotum and metasoma smooth, at most superficially punctate. Second mesonotal process in lateral view distinctly raised above level of anterior dorsopropodeum. Petiole relatively short (PpLI: 126–144). Major workers: frons with moderately long rugae, vertex weakly rugose-reticulate, and posterolateral lobes with oblique rugulae. Mesonotal process in lateral view almost right-angled, second process very shallow and raised above level of dorsopropodeum. In profile, dorsopropodeum anterior to propodeal spines longer than horizontal width of base of spine. Postpetiole moderately wide (PWI: 192–221) and standing hairs on pronotum medially inclined.

Description of minor worker: Measurements (n=5): HL: 0.778–0.811 (0.796), HW: 0.689–0.722 (0.697), SL: 0.967–1.033 (0.989), MDL: 0.533–0.544 (0.542), EL: 0.156–0.189 (0.169), MFL: 1.111–1.190 (1.149), MTL: 0.900–0.911 (0.904), WL: 1.044–1.111 (1.084), PSL: 0.206–0.233 (0.222), PTH: 0.167–0.172 (0.168), PPH: 0.178–0.200 (0.192), PTL: 0.256–0.289 (0.276), PPL: 0.189–0.222 (0.207), PTW: 0.111–0.122 (0.114), PPW: 0.200–0.222 (0.211), PW: 0.467–0.478 (0.475); CI: 85–89 (88), SI: 134–150 (142), MDI: 75–79 (78), PSLI: 26–29 (28), PWI: 68–69 (69), FI: 160–173 (165), PpWI: 173–200 (185), PpLI: 126–144 (134).

Head shape in full-face view slightly elliptical with roundly convex posterior margin (CI: 85–89). Occipital carina conspicuous and medially impressed. Clypeus smooth, lateral carinae weak. Face smooth, except hexagonal microsculpture, superficially punctate laterally towards eyes. Malar rugulae well-developed, disappearing posterior of eyes. Scape surpassing posterior margin by about one third of its length (SI: 134–150), with decumbent pilosity, apically some hairs subdecumbent. Promesonotum in lateral view flat, subangular, anterodorsally towards neck weakly punctate, rest smooth. First mesonotal process obtusely angulate, dorsally smooth. Second process conspicuous and distinctly raised above level of dorsopropodeum. Metanotal groove asymmetrically impressed, posteriorly more shallowly. Mesopleuron and propodeum punctate, with superficially sculptured spots on katapisternum and posterior dorsopropodeum. Spines moderately long (PSLI: 26–35), posteriorly strongly curved. Metafemur long (FI: 158–173), metatibial pilosity decumbent. Petiole punctate laterally and ventrally, dorsolateral postpetiole and ventral process weakly punctate, dorsum of both waist segments smooth, partly micropunctate. Gaster smooth, anteriorly near insertion of postpetiole superficially punctate. Standing hairs on head, postpetiole and gaster long and acute, on petiole short and on promesonotum mostly moderately long and subdecumbent, directed towards center or dorsopronotum. Body surface also with several short and relatively long appressed hairs. Color light to dark brown, gaster darker, mandibles partly transparent.

Description of major worker: Measurements (holotype): HL: 1.800, HW: 1.760, SL: 0.978, MDL: 0.833, EL: 0.222, MFL: 1.444, MTL: 1.078, WL: 1.429, PSL: 0.300, PTH: 0.333, PPH: 0.367, PTL: 0.500, PPL: 0.311, PTW: 0.222, PPW: 0.467, PW: 0.800; CI: 98, SI: 56, MDI: 47, PSLI: 17, PWI: 45, FI: 82, PeI: 28, PpI: 58, PpWI: 210, PpLI: 161.

Measurements (n=3): HL: 1.619–1.860 (1.705), HW: 1.635–1.820 (1.724), SL: 0.922–1.000 (0.975), MDL: 0.722–0.833 (0.792), EL: 0.211–0.222 (0.215), MFL: 1.349–1.444 (1.393), MTL: 1.000–1.111 (1.061), WL: 1.286–1.476 (1.365), PSL: 0.244–0.306 (0.285), PTH: 0.250–0.311 (0.285), PPH: 0.311–0.406 (0.357), PTL: 0.489–0.556 (0.515), PPL: 0.333–0.344 (0.336), PTW: 0.200–0.233 (0.211), PPW: 0.383–0.500 (0.447), PW: 0.711–0.800 (0.764); CI: 98–106 (101), SI: 55–58 (57), MDI: 43–48 (46), PSLI: 15–18 (16), PWI: 39–47 (44), FI: 79–83 (81), PeI: 25–30 (28), PpI: 50–66 (57.9), PpWI: 192–221 (212), PpLI: 147–161 (153).



FIGURE 63–68 *P. semidea* sp. n.: full-face, lateral & dorsal view of minor (Fig. 63–65) (Nigeria, CASENT0227960) and major worker (Fig. 66–68) (Nigeria, CASENT0227960).

Face entirely rugose-punctate, rugae relatively long and sometimes interrupted on frons, posteriorly with some weak cross-meshes, disappearing towards obliquely and weakly rugulose-punctate posterolateral lobes. Outer corners of posterolateral lobes and spaces between rugae on frons superficially punctate, laterally of antennal scrobe irregularly rugose-reticulate. Scape with decumbent pilosity. Promesonotum in lateral view short, posteriorly subangulate, declivity short, anterodorsally and anterolaterally weakly and irregularly rugulose-punctate, grading to superficially punctate posteriorly on dorsopronotum, lateropronotum and mesonotum. First mesonotal process right-angled, with a steep declivity. Second process small or reduced to short, narrowly raised carina, but raised above level of dorsopropodeum. Meso- and metapleuron punctate, with smooth area on katepisternum and posteroventral metapleuron. Metapleural carina relatively short and weak, gland scrobe weak to inconspicuous. Dorsal

and posterior propodeum smooth to superficially punctate, with transverse rugula(e) between spines and moderately developed, longitudinal rugula(e) posteriorly along spines. Petiole and postpetiole punctate, except medial area of anterodorsal petiole. First gastral tergite shagreened, posteriorly slightly weaker. Metatibia with appressed pilosity. Acute, long standing hairs present on head, postpetiole, dorsal gaster and pronotum, on the latter medially inclined. Color reddish brown, gaster darker.

Discussion: *Pheidole semidea*, in morphometrics and overall habitus, is closest to *P. dea*, but differentiated from the latter by the following characters: sculpture of minor workers in face strongly reduced to mostly smooth and shiny versus weakly to superficially punctate in *P. dea*, second mesonotal process higher situated and raised above dorsopropodeal outline, spines more strongly curved, petiole shorter and postpetiole longer (PpLI: 126–144 versus PpLI: 156–223). Rugae on frons and vertex of major workers moderately long, posterolateral lobes with oblique rugulae versus very long, longitudinal and subparallel rugae from frons to head margin in *P. dea*, postpetiole on average wider (PpWI: 192–221) in *P. semidea* versus relatively narrow (PpWI: 177–210) in *P. dea*, and first gastral tergite almost completely shagreened versus only anteriorly shagreened in *P. dea*. Given the relatively minor differences between minor workers of the two species, it is possible that they are conspecifics and that intermediate forms exist within or between the West and East African populations. Yet, we propose that *P. semidea* and *P. dea* should be considered separate species until additional data from future sampling proves otherwise. The *P. semidea* types were collected from a log at Gambari, Nigeria, and another major was collected from Ibadan, Nigeria.

Additional material examined: NIGERIA: (1 major worker) Ibadan, IITA (= International Institute of Tropical Agriculture), 18.v.81, no. 16 (A. Russel-Smith).

***Pheidole setosa* sp. n.**

(Figures 69–71)

Holotype: (minor worker) D.R. CONGO, Epulu, 01° 23' N, 28° 35' E, 750 m, xi.1995, Rainforest (S.D. Torti) (CASC: CASENT0218297). Paratype: (1 minor worker) same data as holotype (CASC: CASENT0218298).

Diagnosis: Color brown. Major unknown. Minor worker: head shape broadly elliptical (CI: 87–90), with relatively wide, slightly compressed posterior margin. In full-face view laterally projecting hairs present on head margin posterior of eye-level. Punctures in face variable, absent to superficial medially between eyes, stronger and more conspicuous in rest of face. Scape and metafemur moderately long (SI: 141–145, FI: 167–168), scape pilosity decumbent with additional erect to suberect hairs along outer edges. Metatibia pilosity appressed. Posterior and lateral pronotum smooth, rest of mesosoma with distinct punctures. Standing hairs coarse and moderately long and truncated, present on all dorsal surfaces.

Description of minor worker: Measurements (holotype): HL: 0.856, HW: 0.744, SL: 1.078, MDL: 0.578, EL: 0.178, MFL: 1.254, MTL: 0.989, WL: 1.133, PSL: 0.300, PTH: 0.178, PPH: 0.222, PTL: 0.367, PPL: 0.222, PTW: 0.122, PPW: 0.233, PW: 0.489; CI: 87, SI: 145, MDI: 78, PSLI: 35, PWI: 66, FI: 168, PpWI: 191, PpLI: 165

Measurements (n=1): HL: 0.867, HW: 0.778, SL: 1.100, MDL: 0.567, EL: 0.178, MFL: 1.302, MTL: 1.033, WL: 1.167, PSL: 0.267, PTH: 0.178, PPH: 0.233, PTL: 0.378, PPL: 0.211, PTW: 0.122, PPW: 0.233, PW: 0.511; CI: 90, SI: 141, MDI: 73, PSLI: 31, PWI: 66, FI: 167, PpWI: 191, PpLI: 172.

Head longer than wide (CI: 87–90), sides roundly convex, with in full-face view laterally projecting hairs posterior of eye-level. Posterior head margin broadly developed and compressed to almost flat and occipital carina narrow. Clypeus smooth, with conspicuous long median carina and short or inconspicuous submedian carinae. Frons smooth, hexagonally microsculptured. Weakly to conspicuously punctate areas posteriorly, about halfway between posterior eye-level and posterior head margin, laterally towards eyes and anteriorly towards malar space. Malar carinae ending at posterior eye-level. Scapes moderately long (SI: 141–145) with decumbent pilosity and with additional erect to suberect hairs along outer edge. Promesonotal outline angulate, dorsopronotum flat, pronotal and mesonotal declivities obtuse-angled, edges in lateral view almost straight and long. Second mesonotal process small, subangular and distinctly raised above level of dorsopropodeum. Metanotal groove conspicuous and dorso-propodeum flat. Spines relatively long and curved (PSLI: 31–35), about as long as height of posteropropodeum. Anterior dorsopronotum punctate, grading to smooth or superficially punctate posterodorsally and on posterior declivity. Lateropronotum mostly smooth, except superficial sculpture anteriorly and dorsally. Mesopleuron, metanotal process and propodeum uniformly punctate, except narrow, smooth strip between spines on dorsopropo-

deum. Metatibia with appressed to decumbent pilosity. Petiole and postpetiole weakly punctate laterally and ventrally, dorsum partly smooth and hexagonally micropunctate. Gaster smooth and shiny. Standing hairs stiff, of moderate length, apically truncated or split. Color brown.



FIGURE 69–71 *P. setosa* sp. n.: full-face, lateral & dorsal view of minor worker (D.R. Congo, CASENT0218298).

Discussion: The description of *Pheidole setosa* is based on two minor workers from a single leaf-litter collection event in a rainforest in the D.R. Congo. The major is unknown. In habitus and amount of sculpture the minors are comparable to those of *P. batrachorum*, but the punctures in face and on dorsopronotum are much less distinct in *P. setosa* and the head is both, absolutely and relatively wider (CI: 87–90 [*P. setosa*] versus CI: 79–86 [*P. batrachorum*]). Scapes and legs are shorter in *P. setosa* than in *P. batrachorum* (SI: 141–145, FI: 167–168 versus SI: 152–172, FI: 172–196), the propodeal spines are significantly longer (PSLI: 31–35 versus PSLI: 21–29) and scape pilosity differs distinctly.

Acknowledgments

We want to thank the director of our museum and supervisor of our project Prof. J.W. Wägele for his overall support during our work. We are also very thankful to Dr. John T. Longino, Mr. Barry Bolton and Dr. Eli Sarnat for their critique and suggestions to improve an earlier version of the manuscript. This work would not have been possible without the help of to the following curators, listed in alphabetical order of their institutions, who loaned the mentioned material or welcomed the first author to work in their collection: Suzanne Ryder and Dr. Gavin Broad from BMNH, Dr. Brian Fisher from CASC, Dr. Bernhard Merz from MHNG, Dr. Claire Villemant from MNHN, Dr. Daniel Burckhardt and Isabell Zürcher-Pfänder from NHMB, and Dr. James Carpenter and Christine LeBeau

from USNM, and we want to express our gratitude to all of them. We are grateful to Dr. Brian Fisher for his cooperation and the possibility to upload all images from this study to AntWeb (www.antweb.org). Last but not least we want to thank all the collectors who provided the studied specimens. The project was supported by financial grants from the BMBF (German Federal Ministry of Education and Research) within the BIOLOG programme [BIOTA East Africa subproject E16 (01LC0625A2)].

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