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A revision of *Pheidole* Westwood (Hymenoptera: Formicidae) in the islands of the Southwest Indian Ocean and designation of a neotype for the invasive *Pheidole megacephala*

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Abstract

The myrmicine genus *Pheidole* Westwood is revised for the smaller islands of the Southwest Indian Ocean: Comoros, Juan de Nova Island, Mauritius, Mayotte, Réunion, and the Seychelles. Descriptions and keys are provided for the thirteen species on these islands of which seven are newly described: *P. decepticon* sp. n., *P. dodo* sp. n., *P. komori* sp. n., *P. loki* sp. n., *P. megatron* sp. n., *P. ragnax* sp. n., *P. vulcan* sp. n.; and six were previously described: *P. braueri* Forel, *P. fervens* Smith, F., *P. jonas* Forel, *P. megacephala* (Fabricius), *P. parva* Forel, and *P. teneriffana* Forel. New synonymies (with the senior synonym listed first) include *P. parva* Mayr = *P. flavens* var. *farquharensis* Forel, *P. parva* Mayr = *P. tarda* Donisthorpe, *P. megacephala* (Fabricius) = *P. picata* Forel, *P. megacephala* (Fabricius) = *P. punctulata* r. *gietleni* Forel, 1905, *P. megacephala* (Fabricius) = *P. picata* var. *bernhardae* Emery, 1915, *P. megacephala* (Fabricius) = *P. megacephala* r. *scabrior* Forel, and *P. teneriffana* Forel = *P. voeltzkowii* Forel. Furthermore, lectotypes are designated from the syntypes of *P. braueri*, *P. fervens*, *P. jonas*, *P. parva*, and *P. teneriffana* in order to provide a single name-bearing specimen and to facilitate future taxonomic studies. Finally, a neotype is provided for the untraceable or possibly lost type of the cosmopolitan and invasive *P. megacephala*, which was originally described by Fabricius from Mauritius (the former ‘Ile de France’).

Key words: Myrmicinae, *Pheidole*, new species descriptions, taxonomic revision, introduced species, native fauna, Comoros, Juan de Nova Island, Mauritius, Mayotte, Réunion, Seychelles

Introduction

The Southwest Indian Ocean (SWIO) islands of Madagascar, Comoros, Europa, Juan de Nova, the Mascarenes (including Mauritius, Réunion, and Rodrigues), and the Seychelles contain one of the highest concentrations of endemic and threatened organisms on earth (Myers *et al.* 2000, Goodman & Bernstead 2003). Isolation, geographic placement, varied geological histories, and environmental heterogeneity have all contributed to the diversity of endemic species. With a greater age range than most other island systems, the SWIO island bioregion offers a unique opportunity to explore mechanisms driving the accumulation of restricted-range species at regional and local levels (Warren *et al.* 2003, Wilmé *et al.* 2006).

The Southwest Indian Ocean islands are composed of a set of recently-emerged coralline islands: the Aldabra group, Farquhars, and Amirantes, aged 15,000 years to 0.125 Ma (Radtkey 1996, Thompson & Walton 1972); relatively young volcanic islands (the Mascarenes and the Comoros) that range in age from 0.13–15 Ma (Ballestracci *et al.* 1985, Emerick & Duncan 1982, Montaggioni & Nougier 1981, 1982, Nougier *et al.* 1986); and the Seychelles and Madagascar, granitic remnants of the Gondwanan continental block that became isolated around 75–130 Ma (Ali & Aitchison 2008, Coffin & Rabinowitz 1987, Kingdon 1991, Rabinowitz *et al.* 1983).

To unravel the history and diversity of ants in the SWIO, inventories were conducted across the island systems by BLF and members of the Malagasy Arthropod team based at the Madagascar Biodiversity Center in Madagascar. Here we report on the diversity and taxonomy of the myrmicine genus *Pheidole* Westwood (1839) on the smaller islands in the region, excluding Madagascar. *Pheidole* is a priority for taxonomic study because of its local diversity and the threat of introduced species in the region. Small SWIO islands such as the Seychelles are under threat from invasive species such as *Pheidole megacephala* (Fabricius), deforestation, and urban growth (Louette *et al.* 2004) but have not received the same attention from biologists as Madagascar (Goodman & Bernstead 2003).

Background

Very little is known about *Pheidole* of the smaller islands of the SWIO apart from a number of general checklists for individual islands (Blard *et al.* 2003, Donisthorpe 1946, Dorow 1996, Forel 1895, 1897, 1907a & 1907c, Gerlach 1998a & 1998b, Madl 2006, Mamet 1954, Mühlenberg *et al.* 1977, Parnaudeau & Madl 2009). Wheeler (1922) gave a relatively detailed account of the ant fauna of the Malagasy region where he listed many of the already described species. Fisher (1997) provided a complete overview of the described species and their known distributions. Only 23 valid *Pheidole* taxa have been described so far from the SWIO islands including Madagascar, the last almost a century ago, in 1918 by A. Forel. Within the last two decades, however, an estimated one hundred or more undescribed *Pheidole* species have accumulated from the intensive inventories carried out in the region. Apart from the most basic ecological requirements inferred from occurrence data, little knowledge exists about the biology of virtually all of the new species and a majority of the previously described species from the SWIO islands.

Dubious records, misidentifications and new synonymies

Although a great effort was made to locate historical specimens in museums in Europe and to conduct exhaustive inventories, a few published species records from the region could not be verified. We classify them as dubious records and exclude them from the region's species list. One of the two dubious species records is *Pheidole anastasioi* var. *cellarum* Forel (junior synonym of *P. bilimeki* Mayr), recorded by Donisthorpe (1946) and based on a single collection by Mamet. Though Mamet's Mauritius collection was studied at Morrison Natural History Museum in Morrison, Colorado and at the The Natural History Museum in London, UK, specimens of *Pheidole bilimeki* were not found. No subsequent records have been published and this species was not found during the recent inventory work in Mauritius. This species is widespread from Mexico to northern South America and has been recorded in hothouses in Europe. The species record for Mauritius may represent either a misidentification or an introduction to the island that did not persist. The other unconfirmed record is *P. punctulata* Mayr. Two major workers from the Seychelles and Madagascar, identified by Forel (1897, 1907), are clearly specimens belonging to the new species *P. decepticon*. In addition, four species mentioned in the literature now become junior synonyms. Reported from the Seychelles and the Comoros (Wheeler 1922), and described from Madagascar, *Pheidole megacephala* r. *scabrior* Forel is a new synonym of *P. megacephala* (Fabricius). The same applies to *P. picata* Forel (and its two subspecies), which was described from Madagascar as a new variation of *P.*

megacephala and later changed to species status (Emery 1915). *Pheidole flavens* var. *farquharensis* Forel, described from the Seychelles (Forel 1907), now is a junior synonym of *P. parva* Mayr, along with *P. tarda* Donisthorpe, a species described from a single queen found on Mauritius.

Pheidole diversity: introduced and native species

The diversity of *Pheidole* on the islands of the Southwest Indian Ocean comprises thirteen species in total with a range from zero species found on Europa Island to six species that were present on Anjouan Island (Comoros) and on Mayotte.

Like many other tropical islands, the SWIO islands are prone to invasions by introduced species (Fisher 2009). Thus it is not surprising that four of the species are apparently introduced, of which the most frequently collected species is *Pheidole megacephala* (Fabricius), which occurred on a majority of the islands (see Table 1) and is also one of the most invasive ant species worldwide. The second introduced species with a large distribution in the region is *P. teneriffana* Forel. It was collected on the Comoros, Mauritius, Mayotte, the Seychelles, and on Madagascar itself. In the Old World, *P. teneriffana* is relatively widespread and seems to be most common in the Mediterranean region, where it is assumed to be native (Collingwood *et al.* 2004). In the Malagasy region, however, it was much less commonly collected than the almost ubiquitously distributed *P. megacephala*. Thirdly, a very abundant and probably invasive species present on Mauritius and the Seychelles is *P. parva* Mayr, which occurs in several Old World regions and might have been introduced to the Malagasy region via trading ships from the Oriental region more than a hundred years ago. The fourth and most rarely collected introduced species in the Malagasy region was *P. fervens* Smith F., which was found at only two localities on Mauritius. *Pheidole fervens* too has a relatively widespread Old World distribution and seems to be common in Southeast Asia and the Pacific region where it may have its origin (Eguchi 2001, 2004, 2008).

The nine remaining *Pheidole* species found on the islands and archipelagos of the Malagasy region are presumed to be native. Considering only native species, Mayotte has the most diverse *Pheidole* fauna with 4 species and includes two species, *P. loki* and *P. ragnax*, known only from Mayotte. *Pheidole jonas* Forel occurs on Mayotte and the neighboring Comoros islands and *P. decepticon* is known from Mayotte and three other islands from the region (Anjouan, Juan de Nova, and the Seychelles). Anjouan too has four native species including *P. jonas*, *P. komori*, and *P. decepticon* and *P. megatron* in the *megacephala* group. Interestingly, *P. megacephala* was only collected once on Anjouan. The presence of the two *megacephala* group species could explain in part the low frequency of *P. megacephala* on Anjouan. *Pheidole komori*, which occurs also on Mohéli, is probably of Eastern African origin, as it was recently collected in Mozambique and is morphologically related to a group of Afrotropical *Pheidole*, including *Pheidole strator* r. *fugax* Arnold. *Pheidole megatron*, along with *P. vulcan*, has not been found anywhere except on the Comoros. While the Seychelles still have two native species, *P. decepticon* and *P. braueri* Forel, on Mauritius the only native and probably endemic species is *P. dodo*.

At the moment it is almost impossible to accurately ascertain the level of endemism of the native *Pheidole* fauna on the smaller islands in the Malagasy region treated in this revision. The reason for this is the overall high level of undescribed species in the genus *Pheidole* combined with a distinct lack of identification keys and revisions for most of the Old World, especially for the Afrotropical and Malagasy regions (Fischer *et al.* 2012). Despite this incomplete faunal knowledge, the species that have not been recorded from outside the region are treated as endemic species here (Table 1), because they have not been located in the Hymenoptera collections of either the California Academy of Sciences in San Francisco (CASC) or of the Museum of Comparative Zoology in Harvard (MCZC), which are two of the largest ant collections worldwide. Still, the highly diverse and often morphologically 'exotic' *Pheidole* faunas of the Oriental, Australian, and Oceanic regions are mostly unrevised, except for those of Japan (Ogata 1982), Borneo (Eguchi 2001), and Vietnam (Eguchi 2008), as well as the *Pheidole rinae* complex and related species (Eguchi *et al.* 2007), and the *Pheidole roosevelti* group from Fiji (Sarnat 2008). Accordingly, little is known about species distribution ranges of *Pheidole*, making accurate biogeographic inferences impossible. Thus, our present result about species endemism on the Malagasy islands should be assessed carefully in future taxon revisions and other studies. In contrast to Madagascar, where a large proportion of the species seems to be derived from pre-historic radiations, uncertainty about species endemism on the Mascarene and neighboring islands remains high. In addition, and like most of the native diversity, the rare and more specialized *Pheidole* species are probably threatened by direct and indirect human influences and invasive species (Fisher 2005). Future research and taxonomic revisions, as well as comprehensive phylogenetic analysis for the Malagasy and other Old World regions, will hopefully provide detailed insights into the distributions and evolution patterns of this highly successful and widespread genus. In the light of ongoing climate change and introductions of exotic and invasive species through ever-increasing human commerce, this will be especially important for the conservation of the few remaining native communities and habitats.

Table 1. List of species distributions in the Malagasy region. KM: Comoros Islands, JU: Juan de Nova Island, MU: Mauritius, YT: Mayotte, RE: Réunion, SC: Seychelles, MG: Madagascar.

Species	KM	JU	MU	YT	RE	SC	MG	Southwest Indian Ocean islands distribution	Conservation status
<i>P. braueri</i> Forel						•		Silhouette Is.	probable endemic
<i>P. decepticon</i>	•	•		•		•		Anjouan, Juan de Nova, Mayotte, Cosmoledo Atoll	unknown endemicity
<i>P. dodo</i>			•					Mauritius	probable endemic
<i>P. fervens</i> Smith, F.		•	•					Mauritius	widespread, introduced; most common in Oriental & Oceanic regions
<i>P. jonas</i> Forel	•			•				Anjouan, Grande Comore, Mohéli, Mayotte	unknown endemicity
<i>P. komori</i>	•							Anjouan, Mohéli	found also in Mozambique
<i>P. loki</i>				•				Mayotte	probable endemic
<i>P. lucas</i>	•							Grande Comore	probable endemic
<i>P. megacephala</i> (Fabricius)	•	•	•	•	•	•	•	Anjouan, Mauritius, Ile aux Aigrettes, Ile de la Passe, Ile Marianne, Rodrigues, Round Is., Mayotte, Réunion, Aldabra Is., Aride Is., Assumption Is., Bird Is., Cosmoledo Atoll, Cousine Is., Félicité Is., La Digue Is., Mahé Is., North Is., Praslin Is., Silhouette Is.	globally introduced: all tropical & subtropical regions
<i>P. megatron</i>	•							Anjouan, Grande Comore, Mohéli	probable endemic
<i>P. parva</i> Forel			•			•		Mauritius, Ile aux Aigrettes, Rodrigues, Aride Is., Bird Is., Conception Is., Cousine Is., Curieuse Is., Félicité Is., La Digue Is., Mahé Is., North Is., Praslin Is., Silhouette Is. Mayotte	widespread, prob. introduced; most common in Oriental region
<i>P. ragnax</i>				•				Anjouan, Grande Comore, Round Is., Serpents Is., Mayotte, Aldabra Is.	probable endemic
<i>P. teneriffana</i> Forel	•		•	•	•	•	•		widespread, introduced; most common in Mediterranean region
Total	7	2	5	6	1	5	>100		7 treated as endemic, 4 introduced

Material and Methods

List of abbreviations of museum collections follows Evenhuis (2009) and Bolton and Fisher (2011, 2012).

BMNH	The Natural History Museum (British Museum, Natural History), London, U.K.
CASC	California Academy of Sciences, San Francisco, California, U.S.A.
MCZC	Museum of Comparative Zoology, Cambridge, Mass. U.S.A.
MHNG	Muséum d'Histoire Naturelle, Geneva, Switzerland
NHMB	Naturhistorisches Museum, Basel, Switzerland
NMW	Naturhistorisches Museum, Wien, Austria
MSNG	Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy
SAMC	Iziko Museums of Cape Town (= South African Museum), South Africa
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

The majority of the material presented in this study originated from inventory samples collected by Brian Fisher and the Malagasy Arthropod team in the Malagasy region between 1992 and 2012. All observations and measurements were taken at magnifications from 50x to usually 100x with a Leica MZ12.5 dissecting microscope and an orthogonal crosshair micrometer, at an accuracy of 0.01 mm to approximately 0.005 mm. In addition, for observations of smaller species' characters, a Leica M165C was used. All measurements are presented in mm units as minimum and maximum values, with the arithmetic mean in parentheses. The presented extended-focus montage images were created either with a JVC KY-F75 digital camera and Syncroscopy Auto-Montage software (version 5.0), or with a Leica DFC 425 camera and Leica Application Suite software (version 3.8) and are available online at AntWeb (<http://www.antweb.org>). Most measurements and indices are the same as in Fischer *et al.* (2012) and are based on several other revisions: Bolton and Fisher (2011), Eguchi (2008), Güsten *et al.* 2006, and Longino (2009). The general morphological terminology follows Bolton (1994) and Longino (2009).

For easier identifications of the older taxa, which are often insufficiently characterized by their original describers, diagnoses for *Pheidole braueri* Forel, *P. fervens* Smith, F., *P. jonas* Forel, *P. megacephala* (Fabricius), *P. parva* Mayr, and *P. teneriffana* Forel are provided in their respective redescriptions. Please note that the diagnoses of *P. fervens*, *P. megacephala*, *P. parva*, and *P. teneriffana* may not be globally applicable as the available material in this publication was from a rather limited number of populations.

Measurements and indices

(Fig. 1A–D)

- HL *head length*: maximum distance from the midpoint of the anterior clypeal margin to the midpoint of the posterior margin of the head, measured in full-face view; in majors, measured from midpoint of tangent between anteriormost position of clypeus to midpoint of tangent between posteriormost projection of the vertex.
- HW *head width*: measured at widest point of the head, in full-face view behind eye level.
- SL *scape length*: maximum scape length, excluding basal condyle and neck.
- EL *eye length*: maximum diameter of compound eye measured in oblique lateral view.
- MFL *metafemur length*: measured from the junction with the trochanter to the junction with the tibia.
- MTL *metatibia length*: measured from the junction with femur to the junction with first tarsal segment.
- MDL *mandible length*: maximum length, measured in oblique frontolateral view, from apex to lateral base.
- PNW *pronotal width*: maximum width of pronotum measured in dorsal view.
- WL *Weber's length*: 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.
- PNH *pronotum height*: maximum height of pronotum, measured in profile from the posterior base of the lateropronotum, where procoxa is attached, to the highest point of the dorsal pronotum.
- MNH *promesonotum height*: maximum height of promesonotum, measured in profile from the anterior base of the katepisternum, where mesocoxa is attached, to the highest point of the dorsal pronotum.

- PDH *propodeum height*: maximum height of propodeum, measured in profile from the highest point of the dorsopropodeum perpendicular to a line that marks the lateroventral borders of the katapisternum and the propodeum.
- PSL *propodeal spine length*: 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 one axis of a dual-axis micrometer, which is aligned along the length of the spine, while the second axis crosses the base of the measured spine, and connects the base with the center of the propodeal concavity.
- PTL *petiole length*: maximum diagonal length of petiole, measured in lateral view, from most anteroventral point of the peduncle, at or below the propodeal lobe, to most posterodorsal point at the junction to first helcial tergite.
- PTH *petiolar node height*: 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 *petiolar node width*: maximum petiolar node width, measured in dorsal view.
- PPL *postpetiole length*: 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 *postpetiole height*: 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 *postpetiole width*: maximum width of postpetiole, measured in dorsal view.

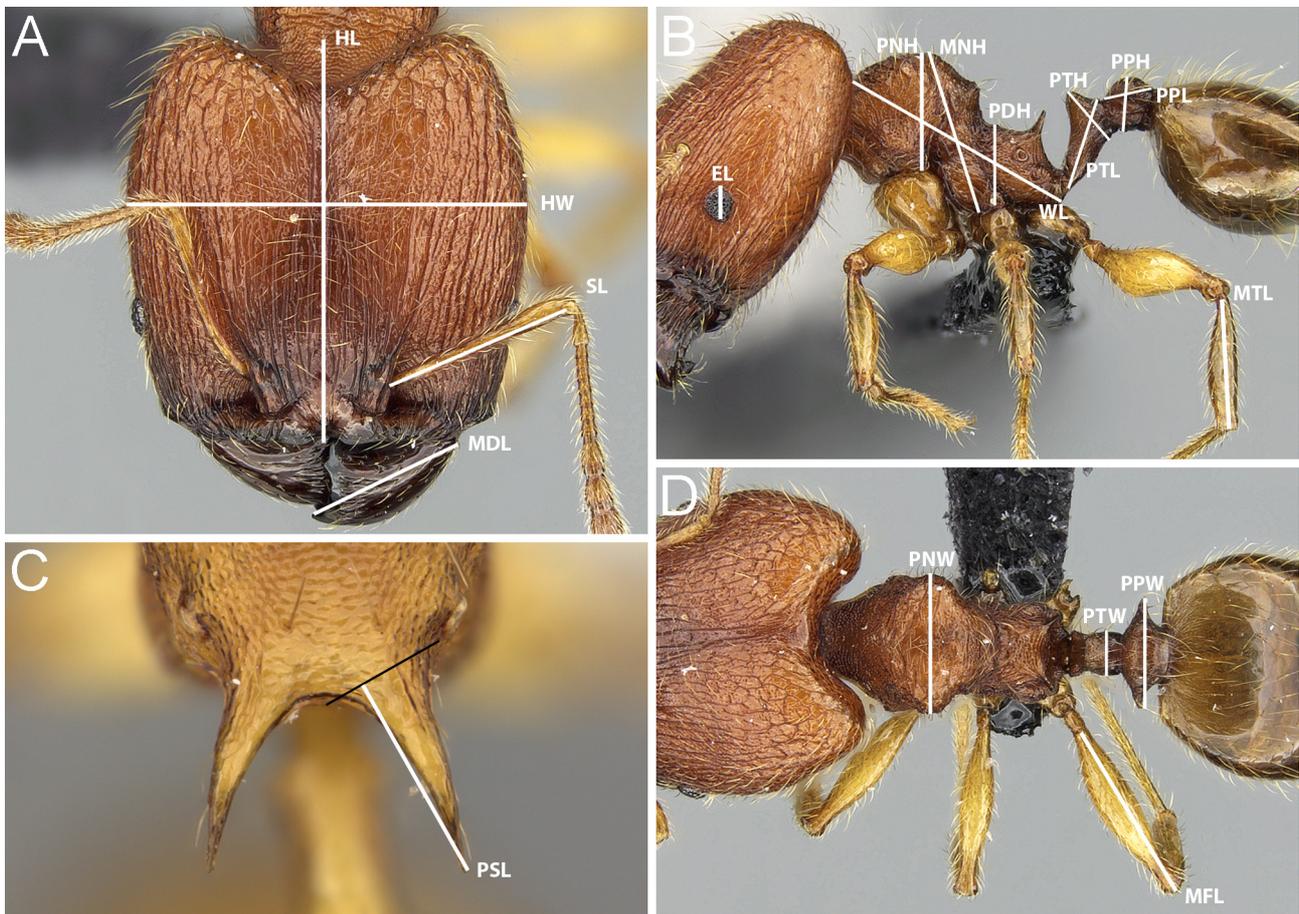


FIGURE 1 Illustrations of measurements: *Pheidole vulcan*, full-face view (A), profile (B), and dorsal view (C) of major worker; *P. pulchella*, oblique frontodorsal / dorsocaudal view (D) of minor worker.

Indices

CI *cephalic index*: $HW / HL * 100$

SI *scape index*: $SL / HW * 100$

MDI *mandible index*: $MDL / HW * 100$

EI	<i>eye index</i> : EL / HW * 100
FI	<i>metafemur index</i> : MFL / HW * 100.
PSLI	<i>propodeal spine index</i> : PSL / HW * 100
LPpI	<i>lateral postpetiole index</i> : PPL / PPH * 100
DPpI	<i>dorsal postpetiole index</i> : PPW / PPL * 100
PpWI	<i>postpetiole width index</i> : PPW / PTW * 100
PpLI	<i>postpetiole length index</i> : PPL / PTL * 100
PpHI	<i>postpetiole height index</i> : PPH / PTH * 100

Synopsis of *Pheidole* species in the Southwest Indian Ocean islands

braueri Forel, 1897

decepticon Fischer & Fisher **sp. n.**

dodo Fischer & Fisher **sp. n.**

fervens Smith, F., 1858

= *pungens* Smith, 1861

= *javana* Mayr, 1867

= *cavannae* Emery, 1887

= *javana* var. *dharmasalana* Forel, 1902

= *amia* Forel, 1912

= *javana* var. *dolenda* Forel, 1912

= *oceanica* subsp. *nigriscapa* Santschi, 1928

= *oceanic* subsp. *nigriscapa* var. *tahitiana* Cheesman & Crawley, 1928

= *javana* var. *desucta* Wheeler, 1929

= *javana* var. *soror* Santschi, 1937b

= *nodus* st. *azumai* Santschi, 1941

jonas Forel, 1907

komori Fischer & Fisher **sp. n.**

loki Fischer & Fisher **sp. n.**

megacephala (Fabricius), 1773

= *edax* Forskål, 1775

= *trinodis* Losana, 1834

= *pusilla* Heer, 1852

= *janus* Smith, 1858

= *laevigata* Smith, 1855

= *laevigata* Mayr, 1862

= *agilis* Smith, F., 1857

= *testacea* Smith, F. 1858

= *perniciosa* Gerstäcker, 1859

= *suspiciosa* Smith, F., 1859

= *megacephala* r. *scabrior* Forel, 1891 **syn. n.**

= *picata* Forel, 1891 **syn. n.**

= *punctulata* r. *gietleni* Forel, 1905 **syn. n.**

= *picata* var. *bernhardae* Emery, 1915 **syn. n.**

megatron Fischer & Fisher **sp. n.**

parva Mayr, 1865

= *parva* var. *decanica* Forel, 1902

= *flavens* var. *farquharensis* Forel, 1907 **syn. n.**

= *sauteri* Wheeler, 1909

= *rinae* var. *mala* Forel, 1911

= *rinae* r. *tipuna* Forel, 1912

= *bugi* Wheeler, 1919
 = *tardus* Donisthorpe, 1947 **syn. n.**

***ragnax* Fischer & Fisher sp. n.**

***teneriffana* Forel, 1893**

= *voeltzkowii* Forel, 1894 **syn. n.**
 = *teneriffana* subsp. *taina* Aguayo, 1932

***vulcan* Fischer & Fisher sp. n.**

Key to *Pheidole* species in the islands of the Southwest Indian Ocean (minor and major workers)

- 1a. **Minors & majors:** Relatively large species (WL minors 0.76–1.07, WL majors 1.06–1.65), with scapes and legs moderately long to very long (SI minors 120–209, FI minors 134–226, FL majors 1.01–1.68) and promesonotal process well-developed, angulate to subangulate, with a relatively deep angular groove in lateral view (Fig. 2A,B) 2
- 1b. **Minors & majors:** Mostly smaller species (WL minors 0.51–0.84, WL majors 0.70–1.22), with scapes and legs usually shorter (SI minors 85–130, FI minors 91–135, FL majors 0.55–1.06) and promesonotal process absent (Fig. 2C), or if present in major workers then the transverse groove in profile view at most shallowly concave (Fig. 2D)..... 5

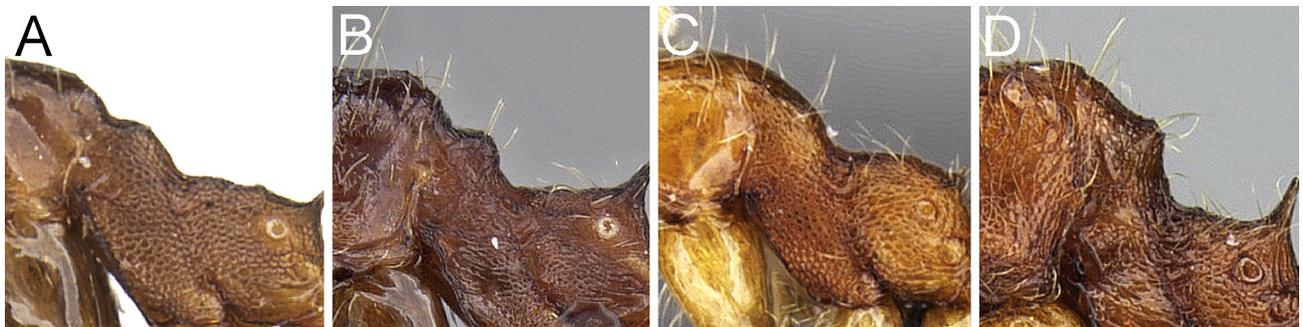


FIGURE 2 *Pheidole teneriffana*, profile of minor (CASENT0280996) (A) and major worker (CASENT0189743) (B); *P. decepticon*, profile of minor worker (CASENT0133677) (C); *P. vulcan*, profile of major worker (CASENT0137234) (D).

- 2a. **Minors:** Postpetiole with convex ventral process (Fig. 3A). **Majors:** Head significantly longer than wide (CI 82–88). Posterior half of face lacking longitudinal rugae (Fig. 3B). Submedian hypostomal teeth moderately large. Postpetiole with small acute ventral process. Comoros Is., Mozambique *P. komori*
- 2b. **Minors:** Postpetiole without ventral process (Fig. 3C). **Majors:** Head about as wide as long (CI 93–101). Face with longitudinal to posteriorly oblique rugae reaching toward posterolateral corners (Fig. 3D). Submedian hypostomal teeth small or inconspicuous. Postpetiole without ventral process..... 3

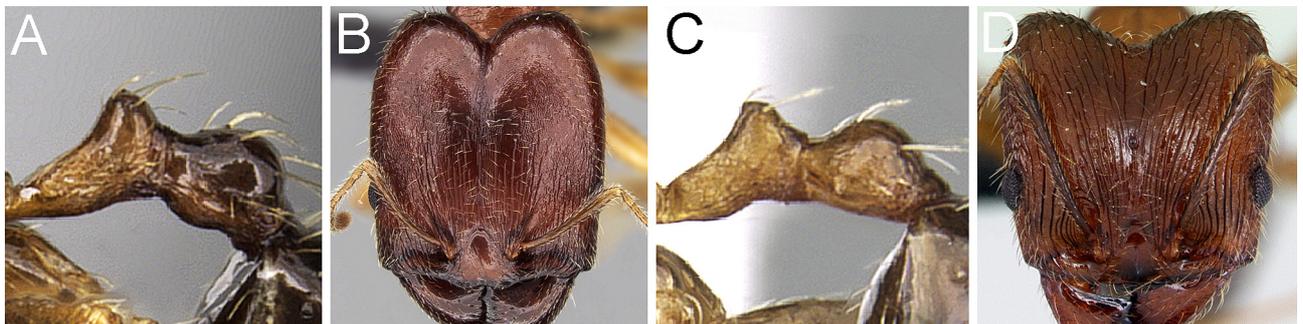


FIGURE 3 *Pheidole komori*, profile of minor (CASENT0149121) (A) and full-face view of major worker (CASENT0147188) (B); *P. teneriffana*, profile of minor worker (CASENT0280996) (C); *P. ragnax*, full-face view of major worker (CASENT0132467) (D).

- 3a. **Minors:** Head almost 50% longer than wide (CI 67–72) with raised occipital carina (Fig. 4A), metafemur very long, more than twice as long as head width (FI 209–226). **Majors:** Frontal carinae and antennal scrobe absent or inconspicuous (Fig. 4B), legs comparatively long (FI 99). Mayotte *P. ragnax*
- 3b. **Minors:** Head relatively shorter (CI 72–88) and without raised occipital carina (Fig. 4C), metafemur shorter (FI 134–170). **Majors:** Frontal carinae and antennal scrobe present and conspicuous (Fig. 4D), legs shorter (FI 73–91)..... 4

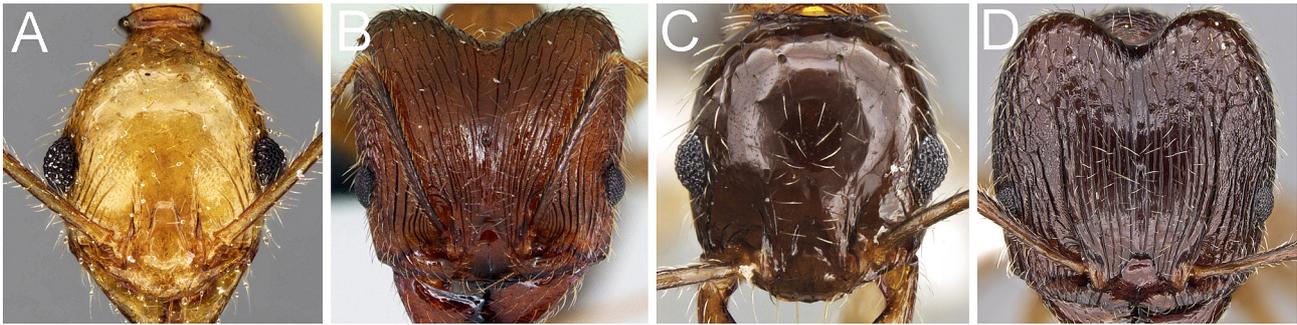


FIGURE 4 *Pheidole ragnax*, full-face views of minor (CASENT0132467) (A) and major worker (CASENT0136791) (B); *P. teneriffana*, full-face view of minor worker (CASENT0280996) (C); *P. fervens*, full-face view of major worker (CASENT0060250) (D).

- 4a. **Minors:** Scape and metatibia pilosity mostly subdecumbent to suberect (Fig. 5A), metanotal groove in profile well-impressed (Fig. 5B), eyes moderately large (mean EI 22), and propodeal spines relatively short (mean PSLI: 12). **Majors:** Frontal carinae reaching at least 4/5 of the distance to posterior head margin, scrobe area and sides of head punctate to weakly punctate, in full-face view with coarse suberect hairs laterally (Fig. 5C). (Mauritius) widespread, introduced species *P. fervens* Smith, F.
- 4b. **Minors:** Scape and metatibia pilosity decumbent to subdecumbent, plus longer suberect hairs along outer edge (Fig. 5D), metanotal groove not or barely impressed in profile (Fig. 5E), eyes slightly larger (mean EI 28), and spines relatively longer (mean PSLI: 16). **Majors:** Frontal carinae reaching $\frac{3}{4}$ of the distance to posterior head margin, scrobe area and sides of head superficially punctate, in full-face view with decumbent to subdecumbent hairs laterally (Fig. 5F). (Comoros Is., Madagascar, Mauritius, Mayotte, Seychelles) widespread, introduced species. *P. teneriffana* Forel



FIGURE 5 *Pheidole fervens*, dorsal view of scape (A) and profile (B) of minor (CASENT006581), and full-face view of major worker (CASENT0060250) (C); *P. teneriffana*, dorsal view of scape (D) and profile (E) of minor worker (CASENT0280996) and full-face view of major worker (CASENT0189743) (F).

- 5a. **Minors & majors:** Postpetiole in profile with large to moderately large, usually convex, ventral process (Fig. 6A), in some major workers widely subtriangular, but never acute (Fig. 6B), and postpetiole almost always higher than petiole (PpHI minors 100–146, PpHI majors 104–123). **Minors:** Face entirely smooth and shiny and scapes moderately short (SI 107–130), head shape oval, posterior head margin in full-face view rounded to medially straight (Fig. 6C), promesonotum in profile roundly convex. **Majors:** Submedian hypostomal teeth always small to inconspicuous and median process absent. 6
- 5b. **Minors & majors:** Postpetiolar ventral process absent (Fig. 6D), or if present in major workers, then small and acute (Fig. 6E), never convex or broadly triangular in profile, and postpetiole usually lower than petiole, only very rarely higher in major workers (PpHI minors 73–97, PpHI majors 79–106). **Minors:** Face usually punctate, if face entirely smooth and shiny then head shape posteriorly more broadly transverse and scapes shorter (SI 91–98) (Fig. 6F), promesonotum in profile flatly convex and elongate. **Majors:** Submedian hypostomal teeth never small to inconspicuous, but relatively large, median process present or absent. 8



FIGURE 6 *Pheidole megacephala*, full-face view (A) and profile (B) of minor (CASENT0056016) and full-face view of major worker (CASENT0104990) (C); *P. braueri*, full-face view of minor worker (CASENT0101571) (D); *P. dodo*, profile of minor worker (CASENT0060619) (E); *P. vulcan*, full-face view (F) and profile (G) of major worker (CASENT0060617).

- 6a. **Minors:** Standing hairs relatively fine and acute, abundant, and with several shorter hairs between longer pilosity (Fig. 7A). **Majors:** Postpetiolar ventral process slightly angulate to subtriangular in profile and small to moderately large, not convex, standing hairs relatively fine and acute (Fig. 7B). Comoros Is., Juan de Nova Is., Mayotte, Seychelles. *P. decepticon*
- 6b. **Minors:** Standing hairs relatively thicker, often blunt or bifurcate apically, and usually less abundant, with few or almost no shorter hairs between longer pilosity (Fig. 7C). **Majors:** Postpetiolar ventral process larger and convex, standing hairs thicker (Fig. 7D), often blunt or apically bifurcate 7

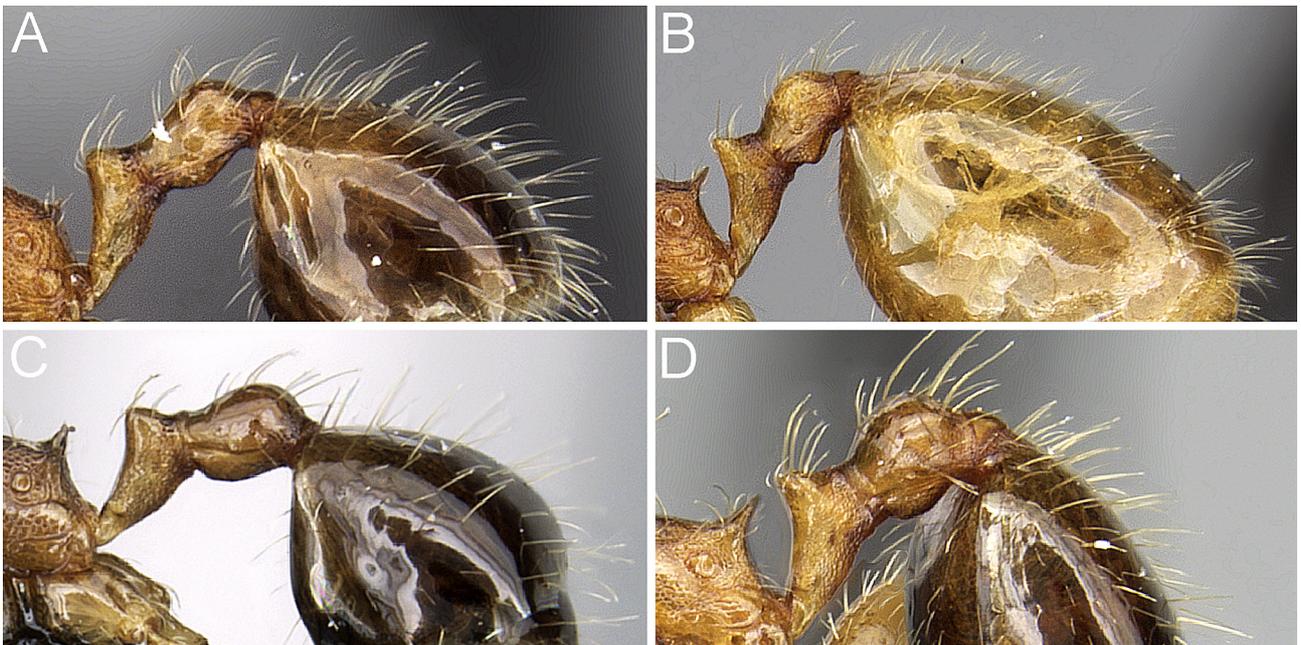


FIGURE 7 *Pheidole decepticon*, profile of minor (CASENT0133677) (A) and major worker (CASENT0132558) (B); *P. megacephala*, profile of minor (CASENT0056016) (C) and major worker (CASENT0104990) (D).

- 7a. **Minors:** Head about 0.9 times as wide as long (CI 86–92) and postpetiole about 0.8 times the length of petiole (PpLI 70–91) (Fig. 8A). **Majors:** Head usually heart shaped with posterior emargination moderately deep, sides of head strongly convex, posterior 1/3 to 1/4 of face, behind level where scapes end, smooth and shiny except for weak median rugae (Fig. 8B), posterolateral corners of head in profile ventrally smooth and shiny, at most with microsculpture present (Fig. 8C). (Comoros Is., Juan de Nova Is., Madagascar, Mauritius, Mayotte, Réunion, Seychelles) globally introduced species. . *P. megacephala* (Fabricius)
- 7b. **Minors:** Head slightly narrower (CI 82–87) and postpetiole shorter, about 0.7 times the length of petiole (PpLI 63–71) (Fig. 8D). **Majors:** Head less heart shaped, with posterior emargination relatively shallow (Fig. 8E), posterior 1/3 to 1/4 of head not completely smooth and shiny, some specimens superficially punctate, and some specimens with few to several, short, irregular, longitudinal rugulae, posterolateral corners of head in profile ventrally with punctate to weakly punctate sculpture (Fig. 8F). Comoros Is *P. megatron*

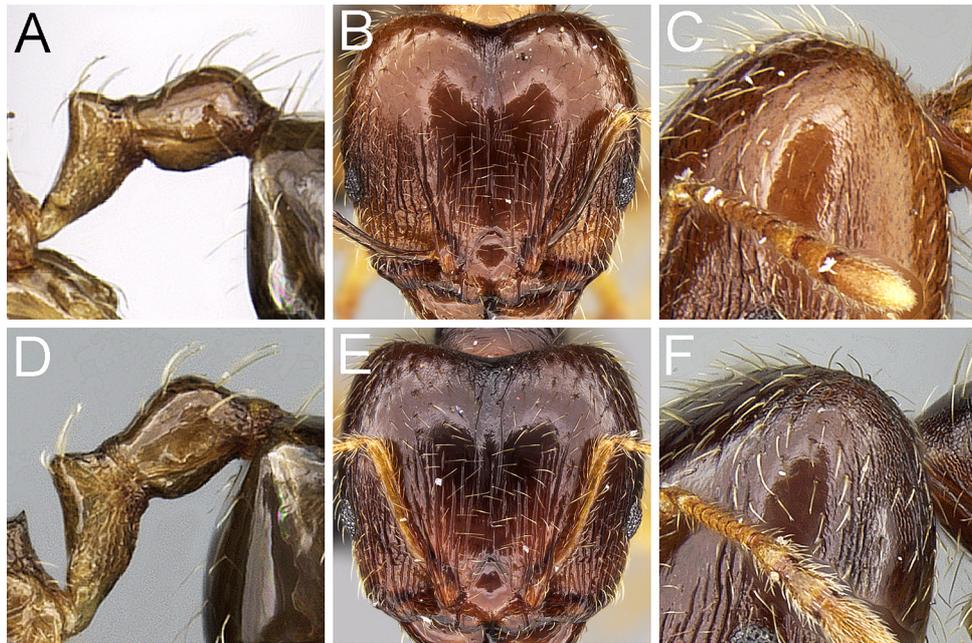


FIGURE 8 *Pheidole megacephala*, profile of minor (CASENT0056016) (A), full-face view (B) and profile (C) of major worker (CASENT0104990); *P. megatron*, profile of minor (CASENT0281179) (D), full-face view (E) and profile (F) of major worker (CASENT0147194).

- 8a. **Minors:** Face smooth (Fig. 9A) to medially superficially punctate and laterally punctate to weakly punctate, with scape pilosity mostly suberect (Fig. 9B), and eyes relatively large (EI 22–24, mean 24). **Majors:** Frontal carinae strongly developed and laterally extended, obscuring part of antennal scrobe (Fig. 9C). Seychelles *P. braueri* Forel
- 8b. **Minors:** Either face mostly punctate to strongly punctate, sometimes overlain with faint rugulae (Fig. 9D), or face sculpture more reduced, then scape pilosity decumbent to subdecumbent (Fig. 9E) and eyes slightly smaller (*P. dodo*: EI 18–22, mean 21). **Majors:** Frontal carinae absent or short and inconspicuous, never laterally extended and obscuring part of antennal scrobe (Fig. 9F). 9

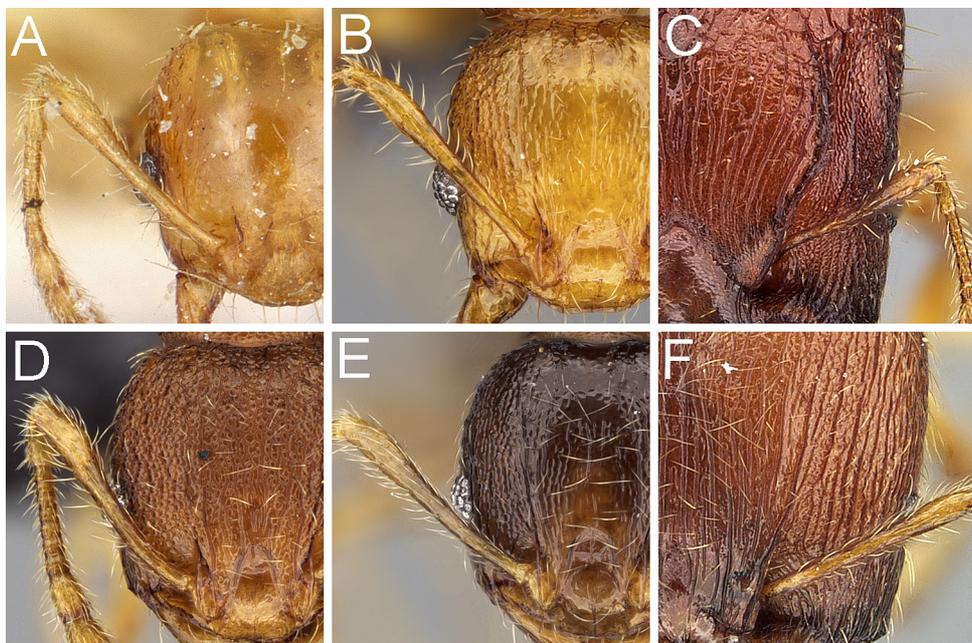


FIGURE 9 *Pheidole braueri*, full-face view of syntype minor (CASENT0101571) (A), non-type minor (CASENT0159919) (B), and of major worker (CASENT0217235) (C); *P. parva*, full-face view of minor worker (CASENT0160528) (D); *P. dodo*, full-face view of minor worker (CASENT0060619) (E); *P. vulcan*, full-face view of major worker (CASENT0137234) (F).

- 9a. **Minors:** Postpetiole usually about as long as high (LPpI 91–115, mean 102) and pronotum laterally mostly smooth and shiny (Fig. 10A). **Majors:** Posterior portion of face and of posterolateral lobes smooth and shiny, without rugae or punctures (Fig.

- 10B). Mauritius *P. dodo*
- 9b. **Minors:** Either postpetiole longer than high (LPpI 114–163) (Fig. 10C) or pronotum laterally not mostly smooth and shiny (Fig. 10D). **Majors:** Face and posterolateral lobes never partly smooth and shiny, but rugoreticulate and punctate to superficially punctate (Fig. 10E) 10

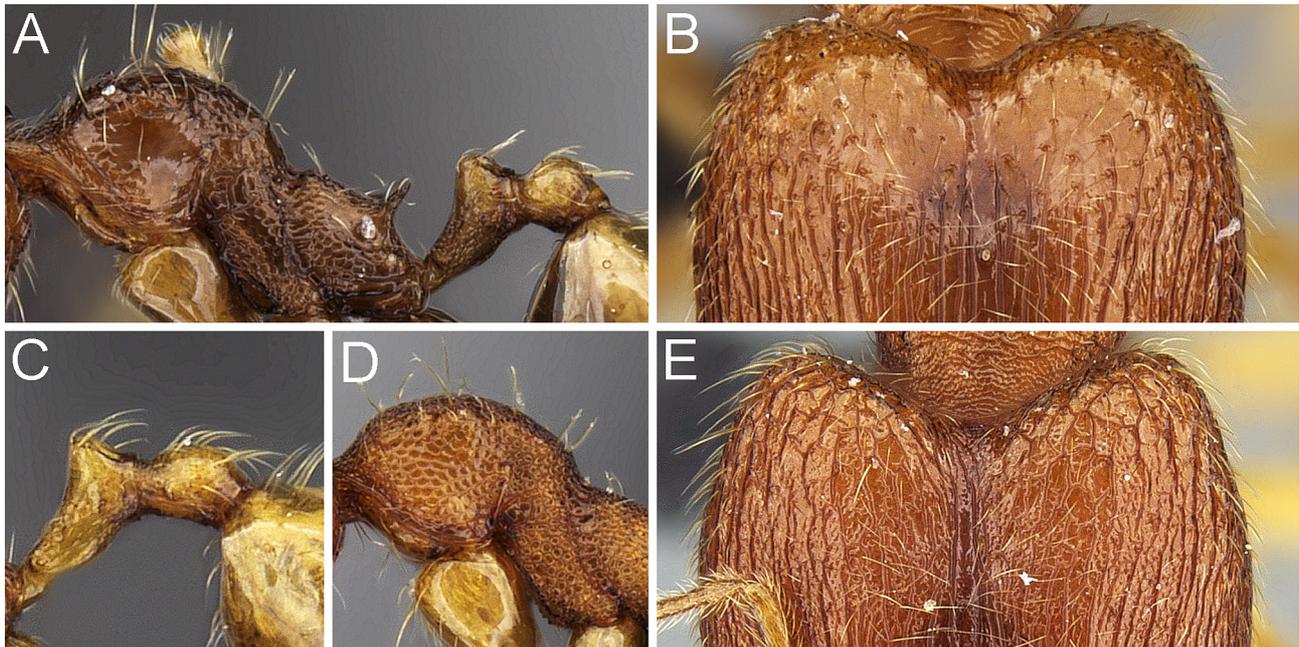


FIGURE 10 *Pheidole dodo*, profile of minor (CASENT0060619) (A) and full-face view of major worker (CASENT0060617) (B); *P. vulcan*, profile of minor worker (CASENT0137429) (C); *P. parva*, profile of minor worker (CASENT0160279) (D); *P. vulcan*, full-face view of major worker (CASENT0137234) (E).

- 10a. **Minors:** Postpetiole distinctly higher than long (LPpI 83–95) (Fig. 11A) and on average 1.4 times wider than long (DpPI 125–150) (Fig. 11B). **Majors:** Head distinctly longer than wide (CI 88–93) (Fig. 11C). (Mauritius, Seychelles, Saudi Arabia, United Arab Emirates) widespread, probably introduced species. *P. parva* Mayr
- 10b. **Minors:** Postpetiole at least as long as high or longer (LPpI 114–163) (Fig. 11D) and on average about as wide as long (DpPI 86–109) (Fig. 11E). **Majors:** Head about as long as wide (CI 95–102) (Fig. 11F) 11

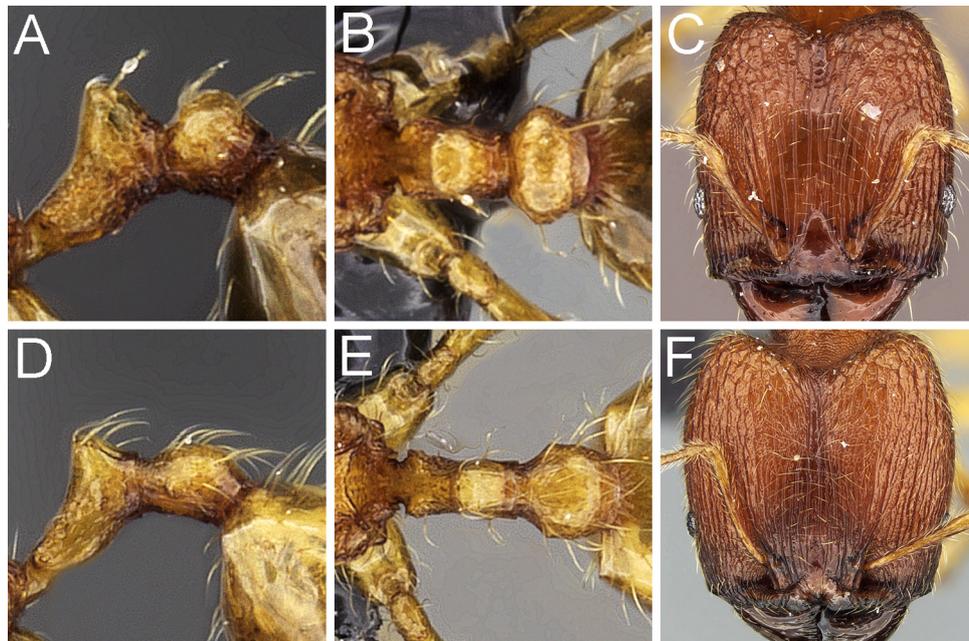


FIGURE 11 *Pheidole parva*, profile (A) and dorsal view (B) of minor (CASENT0160279) and full-face view of major worker (CASENT0160280) (C); *P. vulcan*, profile (D) and dorsal view (E) of minor (CASENT0137429) and full-face view of major worker (CASENT0137234) (F).

- 11a. **Minors** (major unknown): Head posteriorly superficially punctate to smooth, mesosoma sculpture reduced, mostly very faintly punctate (Fig. 12B), sometimes overlain with superficial rugulae, scapes longer, on average 1.2 times longer than width of head (SI 117–122) and postpetiole significantly longer than wide (DPpI 86) (Fig. 12B). Mayotte *P. loki*
- 11b. **Minors**: Head and majority of mesosoma both uniformly punctate to weakly punctate, promesonotum sometimes overlain with transverse rugulae (Fig. 12A), scapes on average 1.0 to 1.1 times longer than width of head (SI 96–122), and postpetiole on average as long as wide (DPpI 88–109) (Fig. 12A). **Majors**: Promesonotum dorsally with transverse rugulae, posterior process in profile weakly defined with inconspicuous to shallowly concave transverse groove, postpetiole in dorsal view with large lateral process 12

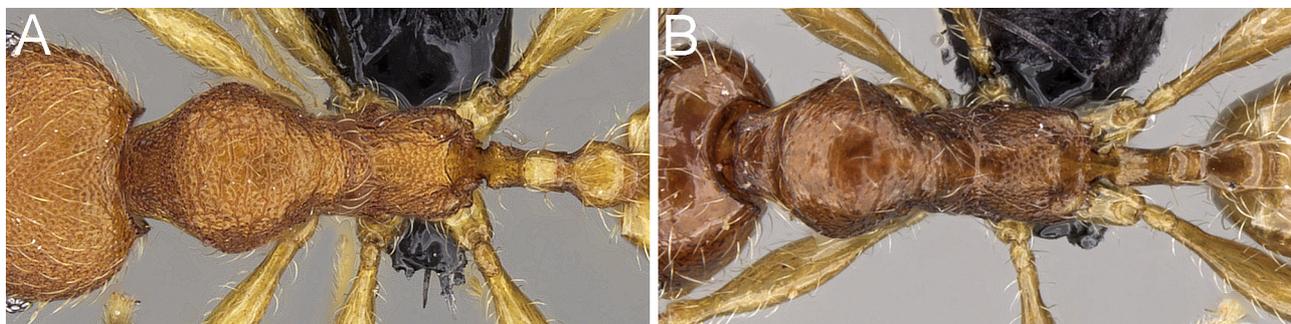


FIGURE 12 *Pheidole vulcan*, dorsal view of minor worker (CASENT0137429) (A); *P. loki*, dorsal view of minor worker (CASENT0059150) (B).

- 12a. **Minors**: Mandibles and scapes relatively short (MDI 54–63, SI 96–106), postpetiole about 1.2 times longer than high (LPpI 114–120), standing hairs on mesosoma abundant (Fig. 13A). **Majors**: Promesonotal process high in profile view, with weakly impressed transverse groove, propodeal spines relatively long and spinose (PSLI 14–17), postpetiole higher than long (LPpI 83–95), and standing hairs on mesosoma abundant, relatively flexuous (Fig. 13B). Comoros Is *P. vulcan*
- 12b. **Minors**: Mandibles and scapes slightly longer (MDI 60–73, SI 102–122), postpetiole about 1.4 times longer than high (LPpI 122–163), standing hairs on mesosoma comparatively scarce (Fig. 13C). **Majors**: Promesonotal process lower, with a more concavely impressed groove, propodeal spines shorter and subtriangular (PSLI 10–14), postpetiole usually longer than high (LPpI 90–126), and standing hairs less abundant and less flexuous (Fig. 13D). Comoros Is., Mayotte *P. jonas* Forel

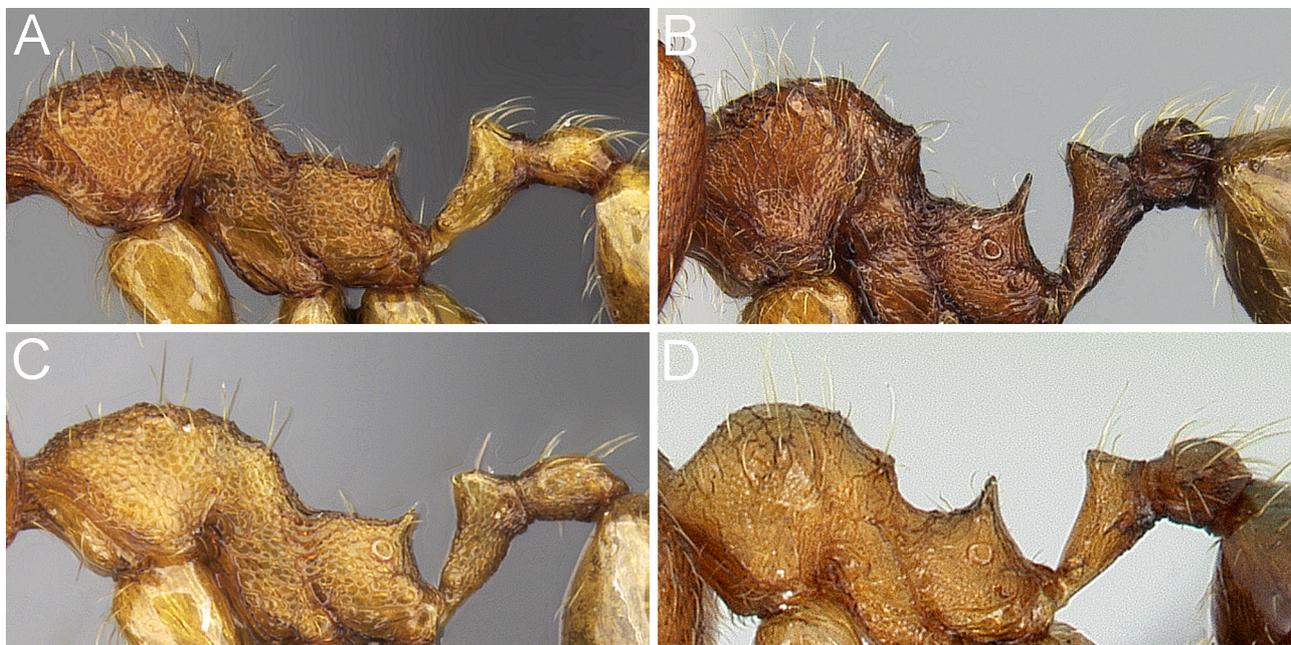


FIGURE 13 *Pheidole vulcan*, profile of minor (CASENT0137429) (A) and major worker (CASENT0137234) (B); *P. jonas*, profile of minor (CASENT0137429) (C) and major worker (CASENT0146984) (D).

Review of species

Pheidole braueri Forel

(Figs. 14A–F)

Pheidole braueri Forel, 1897: 204. Lectotype (major worker, CASENT0101604) [designated here]: SEYCHELLES (A. Brauer) (MHNG) [examined]; paralectotypes (1 major worker & 3 minor workers, CASENT0101604 & CASENT0101571) same data as lectotype (MHNG) [examined].



FIGURE 14 *Pheidole braueri* Forel, full-face view (A), profile (B), and dorsal view (C) of minor worker (CASENT0159919) and full-face view (D), profile (E), and dorsal view (F) of major worker (CASENT0217235).

Diagnosis: Relatively small species (WL major 0.81–0.85 mm, WL minor 0.51–0.56 mm), with short scapes and legs (SI major 41–51, FI major 51–56; SI minor 91–98, FI minor 93–100); both worker castes with

promesonotal process absent. **Major** head rectangular, longer than wide, frontal carinae strongly divergent posteriorly, extending to about 3/5 of the way to the posterior head margin, scrobe well defined, in lateral view a very shallow depression posterior of frontal carinae, hypostomal margin with large submedian teeth, median process absent, spines relatively long (PSLI 15–16), postpetiole higher than long (LPpI 80–89), with small acute ventral process. **Minor** head subrectangular, face smooth to weakly punctate, posterior head margin slightly concave, scapes short (SI 91–98), scape pilosity mostly suberect with few longer erect hairs along outer edge, pronotum largely smooth, rest of mesonotum weakly to superficially punctate, propodeal spines slightly shorter than distance between their bases (PSLI 18–22), postpetiole without ventral process and on average as long as high (LPpI 94–110).

Description of major workers: Measurements (lectotype): HW 1.07, HL 1.15, SL 0.47, MDL 0.55, EL 0.15, WL 0.84, PNH 0.48, PNW 0.55, MNH 0.57, PDH 0.31, PTL 0.33, PPL 0.16, PTH 0.22, PPH 0.20, PTW 0.15, PPW 0.25, PSL 0.17, MFL 0.58, MTL 0.41, CI 93, SI 44, MDI 51, EI 14, FI 54, PSLI 15, LPpI 80, DPpI 153, PpWI 163, PpLI 48, PpHI 91.

Measurements (n=5): HW 1.05–1.13 (1.08), HL 1.13–1.19 (1.17), SL 0.45–0.55 (0.48), MDL 0.53–0.56 (0.55), EL 0.13–0.15 (0.14), WL 0.81–0.85 (0.83), PNH 0.43–0.47 (0.45), PNW 0.58–0.61 (0.59), MNH 0.60–0.64 (0.62), PDH 0.30–0.31 (0.30), PTL 0.31–0.33 (0.33), PPL 0.16–0.17 (0.16), PTH 0.20–0.21 (0.21), PPH 0.19–0.20 (0.19), PTW 0.15–0.17 (0.16), PPW 0.23–0.26 (0.24), PSL 0.16–0.18 (0.17), MFL 0.57–0.59 (0.58), MTL 0.40–0.42 (0.41), CI 90–96 (93), SI 41–51 (45), MDI 47–53 (51), EI 12–14 (13), FI 51–56 (54), PSLI 15–16 (15), LPpI 80–89 (85), DPpI 141–156 (147), PpWI 135–167 (152), PpLI 48–52 (50), PpHI 90–95 (93).

Head slightly longer than wide (CI 90–96), rectangular with almost parallel sides and deep, broadly V-shaped posterior emargination. Mandibles smooth and shiny, compact, and relatively short (MDI 47–53). Clypeus smooth, with median carina absent, and lateral carinae short. Frons longitudinally rugose, with short irregular rugae between longer rugae, on posterior half of head grading into coarsely reticulate sculpture, spaces between rugae smooth to superficially punctate. Frontal carinae reaching slightly behind head midlength, strongly developed, laterally extended, and curving over well developed, smooth to superficially punctate antennal scrobe. Sides of head anterior of scrobes densely rugose-punctate. Scapes relatively short (SI 41–51) and strongly arcuate, with decumbent pilosity and few long, erect standing hairs on outer edge. In profile, head anterior of posterolateral lobes with a faintly concave depression. Head posteriorly and lateroventrally, in dorsal and in profile view, mostly smooth and shiny, almost entirely without sculpture. Submedian hypostomal teeth large, median process absent. Promesonotal dome strongly developed and convex in profile, promesonotal process absent, posterior declivity weakly angulate, in dorsal view wide with humeri distinctly laterally produced. Surface of promesonotum and lateropronotum partly smooth or micropunctate, partly superficially punctate, dorsally with some or several irregular longitudinal or transverse rugae, katapisternum with large smooth area, remainder of mesosoma faintly to superficially punctate. Metanotal groove narrow, barely or not impressed, and with weakly developed cross-ribs. Propodeal spines comparatively stout and long (PSLI 15–16). Metafemur very short (FI 51–56), metatibia with decumbent pilosity. Postpetiole in profile higher than long (LPpI 80–89), with small, weakly angulate to anteriorly acute ventral process, in dorsal view anteriorly wider than posteriorly, and on average 1.5 times wider than petiole (PpWI 135–167). Petiole and postpetiole smooth to superficially punctate. Gaster smooth. Several short to moderately long, stiff standing hairs on dorsal head and body, pilosity short and decumbent. Color reddish brown, with lighter legs and darker gaster.

Description of minor workers: Measurements (n=5): HW 0.42–0.45 (0.44), HL 0.45–0.47 (0.46), SL 0.41–0.42 (0.41), MDL 0.27–0.30 (0.29), EL 0.10–0.11 (0.11), WL 0.51–0.56 (0.54), PNH 0.19–0.22 (0.21), PNW 0.29–0.34 (0.31), MNH 0.35–0.43 (0.38), PDH 0.18–0.22 (0.20), PTL 0.18–0.23 (0.20), PPL 0.09–0.11 (0.10), PTH 0.12–0.14 (0.13), PPH 0.10–0.12 (0.10), PTW 0.08–0.10 (0.08), PPW 0.12–0.15 (0.13), PSL 0.07–0.10 (0.08), MFL 0.40–0.47 (0.43), MTL 0.29–0.35 (0.32), CI 80–95 (91), SI 85–103 (89), MDI 61–74 (66), EI 20–24 (22), FI 91–108 (95), PSLI 15–21 (18), LPpI 39–41 (40), DPpI 109–141 (122), PpWI 141–160 (152), PpLI 47–58 (53), PpHI 79–91 (85).

Head subquadrate, slightly longer than wide (CI 91–98), sides strongly convex, posterior head margin slightly concave, occipital carina not visible in full-face view. Mandibles relatively short (MDI 62–70), smooth. Clypeus smooth or superficially punctate, median carina absent to inconspicuous, lateral carinae weak and irregular. Face sculpture varying from uniformly smooth and shiny in some specimens medially smooth or superficially punctate with weak to superficial punctures and laterally overlain with few faint rugulae. Scapes short (SI 91–98), when laid

back in full-face view barely reaching beyond posterior head margin, pilosity mostly suberect, few hairs along outer edge longer and erect. Eyes moderately large (EI 20–24), oval, and anteriorly narrower. Promesonotal outline in lateral view flatly convex with promesonotum extended posteriorly, weakly subangulate at posterior declivity. Metanotal groove in profile shallowly impressed, with weak cross-ribs, the two lateromedian cross-ribs sometimes continued as faintly developed rugulae along dorsolateral propodeal margins, ending at propodeal spines. Pronotum smooth with areas of weak to superficial punctures anteriorly, posteriorly, and laterally, mesonotum and propodeum weakly to superficially punctate with smooth areas dorsally and laterally. Propodeal spines acute, short-spinose, slightly shorter than distance between their bases (PSLI 18–22). Metafemur short (FI 93–100), metatibia with subdecumbent pilosity and scattered suberect hairs. Postpetiole on average slightly longer than high (LPPI 94–110), without ventral process, petiole and postpetiole surface usually smooth. Gaster smooth and shiny. Standing hairs short, stiff, and suberect, a few longer erect hairs present on dorsum of head and promesonotum. Color yellow to orange with darker gaster.

Discussion: *Pheidole braueri* was described from specimens collected by August Bernhard Brauer who collected insects on Mahé and Silhouette islands, so the precise locality of the type series is unknown. However, subsequent collections are only from Silhouette Island. Thus, this species may be restricted to Silhouette Island. Based on similarities in external morphology, especially the head and body of the major worker, *P. braueri* seems to belong to a widespread group of morphologically related species. The geographic distribution of this potentially monophyletic species group ranges from the Seychelles in the Southwest Indian Ocean to Borneo and to several smaller islands in Micronesia and Melanesia in the South and West Pacific Ocean. This group contains several species with majors that resemble those of *P. braueri* in key characters including head morphology and the shape of the mesosoma and waist segments. Possibly related species are *Pheidole philemon* Forel (Solomon Islands), *P. hortensis* Forel (Borneo and Indonesia), *P. maculifrons* Wheeler (Philippines), *P. recondita* Clouse (Guam), *P. fantasia* Chapman (Philippines), *P. clypeocornis* Eguchi, *P. kikutai* Eguchi, *P. retivertex* Eguchi, *P. rugifera* Eguchi, *P. sayapensis* Eguchi, (these last five from Borneo see Eguchi 2001), and *P. tjibodana* Forel (Southeast Asia). Intraspecifically *P. braueri* minor workers display a significant amount of variability in face and mesosoma sculpture. In contrast to a largely weak to superficial punctate sculpture in most specimens, the heads and mesosomas of the type material are almost entirely smooth and shiny. Despite these relatively distinct intraspecific differences, the morphology and measurements of the types, especially of the major workers, are identical to those of the more recently collected material. Within the Malagasy region, *P. braueri* is a unique species recognizable by the features listed in its diagnosis.

A lectotype major worker, plus a paralectotype major and three paralectotypes minor workers, are herewith designated from the syntype series. One major worker (CASENT0104598) from the syntype series is morphologically different from the rest of the series and is excluded from the paralectotypes. It differs from all other material examined for this work and most likely represents a different species. We defer identification until more is known about this distinctive specimen.

Additional material examined: SEYCHELLES: Silhouette Island: Corgat-Cocos Marron Ridge, 18.vii.2000 (*J. Gerlach*); ridge from Mont Corgat to Mont Cocos Marrons, 4.50126 S, 55.2398 E, 455 m, forest, 24.i.2010 (*B.L. Fisher et al.*); on ridge toward Mont Corgat, 4.49537 S, 55.2395 E, 445 m, forest, 25.i.2010 / 28.i.2010 (*B.L. Fisher et al.*).

***Pheidole decepticon* sp. n.**

(Figs. 15A–F)

Holotype: (major worker), MAYOTTE, Mont Chongui, 12.95945 S, 45.1341 E, 380 m, rainforest, ex rotten log, collection code BLF18916, 28.xi.2007 (*B.L. Fisher et al.*) (CASC: CASENT0132558).

Paratypes: (3 major & 10 minor workers), Mont Chongui, 12.95945 S, 45.1341 E, 380 m, rainforest, sifted leaf litter, collection code BLF18922, 28.xi.2007 (*B.L. Fisher et al.*) (BMNH: CASENT0133665, CASENT0133713; CASC: CASENT0133661, CASENT0133677, CASENT0133678, CASENT0133705, CASENT0133710, CASENT0133715; MHNG: CASENT0133674, CASENT0133708); (1 minor worker), Mont Chongui, 12.95945 S, 45.1341 E, 380 m, rainforest, on low vegetation, collection code BLF18897, 28.xi.2007 (*B.L. Fisher et al.*) (CASC: CASENT0132583); (1 minor worker), Mont Chongui, 12.996 S, 45.1343 E, 550 m, rainforest, sifted leaf litter, collection code BLF18860, 28.xi.2007 (*B.L. Fisher et al.*) (CASC: CASENT0125677).

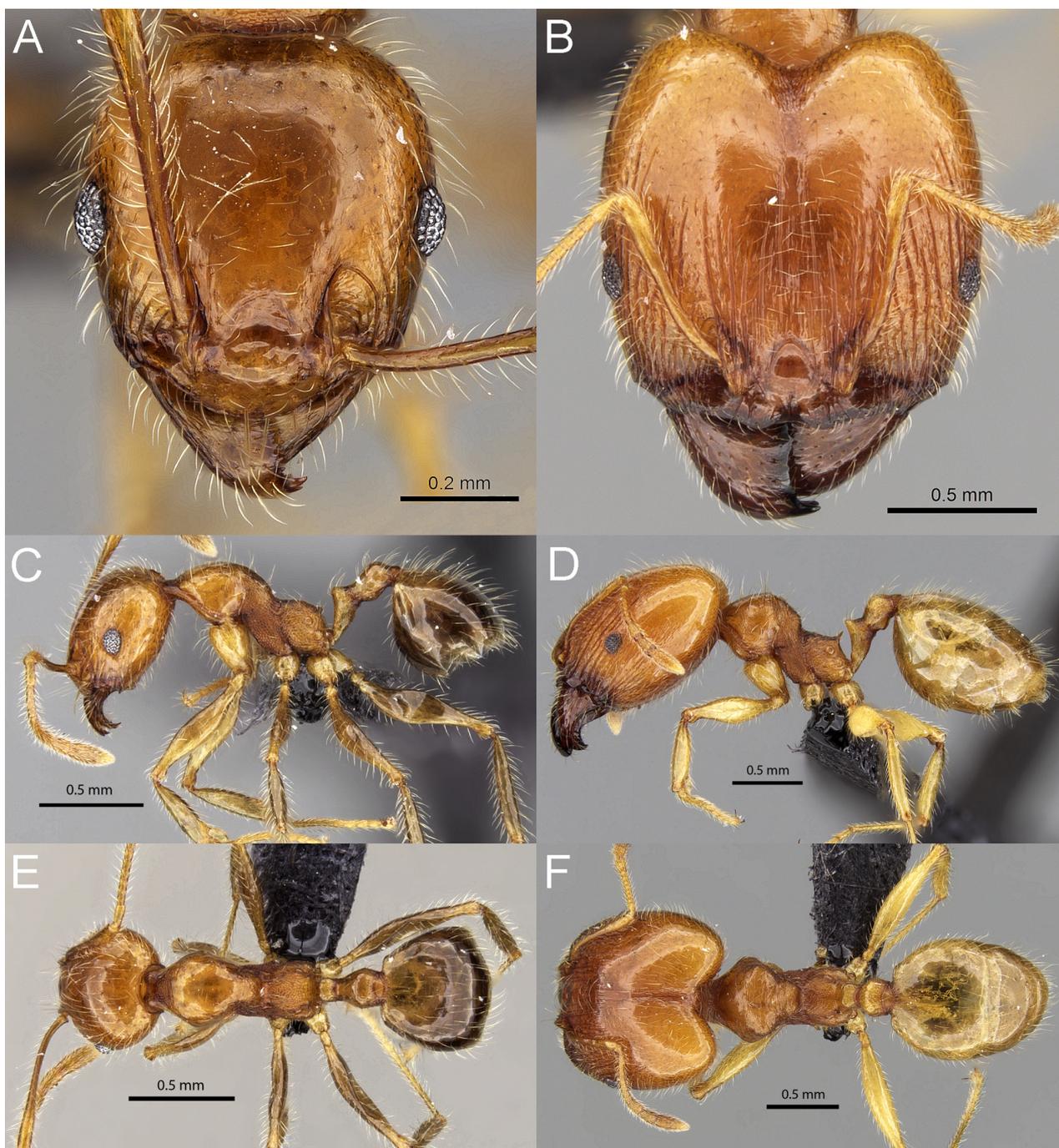


FIGURE 15 *Pheidole decepticon* sp. n., full-face view (A), profile (B), and dorsal view (C) of paratype minor worker (CASENT0133677) and full-face view (D), profile (E), and dorsal view (F) of holotype major worker (CASENT0132558).

Diagnosis: Moderately small species (WL major 0.95–1.12 mm, WL minor 0.57–0.86 mm), minor and major workers with moderately short scapes and legs (SI major 46–57, FI major 64–78, SI minor 107–130, FI minor 102–134); postpetiole of both worker subcastes with moderately large, often anteriorly situated, ventral process, propodeal spines often very short, promesonotal process absent or inconspicuous, standing hairs relatively fine, acute, and abundant, with many shorter hairs in between. **Major** head anteriorly longitudinally rugose and posterior 2/5 smooth and shiny (as in *P. megacephala*), postpetiole on average about 1.7 times wider than petiole (PpWI 155–183). **Minor** worker face and promesonotal dorsum smooth and shiny, head about 1.1 times longer than wide (CI 87–94), postpetiole on average about 0.7 times as long as petiole (PpLI 58–79).

Description of major workers: Measurements (holotype): HW 1.29, HL 1.36, SL 0.66, MDL 0.73, EL 0.16, WL 1.02, PNH 0.43, PNW 0.61, MNH 0.67, PDH 0.35, PTL 0.38, PPL 0.24, PTH 0.23, PPH 0.25, PTW 0.17,

PPW 0.28, PSL 0.14, MFL 0.87, MTL 0.65, CI 95, SI 51, MDI 57, EI 12, FI 67, PSLI 11, LPpI 96, DPpI 117, PpWI 165, PpLI 63, PpHI 109.

Measurements (n=13): HW 1.12–1.44 (1.31), HL 1.10–1.44 (1.31), SL 0.60–0.74 (0.67), MDL 0.58–0.84 (0.71), EL 0.15–0.19 (0.17), WL 0.95–1.12 (1.05), PNH 0.38–0.47 (0.43), PNW 0.58–0.69 (0.63), MNH 0.64–0.75 (0.70), PDH 0.31–0.40 (0.36), PTL 0.33–0.44 (0.39), PPL 0.23–0.28 (0.26), PTH 0.22–0.26 (0.24), PPH 0.24–0.29 (0.27), PTW 0.18–0.22 (0.20), PPW 0.28–0.37 (0.33), PSL 0.13–0.21 (0.16), MFL 0.81–0.90 (0.86), MTL 0.59–0.78 (0.67), CI 96–103 (100), SI 46–57 (52), MDI 48–60 (54), EI 11–15 (13), FI 64–78 (70), PSLI 11–16 (12), LPpI 85–108 (97), DPpI 115–148 (127), PpWI 155–183 (166), PpLI 56–77 (67), PpHI 104–114 (110).

Head about as long as wide (CI 95–103), usually heart shaped, with convex sides and posterior emargination relatively deep (as in *P. megacephala*). Mandibles smooth and shiny and of moderate length (MDI 48–60), clypeus smooth with weak to superficial median and lateral carinae. Frons and sides of head anteriorly longitudinally rugose, interspaces superficially to weakly punctate. Posterior 2/5 of face, behind level where scapes end when laid back, smooth and shiny, but sometimes medially with irregular weak rugulae extending to posterior margin. Frontal carinae short to moderately short, antennal scrobe absent to inconspicuous. Scapes of medium length (SI 46–57) with decumbent to subdecumbent pilosity and few longer suberect to erect hairs along outer edge. Submedian hypostomal teeth very small to inconspicuous, median process absent. Promesonotum convex in profile, without prominent promesonotal process, posterior declivity often weakly marginate anteriorly (at posterior end of pronotum), oblique and angulate at its lower portion, humeri not laterally produced in dorsal view. Dorsum of promesonotum smooth or superficially punctate and usually with weak to superficial irregular transverse rugulae, lateropronotum weakly to superficially punctate, anteriorly weakly rugulose and medially smooth, remainder of mesosoma densely and finely punctate. Metanotal groove barely or not impressed, cross-ribs superficially developed. Spines moderately short and acute (PSI 11–16), shorter than the distance between their bases. Metafemur relatively short (FI 64–78), metatibia on inner edge with decumbent pilosity, on outer edge with decumbent to suberect pilosity. Postpetiole on average almost as high as long (LPpI 85–108), in profile with a weakly rounded to subacute, anteriorly directed, ventral process, in dorsal view trapezoidal, about 1.7 times wider than petiole (PpWI 155–183). Dorsum of petiole and postpetiole smooth to superficially punctate, remainder punctate. Gaster smooth. Standing hairs on dorsal surfaces abundant, relatively long, acute, with abundant, decumbent to suberect, shorter pilosity in between. Color orange to reddish brown, gaster often darker.

Description of minor workers: Measurements (n=21): HW 0.44–0.67 (0.56), HL 0.49–0.73 (0.62), SL 0.49–0.74 (0.66), MDL 0.24–0.41 (0.36), EL 0.10–0.13 (0.12), WL 0.57–0.86 (0.74), PNH 0.20–0.31 (0.26), PNW 0.28–0.43 (0.36), MNH 0.37–0.54 (0.47), PDH 0.18–0.29 (0.24), PTL 0.20–0.35 (0.26), PPL 0.14–0.21 (0.18), PTH 0.12–0.17 (0.15), PPH 0.13–0.21 (0.17), PTW 0.08–0.12 (0.10), PPW 0.12–0.22 (0.18), PSL 0.05–0.09 (0.08), MFL 0.49–0.80 (0.67), MTL 0.36–0.60 (0.51), CI 87–94 (91), SI 107–130 (117), MDI 52–70 (64), EI 19–23 (21), FI 102–134 (119), PSLI 11–16 (13), LPpI 90–133 (108), DPpI 88–117 (100), PpWI 155–191 (173), PpLI 58–79 (71), PpHI 100–133 (116).

Head shape ovoid, slightly longer than wide (CI 87–94), posteriorly slightly compressed with head margin almost straight, sides convex, posterior head margin moderately to relatively wide with rounded lateral corners, medially concave, occipital carina very narrow, almost invisible in full-face view. Mandibles relatively short (MDI 52–70) and smooth, except for faint rugulation laterobasally. Clypeus and rest of face mostly smooth, clypeal carinae absent. Few concentric rugulae around antennal insertion present, with few additional longitudinal rugulae toward posterior margin of eyes. Scapes moderately long (SI 107–130), when laid back surpassing posterior head margin at least by length of tenth funicular segment, with relatively coarse, suberect to erect pilosity. Promesonotal outline in lateral view roundly convex, declining evenly from highest point toward very shallowly impressed metanotal groove, posterior process absent. Propodeum in profile about as long as high, with dorsum slightly convex. Propodeal spines often very short and reduced, much shorter than distance between their bases, subtriangular and acute (PSLI 11–16, mean 13). Pronotum smooth dorsally and laterally except superficial punctures anteriorly near the neck, mesonotum smooth dorsally, mesopleuron and propodeum punctate, sometimes superficially punctate around propodeal spiracle. Metafemur short (FI 102–134), metatibia with coarse subdecumbent to suberect pilosity and some longer suberect hairs on outer edge. Postpetiole in profile with moderately large ventral process anteriorly, on average 1.1 times longer than high (LPpI 90–133), and 0.7 times as long as petiole (PpLI 58–79). Petiole and postpetiole dorsally smooth, remainder weakly to superficially punctate. Gaster smooth and shiny. Standing hairs abundant to sometimes very abundant, slender, whitish, acute, with several

longer and many shorter hairs dorsally on head, pronotum, postpetiole, and gaster. Color orange to completely brown with gaster often slightly darker.

Discussion: *Pheidole decepticon* is a relatively widespread *megacephala* group species on the islands neighboring Madagascar. It occurs on the Comoros (Anjouan Island), Mayotte, Juan de Nova Island, and on the Cosmoledo Atoll of the Seychelles, which is located about 415 km northeast of Mayotte. Morphologically very similar to *P. megacephala* and *P. megatron*, the three are the only *megacephala* group species currently encountered on the smaller islands. Other species, such as the previously reported *P. punctulata*, were not collected recently on any of the islands. On Anjouan Island *P. decepticon* occurs together with *P. megacephala* and *P. megatron*. The latter was collected in lowland dry forest, coastal scrub land, and in a coconut plantation, while *P. decepticon* was found in rainforest, lowland coastal forest, *Casuarina* forest, old settlements, coral karst scrubland, and along roadsides. *Pheidole megacephala* was not found in forested habitats on Anjouan, but was collected once from within a coastal village. Whether the other two species occur in direct sympatry, or if they are spatially or ecologically separated is not known. The minor and major workers of *P. decepticon* are best separated from those of the other two species by their standing hairs, which are more abundant, fine and acute compared to the more sparsely distributed standing hairs that often end in blunt or bifurcate apices in *P. megacephala* and *P. megatron*. In addition, the postpetiolar ventral process of the major workers is less roundly convex and slightly smaller in the *P. decepticon* specimens (see also under discussion of *P. megatron* & *P. megacephala*).

Etymology: This new species is named after the nefarious alien robot warriors called Decepticons, who are the antagonists of the Autobots in the famous Transformers universe. The name is a noun in apposition and thus invariable.

Additional material examined: COMOROS: Anjouan: 12.1877 S, 44.3593 E, 65 m, coastal roadside, 26.i.2009 (*B.L. Fisher et al.*); 12.2576 S, 44.3891 E, 20 m, along roadside, 27.i.2009 (*B.L. Fisher et al.*); **JUAN DE NOVA ISLAND:** 17.0487 S, 42.7101 E, 10 m, littoral vegetation, 11.iv.2011 (*B.L. Fisher et al.*); 17.0527 S, 42.7163 E, 12 m, sandy trail in *Casuarina* forest, 11.iv.2011 (*B.L. Fisher et al.*); 17.0618 S, 42.7251 E, 5 m, scrub on coastal karst, 12.iv.2011 (*B.L. Fisher et al.*); 17.0605 S, 42.7243 E, 12 m, *Casuarina* forest, 12.iv.2011 (*B.L. Fisher et al.*); 17.0518 S, 42.7265 E, 10m, old settlement, 13.iv.2011 (*B.L. Fisher et al.*); Trail to Trou bleu, 17.0531 S, 42.7341 E, Bord de sentier, 30.vii.2007 (*G. Cazanove*); **MAYOTTE:** Mont Combani, 12.8063 S, 45.1531 E, 370 m, rainforest, 25.xi.2007 (*B.L. Fisher et al.*); Tanaraki, 12.7575 S, 45.0678 E, 10 m, coastal scrub, 26.xi.2007 (*B.L. Fisher et al.*); Dapani, 12.9749 S, 45.1618 E, 1 m, mangrove, coastal scrub, 27.xi.2007 (*B.L. Fisher et al.*); Mont Chongui summit, 12.9957 S, 45.1343 E, 550 m, rainforest, 28.xi.2007 (*B.L. Fisher et al.*); R serve Foresti re Sohoa, 12.8059 S, 45.1005 E, coastal scrub, rainforest, 29.xi.2007 (*B.L. Fisher et al.*); Mont Benara, 12.8758 S, 45.1567 E, 425 m, rainforest, 30.xi.2007 (*B.L. Fisher et al.*); R serve Foresti re Sohoa, 12.8124 S, 45.1048 E, 10 m, coastal dry forest, 01.xii.2007 (*B.L. Fisher et al.*); Dapani, 12.9628 S, 45.1504 E, 135 m, rainforest, 02.xii.2007 (*B.L. Fisher et al.*); R serve Foresti re Majimbini, 12.7689 S, 45.1902 E, 350 m, rainforest, 03.xii.2007 (*B.L. Fisher et al.*); Petite Terre, 12.7912S, 45.294 E, 125 m, coastal scrub, 04.xii.2007 (*B.L. Fisher et al.*); Mlima Choungi, near crossroad GRMT1 & CCT11, forest, 19.vii.1998 (*R. Jocque*); Petite Terre, Dziani Dzaha, 12.7833 S, 45.1167 E, 19.ii.1999 (*R. Jocque & G. DeSmet*); Mt. Benara, track to reserve gate, 12.8667 S, 45.1833 E, 250 m / 270 m, 23.ii.1999 (*R. Jocque & G. DeSmet*); Mt. Benara, 12.8667 S, 45.1833 E, 630 m, forest litter, 23.ii.1999 (*R. Jocque & G. DeSmet*); Sazile, 12.9667 S, 45.1667 E, dry forest litter, 26.ii.1999 (*R. Jocque & G. DeSmet*); Coconi, SDA (Service du D veloppement Agricole), 12.8333 S, 45.1333 E, wet area with giant bamboo, 18.ii.1999 (*R. Jocque & G. DeSmet*); Mt. Chongui, 12.8 S, 45.1 E, 360 m, forest near fallen tree, 15.ii.1999 (*R. Jocque & G. DeSmet*); Dziani Karihani, 12.7833 S, 45.1167 E, forest, 14.ii.1999 (*R. Jocque & G. DeSmet*); Sada, 12.7786 S, 45.1403 E, in house, 3.iii.1999 (*M. Charleux*); Tsingoni, 12.7833 S, 45.1 E, litter of shrubs on mangrove edge, 27.ii.1999 (*R. Jocque & G. DeSmet*); **SEYCHELLES: Cosmoledo Atoll (Wizard Island):** on dune, grass, 9.75611 S, 47.6467 E, 10 m, lowland coastal, coralline island, 21.xi.2011 (*G. Galman*).

Pheidole dodo sp. n.

(Figs. 16A–F)

Holotype: (major worker), MAURITUS, Cocotte Mt., 20.4413 S, 57.4728 E, 700 m, rainforest, sifted leaf litter, collection code BLF12091, 28.v.2005 (*B.L. Fisher et al.*) (CASC: CASENT0060617).

Paratypes: (1 major & 6 minor workers) same data as holotype (CASC: CASENT0060618–CASENT0060624); (2 major & 12 minor workers) Cocotte Mt., 20.4413 S, 57.4728 E, 700 m, rainforest, under moss, above ground, collection code BLF12092–BLF12094, 28.v.2005 (*B.L. Fisher et al.*) (CASC: CASENT0059736–CASENT0059749); (2 major & 5 minor workers) Cocotte Mt., 20.4413 S, 57.4728 E, 700 m, rainforest, under moss, on rotten log, collection code BLF12105, 28.v.2005 (*B.L. Fisher et al.*) (CASC: CASENT0059722, CASENT0059724–CASENT0059727); (3 major & 6 minor worker) Cocotte Mt., 20.4413 S, 57.4728 E, 700 m, rainforest, ex rotten log, collection code BLF12103, BLF12111, 28.v.2005 (*B.L. Fisher et al.*) (BMNH: CASENT0059717; CASC: CASENT0059699–CASENT0059701, CASENT0059716, CASENT0059718–CASENT0059721; MCZC: CASENT0059696, MHNG: CASENT0059697; SAMC: CASENT0059698).

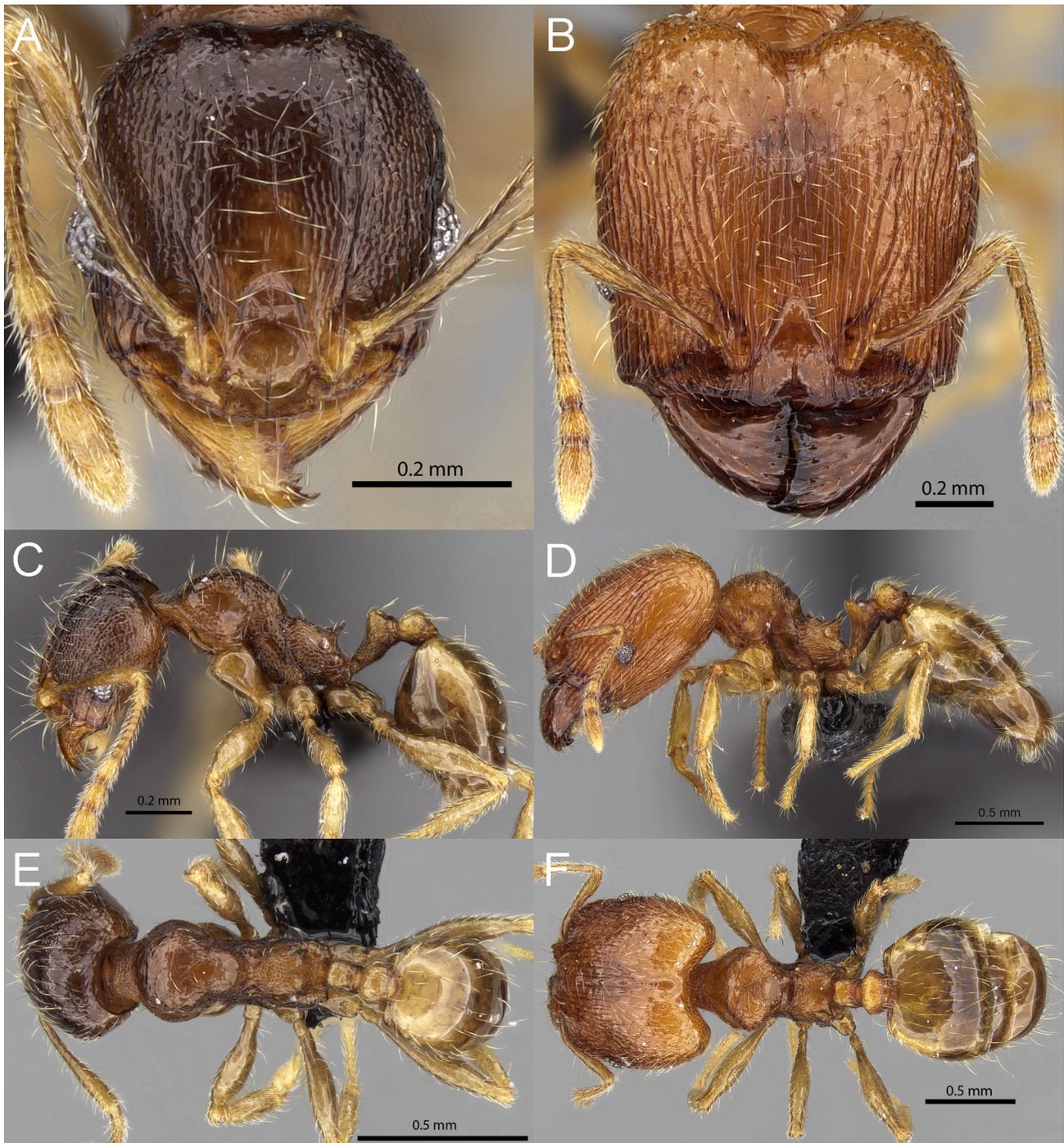


FIGURE 16 *Pheidole dodo* sp. n., full-face view (A), profile (B), and dorsal view (C) of paratype minor worker (CASENT0060619) and full-face view (D), profile (E), and dorsal view (F) of holotype major worker (CASENT0060617).

Diagnosis: Relatively small species (WL major 0.70–0.87, WL minor 0.55–0.62) with relatively short scapes (SI major 48–52, SI minor 97–107) and legs (FI major 60–66, FI minor 100–107), longer standing hairs and shorter pilosity on mesosoma relatively rare. **Major** head anteriorly longitudinally rugose, posterior 1/3 to 1/5 of face smooth and shiny, hypostomal margin with conspicuous submedian teeth, median process wide, postpetiole in profile with small to very conspicuous triangular ventral process. **Minor** head longer than wide (CI 88–93), mandibles longitudinally striate, propodeal spines moderately long (PSLI 18–22), punctures in face and most of mesosoma weak to superficial, with smooth and shiny areas on posterior head dorsum, as well as on dorso- and lateropronotum, postpetiole on average as high as long (LPpI 91–115).

Description of major workers: Measurements (holotype): HW 0.98, HL 1.01, SL 0.47, MDL 0.54, EL 0.13, WL 0.81, PNH 0.37, PNW 0.50, MNH 0.56, PDH 0.29, PTL 0.35, PPL 0.16, PTH 0.23, PPH 0.22, PTW 0.16, PPW 0.26, PSL 0.15, MFL 0.63, MTL 0.47, CI 97, SI 48, MDI 55, EI 13, FI 64, PSLI 15, LPpI 74, DPpI 163, PpWI 163, PpLI 46, PpHI 96.

Measurements (n=6): HW 0.93–1.03 (0.96), HL 0.93–1.03 (0.97), SL 0.46–0.50 (0.48), MDL 0.48–0.57 (0.53), EL 0.12–0.14 (0.13), WL 0.70–0.87 (0.79), PNH 0.32–0.42 (0.37), PNW 0.45–0.53 (0.49), MNH 0.49–0.57 (0.54), PDH 0.22–0.30 (0.28), PTL 0.31–0.35 (0.33), PPL 0.15–0.17 (0.16), PTH 0.19–0.22 (0.21), PPH 0.19–0.21 (0.20), PTW 0.16–0.17 (0.17), PPW 0.23–0.26 (0.25), PSL 0.13–0.16 (0.15), MFL 0.59–0.64 (0.62), MTL 0.42–0.46 (0.45), CI 97–101 (100), SI 48–52 (50), MDI 51–56 (55), EI 12–15 (13), FI 60–66 (64), PSLI 14–16 (15), LPpI 76–85 (81), DPpI 150–156 (154), PpWI 135–153 (148), PpLI 46–50 (48), PpHI 90–100 (95).

Head as long as wide (CI 97–101), sides in full-face view weakly convex and subparallel, posterior emargination moderately shallow. Mandibles smooth and shiny and of moderate length (MDI 51–56). Clypeus smooth with median carina short or absent and one or two pairs of lateral carinae. Frons and sides of head longitudinally rugose, interspaces smooth to superficially punctate at frons, punctate or weakly punctate at sides, in profile view rugae at the sides dorsal and ventral of eyes in some specimens, in others ending shortly after anterior half of the head and reaching further toward posterolateral corners. In full-face view, posterior 1/3 to 1/5 of face smooth and shiny. Frontal carinae very short or inconspicuous, antennal scrobe absent. Scapes relatively short (SI 48–52), pilosity decumbent. Submedian hypostomal teeth conspicuous, median process comparatively wide. Promesonotum in profile convex, promesonotal process only weakly produced, with sometimes shallowly convex, sometimes inconspicuous, transverse groove, posterior declivity low and steeply declining toward narrow, barely or not impressed metanotal groove, the latter with few superficially developed cross-ribs. Surface of promesonotum and lateropronotum mostly smooth to superficially punctate, sometimes with few short, superficial, transverse rugulae dorsolaterally, sometimes with stronger and longer rugulae anteriorly, remainder of mesosoma largely smooth to weakly punctate, with smooth and shiny area on katepisternum. Spines short, subtriangular in profile (PSLI 14–16). Metafemur relatively short (FI 60–66), metatibia on inner edge with decumbent pilosity, on outer edge with suberect to subdecumbent pilosity. Postpetiole in profile higher than long (LPpI 74–85), with small triangular ventral process, in dorsal view trapezoidally shaped and about 1.5 times wider than petiole (PpWI 135–163). Dorsum of petiole and postpetiole smooth, remainder weakly punctate. Gaster smooth. Amount and length of standing hairs on body dorsum variable, usually with few long hairs and some shorter hairs in between, some of them with blunt or bifurcate apices. Fine, short pilosity slightly more abundant. Color orange to dark orange, gaster usually darker.

Description of minor workers: Measurements (n=11): HW 0.44–0.48 (0.46), HL 0.48–0.53 (0.51), SL 0.44–0.48 (0.46), MDL 0.29–0.32 (0.30), EL 0.09–0.10 (0.10), WL 0.55–0.62 (0.59), PNH 0.21–0.24 (0.23), PNW 0.29–0.32 (0.30), MNH 0.29–0.41 (0.36), PDH 0.19–0.21 (0.20), PTL 0.19–0.24 (0.22), PPL 0.10–0.12 (0.11), PTH 0.12–0.13 (0.11), PPH 0.10–0.11 (0.10), PTW 0.08–0.10 (0.09), PPW 0.12–0.15 (0.13), PSL 0.08–0.10 (0.09), MFL 0.45–0.50 (0.47), MTL 0.32–0.36 (0.34), CI 88–93 (91), SI 97–107 (100), MDI 60–70 (65), EI 18–22 (21), FI 100–107 (102), PSLI 18–22 (19), LPpI 91–115 (102), DPpI 113–132 (120), PpWI 139–156 (146), PpLI 42–54 (49), PpHI 77–85 (81).

Head subrectangular, longer than wide (CI 88–93), sides convex, posterior head margin medially weakly concave, occipital carina almost invisible in full-face view. Mandibles relatively short (MDI 60–70), longitudinally striate. Clypeus smooth, with short, sometimes weakly developed, median carina, and lateral carinae inconspicuous. Face punctate to weakly punctate, punctures often overlain with faint longitudinal rugulae, posterior head margin in full-face and oblique dorsal view usually superficially sculptured to smooth. Scapes short (SI 97–107), when laid back surpassing posterior head margin by slightly less than length of ninth funicular

segment, pilosity decumbent to subdecumbent. Promesonotal outline in profile convex, somewhat elongated, slightly rounded at posterior declivity. Metanotal groove narrow, barely impressed, with short, superficial cross-ribs. Promesonotum dorsally superficially punctate to smooth, lateropronotum medially with large smooth area, rest of mesosoma punctate to superficially punctate. Propodeal spines acute, elongate-triangular, moderately long, but shorter than distance between their bases (PSLI 18–22). Metafemur short (FI 100–107), metatibia with decumbent to subdecumbent pilosity. Postpetiole distinctly higher than long (LPpI 74–85), ventral process absent or inconspicuous, petiole and postpetiole dorsally smooth, remainder weakly punctate. Gaster smooth and shiny. Standing hairs relatively rare, stiff, and of medium length, with one longer pair on pronotum, several hairs branched subapically, shorter pilosity decumbent and slightly more abundant. Color dark brown, mandibles and appendages slightly lighter.

Discussion: *Pheidole dodo* is known from Mauritius only, where it was collected from the ground, inside rotten logs, under moss or from the leaf litter and in coastal scrub, closed vegetation, low closed forest, disturbed and undisturbed rainforest, in elevations between 1 and 760 m. The minors are most similar to those of *P. braueri*, differing from the latter by slightly smaller eyes (EI 18–22, mean 21, versus EI 22–24, mean 24) and decumbent to subdecumbent versus mostly suberect scape pilosity in *P. braueri*. The majors look like an odd hybrid of those of *P. braueri*, *P. jonas*, and *P. decepticon*, with the head in full-face view somewhat resembling that of *P. decepticon*, the mesosoma in profile similar to *P. jonas* and the postpetiole shape closest to *P. braueri*. This combination, however, makes this species unique and easily identifiable on the islands of the Malagasy region.

Etymology: The species is named after the iconic and extinct endemic bird of Mauritius – the Dodo, which has become somewhat symbolic for the accelerated number of human caused extinctions. The name is a noun in apposition and thus invariable.

Additional material examined: MAURITIUS: Bassin Blanc, 20.45 S, 57.466709 E, 500 m, disturbed rainforest, 06.v.1989 (*P.S. Ward*); Bassin Blanc, 20.4532 S, 57.4777 E, 480 m, rainforest, 29.v.2005 (*B.L. Fisher et al.*); Ile aux Aigrettes, 20.4188 S, 57.7305 E, 1 m, coastal scrub, 28.v.2005 (*B.L. Fisher et al.*); Le Pouce, 20.2 S, 57.5167 E, 700 m, low closed forest, 09.iv.1989 (*P.S. Ward*); Le Pouce Mt., Moka Range, 20.1985 S, 57.529 E, 750 m, closed vegetation, 25.v.2005 (*B.L. Fisher et al.*); Mgne. Cocotte, 20.4333 S, 57.4667 E, 760 m, disturbed rainforest, 06.v.1989 (*P.S. Ward*); Mt. Cocotte, 20.4414 S, 57.4722 E, 743 m, litter, 08.iv.2005 / 25.viii.2005 (*L. Lach*); Petite Rivière Noire Mt., 20.4088 S, 57.4077 E, 750 m, rainforest, 29.v.2005 (*B.L. Fisher et al.*).

***Pheidole fervens* Smith, F.**

(Figs. 17A–F)

Pheidole fervens Smith, F. 1858: 176. Lectotype (1 major worker, CASENT0901520) [designated here]: SINGAPORE (BMNH) [examined]; paralectotype (1 minor worker, CASENT0901519): same data as lectotype (BMNH) [examined].

Solenopsis pungens Smith, 1861: 48. Lectotype (major worker), designated by Eguchi (2004): INDONESIA (Sulawesi) [not examined]. Combination in *Pheidologeton*: Donisthorpe, 1932: 469; in *Pheidole*: Bolton, 1995: 328. Junior synonym of *Pheidole fervens*: Eguchi, 2004: 198.

Pheidole javana Mayr, 1867: 98. Lectotype (major worker), designated by Eguchi (2004): INDONESIA (Java) [not examined]. Junior synonym of *Pheidole fervens*: Wilson & Taylor, 1967: 45.

Pheidole cavannae Emery, 1887: 464. Syntype(s) (major worker(s)): NEW CALEDONIA [not examined]. Subspecies of *Pheidole oceanica*: Emery, 1914: 401. Junior synonym of *Pheidole fervens*: Wilson & Taylor, 1967: 45.

Pheidole javana var. *dharmasana* Forel, 1902: 184, 198. Lectotype (major worker), designated by Eguchi (2004): INDIA [not examined]. [Also described as new by Forel, 1902: 546]. Subspecies of *Pheidole fervens*: Bolton, 1995: 320. Junior synonym of *Pheidole fervens*: Eguchi, 2004: 198.

Pheidole amia Forel, 1912: 60. Lectotype (major worker), designated by Eguchi (2004): TAIWAN [not examined]. Junior synonym of *Pheidole fervens*: Eguchi, 2004: 197.

Pheidole javana var. *dolenda* Forel, 1912: 60. Lectotype (major worker), designated by Eguchi (2004): TAIWAN [not examined]. Subspecies of *Pheidole fervens*: Bolton, 1995: 320. Junior synonym of *Pheidole fervens*: Eguchi, 2004: 198.

Pheidole oceanica subsp. *nigriscapa* Santschi, 1928: 48. Syntypes (1 major worker, 7 minor workers): SAMOA [not examined]. Junior synonym of *Pheidole fervens*: Wilson & Taylor, 1967: 45.

Pheidole oceanica subsp. *nigriscapa* var. *tahitiana* Cheesman & Crawley, 1928: 516. TAHITI [not examined]. Unavailable name; material referred to *Pheidole fervens* by Wilson & Taylor, 1967: 45.

Pheidole javana var. *desucta* Wheeler, 1929: 2. Lectotype (major worker), designated by Eguchi (2001): CHINA [not examined]. Subspecies of *Pheidole fervens*: Bolton, 1995: 320. Junior synonym of *Pheidole fervens*: Eguchi, 2001: 53.

Pheidole javana var. *soror* Santschi, 1937b: 369. Lectotype (major worker), designated by Eguchi (2004): TAIWAN [not examined]. Subspecies of *Pheidole fervens*: Bolton, 1995: 330. Junior synonym of *Pheidole fervens*: Eguchi, 2004: 198.
Pheidole nodus st. *azumai* Santschi, 1941: 274. Lectotype (major worker), designated by Eguchi (2004): JAPAN [not examined]. Junior synonym of *Pheidole fervens*: Eguchi, 2004: 198.



FIGURE 17 *Pheidole fervens* Mayr, full-face view (A), profile (B), and dorsal view (C) of minor worker (CASENT006581) and full-face view (D), profile (E), and dorsal view (F) of major worker (CASENT0060250).

Diagnosis: Large species (WL major 1.06–1.17, WL minor 0.82–0.91), minor workers with relatively long scapes and legs (SI 133–154, FI 142–158) and major workers with long scapes and relatively long legs (SI 61–71, FI 84–91), both with promesonotal processes well developed and postpetiolar ventral process inconspicuous or very shallow. **Major** with frontal carinae reaching at least 4/5 of the distance to the posterior head margin, face longitudinally rugose, scrobe area and interspaces at sides of head punctate to weakly punctate, head in full-face view with coarse suberect hairs, eyes moderately large (EI 13–15), in profile metanotal groove vestigial to absent,

propodeum sloped down toward spines, postpetiole in dorsal view trapezoidal and almost twice as wide as petiole (PpWI 172–195). **Minor** head oval and rounded posteriorly, occipital carina visible in full-face view but not well developed, face mostly smooth, often with fine, long rugulae at the sides, sometimes together with superficial punctures. Eyes moderately large (EI 21–25), dorsal promesonotum smooth, promesonotal process developed, subangulate in profile, metanotal groove well developed, impressed, propodeum relatively high and sloped toward spines.

Description of major workers: Measurements (n=5): HW 1.13–1.31 (1.25), HL 1.13–1.38 (1.28), SL 0.80–0.86 (0.83), MDL 0.61–0.71 (0.67), EL 0.16–0.17 (0.17), WL 1.06–1.17 (1.14), PNH 0.41–0.49 (0.45), PNW 0.54–0.59 (0.56), MNH 0.72–0.79 (0.77), PDH 0.34–0.39 (0.36), PTL 0.36–0.40 (0.38), PPL 0.23–0.26 (0.24), PTH 0.22–0.26 (0.24), PPH 0.16–0.22 (0.20), PTW 0.17–0.20 (0.19), PPW 0.31–0.39 (0.34), PSL 0.13–0.17 (0.15), MFL 1.03–1.13 (1.08), MTL 0.77–0.84 (0.82), CI 95–100 (98), SI 61–71 (67), MDI 50–56 (53), EI 13–15 (13), FI 84–91 (87), PSLI 10–14 (12), LPpI 110–144 (120), DPpI 133–150 (143), PpWI 172–195 (183), PpLI 60–68 (64), PpHI 70–95 (86).

Head almost as wide as long (CI 95–100), sides convex in full-face view. Mandibles smooth, moderately long (MDI 50–56), clypeus smooth, median carina absent and two weak lateral carinae present. Frontal carinae well developed and reaching at least 4/5 of the distance to posterior head margin, antennal scrobe present and punctate. Face longitudinally rugose, interspaces on frons superficially punctate, sides of head and posterolateral lobes with additional cross-meshes between rugae or weakly reticulate, interspaces punctate or weakly punctate. Scapes long (SI 61–71) with decumbent to subdecumbent pilosity and few longer, erect hairs on outer edge. Eyes well developed, moderately large (EI 13–15). Submedian hypostomal teeth and median process small to inconspicuous. Promesonotum high-domed, convex, posteriorly subangulate, in profile with prominent angulate promesonotal process and transverse groove. Dorsum of pronotum mostly smooth with some weak to superficial transverse rugulae, lateropronotum smooth except for weak to superficial curved rugulae, rest of mesosoma punctate, dorsally more weakly so, metanotal groove in profile not impressed or very shallow, with cross-ribs often reduced, dorsum of propodeum in profile usually weakly sloped toward spines and about as long as posterior declivity. Propodeal spines short-spiniform, acute, sometimes very weakly curved posteriorly, slightly shorter than distance between their bases (PSLI 10–14). Metatibia moderately long (FI 84–91), pilosity mostly subdecumbent, along outer edge also with longer suberect hairs. Postpetiole on average 1.4 times wider than long (DPpI 133–150) and 1.8 times wider than petiole (PpWI 172–195), postpetiole shape in dorsal view trapezoidal to hexagonal, sides angulate, ventral process absent or inconspicuous. Dorsum of petiole weakly to superficially punctate, of postpetiole smooth, remainder of both waist segments punctate. Gaster smooth. Standing hairs relatively coarse and abundant, of medium length to moderately long, yellowish, with shorter subdecumbent pilosity between. Color usually brown to darker brown, with darker gaster.

Description of minor workers: Measurements (n=5): HW 0.52–0.61 (0.58), HL 0.66–0.71 (0.68), SL 0.80–0.84 (0.81), MDL 0.40–0.44 (0.42), EL 0.13, WL 0.82–0.91 (0.86), PNH 0.30–0.31 (0.30), PNW 0.35–0.40 (0.37), MNH 0.57–0.59 (0.58), PDH 0.26–0.28 (0.27), PTL 0.22–0.30 (0.24), PPL 0.15–0.18 (0.16), PTH 0.14–0.18 (0.16), PPH 0.14–0.16 (0.15), PTW 0.11–0.13 (0.12), PPW 0.19–0.21 (0.19), PSL 0.06–0.08 (0.07), MFL 0.82–0.90 (0.85), MTL 0.64–0.69 (0.66), CI 79–88 (85), SI 133–154 (140), MDI 70–77 (73), EI 21–25 (22), FI 142–158 (147), PSLI 10–13 (12), LPpI 50–53 (52), DPpI 117–133 (122), PpWI 161–173 (166), PpLI 61–70 (65), PpHI 89–100 (96).

Head shape roundly oval, longer than wide (CI 79–88), sides convex, posterior head margin relatively wide and weakly rounded, occipital carina visible in full-face view, narrow. Mandibles moderately long (MDI 70–77), longitudinally rugulose. Clypeus smooth, sometimes with short lateral carinae present. Face mostly smooth to superficially punctate, several strong oblique malar carinae present, reaching posterior eye level, sometimes with weak punctures in between, sculpture fading posterior of eyes. Scapes relatively long, about 1.2 times longer than head (SI 133–154), when laid back surpassing posterior head margin by about the length of eleventh funicular segment, with coarse, mostly suberect pilosity. Pronotum in profile flatly convex and subangulate, posterior promesonotal process well developed, bluntly subangulate and prominently produced, metanotal groove well developed and impressed, with weak to inconspicuous cross-ribs, propodeum slightly longer than high, in profile declining smoothly or convexly toward spines. Propodeal spines very short to short-triangular and acute, much shorter than distance between their bases (PSLI 14–19). Promesonotum usually smooth to mostly smooth, remainder of mesosoma punctate to weakly punctate. Metafemur relatively long (FI 142–158), metatibia mostly

with subdecumbent to suberect pilosity. Postpetiole usually slightly longer than high (LPpI 100–113), on average 1.7 times wider (PpWI 161–173) and significantly shorter than petiole (PpLI 61–70), with ventral process inconspicuous or very small. Dorsum of petiolar node and postpetiole mostly smooth, remainder weakly to superficially punctate. Gaster smooth and shiny. Standing hairs moderately long, abundant, and blunt, with shorter subdecumbent to suberect pilosity. Color light to darker reddish brown, head usually darker.

Discussion: *Pheidole fervens*, described from Singapore, is a widespread invasive species and could be native to the Oriental or the Oceanic region (Eguchi 2004, Wilson & Taylor 1967). It usually nests in soil or under stones and usually prefers disturbed habitats (Eguchi 2004). On Fiji it was collected in elevations between 1–800 m and tended to inhabit several different habitats from forest edge and mangrove forest to disturbed and undisturbed rainforest. On Mauritius, which seems to be its western distribution limit, this ant was found in the leaf litter of lowland rainforest (200 m elevation). As with most other introduced ants, such as *P. teneriffana*, it is unclear what effect, if any, *P. fervens* might have on the rest of the local ant fauna. Considering that the ecosystems of the Mauritius islands have been severely altered and disturbed since the arrival of human settlers several hundred years ago, and native species must also contend with the invasions of introduced organisms (Fisher 2005, Ward 1990), parts of the original ant fauna might have been marginalized or driven to extinction long ago. We speculate that the scarcity of *P. fervens* specimens in Mauritius ant collections and its presence in the rainforest means that this ant has not yet become an invasive and dominant aggressor toward other ant species. Nevertheless, efforts to further investigate the presence and activity of introduced *Pheidole* species are worthwhile, especially in the few remaining undisturbed habitats. The workers of *P. fervens* can be easily confused with those of *P. teneriffana*. Morphologically the minor workers are best separated by coarse, mostly suberect scape pilosity, impressed metanotal groove, relatively smaller eyes and shorter spines (EI 21–25, PSLI 10–13) in *P. fervens* versus decumbent to subdecumbent scape pilosity with longer suberect hairs along outer edge, inconspicuous metanotal groove in profile, and larger eyes and longer spines (EI 25–30, PSLI 14–19) in *P. teneriffana*. The major workers of *P. fervens* are recognizable by having longer scapes (SI 61–71 versus SI 49–62) and a narrower postpetiole in dorsal view than *P. teneriffana* (DPpI 133–150 and PpWI 172–195 versus DPpI 146–235 and PpWI 190–247). In *P. fervens*, the pilosity in the face and on the metatibia is coarser and at least partly suberect, and the punctures on the sides of the face are stronger than the thinner and more decumbent to subdecumbent pilosity and superficial punctures on the sides of the face in *P. teneriffana*.

Additional material examined: MAURITIUS: Brise Mt., Bambous, 20.3455 S, 57.7547 E, 200 m, rainforest, 27.v.2005 (*B.L. Fisher et al.*); La Nicolière Reserve, 06.v.2007 (*M. Madl*).

Pheidole jonas Forel

(Figs. 18A–F)

Pheidole jonas Forel, 1907c: 82. Lectotype (1 major worker, CASENT0101758) [designated here]: COMORO ISLANDS (Grande Comore) (*A. Voeltzkow*) (MHNG) [examined]; paralectotypes (1 major workers & 3 minor workers, CASENT0101758, CASENT0101689) same data as lectotype (MHNG) [examined].

Diagnosis: Small species (WL major 0.79–0.95 mm, WL minor 0.53–0.69 mm), minor workers with moderately short scapes and legs (SI 102–122, FI 107–122), major workers with moderately short legs (FI 61–75), in both subcastes standing hairs comparatively sparse on mesosoma. **Major** head posterior half irregularly rugoreticulate, submedian hypostomal teeth large, median process absent, promesonotal process short with shallowly concave groove and almost vertical posterior declivity, spines short-spinose to almost triangular (PSLI 10–14), postpetiole higher than long (LPpI 83–95), without ventral process, but with prominent lateral process and thus on average 2.5 times as wide as petiole. **Minor** workers head subrectangular and punctate, clypeus smooth to superficially punctate, median and lateral carinae absent, mesosoma regularly punctate, often with weak irregular rugulae on pronotum, spines short-subtriangular (PSLI 12–17), postpetiole on average 1.4 times longer than high (LPpI 122–163).

Description of major workers: Measurements (n=16): HW 0.96–1.18 (1.06), HL 0.98–1.18 (1.07), SL 0.47–0.60 (0.56), MDL 0.45–0.59 (0.52), EL 0.11–0.16 (0.13), WL 0.79–0.95 (0.87), PNH 0.39–0.47 (0.43), PNW 0.45–0.55 (0.50), MNH 0.59–0.73 (0.65), PDH 0.27–0.35 (0.30), PTL 0.28–0.42 (0.35), PPL 0.18–0.22 (0.20), PTH 0.17–0.22 (0.21), PPH 0.16–0.21 (0.19), PTW 0.13–0.17 (0.15), PPW 0.32–0.46 (0.38), PSL 0.11–0.14 (0.12),

MFL 0.65–0.81 (0.74), MTL 0.45–0.60 (0.54), CI 95–102 (99), SI 47–56 (52), MDI 45–51 (49), EI 11–14 (12), FI 61–75 (70), PSLI 10–14 (12), LPpI 90–126 (109), DPpI 152–242 (188), PpWI 218–300 (256), PpLI 50–64 (57), PpHI 83–106 (90).



FIGURE 18 *Pheidole jonas* Forel, full-face view (A), profile (B), and dorsal view (C) of minor worker (CASENT006581) and full-face view (D), profile (E), and dorsal view (F) of major worker (CASENT0060250).

Head about as wide as long (CI 95–102), sides weakly convex, posterior emargination comparatively shallow, weakly V-shaped. Mandibles short (MDI 45–51), smooth, and shiny, with very few short rugulae laterobasally. Clypeus smooth, posteromedially often with weakly developed, sometimes anteriorly converging carinae, median carina absent, 2 pairs of lateral carinae present. Frontal carinae very short or inconspicuous, antennal scrobe absent. Face weakly punctate, anteriorly with longitudinal rugae, sides of head irregularly longitudinally rugose to weakly

rugoreticulate, head posterior 1/3 irregularly rugoreticulate, ventrally weakly to superficially punctate. Submedian hypostomal teeth large and very conspicuous in profile view, median process absent. Scapes relatively short (SI 47–56) with decumbent pilosity and few longer erect to suberect standing hairs on outer edge. Promesonotal dome high, strongly convex, rounded to angulate anteriorly, promesonotal process in profile short with shallow, concave groove and situated low at mesonotum, posteriorly bluntly angulate with vertical declivity toward metanotal groove, in dorsal view with humeri not produced laterally. Dorsal surface of promesonotum punctate to very weakly punctate, additionally weakly rugoreticulate or with irregular transverse rugulae, rest of mesosoma punctate, often with slightly reduced sculpture basally on katapisternum and propodeum. Metanotal groove not impressed, cross-ribs mostly short, weakly developed, with superficially punctate interspaces. Spines short-spinose to subtriangular (PSLI 10–14), distinctly shorter than distance between their bases. Metafemur moderately short (FI 61–75), metatibia pilosity decumbent, on outer edge also with few longer, suberect hairs. Petiole in dorsal view anteriorly wider with prominent lateral process, postpetiole in profile usually longer than high (LPpI mean 109), ventral process absent, in dorsal view with short to relatively long lateral processes, between two and three times wider than petiole (PpWI 218–300). Petiole and postpetiole punctate everywhere, postpetiolar dorsum sometimes superficially sculptured. First gastral tergite anteriorly weakly punctate to micropunctate. Standing hairs on mesosoma and metasoma acute, long, and slender, only moderately abundant, shorter on head, and with interspersed shorter decumbent to subdecumbent pilosity. Whole body orange with yellow to dark brown legs.

Description of minor workers: Measurements (n=16): HW 0.37–0.50 (0.46), HL 0.45–0.57 (0.51), SL 0.44–0.55 (0.50), MDL 0.26–0.33 (0.30), EL 0.08–0.11 (0.09), WL 0.53–0.69 (0.60), PNH 0.21–0.28 (0.23), PNW 0.27–0.34 (0.30), MNH 0.34–0.48 (0.41), PDH 0.17–0.22 (0.20), PTL 0.18–0.26 (0.22), PPL 0.11–0.16 (0.13), PTH 0.11–0.13 (0.12), PPH 0.08–0.11 (0.09), PTW 0.07–0.10 (0.08), PPW 0.11–0.15 (0.13), PSL 0.06–0.09 (0.07), MFL 0.45–0.61 (0.53), MTL 0.34–0.49 (0.40), CI 83–94 (90), SI 102–122 (109), MDI 60–73 (66), EI 19–23 (21), FI 107–122 (116), PSLI 12–17 (15), LPpI 122–163 (144), DPpI 88–109 (97), PpWI 133–175 (155), PpLI 52–74 (61), PpHI 73–83 (77).

Head subrectangular, slightly longer than wide (CI 83–94), sides convex, posterior head margin weakly concave medially, occipital carina invisible in full-face view. Mandibles moderately short (MDI 60–73), smooth and shiny. Clypeus smooth to superficially punctate, carinae absent. Face completely punctate, malar carinae faintly developed toward posterior eye level. Scapes short (SI 102–122), when laid back surpassing posterior head margin by length of 10th funicular segment, pilosity mostly subdecumbent to suberect. Promesonotal outline in profile convex, weakly elongated, often subangulate anteriorly and posteriorly, posterior process absent to inconspicuous. Metanotal groove barely to shallowly impressed, cross-ribs conspicuous to superficial with smooth interspaces. Propodeum in profile about slightly higher than long, highest point immediately after metanotal groove, propodeal spines short subtriangular, significantly shorter than distance between their bases (PSLI 12–17). Mesosoma punctate to weakly punctate. Metafemur short (FI 107–122), metatibia with decumbent to subdecumbent pilosity. Postpetiole significantly longer than high (LPpI 122–163), about as long as wide (DpPI 88–109), lower than petiole (PpHI 73–83), and without ventral process. Both waist segments superficially to weakly punctate. Gaster smooth and shiny. Standing hairs moderately short, comparatively scarce on mesosoma and metasoma, stiff and acute, shorter pilosity more abundant, decumbent to subdecumbent. Color orange or brown.

Discussion: *Pheidole jonas* is known only from the Comoros Islands and Mayotte. It was collected mostly from rainforest leaf litter, but also from rotten logs, under moss, and above ground in rainforest and montane rainforest in elevations between 20 and 1235 m. The populations on Anjouan, Grand Comore, and Mayotte islands are morphologically distinct, but share enough characteristics with each other and with the original type material to be identified as a single species, until further research proves otherwise. The specimens from Anjouan are all orange in color, like the types, whereas those from the other two islands are brown. The Grand Comore and Mayotte populations can be distinguished further by minor allometric differences in the head, pronotum and postpetiole. The majors from Grand Comore tend to have a slightly wider head (CI 99–102 versus CI 95–98) and a wider postpetiole (PpWI 218–267 versus PpWI 279–300) than those from Mayotte. *P. jonas* is probably closely related to *P. vulcan* and *P. loki*. The minor workers of *P. jonas* can be separated from those of *P. vulcan* by slightly longer mandibles, scapes, and postpetiole (MDI 60–73, SI 102–122, LPpI 122–163 versus MDI 54–63, SI 96–106, LPpI 114–120 in *P. vulcan*), while the majors have a lower promesonotal process with a conspicuously concave transverse groove in profile view. Standing hairs are significantly less abundant and less flexuous in both worker castes than in those of *P. vulcan*. The minor workers of *P. loki* (majors are unknown) can be easily distinguished

from the two other species, as the scapes are on average longer (SI 117–122) and the sculpture on dorsal head and mesosoma is largely reduced, whereas the heads and mesosomas of *P. jonas* and *P. vulcan* possess comparatively strong punctures.

Additional material examined: **COMOROS:** **Anjouan:** Lac Dzilandee, 12.2247 S, 44.4312 E, 900 m, disturbed montane rainforest, 25.i.2009 (*B.L. Fisher et al.*); Mount Ntringui, 12.2204 S, 44.4292 E, 1225 m, montane forest, 24.i.2009 (*B.L. Fisher et al.*); **Grande Comore:** Karthala, 11.8134 S, 43.4194 E, 1125 m, montane rainforest, 13.iii.2008 (*B.L. Fisher et al.*); Karthala, 11.827 S, 43.4295 E, 1000 m, montane rainforest, 14.iii.2008 (*B.L. Fisher et al.*); Karthala, 11.7533 S, 43.3079 E, 1235 m, montane rainforest, 17.iii.2008 (*B.L. Fisher et al.*); **Mohéli:** Ouallah, 12.3067 S, 43.6641 E, 275 m, rainforest, 21.i.2009 (*B.L. Fisher et al.*); **MAYOTTE:** Coconi, DAF Campus, 12.8333 S, 45.1333 E, 15.i.1999 (*R. Jocque & G. DeSmet*); Coconi, SDA (Service de Developpement Agricole), 12.8333 S, 45.1333 E, wet area with giant bamboo, 18.ii.1999 (*R. Jocque & G. DeSmet*); Dapani, 12.9628 S, 45.1504 E, 135 m, rainforest, 02.xii.2007 (*B.L. Fisher et al.*); Mont Benara, 12.8758 S, 45.1567 E, 425 m, rainforest, 30.xi.2007 (*B.L. Fisher et al.*); Mont Chongui, 12.9578 S, 45.134 E, 470 m, rainforest, 28.xi.2007 (*B.L. Fisher et al.*); Mont Chongui, 12.959 S, 45.1341 E, 380 m, rainforest, 28.xi.2007 (*B.L. Fisher et al.*); Mont Combani, 12.8063 S, 45.1531 E, 370 m, rainforest, 25.xi.2007 (*B.L. Fisher et al.*); Mont Combani, 12.8049 S, 45.1527 E, 460 m, rainforest, 29.xi.2007 (*B.L. Fisher et al.*); Mt. Combani, 12.8 S, 45.1333 E, 470 m / 420 m, forest litter, 22.ii.1999 (*R. Jocque & G. DeSmet*); Reserve Forestière Majimbini, 12.7689 S, 45.1902 E, 350 m, rainforest, 03.xii.2007 (*B.L. Fisher et al.*); Reserve Forestière Majimbini, 12.768 S, 45.1861 E, 525 m, rainforest, 03.xii.2007 (*B.L. Fisher et al.*); Reserve Forestière Sohoa, 12.8059 S, 45.1005 E, 20 m, coastal scrub, rainforest, 29.xi.2007 (*B.L. Fisher et al.*).

Pheidole komori sp. n.

(Figs. 19A–F)

Holotype: (major worker), COMOROS, Mohéli, Lac Boundouni, 12.3792 S, 43.8517 E, 25m, dry forest, ground forager (s), collection code BLF20787, 20.i.2009 (*B.L. Fisher et al.*) (CASC: CASENT0147188).

Paratypes: (1 major & 2 minor workers) same data as holotype, collection code BLF20777 (CASC: CASENT0147136); (1 major & 3 minor workers) Mohéli, Lac Boundouni, 12.3792 S, 43.8517 E, 25m, dry forest, under stone, collection code BLF20809, 20.i.2009 (*B.L. Fisher et al.*) (CASC: CASENT0147143–CASENT0147145, CASENT0147500); (1 major & 8 minor workers) Mohéli, Lac Boundouni, 12.3792 S, 43.8517 E, 25m, dry forest, sifted leaf litter, collection code BLF20824, 20.i.2009 (*B.L. Fisher et al.*) (BMNH: CASENT0149204; CASC: CASENT0149121, CASENT0149200, CASENT0149201, CASENT0149203; MCZC: CASENT0149205; MHNG: CASENT0149207, SAMC: CASENT0149209).

Diagnosis: Moderately large species (WL majors 1.12–1.20 mm, WL minors 0.76–0.83 mm), minor workers with relatively long scapes and legs (SI 120–144, FI 123–156), major workers with relatively short scapes (SI 49–50) and moderately long legs (FI 68–73), both with angulate promesonotal process present and angulate. **Major** postpetiole with small, acute ventral process and head distinctly longer than wide (CI 82–88). Antennal scrobe absent, posterolateral lobes smooth and shiny or with short weak rugulae, hypostomal margin with submedian teeth relatively large and median process well developed. **Minor** postpetiolar ventral process conspicuous, postpetiole on average 1.1 times wider than long (DPpI 106–115).

Description of major workers: Measurements (holotype): HW 1.49, HL 1.76, SL 0.71, MDL 0.78, EL 0.20, WL 1.13, PNH 0.48, PNW 0.65, MNH 0.80, PDH 0.40, PTL 0.45, PPL 0.27, PTH 0.27, PPH 0.29, PTW 0.23, PPW 0.45, PSL 0.18, MFL 1.05, MTL 0.77, CI 85, SI 48, MDI 52, EI 13, FI 70, PSLI 12, LPpI 93, DPpI 167, PpWI 196, PpLI 60, PpHI 107.

Measurements (n=4): HW 1.40–1.48 (1.45), HL 1.69–1.81 (1.73), SL 0.70–0.73 (0.72), MDL 0.70–0.78 (0.75), EL 0.20, WL 1.12–1.20 (1.16), PNH 0.49–0.51 (0.50), PNW 0.63–0.67 (0.64), MNH 0.75–0.80 (0.78), PDH 0.36–0.41 (0.39), PTL 0.42–0.48 (0.44), PPL 0.25–0.28 (0.26), PTH 0.26–0.29 (0.27), PPH 0.26–0.31 (0.28), PTW 0.21–0.24 (0.22), PPW 0.41–0.52 (0.45), PSL 0.15–0.22 (0.19), MFL 1.01–1.06 (1.03), MTL 0.75–0.77 (0.76), CI 82–88 (84), SI 49–50 (49), MDI 47–54 (51), EI 14–14 (14), FI 68–73 (71), PSLI 11–15 (13), LPpI 89–100 (93), DPpI 158–186 (169), PpWI 195–217 (204), PpLI 58–63 (61), PpHI 100–108 (104).



FIGURE 19 *Pheidole komori* sp. n., full-face view (A), profile (B), and dorsal view (C) of paratype minor worker (CASENT0149121) and full-face view (D), profile (E), and dorsal view (F) of holotype major worker (CASENT0147188).

Head distinctly longer than wide (CI 82–88), wider posteriorly than anteriorly, sides convex. Mandibles smooth and shiny, clypeus smooth with well-defined median carina and few weak to superficial lateral carinae. Frontal carinae very short or inconspicuous, antennal scrobe absent. Frons longitudinally rugose, rugae at sides of head more irregular, to sometimes weakly rugoreticulate, interspaces weakly to superficially punctate. Posterolateral lobes smooth and shiny, or with some short and weak, occasionally half-circular, rugulae. Scape relatively short (SI 49–50) with decumbent pilosity and two or three longer, subdecumbent to suberect hairs present along outer edge. Hypostomal margin with submedian teeth conspicuous and median process well developed. Promesonotum relatively high, posterior process well developed, in profile right-angulate, with concave transverse groove, and steep posterior declivity. Surface of pronotum smooth to superficially punctate, sometimes with few

interrupted transverse rugulae at anterior and posterior ends. Mesonotum and propodeum weakly punctate with large smooth and shiny area on katapisternum and smooth to superficially punctate dorsopropodeum. Metanotal groove in profile inconspicuous to barely impressed, cross-ribs weakly developed with reduced sculpture in between. Propodeal spines moderately short-spinose (PSLI 11–15). Metafemur moderately long (FI 68–73), metatibia with decumbent pilosity, along outer edge with additional longer suberect to subdecumbent hairs. Dorsum of waist segments smooth anteriorly, sometimes grading to superficially punctate posteriorly, remainder punctate. Postpetiole on average about 1.7 times wider than long (DPpI 158–186) and twice as wide as petiole (PpWI 195–217), ventral process small to minute, acute, and directed anteriorly. Gaster smooth. Standing hairs relatively abundant and short, yellowish, moderately acute, and stiff. Shorter pilosity decumbent and slightly more abundant than longer hairs. Color brown; mandibles, postpetiole, and gaster darker.

Description of minor workers: Measurements (n=5): HW 0.48–0.56 (0.53), HL 0.60–0.65 (0.64), SL 0.64–0.69 (0.67), MDL 0.38–0.41 (0.40), EL 0.13–0.14 (0.13), WL 0.76–0.83 (0.79), PNH 0.27–0.28 (0.28), PNW 0.35–0.38 (0.36), MNH 0.49–0.53 (0.51), PDH 0.24–0.27 (0.25), PTL 0.24–0.28 (0.26), PPL 0.15–0.17 (0.16), PTH 0.14–0.15 (0.14), PPH 0.14–0.15 (0.14), PTW 0.09–0.10 (0.10), PPW 0.17–0.19 (0.18), PSL 0.06–0.07 (0.06), MFL 0.69–0.77 (0.72), MTL 0.52–0.58 (0.55), CI 74–88 (84), SI 120–144 (126), MDI 70–85 (75), EI 23–27 (25), FI 123–156 (136), PSLI 10–14 (11), LPpI 106–115 (111), DPpI 59–69 (63), PpWI 96–107 (100), PpLI 59–69 (63), PpHI 96–107 (100).

Head shape suboval, longer than wide (CI 74–88), sides convex, posterior head margin transverse, with rounded corners, occipital carina not visible in full-face view. Mandibles relatively long (MDI 70–85), smooth. Clypeus smooth, median and lateral carinae absent or inconspicuous. Face smooth and partly micropunctate, one or two concentric rugulae present around antennal insertion. Scapes distinctly longer than head (SI 120–149), when laid back surpassing posterior head margin by about the length of tenth funicular segment., pilosity subdecumbent to suberect. Pronotum in profile flatly convex, promesonotal process well developed, obliquely angulate, and prominently produced. Metanotal groove in profile narrowly impressed, cross-ribs weak to inconspicuous. Propodeum in profile longer than high, with highest point immediately behind metanotal groove, declining evenly toward spines. Propodeal spines very short-triangular and acute, much shorter than distance between their bases (PSLI 10–14). Promesonotum largely smooth, often micropunctate and sometimes with faint, short, irregular rugulae. Mesopleuron and propodeum mostly weakly punctate, sculpture on katapisternum in some specimens partly effaced. Metafemur relatively long (FI 123–156), metatibia pilosity decumbent to subdecumbent. Postpetiole slightly longer than high (LPpI 107–118) and significantly shorter than petiole (PpLI 59–69), relatively small convex postpetiolar ventral process present, dorsum of petiole and postpetiole mostly smooth, remainder weakly to superficially punctate. Gaster smooth and shiny. Standing hairs relatively short, scarce, stiff, blunt, and erect to suberect. Shorter pilosity slightly more abundant on head and mesosoma, mostly decumbent. Head, promesonotum, postpetiole and gaster brown to dark brown, with significantly lighter colored mandibles, metapleuron, propodeum, legs, and petiole.

Discussion: *Pheidole komori* was collected in dry forest, coastal scrub land, or along a roadside, and all at elevations between 5 and 50 m from two islands of the Comoros – Mohéli and Anjouan. *Pheidole komori* was also found in secondary forest and sand forest in the Gorongosa National Park in Mozambique. This species could belong to a yet undefined Afrotropical species group, and may be related to morphologically similar species like *P. strator* Forel from Eritrea, *P. strator* r. *fugax* Arnold from Mozambique, or *P. schultzei* var. *gwaaiensis* Forel from Zimbabwe. The presence of this species in Africa along with related species suggests that *P. komori* most probably has an Afrotropical origin and did not originate in the Comoros. In the Malagasy region, this medium-sized *Pheidole* is easily distinguished from the *teneriffana* group and other species revised here by minor workers that combine a distinct promesonotal posterior process with a convex postpetiolar ventral process and major workers that combine the distinct promesonotal posterior process with a more elongate head shape and posterolateral lobes that are not rugose or reticulate.

Etymology: This species' name is a short form of the Comoros' name 'Udzima wa Komori' in the local language (Shikomor). The name is a noun in apposition and thus invariable.

Additional material examined: COMOROS: Anjouan: Bimbini, 12.1964 S, 44.2375 E, 5 m, coastal scrub, mangrove, 27.i.2009 (*B.L. Fisher et al.*); 12.2576 S, 44.3891 E, 20 m, along roadside, 27.i.2009 (*B.L. Fisher et al.*); **Mohéli:** Ouallah, 12.3272 S, 43.6595 E, 10 m, coastal scrub, 17.i.2009 (*B.L. Fisher et al.*); Madahali 50, 12.3742 S, 43.8686 E, 50 m, coastal dry forest scrub, 20.i.2009 (*B.L. Fisher et al.*). **MOZAMBIQUE: Sofala:** Gorongosa

NP, 18°15.8'8.6" S, 34°22'38" E, 27 m, sand forest, soil from leaf-litter, 21.v.2012 (*G.D. Alpert*); Gorongosa NP, 18°58'49.6" S, 34°33'24.1" E, 53 m, Sec. forest, on road #11, on ground and leaf-litter, 06.vi.2012 (*G.D. Alpert*).

***Pheidole loki* sp. n.**

(Figs. 20A–F)

Holotype: (minor worker), MAYOTTE, Mt. Benara, 12.8667 S, 45.1833 E, 630 m, forest, sifted leaf litter, collection code RJ1955, 23.ii.1999 (*R. Jocque & G. DeSmet*) (CASC: CASENT0059150).

Paratype: (1 minor worker), MAYOTTE, Mt. Combani, 12.8 S, 45.1833 E, 470 m, forest, sifted leaf litter, collection code RJ1959, 22.ii.1999 (*R. Jocque & G. DeSmet*) (CASC: CASENT0059114).

Diagnosis (minor workers only): Relatively small species (WL 0.62–0.65 mm) with moderately short scapes and legs (SI 117–122, FI 117–120), promesonotal process absent or inconspicuous, postpetiolar ventral process absent, postpetiole significantly longer than high (LPpI 147) and longer than wide (DPpI 86), face posteriorly superficially punctate to smooth, sculpture on mesosoma reduced and mostly superficially punctate to smooth, standing hairs subdecumbent to suberect and relatively rare.

Description of minor workers: Measurements (holotype): HW 0.46, HL 0.52, SL 0.54, MDL 0.31, EL 0.10, WL 0.65, PNH 0.25, PNW 0.31, MNH 0.40, PDH 0.20, PTL 0.25, PPL 0.14, PTH 0.13, PPH 0.10, PTW 0.07, PPW 0.12, PSL 0.06, MFL 0.55, MTL 0.42, CI 88, SI 117, MDI 67, EI 22, FI 120, PSLI 13, LPpI 147, DPpI 86, PpWI 171, PpLI 56, PpHI 76.

Measurements (n=1): HW 0.46, HL 0.51, SL 0.56, MDL 0.30, EL 0.10, WL 0.62, PNH 0.24, PNW 0.31, MNH 0.39, PDH 0.19, PTL 0.22, PPL 0.14, PTH 0.12, PPH 0.10, PTW 0.07, PPW 0.12, PSL 0.06, MFL 0.54, MTL 0.42, CI 90, SI 122, MDI 65, EI 21, FI 117, PSLI 13, LPpI 147, DPpI 86, PpWI 171, PpLI 64, PpHI 79.

Head subrectangular, slightly longer than wide (CI 88–90), sides convex, posterior head margin weakly concave medially, occipital carina invisible in full-face view. Mandibles relatively short (MDI 65–67), longitudinally striate. Clypeus smooth, without median and lateral carinae. Face punctate to weakly punctate, grading to superficially sculptured or smooth near posterior head margin, punctures between antennal sockets and eyes may be overlain with faint malar carinae. Scapes moderately short (SI 117–122), when laid back surpassing posterior head margin by slightly more than length of tenth funicular segment, pilosity decumbent to suberect. Promesonotal outline in profile strongly convex, with a rounded angle between pronotal dorsum and long, relatively steep, posterior declivity. Metanotal groove shallow, with long weakly to superficially developed cross-ribs, interspaces between dorsal cross-ribs smooth and shiny, propodeum slightly shorter than high, in profile weakly convex. Promesonotum dorsally superficially punctate to smooth, with few faint to inconspicuous transverse rugulae, remainder of mesosoma weakly to superficially punctate with small smooth spot on anterior katepisternum. Propodeal spines short-acute, much shorter than distance between their bases (PSLI 13). Metafemur moderately short (FI 117–120), metatibia pilosity decumbent with longer suberect hairs on outer edge. Postpetiole almost 1.5 times longer than high (LPpI 147) and in dorsal view longer than wide (DPpI 86), petiole and postpetiole smooth. Gaster smooth and shiny. Standing hairs on mesosoma and metasoma moderately scarce, acute, slender, and moderately long, some bent anteriorly, subdecumbent to suberect. Shorter pilosity decumbent and slightly more abundant. Color dark orange to brown, mandibles and legs lighter.

Discussion: The two specimens of *Pheidole loki* were collected in forest leaf litter in 470 and 630 m elevation on Mt. Combani and Mt. Benara, Mayotte, where it occurs in sympatry with *P. jonas*. Majors for this possibly rare species could not be found and thus remain undescribed. *Pheidole loki* is most probably closely allied to *P. jonas* and *P. vulcan* and characterized by reduced sculpture and an intermediate amount of standing hairs, compared to these two species. Overall it resembles *P. jonas* more than *P. vulcan*, at least in habitus, morphometric measurements, and promesonotum and postpetiole shape. The minor workers of *P. jonas*, however, display a more strongly punctate sculpture, less abundant and less flexuous standing hairs, and on average slightly shorter scapes (SI mean 109 versus SI mean 120) than *P. loki*, the postpetiole on average as long as wide (DPpI 88–109) versus longer than wide (DPpI 86) in *P. loki*. With all these easily visible differences between the minor workers of the two species, especially their very distinct pilosity patterns, the chance that *P. loki* is a morphologically aberrant conspecific of *P. jonas* is probably small.

Etymology: This species is named after Loki, the god of mischief and chaos in Norse mythology, who is sometimes also referred to as a trickster or a shape shifter. The name is a noun in apposition and thus invariable.

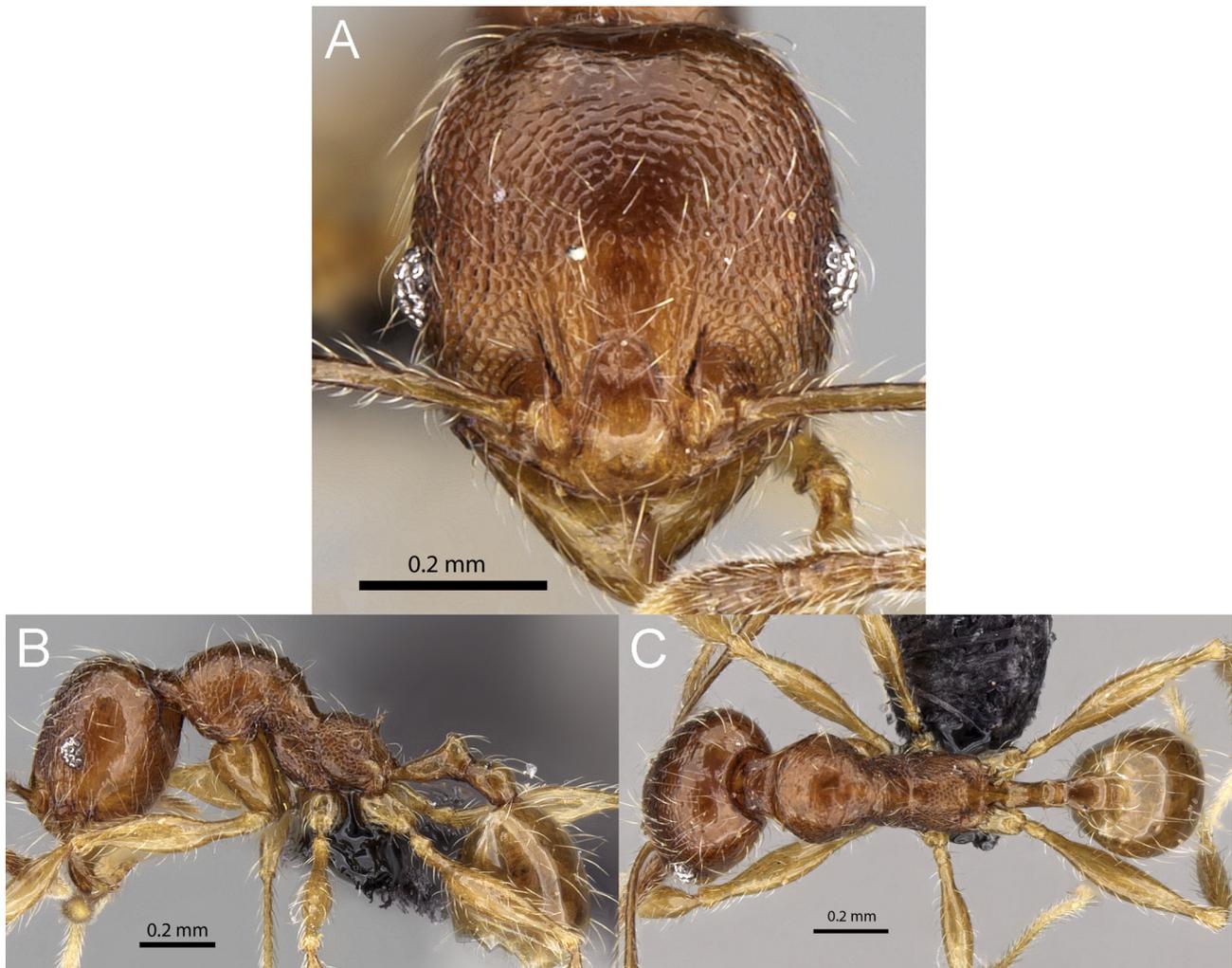


FIGURE 20 *Pheidole loki* sp. n., full-face view (A), profile (B), and dorsal view (C) of holotype minor worker (CASENT0059150).

***Pheidole megacephala* (Fabricius)**

(Figs. 21A–F)

Formica edax Forskål, 1775: 84 (*nomen oblitum*). Syntype(s): (minor and major worker(s)?): EGYPT [not examined]. Junior synonym of *Pheidole megacephala*: Dalla Torre, 1892: 90; Emery, 1892: 160.

Formica megacephala Fabricius, 1793: 361. **NEOTYPE** (major worker) by present designation: MAURITIUS, Camizard Mt., Bambous, 20.3328 S, 57.723 E, 375 m, rainforest, ex rotten log, collection code BLF12051, 27.v.2005 (*B.L. Fisher et al.*) (CASC: CASENT0104990). [previous syntype(s), from MAURITIUS ('Ile de France'), presumed lost]. Description of queen: Latreille, 1802: 232; descriptions of minor worker, major worker, queen, male: Mayr, 1861: 70; descriptions of larva: Wheeler, G.C. & Wheeler, J. 1953: 75. Combination in *Pheidole*: Roger, 1863: 30.

Myrmica trinodis Losana, 1834: 327. Syntype(s) ('worker'): ITALY [not examined]. Junior synonym of *Pheidole megacephala*: Roger, 1863: 30.

Oecophthora pusilla Heer, 1852: 15. Syntype(s) (minor and major worker(s), queen(s), male(s)): PORTUGAL [not examined]. Combination in *Pheidole*: Smith, F. 1858: 173; subspecies of *Pheidole megacephala*: Emery, 1915: 235; senior synonym of *Pheidole laevigata* Smith: Roger, 1859: 259; subspecies of *Pheidole megacephala* Emery, 1915: 235; senior synonym of *Pheidole laevigata* Mayr: Mayr, 1870: 981; junior synonym of *Pheidole megacephala*: Wheeler, W.M. 1922: 812.

Pheidole janus Smith, 1858: 175. Syntype(s) (minor and major worker(s)): CEYLON [not examined]. Junior synonym of *Pheidole pusilla*: Mayr, 1886: 360. Junior synonym of *Pheidole megacephala*: Wheeler, W.M. 1922: 812.

Myrmica(?) laevigata Smith, 1855: 130. Syntypes(s) (minor worker(s)): GREAT BRITAIN [not examined]. Junior synonym of *Pheidole pusilla*: Roger, 1859: 259; junior synonym of *Pheidole pallidula*: Smith, 1858b: 282; junior synonym of *Pheidole megacephala*: Roger, 1863: 30; junior synonym of *Pheidole pusilla*: Emery, 1915: 235. Junior synonym of *Pheidole megacephala*: Wheeler, W.M. 1922: 812.

Myrmica agilis Smith, F., 1857: 71. Syntype(s): (minor worker(s)?): WEST MALAYSIA [not examined]. Combination in *Pheidole*: Donisthorpe, 1932: 449; junior synonym of *Pheidole megacephala*: Eguchi, 2008: 56.

Pheidole laevigata Mayr, 1862: 747. Syntype(s): (major worker (s)): BRAZIL [not examined]. Unresolved junior secondary homonym of *Pheidole laevigata* Smith, F. Junior synonym of *Pheidole pusilla*: Mayr, 1870: 981. Junior synonym of *Pheidole megacephala*: Wheeler, W.M. 1922: 812.

Atta testacea Smith, F. 1858: 168. Syntype(s) (minor and major worker(s)): BRAZIL [not examined]. Combination in *Pheidole*: Mayr, 1886: 360; junior synonym of *Pheidole megacephala*: Brown, 1981: 530.

Oecophthora perniciosus Gerstäcker, 1859: 263. Syntype (minor worker): MOZAMBIQUE [examined]. Combination in *Pheidole*: Roger, 1863: 30; junior synonym of *Pheidole megacephala*: Emery, 1915: 235 (ZMHB).

Myrmica suspiciosa Smith, F., 1859: 148. Syntype(s) (minor worker(s)?): INDONESIA (Aru Is.) [not examined]. Junior synonym of *Pheidole megacephala*: Donisthorpe, 1932: 455.

Pheidole megacephala var. *scabrior* Forel, 1891: 178 (See also: Forel, 1897: 188). Syntypes (2 minor workers, 1 major worker, 3 queens, 1 male): MADAGASCAR, Nosibé (*Voeltzkow*) (MHNG) [examined]. **Syn. n.**

Pheidole picata Forel, 1891: 178. Syntypes (2 major workers, 3 minor workers, 2 queens, 1 male): MADAGASCAR, Antananarivo (*Camboué*) (MHNG) [examined]. (Variation of *megacephala*: Forel, 1895: 49; subspecies of *punctulata*: Forel, 1897: 186; Forel, 1905: 163; Santschi, 1910: 370; raised to species: Emery, 1915: 245; Wheeler, W.M. 1922: 1019). **Syn. n.**

Pheidole punctulata r. *gietleni* Forel, 1905: 164. Syntypes (2 major workers, 2 minor workers): MADAGASCAR, Fianarantsoa (*Gietlen*) (MHNG) [examined]. Subspecies of *Pheidole picata*: Emery, 1915: 245. **Syn. n.**

Pheidole picata var. *bernhardae* Emery, 1915: 245 (First available use of *Pheidole punctulata spinosa bernhardae* Forel, 1905: 164; unavailable name). Syntypes (1 major worker, 1 minor worker): MADAGASCAR, Fianarantsoa (*Gietlen*) (MHNG) [examined]. **Syn. n.**

Workers associated with the neotype: (4 major & 18 minor workers) same data as neotype (+ on low vegetation; ground foragers), collection codes BLF12047, BLF12051, BLF12053, BLF12055, BLF12059 (CASC: CASENT0055882–CASENT0055886, CASENT0055903–CASENT0055905, CASENT0059653–CASENT0059657, CASENT0059671–CASENT0059674; SAMC: CASENT0059652); (3 major & 16 minor workers), MAURITIUS, Moka Range, Le Pouce Mt., 20.1985 S, 57.529 E, 750 m, closed vegetation, under stone / ex rotten log / under tree bark, live tree, collection codes BLF12002, BLF12003, BLF12007, 25.v.2005 (*B.L. Fisher et al.*) (BMNH: CASENT0056010; CASC: CASENT0056004–CASENT0056009, CASENT0056011–CASENT0056019); (4 major & 17 minor workers), MAURITIUS, Moka Range, Pieter Both Mt., 20.1922 S, 57.5553 E, 770 m, closed vegetation, ground nest, collection codes BLF12028, BLF12035, BLF12036, BLF12037, 26.v.2005 (*B.L. Fisher et al.*) (CASC: CASENT0055944–CASENT0055947, CASENT0055951–CASENT0055957, CASENT0055952–CASENT0055954, CASENT0055957; MCZC: CASENT0055955, MHNG: CASENT0055956).

Diagnosis: Moderately small species (WL major 0.99–1.22 mm, WL minor 0.62–0.84 mm), with moderately short scapes (SI minor 114–122, major SI 47–58) and legs (FI minor 114–125, FI major 65–73), both workers subcastes with acute short-spinose propodeal spines, absent promesonotal process, and postpetiole with large convex ventral process, mesosoma with relatively few, usually stiff and often blunt or apically bifurcate standing hairs, scape pilosity subdecumbent to suberect, hind tibia pilosity on inner edge decumbent, along outer edge subdecumbent to suberect. **Major** head often heart shaped, with moderately deep posterior emargination, short-irregular longitudinal rugae anteriorly and sculpture absent from posterior 2/5 of head, except for two weak to superficial longitudinal rugulae medially, hypostomal margin without median process and very small to inconspicuous submedian teeth, promesonotum almost completely smooth and shiny, remainder of mesosoma weakly punctate, smooth or superficially sculptured spots usually present on both katapisternum and lateropropodeum, postpetiole on average 1.9 times wider than petiole (PpWI 171–210). **Minor** head shape usually ovoid and posterior head margin slightly compressed, head almost as wide as long (CI 86–92), face completely smooth and shiny, except for sometimes weakly developed concentric rugulae around antennal insertions, postpetiole on average 0.8 times as long as petiole (PpLI 70–91).

Description of major workers: Measurements (neotype): HW 1.29, HL 1.28, SL 0.69, MDL 0.67, EL 0.17, WL 1.04, PNH 0.45, PNW 0.60, MNH 0.45, PDH 0.34, PTL 0.38, PPL 0.26, PTH 0.22, PPH 0.26, PTW 0.18, PPW 0.36, PSL 0.15, MFL 0.92, MTL 0.66, CI 101, SI 54, MDI 52, EI 13, FI 71, PSLI 12, LPpI 100, DPpI 137, PpWI 197, PpLI 68, PpHI 118.

Measurements (n=19): HW 1.10–1.54 (1.30), HL 1.04–1.59 (1.30), SL 0.59–0.76 (0.67), MDL 0.59–0.82 (0.70), EL 0.15–0.19 (0.17), WL 0.94–1.22 (1.06), PNH 0.36–0.54 (0.45), PNW 0.54–0.74 (0.62), MNH 0.61–0.80

(0.68), PDH 0.33–0.53 (0.37), PTL 0.31–0.44 (0.38), PPL 0.23–0.29 (0.26), PTH 0.20–0.28 (0.23), PPH 0.22–0.31 (0.26), PTW 0.14–0.22 (0.18), PPW 0.27–0.45 (0.34), PSL 0.13–0.20 (0.16), MFL 0.77–1.06 (0.89), MTL 0.59–0.77 (0.67), CI 97–106 (101), SI 47–58 (52), MDI 51–57 (54), EI 11–15 (13), FI 65–73 (69), PSLI 11–14 (12), LPpI 90–114 (100), DPpI 108–156 (134), PpWI 171–210 (190), PpLI 61–81 (69), PpHI 105–123 (114).

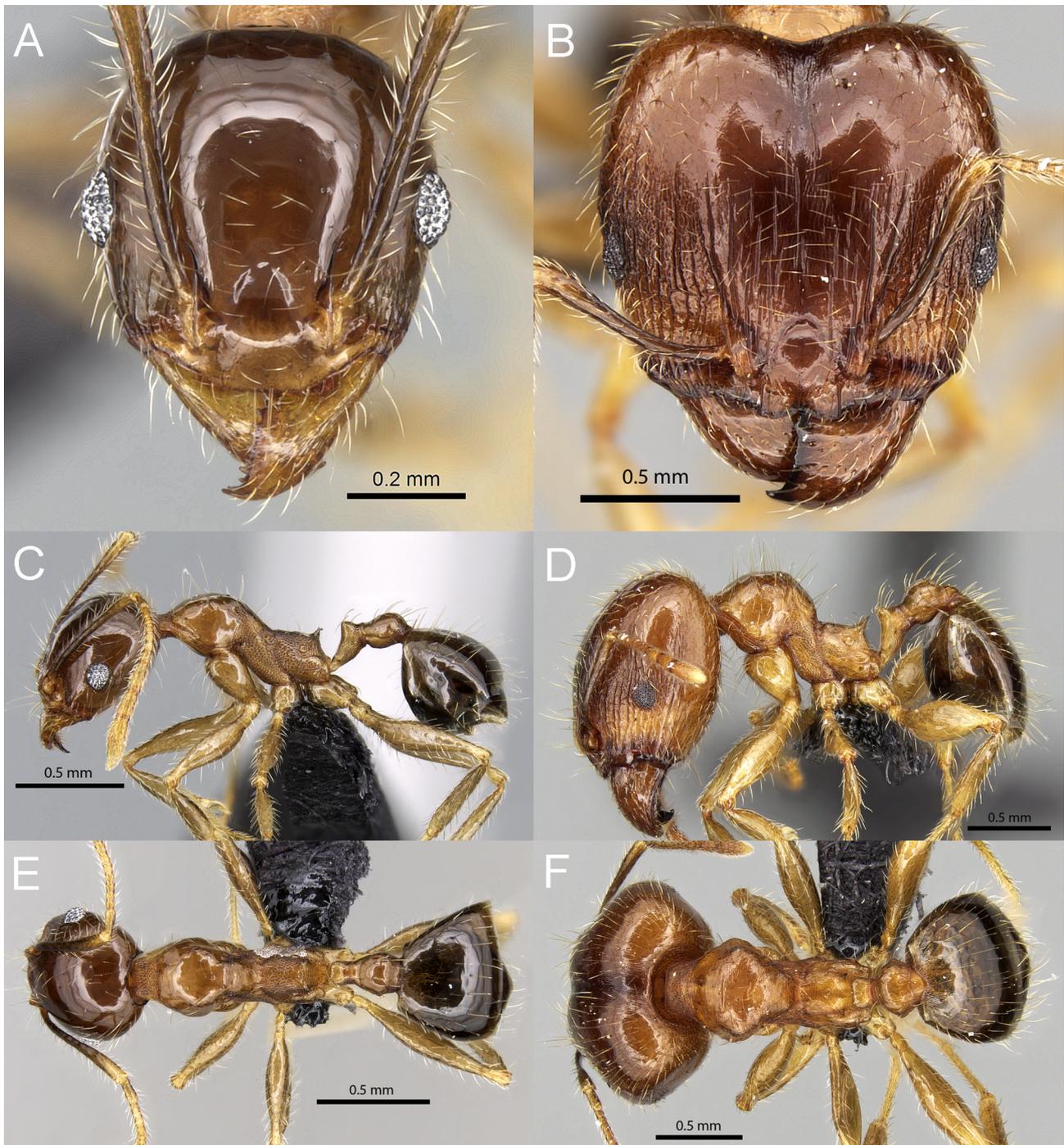


FIGURE 21 *Pheidole megacephala* (Fabricius), full-face view (A), profile (B), and dorsal view (C) of paratype minor worker (CASENT0056016) and full-face view (D), profile (E), and dorsal view (F) of neotype major worker (CASENT0104990).

Head as long as wide (CI 97–103), usually heart shaped with strongly convex sides and posterior emargination moderately deeply impressed. Mandibles moderately long (MDI 51–57), smooth and shiny. Clypeus smooth with median carina short or absent and one or two pairs of lateral carinae. Frons and sides of head anteriorly, longitudinally rugose, interspaces superficially punctate at frons, punctate or weakly punctate at sides, with a few longer rugae ventral of eyes, posterior 2/5 of head smooth and shiny, except for two weakly to faintly developed

longitudinal rugae medially and, rarely present, short, faint rugulae submedially at posterior emargination. Sides of head dorsal and ventral of eyes in profile with few irregular rugae extending up to posterior 1/4 of head, space in between, posterior of eyes, largely unsculptured. Frontal carinae and antennal scrobe absent. Scapes of medium length (SI 47–58) with decumbent to subdecumbent pilosity and few longer, suberect hairs along outer edge. Submedian hypostomal teeth very small to inconspicuous, median process absent. Promesonotum moderately high-domed, in profile usually subangulate posteriorly, humeri in dorsal view not produced, promesonotal process not conspicuously produced, posterior declivity often weakly marginate anteriorly (at posterior end of pronotum), oblique and angulate at its lower portion. Surface of promesonotum and lateropronotum mostly smooth to superficially punctate, with few faint, irregular, transverse rugulae, remainder of mesosoma weakly punctate, with smooth or superficially punctate spots between. Metanotal groove narrow, barely or not impressed, and with few superficially developed cross-ribs. Spines short-spinose to subtriangular in profile (PSI 11–14). Metatibia relatively short (FI 65–72), metafemur pilosity on inner edge decumbent, on outer edge suberect to subdecumbent. Postpetiole in profile about as high as long (LPpI 90–114), with large convex ventral process, in dorsal view trapezoid and on average 1.9 times wider than petiole (PpWI 171–210). Dorsum of petiole and postpetiole smooth, remainder weakly punctate. Gaster smooth. Amount and length of standing hairs on body dorsum variable, usually with few long hairs and some shorter hairs, with several hairs apically blunt or bifurcate. Fine, short pilosity not abundant. Color variable from light to dark brown, head and gaster often darker than the rest.

Description of minor workers: Measurements (n=20): HW 0.50–0.61 (0.55), HL 0.57–0.68 (0.62), SL 0.61–0.72 (0.65), MDL 0.32–0.41 (0.36), EL 0.12–0.15 (0.13), WL 0.62–0.84 (0.73), PNH 0.22–0.29 (0.25), PNW 0.32–0.39 (0.35), MNH 0.42–0.53 (0.46), PDH 0.21–0.27 (0.24), PTL 0.22–0.28 (0.24), PPL 0.17–0.22 (0.19), PTH 0.13–0.16 (0.14), PPH 0.16–0.19 (0.14), PTW 0.09–0.11 (0.10), PPW 0.17–0.21 (0.18), PSL 0.07–0.10 (0.08), MFL 0.57–0.76 (0.67), MTL 0.44–0.57 (0.51), CI 86–92 (90), SI 114–122 (118), MDI 63–70 (66), EI 22–26 (24), FI 114–125 (121), PSLI 13–16 (14), LPpI 94–120 (109), DPpI 89–112 (98), PpWI 164–200 (180), PpLI 70–91 (79), PpHI 110–146 (125).

Head shape roundly ovoid, slightly longer than wide (CI 86–92), sides convex, posterior head margin rounded laterally, medially sometimes slightly compressed, occipital carina very narrow in full-face view, often weakly impressed medially. Mandibles relatively short (MDI 63–70), smooth. Clypeus and remainder of face smooth, clypeal carinae absent or inconspicuous, around antennal insertion few concentric rugulae present and often weakly to superficially developed. Scapes relatively short (SI 114–122), when laid back surpassing posterior head margin by slightly more than the length of tenth funicular segment, with subdecumbent to suberect pilosity. Promesonotal outline in lateral view roundly convex, usually evenly declining from highest point toward metanotal groove, posterior process absent. Metanotal groove in profile weakly impressed, with dorsally weak to laterally superficial cross-ribs. Propodeum about as long as high, in profile slightly declining toward spines. Propodeal spines much shorter than distance between their bases, short-spinose to subtriangular and acute (PSLI 13–16, mean: 14). Promesonotum largely smooth, except superficial punctures anteriorly near the neck, mesopleuron and propodeum punctate to weakly punctate, often with superficially sculptured to smooth areas laterally. Metafemur short (FI 114–125), metatibia with decumbent pilosity and scattered suberect longer hairs on outer edge. Postpetiole in profile with large convex ventral process, on average 1.1 times longer than high (LPpI 94–120), and 0.8 times as long as petiole (PpLI 70–91). Dorsum of petiole and postpetiole smooth, remainder weakly to superficially punctate. Gaster smooth and shiny. Standing hairs short to moderately long, relatively coarse, erect to suberect, not abundant, and usually with some to several hairs apically split or bifurcate. Color usually light brown, sometimes brown, gaster darker brown.

Discussion: *Pheidole megacephala* – commonly also known as the ‘African big-headed ant’ – is a globally distributed invasive ant species and can be found on almost every island in the Malagasy region. This species is considered one of the most problematic invasive ant species and has caused devastating environmental problems all over the world (Hoffmann *et al.* 1999, Hoffmann & Parr 2008, Wetterer 2012). First described by Fabricius from the former ‘Ile de France’, called Mauritius today, the origins of this species remain unknown. *Pheidole megacephala* and the *megacephala* group are probably native to the Afrotropics (Wetterer 2012), although a Malagasy origin is also a possibility, as the whole group seems to be quite diverse in Madagascar.

Possibly as a result of its wide distribution and local abundances, a number of subspecies and synonyms have accumulated during the nineteenth and early twentieth century. Several of the subspecies are probably synonyms (unpublished data), and a number of described and undescribed related species add to the taxonomic confusion

within the *megacephala* group. The types are presumed lost. No type specimens could be located in both of the two possible collections – the Zoological Museum of the University of Copenhagen (ZMUC) and the Muséum National d'Histoire Naturelle in Paris (MNHN). To stabilize the name *P. megacephala* we designated a neotype in this publication. The neotype, together with many associated specimens, was collected on Mauritius. The material is morphologically concordant with previous redescrptions (Wilson 2003, Eguchi 2008), and identical to *P. megacephala* material from other collection localities (e.g. Papua New Guinea and Australia).

Morphologically, both the minor and major workers of *P. megacephala* display relatively few diagnostic characters to set them apart from other members of the group. On the Comoros *P. megacephala* also occurs together with the two newly described species *P. decepticon* and *P. megatron*. The minor workers of the latter two species are very similar in morphometric measurements and external morphology to those of *P. megacephala*, and single major workers possess few clearly defined features that can be used for definite species identifications (see also in respective discussions). Because *P. megacephala* is a morphologically variable species, series with several major workers are much more helpful for positive identifications. Especially the majors of *P. megacephala* and *P. decepticon* are in many characters almost identical and both vary significantly in their development of the typically heart-shaped head. The most apparent and stable differences, however, seem to be the amount of sculpture on the posterior half of the major worker's head, the type and overall quantity of standing hairs on the meso- and metasoma, as well as the shape of the postpetiolar ventral processes. Further minor differences in the morphologies of *P. decepticon* suggest ongoing differentiation between populations on the islands where it occurs.

Additional material examined: **AUSTRALIA:** Norfolk, No. 3992, 28.xii.37; 01.iv.1938; Queensland, Parish of Bunker, Great Barrier Reef, Heron Island, 26-30.vii.1984 (*T.W. Davies*); **BELIZE:** South Water Cay, 01.vi.1985 (*J.F. Lynch*); **COMOROS: Anjouan:** Moya village, S 8.23148w, 10m, suburban area, on stone wall near sea, 04.xii.1994 (*Roger*); **KENYA:** Tsavo Park, Ati R., 26.vi.1967 (*G. Sibley*); **MADAGASCAR: Antsiranana:** R.S. Manongarivo, 10.8 km 229° SW Antanambao, 13.9617 S, 48.4333 E, 400 m, rainforest, 11.viii.1998 (*B.L. Fisher*); **Toamasina:** Antaratasy, 43.5 km 23° Toamasina, 17.7673 S, 49.4777 E, 15 m, urban garden, 02.viii.2006 (*B. Blaimer, F.N. Raharimalala*); Ampasimbe, 118 km 17° Toamasina, 17.0928 S, 49.4778 E, 25 m, urban garden, 07.viii.2006 (*B. Blaimer, F.N. Raharimalala*); Antetetzambaro, 16.0 km 21° Toamasina, 17.0528 S, 49.567 E, 10 m, urban habitats, 08.i.2006 (*B. Blaimer, F.N. Raharimalala*); Mahambo, 73.8 km 16° Toamasina, 17.4893 S, 49.4517 E, 10 m, urban garden, 04.viii.2006 (*B. Blaimer, F.N. Raharimalala*); Toamasina-Ville, 18.1552 S, 49.4095 E, 10 m, interior house, 31.vii.2006 (*B. Blaimer, F.N. Raharimalala*); **Fianarantsoa:** Farafangana, 22.8197 S, 47.83 E, 10 m, urban gardens, 25.iv.2006 (*B.L. Fisher et al.*); **MAURITIUS:** 16.viii.2004, trail across jeep track (*L. Lach*); 20.315 S, 57.4469 E, 231 m, Dry II forest, 27.iv.2009 (*J. Casquet*); Basin Blanc, 20.4532 S, 57.4777 E, 480 m, rainforest, 29.v.2005 (*B.L. Fisher et al.*); Belle Rive, L'Etoile, 17.xii.2006 (*M. Madl*); Black River, Corps de Garde, 20.2633 S, 57.4549 E, 684 m, 24.vii.2004 (*L. Lach*); Black River, Florin, 20.3911 S, 57.4611 E, 631 m, 29.xi.2004 (*L. Lach*); Black River, Macchabee, 20.4005 S, 57.4552 E, 656 m, 22.xi.2004 / 04.iv.2005 / 27.vi.2005 (*L. Lach*); Black River, Petrin, 20.4063 S, 57.4666 E, 644 m, 25.v.2005 (*A.V. Suarez*); Blue Bay, 20.4414 S, 57.7192 E, 20.x.2004 (*L. Lach*); Gunners Quoin (*N. Cole*); Moka Range, Le Pouce, 20.2 S, 57.5167 E, 700 m, grassland, 09.iv.1989 (*P.S. Ward*); Moka Range, Le Pouce, 26.ix.2004 (*L. Lach*); Side of Le Pouce, 20.1906 S, 57.5058 E, 173 m, 1/2 dry II forest, 19.iv.2009 (*J. Casquet*); Side of Le Pouce, 20.1917 S, 57.5067 E, 176 m, 100% butterfly liana, 19.iv.2009 (*J. Casquet*); Moka Range, Perrier, 20.3521 S, 57.4942 E, 564 m, 12.xi.2004 (*L. Lach*); Moka Range, Petrin, 20.4063 S, 57.4666 E, 644 m, 29.xi.2004 / 17.iii.2005 / 22.vi.2005 (*L. Lach*); La Nicolière Reserve, 06.v.2007 (*M. Madl*); Macchabee Forest, 20.4 S, 57.45 E, 600 m, disturbed rainforest, 10.iv.1989 (*P.S. Ward*); Macchabee View Point, 20.x.2004 (*L. Lach*); Montagne du lion, 20.3631 S, 57.7261 E, 393 m, wet II vegetation, 25.iv. 2009 (*J. Casquet*); On the trail to Piton Savane, 20.4419 S, 57.4875 E, 675 m, forest road surrounded by wet II forest, 16.iv.2009 (*J. Casquet*); Perrier Nature Reserve, 20.3521 S, 57.4942 E, 564 m, 25.v.2005 (*A.V. Suarez*); Petite Rivière Noire Mt., 20.4088 S, 57.4077 E, 750 m, rainforest, 29.v.2005 (*B.L. Fisher et al.*); Savanne, Bel Ombre-Belloughy, 20.4689 S, 57.4272 E, 82 m, 19.xi.2004 / 23.xi.2004 / 25.ii.2005 / 30.v.2005 / 14.vii.2005 / 02.viii.2005 (*L. Lach*); Savanne, Combo-lower, 20.4722 S, 57.5153, 320 m, 13.xii.2004 / 13.iv.2005 / 11.vii.2005 (*L. Lach*); St. Catherine (*Linden*); Yemen, 14.xii.2006 (*M. Madl*); **Ile Aux Aigrettes:** 03.ix.2004 / 06.ix.2004 (*L. Lach*); 20.419 S, 57.7302 E, on island, 23.v.2005 (*A.V. Suarez*); 20.4188 S, 57.7305 E, 1 m, coastal scrub, 28.v.2005 (*B.L. Fisher et al.*); 20.4197 S, 57.7311 E, 25 m, protected coastal forest, 21.iv.2009 (*J. Casquet*); **Ile de la Passe:** (*N. Cole*); **Ile Marianne:** 20.3667 S, 57.7833 E, 5 m, 02.iii.2005 (*L. Lach*); **Rodrigues:** Anse Quitor, 19.7561 S, 63.3667 E, 21 m, 15.vi.2005, (*L. Lach*); Canyon Tyeul, 19.7421 S, 63.375 E, 35 m, degraded dry forest,

14.x.2007 (*A. Meunier*); Caverne Bambara, 19.7416 S, 63.3739 E, 38 m, degraded dry forest, 14.xi.2007 (*A. Meunier*); Citronelle, 19.7149 S, 63.4163 E, 10.xii.2007 (*M. Madl*); Cotton Bay Hotel, 19.7149 S, 63.4163 E, 25.iv.2008 (*M. Madl*); Montagne des 4 vents, 19.7181 S, 63.4117 E, 303 m, Low & dry II forest, 02.v.2009 (*J. Casquet*); **Round Island**: 19.8508 S, 57.7697 E, 206 m, 01.viii.2004 (*R. Bone*); 18.viii.2004 (*R. Bone*); 19.8512 S, 57.7838 E, 102 m, 21.i.2005 (*L. Lach*); 19.8508 S, 57.7697 E, 206 m, 22.i.2005 (*L. Lach*); 19.8471 S, 57.789 E, 296 m, 23.i.2005 (*L. Lach*); 19.8568 S, 57.7873 E, 82 m, 23.i.2005 (*L. Lach*); 23.i.2005 (*L. Lach*); 24.i.2005 (*L. Lach*); **MAYOTTE**: Benara, Labattoir, 12.793 S, 45.2761 E, 60 m, diverse vegetation in understory of mango and coconut plantations, 16.i.2010 (*J. Rochat*); Baie de Tsingoni, 12.7926 S, 45.1076 E, 5 m, mangrove, coastal scrub, 26.xi.2007 (*B.L. Fisher et al.*); Coconi DAF campus, dense wet forest, 22.vii.1998 (*R. Jocque*); Combani, 12.8107 S, 45.2793 E, 7 m, native littoral and secondary vegetation, 15.i.2010 (*G. Paulus / S. Gasnier*); Combani, 12.8134 S, 45.2813 E, 24 m, native littoral and secondary vegetation, 16.i.2010 (*J. Rochat*); Mont Combani, 12.8063 S, 45.1531 E, 370 m, rainforest, 25.xi.2007 (*B.L. Fisher et al.*); Dapani, 12.9749 S, 45.1618 E, 1 m, mangrove, coastal scrub, 27.xi.2007 (*B.L. Fisher et al.*); Sazile, 12.9784 S, 45.1726 E, 35 m, dry forest, 27.xi.2007 (*B.L. Fisher et al.*); Tanaraki, 12.7575 S, 45.0678 E, 10 m, coastal scrub, 26.xi.2007 (*B.L. Fisher et al.*); **PAPUA NEW GUINEA**: **Morobe Bululo**: (53 km W), Aseki Rd., 7°19'22" S, 146°21'20" E, 2100 m, mixed montane forest litter, 09.ii.2000 (*R.S. Anderson*); **Morobe Wau**: (19 km NNW), 7°24'11" S, 146°39'41" E, 2150 m, montane forest litter, 06.ii.2000 (*R.S. Anderson*); (9 km NNW), Mt. Kaindi, 7°20'24" S, 146°40'01" E, 2050 m, montane forest litter, 06.ii.2000 (*R.S. Anderson*); (25 km SE), Kuper Range, 7°30'14" S, 146°48'13" E, 2200 m, montane forest litter, 07.ii.2000 (*R.S. Anderson*); **RÉUNION**: Basse Vallée, Théophane Bègue, guesthouse, 21.3481 S, 55.7075 E, 449 m, in garden, 21.iii.2009 (*J. Casquet*); Cilaos, Ilet des Salazes, 21.1116 S, 55.4493 E, 1575 m, mountain forest/garden, 31.iii.2011 (*B.L. Fisher et al.*); Etang Salé, dry forest, disturbed area, 24.iii.2009 (*J. Casquet*); Grande Chaloupe, 20.9293 S, 55.3888 E, 580 m, tropical dry forest, 20.v.2007 (*B.L. Fisher et al.*); Hermitage, 21.0855 S, 55.2275 E, 20 m, urban garden, 21.v.2007 (*B.L. Fisher et al.*); Mare Longue, 22.viii.2001 (*F. Blard*); Mare Longue, 21.3642 S, 55.7435 E, 30 m, rainforest, 22.v.2007 (*B.L. Fisher et al.*); Saint-Denis, Le Port, 20.9492 S, 55.3095 E, 70 m, garden, 20.vi.2002 (*F. Blard*); Saint Denis, 20.8862 S, 55.4847 E, 10 m, urban garden, 21.v.2007 (*B.L. Fisher et al.*); **SEYCHELLES**: **Aldabra Island**: Grande Terre, Takamaka grove, 15.xii.2008 (*V. Robert*); Malabar: Camp Malabar 15.xii.2005 (*J. Gerlach*); **Aride Island**: 01.vii.2000 (*J. Gerlach*); 03.xii.2008 (*V. Robert*); 4.21273 S, 55.6645 E, *P. grandis* forest 01.vii.2010 (*R. Gaigher*); 4.21407 S, 55.6682 E, 10 m, native forest, 05.ii.2005 (*B.L. Fisher et al.*); **Assumption Island**: Airport, 19.xii.2008 (*V. Robert*); Bijoutier Island (Alphonse): 08.iv.2001 (*J. Gerlach*); **Bird Island**: 01.x.2010 (*J. Gerlach*); **Cosmoledo Atoll (Wizard Island)**: 9.73528 S, 47.6478 E / 9.7425 S, 47.6517 E / 9.73833 S, 47.6542 E / 9.74 S, 47.6533 E / 9.76028 S, 47.6419 E / 9.75111 S, 47.6494 E / 9.75444 S, 47.6481 E / 9.75306 S, 47.6489 E, 10 m, lowland coastal, coralline island, 16. & 21.xi.2007 (*G. Galman*); Grande Ile, 17.xii.2005 (*J. Gerlach*); Menai, 17.xii.2005 (*J. Gerlach*); **Cousine Island**: 4.3507 S, 55.6478 E, *P. grandis* forest 01.vii.2010 (*R. Gaigher*); 4.35009 S, 55.6468 E, 60 m, *Ficus* forest on rocks, 07.iii.2008 (*B.L. Fisher*); **Félicité Island**: 4.32012 S, 55.8668 E, 20 m, coastal scrub, 01.ii.2010 (*B.L. Fisher et al.*); **La Digue Island**: La Passe, & La Veuve, 06.xii.2008 (*V. Robert*); **Mahé Island**: Cascade, 4.67494 S, 55.4982 E, 150 m, roadside, 09.ii.2010 (*B.L. Fisher et al.*); Mont Copolia 4.65121 S, 55.4584 E, 520 m, forest, 08.ii.2010 (*B.L. Fisher et al.*); Montagne, Posée, Palm Forest Reserve, Brulée, 4.712 S, 55.5019 E, 360 m, palm forest, 08.iii.2008 (*B.L. Fisher*); Morne Blanc, 4.65988 S, 55.4374 E, 480 m, mixed forest near road, 10.ii.2010 (*B.L. Fisher et al.*); **North Island**: 30.vii.2000 (*J. Gerlach*); **Praslin Island**: Grande Anse, 05.xii.2008 (*V. Robert*); **Silhouette Island**: Above Jardin Marron on crest to Mont Plaisir and Pot à Eau, 4.4867 S, 55.2341 E, 520 m, forest, 20.i.2010 (*B.L. Fisher et al.*); La Passe, 4.48484 S, 55.2507 E, 35 m, park/garden, 23.i.2010 (*B.L. Fisher et al.*); on coastal path to Anse Mondon, 4.46951 S, 55.2416 E, 10 m, coastal scrub, 23.i.2010 (*B.L. Fisher et al.*); **TANZANIA**: Unguga region, Josani For. Res. Zanzibar, Ground Water Forest, 6.2676 S, 39.4111 E, 19 m, 30.x.-14.xi.2007 (*P. Hawkes, M. Bhoke, U. Richard*); Lindi region, Mbarawala Plateaux, Primary Forest, 9.0396 S, 39.1201 E, 270 m, 29.ii.-04.iii.2008 (*P. Hawkes, Y. Mlacha, F. Ninga*); Morogoro region, Mamiwa-Kizara For. Res., Primary Forest, 6.3753 S, 36.9371 E, 1989 m, 16.-21.viii.2005 (*P. Hawkes, J. Makawati, R. Mtana*); **UGANDA**: Entebbe, Botanical Garden, 0.0602 N, 32.4807 E, 1130 m, 19.viii.2012 (*G. Fischer*); **USA**: Phoenix, Arizona, 13.x.1980 (*R.R. Snelling?*).

***Pheidole megatron* sp. n.**

(Figs. 22A–F)

Holotype: (major worker), COMOROS, Mohéli, Lac Boundouni, 12.3792 S, 43.8517 E, 25 m, dry forest, under stone, collection code BLF20771, 20.i.2009 (*B.L. Fisher et al.*) (CASC: CASENT0147194).

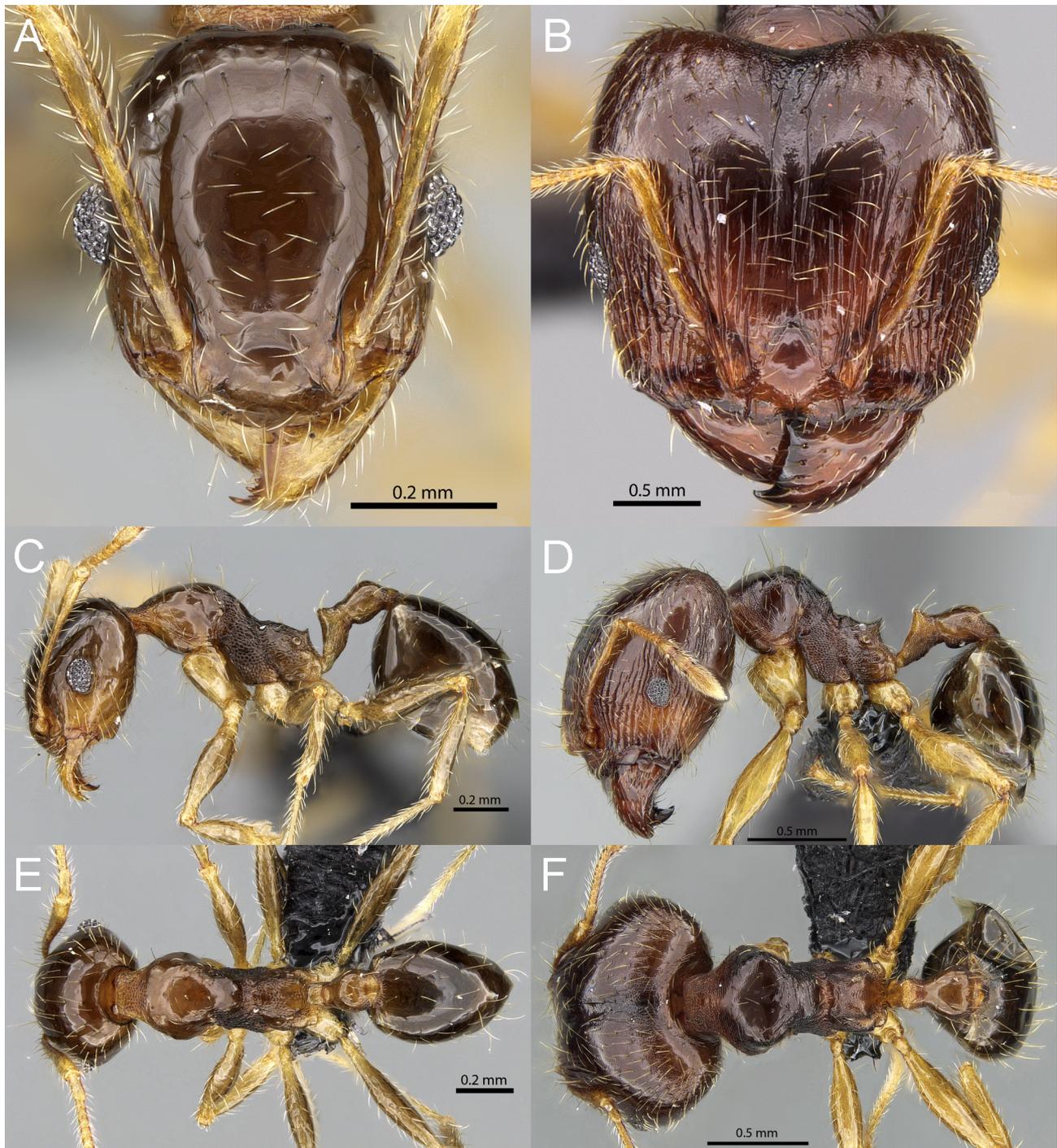


FIGURE 22 *Pheidole megatron* sp. n., full-face view (A), profile (B), and dorsal view (C) of paratype minor worker (CASNT0281179) and full-face view (D), profile (E), and dorsal view (F) of holotype major worker (CASNT0147194).

Paratypes: (2 minor workers) same data as holotype (CASC: CASENT0147193, CASENT0059654); (1 major & 2 minor workers), COMOROS, Mohéli, Lac Boundouni, 12.3792 S, 43.8517 E, 25 m, dry forest, ex rotten log, collection code BLF20797, 20.i.2009 (*B.L. Fisher et al.*) (CASC: CASENT0147140, CASENT0147141); (1 major & 3 minor workers), Mohéli, Lac Boundouni, 12.3792 S, 43.8517 E, 25 m, dry forest, under stone, collection codes

BLF20776 & BLF20770, 20.i.2009 (*B.L. Fisher et al.*) (BMNH: CASENT0147160, CASENT0147220; CASC: CASENT0147161, CASENT0147219); (1 major & 3 minor workers), Mohéli, Lac Boundouni, 12.3792 S, 43.8517 E, 25 m, dry forest, ex rotten log, collection code BLF20762 & BLF20758, 20.i.2009 (*B.L. Fisher et al.*) (CASC: CASENT01281179, CASENT0147183, CASENT0147241).

Diagnosis: Relatively small species (WL major 0.94–1.08, WL minor 0.63–0.72), minor and major workers with moderately short scapes and legs (SI major 52–55, SI minor 102–118, FI major 60–66, FI minor 117–131), propodeal spines short-triangular, promesonotal process absent or inconspicuous, standing hairs on mesosoma relatively coarse and rare, often blunt or apically bifurcate, with few shorter hairs in between. **Major** head not or very weakly heart-shaped, sometimes almost subrectangular, posterior emargination shallow, face longitudinally rugose anteriorly, sculpture on posterior 2/5 variable, from smooth and micropunctate to weakly and irregularly longitudinally rugulose, lateroventral corners of head in profile with relatively large weakly punctate area, hypostomal margin with submedian teeth very small to inconspicuous, median process absent, postpetiole on average about 1.9 times wider than petiole (PpWI 169–207). **Minor** head shape ovoid and distinctly longer than wide (CI 82–87), face and promesonotum completely smooth and shiny, postpetiole between 0.6 and 0.7 times as long as petiole (PpLI 63–71).

Description of major workers: Measurements (holotype): HW 1.22, HL 1.16 SL 0.59, MDL 0.63, EL 0.16, WL 0.97, PNH 0.39, PNW 0.56, MNH 0.62, PDH 0.36, PTL 0.38, PPL 0.24, PTH 0.23, PPH 0.27, PTW 0.16, PPW 0.31, PSL 0.14, MFL 0.83, MTL 0.61, CI 105, SI 48, MDI 52, EI 13, FI 68, PSLI 11, LPpI 89, DPpI 129, PpWI 194, PpLI 63, PpHI 117.

Measurements (n=5): HW 1.10–1.32 (1.19), HL 1.04–1.33 (1.17), SL 0.61–0.68 (0.63), MDL 0.59–0.71 (0.65), EL 0.15–0.17 (0.16), WL 0.94–1.08 (0.99), PNH 0.36–0.43 (0.40), PNW 0.54–0.63 (0.58), MNH 0.61–0.70 (0.64), PDH 0.33–0.40 (0.36), PTL 0.31–0.44 (0.38), PPL 0.23–0.27 (0.25), PTH 0.20–0.28 (0.25), PPH 0.22–0.28 (0.23), PTW 0.14–0.19 (0.16), PPW 0.27–0.35 (0.30), PSL 0.13–0.15 (0.14), MFL 0.77–0.93 (0.84), MTL 0.59–0.69 (0.62), CI 99–106 (103), SI 52–55 (53), MDI 54–57 (55), EI 13–15 (14), FI 69–72 (71), PSLI 11–13 (12), LPpI 96–108 (101), DPpI 112–132 (122), PpWI 169–207 (185), PpLI 61–76 (70), PpHI 109–113 (110).

Head on average slightly longer than wide (CI 99–106), subquadrate, with weakly convex sides and posterior emargination usually shallow. Mandibles moderately long (MDI 52–57), smooth and shiny. Clypeus smooth with very short median carina and one pair of lateral carinae present. Face sculpture anteriorly longitudinally rugose (as in *P. megacephala*), sculpture on posterior 2/5 of head variable, from mostly smooth with micropunctures and faint short rugulae posteromedially to micropunctate without rugulation to weakly and irregularly longitudinally rugulose with smooth to superficially punctate interspaces. Frontal carinae very short, antennal scrobe absent. Scapes of medium length (SI 48–55) with decumbent to subdecumbent pilosity and few longer suberect to erect hairs along outer edge. Submedian hypostomal teeth very small to inconspicuous, median process absent. Promesonotum in profile convex and without prominent promesonotal process, posterior declivity often weakly marginate anteriorly (at posterior end of pronotum), oblique and angulate at its lower portion. Dorsum of promesonotum smooth or superficially punctate, anterior lateropronotum smooth, and remainder of mesosoma densely and finely punctate. Metanotal groove barely or not impressed, cross-ribs inconspicuous to superficially developed. Spines short, acute, subtriangular, much shorter than distance between their bases (PSLI 11–13). Metafemur relatively short (FI 68–72), metatibia pilosity on inner edge decumbent, on outer edge decumbent to suberect. Postpetiole about as long as high (LPpI 89–108), in profile with rounded to bluntly acute, anteriorly directed ventral process, in dorsal view trapezoidal with rounded lateral corners, on average 1.9 times wider than petiole (PpWI 169–207). Dorsum of petiole and postpetiole smooth to superficially punctate, remainder punctate. Gaster smooth, anteriorly micropunctate. Dorsal body surfaces with relatively stiff standing hairs of variable lengths, with some long, thin, acute hairs and shorter, moderately abundant, decumbent to suberect pilosity between. Color brown, with lighter appendages and darker gaster.

Description of minor workers: Measurements (n=6): HW 0.47–0.52 (0.50), HL 0.55–0.61 (0.58), SL 0.52–0.61 (0.56), MDL 0.32–0.35 (0.34), EL 0.12–0.13 (0.12), WL 0.63–0.72 (0.68), PNH 0.22–0.25 (0.23), PNW 0.25–0.33 (0.31), MNH 0.40–0.45 (0.43), PDH 0.22–0.40 (0.26), PTL 0.22–0.24 (0.23), PPL 0.14–0.17 (0.16), PTH 0.13–0.14 (0.13), PPH 0.15–0.17 (0.16), PTW 0.09–0.10 (0.09), PPW 0.16–0.18 (0.17), PSL 0.06–0.08 (0.07), MFL 0.57–0.65 (0.62), MTL 0.43–0.49 (0.46), CI 82–87 (85), SI 102–118 (113), MDI 67–72 (69), EI 23–26 (24), FI 117–131 (125), PSLI 11–17 (14), LPpI 97–106 (100), DPpI 100–120 (109), PpWI 168–200 (181), PpLI 63–71 (67), PpHI 114–119 (116).

Head ovoid, relatively narrow, longer than wide (CI 82–87), sides convex, posterior head margin rounded, occipital carina narrow in full-face view, medially impressed. Mandibles relatively short (MDI 67–72), smooth. Clypeus and remainder of face smooth, clypeal carinae absent or very faint, few concentric rugulae present around antennal insertion and in some specimens few weak malar carinae reaching to median eye level. Scapes relatively short (SI 102–118), when laid back surpassing posterior head margin by little more than length of tenth funicular segment, with subdecumbent pilosity and few suberect longer hairs along outer edge. Promesonotal outline in lateral view roundly convex, declining evenly from highest point toward metanotal groove, posterior process absent. Metanotal groove in profile narrow and weakly impressed, with two weak to superficial cross-ribs dorsally. Propodeum about as long as high, in profile declining toward spines. Propodeal spines short-triangular, acute and much shorter than distance between their bases (PSLI 11–17, mean 14). Promesonotum smooth, except punctures anteriorly near the neck and laterally at mesonotum, mesopleuron and propodeum punctate, with smooth spot near propodeal spiracle. Metafemur short (FI 117–131), metatibia with subdecumbent pilosity. Postpetiole about as high as long (LPpI 97–106) and on average 0.7 times as long as petiole (PpLI 63–71), in profile with large convex ventral process. Petiole and postpetiole dorsally smooth, remainder weakly to superficially punctate. Gaster smooth and shiny. Standing hairs moderately rare, relatively short and stiff to moderately long, suberect, usually several to many hairs apically split or bifurcate, especially on mesosoma, waist segments, and gaster. Color light brown to brown, appendages lighter colored, gaster slightly darker.

Discussion: *Pheidole megatron* was found under stones, in and under rotten logs, and nesting and foraging on the ground, occurring in coastal scrub, dry forest and in a coconut plantation, in elevations between 10 and 35 m. It was collected only on the islands of Anjouan, Moheli, and Grand Comoro of the Comoros. On Anjouan it occurs together with two likely relatives, *P. decepticon* and *P. megacephala*. From the former species, *P. megatron* can be distinguished by a slightly larger and more globular postpetiolar ventral process in the major workers and significantly less abundant standing hairs, which often end bluntly or apically split in both worker subcastes, compared to a slightly smaller, more angulate postpetiolar ventral process and relatively numerous, acute standing hairs in *P. decepticon*. The major workers of *P. megatron* tend to have a less heart- and more square-shaped head in full-face view than both *P. decepticon* and *P. megacephala*, with a shallower posterior emargination, and some to several longitudinal rugulae on the posterior 2/5 of the face, compared to an often heart-shaped head, with a deeper posterior emargination, and an almost completely smooth and shiny posterior head surface in *P. decepticon* and *P. megacephala* major workers. The minor workers of *P. megatron* have a slightly narrower head (CI 82–87 versus CI 87–94) and larger eyes (EI 23–26 versus EI 19–23) than those of *P. decepticon* and also a narrower head (CI 82–87 versus CI 86–92) and a slightly shorter postpetiole (PpLI 63–71 versus PpLI 70–91) than the minors of *P. megacephala* (see also under discussion of *P. megacephala*).

Etymology: This species is named after the Transformers character Megatron, merciless leader of the malevolent Decepticons. The name is a noun in apposition and thus invariable.

Additional material examined: COMOROS: Anjouan: 12.3805 S, 44.5022 E, 20 m, coastal scrub, 28.i.2009 (*B.L. Fisher et al.*); **Grande Comore:** Trou du Prophète, 11.3809 S, 43.3134 E, 10 m, coconut plantation on beach, 16.iii.2008 (*B.L. Fisher et al.*); Pidjani, 11.7545 S, 43.4515 E, 35 m, coastal scrub, 18.iii.2008 (*B.L. Fisher et al.*).

Pheidole parva Mayr

(Figs. 23A–F)

Pheidole parva Mayr, 1865: 98. Lectotype (1 major worker) (CASENT0319248) [designated here]: SRI LANKA (NHMW) [examined]; paralectotype (1 minor worker) (CASENT0319249) (NHMW) [examined].

Pheidole parva var. *decanica* Forel, 1902: 175. Lectotype (major worker), designated by Eguchi *et al.* (2007): INDIA [not examined]. Junior synonym of *Pheidole parva*: Eguchi *et al.*, 2007: 261.

Pheidole flavens var. *farquharensis* Forel, 1907: 91. Holotype (minor worker): SEYCHELLES, Farquhar Atoll, v–xii.1905 (*J.S. Gardiner*) (BMNH) [examined]. **Syn. n.**

Pheidole sauteri Wheeler, 1909: 334. Syntypes (3 major workers, 19 minor workers): TAIWAN [not examined]. Junior synonym of *Pheidole parva*: Eguchi *et al.*, 2007: 262.

Pheidole rinae var. *mala* Forel, 1911: 205. Lectotype (major worker), designated by Eguchi (2001): INDONESIA [not examined]. Junior synonym of *Pheidole parva*: Eguchi *et al.*, 2007: 261.

Pheidole rinae r. *tipuna* Forel, 1912: 68. Lectotype (major worker), designated by Eguchi *et al.* (2007): TAIWAN [not examined]. Junior synonym of *Pheidole parva*: Eguchi *et al.*, 2007: 262.
Pheidole bugi Wheeler, 1919: 66. Lectotype (major worker), designated by Eguchi (2001): MALAYSIA (Sarawak, Borneo) [examined]. Junior synonym of *Pheidole parva*: Eguchi *et al.*, 2007: 262.
Pheidole tardus Donisthorpe, 1947: 285. Holotype (queen): MAURITIUS, Rose Hill, 07.v.1946 (*R. Mamet*) (BMNH) [examined]. **Syn. n.**

Diagnosis: Small species (WL major 0.73–0.84 mm, WL minor 0.52–0.63 mm) with both worker castes prominently sculptured, promesonotal process absent or inconspicuous, scapes and legs of minor workers short (SI 85–93, FI 91–96), scapes and legs of major workers moderately short (SI 47–51, FI 63–68). **Major** head rectangular (CI 88–93) with broadly V-shaped posterior emargination, frontal carinae very short or inconspicuous, scrobe weakly developed, submedian hypostomal teeth large, median process present, promesonotum high-domed, strongly convex in profile, spines short-triangular (PSLI 12–16), metatibia with decumbent pilosity and longer erect hairs along outer edge. **Minor** head subrectangular, punctate, often overlain with rugoreticulate sculpture, scapes, when laid back, not reaching or barely surpassing beyond posterior head margin (SI 85–93), mesosoma fully punctate, spines short-spinose, postpetiole distinctly higher than long (DPpI 125–150).

Description of major workers: Measurements (n=8): HW 0.82–0.92 (0.87), HL 0.92–1.05 (0.97), SL 0.41–0.43 (0.42), MDL 0.48–0.51 (0.50), EL 0.12–0.13 (0.12), WL 0.73–0.84 (0.77), PNH 0.35–0.41 (0.37), PNW 0.45–0.54 (0.48), MNH 0.53–0.58 (0.55), PDH 0.26–0.27 (0.26), PTL 0.24–0.33 (0.28), PPL 0.12–0.16 (0.14), PTH 0.18–0.21 (0.20), PPH 0.12–0.18 (0.16), PTW 0.14–0.15 (0.14), PPW 0.21–0.24 (0.22), PSL 0.11–0.14 (0.12), MFL 0.55–0.60 (0.57), MTL 0.41–0.43 (0.42), CI 88–93 (89), SI 47–51 (49), MDI 54–61 (57), EI 13–15 (14), FI 63–68 (66), PSLI 12–16 (14), LPpI 71–89 (80), DPpI 146–200 (164), PpWI 147–171 (156), PpLI 39–58 (49), PpHI 81–97 (86).

Head distinctly longer than wide (CI 88–90), in full-face view rectangular with subparallel sides, posterior emargination broadly and weakly V-shaped. Mandibles smooth and shiny, moderately long (MDI 49–59). Clypeus smooth, with median carina absent, lateral carinae weak and short. Frontal carinae relatively short or inconspicuous, antennal scrobe weakly defined, posteriorly superficially punctate. Frons longitudinally rugose, interspaces smooth to superficially punctate, sides of head weakly rugoreticulate and punctate, posterior 1/3 of head increasingly irregularly rugoreticulate, with superficially punctate interspaces. Scapes relatively short (SI 47–51), with decumbent pilosity and few long, erect, standing hairs on outer edge. Submedian hypostomal teeth large, median process conspicuously developed. Promesonotal dome high and strongly convex in profile, promesonotal process absent, posterior declivity convex to weakly angulate, humeri in dorsal view slightly laterally produced. Surface of promesonotum and lateropronotum rugoreticulate and weakly to superficially punctate, remainder of mesosoma weakly to superficially punctate with small, smooth spots. Metanotal groove very narrow, unimpressed, and with absent to superficially developed cross-ribs. Spines relatively short-acute, subtriangular in profile (PSLI 12–16). Metatibia very short (FI 58–65), with decumbent pilosity, on outer edge with additional longer, erect hairs. Postpetiole in profile about as high as long (LPpI 71–89), with small, weakly acute ventral process, in dorsal view wider anteriorly than posteriorly, and about 1.6 times wider than petiole (PpWI 147–171). Petiole and postpetiole smooth to superficially sculptured. Gaster smooth. Several short to moderately long, stiff, standing hairs on dorsal head and body, pilosity short and decumbent. Color orange-brown, legs lighter orange to yellow, gaster darker.

Description of minor workers: Measurements (n=9): HW 0.43–0.50 (0.46), HL 0.47–0.53 (0.49), SL 0.38–0.44 (0.40), MDL 0.27–0.33 (0.29), EL 0.09–0.11 (0.10), WL 0.52–0.63 (0.56), PNH 0.21–0.25 (0.22), PNW 0.29–0.34 (0.31), MNH 0.35–0.43 (0.38), PDH 0.18–0.22 (0.20), PTL 0.17–0.23 (0.20), PPL 0.09–0.10 (0.09), PTH 0.12–0.14 (0.13), PPH 0.10–0.12 (0.10), PTW 0.08–0.10 (0.08), PPW 0.12–0.15 (0.13), PSL 0.07–0.10 (0.08), MFL 0.40–0.47 (0.43), MTL 0.29–0.35 (0.32), CI 91–95 (93), SI 85–93 (88), MDI 61–66 (64), EI 20–23 (21), FI 91–96 (94), PSLI 15–20 (18), LPpI 83–95 (90), DPpI 125–150 (140), PpWI 144–165 (154), PpLI 41–53 (47), PpHI 79–86 (83).

Head subrectangular, slightly longer than wide (CI 91–95), sides convex, posterior head margin weakly concave, occipital carina not visible in full-face view. Mandibles relatively short (MDI 61–66) and smooth. Clypeus smooth, median carina inconspicuous to faintly developed, lateral carinae short and irregular. Face strongly punctate, punctures sometimes aligned into weak irregular rugulae. Scapes very short (SI 85–93), not reaching to or barely surpassing posterior head margin when laid back, with decumbent pilosity and some longer erect hairs along outer edge. Promesonotal outline in lateral view anteriorly flatly convex to subangulate and

posteriorly elongated, with bluntly angulate posterior declivity. Metanotal groove narrow, not or shallowly impressed, with weak to superficial cross-ribs, interspaces smooth to superficially sculptured. Pronotum, mesonotum, and propodeum strongly punctate. Propodeal spines acute, short-spinose, in profile bladelike and pointing slightly anteriorly, shorter than distance between their bases (PSLI 15–20). Metafemur short (FI 91–96), metatibia with decumbent pilosity and scattered suberect hairs. Postpetiole without ventral process, lower than petiole (PpHI 80–86), and slightly higher than long (LPpI 83–95), petiole and postpetiole dorsally smooth to superficially punctate, remainder weakly punctate. Gaster smooth and shiny. Most standing hairs suberect, short to slightly longer, and stiff, with several hairs apically split or subapically branched. Color orange, legs lighter orange to yellow, gaster darker.

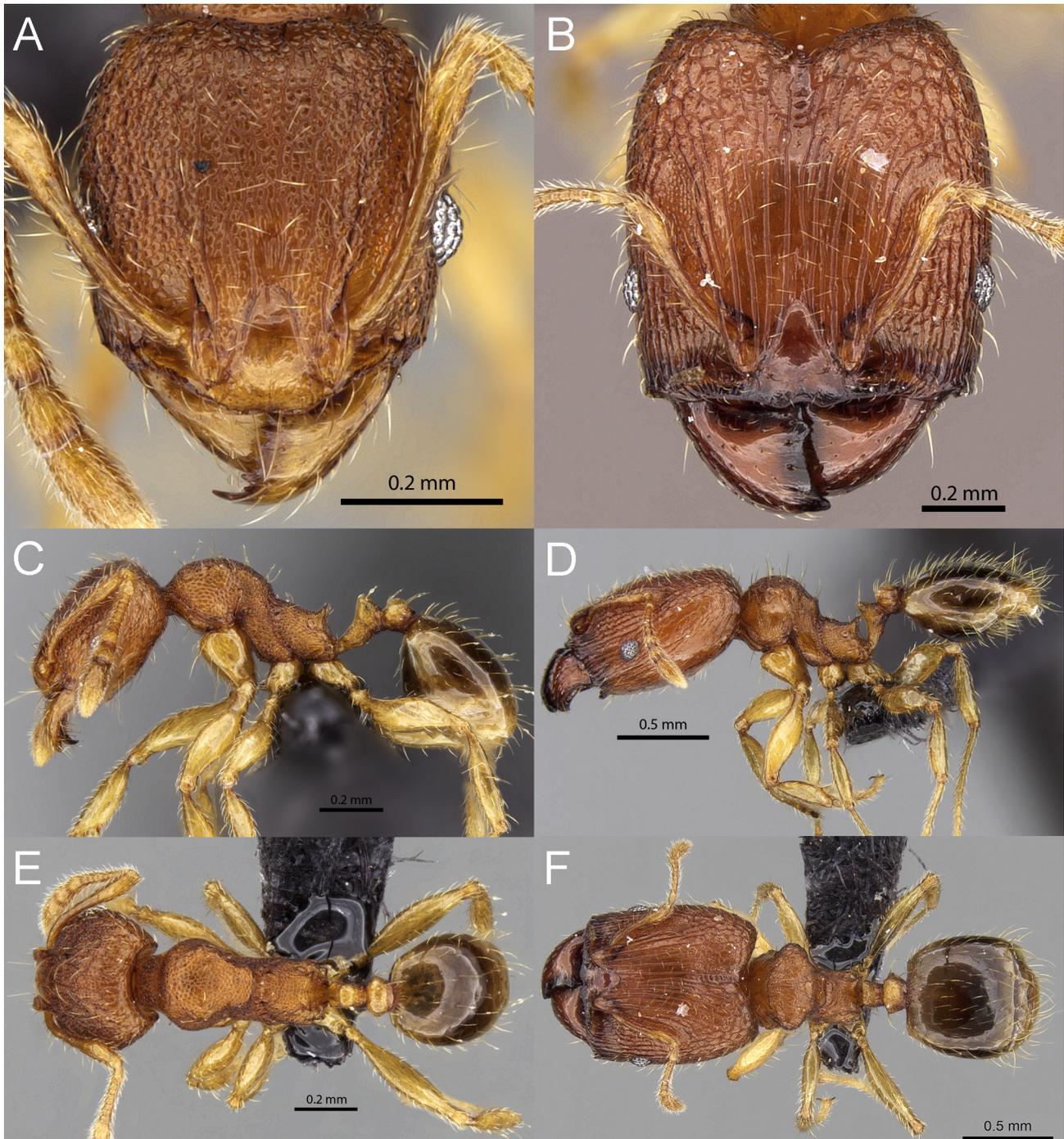


FIGURE 23 *Pheidole parva* Forel, full-face view (A), profile (B), and dorsal view (C) of minor worker (CASENT0160279) and full-face view (D), profile (E), and dorsal view (F) of major worker (CASENT0160280).

Discussion: *Pheidole parva* is a widespread and probably invasive species in parts of the Old World and

belongs to the *P. rinae* complex (Eguchi *et al.* 2007). Most likely it is an introduced species to the Malagasy region. Indeed, live ants of this species have recently been found travelling onboard different ships (K. Eguchi, personal communication). Also its ubiquity in many different habitats and microhabitats on Mauritius and the Seychelles and its presence in ports there indicate that it is well-adapted to human environments and thus a likely candidate to invade new areas through human commerce. This tiny and relatively inconspicuous ant is very common in places and can be found in soil and leaf litter, under stones or root mats, in rotten logs, foraging on or nesting in the ground, as well as in lower vegetation and even under the bark of live trees. It was collected in a variety of different habitats, from parks and gardens, to mangrove and coastal scrub, to degraded dry forest, littoral and mixed forest, and rainforest, in elevations between 1 and 445 m. Recently it was also found on the Arabian Peninsula in Saudi Arabia and in the United Arab Emirates, on farms mostly inland from the coast at elevations of 675 and 735 m. As the nests were also found under potted plants, it is very likely that *P. parva* has been introduced to the Arabian Peninsula by human commerce.

On the smaller islands of the Southwest Indian Ocean, *P. parva* can be superficially confused with *P. jonas*, especially because the minors are relatively similar in their morphologies. The main characters distinguishing both worker castes of these two species are: the relative length of the postpetiole in both castes (LPPi minors 83–95, LPPi majors 71–89 in *P. parva*, versus LPPi minors 122–163, LPPi majors 90–126 in *P. jonas*); the scapes of the workers of *P. parva* are distinctly shorter than those of *P. jonas* (SI 85–93 versus SI 102–122); and the heads of majors are distinctly longer than wide (CI 88–93) in *P. parva*, versus on average as long as wide (CI 95–102) in *P. jonas*.

Additional material examined: MAURITIUS: Brise Mt., Bambous, 20.3455 S, 57.7547 E, 200 m, rainforest, 27.v.2005 (*B.L. Fisher et al.*); Ilot Vacoas, 20.3833 S, 57.7667 E, 5 m, 02.iii.2005, (*L. Lach*); Port Louis – Port, 20.1553 S, 57.5 E, 5 m, 29.v.2005, (*A.V. Suarez*); **Ile aux Aigrettes:** 06.ii.2005, (*L. Lach*); 20.4197 S, 57.7342 E, 13 m, Ebony litter, 24.viii.2005, (*L. Lach*); 20.419 S, 57.7302 E, just north of Jetty at ocean's edge, near aviary / on kiln, 26.v.2005 (*A.V. Suarez*); 20.4188 S, 57.7305 E, 1 m, coastal scrub, 28.v.2005 (*B.L. Fisher et al.*); **Rodrigues:** Anse Quito, 19.7561 S, 63.3667 E, 21 m, 15.vi.2005, (*L. Lach*); Canyon Tyeul, 19.7444 S, 63.3751 E, 52 m, degraded dry forest, 14.xi.2007 (*A. Meunier*); Grand Montagne, 19.7057 S, 63.465 E, 358 m, 14.vii.2005, (*L. Lach*); Marouk, 19.731 S, 63.465 E, 122 m, 17.vii.2005, (*L. Lach*); **SAUDI ARABIA:** Dhi Ain archaeological village, Al Bahah, 19.928 S, 41.4419 E, 735 m, banana field next to dry stream, 23.ix.2011 (*B.L. Fisher*); Ar Riyad, 25.6088 S, 45.7583 E, 675 m, isolated date farm, 26.ix.2011 (*B.L. Fisher / F.A. Esteves*); **SEYCHELLES:** **Aride Island:** 4.21273 S, 55.6645 E, *P. grandis* forest 01.vii.2010 (*R. Gaigher*); 4.21096 S, 55.6624 E, 110 m, forest, 05.ii.2005 (*B.L. Fisher et al.*); 4.21407 S, 55.6682 E, 10 m, native forest, 05.ii.2005 (*B.L. Fisher et al.*); **Bird Island:** 01.x.2010 (*J. Gerlach*); **Conception Island:** 4.66311 S, 55.3682 E, 65 m, mixed forest, 12.ii.2010 (*B.L. Fisher et al.*); 4.66527 S, 55.3709 E, 20 m, mixed forest, 12.ii.2010 (*B.L. Fisher et al.*); **Cousine Island:** 4.3507 S, 55.6478 E, *P. grandis* forest 01.vii.2010 (*R. Gaigher*); 4.35009 S, 55.6468 E, 60 m, *Ficus* forest on rocks, 07.iii.2008 (*B.L. Fisher*); **Curieuse Island:** 4.28364 S, 55.7269 E, 5 m, coastal scrub / mangrove, 04.ii.2010 (*B.L. Fisher et al.*); **Félicité Island:** 4.31991 S, 55.8691 E, 75 m, coastal scrub, 01.ii.2010 (*B.L. Fisher et al.*); 4.32577 S, 55.8698 E, 120 m, forest, 01.ii.2010 (*B.L. Fisher et al.*); **La Digue Island:** 4.35613 S, 55.8433 E, 300 m, forest, 31.i.2010 (*B.L. Fisher et al.*); 4.34419 S, 55.8419 E, 25 m, coastal scrub, 31.i.2010 (*B.L. Fisher et al.*); Veuve Réserve, 4.35697 S, 55.8279 E, 15 m, littoral forest, 30.i.2010 / 02.ii.2010 (*B.L. Fisher et al.*); **Mahé Island:** Beau Vallon, 4.60928 S, 55.4325 E, 15 m, park/garden, 12.ii.2010 (*B.L. Fisher et al.*); Cascade, 4.67494 S, 55.4982 E, 150 m, roadside, 09.ii.2010 (*B.L. Fisher et al.*); Glacis la Réserve, 4.71023 S, 55.5043 E, 300 m, forest and glacis, 09.ii.2010 (*B.L. Fisher et al.*); Port Glaud, 4.65974 S, 55.4105 E, 10 m, park/garden, 12.ii.2010 (*B.L. Fisher et al.*); Port Launay, 4.65892 S, 55.4107 E, 10 m, mangrove, 11.ii.2010 (*B.L. Fisher et al.*); **North Island:** 30.vii.2000 (*J. Gerlach*); **Praslin Island:** 4.33374 S, 55.7224 E, 10 m, mangrove, 03.ii.2010 (*B.L. Fisher et al.*); Newcome, 4.301 S, 55.6926 E, 130 m, palm forest, 06.ii.2010 (*B.L. Fisher et al.*); Praslin Maxime, 4.34524 S, 55.7597 E, 40 m, park/garden, 02.ii.2010 (*B.L. Fisher et al.*); Praslin Tower, 4.34093 S, 55.7451 E, 370 m, mixed forest, 03.ii.2010 (*B.L. Fisher et al.*); Vallée de Mai, 4.33103 S, 55.7389 E, 200 m, palm forest, 02.ii.2010 (*B.L. Fisher et al.*); **Silhouette Island:** 4.49076 S, 55.2534 E, 20m, coastal scrub, 21.i.2010 (*B.L. Fisher et al.*); La Passe, 4.48484 S, 55.2507 E, 35 m, park/garden, 19.i.2010 / 23.i.2010 (*B.L. Fisher et al.*); on coastal path to Anse Mondon, 4.46951 S, 55.2416 E, 10 m, coastal scrub, 23.i.2010 (*B.L. Fisher et al.*); on path to Anse Mondon, 4.46893 S, 55.2294 E, 255 m, forest, 23.i.2010 (*B.L. Fisher et al.*); **UNITED ARAB EMIRATES:** Wadi Wurayah farm, 25.3833 S, 56.3167 E, 02.vi.2009 (*M. Hauser et al.*).

***Pheidole ragnax* sp. n.**

(Figs. 24A–F)

Holotype: (major worker), MAYOTTE, Reserve Forestière Sohoa, 12.8059 S, 45.1005 E, 20 m, coastal scrub, rainforest, collection code BLF18941, 29.xi.2007 (*B.L. Fisher et al.*) (CASC: CASENT0132467).

Paratypes: (5 minor workers) same data as holotype (CASC: CASENT0136788–CASENT0136791).

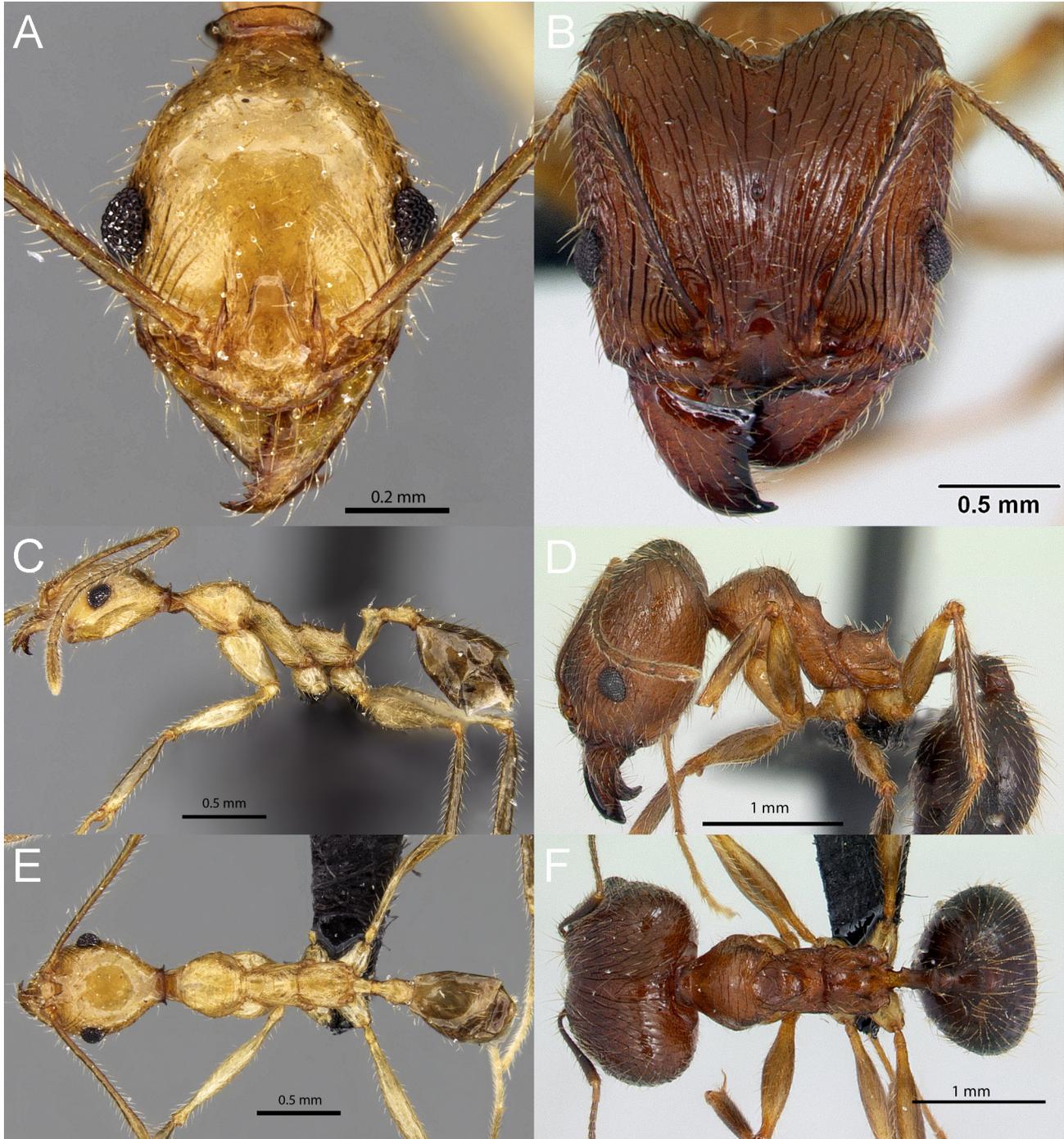


FIGURE 24 *Pheidole ragnax* sp. n., full-face view (A), profile (B), and dorsal view (C) of paratype minor worker (CASENT0132467) and full-face view (D), profile (E), and dorsal view (F) of holotype major worker (CASENT0136791).

Diagnosis: Comparatively large species (WL major 1.50–1.65 mm, WL minor 1.01–1.07 mm), minor workers with very long scapes and legs (SI 191–209, FI 209–226), major workers with long scapes and legs (SI 64–70, FI 96–108), promesonotal process well developed and in profile subangulate in both worker castes. **Major**

postpetiolar ventral process absent, head about as long as wide (CI 99), frontal carinae and antennal scrobe absent or inconspicuous, head posteriorly wider than anteriorly with slightly oblique sides, eyes relatively large (EI 14–17), metafemur long (FI 99), metanotal groove in profile broadly impressed, propodeum higher than long and sloped toward spines. **Minor** head shape elongated (CI 67–75) and with very prominent occipital carina, scapes and legs long (SI 170–209, FI 197–226), eyes large (EI 26–31), anterior half of face superficially punctate, grading to smooth and shiny posteriorly, mesosoma slender and elongated, metanotal groove usually impressed and spines subvertical in profile.

Description of major worker: Measurements (holotype): HW 1.59, HL 1.60, SL 1.12, MDL 0.94, EL 0.26, WL 1.50, PNH 0.63, PNW 0.74, MNH 1.00, PDH 0.47, PTL 0.54, PPL 0.28, PTH 0.29, PPH 0.25, PTW 0.21, PPW 0.56, PSL 0.19, MFL 1.58, MTL 1.19, CI 99, SI 70, MDI 59, EI 16, FI 99, PSLI 12, LPpI 112, DPpI 200, PpWI 267, PpLI 52, PpHI 86.

Head about as long as wide (CI 99), wider posteriorly than anteriorly with oblique sides. Mandibles long (MDI 59), smooth. Clypeus smooth, median carina absent, lateral carinae superficial. Frontal carinae and antennal scrobe absent. Entire face with interrupted longitudinal, posteriorly diverging rugae, rugae at sides of head and posterolateral lobes more irregular with weakly reticulate areas, interspaces weakly to superficially punctate. Scapes relatively long (SI 70), with decumbent to subdecumbent pilosity. Eyes well developed and relatively large (EI 16). Submedian hypostomal teeth and median process very small to inconspicuous. Promesonotum in profile high domed, convex, with a prominent angular posterior process dividing mesonotal declivity into two long, relatively steep slopes, humeri not produced laterally in dorsal view. Surface of promesonotum and lateropronotum superficially punctate with irregular transverse rugulae anteriorly and oblique longitudinal rugulae posteriorly on dorsum of mesonotum, rest of mesosoma weakly sculptured. Metanotal groove broadly impressed in profile, with inconspicuous cross-ribs. Dorsum of propodeum anterior of spines shorter than posterior declivity. Propodeal spines relatively long-spinose, almost as long as distance between their bases (PSI 12). Metatibia long (FI 99), pilosity abundant, coarse, and decumbent to subdecumbent. Dorsum of waist segments smooth to superficially punctate, remainder superficially punctate. Postpetiole in dorsal view very wide, about 2.7 times wider than petiole (PpWI 267), ventral process and lateral process absent. Gaster smooth, anteriorly superficially punctate. Standing hairs abundant, relatively stiff, yellowish, on head and mesosoma short, on postpetiole and gaster longer. Shorter pilosity subdecumbent and abundant. Color light reddish brown, with darker gaster.

Description of minor workers: Measurements (n=5): HW 0.53–0.58 (0.55), HL 0.75–0.80 (0.79), SL 1.05–1.13 (1.10), MDL 0.41–0.54 (0.45), EL 0.16–0.17 (0.16), WL 1.01–1.07 (1.05), PNH 0.28–0.31 (0.29), PNW 0.36–0.40 (0.38), MNH 0.54–0.66 (0.61), PDH 0.26–0.27 (0.26), PTL 0.31–0.35 (0.33), PPL 0.15–0.21 (0.19), PTH 0.15–0.16 (0.15), PPH 0.10–0.13 (0.11), PTW 0.09–0.10 (0.09), PPW 0.14–0.18 (0.16), PSL 0.07–0.09 (0.07), MFL 1.18–1.22 (1.20), MTL 0.93–0.97 (0.95), CI 67–72 (69), SI 191–209 (202), MDI 76–102 (82), EI 29–31 (30), FI 209–226 (219), PSLI 13–15 (14), LPpI 150–183 (167), DPpI 76–94 (85), PpWI 156–178 (171), PpLI 48–68 (57), PpHI 67–80 (73).

Head shape elongate ovoid, almost 1.5 times longer than wide (CI 67–72), sides convex and posteriorly converging toward constricted posterior head margin, with occipital carina conspicuously raised to flange-like collar. Mandibles long (MDI 76–80), smooth. Clypeus smooth, median and lateral carinae absent. Face smooth, except for superficial punctures and malar carinae reaching toward posterior eye level. Scapes twice as long as head width (SI 191–209), pilosity subdecumbent to suberect. Eyes large (EI 29–31). Pronotum in profile flatly convex, posterior promesonotal process well developed, prominently produced, and subangulate. Metanotal groove barely to broadly and deeply impressed, with superficial to inconspicuous cross-ribs. Propodeum in profile longer than high, declining smoothly toward spines. Propodeal spines acute, moderately short-spinose, almost vertical, and somewhat shorter than distance between their bases (PSLI 13–15). Promesonotum almost completely smooth, at most with superficial sculpture on mesopleuron and propodeum. Metafemur long (FI 209–226), metatibia with subdecumbent to suberect pilosity. Postpetiole in profile without ventral process, on average 1.7 times longer than high (LPpI 150–183), and significantly lower than petiole (PpHI 67–80). Petiole and postpetiole dorsum smooth, remainder at most superficially sculptured. Gaster smooth and shiny. Standing hairs erect to suberect, short, stiff, and blunt, scarce on mesosoma, shorter pilosity absent. Color light yellow, with gaster and tibiae darker.

Discussion: *Pheidole ragnax* seems closely related to *P. bessonii* Forel from Madagascar, as the two share important key characters such as the occipital collar and the elongated shapes of the head, mesonotum, scapes, legs, and postpetiole in minor workers, and the acute lateral postpetiolar process and face with obliquely longitudinal

rugae in major workers. All six specimens of this species were collected from a single rotten log in coastal scrub rainforest on Mayotte, which is less than 350 km north and east of the coast of Madagascar. Such proximity suggests that *P. ragnax* could represent a mere geographic variation of *P. bessonii*. Nevertheless, the *P. ragnax* specimens can be clearly separated from the type material of *P. bessonii* by the more elongated head shape (CI 67–72 versus CI 76), scapes (SI 191–209 versus SI 176), and legs (FI 209–226 versus FI 198) in the minor workers. The holotype major worker of *P. ragnax* differs from that of *P. bessonii* in the oblique versus convex head sides, as well as longer scapes (SI 70 versus SI 59), mandibles (MDI 59 versus MDI 49), legs (FI 99 versus FI 86), and larger eyes (EI 16 versus EI 12). However, until more material of *P. ragnax* is collected and the whole group is revised, there will not be a definite answer to whether *P. ragnax* is a synonym of *P. bessonii* or a distinct biological species.

Etymology: The name of this species is an arbitrary combination of letters.

***Pheidole teneriffana* Forel**

(Figs. 25A–F)

Pheidole teneriffana Forel, 1893: 465. Lectotype (1 major worker, CASENT0906530) [designated here]: SPAIN (CANARY IS) (MHNG) [examined]; paralectotypes (3 minor workers, CASENT0319247): same data as lectotype (MHNG) [examined]. Also described as new by Forel, 1894a: 160. Description of queen: Santschi, 1908: 521; description of male: Gómez & Espadaler, 2006: 229.

Pheidole voeltzkowii Forel, 1894c: 227. Syntypes (4 major workers, 3 minor workers, 1 male): MADAGASCAR, Majanga, W. Madagascar (*Voeltzkow*) (MHNG) [examined]. Description of queen: Forel, 1897c: 207. **Syn. n.**

Pheidole teneriffana subsp. *taina* Aguayo, 1932: 219. Syntypes (5 major workers): CUBA [not examined]. Junior synonym of *Pheidole teneriffana*: Wilson, 2003: 640. See also: Baroni Urbani, 1968: 438; Snelling, R.R. 1992: 121.

Diagnosis: Moderately small species (WL major 1.18–1.44 mm, WL minor 0.79–0.97 mm), minor workers with relatively long scapes and legs (SI minor 120–149, FI minor 134–170) and major workers with moderately long legs (FI major 73–89), both with a well-developed promesonotal process. **Major** with frontal carinae and antennal scrobe reaching posterior quarter of head, face with longitudinal rugae often very oblique posteriorly, curved toward posterolateral lobes, eyes moderately large (EI 13–16), submedian hypostomal teeth small, median process reduced and often very shallow, promesonotal process prominent and well developed, in profile metanotal groove shallow and dorsal propodeum usually level, postpetiole in dorsal view trapezoidal, often with rounded lateral corners, but sometimes with acute lateral dents, postpetiole between 1.9 and 2.5 times wider than petiole, postpetiolar ventral process reduced and very shallow. **Minor** head oval, posteriorly rounded, scapes and legs relatively long (SI 120–149, FI 134–170), with decumbent to subdecumbent pilosity, eyes relatively large (EI 25–30), metanotal groove not or barely impressed in profile.

Description of major workers: Measurements (n=14): HW 1.22–1.67 (1.47), HL 1.31–1.71 (1.51), SL 0.73–0.84 (0.80), MDL 0.70–0.91 (0.82), EL 0.20–0.23 (0.22), WL 1.18–1.44 (1.28), PNH 0.43–0.66 (0.55), PNW 0.61–0.80 (0.70), MNH 0.76–0.99 (0.86), PDH 0.39–0.56 (0.45), PTL 0.36–0.45 (0.42), PPL 0.20–0.28 (0.25), PTH 0.24–0.30 (0.26), PPH 0.22–0.26 (0.24), PTW 0.16–0.22 (0.20), PPW 0.35–0.48 (0.42), PSL 0.17–0.24 (0.20), MFL 1.08–1.28 (1.18), MTL 0.66–0.95 (0.87), CI 93–101 (98), SI 49–62 (55), MDI 52–60 (56), EI 13–17 (15), FI 73–89 (80), PSLI 11–16 (14), LPpI 87–123 (104), DPpI 146–235 (172), PpWI 190–247 (213), PpLI 51–67 (59), PpHI 83–108 (90).

Head usually slightly longer than wide (CI 93–101), sides convex to strongly convex. Mandibles smooth and relatively long (MDI 52–60). Clypeus smooth, median carina inconspicuous or absent, usually two pairs of lateral carinae present. Frontal carinae well developed and reaching 3/4 of the way to posterior head margin, antennal scrobe conspicuous and weakly to superficially punctate. Frons longitudinally rugose, sides of head rugoreticulate, rugulae on posterolateral lobes variable, from straight longitudinal or longitudinal with scarce, short, reticulate rugulae in between, to obliquely curved toward posterolateral lobes, to transversal, interspaces smooth to superficially punctate; posterior head margin in dorsal view usually smooth to superficially sculptured. Scape moderately long (SI 49–62) with decumbent to subdecumbent pilosity and usually three erect longer hairs on outer edge. Eyes relatively large (EI 13–17). Submedian hypostomal teeth small to medium-sized, median process small to inconspicuous. Promesonotum in profile high-domed, convex, promesonotal process prominently produced, with deeply concave to angulate transverse groove, set almost at a right angle toward posterior declivity. Dorsum of

promesonotum transversely rugulose, lateropronotum weakly rugulose to largely smooth, sides of mesonotum and propodeum densely punctate. Metanotal groove impressed to very shallow in profile, cross-ribs reduced to inconspicuous. Dorsum of propodeum weakly to superficially sculptured, in profile usually straight, not sloped toward spines, and about as long as posterior declivity. Propodeal spines acute, moderately short, slightly shorter than distance between their bases (PSI 11–16). Metatibia moderately long (FI 73–89), pilosity on inner edge decumbent, on outer edge subdecumbent. Postpetiole on average 1.7 times wider than long (DPpI 146–235) and 2.1 times wider than petiole (PpWI 190–247), sides in dorsal view roundly convex, or subangulate or with small denticle laterally, ventral process very small or inconspicuous. Dorsum of waist segments partly smooth, partly superficially punctate, remainder punctate. Gaster smooth to micropunctate. Standing hairs on mesosoma moderately scarce, yellowish, of short to moderate length, acute, with more abundant shorter decumbent pilosity. Color light to darker reddish brown, with dark brown to blackish gaster.

Description of minor workers: Measurements (n=16): HW 0.50–0.65 (0.58), HL 0.60–0.74 (0.68), SL 0.64–0.81 (0.74), MDL 0.35–0.46 (0.42), EL 0.14–0.17 (0.16), WL 0.79–0.97 (0.88), PNH 0.27–0.33 (0.30), PNW 0.31–0.42 (0.38), MNH 0.50–0.62 (0.58), PDH 0.25–0.31 (0.28), PTL 0.23–0.29 (0.26), PPL 0.15–0.18 (0.16), PTH 0.15–0.18 (0.16), PPH 0.13–0.16 (0.15), PTW 0.10–0.12 (0.11), PPW 0.19–0.26 (0.22), PSL 0.08–0.10 (0.09), MFL 0.71–0.95 (0.85), MTL 0.53–0.75 (0.66), CI 72–88 (85), SI 120–149 (129), MDI 66–83 (72), EI 25–30 (28), FI 134–170 (147), PSLI 14–19 (16), LPpI 100–124 (112), DPpI 112–160 (133), PpWI 177–236 (199), PpLI 58–70 (63), PpHI 81–100 (94).

Head shape oval, distinctly longer than wide (CI 72–88), sides strongly convex, posterior head margin rounded and occipital carina conspicuous in full-face view. Mandibles moderately long (MDI 66–83), weakly longitudinally rugulose. Clypeus smooth, sometimes with short median and lateral carinae present. Face smooth, except for concentric rugulae around antennal insertion and usually two malar carinae reaching posterior eye level. Scapes distinctly longer than head (SI 120–149), with decumbent to subdecumbent pilosity and longer suberect hairs along outer edge. Pronotum in profile flatly convex, posterior promesonotal process well developed, angulate, and prominently produced. Metanotal groove not or barely impressed, with weak to inconspicuous cross-ribs. Propodeum in profile about as long as high or slightly longer with highest point immediately behind metanotal groove, declining smoothly toward spines. Propodeal spines short-triangular and acute, much shorter than distance between their bases (PSLI 14–19). Promesonotum largely smooth, except for superficial punctures anteriorly near the neck, remainder of mesosoma punctate to weakly punctate, often with scattered superficially sculptured to smooth areas. Metafemur relatively long (FI 134–170), metatibia pilosity mostly decumbent with longer suberect hairs along outer edge. Postpetiole in profile without ventral process, on average 1.1 times longer than high (LPpI 100–124), and on average 2 times wider and significantly shorter than petiole (PpWI 177–236, PpLI 58–70). Dorsum of petiole and postpetiole mostly smooth, rest weakly to superficially punctate. Gaster smooth and shiny. Standing hairs moderately scarce, short to moderately long, thin, and acute, suberect, some hairs subapically branched. Short decumbent to subdecumbent pilosity comparatively scarce. Color reddish to darker brown, with significantly darker head and gaster.

Discussion: *Pheidole teneriffana* is an invasive species with collection records scattered over several continents and islands across the globe. Described from the Canary Islands and found widely distributed throughout the greater Mediterranean region, its native range and origin are unknown (Wilson 2003, Wetterer 2011). Probably introduced to the Malagasy region, it was described from Madagascar as *P. voeltzkowii* Forel, only one year after the publication of the senior synonym. Morphologically, *P. teneriffana* can be grouped together with, and is possibly related to, *P. fervens* Smith, F., *P. indica* Mayr, *P. oceanica* Mayr, and *P. sinaitica* Mayr. In the New World, *Pheidole teneriffana* has been introduced to California (Martinez 1992, Snelling 1992), Cuba, Peru (Wilson 2003), and the West Indian islands (Wetterer 2011). It seems to be common in dry habitats (Wetterer 2011), especially along coasts and in urban areas (Collingwood *et al.* 1997, Gómez & Espalader 2006), and has been described as aggressive toward other ant species, locally abundant, and spreading in urban areas (Collingwood 1985, Gómez & Espalader 2006). In the Malagasy region *P. teneriffana* was collected on the Comoros, Mauritius, the Seychelles, and from coastal towns in Madagascar, usually from under stones, ground nests, or foraging on the ground or lower vegetation in urban or garden habitats at elevations between 2 and 296 m, on Mayotte in native littoral and secondary forest (7 m elevation). Recently in Saudi Arabia it was collected from soil, under stones, and foraging on the ground on a few farms at elevations between 570 and 1620 m.

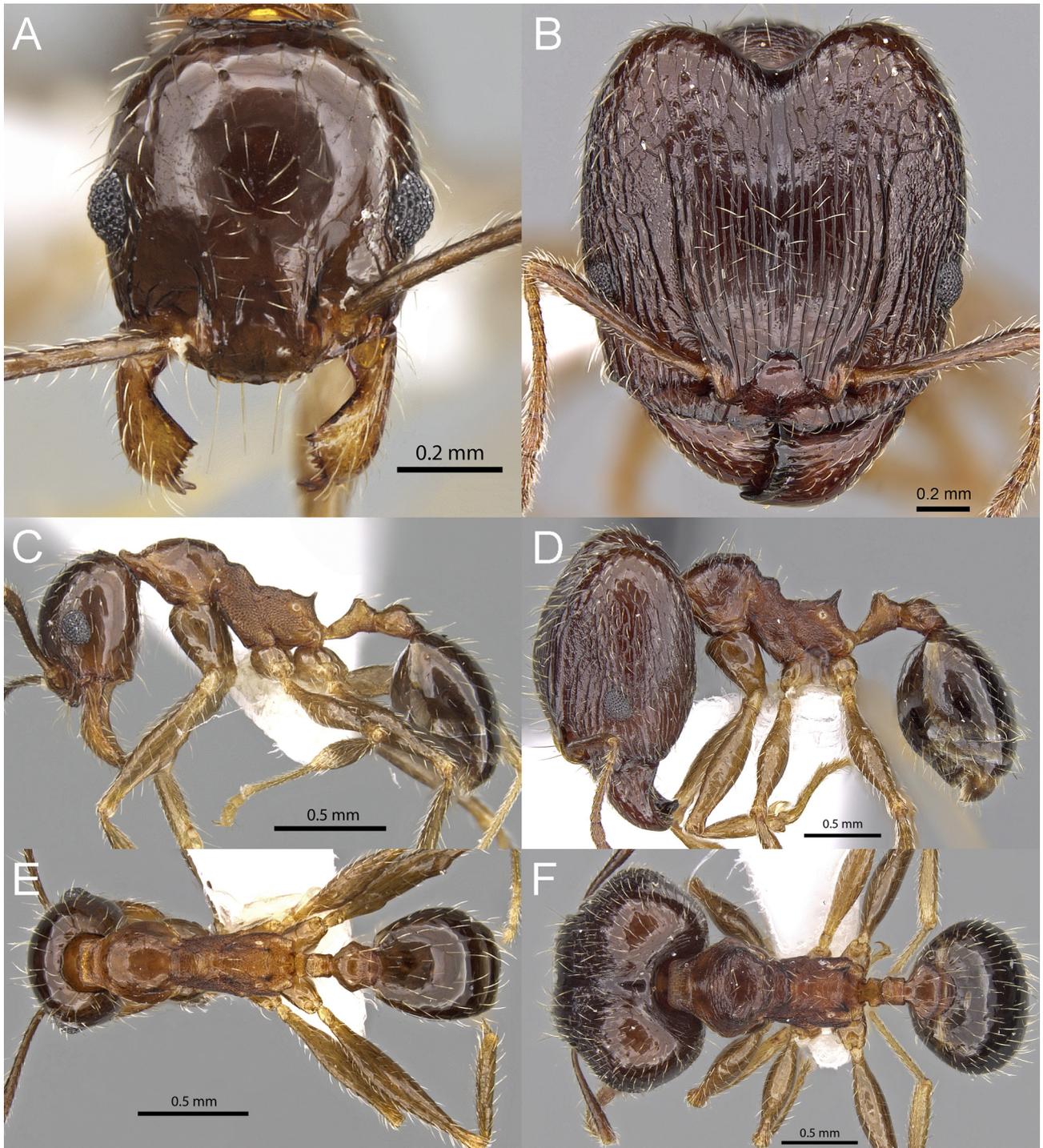


FIGURE 25 *Pheidole teneriffana* Forel, full-face view (A), profile (B), and dorsal view (C) of minor worker (CASENT0280996) and full-face view (D), profile (E), and dorsal view (F) of major worker (CASENT0189743).

Additional material examined: **COMOROS: Anjouan:** 12.1877 S, 44.3593 E, 65 m, coastal roadside, 26.i.2009 (*B.L. Fisher et al.*); **Grande Comore:** Moroni, S 11.23172, 5 m, suburban area, 06.xii.1994 (*Roger*); **MADAGASCAR: Antananarivo:** Ankazobe, 18.3162 S, 47.1158 E, 1241 m, urban/garden, 09.ii.2007 (*B.L. Fisher et al.*); **Majunga:** Ambondromamy, 16.4375 S, 47.1575 E, 64 m, urban/garden, 07.ii.2007 (*B.L. Fisher et al.*); Maevatanana, 16.9482 S, 46.8277 E, 56 m, urban/garden, 07.ii.2007 (*B.L. Fisher et al.*); Majunga, 15.7178 S, 46.317 E, 5 m, urban/garden, 08.ii.2007 (*B.L. Fisher et al.*); Mampikony, 16.0932 S, 47.6428 E, 49 m, urban/garden, 20.iii.2007 (*B.L. Fisher et al.*); Port Berger, 15.5683 S, 47.6193 E, 61 m, urban/garden, 21.iii.2007 (*B.L. Fisher et al.*); **Toamasina:** Toamasina-Ville, 18.1552 S, 49.4095 E, 10 m, urban garden, 31.vii.2006 (*B. Blaimer*;

F.N. Raharimalala); **Toliara**: Amboasary, 25.0388 S, 46.3835 E, 25 m, urban/garden, 09.xii.2006 (*B.L. Fisher et al.*); Morondava, 20.2965 S, 44.2815 E, 7 m, urban/garden, 03.ii.2007 (*B.L. Fisher et al.*); **MAURITIUS: Round Island**: 19.8568 S, 57.7873 E, 82 m, 17.viii.2004 (*R. Bone*); 19.8471 S, 57.789 E, 296 m, 23.ii.2005 (*L. Lach*); 22.ii.2005 (*L. Lach*); 24.ii.2005 (*L. Lach*); **Serpents Island**: (N. Cole); **MAYOTTE**: Combani, 12.8107 S, 45.2793 E, 7 m, native littoral and secondary vegetation, 15.i.2010 (*G. Paulus*); **SAUDI ARABIA**: Al Bahah, Shada Mountain, 19.8388 S, 41.3118E, 1620 m, irrigated patch of coffee trees in village garden, 22.ix.2011 (*F.A. Esteves*); Ar Riyad, 25.6088 S, 45.7583 E, 675 m, isolated date farm, 26.ix.2011 (*B.L. Fisher*); Ar Riyad, Dirab Research Station, 24.4208 S, 46.6534 E, 570 m, irrigated date and olive trees, 28.ix.2011 (*B.L. Fisher*); **SEYCHELLES: Aldabra Island**: Picard, old settlement, 9.39606 S, 46.2047 E, 2 m, coastal scrub, 04.iii.2008 (*B.L. Fisher*); **UNITED ARAB EMIRATES**: al-Ajban, 24.36 S, 55.01 E, 03.i.2007 (*A. van Harten*); Jebel Jibir, 25.6503 S, 56.1231 E, 06.iii.2011 (*A. van Harten*); near Mahafiz, 25.09 S, 55.48 E, 24.iii.2007 (*A. van Harten*); Sharjah-Khor Kalba, wadi near tunnel, 01.xi.2011 (*A. van Harten*); 15 km ESE of Sharjah, 25.21 S, 55.24 E, 28.ii.2011 (*A. van Harten*); Wadi Madaq, 25.18 S, 56.07 E, 15.x.2011 (*A. van Harten*); Wadi Shawkah, 25.06 S, 56.01 E, 01.xi.2011 (*A. van Harten*).

***Pheidole vulcan* sp. n.**

(Figs. 26A–F)

Holotype: (major worker), COMOROS, Grande Comore, Karthala, 11.8134 S, 43.4194 E, 1125 m, montane rainforest, sifted leaf litter, collection code BLF19700, 13.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT0137234).

Paratypes: (4 major & 10 minor workers) same data as holotype (CASC: CASENT0137211, CASENT0137219, CASENT0137224, CASENT0137225, CASENT0137228, CASENT0137234, CASENT0137236, CASENT0137243, CASENT0137249, CASENT0137251, CASENT0137258–CASENT0137260, CASENT0137270); (3 major & 10 minor workers) Grande Comore, Karthala, 11.8134 S, 43.4194 E, 1125 m, montane rainforest, ex rotten log, collection codes BLF19701, BLF19704, BLF19705, BLF19706, BLF19711, BLF19712, BLF19721, 13.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT013531, CASENT0136729, CASENT0136735, CASENT0136741, CASENT0136742, CASENT0136750, CASENT0136753–CASENT0136755; MCZC: CASENT0136740); (1 minor worker) Grande Comore, Karthala, 11.8134 S, 43.4194 E, 1125 m, montane rainforest, on low vegetation, collection code BLF19727, 13.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT0136746); (1 minor worker) Grande Comore, Karthala, 11.8134 S, 43.4194 E, 1125 m, montane rainforest, under moss, above ground, collection code BLF19730, 13.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT0136738, CASENT0136746); (9 major & 8 minor workers) Grande Comore, Karthala, 11.827 S, 43.4295 E, 1000 m, montane rainforest, sifted leaf litter, collection code BLF19734, 14.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT0137193–CASENT0137205, CASENT0137206, CASENT0137278, CASENT0137279, CASENT0137291, CASENT0137293, CASENT0137431, CASENT0137442, CASENT0137443, CASENT0137512, CASENT0137515, CASENT0137527, CASENT0137528, CASENT0137592, CASENT0137593); (1 major & 1 minor worker) Grande Comore, Karthala, 11.827 S, 43.4295 E, 1000 m, montane rainforest, ex rotten log, collection code BLF19735, 14.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT0135110); (1 major & 1 minor workers) Grande Comore, Karthala, 11.827 S, 43.4295 E, 1000 m, montane rainforest, under tree bark, live tree, collection code BLF19740, 14.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT0135229); (1 minor worker) Grande Comore, Karthala, 11.827 S, 43.4295 E, 1000 m, montane rainforest, on low vegetation, collection code BLF19753, 14.iii.2008 (*B.L. Fisher et al.*) (CASC: CASENT0135237).

Diagnosis: Relatively small species (WL major 0.94–1.04 mm, WL minor 0.59–0.73 mm) with relatively short scapes (SI major 46–52, SI minor 96–106) and legs (FI major 58–68, FI minor 104–108) and very abundant standing hairs on mesosoma. **Major** head posterior half rugoreticulate, submedian hypostomal teeth large, median process absent, promesonotal process barely defined, in profile very high with steep posterior declivity and almost inconspicuous transverse groove, spines relatively long, almost as long as distance between their bases (PSLI 14–17), postpetiole on average higher than long (LPpI 83–95), without ventral process, but with large lateral process present and about 2.7 times wider than petiole (PpWI 255–276). **Minor** worker head subrectangular and strongly punctate, clypeus posteriorly usually punctate and with irregular oblique carinae medially, mesosoma mostly strongly punctate with irregular transverse rugulae on pronotal dorsum, spines short-spinose (PSLI 11–16), postpetiole on average almost 1.2 times longer than high (LPpI 114–120).

Description of major workers: Measurements (holotype): HW 1.22, HL 1.23, SL 0.62, MDL 0.59, EL 0.14, WL 0.97, PNH 0.47, PNW 0.56, MNH 0.69, PDH 0.36, PTL 0.41, PPL 0.19, PTH 0.25, PPH 0.21, PTW 0.17, PPW 0.45, PSL 0.18, MFL 0.78, MTL 0.55, CI 99, SI 51, MDI 48, EI 11, FI 64, PSLI 15, LPpI 90, DPpI 234, PpWI 262, PpLI 46, PpHI 84.

Measurements (n=5): HW 1.15–1.36 (1.26), HL 1.19–1.39 (1.29), SL 0.59–0.62 (0.61), MDL 0.62–0.65 (0.63), EL 0.13–0.15 (0.14), WL 0.94–1.04 (0.99), PNH 0.47–0.50 (0.49), PNW 0.56–0.62 (0.59), MNH 0.71–0.76 (0.73), PDH 0.33–0.37 (0.35), PTL 0.36–0.44 (0.39), PPL 0.18–0.21 (0.20), PTH 0.23–0.27 (0.25), PPH 0.20–0.24 (0.22), PTW 0.15–0.18 (0.17), PPW 0.37–0.48 (0.45), PSL 0.17–0.20 (0.19), MFL 0.75–0.80 (0.78), MTL 0.50–0.61 (0.58), CI 95–99 (97), SI 46–52 (48), MDI 46–54 (50), EI 10–12 (11), FI 58–68 (62), PSLI 14–17 (15), LPpI 83–95 (89), DPpI 206–235 (225), PpWI 255–276 (267), PpLI 45–56 (51), PpHI 85–96 (90).

Head almost as wide as long (CI 95–99), with weakly convex sides and relatively deep posterior emargination. Mandibles relatively short (MDI 46–54), smooth and shiny, with few weak rugulae near the lateral base. Clypeus smooth, posteromedially with several faint rugulae, continuous with some rugae from frons, usually with two pairs of lateral carinae. Frontal carinae weakly developed, not surpassing anterior third of head, antennal scrobe absent. Frons longitudinally rugose, interspaces superficially punctate. Sides of head longitudinally rugulose and punctate to weakly punctate. Posterolateral lobes irregularly rugoreticulate, with anteriorly weakly to posteriorly superficially punctate interspaces. Scapes relatively short (SI 46–52) with mostly decumbent pilosity and few long erect to suberect standing hairs on outer edge. Submedian hypostomal teeth large and prominent, easily visible in profile view, median process absent. Promesonotal dome high and convex, wide in dorsal view with humeri slightly produced laterally, promesonotal process weakly defined, in profile very high, with almost inconspicuous to shallowly concave transverse groove and strongly defined angle toward steep posterior declivity. Dorsal surface of promesonotum transversely rugulose and weakly to superficially punctate, on highest point partly smooth, lateropronotum similarly sculptured with weak punctures medially, katapisternum superficially punctate to almost entirely smooth and shiny, remainder of mesosoma punctate to weakly punctate. Metanotal groove in profile not impressed, cross-ribs usually short and weakly developed, interspaces superficially sculptured. Spines relatively long-spinose (PSLI 14–17), acute, but shorter than distance between their bases. Metafemur short (FI 58–68), metatibia pilosity mostly decumbent, on outer edge with some subdecumbent to suberect hairs. Petiole in dorsal view very often anteriorly widened with short wing-like lateral processes, postpetiole in profile higher than long (LPpI 83–95), ventral process absent or very shallow, in dorsal view with relatively long lateral processes, at least 2.5 times wider than petiole node (PpWI 255–276). Petiole and postpetiole dorsally superficially punctate, remainder punctate. First gastral tergite smooth and shiny, anteriorly micropunctate. Standing hairs acute, relatively thin, of varying length, and very abundant, on head also with slightly shorter subdecumbent pilosity. Body color orange to light reddish brown, first gastral tergite often lighter colored, other tergites darker, legs dark yellow or orange.

Description of minor workers: Measurements (n= 5): HW 0.46–0.56 (0.53), HL 0.50–0.61 (0.57), SL 0.48–0.57 (0.54), MDL 0.29–0.35 (0.32), EL 0.10–0.11 (0.11), WL 0.59–0.73 (0.67), PNH 0.22–0.27 (0.24), MNH 0.40–0.50 (0.47), PDH 0.20–0.25 (0.22), PTL 0.21–0.26 (0.24), PPL 0.11–0.14 (0.13), PTH 0.12–0.14 (0.13), PPH 0.10–0.12 (0.11), MFL 0.48–0.60 (0.56), MTL 0.38–0.46 (0.43), PNW 0.30–0.37 (0.34), PTW 0.07–0.09 (0.08), PPW 0.11–0.14 (0.13), PSL 0.06–0.09 (0.07), CI 92–93 (93), SI 96–106 (102), MDI 54–63 (60), EI 18–21 (20), FI 104–108 (106), PSLI 11–16 (14), LPpI 77–86 (81), DPpI 114–120 (117), PpWI 133–169 (153), PpLI 48–54 (52), PpHI 77–86 (81).

Head subrectangular, slightly longer than wide (CI 92–93), sides weakly convex, posterior head margin medially weakly concave, occipital carina not visible in full-face view. Mandibles relatively short (MDI 54–63), smooth. Clypeus posteriorly weakly punctate to punctate, often irregularly and obliquely carinate. Face strongly punctate. Scapes short (SI 96–106), surpassing posterior head margin when laid back by length of ninth funicular segment, with subdecumbent to suberect pilosity and longer suberect to erect hairs along outer edge. Promesonotal outline in profile flatly convex, distinctly elongated, posterior process inconspicuous, bluntly angulate toward high, oblique declivity. Metanotal groove in profile narrow, weakly impressed, with short superficial cross-ribs, interspaces smooth to superficially sculptured. Mesosoma strongly punctate, with the exception of a smooth to superficially sculptured spot on katapisternum, pronotum in addition with strongly to weakly developed, very irregular, transverse rugulae. Propodeal spines acute, short-spinose, distinctly shorter than distance between their bases (PSLI 11–16). Metafemur short (FI 104–108), metatibia with decumbent to suberect pilosity and some longer

suberect hairs along outer edge. Postpetiole longer than high (LPpI 114–120), about as long as wide (DPpI 114–120), and lower than petiole (PpHI 77–86), both segments dorsally smooth to superficially punctate, remainder weakly punctate. Gaster smooth and shiny. Standing hairs very thin and abundant, mostly moderately long, on mesosoma bending medially in oblique dorsal view. Color yellow-orange.

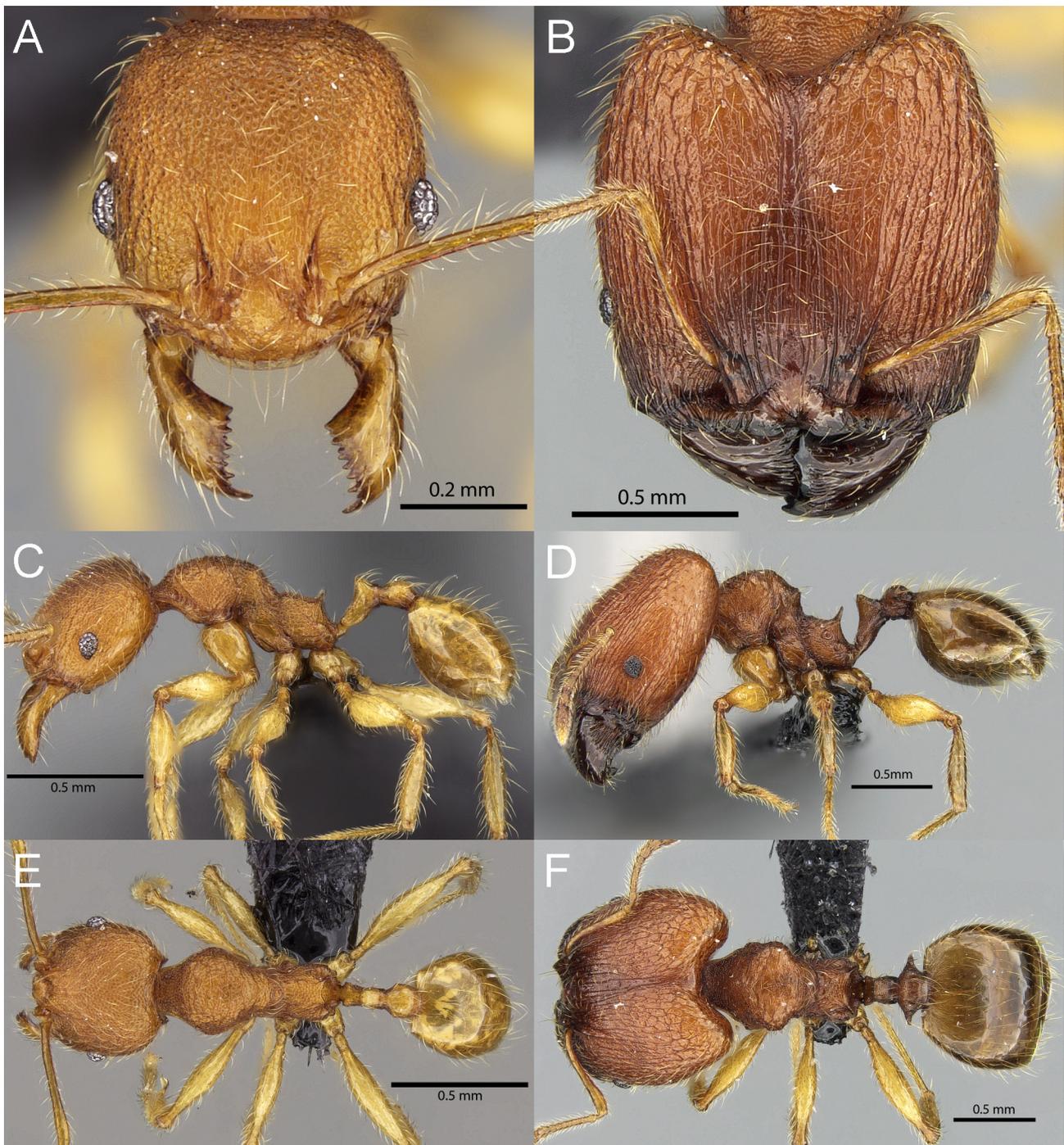


FIGURE 26 *Pheidole vulcan* sp. n., full-face view (A), profile (B), and dorsal view (C) of paratype minor worker (CASENT0137429) and full-face view (D), profile (E), and dorsal view (F) of holotype major worker (CASENT0137234).

Discussion: *Pheidole vulcan* is known only from the slopes of the two volcanoes Mt. Karthala and La Grille, at elevations between 995 and 1125 m on Grande Comore and thus is possibly an endemic species of the island. The species has been found in rotten logs, sifted leaf litter, under tree bark and on the lower vegetation in montane rainforest. In its morphology this species is closely related to *P. jonas* and has been collected in sympatry. While all specimens of *P. vulcan* are orange in color, the specimens of *P. jonas* from Mt. Karthala are all dark. More

important characters for separating the minor workers of the two species are the shape of the promesonotum in profile, which is less strongly angulate in *P. jonas*; the amount of sculpture on the clypeus, which is smooth in *P. jonas* versus posteriorly punctate in *P. vulcan*; and the significantly more abundant and flexuous standing hairs in *P. vulcan* in both worker castes. In addition, the postpetiole of *P. jonas* is relatively longer compared to its height (PpHI 122–163 versus PpHI 114–120) and the height of the petiole (PpLI 52–74 versus PpLI 48–54) than in *P. vulcan*. The minors of *P. vulcan* are also similar to those of *P. loki*; the diagnostic differences are listed under the latter species. The major workers of *P. vulcan* differ from those of *P. jonas* by the combination of a high promesonotal process and inconspicuous to weakly concave transverse groove in the first versus a lower process with concave groove in the latter, longer spines (PSLI 14–17 versus PSLI 10–14 in *P. jonas*) and the postpetiole higher than long (LPpI 83–95) versus usually longer than high (LPpI 90–126).

Etymology: This new species is named after ‘Vulcan’ the Roman god of fire – and volcanoes – counterpart of the Greek god ‘Hephaestus’ who also was a master craftsman. The name is a noun in apposition and thus invariable.

Additional material examined: COMOROS: Grande Comore: Grillé, 11.4758 S, 43.3467 E, 995 m, montane rainforest, 15.iii.2008 (*B.L. Fisher et al.*).

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