

Ants of the *Monomorium monomorium* species group (Hymenoptera: Formicidae) in the Arabian Peninsula with description of a new species from southwestern Saudi Arabia (#21043)

1

First revision

Editor guidance

Please submit by **28 Dec 2017** for the benefit of the authors (and your \$200 publishing discount).



Structure and Criteria

Please read the 'Structure and Criteria' page for general guidance.



Custom checks

Make sure you include the custom checks shown below, in your review.



Author notes

Have you read the author notes on the [guidance page](#)?



Raw data check

Review the raw data. Download from the [materials page](#).



Image check

Check that figures and images have not been inappropriately manipulated.

Privacy reminder: If uploading an annotated PDF, remove identifiable information to remain anonymous.

Files

Download and review all files from the [materials page](#).

1 Tracked changes manuscript(s)

1 Rebuttal letter(s)

11 Figure file(s)

1 Table file(s)

! Custom checks

New species checks



Have you checked our [new species policies](#)?



Do you agree that it is a new species?



Is it correctly described e.g. meets ICZN standard?



Structure your review

The review form is divided into 5 sections.

Please consider these when composing your review:

1. BASIC REPORTING

2. EXPERIMENTAL DESIGN

3. VALIDITY OF THE FINDINGS

4. General comments

5. Confidential notes to the editor

 You can also annotate this PDF and upload it as part of your review

When ready [submit online](#).

Editorial Criteria

Use these criteria points to structure your review. The full detailed editorial criteria is on your [guidance page](#).

BASIC REPORTING

-  Clear, unambiguous, professional English language used throughout.
-  Intro & background to show context. Literature well referenced & relevant.
-  Structure conforms to [PeerJ standards](#), discipline norm, or improved for clarity.
-  Figures are relevant, high quality, well labelled & described.
-  Raw data supplied (see [PeerJ policy](#)).

EXPERIMENTAL DESIGN

-  Original primary research within [Scope of the journal](#).
-  Research question well defined, relevant & meaningful. It is stated how the research fills an identified knowledge gap.
-  Rigorous investigation performed to a high technical & ethical standard.
-  Methods described with sufficient detail & information to replicate.

VALIDITY OF THE FINDINGS

-  Impact and novelty not assessed. Negative/inconclusive results accepted. *Meaningful* replication encouraged where rationale & benefit to literature is clearly stated.
-  Data is robust, statistically sound, & controlled.
-  Conclusions are well stated, linked to original research question & limited to supporting results.
-  Speculation is welcome, but should be identified as such.

Standout reviewing tips

3



The best reviewers use these techniques

Tip

Support criticisms with evidence from the text or from other sources

Example

Smith et al (J of Methodology, 2005, V3, pp 123) have shown that the analysis you use in Lines 241-250 is not the most appropriate for this situation. Please explain why you used this method.

Give specific suggestions on how to improve the manuscript

Your introduction needs more detail. I suggest that you improve the description at lines 57- 86 to provide more justification for your study (specifically, you should expand upon the knowledge gap being filled).

Comment on language and grammar issues

The English language should be improved to ensure that an international audience can clearly understand your text. Some examples where the language could be improved include lines 23, 77, 121, 128 – the current phrasing makes comprehension difficult.

Organize by importance of the issues, and number your points

1. Your most important issue
2. The next most important item
3. ...
4. The least important points

Please provide constructive criticism, and avoid personal opinions

I thank you for providing the raw data, however your supplemental files need more descriptive metadata identifiers to be useful to future readers. Although your results are compelling, the data analysis should be improved in the following ways: AA, BB, CC

Comment on strengths (as well as weaknesses) of the manuscript

I commend the authors for their extensive data set, compiled over many years of detailed fieldwork. In addition, the manuscript is clearly written in professional, unambiguous language. If there is a weakness, it is in the statistical analysis (as I have noted above) which should be improved upon before Acceptance.

Ants of the *Monomorium monomorium* species group (Hymenoptera: Formicidae) in the Arabian Peninsula with description of a new species from southwestern Saudi Arabia

Mostafa Sharaf^{Corresp., 1}, Hathal M Al Dhafer¹, Abdulrahman S Aldawood¹, Francisco Hita Garcia²

¹ Department of Plant Protection, College of Food and Agriculture Sciences, King Saud University, Riyadh, Riyadh, Kingdom of Saudi Arabia

² Okinawa Institute of Science and Technology, Okinawa, Japan

Corresponding Author: Mostafa Sharaf

Email address: mosharaf@ksu.edu.sa

We revise the taxonomy of the myrmicine ants of the *Monomorium monomorium* species group for the Arabian Peninsula. Six species are recognized: *Monomorium aeyade* Collingwood & Agosti, 1996, *M. clavicorne* André, 1881, *M. exiguum* Forel, 1894, *M. holothir* Bolton, 1987, *M. mohammedi* sp. n., and *M. sarawatense* Aldawood & Sharaf, 2013. On the basis of the worker caste, we describe *Monomorium mohammedi* sp. n. from the southwestern region of the Kingdom of Saudi Arabia (KSA). We designate a neotype for *Monomorium aeyade* Collingwood & Agosti and redescribe and illustrate the worker caste. Furthermore, we provide a worker-based species identification key, distribution maps for the treated species, and ecological and biological notes, if available. *Monomorium holothir* is recorded for the first time from the KSA. Also, we propose *M. dryhimi* Aldawood & Sharaf, 2011 and *M. montanum* Collingwood & Agosti, 1996 to be treated as junior synonyms of *M. exiguum*.

1 **Ants of the *Monomorium monomorium* species group (Hymenoptera: Formicidae) in the**
 2 **Arabian Peninsula with description of a new species from southwestern Saudi Arabia**

3 Mostafa R. Sharaf ^{1*}, Hathal M. Al Dhafer¹, Abdulrahman S. Aldawood¹, Francisco Hita Garcia²

4 *1 Department of Plant Protection, College of Food and Agriculture Sciences, King Saud*
 5 *University, Riyadh, Kingdom of Saudi Arabia.*

6 *2 Okinawa Institute of Science and Technology, Onna-son, Okinawa, Japan.*

7 ** Author to whom correspondence should be addressed e-mail:mosharaf@ksu.edu.sa*

8 **ABSTRACT**

9 We revise the taxonomy of the myrmicine ants of the *Monomorium monomorium* species group
 10 for the Arabian Peninsula. Six species are recognized: *Monomorium aeyade* Collingwood &
 11 Agosti, 1996, *M. clavicorne* André, 1881, *M. exiguum* Forel, 1894, *M. holothir* Bolton, 1987, *M.*
 12 *mohammedi* sp. n., and *M. sarawatense* Aldawood & Sharaf, 2013. On the basis of the worker
 13 caste, we describe *Monomorium mohammedi* sp. n. from the southwestern region of the Kingdom
 14 of Saudi Arabia (KSA). We designate a neotype for *Monomorium aeyade* [Collingwood & Agosti](#)
 15 and redescribe and illustrate the worker caste. Furthermore, we provide a worker-based species
 16 identification key, distribution maps for the treated species, and ecological and biological notes, if
 17 available. *Monomorium holothir* is recorded for the first time from the KSA. Also, we propose
 18 *M. dryhimi* [Aldawood & Sharaf, 2011](#) and *M. montanum* [Collingwood & Agosti, 1996](#) to be
 19 treated as junior synonyms of *Monomorium exiguum*.

20 **INTRODUCTION**

21 The ant genus *Monomorium* is one of the most diverse genera in the subfamily Myrmicinae with
 22 388 described species and subspecies (Bolton, 2017). It is distributed worldwide throughout all
 23 zoogeographic regions, with most species occurring in the Old World tropics and temperate zones
 24 (Brown, 2000). Considering how diverse and widespread the genus is, very little information of
 25 the natural history of most species exists, especially for the *M. monomorium* species group
 26 (Bolton, 1987). Apparently, most species inhabit the topsoil layer or leaf litter and seem to have a
 27 rather generalist diet. The taxonomic foundation for the genus as a whole is in a moderate state
 28 based on some regional revisions (e.g. Bolton, 1987; Heterick, 2001, 2006), as well as faunistic
 29 treatments providing local or regional keys (e.g. Collingwood & Agosti, 1996; Terayama, 2009;
 30 Sarnat & Economo, 2012). The available revisionary contributions on the fauna of the *M.*
 31 *monomorium* species group are scarce, and basically consist of Bolton (1987) for the Afrotropical

fauna and [Heterick](#) (2001, 2006) for the Australian and Malagasy faunas respectively. However, these include many species now removed from the genus.

The taxonomic history of the *M. monomorium* species group in the Arabian Peninsula is a set of single distribution records and single species descriptions scattered through the literature. The first published work on the Arabian *Monomorium* fauna (Collingwood, 1985) recorded a couple of species of the *M. monomorium* species group from the Kingdom of Saudi Arabia (KSA), namely *M. clavicorne* Andre, 1881 and *M. montanum* Collingwood & Agosti, 1996 (initially misidentified as *M. zulu* Santschi, 1914 in Collingwood, 1985). In a later faunistic contribution Collingwood & Agosti (1996) listed eight species, and described five new species, *M. aeyade* Collingwood & Agosti, 1996, *M. baushare* Collingwood & Agosti, 1996, *M. desertorum* Collingwood & Agosti, 1996, *M. montanum* Collingwood & Agosti, 1996, and *M. qarahe* Collingwood & Agosti, 1996.

The first record of the species *M. exiguum* Forel was published by Aldawood & Sharaf (2009) from the Asir Mountains (KSA). Aldawood & Sharaf (2011) described *M. dryhimi*, based on the worker caste from the southwestern Mountains of the KSA, and provided a key to the Arabian species. El-Hawagry et al. (2013) described *M. sarawatensis* Sharaf & Aldawood from the Al Baha Province based on the worker caste, and provided a key to the Arabian species of the *M. monomorium* species group. Recently, *M. desertorum* Collingwood & Agosti, 1996 was synonymized with *M. exiguum* Forel, 1894 (Sharaf et al., 2015), and Sharaf et al. (2017) produced a key to the *Monomorium* fauna of the Socotra Archipelago, described *M. elghazalyi* Sharaf & Aldawood, 2017, and synonymized *M. baushare* and *M. qarahe* under *M. exiguum*. In the Malagasy region, *M. exiguum* is the most abundant species in leaf litter samples ([Heterick](#), 2006). However, this group of ants is taxonomically difficult due to lack of revisionary work, in addition to the small body size and pale body colors that make the ants frequently overlooked by collectors and consequently poorly represented in the regional museums and collections. Ants of the *M. monomorium*-group are among the most abundant *Monomorium* in the Arabian Peninsula, commonly represented in ecological and biodiversity research projects of the region.

In this study, we provide the first comprehensive revision of the *M. monomorium* species group for the Arabian Peninsula. We describe one new species from the southwestern region of the KSA and re-describe the five previously known species. For all species we present detailed descriptions, diagnoses, high-quality montage images, and distribution maps. Furthermore, we

provide a new illustrated identification key to the species of the species group on the basis of the worker caste.

MATERIAL AND METHODS

The species names follow the online catalogue of ants of the world (Bolton, 2017). Distribution maps were made using DIVA-GIS (version 7.5.0.0). Digital color images of lateral and dorsal views of the entire body and full-face views of the head of each species were created using a Leica DFC450 digital camera with a Leica Z16 APO microscope and LAS (v3.8) software. These images are also available online on AntWeb (<https://www.antweb.org>) and are accessible through unique specimen identifiers attached (e.g. CASENT0922329). Throughout the text, 'w' stands for 'worker' or 'workers'.

Institutional abbreviations

The collection abbreviations follow Evenhuis (2009) and Brandão (2000).

BMNH = The Natural History Museum, London, U.K.

KSMA = King Saud University Museum of Arthropods, Plant Protection Department,
College of Food and Agriculture Sciences, King Saud University, Riyadh,
Kingdom of Saudi Arabia

MHNG = Muséum d'Histoire Naturelle, Geneva, Switzerland

MNHN = Muséum National d'Histoire Naturelle, Paris, France.

NHMB = Naturhistorisches Museum, Basel, Switzerland.

WMLC = World Museum Liverpool, Liverpool, U.K.

Measurements and indices Figures 1, 2, 3:

All measurements are in millimeters and follow the standard measurements of previous works on the genus (Bolton, 1987; Sharaf et al., 2017):

EL = Eye Length; maximum diameter of eye in lateral view.

EM = Distance between anterior margin of eye and mandibular insertion in lateral view.

HL = Head Length; maximum length of head, excluding mandibles in full-face view.

HW = Head Width; maximum width of head behind eyes in full-face view.

ML = Mesosoma Length (=Weber Length); length of mesosoma in lateral view; from a point at which pronotum meets cervical shield to posterior base of propodeal lobes or teeth.

PPH = Postpetiole Height; maximum height measured in lateral view.

- 93 PPL = Postpetiole Length; maximum length measured in dorsal view.
 94 PPW = Postpetiole Width; maximum width measured in dorsal view.
 95 PTH = Petiole Height; maximum height measured in lateral view.
 96 PTL = Petiole Length; maximum length measured in dorsal view, from anterior margin to
 97 posterior margin.
 98 PTW = Petiole Width; maximum width measured in dorsal view.
 99 PW = Pronotal Width; maximum width in dorsal view.
 100 SL = Scape Length, excluding basal neck.
 101 TL = Total Length, sum of lengths of head, mesosoma, petiole, postpetiole and gaster in profile.

102 **Indices**

- 103 CI = Cephalic Index ($HW/HL \times 100$).
 104 EI = Eye Index ($EL/HW \times 100$).
 105 SI = Scape Index ($SL/HW \times 100$).

106 **Nomenclatural acts**

107 The electronic version of this article in Portable Document Format (PDF) will represent a
 108 published work according to the International Commission on Zoological Nomenclature (ICZN),
 109 and hence the new names contained in the electronic version are effectively published under that
 110 Code from the electronic edition alone. This published work and the nomenclatural acts it
 111 contains have been registered in ZooBank, the online registration system for the ICZN. The
 112 ZooBank LSIDs (Life Science Identifiers) can be resolved and the associated information viewed
 113 through any standard web browser by appending the LSID to the prefix <http://zoobank.org/>. The
 114 LSID for this publication is: urn:lsid:zoobank.org:pub:58913E59-AEE4-43BD-881E-
 115 C23CD61F44F9. The online version of this work is archived and available from the following
 116 digital repositories: PeerJ, PubMed Central and CLOCKSS.

117 **RESULTS**

118 **Diagnosis of the Arabian *Monomorium monomorium* species group**

119 Within the genus *Monomorium*, workers of the *M. monomorium* species group can be easily
 120 recognized by the following combination of characters (Bolton, 1987): monomorphic, with size
 121 variation; median clypeal portion raised, projecting anteriorly and longitudinally bicarinate;
 122 anterior clypeal margin without a pair of teeth; dorsal surface of mandibles unsculptured and
 123 masticatory margin armed with four teeth, decreasing in size from apex to base; antennae with 10
 124 to 12 segments, terminating in a well-defined three-segmented club; eyes present but variable in

size, situated in front of the midlength of the sides in full-face view, and with four or more ommatidia in the longest row; head longer than broad; cephalic dorsum smooth and shining; metanotal groove impressed, with distinct cross-ribs; propodeal spiracle circular to subcircular; propodeal dorsum meeting declivity in a rounded angle; promesonotum and propodeal dorsum unsculptured; body pilosity variable in distribution but usually conspicuous, rarely absent from mesosomal dorsum; petiole, postpetiole and gastral tergites usually unsculptured.

Synoptic species list and distribution of the Arabian *Monomorium monomorium* species group

Figure 4

aejade Collingwood & Agosti, 1996
clavicorne André, 1881
exiguum Forel, 1894 
exiguum var. *bulawayensis* Forel, 1913b
faurei Santschi, 1915b
exiguum r. *flavescens* Forel, 1916
= *M. montanum* [Collingwood & Agosti, 1996](#) **syn. nov.**
= *M. dryhimi* Aldawood & Sharaf, 2011 **syn. nov.**
holothir Bolton, 1987
mohammedi Sharaf & Hita Garcia **sp. n.**
sarawatense Aldawood & Sharaf, 2013

Identification Key to the Arabian species of the *Monomorium monomorium*-group

1 Mesosoma without standing hairs (Figs. 5A, 5B).....2 
- Mesosoma with standing hairs (Figs. 5C, 5D, 5E,5F).....3

2 Eyes appearing larger, with a ring of seven to eight ommatidia encircling a single row of 2 ommatidia, and in profile closer to mandibular insertions (EM 0.05); meso- and metapleuron smooth; petiole and postpetiole smooth and each with one pair of standing hairs (Fig. 5A)*aejade* Collingwood & Agosti

- 153 - Eyes appearing smaller, with only 5–6 ommatidia, and in profile further away from mandibular
 154 insertions (EM 0.09–0.11); meso-and metapleuron finely shagreened; petiole and postpetiole
 155 superficially shagreened and without standing hairs (Fig. 5B).....*mohammedi* sp. n.
- 156 3 Body pilosity clubbed; mesosoma, petiole and postpetiole densely and conspicuously reticulate-
 157 punctate; Antennae with 12 segments (Fig. 5C).....*sarawatense* Sharaf & Aldawood
 158 –Body pilosity simple; mesosoma, petiole and postpetiole smooth and shining; Antennae with 11
 159 segments (Figs. 5D, 5E,-5F).....4
- 160 4 Mesosoma with only two pairs of standing hairs, one on pronotal corners and one propodeum
 161 (Fig. 5D).....*clavicorne* André
 162 – Mesosoma with several pairs of standing hairs (Figs.
 163 5E,5F).....5
- 164 5 Smaller species (HL 0.36–0.42, HW 0.28–0.32, SI 74–84, PW 0.17–0.21); eyes smaller (EL
 165 0.19–0.22 x HW), in profile with an outer ring of ommatidia enclosing one row of 2–3
 166 ommatidia; in profile petiolar node on a higher level than postpetiolar node (Fig.
 167 5E)*exiguum*
 168 **Forel**
- 169 -Larger species (HL 0.48–0.50, HW 0.36–0.37, SI 92, PW 0.22–0.24); eyes relatively larger (EL
 170 0.30–0.32 x HW), in profile with 8-9 ommatidia in the longest row; in profile petiolar and
 171 postpetiolar nodes on the same level (Fig. 5F).....*holothir* Bolton
- 172 **Review of species**
- 173 *Monomorium aeyade* Collingwood & Agosti, 1996, Figure 6
 174 *Monomorium aeyade* Collingwood & Agosti, 1996: 341 (w.)
- 175 **Type material examined**
- 176 **Neotype** pinned worker: Oman, wadi Aeyad, 20.iii.1990, (M. D. Gallagher) (WMLC:
 177 CASENT0922329)..
- 178 **Measurements**
- 179 Paratype worker.
- 180 TL 1.42; HL 0.40; HW 0.31; SL 0.27; EL 0.06; ML 0.40; PW 0.18; PTW 0.07; PTH 0.12; PPW
 181 0.09; PPH 0.09; CI 78; EI 19; SI 87.
- 182 **Description**

Worker. Head. In full-face view distinctly longer than broad with nearly parallel sides and feebly concave posterior margin; median clypeal portion without carina or anterolateral angles, anterior clypeal margin straight or feebly concave; antenna 11-segmented; scapes relatively long (SI 81), when laid straight back from their insertions reach three quarter of head length; eyes oval, small, (EL $0.16 \times$ HW) with a ring of ommatidia encircling a single row of 2 ommatidia; frontal lobes farther apart in full-face view. **Mesosoma.** In profile with flat promesonotal dorsum, which slopes posteriorly to a well-defined metanotal groove; propodeal spiracles small and pinhole-like; propodeal dorsum evenly sloping posteriorly to short declivity. **Petiole:** Node massive, rounded dorsally, and little higher than postpetiolar node in profile; anterior peduncle short. **Postpetiole.** Node low and convex dorsally. **Sculpture.** Entire body surfaces smooth and shining except for the distinct metanotal cross ribs. **Pilosity.** Underside of head without hairs; cephalic surface with scattered minute hair-pits; anterior clypeal margin and mandibles with longer hairs; antennae with abundant appressed pubescence; mesosoma without hairs; postpetiole two pairs of backward directed hairs; gaster with few longer hairs. **Color.** Concolour light yellow.

Note

This species was originally described based on two worker specimens, the holotype and one paratype. During an extensive search in the WMLC collection it was not possible to locate the holotype, which is presumably lost. However, the paratype specimen was available for examination. The original description given by Collingwood & Agosti (1996) was brief and the diagnostic differentiation was unclear, therefore, we designate a neotype to unequivocally ascertain the identity of the species and re-describe the species.

Biological and Ecological notes

Nothing is known of the biology or ecology of the species.

Geographic range

Monomorium aeyade is only known from the type locality in Oman (Table 1).

***Monomorium clavicorne* André, 1881, Figure 7**

Monomorium clavicorne André, 1881: 68, pl. 3, fig. 9 (w.). [Combination in *Monomorium* (*Lampromyrmex*): Wheeler, 1922: 876. Subspecies of *Monomorium orientale*: Mayr, 1904: 4; Emery, 1908: 685. Raised to species by Santschi, 1915a: 58; Emery, 1922: 183. Current subspecies: nominal plus *Monomorium clavicorne punicum*.]

Type material examined

Of *M. clavicorne*: Holotype, pinned worker, ISRAEL, Jaffa (MNH: CASENT0915416).
[image examined]

Of *M. clavicorne punicum*: Holotype, pinned worker, **TUNISIA**: Sousse, 31.XII.1915 (Normand) (NHMB: CASENT0913568). [image examined]

Non-type material examined

KSA: Riyadh, Al Hayer, 24.394839°N, 46.832231°E, 544 m, 10.iii.2011, (Sharaf M. R.) (1 w, KSMA).

Previous records. Riyadh, Riyadh Agricultural Centre, 24.501389°N, 46.626111°E 22.iii.83, 19.iv.83; Fayfa, 17.28797°N, 43.14434°E, 27.iii.83; Al Qatif, 26.510278°N, 49.968889°E, 15.iv.83; Hair valley, 17.iv.83 (Collingwood C. A.) (Collingwood 1985).

Measurements

Worker (n=2). TL 1.44–1.48; HL 0.37–0.38; HW 0.28–0.29; SL 0.22–0.25; EL 0.05–0.06; ML 0.41–0.42; PW 0.17–0.18; PTL 0.07–0.08; PTW 0.07; PTH 0.09–0.12; PPL 0.05–0.07; PPW 0.08; PPH 0.07–0.08; CI 76; EI 17–21; SI 79–86.

Description

Worker. Head. In full-face view distinctly longer than broad with nearly parallel sides and feebly concave posterior margin; median clypeal portion without carina or anterolateral angles, anterior clypeal margin feebly concave; antenna 11-segmented; terminal funicular segment enlarged, more than twice longer than the two preceding segments; scapes long (SI 79–86); eyes oval, small, (EL 0.17–0.21 × HW) with a ring of ommatidia encircling two inner short rows of 2-3 ommatidia; frontal lobes farther apart in full-face view. **Mesosoma.** In profile with a feebly convex promesonotal dorsum, which slopes posteriorly to a well-defined metanotal groove; propodeal spiracles small and pinhole-like; propodeal dorsum evenly sloping posteriorly to short declivity. **Petiole:** Node massive, narrowly rounded above, and slightly higher than postpetiolar node in profile, anterior peduncle short. **Postpetiole.** Node small and convex dorsally. **Sculpture.** Cephalic surface smooth and shining; mandibles smooth and shining, with faint striations; mesosoma, petiole, postpetiole, and gaster smooth and shining; metanotal cross ribs distinct. **Pilosity.** Cephalic surface with scattered minute hair-pits; anterior clypeal margin and mandibles with longer hairs; antennae with abundant appressed pubescence; pronotal angles with a pair of long hairs; propodeal dorsum with one pair of hairs; petiole and postpetiole each with one pair of backward directed hairs; gaster with few longer hairs on distal half. **Color.** Overall uniform clear yellow.

Biological and Ecological notes

Little is known of the biology of the species. The single specimen available was found in a cultivated area with a sewage water stream. It was coexisting with [Tapinoma simrothi](#) Krausse,

1911, *Trichomyrmex mayri* (Forel, 1902), and *Tetramorium caespitum* (Linnaeus, 1758). Due to the relatively broad regional distribution of the species it might be an introduction to the KSA.

Geographic range

This species was described from Israel (André, 1881) and recorded from the KSA (Collingwood, 1985; Collingwood & Agosti, 1996), the UAE (Collingwood et al., 2011), and Egypt (Sharaf, 2006) (Table 1).

***Monomorium exiguum* Forel, 1894, Figure 8**

Monomorium exiguum Forel, 1894: 85. [Combination in *Monomorium* (Martia): [Forel, 1913a](#): 351; in *Monomorium* (*Lampromyrmex*): Wheeler, 1922: 876.]

Monomorium exiguum var. *bulawayensis* Forel, 1913: 217 (w.) [Combination in *Monomorium* (*Lampromyrmex*): Wheeler, 1922: 876. Junior synonym of *Monomorium exiguum*: Bolton, 1987: 388; here confirmed.]

Monomorium faurei Santschi, 1915b: 260, fig. 10 (w.). [Combination in *Monomorium* (*Lampromyrmex*): Wheeler, 1922: 876. Junior synonym of *Monomorium exiguum*: Bolton, 1987: 388; here confirmed.]

Monomorium exiguum r. *flavescens* Forel, 1916: 418 (w.). [Junior synonym of *Monomorium exiguum*: Bolton, 1987: 388; here confirmed.]

Monomorium minutissimum Santschi, 1937: 227, figs. 27, 28 (w.). [Junior synonym of *Monomorium mictile*: Bolton, 1987: 401. Junior synonym of *Monomorium exiguum*: Heterick, 2006: 116; here confirmed.]

Monomorium baushare Collingwood & Agosti, 1996: 342 (w.). [Junior synonym of *Monomorium exiguum*: Sharaf et al., 2017: 343; here confirmed.]

Monomorium desertorum Collingwood & Agosti, 1996: 344 (w.). [Junior synonym of *Monomorium exiguum*: Sharaf et al., 2015: 52; here confirmed.]

Monomorium montanum Collingwood & Agosti, 1996: 350, fig. 24 (w.). **Syn. nov.**

Monomorium qarahe Collingwood & Agosti, 1996: 353 (w.). [Junior synonym of *Monomorium exiguum*: Sharaf et al., 2017: 343; here confirmed.]

Monomorium dryhimi Aldawood & Sharaf, 2011: 49, figs. 1-7 (w.). **Syn. nov.**

Type material examined

Of *M. exiguum*: Lectotype, pinned worker, **ETHIOPIA**: Shoa, 3 (MHNG: CASENT0101870).

Paralectotype, Shoa, 3 (MHNG: CASENT0101853). [Images of both examined]

Of *M. baushare*: Holotype, pinned worker, **OMAN**: Sad Baushar, 23.55, 58.4, 2.I.1992 (Gallagher, M.D.) (WMLC: CASENT0906342). [examined]

Of *M. bulawayensis*: Lectotype, pinned worker, **ZIMBABWE**: Bulawayo, (Arnold, G.) (MHNG: CASENT0010763). **Paralectotype**, pinned worker with same data as lectotype (MHNG: CASENT0010762). [Images of both examined]

Of *M. dryhimi*: Holotype, pinned worker, **KSA**: Al Bahah province, Amadan forest, Al Mandaq governorate, 20.7496, 41.24743, 1881 m, 19.V.2010 (Sharaf, M. R. & Aldawood, A. S.) (KSMA). **Paratypes**, 15 pinned workers with same data as holotype (CASC: CASENT0217367; KSMA; WMLC: CASENT0922344).

Of *M. faurei*: Lectotype, pinned worker, **GABON**: 31.XII.1914 (Faure, F.) (NHMB: CASENT0010878). **Paralectotype**, pinned worker with same data as lectotype (NHMB: CASENT0010879). [Images of both examined]

Of *M. flavescens*: Lectotype, pinned worker, **DEMOCRATIC REPUBLIC OF CONGO**: St. Gabriel, Stanleyville (Kohl) (MHNG: CASENT0101592). **Paralectotype**, pinned worker with same data as lectotype (MHNG: CASENT0101586). [Images of both examined]

Of *M. minutissimum*: Holotype, pinned worker, Angola, Chemin d' Ebanga (Monard, A.) (NHMN: CASENT0010880). [Images examined]

Of *M. montanum*: Holotype, pinned worker, **KSA**: Sawdah Mt., 2500 m, 9.IV.1983 (Collingwood, C. A.) (WMLC). **Paratypes**, 4 pinned workers: 1 w same data as holotype (NHMB: CASENT0913825); 1 w Wadi Azizah, 18.IX.1983 (Collingwood, C. A.) (WMLC: CASENT0906347); 1 w Bishah, 7.IV.1983 (Collingwood, C. A.) (WMLC: CASENT0906345); 1 w An-Naamah, 8.IV.1983 (Collingwood, C. A.) (WMLC: CASENT0906346). [examined]

Of *M. qarahe*: Holotype, pinned worker, **KSA**: Qaraah village, 18.05, 42.75, 2000 m, 16.IV.1976 (Büttiker, W.) (WMLC: CASENT0906344). **Paratype**, one pinned worker with same data as holotype (WMLC). [examined]

Non-type material examined

CAMEROON: Nkoemvon, 1980, (Jackson D.), (12 w); Nkoemvon, 18.v.1980, (Jackson D.), (6 w); Nkoemvon, 04.iii.1980, (Jackson D.), (9 w); Mondoni, 14.iii.1990, (Dejean A.), (6 w); Yaounde, 26.iii.1989, (Dejean A.), (3 w); Mbalmayo, xi.1993, (Stork N.), (3 w); **GHANA**: Old Tafo nr. Tafo, 31.i.1992, (Belshaw B.), (2 w, 1 q, leaf litter, primary forest); Maabari nr. Tepa, 18.xii.1991, (Belshaw B.), (3 w, leaf litter, secondary forest); Asiakwa nr. Kibi, 01.v.1992, (Belshaw B.), (3 w, leaf litter Cocoa); Kibi, 24.iii.1970, (Leston D.), (17 w, litter samples); Manpong, 03.ii.1970, (Room R.), (5 w); Boku, 14.viii.1968, (Collingwood C. A.), (1 w, on cocoa); Pankese, 30.ix.1968, (Collingwood C. A.), (1 w, on cocoa); Mampong, 26.i.1970, (Room P.), (1 w, 1 q); Legon, A. D., 08.vii.1970, (Leston D.), (7 w, 2 q); Tafo, 25.ix.1970, (Bolton B.), (6

315 w, twig on forest floor); Tafo, Cocoa Research Institution, 23.xii.1991, (Belshaw R.), (3 w, leaf
316 litter, secondary forest); Tafo, 26.ii.1970, (Bolton B.), (2 w, 1 q, log mould); Tafo, 26.ii.1970,
317 (Bolton B.), (3 w, log mould samples); Legon, 24.vii.1970, (Leston D.), (3 w); Legon, A. D.,
318 08.x.1970, (Leston D.), (5 w); Legon, A. D., 14.x.1970, (Leston D.), (6 w, 2q); Legon, A. D.,
319 24.vii.1970, (Leston D.), (3 w); Tumu, 25.xii.1969, (Room R.), (2 w); **KENYA**: Tana R., Kora,
320 11.vii.1983, (Collins N. M., Ritchie M.), (6 w, pitfall); **MADAGASCAR**: 48 km ENE,
321 Morondava, 20.066667°S, 44.65°E, 07.i.1991, 30 m, (Olson D. M.), (2 w, tropical dry forest,
322 CN6T); **NIGERIA**: Black pod project, 05.ii.1975, (Taylor B.) (3 w, 1 q); Gambari, 16.vi.1969,
323 (Bolton B.), (9 w, on cocoa); Gambari, 20.v.1969, (Bolton B.), (7 w, rotten log); Ibadan,
324 11.x.1987, (Noyes J.), (21 w), previous material in BMNH; **OMAN**: Jebel Akhdar, Alain,
325 23.07279°N, 57.66179°E, 1949 m, 4.iv.2016, (Sharaf M. R.) (17 w, KSMA); Jebel Akhdar, Alain,
326 23.07237°N, 57.66187°E, 1889 m, 6.iv.2016, (Sharaf M. R.) (4 w, KSMA); Muscat, 23.62405°N,
327 58.48891°E, 9 m, 9.iv.2016, (Sharaf M. R.) (6 w, KSMA); Qurayat, 23.20460°N, 58.96920°E, 39
328 m, 8.iv.2016, (Sharaf M. R.) (9 w, KSMA); Date palm, no specific locality, 8.iv.2016, (A.
329 Polaszek) (1 w, KSMA); Nakhl, 23.49327°N, 57.83421°E, 190 m, 5.iv.2016, (Sharaf M. R.) (7 w,
330 KSMA); Muscat, 23.61760°N, 58.49364°E, 81 m, 7.iv.2016, (Sharaf M. R.) (1 w, KSMA); W.
331 Fanga, 23.46194°N, 58.10326°E, 160 m, 20.i.2017, (Sharaf M. R.) (3 w, KSMA); Eastern Hajar,
332 Mts, S. side, Samail gap, Lizurgh village, 23.355556°N, 58.105556°E, 280 m, 6.iv.2016, (A.
333 Polaszek) (3 w, KSMA); Muscat, KOM, Alraha village, 23.56665°N, 58.17630°E, 74 m, (Sharaf
334 M. R.) (1 w, KSMA); Masfat Elebryein, 23.14178°N, 57.31330°E, 933 m, 21.i.2017, (Sharaf M.
335 R.) (3 w, KSMA); Alkhoud village, 23.57154°N, 58.12166°E, 63 m, (Sharaf M. R.) (1 w,
336 KSMA); W. Fanga, 23.45336°N, 58.11807°E, 166 m, 20.i.2017, (Sharaf M. R.) (4 w, KSMA);
337 Eastern Hajar, Mnt., Rd to Sur, 23.1675°N, 58.101944°E, 280 m, (A. Polaszek) (2 w, KSMA);
338 Western Hajar Mnt., Nakham, 23.388056°N, 57.832222°E, 310 m, 2.iv.2016, (A. Polaszek) (12
339 w, KSMA); Hajar Mnt., Wadi Alkhoud, 23.566667°N, 58.116667°E, 80 m, 13.i.2017, (A.
340 Polaszek) (1 w, KSMA); Batinah coast, Hibra village, 23.493733°N, 57.8337°E, 190 m,
341 5.iv.2016, (A. Polaszek) (32 w, KSMA); **KSA: Al Baha Province**: Elqamh park, Baljurshi,
342 19.913056°N, 41.905°E, 1931 m, v.2010, (49 w); Elqamh park, Baljurshi, 19.805722°N,
343 41.711889°E, 1950 m, ix.2011, (39 w); Amadan, Almandaq, 20.245278°N, 41.468333°E, 1881
344 m, v.2010, (21 w); W. Turabah, Almandaq, 20.211028°N, 41.288222°E, 1793 m, v.2011 (13 w);
345 W. Turabah, Almandaq, 20.241917°N, 41.262833°E, 1751 m, ix.2011, (6 w); W. Turabah,
346 Almandaq, 20.211028°N, 41.288222°E, 1793 m, v.2011, (30 w); W. Gonouna, AlUrduya gov.,
347 19.429361°N, 41.605028°E, 353 m, v.2011, (17 w); Al majardah, W. Khat, 19.08913°N,

41.97126°E, 513 m, xi.2012, (1 w); Al Mukhwah, Dhi Ayn, 19.929417°N, 41.441722°E, 741 m,
v.2011, (4 w); Al Mukhwah, Dhi Ayn, 19.93143°N, 41.44185°E, 728 m, iv.2016, (10 w, 2 q); Al
Mukhwah, Dhi Ayn, 19.92967°N, 41.44291°E, 706 m, iv.2016, (2 w); Al Mukhwah, Dhi Ayn,
19.929417°N, 41.441722°E, 741 m, v.2010, (25 w); Al Mukhwah, Dhi Ayn, 19.92967°N,
41.44291°E, 706 m, ix.2011, (3 w); Al Mukhwah, Dhi Ayn, 19.92967°N, 41.44291°E, 744 m,
ix.2011, (11 w); Al Mukhwah, Dhi Ayn, 19.92967°N, 41.44291°E, 741 m, v.2011, (3 w); Shada
Al A'la, 19.845167°N, 41.30445°E, 741 m, i.2015, (1 w); Shada Al A'la, 19.842917°N,
41.311517°E, 1666 m, xi.2015, (1 w); W. Elzaraeb, 20.073417°N, 41.38675°E, 2086 m, v.2011,
(1 w), previous material is collected by Sharaf, M. R. and deposited in KSMA; Shada Al A'la,
19.842917°N, 41.311517°E, 1666 m, xii.2014, (2 w); Shada Al A'la, 19.842917°N, 41.311517°E,
1666 m, vii.2015, (2 w); Shada Al A'la, 19.845167°N, 41.30445°E, 1474 m, iii.2015, (1 w);
Shada Al A'la, 19.840183°N, 41.311433°E, 1611 m, vii.2015, (1 w); Shada Al A'la, 19.8511°N,
41.300617°E, 1325 m, iii.2015, (1 w); Shada Al A'la, 19.842917°N, 41.311517°E, 1666 m,
xi.2015, (1 w), previous material is collected using PT by Al Dhafer et al. **Asir Province:**
Dalaghan park, 18.066066°N, 42.710981°E, 2223 m, iv.2008, (2 w); Abha-Khamis Mushayt
Road, 18.239186°N, 42.588481°E, 2129 m, ix.2004, (5 w); W. Bagara, 18.79214°N, 42.01912°E,
428 m, vi.2014, (3 w); Abha-Khamis Mushayt Road, 18.23875°N, 42.570694°E, 2147 m,
iv.2011, (21 w); Abha-Khamis Mushayt Road, 18.23875°N, 42.570694°E, 2147 m, x.2014, (12
w); Raydah: 18.204267°N, 42.4124°E, 2820 m, ii.2014, (12 w); 18.204267°N, 42.4124°E, 2820
m, iv.2014, (4 w); 18.22217°N, 42.40241°E, 2744 m, vi.2014, PT (4 w), previous materials are
collected by Sharaf, M. R.; 18.204267°N, 42.4124°E, 2820 m, vi.2014, (1 w); 18.204267°N,
42.4124°E, 2820 m, viii.2014, (4 w); 18.204267°N, 42.4124°E, 2820 m, iii.2015, (2 w);
18.20525°N, 42.410117°E, 2761 m, ii.2014, (1 w); 18.20525°N, 42.410117°E, 2761 m, iv.2014,
(3 w); 18.20525°N, 42.410117°E, 2761 m, vi.2014, (3 w); 18.20525°N, 42.410117°E, 2761 m,
viii.2014, (2 w); 18.20525°N, 42.410117°E, 2761 m, i.2015, (1 w); 18.20525°N, 42.410117°E,
2761 m, i.2015, PT (2 w); 18.20525°N, 42.410117°E, 2761 m, vii.2015, (3 w); 18.20525°N,
42.410117°E, 2761 m, xi.2015, (2 w); 18.198067°N, 42.40725°E, 2387 m, ii.2014, (4 w);
18.198067°N, 42.40725°E, 2387 m, iv.2014, (1 w); 18.198067°N, 42.40725°E, 2387 m,
26.viii.2014, (4 w); 18.198067°N, 42.40725°E, 2387 m, x.2014, (3 w); 18.198067°N,
42.40725°E, 2387 m, xii.2014, (1 w); 18.198067°N, 42.40725°E, 2387 m, iii.2015, (4 w);
18.198067°N, 42.40725°E, 2387 m, iv.2015, (4 w); 18.198067°N, 42.40725°E, 2387 m, vii.2015,
(3 w); 18.201583°N, 42.408933°E, 2578 m, ii.2014, (5 w); 18.201583°N, 42.408933°E, 2578 m,
iv.2014, (3 w); 18.201583°N, 42.408933°E, 2578 m, vi.2014, (7 w); 18.201583°N, 42.408933°E,

381 2578 m, viii.2014, (10 w); 18.201583°N, 42.408933°E, 2578 m, x.2014, (2 w); 18.201583°N,
 382 42.408933°E, 2578 m, iii.2015, (1 w); 18.201583°N, 42.408933°E, 2578 m, v.2015, (5 w);
 383 18.201583°N, 42.408933°E, 2578 m, vii.2015, (5 w); 18.201583°N, 42.408933°E, 2578 m,
 384 xi.2015, (2 w); 18.1961°N, 42.40525°E, 2285 m, ii.2014, (2 w); 18.1961°N, 42.40525°E, 2285
 385 m, viii.2014, (3 w); 18.1961°N, 42.40525°E, 2285 m, x.2014, (2 w); 18.1961°N, 42.40525°E,
 386 2285 m, xi.2015, (2 w); 18.1961°N, 42.40525°E, 2285 m, iii.2015, (5 w); 18.1961°N,
 387 42.40525°E, 2285 m, i.2015, (1 w); 18.1961°N, 42.40525°E, 2285 m, v.2015, (3 w);
 388 18.194917°N, 42.396967°E, 1897 m, x.2014, (5 w); 18.194917°N, 42.396967°E, 1897 m,
 389 iii.2015, (1 w); 18.194917°N, 42.396967°E, 1897 m, vii.2015, (8 w); 18.194917°N,
 390 42.396967°E, 1851 m, xii.2014, (1 w); 18.195817°N, 42.389083°E, 1614 m, ii.2014, (1 w);
 391 18.195817°N, 42.389083°E, 1614 m, viii.2014, (5 w); 18.195817°N, 42.389083°E, 1614 m,
 392 xii.2014, (5 w); 18.195817°N, 42.389083°E, 1614 m, i.2015, (2 w); 18.195817°N, 42.389083°E,
 393 1614 m, iii.2015, (3 w); 18.195817°N, 42.389083°E, 1614 m, vii.2015, (1 w); 18.195817°N,
 394 42.389083°E, 1614 m, ix.2015, (3 w); 18.195817°N, 42.389083°E, 1614 m, xi.2015, (3 w);
 395 18.193633°N, 42.390333°E, 1772 m, iv.2014, (1 w); 18.193633°N, 42.390333°E, 1772 m,
 396 viii.2014, (1 w); 18.193633°N, 42.390333°E, 1772 m, x.2014, (2 w); 18.193633°N,
 397 42.390333°E, 1772 m, xii.2014, (1 w); 18.193633°N, 42.390333°E, 1772 m, i.2015, (1 w);
 398 18.193633°N, 42.390333°E, 1772 m, iii.2015, (1 w); 18.193633°N, 42.390333°E, 1772 m,
 399 v.2015, (1 w); 18.193633°N, 42.390333°E, 1772 m, vi.2015, (3 w); 18.193633°N, 42.390333°E,
 400 1772 m, vii.2015, (1 w); 18.193633°N, 42.390333°E, 1772 m, ix.2015, (2 w), previous material
 401 is collected using PT by Al Dhafer et al. and deposited in KSMA; **Riyadh Province:** Riyadh,
 402 Takhassosy street, 24.693472°N, 46.671136°E, 615 m, x.2015, (1 w); Riyadh, Alhayer,
 403 24.280194°N, 46.765861°E, iii.2009, (6 w); Dirab, KSU research farm, 24.4085°N,
 404 46.661639°E, 588 m, xii.2009, (1 w); Oyaina, 24.90665°N, 46.389917°E, 749 m, iv.2010, (3 w);
 405 Qarina, 25.132275°N, 46.163883°E, 761 m, (3 w); Riyadh, Al Emam University campus,
 406 24.809158°N, 46.701892°E, 650 m, x.2010, (1 w); Riyadh, KSU guest building, Dereyia,
 407 24.716667°N, 46.616667°E, 612 m, vii.2009, (1 w), previous material is collected by Sharaf, M.
 408 R. and deposited in KSMA; Riyadh, Janaderiyah, 24.98121°N, 46.77711°E, 630 m, ix.2014, (1
 409 w); Riyadh, Hawtet Sudair, 25.60490°N, 45.60050°E, 751 m, i.2015, (1 w); Hawtet Bani Tamim,
 410 23.48019°N, 46.84350°E, 597 m, i.2014, (3 w); Hawtet Bani Tamim, 23.50737°N, 46.90059°E,
 411 593 m, xii.2014, (10 w); Hawtet Bani Tamim, 23.45943°N, 46.81895°E, 582 m, xii.2014, (4 w);
 412 Riyadh, Ammariya, 24.81839°N, 46.44698°E, 696 m, x.2013, (11 w); Mezahmiya, 24.45570°N,
 413 46.14881°E, 719 m, x.2013, (42 w); Mezahmiya, 24.47197°N, 46.23878°E, 633 m, i.2014, (2 w);

Dirab, KSU research farm, 24.4085°N, 46.661639°E, 588 m, xii.2013, (4 w); Layla (Alaflaj),
 22.21325°N, 46.68818°E, 543 m, i.2014, (4 w); Elsolayel, 20.45473°N, 45.57120°E, 616 m,
 i.2014, (2 w); Riyadh, W. Hanifa, 24.67089°N, 46.58061°E, 654 m, ii.2014, (3 w); Riyadh, W.
 Hanifa, 24.77091°N, 46.53147°E, 695 m, ix.2014, (10 w); Riyadh, W. Hanifa, 24.74747°N,
 46.56474°E, 679 m, ix.2014, (4 w); Riyadh, W. Hanifa, 24.73507°N, 46.57518°E, 674 m,
 ix.2014, (2 w); Huraymila, 25.12636°N, 46.15782°E, 951 m, ii.2014, (2 w); Dhurma,
 24.59961°N, 46.15547°E, 657 m, iv.2014, (2 w); Thadiq, 25.30974°N, 45.86457°E, 736 m,
 iv.2014, (2 w); Thadiq, 25.29360°N, 45.87102°E, 735 m, iv.2014, (2 w); Quwaiiyah,
 24.04718°N, 45.24430°E, 854 m, v.2014, (3 w); Quwaiiyah, 24.04347°N, 45.24007°E, 857 m,
 v.2014, (3 w); Shaqra, 25.26655°N, 45.26779°E, 728 m, v.2014, (2 w); Shaqra, 25.32638°N,
 45.23341°E, 710 m, v.2014, (2 w); Shaqra, 25.23018°N, 45.31915°E, 703 m, i.2015, (3 w); Al
 Majma'a, 25.93294°N, 45.29779°E, 736 m, vi.2014, (3 w); Al Majma'a, 25.92384°N,
 45.38035°E, 743 m, ii.2014, (5 w); Al Ghat, 26.02495°N, 44.93650°E, 670 m, vi.2014, (3 w); Al
 Ghat, 26.06582°N, 44.91929°E, 653 m, x.2015, (2 w); Riyadh-Al Kharj Road, 24.29615°N,
 47.15553°E, 453 m, ix.2014, (4 w); W. Al Dawasir, 20.49055°N, 44.79462°E, 721 m, ii.2015, (2
 w), previous material is collected by Salman, S. and deposited in KSMA; **Jazan Province:** Abu
 Arish, 17.01347°N, 42.80160°E, 90 m, iv.2012, (6 w); W. Shahdan, 17.45222°N, 42.71516°E,
 200 m, xi.2012, (5 w); W. Aljora near Abadan, 17.29263°N, 43.07010°E, 465 m, xi.2012, (7 w).
Eastern Province: Al Qatif, El Naft, 26.510278°N, 49.968889°E, 30 m, iii.2012, (2 w) All
 previous material is collected by Sharaf M. R. and deposited in KSMA; Wadi Shugub, 1390 m,
 iv.1983, (1 w); Al Tawlah, 1.iv.1983, (1 w); Annamas, 8.iv.1983, (1 w); Hufuf, 14.iv.1983, (1 w),
 previous material is collected by C. A. Collingwood and deposited in WMLC; **TANZANIA:**
 Kizimngani, 16.iii.1988, (M. J. Ways), (3 w); Sotale, x.1989, (Lohr), (2 w); Kanga, x.1989, (Lohr),
 (1 w). **UNITED ARAB EMIRATES:** Khor al-khwair, 25.95°N, 56.05°E, 08.iii-07.v.2007, (M.
 Hauser et al.), UAE13173, CASENT0264114 (1 w, KSMA); Sharjah, 25.35°N, 55.4°E, 28.ii-
 12.iv.2011, (M. Hauser et al.), UAE13028, CASENT0264785 (1 w, KSMA); W. Bih dam,
 25.8°N, 56.066667°E, 16-31.xii.2009, (M. Hauser et al.), UAE13123, CASENT0264962 (1 w,
 KSMA); Dubai, palm Deira trees by metro, 25.276°N, 55.300°E, 16.v.2012, (Wetterer J.), (2 w,
 #99, #107, KSMA); no locality, iii.2005, (Collingwood), UAE173, (1 w, WMLC);
ZIMBABWE: Bulawayo, 04.xii.1916, (G. Arnold) (18 Syntype w); Sawmills, 22.xi.1918, (G.
 Arnold), (3 w, 2 m); Victoria Falls, 09.xii.1914, (G. Arnold), (7 w).

Description

Head. In full-face view distinctly longer than broad with nearly parallel sides and feebly concave of straight posterior margin; clypeal carinae feebly developed, broadly separated and clearly divergent anteriorly; anterior clypeal margin feebly concave, without anterior sharp angles; antennae 11-segmented; scapes, when laid back straight from their insertions, failing to reach posterior margin of head; eye size variable ($EL\ 0.19-0.22 \times HW$), in profile consisting of an outer ring of ommatidia encloses one or two longitudinal rows of 2–4 ommatidia; in few specimens one or two ommatidia within the ring present; eyes distinctly situated in front of midlength of head sides in full-face view. **Mesosoma.** Promesonotum feebly convex in profile; metanotal groove distinctly impressed, with short cross-ribs; propodeal dorsum and declivity meeting in a rounded convexity. **Petiole.** Petiolar peduncle short, with a small anteroventral process in profile; petiolar node low-subconical in profile. **Postpetiole.** Postpetiole smaller than petiole, lower and broadly convex dorsally in profile. **Sculpture.** Entire body smooth and shining, except for metanotal cross-ribs on sides of metanotal groove. **Pilosity.** All body surfaces with standing hairs, pronotum with a single pair on anterior margin between humeral pair; promesonotum usually with four pairs of hairs but in many specimens a fifth pair present; propodeum without hairs or with one or two pairs of hairs. **Color.** Variable, from uniform yellow to uniform dark brown, frequently with a pair of brown patches or a darker band apically on first gastral tergite.

Note

Aldawood and Sharaf (2011) described *M. dryhimi* from Al Baha Province (KSA) based on the worker caste. Comparing the type material of *M. dryhimi* and *M. montanum* with *M. exiguum* revealed that they have similar body size and color, in addition to the possession of the following characters: eyes of moderate size, with an outer ring of ommatidia encloses one or two longitudinal rows of 2–4 ommatidia; metanotal groove impressed, with distinct cross-ribs; all body surfaces with standing hairs, pronotum with a single pair on anterior margin between humeral pair; posterior half of first gastral tergite brown; body smooth and shining. Herein, we treat *M. dryhimi* and *M. montanum* as junior synonyms of *M. exiguum*.

Biological and Ecological notes

This species is by far the most common Arabian species of the *M. monomorium*-group, and it appears to be very flexible in its ecological requirements since it occurs in numerous habitats throughout the Arabian Peninsula. It was found living in humid soil, leaf litter, under rocks, and under bark. Once it was even collected from inside galleries of a *Camponotus* sp. colony.

Furthermore, *M. exiguum* was found in a variety of agricultural landscapes and human settlements, very often in close proximity to trees or other vegetation.

Geographic range

Even though this species was originally described from Ethiopia (Forel, 1894), *M. exiguum* is extremely widespread (Table 1) since it occurs in much of the Afrotropical Region (Bolton, 1987; Sharaf et al., 2017), the Malagasy Region (Heterick, 2006), and the Mediterranean Basin (Gómez & Espadaler, 2006, Sharaf, 2006). As mentioned above, this species is also broadly distributed throughout the Arabian Peninsula, and is considered as the commonest species of the *M. monomorium*-group in the region. The first record from the Arabian Peninsula was from the KSA (Aldawood & Sharaf, 2009) while later records from the UAE, Oman, and Yemen (Collingwood et al. 2011) were published under the name *M. baushare* Collingwood & Agosti, 1996 that was recently synonymized under *M. exiguum* (Sharaf et al., 2017).

Monomorium holothir [Bolton, 1987](#), Figure 9

Monomorium holothir Bolton, 1987: 393 (w.)

Type material examined

Holotype, pinned worker, **KENYA**: Lake Baringo, 1.XII 1983 (L. Darlington) (BMNH: CAsENT0902243). **Paratype**, pinned worker with same data as holotype (BMNH).

Non-type material examined

KSA: Jazan, 16.97627°N, 42.61743°E, alt. 38 m, 12.iv.2012, (Sharaf M. R.) (4 w, KSMA) (CAsENT0906392); Jazan, Abu Arish, 17.01347°N, 42.80160°E, alt. 90 m, 10.iv.2012, (Sharaf M. R.) (1 w, KSMA); Jazan, Zabia, 17.10745°N, 42.65026°E, alt. 43 m, 9.iv.2012, (Sharaf M. R.) (4 w, KSMA).

Description

Head. In full-face view distinctly longer than broad with feebly convex sides behind eyes and nearly straight or feebly concave posterior margin; clypeal carinae sharply developed; anterior clypeal margin feebly concave; antennae 12-segmented; scapes failing to reach posterior margin of head; eyes relatively large ($EL\ 0.30 \times HW$), with 7-9 ommatidia in longest row; in profile eye length clearly greater than distance between anteriormost point of eyes and nearest point of mandibular insertion. **Mesosoma.** Promesonotum feebly convex in profile; metanotal groove distinctly impressed, with distinct cross-ribs; propodeal dorsum and declivity meeting in a rounded convexity; propodeal spiracle small and pinhole-like. **Petiole.** Petiolar node high, subconical and with narrowly rounded dorsum in profile. **Sculpture.** Entire body smooth and shining, except for metanotal cross-ribs on sides of metanotal groove. **Pilosity.** All body surfaces

with abundant long-standing hairs; promesonotum with more than six pairs of hairs; propodeum with four pairs of hairs. **Color.** Variable, from yellow to brown-yellow.

Biological and Ecological notes

This species was collected from mangos, *Mangifera* sp. ([Anacardiaceae](#)) imported from Kenya and this provides the context for the present record. It was also found in leaf litter next to *Calotropis procera* ([Aiton](#)) [W.T.Aiton](#) ([Asclepiadaceae](#)). Some workers were found nesting in a thin layer of clay soil above sandy soil, while several workers were collected from leaf litter under a *Conocarpus* [L.](#) tree ([Combretaceae](#)).

Geographic range

Monomorium holothir is a comparatively rare species originally described from Kenya and prior to this study only known from the type locality (Bolton, 1987; Hita Garcia et al, 2013). Our collections represent a new species record for KSA, and it is highly likely an introduction to the country.

Monomorium mohammedi Sharaf & Hita Garcia sp. n., Figure 10

Type material

Holotype, pinned worker, **KSA**: Almajardah, Wadi Khat, 19.08913°N, 41.97126°E, alt. 513 m, 10.xi.2012, (Sharaf M. R.) (KSMA: CASENT0823774). **Paratypes**, six pinned workers: **KSA**: 2 w, with same data as the holotype (KSMA); 3 w, Jazan, Wadi Shahdan, 17.45222°N, 42.71516°E, alt. 200 m, 13.xi.2012, (Sharaf M. R.) (1 in CASC: CASENT0922351, 2 in KSMA); 1 w, Jazan, Abu Arish, 17.01347°N, 42.80160°E, alt. 90 m, 10.iv.2012, (Sharaf M. R.) (WMLC).

Measurements

Holotype: TL 1.37; HL 0.41; HW 0.31; SL 0.25; EL 0.04; EM 0.09; ML 0.42; PW 0.19; PTL 0.15; PTW 0.08; PTH 0.11; PPL 0.07; PPW 0.08; PPH 0.08; CI 76; EI 13; SI 81.

Paratypes (n = 7): TL 1.32–1.53; HL 0.38–0.44; HW 0.29–0.32; SL 0.26–0.29; EL 0.04–0.05; EM 0.09–0.11; ML 0.36–0.44; PW 0.18–0.21; PTL 0.08–0.11; PTW 0.07–0.08; PTH 0.09–0.12; PPL 0.05–0.07; PPW 0.08; PPH 0.08; CI 71–82; EI 13–17; SI 88–97.

Diagnosis. *Monomorium mohammedi* can be readily diagnosed by the combination of the following characters: eyes distinctly small, with 5–6 ommatidia; mesosoma, petiole, and postpetiole without standing hairs; mesopleuron, metapleuron, petiole and postpetiole finely shagreened.

Description

Worker. Head. In full-face view distinctly longer than broad with shallowly convex or nearly parallel sides and clearly concave posterior margin in full-face view; median clypeal portion

without carina or anterolateral angles, anterior clypeal margin feebly concave; antenna 11-segmented; scapes short, when laid straight back, just surpassing midlength of head (SI 88–97); mandibles armed with three teeth, decreasing in size from apex to base; eyes oval, tiny, (EL 0.13–0.15 × HW) with 5 ommatidia, set in front of midlength of head; frontal lobes farther apart in full-face view; underside of head with six scattered short hairs. **Mesosoma.** In profile with a flat promesonotal dorsum, which slopes posteriorly to a well-defined metanotal groove; propodeal spiracles small and pinhole-like; propodeal dorsum evenly sloping posteriorly to short declivity. **Petiole:** Node massive, narrowly rounded above, and little higher than postpetiolar node in profile; anterior peduncle short; ventral petiolar surface below node broadly convex extending anteriorly to form a blunt broad dent. **Postpetiole.** Node small with convex dorsal margin; postpetiole as high as broad. **Sculpture.** Cephalic surface smooth and shining; mandibles smooth and shining, with faint striations on the outer margin; mesosoma dorsum and propleuron smooth and shining; meso- and metapleuron finely shagreened; metanotal cross ribs distinct; petiole and postpetiole with traces of superficially shagreened sculpture, but never smooth; gaster smooth and shining. **Pilosity.** Underside of head without hairs; cephalic surface with scattered minute hair-pits; anterior clypeal margin and mandibles with longer hairs; antennae with abundant appressed hairs; mesosoma without hairs, only rare appressed pubescence; petiole and postpetiole without hairs, only few appressed pubescence dorsally; gaster with scattered appressed pubescence, few longer hairs on the last gastral tergites. **Color.** Overall uniform clear yellow, mandibular teeth light brown.

Differential diagnosis

This new species is closest to *M. guillarmodi* Arnold, 1946 from Lesotho in terms of the small body size, tiny eyes, 11-segmented antennae, lack of hairs on mesosoma, and the smooth body. However, *M. mohammedi* is readily separated from *M. guillarmodi* by the following characters: the posterior margin of head without hairs and concave in full-face view, petiole and postpetiole without hairs, median clypeal portion without anterolateral angles or carina, scape relatively longer (SI 81–97), whereas *M. guillarmodi* has a transverse posterior head margin with 1–2 pairs of hairs, petiole and postpetiole each with a single pair of hairs, median clypeal portion prominent with well-defined anterolateral angles and distinct carina, and scape shorter (SI less than 80). Among the Arabian species of the *M. monomorium*-group only three species have 11-segmented antennae: *M. mohammedi*, *M. clavicorne* and *M. aeyade*. *Monomorium mohammedi* is easily separated from *clavicorne* by its smaller eyes, smaller terminal funicular segment, and lack of

mesosomal pilosity, whereas *clavicorne* has larger eyes, greatly swollen terminal funicular segments, and abundant hairs on the mesosoma.

When comparing *M. mohammedi* with *M. aeyade*, both lack hairs on the mesosoma but *M. mohammedi* can be immediately separated by its smaller eyes with only 5 ommatidia that are situated distinctly further apart from the mandibular insertions (EM 0.09–0.11), the finely shagreened meso- and metapleuron, the hairless petiole and postpetiole, whereas *M. aeyade* has larger eyes (EL $0.24 \times \text{HW}$), with a ring of ommatidia encircling a single row of 2 ommatidia that are situated closer to the mandibular insertions (EM 0.05); meso- and metapleuron smooth, and petiole and postpetiole each with one pair of hairs.

Biological and Ecological notes

The new species was collected from leaf litter under a *Hyphaene* tree ([Arecaceae](#)) and another nest series was found in a thin layer of clay soil above sandy soil under a Mango tree.

Geographic range

So far, the new species is only known from the type locality.

Etymology

The name of the new species is a patronym in honor of Mohammed Sharaf, the eight year old son of the senior author.

***Monomorium sarawatense* Sharaf & Aldawood, 2013, Figure 11**

Monomorium sarawatensis Sharaf & Aldawood, 2013: 70, figs. 5-15 (w).

Type material examined

Holotype, pinned worker, **KSA**: Al-Baha Province, Aqabet Al-Baha-Tihama, 20.00000°N, 41.43758°E, 1300 m, 19.iv.2012 (Sharaf M. R.) (KSMA). **Paratypes**, 26 pinned workers with same data as holotype (one in BMNH, 25 in KSMA).

Non-type material examined

KSA: Al Baha Province, Aqabet Al-Baha-Tihama, 20.00000°N, 41.43758°E, 1300 m, 19.iv.2012 (Sharaf M. R.) (21 w, KSMA); Shada Al A'la, 19.8511°N, 41.300617°E, 1325 m, 2.iii.2015, (Al Dhafer et al.) (1 w, KSMA); Asir Province: Raydah, 18.1961°N, 42.40525°E, 2285 m, 26.iii.2014, Malaise trap (Al Dhafer et al.) (1 w, KSMA).

Description

Head. Distinctly longer than broad, with nearly straight posterior margin and shallowly convex sides; anterior clypeal margin feebly concave between a pair of obtusely projecting angles; clypeal carinae broadly separated and subparallel; antenna 12-segmented; scapes, when laid back from their insertions, fail to reach posterior margin of head; eyes with five-six ommatidia in

longest row (EL 0.17–0.22 × HW); with head in profile the posterior margins of eyes at midlength of sides. **Mesosoma.** In profile with promesonotum straight or feebly convex; metanotal groove deep and broad; propodeal dorsum making weak obtuse angle with propodeal declivity; propodeal spiracle small and pinhole-like. **Petiole.** Petiolar node high and acuminate in profile, petiolar peduncle thick and short. **Postpetiole.** In dorsal view clearly broader than long. **Sculpture.** Cephalic dorsum smooth and shining; genae faintly longitudinally striate; mesosoma densely reticulate-punctate except for pronotal sides, which are nearly smooth and shining; petiole and postpetiole densely reticulate-punctate. **Pilosity.** Body pilosity clubbed; cephalic dorsum with few scattered hair-pits; mesosomal pilosity few and sparse, two pairs of erect setae on pronotum, five or more on mesonotum, three on propodeum, petiole usually with two pairs of erect setae. **Color.** Uniformly yellow.

Biological and Ecological notes

[Monomorium sarawatense](#) was found nesting inside woody fruits of *Annona squamosa* L. (*Annonaceae*).

Geographic range

Based on current knowledge, this species is endemic to the southwestern Mountains of the KSA.

DISCUSSION

The previously documented number of species of the *M. monomorium*-group from the Arabian Peninsula was six: *M. aeyade*, *M. clavicorne*, *M. dryhimi*, *M. exiguum*, *M. montanum*, and [M. sarawatense](#) (Collingwood, 1985; Collingwood & Agosti, 1996; Aldawood & Sharaf, 2009; Aldawood & Sharaf, 2011; El-Hawagry et al., 2013; Sharaf et al., 2015 & Sharaf et al., 2017). In this study, the number of species remains six due to some taxonomic amendments, additional records, and the descriptions of *M. mohammedi* sp. n.

Within the *M. monomorium* group, *M. exiguum* is one of the most broadly distributed species due to its ability to inhabit a broad range of habitats in the region. The species is widespread in the central and southwestern regions of the KSA, Oman and the UAE but it is highly likely that it has a similar broad geographical distribution in other unexplored areas of the Arabian Peninsula. In addition, the species has a wide distribution range in the Afrotropical region (Table 1). The recent synonymies of some Arabian species under *M. exiguum* (Sharaf et al., 2017), as well as the ones suggested in this study, reveal a remarkable size and color variation, which has led to erroneous species descriptions in the past. During the present work, it was observed that some nest series

are uniform yellow, or with brown transverse bands on the first and second gastral tergites, whereas other series have brown heads and yellow-brown gastral tergites. These variations were already noted by Bolton (1987) for the Afrotropical fauna. These morphological variations should be taken into consideration in future studies that will treat the *M. monomorium* group in the region, especially those concerning descriptions of new species, in order to avoid possible synonymies. Considering the challenging morphological species delimitations, integrative approaches combining morphological and molecular techniques might provide a more comprehensive taxonomic system (Schlick-Steiner et al., 2010).

The distribution of the three species *M. holothir*, *M. mohammedi*, and *M. sarawatense* appears to be confined to the southwestern region of the KSA. The latter region is known for its Afrotropical affinities (Bolton, 1994; Eig, 1938; Zohary, 1973; Aldawood et al., 2011; Sharaf & Aldawood, 2012; Sharaf et al., 2012a, b; El-Hawagry et al., 2013, Sharaf & Aldawood, 2013), and the newly recorded *Monomorium holothir*, a species previously only known from Kenya, emphasizes this Afrotropical influence.

We hope that this work will help regional researchers with the identification of this rather challenging group of ants and we also expect adding more material including new records and undescribed species with further surveys of poorly collected areas of the region.

Conclusions. The Arabian ant fauna of the *Monomorium monomorium* species group is revised, keyed and illustrated based on the worker caste. Six species are treated with description of a new species *M. mohammedi* sp. n. from the southwestern region of the KSA.

ACKNOWLEDGEMENTS

We thank Brian Heterick and an anonymous reviewer for useful comments. We are grateful to Brian Fisher and Michele Esposito for imaging species. Mostafa Sharaf thanks Stephen Judd and Tony Hunter for the help during the visit to the World Museum Liverpool, U. K. Special thanks to Boris Kondratieff for careful editing of earlier version of the manuscript. Thanks also to Andrew Polaszek for proving some material from Oman.

REFERENCES

- Aldawood AS, Sharaf MR. 2009. Two ant species (Hymenoptera: Formicidae) as new records to fauna of Saudi Arabia. *Bulletin of Entomological Society of Egypt* 86: 143–147.
- Aldawood SA, Sharaf MR. 2011. *Monomorium dryhimi* sp. n., a new ant species (Hymenoptera, Formicidae) of the *M. monomorium* group from Saudi Arabia, with a key to the Arabian *Monomorium monomorium*-group. *ZooKeys* 106:47–54.

- 672 Aldawood AS, Sharaf MR, Taylor B. 2011. First record of the myrmicine ant genus *Carebara*
673 Westwood, 1840 (Hymenoptera, Formicidae) from Saudi Arabia with description of a new
674 species *C. abuhurayri* sp. n. *ZooKeys* 92: 61–69.
675 <http://dx.doi.org/10.3897/zookeys.92.770>
- 676 André E. 1881. Catalogue raisonné des Formicides provenant du voyage en Orient de M. Abeille
677 de Perrin et description des espèces nouvelles. *Annales de la Société Entomologique de*
678 *France* (6)1:53–78.
- 679 Bolton B. 1987. A review of the *Solenopsis* genus-group and revision of
680 Afrotropical *Monomorium* Mayr (Hymenoptera: Formicidae). *Bulletin of the British*
681 *Museum (Natural History). Entomology* 54:263–452. Bolton B. 1994. *Identification*
682 *Guide to the Ant Genera of the World*: Cambridge, Mass, 222 pp.
- 683 Bolton B. 2017. An online catalog of the ants of the world. Available at <http://antcat.org/>
684 [accessed 25 May 2017].
- 685 Brandão CRF. 2000. Specimen processing, building and curating an ant 797 collection Major
686 regional and type collections of ants (Formicidae) of the world and 798 sources for the
687 identification of ant species. In: Agosti D. et al. (eds) *Ants. Standard 799 Methods for*
688 *Measuring and Monitoring Biodiversity*. Biological Diversity Handbook 800 Series 3:
689 17255–18571. Smithsonian Institution Press, Washington and London.
- 690 Brown WL Jr. 2000. *Diversity of ants*. Pp 45–79. In: Agosti et al. (eds.) *Ants. Standard methods*
691 *for measuring and monitoring biodiversity*, Biological diversity hand book series.
692 Smithsonian Institution Press, Washington D. C. 280 pp.
- 693 Collingwood CA. 1985. Hymenoptera: Fam. Formicidae of Saudi Arabia. *Fauna of Saudi Arabia*
694 7: 230–302.
- 695 Collingwood CA, Agosti D. 1996. Formicidae (Insecta: Hymenoptera) of Saudi Arabia (part 2).
696 *Fauna of Saudi Arabia* 15:300–385.
- 697 Collingwood CA, Agosti D, Sharaf MR, Harten A. 2011. Order Hymenoptera, Family
698 Formicidae. *Arthropod Fauna of the United Arab Emirates* 4: 405–474.
- 699 Eig A. 1938. Taxonomic studies on the Oriental species of the genus *Anthemis*. *Palestine Journal*
700 *of Botany, Jerusalem* 1: 161–224.
- 701 El-Hawagryi MS, Khalil MW, Sharaf MR, Fadl HH, Aldawood AS. 2013. A preliminary study on
702 the insect fauna of Al-Baha Province, Saudi Arabia, with descriptions of two new species.
703 *Zookeys* 274:1–88.

- Emery C. 1908. Beiträge zur Monographie der Formiciden des paläarktischen Faunengebietes. (Hym.) Teil V. *Deutsche Entomologische Zeitschrift* **1908**:663–686.
- Emery C. 1922. Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. [part]. *Genera Insectorum* **174B**:95–206.
- Evenhuis, N. L. 2009. The Insect and Spider Collections of the World Website. <http://hbs.bishopmuseum.org/codens/>. [accessed 3 December 2017].
- Forel A. 1894. Abessinische und andere afrikanische Ameisen, gesammelt von Herrn Ingenieur Alfred Ilg, von Herrn Dr. Liengme, von Herrn Pfarrer Missionar P. Berthoud, Herrn Dr. Arth. Müller etc. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **9**:64–100.
- Forel A. 1913a. Quelques fourmis du Musée du Congo Belge (1). *Annales de la Société Entomologique de Belgique* **57**:347–359.
- Forel A. 1913b. Ameisen aus Rhodesia, Kapland usw. (Hym.) gesammelt von Herrn G. Arnold, Dr. H. Brauns und Anderen. *Deutsche Entomologische Zeitschrift* **1913**(Suppl.):203–225.
- Forel A. 1916. Fourmis du Congo et d'autres provenances récoltées par MM. Hermann Kohl, Luja, Mayné, etc. *Revue Suisse de Zoologie* **24**:397–460.
- Gómez K, Espadaler X. 2006. Exotic ants (Hymenoptera: Formicidae) in the Balearic Islands. *Myrmecologische Nachrichten* **8**:225–233.
- Heterick BE. 2001. Revision of the Australian ants of the genus *Monomorium* (Hymenoptera: Formicidae). *Invertebrate Taxonomy* **15**:353–459.
- Heterick B. 2006. A revision of the Malagasy ants belonging to genus *Monomorium* Mayr, 1855 (Hymenoptera: Formicidae). *Proceedings of the California Academy of Sciences* **(4)** **57**:69–202.
- Hita Garcia F, Wiesel E, Fischer G. 2013. The Ants of Kenya (Hymenoptera: Formicidae) - Faunal overview, first species checklist, bibliography, accounts for all genera, and discussion on taxonomy and zoogeography. *Journal of East African Natural History* **101**(2):127–222.
- Janicki J, Narula N, Ziegler M, Guénard B, Economo EP. 2016. Visualizing and interacting with large-volume biodiversity data using client–server web-mapping applications: the design and implementation of antmaps.org. *Ecological Informatics* **32**:185–193.
- Mayr G. 1904. Formiciden aus Ägypten und dem Sudan. In: Jägerskiöld, L. A. 1904. *Results of the Swedish Zoological Expedition to Egypt and the White Nile*, 1901. Part 1 (no. 9). Uppsala: Library of the Royal University of Uppsala, 11 pp.

- 737 Santschi F. 1915a. Nouvelles fourmis d'Algérie, Tunisie et Syrie. *Bulletin de la Société d'Histoire*
738 *Naturelle de l'Afrique du Nord* **6**:54–63.
- 739 Santschi F. 1915b. Nouvelles fourmis d'Afrique. *Annales de la Société Entomologique de France*
740 **84**:244–282.
- 741 Santschi F. 1937. Résultats de la Mission scientifique suisse en Angola (2me voyage) 1932-1933.
742 Fourmis angolaises. *Revue Suisse de Zoologie* **44**:211–250.
- 743 Sarnat EM, Economo EP. 2012. The ants of Fiji. *University of California Publications in*
744 *Entomology* **132**:1–384.
- 745 Schlick-Steiner BC, Steiner FM, Seifert B, Stauffer C, Christian E, Crozier RH. 2010. Integrative
746 taxonomy: a multisource approach to exploring biodiversity. *Annual Review of*
747 *Entomology* **55**: 21–438.
- 748 Sharaf MR. 2006. *Taxonomic and Ecological Studies on Family Formicidae (Order:*
749 *Hymenoptera) in Egypt including some Protectorates with a Study of some Insect Fauna*
750 *associated with Ant Species*. Ain Shams University, Faculty of Science, Entomology
751 Department, Cairo, 340 pp. [unpublished thesis].
- 752 Sharaf MR, Aldawood AS. 2012. A new ant species of the genus *Tetramorium* Mayr, 1855
753 (Hymenoptera, Formicidae) from Saudi Arabia, including a revised key to the Arabian
754 species. *PLoS ONE* **7** (2), e30811. <http://dx.doi.org/10.1371/journal.pone.0030811>
- 755 Sharaf MR, Aldawood AS. 2013. First occurrence of the *Monomorium hildebrandti*-group
756 (Hymenoptera: Formicidae), in the Arabian Peninsula, with description of a new species
757 *M. kondratieffi* n. sp. *Proceedings of the Entomological Society of Washington* **115** (1):
758 75–84.
- 759 Sharaf MR, Aldawood AS, El-Hawagry MS. 2012a. A new ant species of the genus *Tapinoma*
760 (Hymenoptera, Formicidae) from Saudi Arabia with a key to the Arabian species.
761 *ZooKeys* **212**: 35–43. <http://dx.doi.org/10.3897/zookeys.212.3325>
- 762 Sharaf MR, Aldawood AS, El-Hawagry MS. 2012b. First record of the ant subfamily Aenictinae
763 (Hymenoptera, Formicidae) from Saudi Arabia, with the description of a new species.
764 *ZooKeys* **228**: 39–49. <http://dx.doi.org/10.3897/zookeys.228.3559>
- 765 Sharaf MR, Collingwood CA, Al Dhafer HM, Al mutairi MS, Aldawood AS. 2015. New
766 synonyms of two Arabian ants of the genus *Monomorium* Mayr, 1855 (Hymenoptera,
767 Formicidae). *ZooKeys* **505**: 51–58.

768 Sharaf MR, Fisher BL, Collingwood CA, Aldawood SA. 2017. Ant fauna (Hymenoptera:
769 Formicidae) of the Socotra Archipelago (Yemen): zoogeography, distribution and
770 description of a new species. *Journal of Natural History* **51(5-6)**:317–378.
771 Terayama M. 2009. A synopsis of the family Formicidae of Taiwan (Insecta: Hymenoptera).
772 Research Bulletin of Kanto Gakuen University. *Liberal Arts* **17**:81–266.
773 Wheeler W. M. 1922. Ants of the American Museum Congo expedition. New York: *Bulletin of*
774 *the American Museum of Natural History* 1139.
775 Zohary M. 1973. *Geobotanical foundations of the Middle East*. Vols. 1–2. G. Fischer, Stuttgart,
776 Swets & Zeitlinger, Amsterdam, 738 pp.

777 Figure Legends

778 **Figure 1.** Body profile of *M. exiguum* Forel (CASENT0922302,
779 from www.AntWeb.org

780 - Michele Esposito) illustrating the used measurements.

781 **Figure 2.** Body in dorsal view of *M. exiguum* Forel (CASENT0922344,
782 from www.AntWeb.org

783 - Michele Esposito) illustrating the used measurements.

784 **Figure 3.** Head in full-face view of *M. holothir* Bolton (CASENT0906392,
785 from www.AntWeb.org

786 -Estella Ortega) illustrating the used measurements.

787 **Figure 4.** Distribution maps showing the known distribution ranges of the treated species on the
788 Arabian Peninsula, except for *M. aeyade* Collingwood & Agosti, for which no exact locality data
789 exists **A** Distribution range of *M. exiguum* Forel (yellow circles). **B** Distribution ranges of *M.*
790 *clavicorne* André (red triangles), *M. holothir* Bolton (yellow squares), *M. mohammedi* **sp. n.**
791 (gree circles), and *M. sarawatense* Aldawood & Sharaf (blue circles).

792 **Figure 5.** Body in profile showing eyes, pilosity and sculpture on mesosoma and waist segments.

793 **A** *M. aeyade* (CASENT0922329,

794 from www.AntWeb.org- Michele Esposito). **B** *M. mohammedi* (CASENT0922351, Antweb, –
795 photographer: Michele Esposito). **C** *M. sarawatense* (CASENT0280971,

796 from www.AntWeb.org, photographer: Estella Ortega). **D** *M. clavicorne* (CASENT0823774). **E**

797 *M. exiguum* (CASENT0922344, Antweb - photographer:Michele Esposito). **F** *M. holothir*

798 (CASENT0906392,

799 from www.AntWeb.org, photographer: Estella Ortega).

Figure 6. *Monomorium aeyade* (CASENT0922329,

from www.AntWeb.org, photographer: Michele Esposito). **A** Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

Figure 7. *Monomorium clavicorne* (photographer: Francisco Hita Garcia). **A** Body in profile. **B**

Body in dorsal view. **C** Head in full-face view.

Figure 8. *Monomorium exiguum* (CASENT0922344,

from www.AntWeb.org, photographer: Michele Esposito). **A** Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

Figure 9. *Monomorium holothir* (CASENT0906392,

from www.AntWeb.org, photographer: Estella Ortega). **A** Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

Figure 10. *Monomorium mohammedi* **sp. n.** (CASENT0922351,

from www.AntWeb.org, photographer: Michele Esposito). **A** Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

Figure 11. *Monomorium sarawatense* (CASENT0280971,

from www.AntWeb.org, photographer: Estella Ortega). **A** Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

List of tables:

Table 1. List of species with known distribution ranges. Data extracted from Antmaps

(<http://antmaps.org>; Janicki et al. 2016)

Figure 1

Body profile of *M. exiguum* Forel (CASENT0922302, from www.AntWeb.org - Michele Esposito) illustrating the used measurements

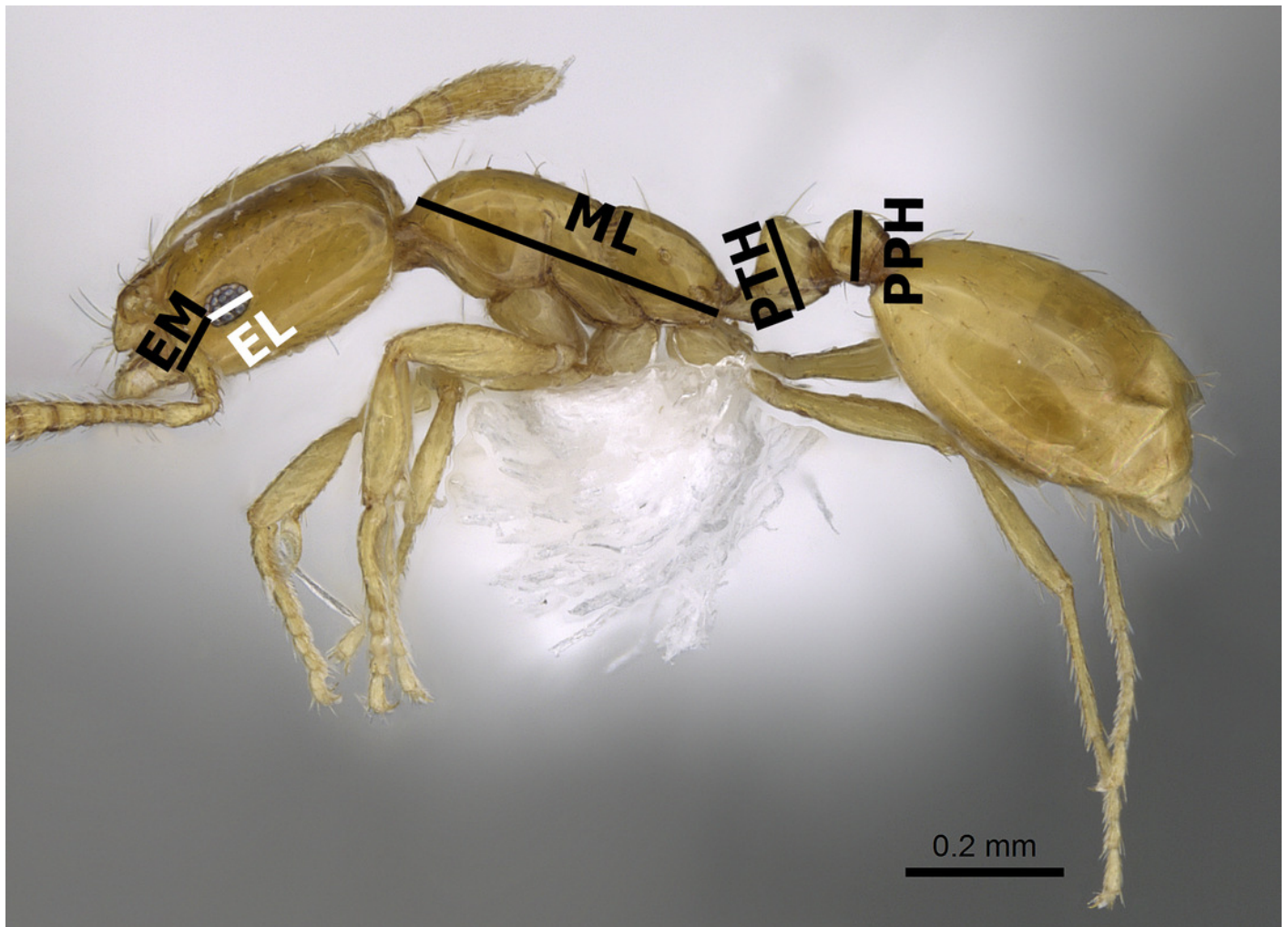


Figure 2

Body in dorsal view of *M. exiguum* Forel (CASENT0922344, from www.AntWeb.org - Michele Esposito) illustrating the used measurements.

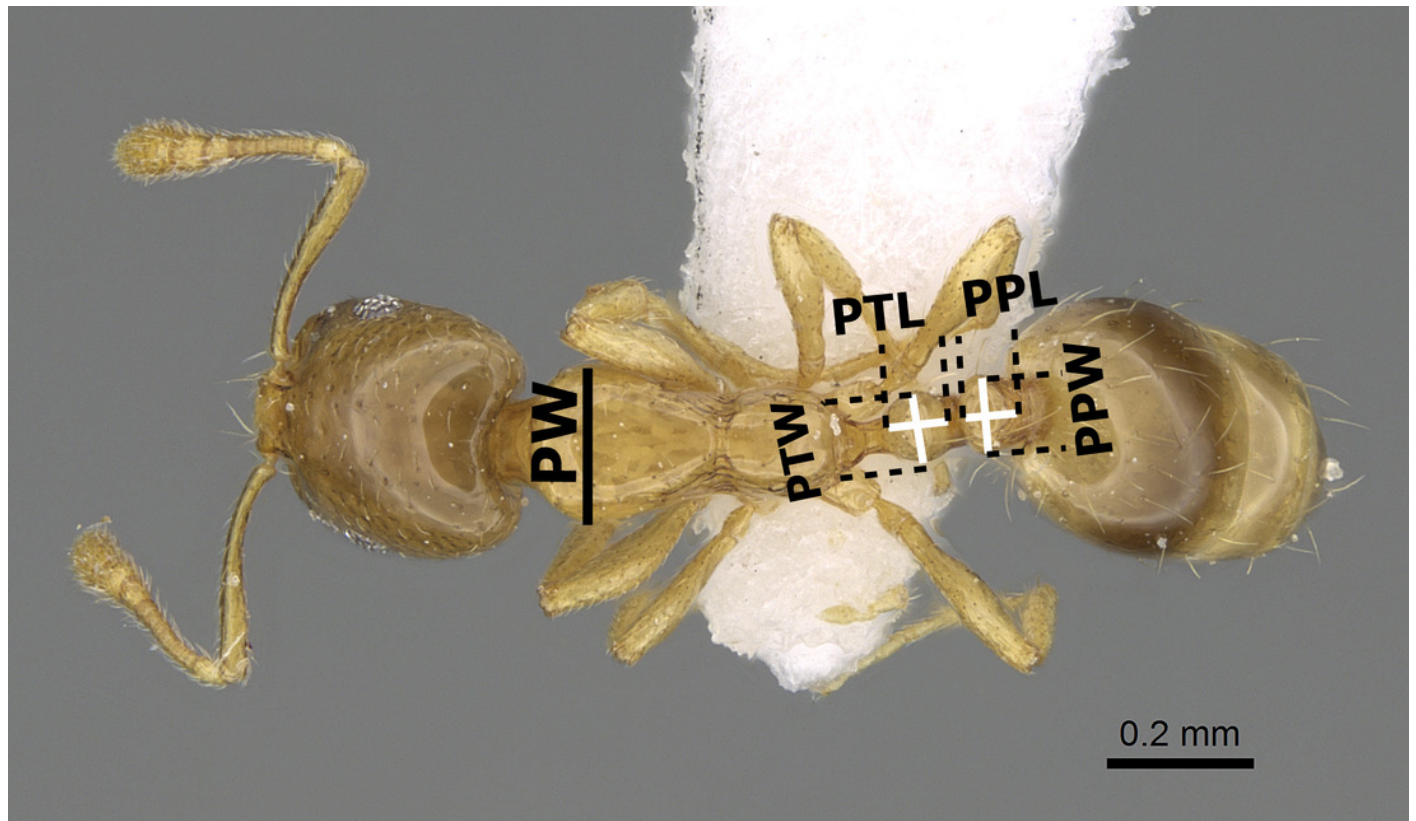


Figure 3

Head in full-face view of *M. holothir* Bolton (CASENT0906392, from www.AntWeb.org - Estella Ortega) illustrating the used measurements.

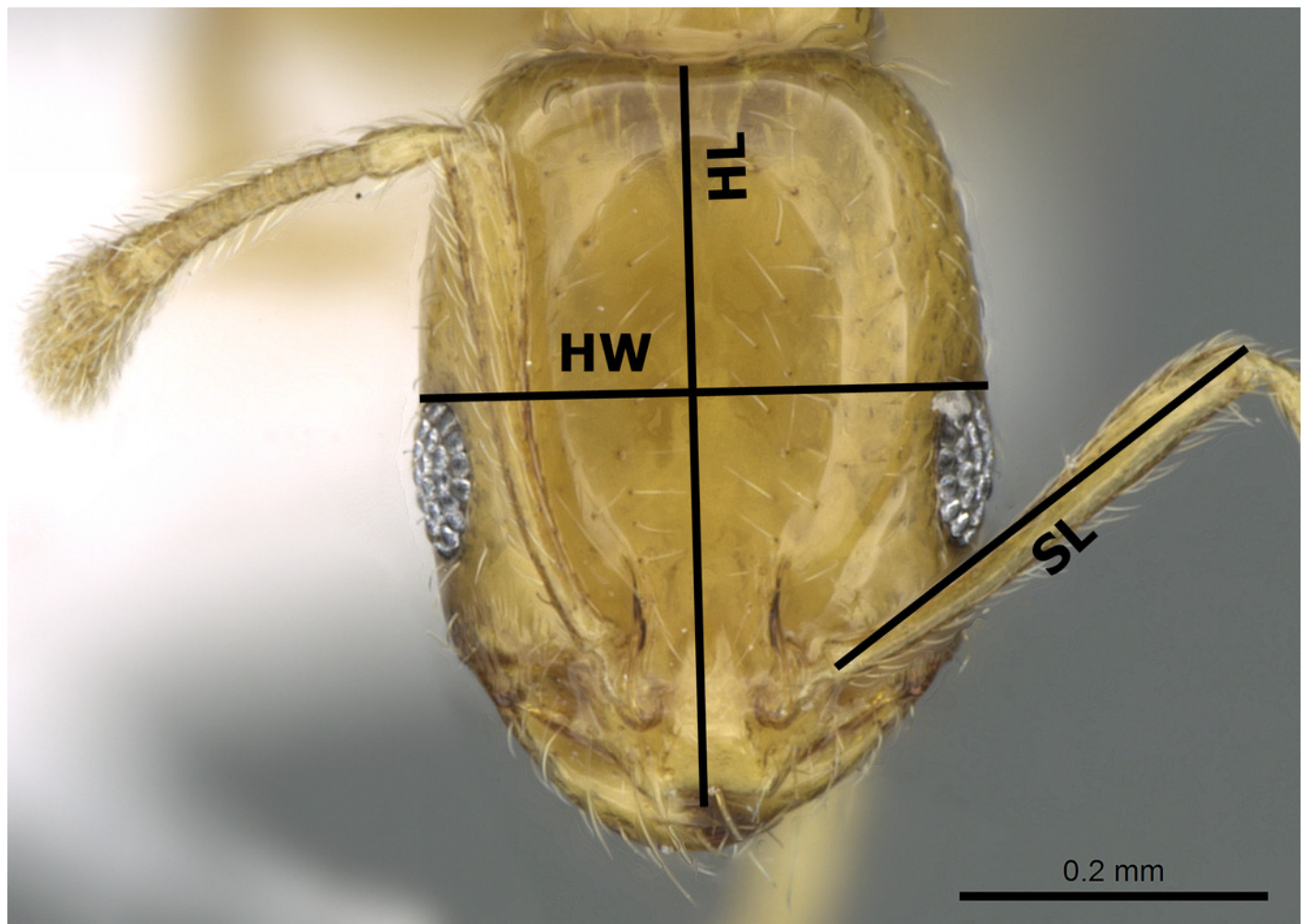


Figure 4

Distribution maps showing the known distribution ranges of the treated species on the Arabian Peninsula, except for *M. aeyade* Collingwood & Agosti, for which no exact locality data exists.

A Distribution range of *M. exiguum* Forel (yellow circles). **B** Distribution ranges of *M. clavicorne* André (red triangles), *M. holothir* Bolton (yellow squares), *M. mohammedi* **sp. n.** (green circles), and *M. sarawatense* Aldawood & Sharaf (blue circles).

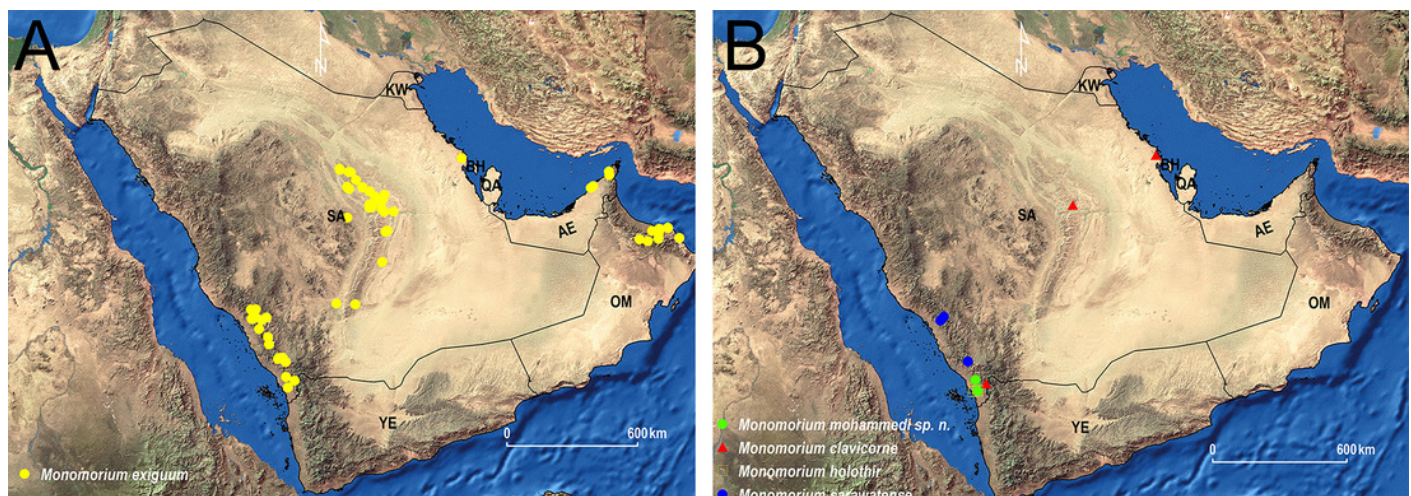


Figure 5

Body in profile showing eyes, pilosity and sculpture on mesosoma and waist segments.

A *M. aeyade* (CASENT0922329, from www.AntWeb.org- Michele Esposito). **B** *M. mohammedi* (CASENT0922351, Antweb, - photographer: Michele Esposito). **C** *M. sarawatense* (CASENT0280971, from www.AntWeb.org, photographer: Estella Ortega). **D** *M. clavicorne* (CASENT0823774). **E** *M. exiguum* (CASENT0922344, Antweb - photographer:Michele Esposito). **F** *M. holothir* (CASENT0906392, from www.AntWeb.org, photographer: Estella Ortega).



Figure 6

Monomorium aeyade (CASENT0922329, from www.AntWeb.org, photographer: Michele Esposito).

A Body in profile. **B** Body in dorsal view. **C** Head in full-face view.



Figure 7

Monomorium clavicorne (CASENT0823774, photographer: Francisco Hita Garcia).

A Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

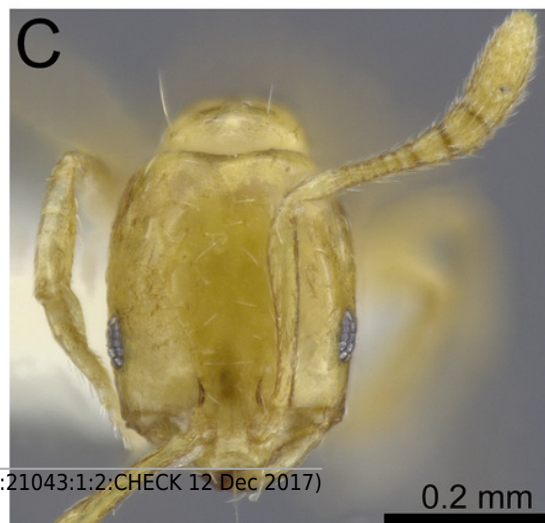


Figure 8

Monomorium exiguum (CASENT0922344, from www.AntWeb.org, photographer: Michele Esposito).

A Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

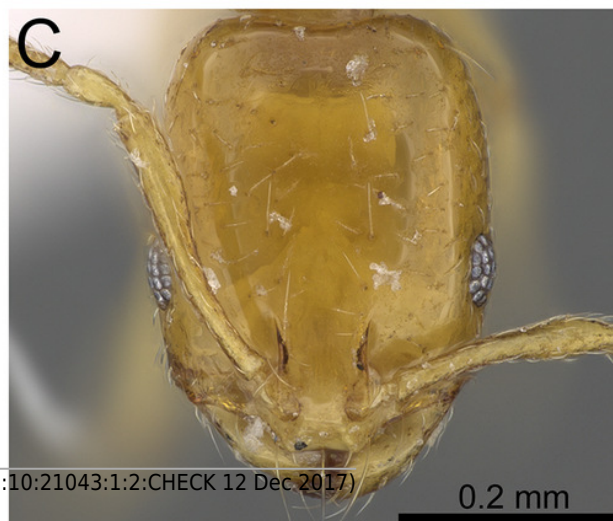


Figure 9

Monomorium holothir (CASENT0906392, from www.AntWeb.org, photographer: Estella Ortega).

A Body in profile. **B** Body in dorsal view. **C** Head in full-face view.



Figure 10

Monomorium mohammedi sp. n. (CASENT0922351, from www.AntWeb.org, photographer: Michele Esposito).

A Body in profile. **B** Body in dorsal view. **C** Head in full-face view.



Figure 11

Monomorium sarawatense (CASENT0280971, from www.AntWeb.org, photographer: Estella Ortega).

A Body in profile. **B** Body in dorsal view. **C** Head in full-face view.

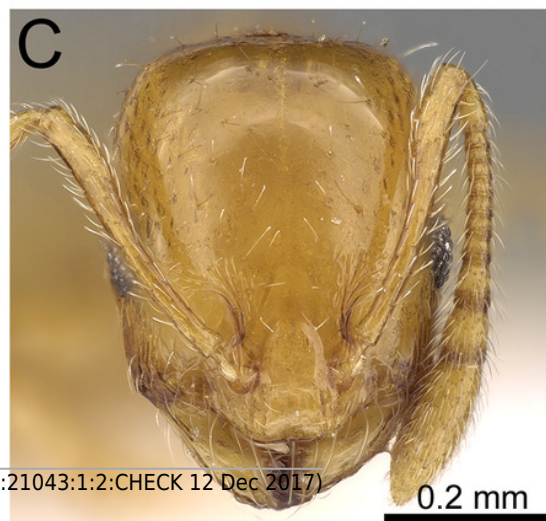


Table 1(on next page)

List of species with known distribution ranges. Data extracted from Antmaps (<http://antmaps.org>; Janicki et al. 2016).

Species	Distribution
<i>M. aeyade</i>	Oman
<i>M. clavicorne</i>	Egypt, Iran, Israel & Palestine, KSA, Lebanon, Morocco, Sudan, Syria, Tunisia, Turkey, United Arab Emirates
<i>M. exiguum</i>	Angola, Cameroon, Cape Verde, Central African Republic, Democratic Republic of Congo, Ethiopia, Gabon, Ghana, Guinea, Ivory Coast, Kenya, Iran, KSA, Madagascar, Mozambique, Nigeria, Oman, Spain, South Africa, Tanzania, Uganda, United Arab Emirates, Yemen, Zimbabwe
<i>M. holothir</i>	Kenya, KSA
<i>M. mohammedi</i>	KSA
<i>M. sarawatense</i>	KSA

1