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Tetramorium sericeiventre (Hymenoptera: Formicidae) on the Arabian Peninsula, with an evaluation of its ecology and global distribution

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ABSTRACT

Tetramorium sericeiventre Emery, 1877 is a widespread ant of Africa, Arabia, and neighbouring areas. Across its broad range, *T. sericeiventre* shows much variation and many different forms have been described. In the present study, we report additional site records of *T. sericeiventre* on the Arabian Peninsula, and provide information on species variation, habitat, behaviour, and distribution. In addition, we evaluate the global distribution of this species and present a taxonomic diagnosis of *T. sericeiventre* for facilitating species recognition. *Tetramorium sericeiventre* thrives in a wide variety of open habitats, ranging from intact natural areas to sites heavily disturbed by human activity. Genetic analyses would be useful in elicidating the relationships among the many different forms of *T. sericeiventre*.

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Afrotropical Region; Arabian Peninsula; habitat preference; Middle East; Myrmicinae; Palearctic Region

Introduction

Tetramorium sericeiventre Emery, 1877 is a widespread ant of Africa, Arabia, and neighbouring areas. Across its broad range, *T. sericeiventre* shows much variation and many different forms have been described (Hita Garcia and Fisher 2011; Figure 1). A total of 33 described taxa are now considered junior synonyms of *T. sericeiventre* (Bolton 1980; Hita Garcia and Fisher 2011).

Bolton (1979) wrote, '*T. sericeiventre* is perhaps the commonest member of its genus in Africa in arid or semi-desert conditions or in any locality where the soil is insolated, sandy and well drained. It occurs from the Mediterranean littoral to the Cape and from the western to the eastern coasts. In the Malagasy region it is decidedly less common and appears to take second place to *quadrispinosum*.' Hita Garcia and Fisher (2011), however, designated *T. quadrispinosum* to be a junior synonym of *T. sericeiventre*. The geographic range of *T. sericeiventre* also extends into the Arabian Peninsula and Iran (Collingwood 1985; Collingwood and Agosti 1996; Collingwood et al. 2011; Ghahari and Collingwood

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2011; El-Hawagry et al. 2013; Sharaf et al. 2013). Collingwood and Agosti (1996) wrote that *T. sericeiventre* 'is the most conspicuous species of the genus in southern Arabia.'

In the present study, we report additional site records of *T. sericeiventre* on the Arabian Peninsula, providing information on habitat, behaviour, and distribution. In addition, we evaluate the global distribution of this species and present a taxonomic diagnosis of *T. sericeiventre* for facilitating species recognition.

Material and methods

We examined *T. sericeiventre* collected in pitfall traps and by hand at many sites during King Saud University Museum of Arthropods entomological inventories at the different regions of the Kingdom of Saudi Arabia (KSA). In addition, using published and unpublished records, we documented the global range of *T. sericeiventre*. We obtained unpublished site records from on-line databases with collection information on specimens by Antweb (www.antweb.org). We also examined specimens from California Academy of Sciences (CASC, San Francisco, USA), King Saud University Museum of Arthropods (KSMA, Riyadh, KSA), Oxford University Museum (OUMC, Oxford, UK), World Museum Liverpool (WMLC, Liverpool, UK). We used carto.com to make distribution maps.

Results

Taxonomic diagnosis

***Tetramorium sericeiventre* Emery, 1877**

(Figures 1–2)

Tetramorium sericeiventre Emery, 1877: 370 (w.) Eritrea. Afrotropic.

For full synonymic history see Hita Garcia and Fisher (2011).

Identification. *Tetramorium sericeiventre* can be diagnosed by the following characters: frontal carinae short and feebly developed; metanotal groove absent; propodeal spines sharp; propodeal lobes long, usually of same length of propodeal spines; petiolar nodes rectangular, in profile with a feebly convex dorsum; cephalic surface, mesosoma (except propodeum), petiole, postpetiole, and gaster with sparse and stout standing hairs. Among Arabian *Tetramorium* species, *T. sericeiventre* can be confused with *T. khyarum* Bolton, 1980 from Nigeria in all morphological characters except the lack of the single pair of hairs on the propodeal dorsum.

Worker morphology. **Head**. Head distinctly longer than broad; anterior clypeal margin entire and convex; frontal carinae short and feebly developed; antennal scrobes absent; scapes when laid back from their insertions relatively long, surpassing posterior head margin; eyes small to moderate with 11 to 14 ommatidia in longest row. **Mesosoma**. Mesosomal profile flat; metanotal groove absent; propodeal spines sharp and narrow; propodeal lobes relatively long, usually of same length of propodeal spines. **Petiole**. Petiolar nodes rectangular, in profile with a feebly convex dorsum. **Postpetiole**. Postpetiole in profile rounded, distinctly higher than long, in dorsal view clearly broader than long, and broader than petiolar node. **Sculpture**. Mandibles longitudinally striate or

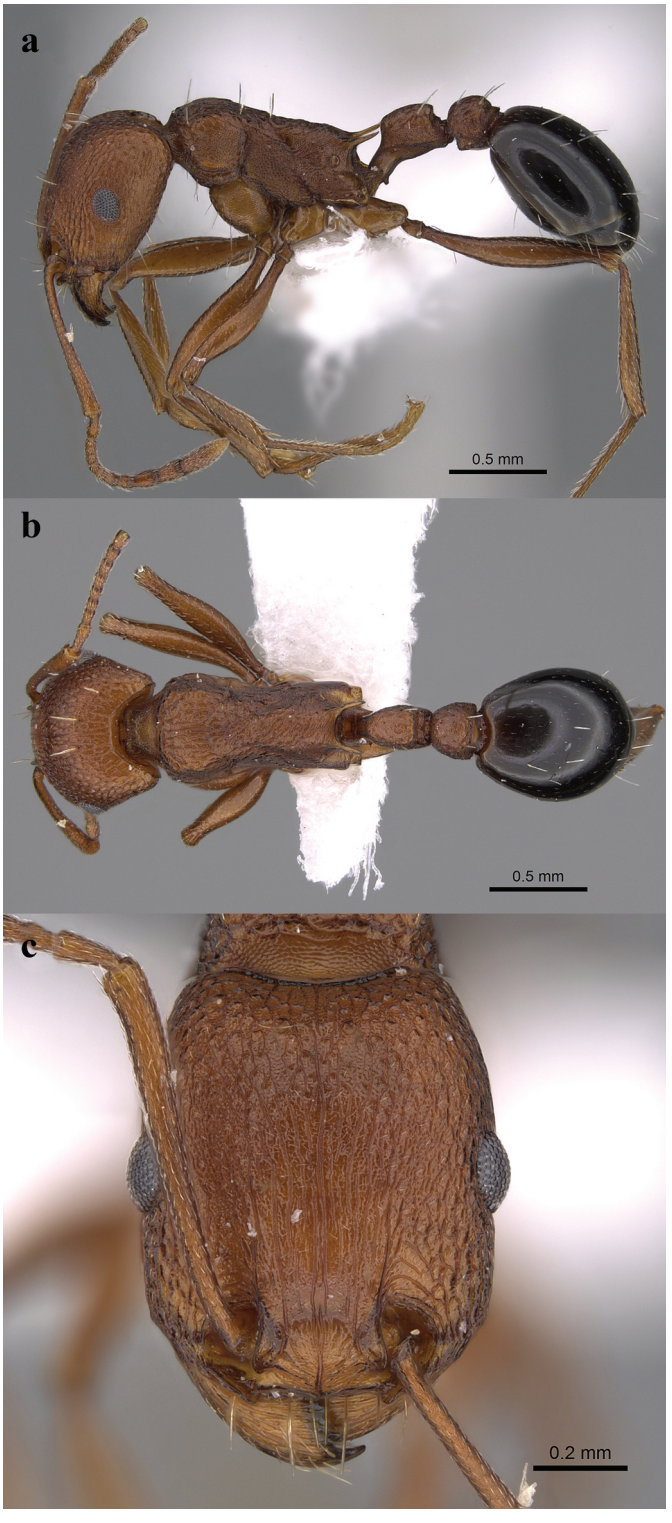

Figure 1. *Tetramorium sericeiventre* workers from Oman ((a) body in profile, (b) body in dorsal view, (c) head in full-face view; CASENT0922884; photographer: Michele Esposito, antweb.org).

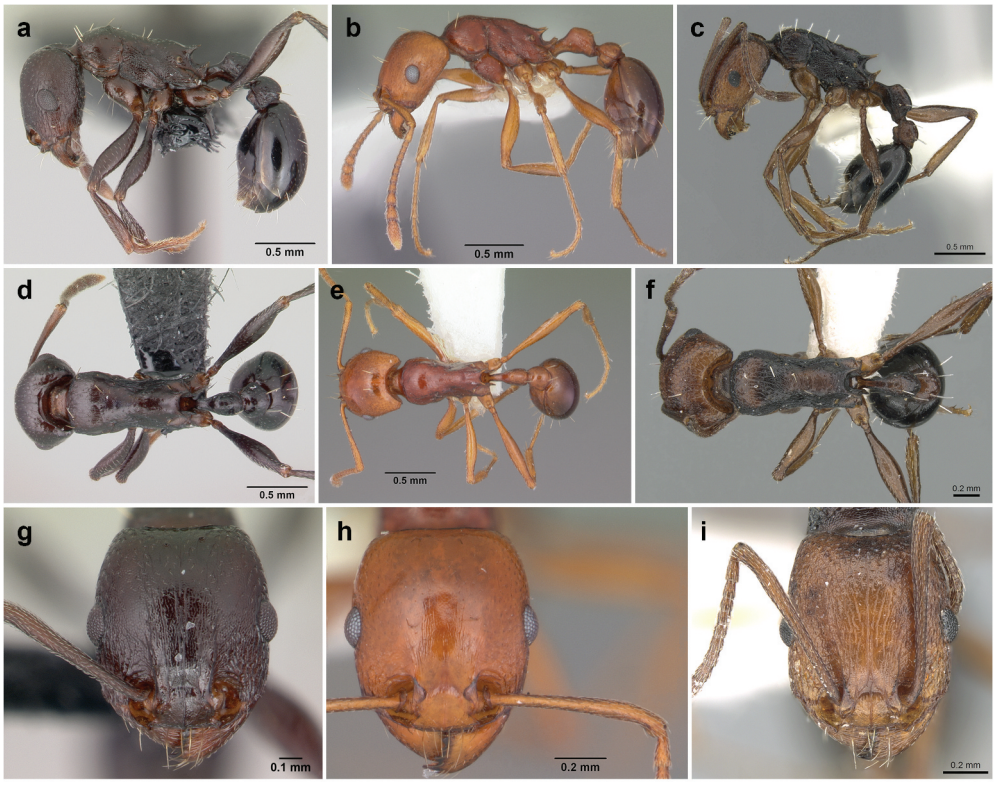

Figure 2. Representative specimens of *Tetramorium sericeiventre* showing the broad range of morphological variations; (a,d,g) worker from Comoros, ((a) body in profile, (d) body in dorsal view, (g) head in full-face view; CASENT0147456); (b,e,f) worker from Madagascar, ((b) body in profile, (e) body in dorsal view, (h) head in full-face view; CASENT0102385); (c,f,i) worker from KSA, ((c) body in profile, (f) body in dorsal view, (i) head in full-face view; CASENT0906430). All photographs by Michele Esposito, antweb.org.

rugose; clypeus with a median longitudinal ruga; cephalic sculpture variable, usually reticulate-rugose; mesosomal, petiolar, and postpetiolar sculpture variable, usually with longitudinal rugae and with a reticulate-punctulate ground sculpture; first gastral tergite usually densely punctulate or strongly shagreened. **Pilosity**. Cephalic surface, mesosoma (except propodeum), petiole, postpetiole, and gaster with sparse and stout standing hairs, pronotum and mesonotum with 5 to 6 pairs of hairs, propodeum bare; scapes and tibiae with short and appressed pubescence. **Colour**. Colour red-brown to brown, sometimes dark brown, gaster often darker than rest of body.

Material examined. We examined a total 431 *Tetramorium sericeiventre* specimens (specimens deposited in KSMA unless otherwise noted). **KSA: Al-Baha Province**: Al-Baha, Shada Mountain, 19.8388°N, 41.3117°E, 1620 m, 22.ix.2011, M. R. Sharaf, 6 w; Baljurashi, Al Qam'a park, 19.48°N, 41.43°E, 1950 m, 21.ix.2011, M. R. Sharaf, 9 w; Baljurashi, Al Qam'a park, 19.48°N, 41.43°E, 1931 m, 17.v.2010, M. R. Sharaf, 35 w, 3 q; Al Mukhwah, Dhi Ayn Archaeological vill., 19.9295°N, 41.4428°E, 744 m, 20.ix.2011,

M. R. Sharaf, MRS0022, 1 w; Al-Baha, Al Mukhwah, Dhi Ayn Archaeological vill., 19.9295°N, 41.4428°E, 744 m, 08.xi.2012, M. R. Sharaf, MRS0106, 2 w; Al Mukhwah, Dhi Ayn Archaeological vill., 19.9295°N, 41.4428°E, 744 m, 17.iv.2013, M. R. Sharaf, MRS0152, 9 w; Al Mukhwah, Dhi Ayn Archaeological vill., 19.9295°N, 41.4428°E, 741 m, 18.v.2010, M. R. Sharaf, 23 w, 1 q; Al Mukhwah, Dhi Ayn Archaeological vill., 19.9295°N, 41.4428°E, 744 m, 07.iv.2013, M. R. Sharaf, MRS0152, 8 w; Al Mukhwah, Dhi Ayn Archaeological vill., 19.9295°N, 41.4428°E, 741 m,11.v.2011, M. R. Sharaf, 17 w; Al Mukhwah, Dhi Ayn Archaeological vill., 19.9295°N, 41.4428°E, 741 m,15.v.2011, M. R. Sharaf, 6 w; wadi Wlzaraeb (Kheir), 20.0600°N, 41.3865°E, 2123 m, 15.v.2010, M. R. Sharaf, 2 w, 3q, 2 m; wadi Moqwah, 19.4950°N, 41.2267°E, 482 m, 07.iii.2013, M. R. Sharaf, 1 w; Shohba forest, 20.0453°N, 41.4760°E, 2324 m, 14.v.2010, M. R. Sharaf, 3 w; Shohba forest, 20.0453°N, 41.4760°E, 2324 m, 14.v.2010, M. R. Sharaf, 6 w; Amadan, El Mandaq, 20.2027°N, 41.2317°E, 1881 m, 19.v.2010, M. R. Sharaf, 2 w; wadi Turabah, 20.2110°N, 41.2882°E, 1793 m, 10. v.2011, M. R. Sharaf, MRS0011, 12 w; **Asir Province**: Khamis Mushayt, wadi Bishah, 18.3336 °N, 42.7035°E, 1990 m, 27.iv.2011, M. R. Sharaf, 7 w; Khamis Mushayt, wadi Ben Hashbal, 18.5948°N, 42.6503°E, 1892 m, 26.iv.2011, M. R. Sharaf, 4 w; Dalaghan, 18.1014 °N, 42.7051° E, 17.iv.2008, M. R. Sharaf, 2 w, 1q; AlUrdyiah Gov., wadi Gonouna, 19.4293°N, 41.6050°E, 353 m, 12.v.2011, M. R. Sharaf, MRS3.4, 5 w; Al Atawla (Al-Baha-Taif RD), wadi Bawah, 20.7496°N, 41.2474°E, 1310 m, 08.xi.2012, M. R. Sharaf, MRS0108, 1 w; **Riyadh Province**: Rawdhat Khorim, 25.23°N, 47.17°E, 559 m, 18.iii.2012, M. R. Sharaf, CASENT 0906430,1 w; Rawdhat Khorim, 25.3861°N, 47.2767°E, 618 m, 02.vi.2013, S. Salman, 9 w; Rawdhat Khorim, 25.3824°N, 47.2797°E, 551 m, 16.i.2015, S. Salman, 3 w; wadi Hanifa, 24.6649°N, 46.6057°E, 633 m, 15.i.2010, M. R. Sharaf, 2 w; wadi Hanifa, 24.7709°N, 46.5314°E, 695 m, 18.ix.2014, S. Salman, 2 w (1 w with a broken gaster); Al-Ammariyah, 24.8183°N, 46.4469°E, 696 m, 12.x.2013, S. Salman, 6 w; W. Eldawaser, 20.4865°N, 44.7643°E, 690 m, 22.i.2014, S. Salman, 1 w; Mezahmyia, 24.4838°N, 46.2631°E, 648 m, 25.i.2014, S. Salman, 1 w; Buaythiran, 25.1486°N, 45.9503°E, 815 m, 07.ii.2011, M. R. Sharaf,1 w; AlHayer, 24.5537° N, 46.7380°E, 648 m, 11.iv.2014, S. Salman, 7 w; AlHayer, 24.5570°N, 46.4355°E, 589 m, 11. iv.2014, S. Salman, 4 w (1 w with a broken gaster); Rumah, 25.5706°N, 46.9725°E, 615 m, 11. iv.2014, S. Salman, 2 w; Dirab, 24.4186°N, 46.6540°E, 604 m, 18.ix.2014, S. Salman, 1 w; Dirab, 24.4186° N, 46.6540° E, 588 m, 30.xii.2009, M. R. Sharaf, 3 w; Oyaina, 24.9066° N, 46.3899° E, 749 m, 28.iv.2010, M. R. Sharaf, 5 w, 8q; Majmaa, 26.0049°N, 45.0189° E, 594 m, 13.ix.2014, S. Salman, 5 w; Majmaa, 25.9223°N, 45.31045° E, 736 m, 13.ix.2014, S. Salman, 3 w; Ghiyanah, 25.0736°N, 46.2264°E, 793 m, 26.xii.2014, S. Salman, 15 w; Dawadimi, 24.5375°N, 44.3548°E, 999 m, 16.i.2015, S. Salman, 5 w; Dawadimi, 24.5521°N, 43.9317°E, 873 m, 16.i.2015, S. Salman, 31 w; Dawadimi, 24.4840°N, 44.3767°E, 893 m, 18.iv.2014, S. Salman, 1 w; Dawadimi, 24.4670°N, 44.3424°E, 1038 m, 18.iv.2014, S. Salman, 1 w; Dawadimi, 24.5375°N, 44.3548°E, 999 m, 16.i.2015, S. Salman, 4 w, 2 m; Thadiq, 25.2936° N, 45.8710° E, 735 m, 26.iv.2014, S. Salman, 2 w; Shaqra, 25.3263°N, 45.2334° E, 710 m, 30. v.2014, S. Salman, 4 w; Shaqra, 25.2301°N, 45.3191° E, 703 m, 24.i.2015, S. Salman, 4 w; Quwayaiyah, 24.0504°N, 45.2579°E, 839 m, 29.xi.2014, S. Salman, 1 w; Hawtat Bani Tamim, 23.5073°N, 46.9005°E, 593 m, 13.xii.2014, S. Salman, 5 w; Hawtat Sudair, 25.5916°N, 45.6124°E, 732 m, 31.i.2015, S. Salman, 9 w; Afif, 23.9000°N, 42.8807°E, 1052 m, 17. i.2015, S. Salman, 2 w; Sajir, 25.0650°N, 44.6974°E, 751 m, 23.i.2015, S. Salman, 1 w; Sulayel, 22.2028°N, 46.6943°E, 560 m, 19.ii.2015, S. Salman, 6 w; Kharrarah, 24.3916°N, 46.2443°E, 726 m, 08.iv.2015, S. Salman, 5 w; Ghiyanah, 25.0736°N, 46.2264°E, 728 m, 26.

xii.2014, S. Salman, 3 w; Ghiyanah, 25.0736°N, 46.2264°E, 793 m, 26.xii.2014, S. Salman, 3 w; Bijadriyah, 24.3101°N, 43.7313°E, 934 m, 16.i.2015, S. Salman, 3 w; Salboukh, 25.0792°N, 46.3472°E, 05.xi.2009, M. R. Sharaf,18 w; Salboukh, 25.0783°N, 46.3469°E, 716 m, 26. xii.2017, M. R. Sharaf,1 w; wadi Huraymila, 25.0686°N, 46.0027°E, 15.ix.2011, F. A. Esteves, FAE912, CASENT0264322, 1 w; Huraymila, 25.1206°N, 46.1159°E, 15.ix.2011, F. A. Esteves, FAE911, CASENT0263997, 1 w (KSMA); wadi Drady, 01.v.1980, W. Buttiker, 1 w; Jizan, 2 w (WMLC); Alkarj, 24.1576°N, 47.3248°E, 25.v.1980, W. Buttiker, 2 m, (WMLC); Abu Arish, 16.9692°N, 42.8443°E, 27.iii.1983, C. A. Collingwood, 1 m, (WMLC); wadi Qust (Mecca region), 21.0436°N, 41.2886°E, 07.iv.1983, C. A. Collingwood, 1 w, (WMLC); Al Khubra, 26.2172°N, 50.1971°E, 29.v.1978, W. Buttiker, 1 m, (WMLC); Fayfa, 17.2473°N, 43.1069°E, 27–31.iii.1983, Holzschuh, 1 w, (WMLC); wadi Tumair (Riyadh Province), 23.8667°N, 46.9833°E, 20.ii.1976, Buttiker, 1 w, (WMLC); wadi Azizah, 18.217°N, 42.433°E, 17–18. ix.1983, C. A. Collingwood, 4 w, (WMLC); wadi Maraba, 17.9°N, 42.3833°E, 16.x.1979, Buttiker, 1 w, (WMLC); **OMAN**: Khawr Sawli (Dhofar), 17.0329°N, 54.3298°E, 08.i.1985, Gallager, 5 w; Hajar Mnt., Salma Plateau, 22.8777°N, 59.1186°E, 1334 m, 14.xi.2018, A. Polaszek, 2 w; Dhofar, Ayn Sahlanot, 17.14766°N, 54.17878°E, 151 m, 16.xi.2017, M. R. Sharaf, 2 w, (1 w, CASC, CASENT0922884); Ayn Ashat,16.9981°N, 53.8195°E, 202 m, 21.xi.2017, M. R. Sharaf, 9 w; Ayn Dirbat, 17.1057°N, 54.4529°E, 207 m, 17.xi.2017, M. R. Sharaf, 1 w, (KSMA); **YEMEN**: San'a, 15.3694°N, 44.191°E, iii.1991, Van Harten, 1q, (WMLC); **BENIN**: Korobourou, 09°22′13″N, 02°40′16″E, 14.ix.2012, J-F Vayssieres, RVA 2895, 2 w; Korobourou, 09°22′13″N, 02°40′16″E, 9.xi.2012, J-F Vayssieres, VA 3020.1, 2 w; Koro, 09°22′21″N, 02°40′13″E, 27.iii.2013, J-F Vayssieres, RVA 3056.5, 2 w; Kika-Beterou, 09° 14′07″N, 02°11′52″E, 9.xi.2011, J-F Vayssieres, RVA 3099.12, 3 w; Agonlin, 07°12′55.2″N, 02°19′13.7″E, 55 m, J-F Vayssieres, RVA 3108.3, 1 w; **CAMEROUN**: Poli, 8°29′N, 13°15′E, 15. vi.2001, G Debout & A Dalecky, 126, 1 w; Awae II, 03°54′30″N, 11°25′58″E, 17.xii.2006, A Fotso Kuate, 1 w; **CENTRAL AFRICAN REPUBLIC**: Dzanga-Sangha, 03°55′13.2″N, 16° 36′46.1″E, 536 m, 20.i.2005, P Annoyer, Di-09, 1 w; CONGO: Brazzaville, 4° 15′ 33″S, 15° 17′ 5″E, 19.viii.2007, 317 m, Y Braet, t-1-1, 2 w; same data as previous material, t-1-10, 1 w; same data as previous material, t-1-19, 1 w; Iboubikro, 25.i.2008, Y Braet & E Zassi, 1 w; **GABON**: Pongara, 00°34′N, 09°19′E, 16.vii.2006, L Volait, G 17, 2 w; same data as previous material, G 18, 1 w; same data as previous material, G 19, 1 w; **GHANA**: no locality, 2005, S Sky Stephens, 05G0011, 1 w; **NAMIBIA**: Caprivi Park, 17°46′56″S, 23°16′31″E, 15.xii.1999, Mann & Marais, OUMNH-2006-093, 6 w; **SENEGAL**: Tambacounda, Dindifa, 13°09′40″N, 12° 06′46″W, 213 m, 10.v.2009, B Ndiaye, 3 w; Ferlo, Katané, 15.48°N, 14.08°W, x.2010, B Ndiaye, 4 w; Lamine Diamé, Sébikotane, 14°46′N, 17°07′W, 2012, 3 w; **SUDAN**: Jabel awlya, 15°14′28″N, 32°29′59″E, 2009, A Omer, 1 w; Wad Al Hadad, 13°49′28.14″N, 33° 32′39.33″E, 9.ii.2010, Z Mahmoud, 2009–77, 1 w; South Sudan, 8.183°N, 30.317°E, vi. 2005, A Omer, S 1–14-1, 1 w; Dinder NP, 11°N, 35°E, 2012, A Omer, 26, 1 w; Sinja, 13° 09′N, 33°55′60″E, 17. Ii.2013, A Omer, 2 w; Abu Hijar, 12°52′N, 34°0′E, 24.ii.2013, A Omer, 1 q; Abu Hijar, 12°52′N, 34°0′E, 28.ii.2013, A Omer, 3 w (OUMC).

Morphological variation. *Tetramorium sericeiventre* displays a wide range of colour variation ranging from distinctly contrasting body colour with head, mesosoma, petiole and postpetiole clear yellow, light brown or dark brown and gaster frequently dark black brown to black (Figures 1–2). In rare cases, workers have bark brown to black brown body with head conspicuously paler usually reddish to brown. Its body sculpture also shows

a remarkable degree of variation, comprehensively discussed by Bolton (1980) and Hita Garcia and Fisher (2011). Some workers are uniform black with superficial sculpture on the head, mesosoma, petiole and postpetiole, while some workers are relatively smooth and shiny. Bolton (1980) presented 25 synonyms for *T. sericeiventre*, 13 of which were from a single reference (Santschi 1918). Hita Garcia and Fisher (2011) added eight additional synonyms from the Malagasy fauna. This high number of synonyms is the result of the wide range of variation within the species.

Natural History in KSA. *Tetramorium sericeiventre* occurs in a wide range of habitats in KSA (e.g. see Figure 3). In the woodland forests of the Asir Mountains, this species builds nests in ground under rocks and stones near *Acacia* (Fabaceae) and *Juniper* (Cupressaceae) trees. We observed workers foraging in humid leaf litter in the Al Sarawat Mountains and coexisting with some beetle species of the families Pselaphinae, Staphylinidae and Tenebrionidae. In the Fayfa Mountains, *T. sericeiventre* foraging at night and attracted to tight traps. Males are frequently attracted to light (Collingwood 1985).

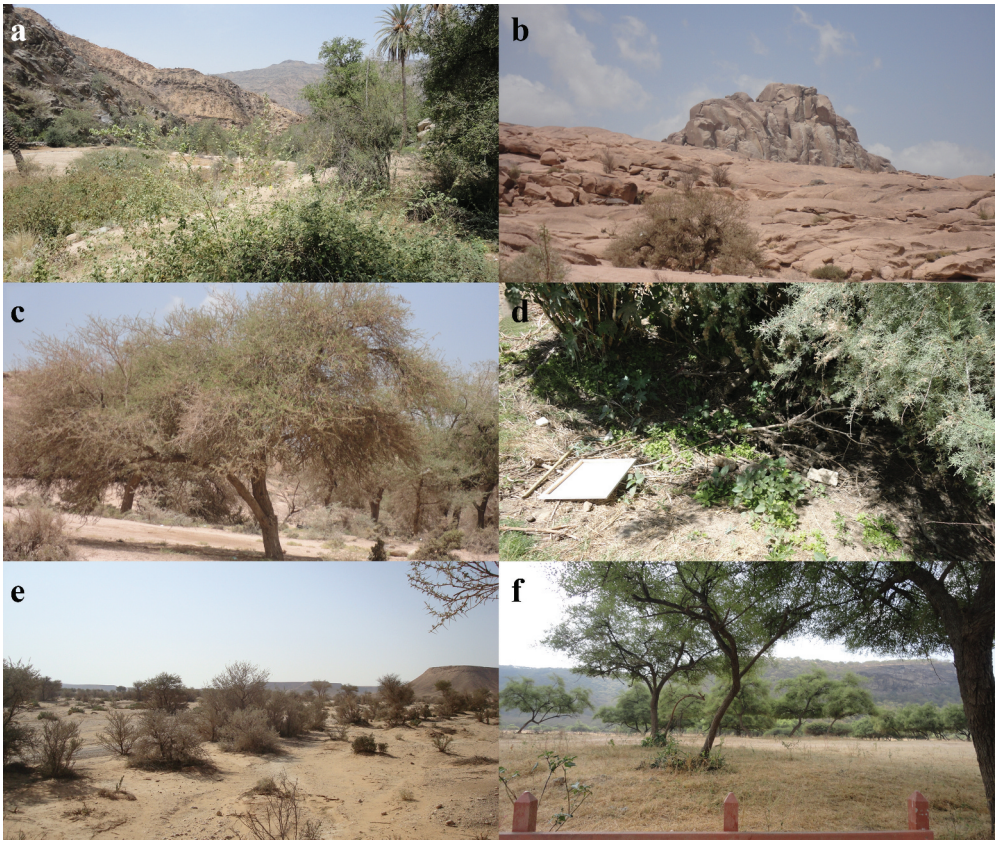

Figure 3. Representative habitats of *Tetramorium sericeiventre* on the Arabian Peninsula, (a) Dhi Ayn Archaeological village (KSA), (b,c) wadi Ben Hashbal (KSA), (d). wadi Bishah (KSA), (e) wadi Hanifa (KSA), (f) Dhofar (Oman). Mostafa Sharaf photo.

In the KSA, *T. sericeiventre* was found at numerous mid and high elevation (572–2387 m) sites (Table 1). It was the most abundant *Tetramorium* collected by pitfall traps in *Acacia* thorn woodlands and in areas of cactus pear, *Opuntia ficus-indica* (L.) Mill. (Cactaceae) and wild olive trees *Olea europaea* ssp *cuspidata* (Wall. ex G. Don) Cifferi (Oleaceae) in the mountainous areas of southwest of the KSA. The species is also the commonest *Tetramorium* in sandy areas of Riyadh Province, with *Acacia ehrenbergiana* Heyne (Fabaceae), *Echinops* sp. (Compositae), *Pulicaria undulata* (L.) C. A. Mey. (Asteraceae), and *Artemisia graveolens* Rydb. (Asteraceae).

In wadi Hanifa, Riyadh, we found *T. sericeiventre* more abundant in the rural and suburban areas than in urban areas. At Rawdhat Khorim, Sharaf et al. (2013) found a similarly high abundance of *T. sericeiventre*. In Al-Baha Province, El-Hawagry et al. (2013) collected *T. sericeiventre* in five different natural areas in the Al Sarawat Mountains: Amadan forest, Baljurashi, Raghdan forest, Shahba forest, and wadi El-Zarayeb.

Geographic distribution. *Tetramorium sericeiventre* is broadly spread throughout open habitats of the Arabian Peninsula, the Afrotropical (Bolton 1980) and the Malagasy (Hita Garcia and Fisher 2011) (Figure 4). On the Arabian Peninsula, it is one of the most widely distributed *Tetramorium* species (Collingwood 1985; Collingwood and Agosti 1996; Collingwood et al. 2011; Sharaf et al. 2013).

We did not map three erroneous or questionable published site records of *T. sericeiventre*. Chapman and Capco (1951) erroneously listed a record of *Tetramorium sericeiventre munda* Santschi from Guinea, West Africa as from Melanesian island of New Guinea. Collingwood and Agosti (1996) marked in a table that *T. sericeiventre* occurs in Kuwait, but the paper included no records from Kuwait. De Haro and Collingwood (1994) listed *T. sericeiventre* as present in southern Iberia, but we found no specimen records supporting this.

Discussion

Tetramorium sericeiventre is a common ant through much of sub-Saharan Africa and the southern Arabian Peninsula, ranging from 33.8°S in Brandfontein Reserve, South Africa (SAM-HYM-C006358; antweb.org) to 35.8°N in an olive grove of Nouara, Algeria (Barech et al. 2017). *Tetramorium sericeiventre* thrives in a wide variety of open habitats, ranging

Table 1. Vegetation cover, and soil types of mid and high elevation sites in KSA where *Tetramorium sericeiventre* occurs.

Locality	Province	Elevation	Dominant Plant Cover	Soil type
Rawdhat Al Sabalah	Riyadh	669 m	*Echinops* sp. (Compositae), *Pulicaria undulata* (L.) C. A. Mey. (Asteraceae), *Artemisia graveolens* Rydb. (Asteraceae)	Sandy clay loam
Wadi Hanifa	Riyadh	515–947 m	*Acacia ehrenbergiana* Heyne (Fabaceae)	Sandy clay loam
Rawdhat Khorim National Park	Riyadh	572 m	*Calotropis procera* (Aiton) W.T. Aiton (Apocynaceae)	Sandy clay loam
Garf Raydah Nature Reserve	Asir	1614–1851 m	Shrubs of Barbary fig or cactus pear, *Opuntia ficus-indica* (L.) Mill. (Cactaceae)	Gravel with coarse sand and silt
		1897–2387 m	Olive, *Olea europaea* ssp *cuspidata* (Wall. ex G. Don) Cifferi (Oleaceae)	Rocky soil
Shada Al-A'Ala Nature Reserve	Al-Baha	1225–1474 m	*Acacia* spp.	Gravel with coarse sand and silt
		1563–1666 m	*Opuntia ficus-indica*	Gravel with coarse sand and silt

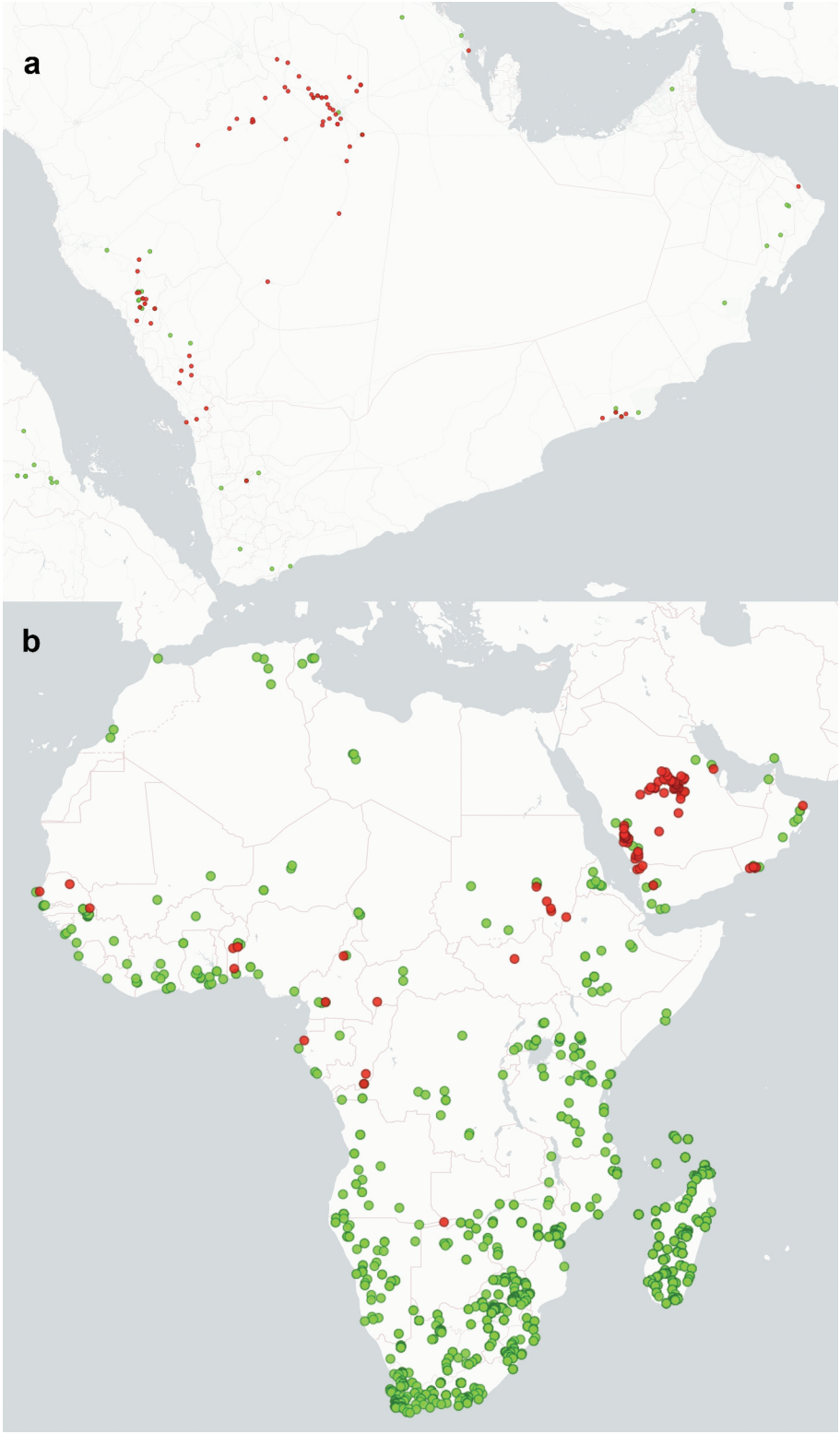

Figure 4. Distribution maps of *Tetramorium sericeiventre*, (a) distribution in the Arabian Peninsula, (b) World distribution. Red = sites of examined specimens. Green = other site records.

from intact natural areas to sites heavily disturbed by human activity. In some studies, *T. sericeiventre* was found only in human-disturbed areas. For example, Kone et al. (2010) surveyed ants in areas of Côte d'Ivoire with different levels of human disturbance transitional forest-savannah zone, reporting that '*Tetramorium sericeiventre* was found only in the food crop plantations. This species might be an opportunistic explorer of human associated habitats.' Borowiec and Salata (2018) even referred to *T. sericeiventre* as 'an invasive species.'

We found surprisingly few records of *T. sericeiventre* from North Africa (Figure 3): Morocco (four sites), Algeria (four sites), Tunisia (three sites), Libya (three sites) (Emery 1891; Santschi 1918; Bernard 1948; Bolton 1980; De Haro and Collingwood 1994; Cagniant 2006; Hita Garcia and Fisher 2011; Chemala 2013; Barech et al 2017; Chemala et al. 2017; Amara et al. 2020). Despite extensive collecting by many researchers, there are no known records of *T. sericeiventre* from Egypt. Bernard (1948) reported the only known Libya *T. sericeiventre* records from three populated areas far from any other recorded sites, describing the specimens as belonging to a new species (*Atopula hortensis* Bernard), which he categorised as a diurnal heliophile of oases, gardens, and lakesides. The broad gap between the sub-Saharan and North African populations of *T. sericeiventre* suggest that this species may be introduced in North Africa. Genetic analyses would be useful in determining whether North Africa populations are native or introduced, and elicidating the relationships among the many different morphological forms of *T. sericeiventre*.

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