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## Intriguing additions of exotic and invasive ants to The Gambia (Hymenoptera: Formicidae)

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Front cover: From left to right and top to bottom: *Brachymyrmex depilis* Emery, 1893 and *Strumigenys eggersi* Emery, 1890 (First record to Africa); *Wasmannia auropunctata* (Roger, 1863), *Monomorium floricola* (Jerdon, 1851), *Solenopsis globularia* (Smith, F., 1858) and *Trichomyrmex destructor* (Jerdon, 1851) (first records to The Gambia).

# Intriguing additions of exotic and invasive ants to The Gambia (Hymenoptera: Formicidae)

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## Abstract

Nine exotic or invasive ant species are reported from the western Gambia. *Brachymyrmex depilis* Emery, 1893 and *Strumigenys eggersi* Emery, 1890 are cited for the first time in Africa from its native South American range. *Wasmannia auropunctata* (Roger, 1863) is reported in Gambia for the first time, and its presence should be monitored and, if possible, eradicated. *Hypoponera ragusai* (Emery, 1894) is reported for the second time in Western Africa, first to The Gambia. *Monomorium floricola* (Jerdon, 1851), *Solenopsis globularia* (Smith, F., 1858) and *Trichomyrmex destructor* (Jerdon, 1851) are first records to The Gambia. *Paratrechina longicornis* (Latreille, 1802) and *Tapinoma melanocephalum* (Fabricius, 1793) are introduced species common in houses and disturbed areas.

**Keywords**: Africa, Brachymyrmex, Strumigenys, Wasmannia

## Introduction

Exotic ants have been reported extensively all over the world. More than 200 species have been cited out of their native range (Sarnat *et al.,* 2016). A considerable number of them are enormously successful and have become widespread all over the tropical and subtropical regions, and even other faunistic regions (Wetterer, 2015). Some of them pose a massive threat to native biodiversity and may disrupt entire ecosystems (Allen *et al*., 2001).

The usual suspects are being continuously discovered in or near populated places in Western and Central Africa: Kouakou *et al*., (2018 a, b), Taylor *et al*., (2018), Jimoh *et al*. (2022). Based on these publications, a preliminary list of them comprises the following 14 species: *Hypoponera punctatissima* (Roger, 1859), *Monomorium floricola* (Jerdon, 1851), *Monomorium pharaonis* (Linnaeus, 1758), *Nylanderia bourbonica* (Forel, 1886), *Paratrechina longicornis* (Latreille, 1802), *Solenopsis geminata* (Fabricius, 1804), *Solenopsis globularia* (Smith, 1858), *Tapinoma melanocephalum* (Fabricius, 1793), *Tetramorium bicarinatum* (Nylander, 1846), *Tetramorium caldarium* (Roger, 1857), *Tetramorium lanuginosum* Mayr, 1870, *Tetramorium simillimum* (Smith, 1851), *Trichomyrmex destructor* (Jerdon, 1851) and *Trichomyrmex mayri* (Forel, 1902). Not included here as exotic species are those that tend to live near populated places and are considered exotic out of the Afrotropical region: *Cardiocondyla emeryi* Forel, 1881, *Monomorium pharaonis* (Linnaeus, 1758) or *Pheidole megacephala* (Fabricius, 1793).

The regions of Banjul and the Western region in Gambia are densely populated and our samples from the area were expected to contain several exotic species, following the pattern of the cited articles for Western Africa. We found indeed some of the common exotic ants, but also found some visitors that raise concern due to its potential damaging impact (*Wasmannia*

*auropunctata* (Roger, 1863)) or to their unexpected finding: *Brachymyrmex depilis* Emery, 1893 and *Strumigenys eggersi* Emery, 1890.

We also want to note that despite our sampling efforts dedicated specifically to red mangrove forests along the Gambia river, we could not find any exotic species nesting there. This fact is quite surprising having into account that previous publications on mangroves from other locations have almost half the nesting species listed as exotic (Wetterer *et al*. 2023).

## Material and methods

Samples were collected in the vicinity of Banjul and Western Provinces in The Gambia during the month of November 2022 and preserved in 95% ethanol. Detailed records are provided under each species.

Identification was conducted with the keys available in Fisher & Bolton (2016) for genera. To reach species level several other keys and revisions were consulted: for *Hypoponera*: Bolton & Fisher (2011); for *Monomorium* and *Trichomyrmex*: Bolton (1987); for *Strumigenys*: Bolton (2000); for *Solenopsis*: Pachecho & Mackay (2013); for *Tapinoma*: Seifert (2022). Images and complementary information of type materials to confirm the identifications were consulted in Antweb (www.antweb.org). Current known distribution was obtained from Antmaps (www.antmaps,org).

Voucher specimens are available in the Kiko Gómez Collection (KGAC). Each individual pin or vial has a code access number listed under brackets in the detailed collection list, and all available information has been uploaded into the Antweb database. It is accessible via https://www.antweb.org/specimen.do?code=XXX, replacing "XXX" with access code (e.g. KGCOL02507). All images have been downloaded from Antweb, except those from *Hypoponera ragusai*, imaged by Julien Lalanne at RBINS and modified using GIMP free software (v. 2.10.36)

## Results and discussion

### ***Brachymyrmex depilis*** Emery, 1893

Fig. 1

First record to Africa as exotic species outside of its native range.

The genus *Brachymyrmex* Mayr, 1868 is distributed all along the Neotropical and Nearctic regions. Some species of this genus have been recorded as exotic. *Brachymyrmex cordemoyi* Forel, 1895 has been found as exotic from the Malagasy region (Fisher & Bolton 2016, P. Hawkes pers. comm.), Saudi Arabia (Sharaf *et al*., 2016), Canary Islands (Hernandez-Teixidor *et al*., 2020), Arizona, Solomon Islands and Vanuatu (Ortíz Sepúlveda *et al*., 2019), The Netherlands (Boer *et al*., 2018) and Germany (Husemann & Ortiz-Sepulveda, 2019). *Brachymyrmex patagonicus* Mayr, 1868 has also been found as exotic in Europe (Espadaler & Pradera, 2016) and North America (MacGown *et al*.,2013).

Some doubtful records under this genus were cited for the Afrotropical Region (Fisher & Bolton 2016), but all of them have been reidentified under other genera and are subject to future publications (Peter Hawkes, pers. comm.).

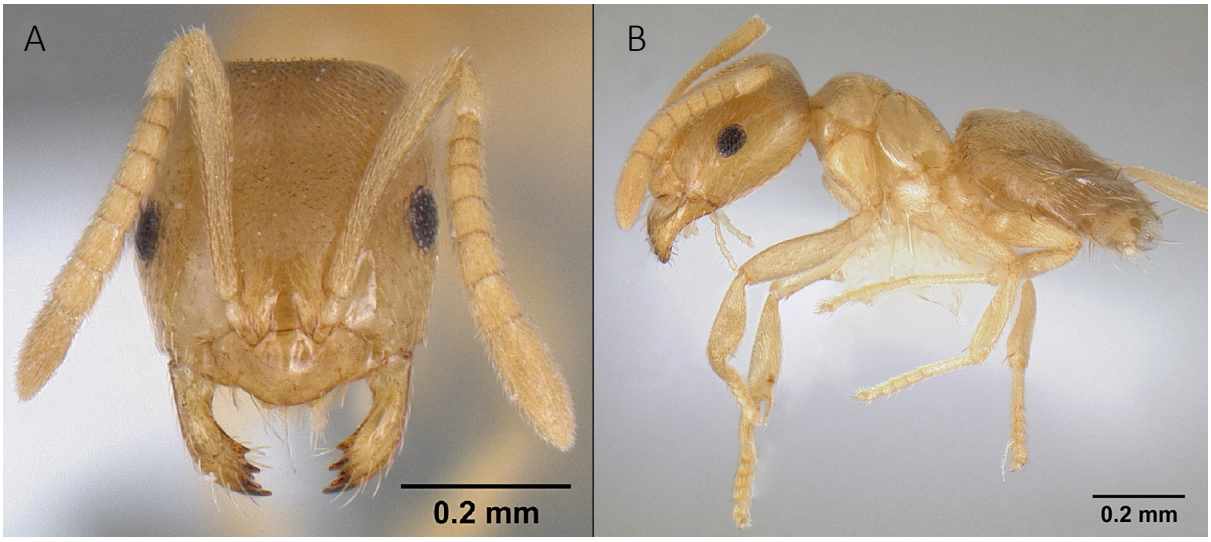


Fig.1 *Brachymyrmex depilis* Emery, 1893 (CASENT0106038), USA. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

Our record of *B. depilis* is the first confirmed identification out of any *Brachymyrmex* species for the Afrotropical region and the first out of its native Nearctic range for this species. Several workers were collected under garbage near the Gambia College Mosque (Brikama).

Material examined: **The Gambia**: **West Coast**: Gambia College Mosque (Brikama) 20 m. 13.28441, -16.65637, Ruderal. Wetterer, J. 17/11/2022, Hand collected, Foraging [KG06260D, KGCOL02507]

***Hypoponera ragusai*** (Emery, 1894)
Fig. 2

Second record to Western Africa, first in more than 50 years after Levieux (1972).

Palearctic ant that has been found as exotic in Asia, North America, Oceania and Southern and Eastern Africa (Guenárd *et al*., 2017).

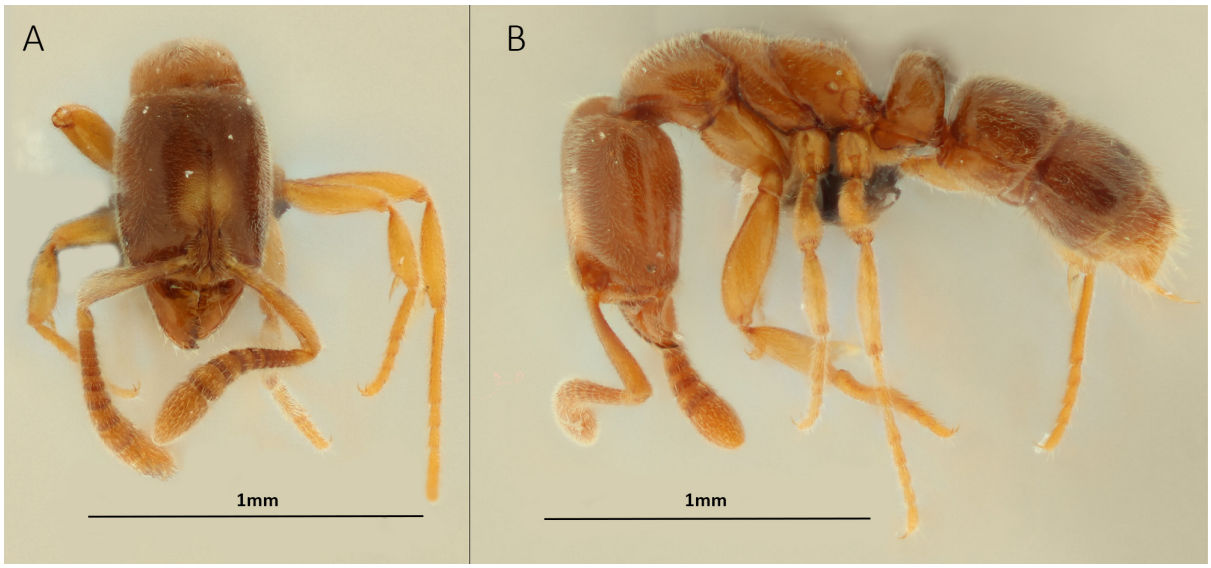


Fig.2 *Hypoponera ragusai* (Emery, 1894) (KGCOL02534), Gambia. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Julien Lalanne (RBINS).

Material examined: **The Gambia**: **North Bank**: Essau path to Mangrove 20 m. 13.4914, -16.52398, Sahelian Savannah. Gómez, K. 19/11/2022, Hand collected, Nest under stone [KG06138A, KGCOL02534, KG06139] ** Essau path to Mangrove 20 m. 13.4914, -16.52398, foraging, sandy terrain. Wetterer, J. 19/11/2022, Hand collected [KGCOL02395] ** nr. military post (Ginak-Kajata) 20 m. 13.52712, -16.48192, Sahelian Savannah. Wetterer, J. 19/11/2022, Hand collected [KGCOL02478] ** **West Coast**: Brikama University Campus (Busumbala) 20 m. 13.29612, -16.65897, Ruderal. Gómez, K. 15/11/2022, Hand collected, Under stone foraging [KG06051, KGCOL02430] ** Gambia College Mosque (Brikama) 20 m. 13.28441, -16.65637, Ruderal. Wetterer, J. 17/11/2022, Hand collected, Foraging [KGCOL02462]

***Monomorium floricola*** (Jerdon, 1851)
Fig. 3

First record to Gambia.

It was found in the Abuko Nature reserve, in a wet location near a swamp.

Asian species that has colonized most of the tropical ecosystems in Africa, Oceania, North and South America and Oceania.

Material examined: **The Gambia**: **West Coast**: Abuko Nature Reserve, Site 2 (Abuko) 20 m. 13.39502, -16.64545, Gallery for., near pond. Gómez, K. 23/11/2022, Hand collected, Ex rotten log [KGCOL02548] * * same data, Wetterer, J. 23/11/2022, Hand collected [KG06274C]

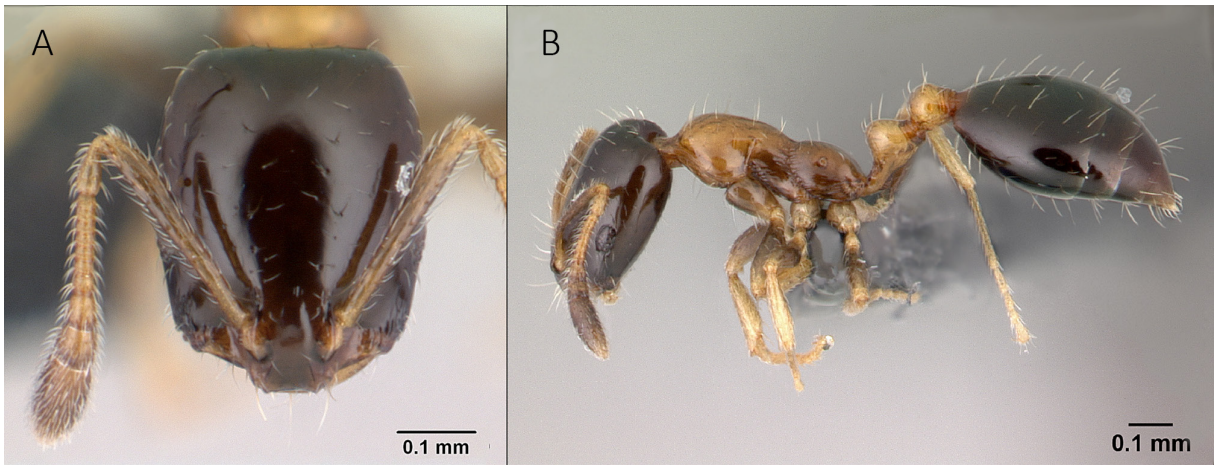


Fig.3 *Monomorium floricola* (Jerdon, 1851) (CASENT0146777), Comoros. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

***Paratrechina longicornis*** (Latreille, 1802)
Fig. 4

This species of Indian origin has successfully colonized the tropical regions around the globe (Wetterer, 2008b). We found it almost in any location in or near villages in our samplings.

Material examined: **The Gambia**: **West Coast**: Sumanguru Guest House (Busumbala) 20 m. 13.33298, -16.67077, Garden. Gómez, K. 14/11/2022, Hand collected, Foraging [KG06020B]

** Brikama University Campus (Busumbala) 20 m. 13.29612, -16.65897, Ruderal. Gómez, K. 15/11/2022, Hand collected, Foraging [KG06028] ** same data Foraging on tree [KG06034, KG06053] ** Rd. nr. Abuko Reserve (Latrikunda) 20 m. 13.40185, -16.6545, Village. Gómez, K. 18/11/2022, Hand collected, Foraging [KG06107B] ** Bijilo 1 (Bijilo N. P.) 20 m. 13.435, -16.72628, Coastal for.. Gómez, K. 20/11/2022, Hand collected, Foraging on ground [KG06153A] ** Bijilo 3 Sandy path to the beach (Bijilo N. P.) 20 m. 13.43682, -16.72682, Coastal for.. Gómez, K. 20/11/2022, Japanese Umbrella, On leaves [KG06173A] **Mandinari River Lodge (Mandinari) 20 m. 13.38282, -16.6034, Red Mangrove. Gómez, K. 21/11/2022, Hand collected, Foraging on soil [KG06078C] ** **Banjul**: Tanbi Wetland NP (Greater Banjul) 20 m. 13.4733, -16.6613, Red Mangrove. Gómez, K. 17/11/2022, Hand collected, Foraging on Tree [KG06096A] ** same data Foraging on Soil [KG06101C] ** same data, Japanese Umbrella, On trees [KG06104A] ** Village 01 (London Corner) 20 m. 13.42188, -16.6603, Village. Gómez, K. 18/11/2022, Hand collected, Foraging [KG06109C] ** Port (Banjul City) 20 m. 13.44603, -16.57295, Ruderal. Gómez, K. 19/11/2022, Hand collected, Foraging on ground [KG06115A] ** **North Bank**: Essau path to Mangrove 20 m. 13.4914, -16.52398, Sahelian Savannah. Gómez, K. 19/11/2022, Hand collected, Foraging on soil [KG06125A] ** same data, Nest under stone [KG06137] ** Njongon, nr. military post (Ginak-Kajata) 20 m. 13.52712, -16.48192, Sahelian Savannah. Gómez, K. 19/11/2022, Hand collected, Foraging ground [KG06142]

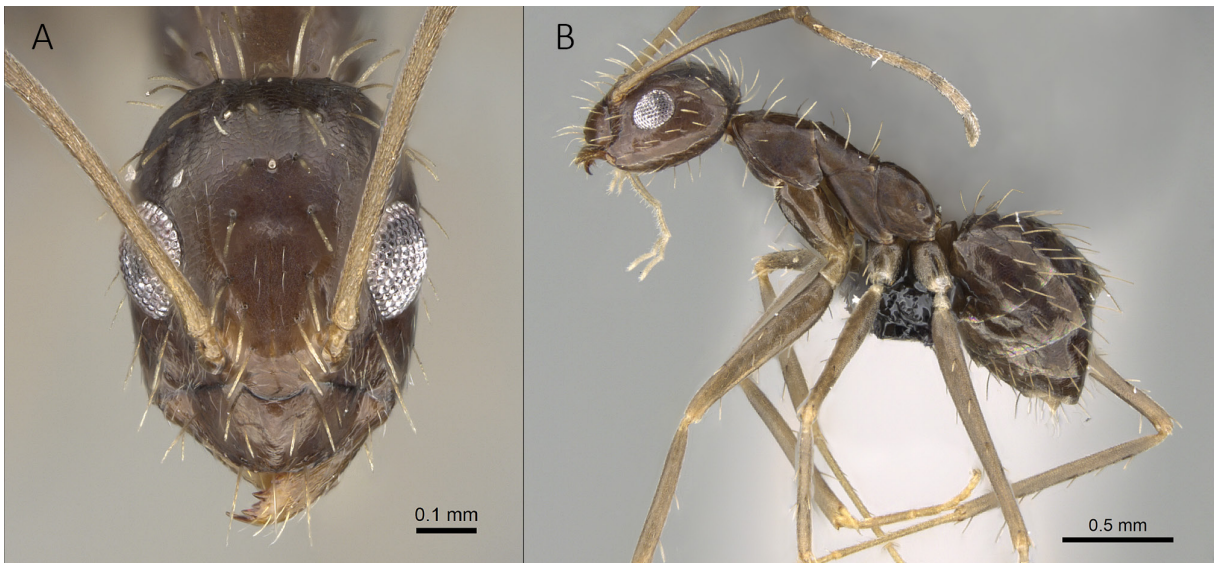


Fig.4 *Paratrechina longicornis* (Latreille, 1802) (CASENT0125018), Madagascar. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

***Solenopsis globularia*** (Smith, F., 1858)
Fig. 5

First record to Gambia.

Originally from the Neotropical region, it has been recently found in West Africa (Jimoh *et al*., 2021), Philippines Oceania and North America (Wetterer, 2019).

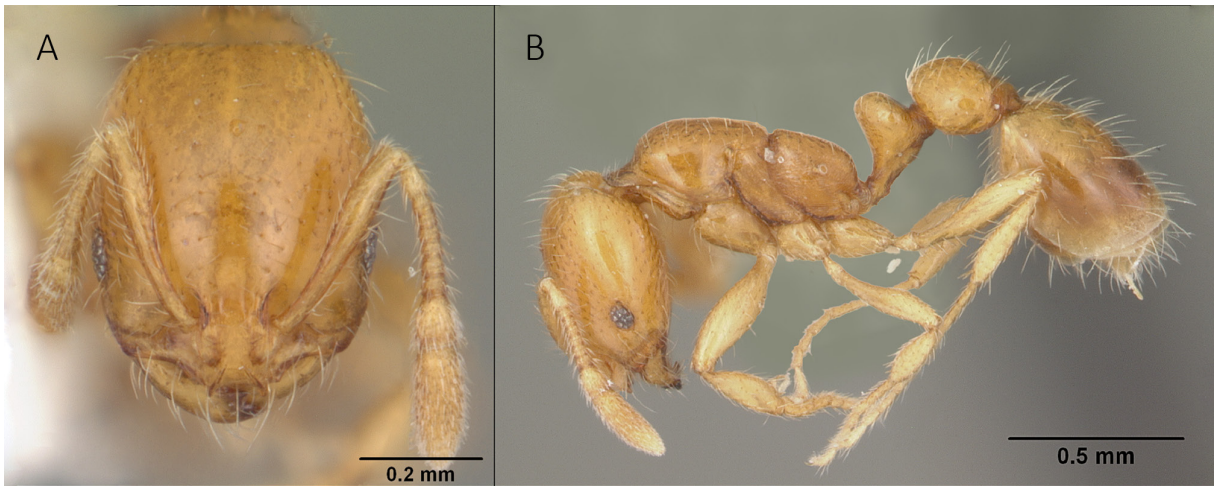


Fig.5 *Solenopsis globularia* (Smith, F., 1858) (CASENT0104501), Florida, USA. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

Material examined: **The Gambia**: **Banjul**: Tanbi Wetland NP (Greater Banjul) 20 m. 13.4733, -16.6613, Red Mangrove. Gómez, K. 17/11/2022, Hand collected, Foraging on Soil [KGCOL02580]

***Strumigenys eggersi*** Emery, 1890
Fig. 6

First record in Africa.

Surprising record of this South American species. It belongs to the *gundlachi*-complex in the *Strumigenys gundlachi* group. Species of this group presents a series of denticles close to the apical teeth that are not present in any other Afrotropical species. It has also been recently reported as exotic from American Samoa and Singapore (Wetterer, 2018).

Material examined: **The Gambia**: **West Coast**: Gambia College Mosque (Brikama) 20 m. 13.28441, -16.65637, Ruderal. Wetterer, J. 17/11/2022, Hand collected, Foraging [KGCOL02519]

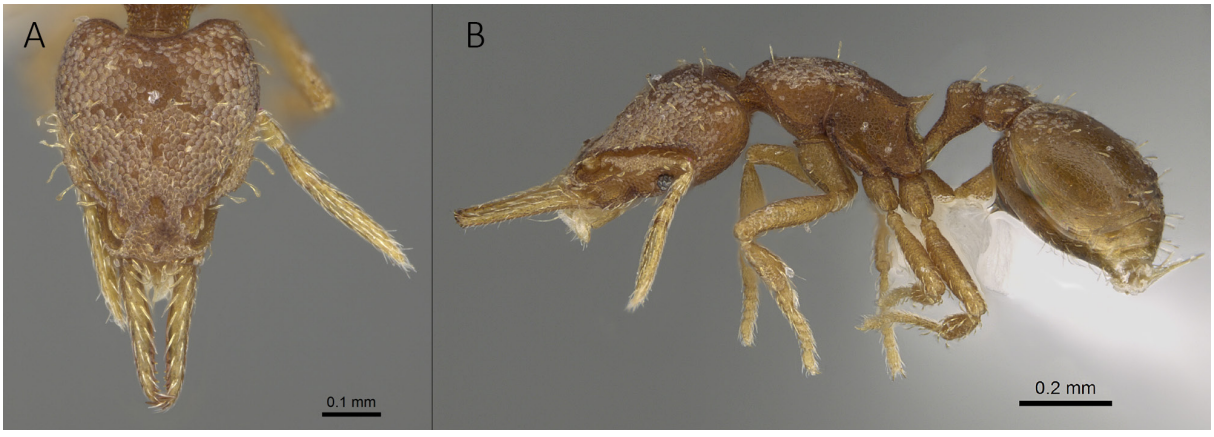


Fig.6 *Strumigenys eggersi* Emery, 1890 (CASENT0625429), Ecuador. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

***Tapinoma melanocephalum*** (Fabricius, 1793)
Fig. 7

Identified following the recent paper by Seifert (2022). Successful Asian ant that has colonized the tropics around the world (Wetterer, 2009).

Material examined: **The Gambia**: **West Coast**: Sumanguru Guest House (Busumbala) 20 m. 13.33298, -16.67077, Garden. Gómez, K. 14/11/2022, Hand collected, Foraging [KG06020A] ** Bijilo 1 (Bijilo N. P.) 20 m. 13.435, -16.72628, Coastal forest. Gómez, K. 20/11/2022, Hand collected, Leaf litter under rotten palm [KG06159B]

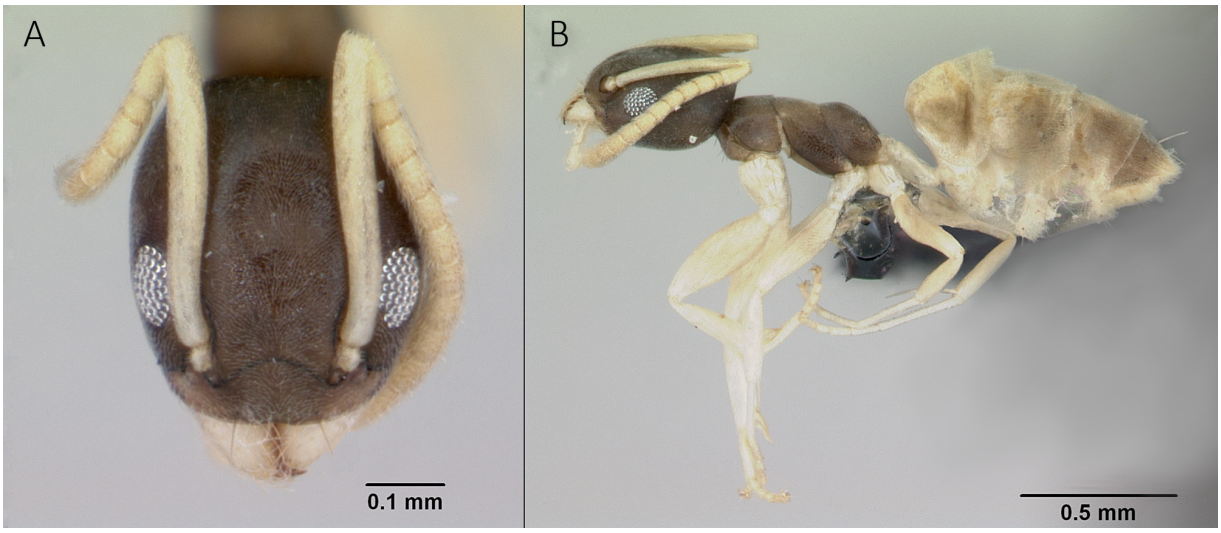


Fig.7. *Tapinoma melanocephalum* (Fabricius, 1793) (CASENT0008659), Madagascar. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

***Trichomyrmex destructor*** (Jerdon, 1851)
Fig. 8

First record to The Gambia.

Another extraordinarily successful Indian species which has become a pest in the tropical regions of the world (Wetterer, 2008a).

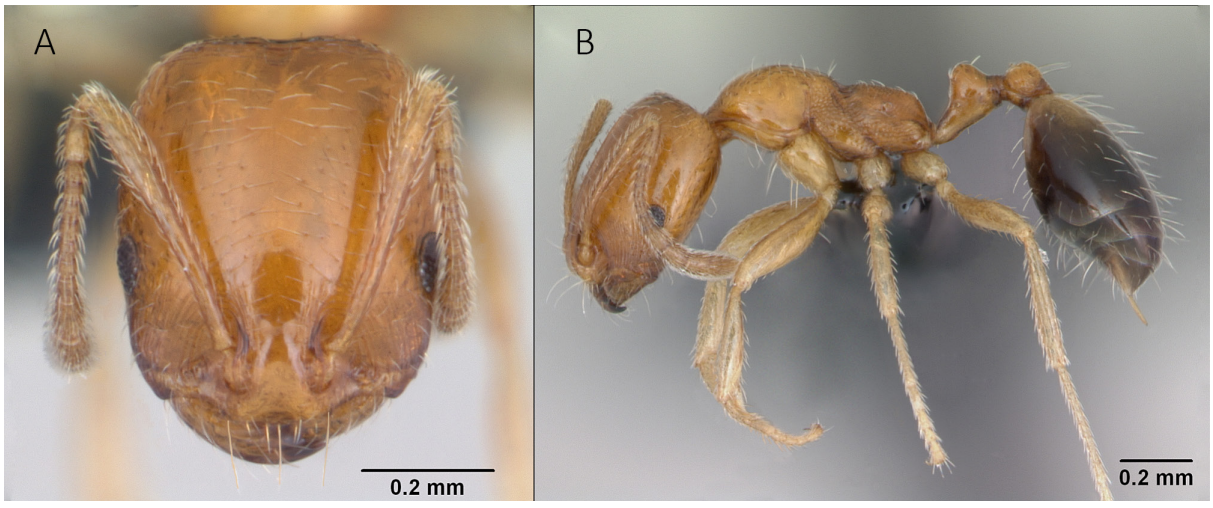


Fig.8. *Trichomyrmex destructor* (Jerdon, 1851) (CASENT0125190), Reunion Island. Worker. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

Material examined: **The Gambia**: **Banjul**: Tallinding (London Corner) 20 m. 13.42233, -16.65882, Path bt. Red Mangrove and Rice fields. Gómez, K. 18/11/2022, Hand collected, Nest in dead log, close to dumpster [KG06110, KGCOL02556] ** Port (Banjul City) 20 m. 13.44603, -16.57295, Ruderal. Gómez, K. 19/11/2022, Hand collected, Foraging on ground [KG06116] ** **North Bank**: Port (Barra) 20 m. 13.48408, -16.54652, Ruderal. Wetterer, J. 19/11/2022, Hand collected [KG06267B]

***Wasmannia auropunctata*** (Roger, 1863)
Fig. 9

First record to Gambia.

This invasive ant of Neotropical origin is steadily spreading to the tropical regions, having been recently detected in Spain (Espadaler *et al*., 2018), Guandong (Chen *et al*., 2022) and Taiwan (Lee *et al*., 2021).

Reported from Central Africa and Sierra Leone, its presence in this country should be confirmed as its first record dates from 1890; with no additional records in between (Wetterer, 2013). Its presence in Central Africa, though, is confirmed and its spreading from Gabon in the neighboring countries is well documented.

Our observation is the second record for Western Africa, and its presence is worrying due to the huge impacts that this species tends to have both for humans and in ecosystems (Wetterer, 2013). Its distribution and most probable expansion should be monitored to prevent future damages.

Several workers were found in the same spot as *B. depilis* and *S. eggersi*. This spot has no special characteristic that can make us think that this is the initial focus of infection, as it is not close to any harbor or merchandise transport hub.

Material examined: **The Gambia**: **West Coast**: Gambia College Mosque (Brikama) 20 m. 13.28441, -16.65637, Ruderal. Wetterer, J. 17/11/2022, Hand collected, Foraging [KG06048, KGCOL02560]

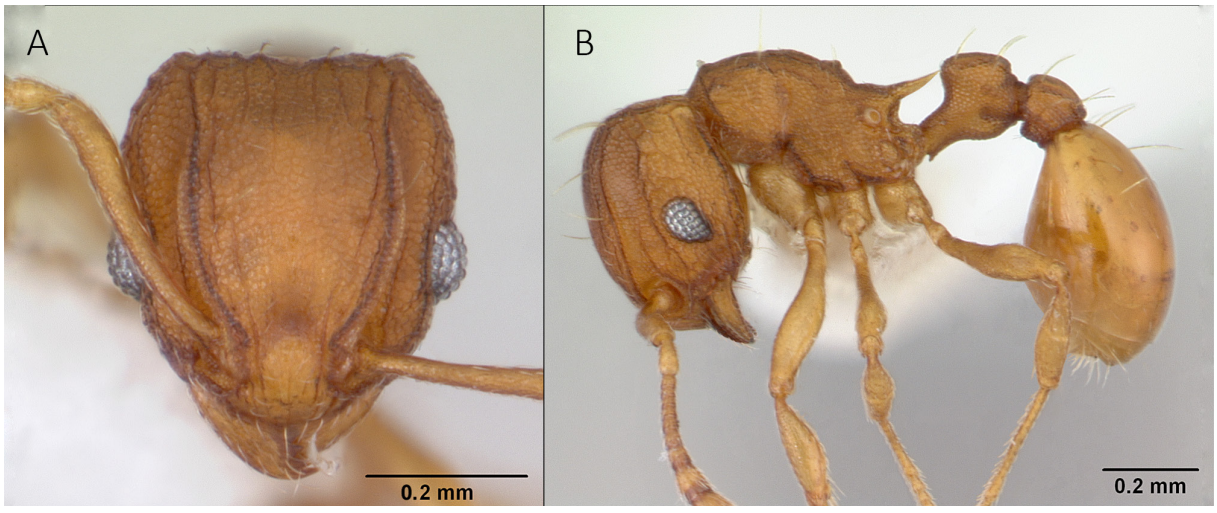


Fig.9. *Wasmannia auropunctata* (Roger, 1863) (CASENT0178173), Paraguay. **A**, Head frontal view. **B**, Habitus lateral view. © Antweb.

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We want to dedicate this article to Dr. James K. Wetterer, main expert in exotic and invasive ants, excellent professor and companion. We have been lucky enough to share our days in Gambia, learning from him and enjoying his company. Also, he is responsible for collecting some of the most interesting samples in this article.

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