



Worldwide distribution of *Syllophopsis subcoeca* (Hymenoptera: Formicidae), an Old-World species long known only from the West Indies

James K. Wetterer^a and Mostafa R. Sharaf^b

^aWilkes Honors College, Florida Atlantic University, Jupiter, FL, USA; ^bPlant Protection Department, College of Food and Agriculture Sciences, King Saud University, Riyadh, Saudi Arabia

ABSTRACT

Syllophopsis (Hymenoptera: Formicidae) is a taxonomically difficult and possibly polyphyletic genus of tiny, inconspicuous ants. *Syllophopsis subcoeca* (Emery) was described in 1894 from St Thomas, US Virgin Islands. This remained the sole published record of *S. subcoeca* for more than 100 years. Here, we present new descriptions of the worker and queen castes, and document a greatly expanded known geographic distribution of *S. subcoeca* in both the New World and the Old World. We compiled published and unpublished *S. subcoeca* specimen records from 67 sites. These include 59 New World sites on 12 West Indian islands (Barbados, Dominica, Grenada, Guadeloupe, Martinique, Nevis, St Croix, St John, St. Kitts, St Lucia, Tortola and Trinidad) and in southern Florida. In addition, we report records of *S. subcoeca* from eight Old World sites, in Singapore and on two islands of the Northern Mariana Islands (Tinian and Saipan). Published records of *Syllophopsis* cf. *subcoeca* from Australia, Christmas Island and Sri Lanka are probably true *S. subcoeca*. All other *Syllophopsis* species appear to have originated in the Old World; therefore, the same is almost certainly true of *S. subcoeca*. It is likely that *S. subcoeca* was introduced to the West Indies and Florida through human commerce. *Syllophopsis subcoeca* appears to be a very recent arrival to Florida, where it is now known from nine sites in Miami-Dade and Broward counties. It remains to be seen whether *S. subcoeca* will become widespread in Florida. It seems unlikely that this *S. subcoeca* will become a significant ecological or agricultural pest.

ARTICLE HISTORY

Received 16 March 2021
Accepted 18 June 2021

KEYWORDS

biogeography; biological invasion; exotic species; island fauna

Introduction

Syllophopsis (Hymenoptera: Formicidae) is a genus of tiny, inconspicuous ants. Twenty of the 22 recognised *Syllophopsis* taxa are found exclusively in the Old World (Sharaf 2007; Sharaf and Aldawood 2013; Aldawood 2016; Wetterer and Sharaf 2017; Bolton 2020). *Syllophopsis subcoeca* (Emery), however, was long known solely from its type locale in the West Indies. Like most *Syllophopsis* species, *S. subcoeca* workers have tiny eyes, reduced to

CONTACT James K. Wetterer ✉ wetterer@fau.edu
 Supplemental data for this article can be accessed [here](#).

© 2021 Informa UK Limited, trading as Taylor & Francis Group

just one or two ommatidia. The name ‘*subcoeca*’ derives from Latin for ‘almost blind’ (Deyrup 2016).

Syllophopsis subcoeca was originally described by Emery (1894) based on specimens collected on the island of St Thomas, US Virgin Islands, by Baron Henrik Franz Alexander von Eggers (1844–1903), a Danish biologist who collected extensively throughout the West Indies from 1880 to 1890. This remained the sole published record for *S. subcoeca* for more than 100 years, until Torres and Snelling (1997) reported *S. subcoeca* from Puerto Rico and the neighbouring island of Culebra. Although Torres and Snelling (1997) considered *S. subcoeca* to be an introduced Old World species, Fernández (2007) listed it as a native Neotropical species known only from St. Thomas and Puerto Rico.

More recently, *S. subcoeca* was recorded from Barbados (Wetterer et al. 2016) and Guadeloupe (Galkowski 2016). Deyrup (2016) collected *S. subcoeca* at one site in South Florida, the first published record of *S. subcoeca* from outside the West Indies. Wetterer et al. (2019) reported the first records of *S. subcoeca* from Grenada. Here, we present new descriptions of the worker and queen castes, and document a greatly expanded known geographic distribution of *S. subcoeca* in both the New World and the Old World.

Taxonomy and identification of *Syllophopsis*

Santschi (1915) described *Syllophopsis* as a subgenus of *Monomorium*. Some subsequent authors followed this designation, whereas others considered *Syllophopsis* to be a distinct genus. Still other authors designated these ants as belonging to the *Monomorium fossulatum* group (e.g. Bolton 1987; Sharaf 2007) or the *Monomorium hildebrandti* group (e.g. Heterick 2006; Sharaf and Aldawood 2013). Ward et al. (2015) designated *Syllophopsis* as a distinct genus. Recent genetic analyses, however, suggest that *Syllophopsis*, as currently constituted, may be polyphyletic, with two distinct clades: one closely related to *Monomorium* and the other closely related to the newly resurrected genus *Chelaner* (Sparks et al. 2019). A comprehensive revision encompassing all named *Syllophopsis* taxa is needed.

Syllophopsis workers are small, monomorphic, and yellow to light brown in colour, and can be recognised by the following characters in the workers (Bolton 1987; Fisher and Bolton 2016): 12-segmented antennae with well-defined three-segmented terminal clubs; eyes usually minute with one or two ommatidia; head in full-face view with a narrow clypeus and close antennal sockets; propodeum profile denticulate or angulate. Workers of *Syllophopsis* species resemble small *Solenopsis* thief ants – from which, however, they can be easily distinguished by the 12-segmented antenna that terminates in a 3-segmented large club, and the obtusely angled or denticulate profile between propodeal dorsum and declivity.

Methods

From 2003 to 2014, JKW collected *S. subcoeca* on West Indian islands as part of general ant surveys. In September–November 2019, JKW found this species in Florida through extracting ants from leaf litter collected from the bases of trees at urban sites in Broward and Miami-Dade counties in south-east Florida.

Voucher specimens have been deposited in the Museum of Comparative Zoology (MCZ), the US National Museum of Natural History (USNM), the Florida State Collection of Arthropods (FSCA), the Museum d’Histoire Naturelle, Geneva, Switzerland (MHNG), Mostafa Sharaf’s personal collection (MSC), John T. Longino’s personal collection (JTLCL), and James K. Wetterer’s personal collection (JKWC) (see Supplementary material).

Michele Esposito made new digital colour images of two workers and one queen of *S. subcoeca* using a Leica DFC450 digital camera with a Leica Z16 APO microscope and LAS (v. 3.8) software. These are available online on AntWeb (<http://www.antweb.org>) and are accessible through unique specimen identifiers (CASENT0923381, CASENT0923382, CASENT0923383).

Results

JKW collected *S. subcoeca* at 52 sites (see Supplementary material), including 38 sites on 12 West Indian islands (# of sites in parentheses): Barbados (11; see Wetterer et al. 2016), Dominica (1), Grenada (3; see Wetterer et al. 2019), Guadeloupe (3), Martinique (5), Nevis (4), St Croix (3), St John (1), St. Kitts (1), St Lucia (3), Tortola (2) and Trinidad (1). In Florida, JKW collected *S. subcoeca* at eight sites in two counties: Broward (1) and Miami-Dade (7). In Singapore, JKW collected *S. subcoeca* at six sites.

MS identified specimens of *S. subcoeca* that Orty Bourquin collected on two of the Northern Mariana Islands: Tinian (4 December 2002) and Papago, Saipan (31 December 2002).

In total, we compiled 68 published and unpublished *S. subcoeca* specimen site records from 67 distinct sites (Figures 3–4; Tables 1–Tables 2). One site record from Turner Hall Woods, Barbados (18 March 1998; S.P. Cover) could not be geographically distinguished

Table 1. Earliest known records for *Syllophopsis subcoeca* from the West Indies and Florida.

Neotropics	Earliest record
Saint Thomas, USVI	≤1890 (Emery 1894)
Puerto Rico	1981–1983 (Torres and Snelling 1997)
Culebra, PR	1982 (Torres and Snelling 1997)
Barbados	1998 (Wetterer et al. 2016)
Trinidad	2003 (J.K. Wetterer): Saint Augustine
Dominica	2004 (J.K. Wetterer): 3 km SW of Morpo
Tortola, BVI	2005 (J.K. Wetterer): Ballast Bay
Saint Croix, USVI	2005 (J.K. Wetterer): Saint George, Botanical Garden
Saint John, USVI	2005 (J.K. Wetterer): Peter Bay
Saint Lucia	2006 (J.K. Wetterer): Grande Riviere
Nevis	2006 (J.K. Wetterer): Long Point
Saint Kitts	2007 (J.K. Wetterer): Phillips Level
Martinique	2008 (J.K. Wetterer): Propreté
Guadeloupe	2008 (J.K. Wetterer): Bas du Fort
Grenada	2014 (Wetterer et al. 2019)
Florida	2014 (M. and N. Deyrup): Matheson Hammock

BVI: British Virgin Islands; USVI: United States Virgin Islands; PR: Puerto Rico.

Table 2. Earliest known records for *Syllophopsis subcoeca* in Old World bioregions.

	Earliest record
Northern Mariana Islands	2002 (O. Bourquin): Tinian
Singapore	2014 (J.K. Wetterer): Katong

from a later record from the same forest (26 November 2003; J.K. Wetterer; Wetterer et al. 2016).

Snelling and Torres (unpublished manuscript dated 1993; both authors deceased) recorded *S. subcoeca* from six sites on Puerto Rico (Arecibo, El Verde, Mayagüez, Palmer, San Juan, San Lorenzo) and on neighbouring Culebra. In addition, specimens of *S. subcoeca* collected by Juan Torres in Rio Piedras, Puerto Rico, were deposited at Archbold Biological Station (26 April 1983; J Torres; ABS).

Tourout et al. (2018) reported '*Syllophopsis* cf. *subcoeca*' from Martinique; it seems likely that these are *S. subcoeca*, although it is possible that they are misidentified *S. sechellensis* (see below).

Erroneous record

Deyrup (2016, p. 423) reported *S. subcoeca* from Dominica, writing 'specimens were found by digging in an open, dry, scrub area'. These specimens from Dominica (Cabrits National Park; 2 May 2006; M. Deyrup), however, were misidentified; they are actually *S. sechellensis* (M. Deyrup, pers. comm.), the first record of *S. sechellensis* from Dominica.

Diagnosis for *Syllophopsis subcoeca*

All measurements and indices are given in mm and follow the standard measurements and morphological definitions (see Sharaf and Aldawood 2013).

- EL Eye length: maximum diameter of eyes.
- HL Head length: maximum length of head from anterior clypeal margin to posterior margin of head.
- HW Head width: maximum width of head behind eyes in full face view.
- ML Mesosoma length: maximum length of mesosoma from the point at which pronotum meets with cervical shield to posterior edge of propodeal lobes in lateral view.
- PL Petiole length: maximum length of petiole from anterior margin to posterior margin in dorsal view.
- PPL Postpetiole length: maximum length of postpetiole in dorsal view.
- PPW Postpetiole width: maximum width of postpetiole in dorsal view.
- PRW Pronotal width: maximum width of pronotum in dorsal view.
- PW Petiole width: maximum width of petiole in dorsal view.
- SL Scape length: maximum length of scape excluding basal neck.
- CI Cephalic index: $HW/HL \times 100$.
- SI Scape index: $SL/HW \times 100$.

Worker (Figure 1)

Compared to syntype workers: CASENT0904581 (Museo Civico di Storia Naturale di Genova, Genoa, Italy), ENTO00081327 (MHNG) and ENTO00081221 (MHNG).

Measurements. EL 0.01, HL 0.30–0.33, HW 0.25–0.33, ML 0.32–0.35, PL 0.05–0.06, PPL 0.05–0.07, PPW 0.08–0.10, PRW 0.15–0.20, PW 0.06–0.08, SL 0.20–0.22, CI 83–100, SI 67–80 (n = 13).

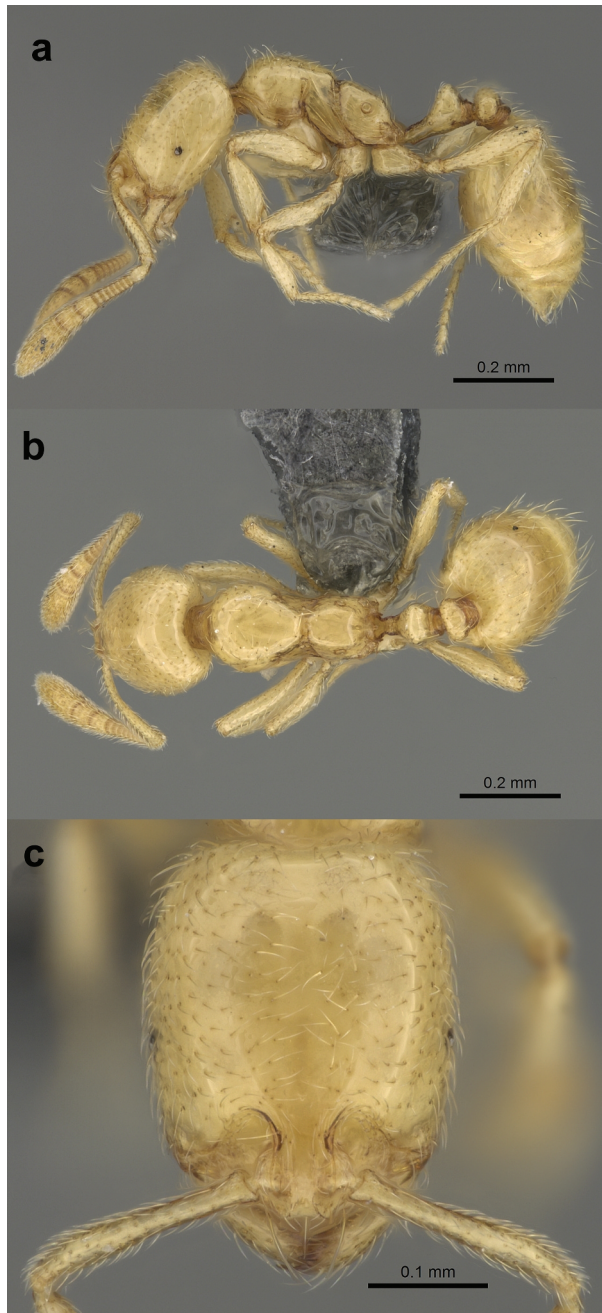


Figure 1. *Syllophopsis subcoeca* worker from Miami, Florida (collected by J.K. Wetterer; photo by M. Esposito; from www.antweb.org; CASENT0923383).

Head. Head in full-face view distinctly longer than broad, with convex sides and feebly concave posterior margin; masticatory margin of mandibles armed with four teeth decreasing in size from apex to base; frontal carinae short and rounded; anterior margin

of median portion of clypeus short and shallowly convex; eyes minute with a single ommatidium situated at midlength of head sides; antennae with 12 segments terminating in a well-marked 3-segmented club which is more than twice longer than funicular segments 2–8; funicular segments 2–8 distinctly broader than long; scapes when laid back from their insertions fail to reach posterior margin of head. **Mesosoma.** Profile of promesonotum relatively flat (compared to other *Syllophopsis* species); metanotal groove acutely impressed; propodeal dorsum meeting declivity in a well-marked obtuse angle; propodeal spiracles relatively large and circular. **Petiole.** Petiole in profile with long anterior peduncle; petiolar node in profile distinctly higher than postpetiolar node and nearly as broad as postpetiole in dorsal view. **Postpetiole.** Postpetiole in dorsal view about twice broader than long. **Sculpture.** Body surface entirely smooth and shining except impression between mesopleuron and metapleuron/propodeum finely cross-ribbed. **Pilosity.** Cephalic surface with abundant, minute scattered hair pits; sides of head, mandibles and anterior clypeal margin with abundant subdecumbent relatively long hairs; mesosoma, petiole, postpetiole and gaster with abundant suberect hairs; entire antennae with dense appressed pubescence; mesopleuron characteristically smooth with no hairs. **Colour.** Uniform yellow except first gastral tergite yellow with faint brown tint.

Queen (Figure 2)

Measurements. EL 0.09, HL 0.35, HW 0.30, ML 0.56, PL 0.07, PPL 0.08, PPW 0.14, PW 0.10, SL 0.09, CI 86, SI 87 (n = 1).

Head. Head in full-face view slightly longer than broad with feebly convex sides and shallowly concave posterior margin; scapes when laid back from their insertions fail to reach posterior margin of head; mandibles armed with four teeth decrease in size from apex to base; median anterior clypeal margin narrow and feebly concave or straight; eyes large, with about 10 ommatidia in longest row; in profile with dorsal margin rounded and ventral margin concave; ocelli prominent. **Mesosoma.** Mesoscutum, axilla and mesoscutellar disc forming a continuous curve in profile; propodeal dorsum nearly as long as declivity in profile and both making a broad obtuse angle. **Petiole.** Petiole in profile with a relatively long peduncle making a continuous curve with petiolar; petiolar node pointed in profile and slightly higher than postpetiolar node. **Postpetiole.** Postpetiole in dorsal view about twice broader than long and distinctly broader than petiole. **Sculpture.** Cephalic surface areolate-rugose; area between frontal carinae feebly longitudinally striated; mandibular surface unsculptured; mesosomal dorsum and sides smooth and shining; propodeal dorsum faintly transversally striated; petiole and postpetiole superficially punctate and dull; gaster superficially smooth and shining. **Pilosity.** Cephalic surface, antennae and mandibles with abundant subdecumbent hairs; mesosoma, petiole, postpetiole and gaster with abundant suberect hairs. **Colour.** Mesosoma, petiole, postpetiole, antennae, mandibles and legs yellow, head and gastral tergites yellow-brown, area between ocelli brown.

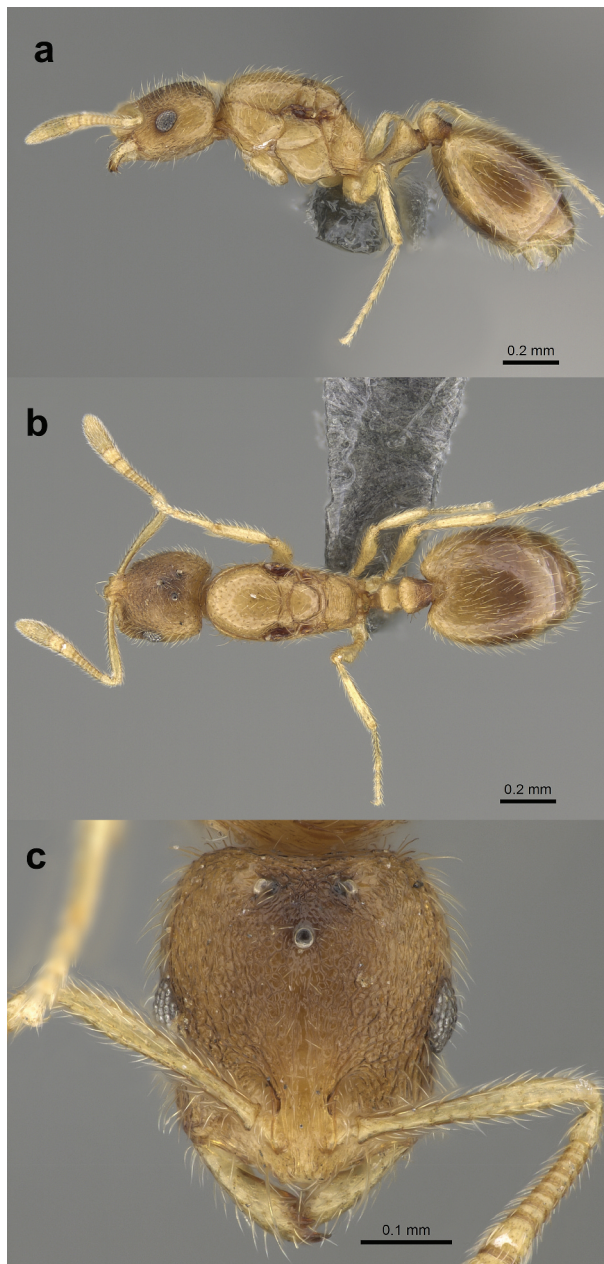


Figure 2. *Sylophopsis subcoeca* worker from Tortola, British Virgin Islands (collected by J.K. Wetterer; photo by M. Esposito; from www.antweb.org; CASENT0923381).

Species comparisons

Sylophopsis subcoeca has been considered to be closely related to *Sylophopsis australica* (Forel), originally described as *Monomorium subcoecum australicum* based on a worker specimen from the Blue Mountains in New South Wales, Australia. In his original description,

Forel (1907) discerned several subtle characters to differentiate *S. australica* from the types of *S. subcoeca*: a paler yellow colour, the slightly larger size, a deeper metanotal groove, and the slightly higher profile of the postpetiolar node. Ettershank (1966) raised *Monomorium australicum* (= *S. australica*) to species rank, but gave no rationale for doing so.

As part of a revision of Australian *Monomorium* species, Heterick (2001, p. 367) examined two syntype workers of *S. subcoeca* (from St Thomas, US Virgin Islands) and found that they 'lack the domed promesonotum and deeply impressed metanotal groove' diagnostic of *S. australica*. Heterick (2001) concluded that *S. subcoeca* and *S. australica* are two distinct species. Heterick (2001, p. 367) also examined a *fossulatum* group (= *Syllophopsis*) nest series from Cannonvale, Queensland, Australia, that he could not assign to *S. australica*, which 'closely resembles *M. subcoecum* overall'. Heterick (2001, p. 367) includes the Cannonvale series in his key of workers as '*M. cf. subcoecum* Emery', distinguished by having 'promesonotum flattened posteriad' (in contrast with 'promesonotum distinctly humped' for *S. australica*). Three Cannonvale *Syllophopsis* specimens, collected by G. Montieth on 25 April 1979, are currently listed in the Australian National Insect Collection as '*Syllophopsis cf. subcoeca*' (ANIC:32-056864-331).

Workers of *Syllophopsis subcoeca* look similar to *S. vitiensis* (Mann, 1921) from Fiji. The two species have single-ommatidium eyes, short scapes that fail to reach the posterior margin, abundant body pilosity, an acutely impressed metanotal groove, and a uniform yellow body colour. However, *S. subcoeca* can be readily separated by the lack of the small dent between propodeal dorsum and declivity.

In addition to *S. subcoeca*, only one other *Syllophopsis* species is known from the New World, *Syllophopsis sechellensis* (Emery), found on many West Indian islands and in South Florida (Wetterer and Sharaf 2017; Wetterer 2020). Although *S. sechellensis* is certainly native to the Old World, the extent of its original native range is unclear (Wetterer and Sharaf 2017). One character that easily distinguishes *S. sechellensis* from *S. subcoeca* is that its entire mesopleuron is matte and reticulate-punctate, whereas in *S. subcoeca* (and all other described *Syllophopsis* species) the mesopleuron is smooth and shiny. *Syllophopsis sechellensis* workers are also somewhat larger and darker than those of *S. subcoeca*. Fernández (2007) wrote, in error, that rather than *Syllophopsis sechellensis*, *S. subcoeca* has a sculptured mesopleuron.

Discussion

Syllophopsis subcoeca is now known in the Old World from Singapore and the Northern Mariana Islands. It is very likely that some of the other published and unpublished *Syllophopsis* records from the Old World are true *S. subcoeca*, for example the series Heterick (2001) reported from Cannonvale, Australia (see Introduction; Figure 4). In addition, Framenau and Thomas (2008) reported '*Monomorium cf. subcoecum*' (identified by B. Heterick) from Christmas Island in the Indian Ocean (Figure 4). Gunawardene et al. (2008) reported both '*Monomorium hildebrandti* gp sp. nr *subcoecum* Emery' (Figure 4) and '*Monomorium hildebrandti* gp sp. cf. *australicum* Forel' from Sri Lanka (identified by B. Heterick). Since all other *Syllophopsis* species originated in the Old World, the same is almost certainly true of *S. subcoeca*.

It is likely that *S. subcoeca* was introduced to the Neotropics through human commerce. Although *S. subcoeca* was described from the island of St. Thomas in 1894, it was

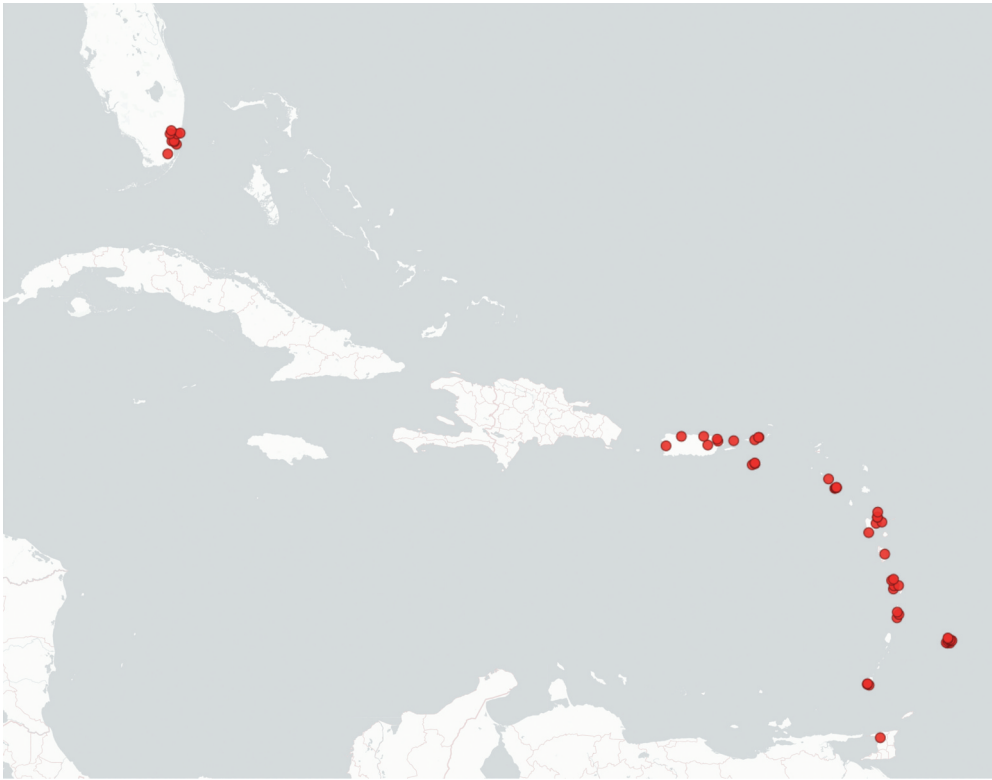


Figure 3. Distribution records of *Sylophopsis subcoeca* in the West Indies and Florida (from www.antweb.org).

not until 1981–1983 that the next known collections were made, on the neighbouring islands of Puerto Rico and Culebra. In the past 20 years, however, this species has been found for the first time on many additional West Indian islands and in Florida (Table 1; Figure 3). Many of these West Indian islands were poorly surveyed for ants until recently, so *S. subcoeca* may have arrived many years earlier but was simply overlooked. However, that is not the case for Florida, whose ants have been well studied for many decades. Deyrup (2016), who has intensively surveyed ants in leaf litter all around Florida, reported the first Florida record of *S. subcoeca* from Matheson Hammock in Miami-Dade County, where he has collected it repeatedly starting in 2014. In September–November 2019, JKW found *S. subcoeca* at eight additional locales in Miami-Dade and Broward counties. This suggests that *S. subcoeca* is a recent arrival in Florida, but is now spreading. It remains to be seen whether *S. subcoeca* will become widespread in Florida. Research on the genetic diversity of *S. subcoeca* at sites around the world is needed to resolve questions concerning its native range and the invasion history of this species.

We collected *S. subcoeca* in a wide range of habitats, ranging from highly disturbed urban sites to relatively pristine forests (see Supplementary material). In this respect, we could not discern any difference in habitat preference compared with that of *S. sechellensis*, the other cosmopolitan *Sylophopsis* species. Little information has been reported about the ecology of *S. subcoeca*. Torres et al. (2000) recorded *S. subcoeca* in the



Figure 4. Old World distribution records of *Sylophopsis subcoeca* (red) and *Sylophopsis cf. subcoeca* (green – see text) (from www.antweb.org).

scat of flathead worm snakes, *Antillotyphlops platycephalus* (Duméril and Bibron), at two sites on Puerto Rico. Snelling and Torres (unpublished 1993 ms) wrote of *S. subcoeca* in Puerto Rico: ‘Colonies of this ant are in soil, often under covering objects, such as stones, in open areas. This species is largely or entirely subterranean and there are multiple queens in a nest’. All samples that JKW collected came from sifting leaf litter. JKW extracted 60 *S. subcoeca* workers and four queens from leaf litter accumulated between two exposed tree roots at the base of a tree in Maurice A. Ferré Park, Miami, confirming the observation of multiple queens in a nest. Based on what little is known about *S. subcoeca*, it seems unlikely that it will become a significant ecological or agricultural pest.

Acknowledgements

We thank M. Wetterer for comments on this manuscript; and Florida Atlantic University and the National Science Foundation (DEB 200515648) for financial support. We are grateful to B. Landry, Muséum d’Histoire Naturelle (MNHG), Geneva, Switzerland, for making *S. subcoeca* type material available for study. Special thanks to Brian Fisher and Michele Esposito for imaging the worker and queen castes.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Florida Atlantic University; National Science Foundation [DEB 200515648].

References

- Aldawood AS. 2016. Ants of the genus *Sylophopsis* Santschi, 1915 (Hymenoptera: Formicidae) in Saudi Arabia with description of a new species. *Zool Middle East*. 62(2):137–143. doi:[10.1080/09397140.2016.1173898](https://doi.org/10.1080/09397140.2016.1173898).
- Bolton B. 1987. A review of the *Solenopsis* genus-group and revision of Afrotropical *Monomorium* Mayr (Hymenoptera: Formicidae). *Bull Br Mus (Nat Hist) Entomol*. 54:263–452.
- Bolton B. 2020. *Sylophopsis* in *AntCat An Online Catalog of the Ants of the World*. [accessed 2020 Oct 8]. www.antcat.org/catalog/429732?qq=Sylophopsis.
- Deyrup MA. 2016. *Ants of Florida: identification and Natural History*. Boca Raton (FL): CRC Press; p. 423.
- Emery C. 1894. Studi sulle formiche della fauna neotropica. VI–XVI. *Bull Soc Entomol Ital*. 26:137–241.
- Ettershank G. 1966. A generic revision of the world Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). *Aust J Zool*. 14:73–171. doi:[10.1071/ZO9660073](https://doi.org/10.1071/ZO9660073).
- Fernández F. 2007. Two new South American species of *Monomorium* Mayr with taxonomic notes on the genus. *Mem Amer Ent Inst*. 80:128–145.
- Fisher BL, Bolton B. 2016. *Ants of Africa and Madagascar, a guide to the genera*. Berkeley: University of California Press; p. 503.
- Forel A. 1907. Formicides du Musée National Hongrois. *Ann Hist -Nat Mus Natl Hung*. 5:1–42.
- Framenau VW, Thomas ML. 2008. Ants (Hymenoptera: Formicidae) of Christmas Island (Indian Ocean): identification and distribution. *Rec West Aust Mus*. 25:45–85. doi:[10.18195/issn.0312-3162.25\(1\).2008.045-085](https://doi.org/10.18195/issn.0312-3162.25(1).2008.045-085).
- Galkowski C. 2016. New data on the ants from the Guadeloupe (Hymenoptera, Formicidae). *Bull Soc Linn Bordeaux*. 151, 44(1):25–36.
- Gunawardene NR, Majer JD, Edirisinghe JP. 2008. Diversity and richness of ant species in a lowland wet forest reserve in Sri Lanka. *Asian Myrmecol*. 2:71–83. doi:[10.20362/am.002007](https://doi.org/10.20362/am.002007).
- Heterick BE. 2001. Revision of the Australian ants of the genus *Monomorium* (Hymenoptera: Formicidae). *Invertebr Taxon*. 15:353–459. doi:[10.1071/IT00003](https://doi.org/10.1071/IT00003).
- Heterick BE. 2006. A revision of the Malagasy ants belonging to genus *Monomorium* Mayr, 1855 (Hymenoptera: Formicidae). *Proc Calif Acad Sci*. 57:69–202.
- Santschi F. 1915. Nouvelles fourmis d'Afrique. *Ann Soc Entomol Fr*. 84:244–282.
- Sharaf MR. 2007. *Monomorium dentatum* sp. n., a new ant species from Egypt (Hymenoptera: Formicidae) related to the *fossulatum*-group. *Zool Middle East*. 41:93–98. doi:[10.1080/09397140.2007.10638231](https://doi.org/10.1080/09397140.2007.10638231).
- Sharaf MR, Aldawood AS. 2013. First occurrence of the *Monomorium hildebrandti*-group (Hymenoptera: Formicidae), in the Arabian Peninsula, with description of a new species *M. kondratieffi* n. sp. *Proc Entomol Soc Wash*. 115:75–84. doi:[10.4289/0013-8797.115.1.75](https://doi.org/10.4289/0013-8797.115.1.75).
- Snelling RR, Torres JA. 1993. The ants of Puerto Rico (Hymenoptera: Formicidae). Unpublished manuscript; p. 152.
- Sparks KS, Andersen AN, Austin AD. 2019. A multi-gene phylogeny of Australian *Monomorium* Mayr (Hymenoptera: Formicidae) results in reinterpretation of the genus and resurrection of *Chelaner* Emery. *Invertebr Syst*. 33:225–236. doi:[10.1071/IS16080](https://doi.org/10.1071/IS16080).
- Torres JA, Snelling RR. 1997. Biogeography of Puerto Rican ants: a non-equilibrium case? *Biodivers Conserv*. 6:1103–1121. doi:[10.1023/A:1018332117719](https://doi.org/10.1023/A:1018332117719).
- Torres JA, Thomas R, Leal M, Gush T. 2000. Ant and termite predation by the tropical blindsnake *Typhlops platycephalus*. *Insectes Soc*. 47:1–6. doi:[10.1007/s000400050001](https://doi.org/10.1007/s000400050001).

- Touroult J, Poirier E, Moulin N, Deknuydt F, Dumbardon-Martial E, Ramage T, Lucas P-D, Romé D. 2018. Inventaire entomologique des ZNIEFF de Martinique. Campagne de terrain 2017. Rep Soc Entomol Antilles-Guyane. 2018–1:1–92.
- Ward PS, Brady SG, Fisher BL, Schultz TR. 2015. The evolution of myrmicine ants: phylogeny and biogeography of a hyperdiverse ant clade (Hymenoptera: Formicidae). Syst Entomol. 40:61–81. doi:[10.1111/syen.12090](https://doi.org/10.1111/syen.12090).
- Wetterer JK. 2020. First North American records of *Sylophopsis sechellensis* (Hymenoptera: Formicidae). Sociobiology. 67:478–480. doi:[10.13102/sociobiology.v67i3.5014](https://doi.org/10.13102/sociobiology.v67i3.5014).
- Wetterer JK, Lubertazzi D, Rana J, Wilson EO. 2016. Ants (Hymenoptera: Formicidae) of Barbados. Breviora. 548:1–34. doi:[10.3099/brvo-548-00-1-34.1](https://doi.org/10.3099/brvo-548-00-1-34.1).
- Wetterer JK, Lubertazzi D, Wilson EO. 2019. Ants (Hymenoptera: Formicidae) of Grenada. Bull Mus Comp Zool. 162(5):1–38. doi:[10.3099/0027-4100-162.5.263](https://doi.org/10.3099/0027-4100-162.5.263).
- Wetterer JK, Sharaf MR. 2017. Worldwide distribution of *Sylophopsis sechellensis* (Hymenoptera: Formicidae). Fla Entomol. 100:281–285. doi:[10.1653/024.100.0224](https://doi.org/10.1653/024.100.0224).