Midsouth Entomologist **6**: 104-114
ISSN: 1936-6019
www.midsouthentomologist.org.msstate.edu

Report

Notes and New Distributional Records of Invasive Ants (Hymenoptera: Formicidae) in the Southeastern United States

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Received: 01-X-2013 Accepted: 31-X-2013

Abstract: The spread and establishment of alien species into new regions is becoming commonplace with increased global trade and a warming climate. Ants are among the most successful of these species due to their relatively small size and adaptability. The southeastern United States has been particularly susceptible to the introduction of alien ant species as a result of its geographic location and large number of shipping ports. A subset of these alien species is considered invasive based on their overall negative impacts to natural ecosystems and to humans. During recent years, several of these species have shown marked dispersal in the Southeast. Here, we give a brief overview of some less well-known invasive ants and their distributions in the southeastern United States.

Keywords: Invasive species, dark rover ant, tawny crazy ant, graceful twig ant, Roger's ant, Asian needle ant

Introduction

As global commerce has increased, so has the transportation of alien species. This has resulted in the introduction of numerous alien species to non-native regions (McGlynn 1999). Survival of an alien species in a new region, such as Southeastern U.S., is dependent upon conditions that are similar to their native habitat. It is unknown whether newly introduced species that have been detected in the southeastern U.S. will survive in this region. A small subset of alien species may become "invasive" species that have negative effects on natural ecosystems as well as the economy, agriculture, and health of humans (Ward et al. 2008). Ants are among the most successful alien invaders because they are easily transported from place to place by commerce and are very adaptable. Geographic location in a moderate climate coupled with a large number of shipping ports makes the southeastern U.S. especially susceptible to introduction and establishment of exotic ants. At least 75 exotic species have been reported from this region (MacGown 2009a). [This is especially true for Florida, a state surrounded mostly by water and semitropical in climate It is also true for port cities in other states such as Mobile, Alabama; New Orleans, Louisiana; and Gulfport, Mississippi.

Alien species established in the Southeast are native to many regions including Africa, Argentina, Brazil, Europe, Greater Antilles, the Indo-Pacific region, Japan, Mexico, Puerto Rico, and Southeast Asia. After being introduced and established in the U.S., alien species may increase their range by natural dispersal or with inadvertent aid of humans. These species may be transported in nursery stock, mulch, firewood, garbage, hay bales, yard debris or other materials carried by various vehicles.

Invasive ant species have a great economic impact in the U.S. One of the most infamous invasive ant species in the US is the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae: Myrmicinae) (Figure 1), first reported in the US from Mobile, Alabama. According to the Food and Drug Administration (FDA), more than 5 billion US dollars are spent annually on medical treatment, damage, and control of red imported fire ants (McDonald 2006). Similarly, large sums of money are spent annually to control Argentine ants, *Linepithema humile* (Mayr) (Hymenoptera: Formicidae: Dolichoderinae) (Figure 2). Argentine ants were first reported from New Orleans in the late 1890's, and are now considered to be one of the top 100 invasive animal species in the world (McGlynn 1999).

Figure 1. *Solenopsis invicta,* profile view of worker.

Figure 2. Linepithema humile, profile view of worker.

Much has been written about these now common species as they spread throughout the US and other regions of the world. Their spread, especially that of *S. invicta*, has greatly exceeded estimates made using early distributional models. As climate change continues with global warming, species such as these are expanding their ranges northward.

Although imported fire ants and Argentine ants are considered to be the most serious invasive species in the US, other species may also be considered invasive such as the dark rover ant (*Brachymyrmex patagonicus* Mayr) (Formicinae), the tawny crazy ant (*Nylanderia fulva* (Mayr)) (Formicinae), the graceful twig ant (*Pseudomyrmex gracilis*) (Pseudomyrmicinae), Roger's ant (*Hypoponera punctatissima* (Roger)) (Ponerinae), and the Asian needle ant (*Pachycondyla chinensis* Emery) (Ponerinae). Here we give an update on the status of these other invasive species in the Southeast with new distributional records.

Methods

New records reported here are vouchered in the Mississippi Entomological Museum (MEM). Photographs of ants were taken using a Leica DFC digital camera mounted on a Leica Z16 Macroscope. Images were stacked using Leica Application Suite vs. 4.1 with Automontage module.

Discussion

Brachymyrmex patagonicus, the dark rover ant (Figure 3)

Brachymyrmex patagonicus is an invasive pest species native to Argentina. This species constructs small to large nests in a wide variety of habitats and in man-made structures. Rover ants are a serious nuisance species and are considered one of the most difficult pest ants to control by pest control operators. This species has been reported to nest in electrical outlets and light sockets (MacGown et al. 2007). This species does not sting and rarely bites.

Dark rover ants can be recognized by their minute size (1.5-2.0 mm total length), dark brown to blackish color, nine segmented antennae, single petiole, large eyes, and scattered stout erect setae.

Figure 3. *Brachymyrmex patagonicus,* profile view of worker.

The explosive spread of *Brachymyrmex patagonicus* from early isolated populations in Mobile, Alabama and southern Louisiana in the late 1970's to being widespread throughout the Southeast and west to California was documented by MacGown et al. (2007). At the time of that study, *B. patagonicus* was widespread in Louisiana, southern to central Mississippi and Alabama, central to northern Florida, and central to southern Georgia, and found less commonly in southern Arkansas and eastern Texas.

This species has continued to spread and is now common throughout the Southeast into South Carolina, North Carolina, numerous counties of Texas, in Arizona, New Mexico, and parts of California (MacGown 2013).

Nylanderia fulva, the tawny crazy ant (Figure 4)

Nylanderia fulva is an invasive species native to South America that reduces biodiversity, causes serious nuisance problems, and is difficult to control. This species is noted to commonly cause short circuits in electrical equipment such as breaker boxes, light sockets, receptacles, computers, cell phones, and numerous other devices and equipment. Tawny crazy ants do not sting, but occasionally bite and may spray formic acid into the bitten area.

Nylanderia fulva colonies are often massive with nests typically found in rotting wood, in soil, in and under various types of debris and landscape objects, under mulch, under bark, in potted plants, in vehicles, and in structures. Due to their nesting habits, populations may be easily transported from one locality to another. Colonies are less active during cool months; however, populations build rapidly in the spring and increase in size throughout the summer and fall. Tawny crazy ant workers tend various hemipterous insects (aphids, mealybugs, scale insects, treehoppers, whiteflies, etc.) for honeydew. They are also attracted to plant nectaries, damaged or overripe fruit, and other sweet food sources. They supplement their diets with other arthropods and small vertebrates for protein (Drees 2009, MacGown 2011).

Tawny crazy ants can be identified by their small size (approximately 2.0-2.5 mm), reddish-brown color, 12-segmented antennae, single segmented waist, dense pubescence (especially compared to most other members in this genus), and numerous elongate, thickened, flexuous setae on the body. This species can be recognized in the field by the extremely large populations, uniform size of workers, reddish-brown coloration, and rapid, erratic movement.

Figure 4. *Nylanderia fulva,* profile view of worker.

The tawny crazy ant has become a significant invasive species in Florida and Texas, with isolated populations in Louisiana and Mississippi (MacGown and Layton 2010). Within these states, this species continues to spread. The tawny crazy ant was only known from one isolated location in Hancock County, Mississippi in 2009, but has since been collected at numerous localities in Hancock, Harrison, and Jackson Counties along the Mississippi Gulf Coast with the most recent collections from Pascagoula only a few miles from the Alabama border. It has not yet been discovered in Alabama, but it will likely be found there soon. Likewise, this species is now known to occur in at least 23 counties in Florida. Recently, a large population was discovered August, 2013 in Albany, Doughterty County, Georgia by James Morgan (Doughterty County Extension Agent). This represents a new state record and the northernmost record of this species.

Pseudomyrmex gracilis, graceful, elongate, or Mexican twig ant (Figure 5).

Pseudomyrmex gracilis is an alien species thought to be native to Mexico, but also found from Argentina and Brazil through Texas, parts of southeastern US, and the Caribbean. Its status as an invasive species is unclear, but due to its apparent spread in the US and its painful sting, this species is worth monitoring.

Unlike most ant species, *P. gracilis* nests in hollow twigs, branches, stems, and grasses, but also in in crevices in buildings (Wetterer 2010). Klotz et al. (1995) reported finding nests of this species in wooden door frames of houses. Colony size is typically small with one queen per colony. Stings usually occur after a worker falls from foliage onto human skin, but also when workers are defending their colonies. According to Wheeler and Wheeler (1956), *P. gracilis* readily defends it host plant or colony by swarming and stinging intruders.

The graceful twig ant is easily recognized by its elongate, wasp-like appearance, large size (8-10 mm), orange and black coloration, large eyes, elongate two-segmented waist, and a well developed sting.

Figure 5. *Pseudomyrmex gracilis,* profile view of worker.

As recently as 2003, this species was reported in the US only from Texas, Louisiana, Florida, and Hawaii (Wetterer and Wetterer 2003). Although it was discovered in Florida in the late 1960's (Whitcomb et al. 1972), *P. gracilis* was reported as being very common in southern Florida by the year 2000 (Deyrup et al. 2000). MacGown and Hill (2010) reported it from Harrison and Pearl River in southern Mississippi. This species was later collected in the fall of 2011 in Ocean Springs, Jackson County, Mississippi (30°23'56"N 88°48'02"W). With populations in Louisiana, Mississippi, and Florida, it seemed likely that this species should occur in Alabama. Indeed, Richter collected foraging workers on 11 June 2012 at Village Point Park Preserve in Daphne, Baldwin County (30°37'46"N 87°54'57"W) and on 25 September 2012 at a different site in the same preserve (30°37'41"N 87°54'51"W). Richter collected this species on 29 April 2013 at the Environmental Studies Center in Mobile, /Mobile County (30°36'42"N 88°10'32"W). Thus far, this species has not been reported from Georgia; however, a worker was collected foraging on the ground beneath a street light at 11 PM by D. S. Hodo at Mt. Pleasant in Charleston County, South Carolina on 22 July 2012. This is the northernmost record of this species.

Hypoponera punctatissima, Roger's ant or the tropical stinging ant (Figure 6)

Hypoponera punctatissima is a cosmopolitan tramp species that occurs throughout many of the warmer regions of the world. Despite its widespread distribution, the origin of this species is uncertain, although it is reported to be native to western Europe or Africa (McGlynn 1999). This species is in a taxonomically difficult group and has often been confused with *H.* ragusai (Emery) [as its junior synonym, *H. gleadowi* (Forel)] in the literature or has been reported as one of several synonyms of *H. punctatissima* such as *H. ergantandria* (Bolton and Fisher 2011, Delabie

and Blard 2002). Currently, *H. punctatissima* and *H. ragusai* are the only two species in the *punctatissima* group known to occur in the United States.

Workers of *H. punctatissima* are small (2.0-2.5 mm), brownish-yellow to almost black, have small eyes with 1-6 ommatidia that are placed on the sides of the head near the base of the mandibles, 12-segmented antennae, a one-segmented waist, and an obvious sting. Queens are similar, but are slightly larger, have much larger eyes with numerous ommatidia, and have wings (alates). Both workers and queens of *H. punctatissima* can differentiated from other species of *Hypoponera* found in Mississippi by their small size. The related *Ponera exotica* Smith is similar in size and general appearance, but can be easily differentiated by the presence of a fovea on the subpetiolar process.

Figure 6. *Hypoponera punctatissima,* profile view of alate female.

Deyrup et al. (2000) reported that *H. punctatissima* sometimes is common in south and central Florida, especially in highly disturbed areas such as urban, suburban, roadsides and improved pastures, and may have considerable impact on some native species. Nests have been found in disturbed fields, lawns, edges of ditches, and marsh grass tussocks. This species is considered to be a stinging pest, with stings often being from queens. During the summer, large mating flights occur, and queens often land on human skin where they often sting if trapped under clothing, stuck in sweat, or touched (Deyrup et al., 2000).

According to Bolton and Fischer (2011), the reported distribution of this species in the US is unclear due to confusion with *H. ragusai.* However, other than its occurrence in Florida, US records have been primarily confined to indoor buildings and greenhouses. Here, we report the first records of this species from Louisiana, Mississippi, and Alabama. Alate females were collected in flight interception traps run by C. Carlton and D. Prowell at 30°31'25"N 89°58'07"W at Abita Creek Preserve in St. Tammany Parish, Louisiana on 6 July 2000, 1 August 2000, 11 August 2000, 31 August 2000, and 29 September 2000. Alate females were collected on 3 August 2010 in a home in Gautier in Jackson County, Mississippi. The homeowner commented that the ants were swarming in large numbers and were a nuisance. A single winged queen was collected by the first author (JAM) as it alighted upon his arm and stung him on 8 August 2013 at

Blakeley Park in Baldwin County, Alabama (30°43'56"N 87°53'59"W). The sting was not overly painful, and only persisted for a few minutes.

Pachycondyla chinensis, the Asian needle ant (Figure 7)

The Asian needle ant is an invasive species that has been shown to negatively impact biodiversity and pose medical risks for humans from anaphylaxis as a result of stings (Nelder et al. 2006). Although this species possesses a large sting, it is not an aggressive stinger. Typically, stings are a result of an individual disturbing a colony or having a winged female alight on the body and become trapped between the skin and clothing layer. Based on experience of the first author (JAM), stings are painful and persist for up to 30 minutes or more.

Pachycondyla chinensis nests may be found in rotting logs and stumps, in standing trees, in soil, or in and under debris. In urban settings, it may be found under mulch, railroad ties, bricks and pavers. Colony size ranges from fewer than 100 individuals to several thousand, and multiple queens may be present. Unlike many introduced, invasive ant species, Asian needle ants often nest in natural wooded habitats and may reduce biodiversity (Nelder et al. 2006).

Asian needle ants are average-sized ponerine ants (about 5.0 mm), shiny dark brownish-black with reddish-brown legs, have a one-segmented waist, and a strong sting.

Figure 7. *Pachycondyla chinensis,* profile view of worker.

Pachycondyla chinensis was first reported [*sensu Euponera solitaria* (F. Smith)] as occurring in the US in Georgia, North Carolina, and Virginia (Smith 1934). Populations of this species were not reported as being noticeably high until 2006 when researchers documented large populations in North Carolina and South Carolina that were displacing native ants in natural wooded habitats and stinging individuals (Guénard and Dunn 2010). Since then, this species has been reported from Alabama, Connecticut, Florida, New Jersey, New York, South Carolina, Tennessee, Washington, and Wisconsin (Dunn and Menninger 2013, Guénard and Dunn 2010, MacGown 2009b). The Florida record was isolated, and no new records have been reported from Alabama

or farther west in the southern US since 2009. But, its occurrence in Alabama does not appear to be isolated as numerous colonies were discovered on 2 September 2013 near Dadesville, Tallapoosa County, Alabama (32°36'42"N 85°53'11"W). This species recently was discovered in Pearl River County, Mississippi (30° 47' 20"N 89°48' 16"W). MacGown discovered a single alate queen in a sample from a Lindgren funnel trap in southern Mississippi, and this represents a new state record and the southwestern-most locality for this species in the US.

Acknowledgments

Thanks to D. Scott Hodo for the donation of his collection of *Pseudomyrmex gracilis* from South Carolina, Victoria Bayless (Louisiana State Arthropod Museum curator) for the loan of *Hypoponera punctatissima*, and to Dan Suitor for donation of *Nylanderia fulva* from Georgia. The specimen of *Pachycondyla chinensis* from Mississippi was collected as a part of the USDA-APHIS-PPQ trapping program aimed at monitoring the region for new introductions of alien bark beetles. This article is approved for publication as Journal Article No. J-12432 of the Mississippi Agricultural and Forestry Experiment Station. This research was supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under Project No. MIS-012040 and the USDA-ARS Areawide Management of Imported Fire Ant Project (Richard L. Brown, Principal Investigator).

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