

Geographic distribution of *Temnothorax allardycei* (Hymenoptera: Formicidae)

JAMES K WETTERER

Wilkes Honors College, Florida Atlantic University, 5353 Parkside Drive, Jupiter, FL 33458;
e-mail: wetterer@fau.edu

ABSTRACT

Temnothorax allardycei (Mann) (Hymenoptera: Formicidae) is a rarely encountered ant known only from the Bahamas and South Florida. I found a total of only 24 site records of *T. allardycei*, six in the Bahamas and 22 in South Florida. *Temnothorax allardycei* nests in plant cavities, notably in dead vines and dead stems of sawgrass, *Cladium jamaicense* (Cranz). All records of *T. allardycei* for which I have habitat data came from relatively intact natural areas, a pattern that suggests that this species is native to both the Bahamas and South Florida.

Key words: biogeography, geographic range, native range

INTRODUCTION

Temnothorax allardycei (Mann) (Hymenoptera: Formicidae) (formerly *Leptothorax allardycei*) is a rarely encountered ant with site records known only from the Bahamas and South Florida. *Temnothorax allardycei* colonies nest in plant cavities, such as hollow twigs, vines, and the hollow dead stems of grass and sedges, notably sawgrass, *Cladium jamaicense* (Cranz) (Deyrup and Cover 2004). Colonies are relatively small, with 20 to 120 workers (Cole 1991), and workers forage at night (Deyrup and Cover 2004). Extensive laboratory studies have examined worker interactions, activity cycles, time budgets, efficiency, and reproduction of *T. allardycei* (Cole 1981, 1984, 1986, 1988a, b, 1991, 1992, Cole et al. 1994, Cole and Hoeg 1996). Little is known, however, about the ecology of *T. allardycei* in nature.

Morrison (1998) listed *T. allardycei* as native in the Bahamas, and Deyrup et al. (1998) wrote that *T. allardycei* was “presumed native” in the Bahamas. Deyrup et al. (1988) considered *T. allardycei* “as probably a native species” in the Florida Keys. Nonetheless, Deyrup et al. (2000) included *T. allardycei* on a list of “dubious natives” in Florida, writing: “it is a twig-inhabiting ant that might have been imported in nursery stock.”

Apparently based on Deyrup et al.’s (2000) uncertainty, Wittenborn and Jeschke (2011) included *T. allardycei* on their list of 93 exotic ant species established in North America. The present analysis aimed to document the known range of *T. allardycei*, assess how common this species may be, and speculate on where this ant is native and where it may have been introduced through human commerce.

Blaine Cole (pers. comm.) gave me this advice on finding *T. allardycei*: “I have had the best luck in dead sawgrass stems that have reached a gray stage of decay (they gradually and eventually turn a silvery color). The stems are horizontal (you often see the carton tube that they form on the entrance. The most productive stems are deep in the understory, particularly under Florida poisonwood (hurray!) and also under satinleaf bushes (at least in the lower keys).” In contrast, Deyrup et al. (1988) wrote of *T. allardycei*: “the habitat of this species is dead vines in dense tropical hammock.”

Taxonomy — Mann (1920) described *Macromischa allardycei* (= *T. allardycei*) from the Bahamas. Wheeler (1931) described its junior synonym, *Antillaemyrmex floridanus* (= *T. allardycei*), from Florida. Smith (1939) examined Wheeler’s specimens and wrote: “The three specimens of *floridana* agree so closely

with cotypes of *Macromischa allardycei* Mann of the Bahama Islands, that I at first considered synonymizing *floridana* with that species. After studying specimens of both species, however, it appears to me that the worker of *floridana* is much more robust; has a proportionally broader head, with less convex posterior border; more robust epinotal spines; and the petiolar node arising more abruptly from the pedicel. The workers of *allardycei* appear to show greater tendency to polymorphism than do the workers of *floridana*." Baroni Urbani (1978), however, disagreed with Smith's (1939) evaluation and designated *A. floridanus* a junior synonym of *T. allardycei*. Baroni Urbani (1978) wrote (in Italian): "The probable synonymy between *allardycei* and *floridanus* had already been raised by several authors and the examination of the above-mentioned material, comprising the series are typical of the two species, leaves no room for doubt on the appropriateness of this nomenclatorial solution. The greater robustness of *floridanus* disappears entirely within the material examined in the course of this review."

MATERIALS AND METHODS

Following Blaine Cole's advice (above), I searched for *T. allardycei* colonies in dead sawgrass stems at numerous sites in Palm Beach County, Florida, particularly looking for stems fitting the characteristics that Cole (pers. comm.) found most productive.

Using published and unpublished records, I documented the known range of *Temnothorax allardycei*. I obtained unpublished site records from museum specimens in the collections of the Archbold Biological Station (ABS), Museum of Comparative Zoology (MCZ), and the Smithsonian Institution (USNM). I also obtained unpublished site records of *T. allardycei* from B. Cole, M. Deyrup, C. Moreau, and L. Morrison. In addition, I used on-line databases with collection information on specimens by Antweb (www.antweb.org). I obtained geo-coordinates for collection sites from published references, specimen labels, maps, or geography web sites (e.g., earth.google.com and www.tageo.com).

RESULTS

I collected >100 ant colonies from dead sawgrass stems in Palm Beach County, Florida, but none were *T. allardycei*.

In total, I found records of *Temnothorax allardycei* from a total of only 24 different sites. In the Bahamas, there were six records from six different islands (from south to north): Rum Cay (23.68°N, 74.87°W; J. Mangold; Deyrup 2016), South Andros (23.95°N, 77.62°W; B. Cole; pers. comm.), Staniel Cay (24.17°N, 76.44°W; 1989-1994; Morrison 1998), North Andros, at old Bio station (24.90°N, 77.93°W; 1996; Deyrup et al 1998), New Providence, swamp on the road between Grants Town and the Blue Hills (= Big Pond) (25.06°N, 77.35°W; 1917-1918; USNM; Mann 1920), and Gorda Key (26.08°N, 77.53°W; 1997; Z. Prusak; MCZ; Deyrup 2016). In South Florida, there were records from 18 different sites (from south to north): Sugarloaf Key, sawgrass (24.62°N, 81.54°W; 1977; B. Cole; MCZ; 1979-81; Cole 1982, 1984, 1991), Little Torch Key, TNC Torchwood Hammock (24.65°N, 81.39°W; 2010; C.S. Moreau; Moreau et al 2014), Cudjoe Key (24.66°N, 81.48°W; B. Cole; Cole 1991), Big Pine Key (24.68°N, 81.37°W; B. Cole; pers. comm.), Middle Torch Key (24.69°N, 81.38°W; B. Cole; pers. comm.), Middle Torch Key, Middle Torch Road (24.69°N, 81.41°W; 2010; C. S. Moreau; Moreau et al 2014), No Name Key (24.70°N, 81.33°W; B. Cole; pers. comm.), Big Pine Key (24.70°N, 81.45°W; 1995; S. Peck and J. Kukalova-Peck; ABS; Deyrup et al. 1988), Big Pine Key (24.71°N, 81.39°W; B. Cole; pers. comm.), Big Torch Key (24.72°N, 81.44°W; S. Peck and J. Kukalova-Peck; Deyrup et al. 1988), Key Largo, 4.6 mi. NNE Jct. with Rt. 1 on SR 905; hammock forest (25.22°N, 80.33°W; 1988; S.P. Cover; MCZ), Paradise Key (25.38°N, 80.61°W; 1919, H.S. Barber; USNM; 1930, W.M. Wheeler; MCZ; Wheeler 1931), Palma Vista Hammock near Anhinga Trail; hardwood hammock (25.38°N, 80.60; 1992; Ferster and Prusak 1994), Elliott Key; in tropical hardwood hammock (25.45°N, 80.20°W; 1987; M. Deyrup; ABS; Deyrup et al. 1988), Tamiami Trail (25.76°N, 80.51°W; 1945, W.F. Buren; MCZ; Baroni-Urbani 1978), Ding Darling

National Wildlife Refuge (26.46°N, 82.12°W; 1993; S.P. Cover; MCZ and ABS), Manalapan (26.57°N, 80.04°W; 1945, W.F. Buren; MCZ and USNM; Baroni-Urbani 1978), and St. Petersburg, marine drift (27.78°N, 82.62°W; 1894; USNM; queen). Two additional records came from sites not geographically distinguishable from other records above: Key Largo (1989; M. Deyrup; ABS; Deyrup et al. 1988; Moreau et al 2014) and Sugarloaf Key (S. Peck and J. Kukalova-Peck; Deyrup et al. 1988).

Excluded records — Deyrup et al. (2000) listed *T. allardycei* from Cuba without any site information. Mark Deyrup (pers. comm.) could not recall the origin of his record, so I consider it as unconfirmed. Deyrup (2016) wrote that “it would be surprising if this species was absent from Cuba.”

The Field Museum, Chicago listed a record of *T. allardycei* from Adaton, Mississippi (FMNHINS0000116011). The Field Museum loaned me three workers from the series in ethanol, with labels indicating that M.R. Smith collected and identified them as *Leptothorax pergandei flavus* Smith (= *Temnothorax pergandei*). These specimens are apparently part of the *L. pergandei flavus* type series described by Smith (1929) from Adaton, Mississippi. The Field Museum invoice listed these specimens as *Temnothorax floridanus*, and this explains the error: a confusion between two homonyms. *Leptothorax pergandei flavus* Smith was synonymized with *Temnothorax floridanus* (Emery) = *Temnothorax pergandei*. Whoever entered the information into the database mistakenly thought the specimens were the homonym *Temnothorax floridanus* (Wheeler) = *Temnothorax allardycei*.

DISCUSSION

All records of *Temnothorax allardycei* come from the Bahamas and South Florida, with a 4.4° range in latitude (23.7° to 27.8°N). Every record of *T. allardycei* for which I have habitat data came from a natural area, a pattern that suggests that this species is native to both the Bahamas and South Florida. Indeed, Deyrup (2016) most recently classified *T. allardycei* as a native species in Florida.

Although Cole (pers. comm.) most often found *T. allardycei* colonies in dead sawgrass stems, this

species was not common even in these nesting sites. For example, Cole (1982) found ant colonies in 85 of 119 dead, erect sawgrass stems on Sugarloaf Key, Florida, including only two *T. allardycei* colonies. In addition, Cole (pers. comm.) wrote concerning *T. allardycei*: “I also looked for it in Key Largo and in the Everglades NP, but was never able to find it.” I had no success finding any *T. allardycei* nesting in >100 dead sawgrass stems I collected in Palm Beach County, Florida. Nonetheless, given that sawgrass is the dominant macrophyte in what remains of the Everglades, it is possible that the overall population size of *T. allardycei* in South Florida could be relatively large.

Conversely, *T. allardycei* may be a very rare species living only in a few relatively pristine habitats and could be threatened by human-caused environmental changes in South Florida. Further research is necessary to determine the status of *T. allardycei* and whether it may need protection.

ACKNOWLEDGEMENTS

I thank M. Wetterer for comments on this manuscript; S. Cover (MCZ) and T. Schultz (USNM) for help with their respective ant collections; B. Cole, M. Deyrup, C. Moreau, and L. Morrison for unpublished site records; B. Cole for useful advice; Florida Atlantic University for financial support.

REFERENCES

- Baroni Urbani C (1978) Materiali per una revisione dei *Leptothorax* neotropici appartenenti al sottogenere *Macromischa* Roger, n. comb. (Hymenoptera: Formicidae). *Entomologica Basiliensia* 3: 395-618.
- Cole BJ (1981) Dominance hierarchies in *Leptothorax* ants. *Science* 212: 83-84.
- Cole BJ (1982) The guild of sawgrass-inhabiting ants in the Florida Keys. *Psyche* 89: 351-356.
- Cole BJ (1984) Colony efficiency and the reproductivity effect in *Leptothorax allardycei* (Mann). *Insectes Sociaux* 31: 403-407.
- Cole BJ (1986) The social behavior of *Leptothorax allardycei* (Hymenoptera, Formicidae): time budgets and the evolution of worker

- reproduction. *Behavioral Ecology and Sociobiology* 18: 165-173.
- Cole BJ (1988a) Individual differences in social insect behavior: movement and space use in *Leptothorax allardycei*. pp. 113-145 in Jeanne RL (ed.) *Interindividual Behavioral Variability in Social Insects*. Westview Press, Boulder, USA 456 pp.
- Cole BJ (1988b) Escalation of aggression in *Leptothorax* ants. *Insectes Sociaux* 35: 198-205.
- Cole BJ (1991) Short-term activity cycles in ants: generation of periodicity by worker interaction. *American Naturalist* 137: 244-259.
- Cole BJ (1992) Short-term activity cycles in ants: age-related changes in tempo and colony synchrony. *Behavioral Ecology and Sociobiology* 31: 181-187.
- Cole BJ, Hoeg L (1996b) The influence of brood type on activity cycles in *Leptothorax allardycei* (Hymenoptera: Formicidae). *Journal of Insect Behavior* 9: 539-547.
- Cole BJ, McDowell J, Cheshire D (1994) Demography of the worker caste of *Leptothorax allardycei* (Hymenoptera: Formicidae). *Annals of the Entomological Society of America* 87: 562-565.
- Deyrup M (2016) *Ants of Florida. Identification and Natural History*. CRC Press, Boca Raton, USA 423 pp.
- Deyrup M, Cover S (2004) A new species of the ant genus *Leptothorax* from Florida, with a key to the *Leptothorax* of the southeast (Hymenoptera: Formicidae). *Florida Entomologist* 87: 51-59.
- Deyrup M, Davis L, Buckner S (1998) Composition of the ant fauna of three Bahamian islands. pp. 23-31 in *Proceedings of the 7th Symposium of Natural History of the Bahamas*. Bahamian Field Station, San Salvador, Bahamas 140 pp.
- Deyrup M, Davis L, Cover S (2000) Exotic ants in Florida. *Transactions of the American Entomological Society* 126: 293-326.
- Deyrup MA, Carlin N, Trager J, Umphrey G (1988) A review of the ants of the Florida Keys. *Florida Entomologist* 71: 165-6.
- Ferster B, Prusak Z (1994) A preliminary checklist of the ants (Hymenoptera: Formicidae) of Everglades National Park. *Florida Entomologist* 77: 508-512.
- Mann WM (1920) Additions to the ant fauna of the West Indies and Central America. *Bulletin of the American Museum of Natural History* 42: 403-439.
- Morrison LW (1998) A review of Bahamian ant (Hymenoptera, Formicidae) biogeography. *Journal of Biogeography* 25: 561-571.
- Smith MR (1939) Ants of the genus *Macromischa* Roger in the United States (Hymenoptera: Formicidae). *Annals of the Entomological Society of America* 32: 502-509.
- Wheeler WM (1931) New and little-known ants of the genera *Macromischa*, *Creosomyrmex* and *Antillaemyrmex*. *Bulletin of the Museum of Comparative Zoology* 72: 1-34.
- Wittenborn D, Jeschke JM. 2011. Characteristics of exotic ants in North America. *NeoBiota* 10: 47-64 (Appendix 1).



Figure 1. Site records of *Temnothorax allardycei*