Geographic distribution of *Cephalotes varians* (Hymenoptera: Formicidae)

James K. Wetterer*

**Abstract**

*Cephalotes varians* (Smith) (Hymenoptera: Formicidae) recently was included on a list of adventive ants established in North America. Published and unpublished records of *C. varians* from >100 sites reveal that it has an apparently continuous distribution through the Bahamas, Cuba, and southern Florida. Records of *C. varians* from South America, Central America, and Trinidad appear to be based on misidentifications, and there is therefore no justification for regarding *C. varians* as adventive in Florida.

Key Words: biogeography; exotic range; native range; conservation

**Resumen**

*Cephalotes varians* (Smith) (Hymenoptera: Formicidae) recientemente fue incluido en una lista de hormigas adventicias establecidas en América del Norte. Registros de *C. varians* publicados y no publicados de >100 sitios revelan que esta especie tiene una distribución aparentemente continua por las Bahamas, Cuba y el sur de la Florida. Registros de *C. varians* de América del Sur, América Central y Trinidad parecen estar basadas en identificaciones erróneas, y por lo tanto no existe justificación para considerar *C. varians* como adventiva en Florida.

Palabras Clave: biogeografía; gama exótica; área de distribución natural; conservación

Turtle ants, genus *Cephalotes* (Hymenoptera: Formicidae), are a group of New World arboreal ants with heavily armored workers. When disturbed, workers typically tuck their antennae and legs beneath flanges on their head and body, crouch down, and freeze, thus passively resisting attacks.

Only 1 of the 119 described species of extant *Cephalotes* is known in the United States: *Cephalotes varians* (Smith) (Bolton 2016). Recently, Wittenborn & Jeschke (2011) included *C. varians* on their list of 93 exotic ant species established in North America. The present analysis was aimed primarily at documenting the range of *C. varians* and assessing where this species is native and where it may have arrived through human commerce.

*Cephalotes varians* is notable for having specialized major workers with large disc-shaped heads they use to plug the nest entrance holes and prevent enemies from gaining access to the nest. Several studies have examined behavior and ecology of *C. varians* in the Florida Keys (e.g., Wilson 1976; Cole 1980, 1983). Wilson (1976) wrote that *C. varians* “has been found nesting in dead branches of various trees, including Bauhinia, the sea grape Coccoloba, and (especially in the Florida Keys) the red mangrove Rhizophora mangle. Colonies have also been found in stems of tall grasses and sedges, including sea oat (Uniola paniculata) and saw grass (Cladium jamaicensis).” Mature colonies of *C. varians* have up to several hundred workers (Wilson 1976).

**TAXONOMY**

Smith (1876) described *Cryptocerus varians* (= *C. varians*) from Cuba. Kempf (1958) designated *Cephalotes jamaicensis* (Forel) a junior synonym of *C. varians*, but de Andrade & Baroni Urbani (1999) revived *C. jamaicensis* from synonymy and raised it to a full species.

De Andrade & Baroni Urbani (1999) placed *C. varians* in the “pallens clade” with 9 other species: *Cephalotes decolor* de Andrade (of Colombia and Venezuela), *Cephalotes decoloratus* de Andrade (of the Dominican Republic and Haiti), *Cephalotes jamaicensis* (Forel) (of Jamaica), *Cephalotes pallens* (Klug) (widespread in the Caribbean region), *Cephalotes pallidoides* de Andrade (of South America, Trinidad, and Tobago), *Cephalotes pallidus* de Andrade (of South America), *Cephalotes patellaris* (Mayr) (of Brazil), *Cephalotes pellans* de Andrade (of South America), and *Cephalotes porrasii* (Wheeler) (of Central and South America). De Andrade & Baroni Urbani (1999) wrote: “The species we recognise as belonging to the pallens clade represent a very homogeneous set and are often difficult to distinguish from each other, particularly in the worker caste. This situation is worsened by the fact that these ants appear to exhibit the greatest variability within *Cephalotes* in sculpture and in body size.”

Wheeler (1905) wrote that compared with *C. pallens*, “the petiole and postpetiole of the worker and the soldier of *varians* [. . .] are narrower and of a different shape, and the thorax of the soldier is not so broad behind.” De Andrade & Baroni Urbani (1999) wrote that diagnostic characters of *C. varians* included “in the worker propodeal sides unarmed or with a narrow membraneous margin medially denticulate, in the soldier and in the gynae by the combination of head disc with foveae contiguous each other, in the soldier by the outer face of the hind femora superficially carinate, by the head longer than broad, and, in the gynae, by the petiole and postpetiole without or with reduced lateral expansions.” De Andrade & Baroni Urbani (1999) reported *C.
varians as the only member of the pallens clade known in the Bahamas, Cuba, or Florida, and all their records of this species came from these three areas.

Previous taxonomic revisions have classified C. varians and its closest relatives in the following genera: Cyathocephalus, Cryptocerus, Paracryptocerus, and Zacryptocerus (de Andrade & Baroni Urbani 1999).

Materials and Methods

I compiled collection location data taken from published records and unpublished records of museum specimens in the collections of the Archbold Biological Station (ABS), the Museum of Comparative Zoology (MCZ), and the Smithsonian Institution (USNM). In addition, I used online databases that host specimen collection information (Antweb; www.antweb.org) and 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).

To refine the geographic range of C. varians, I collected ants nesting inside dead twigs of red mangrove (Rhizophora mangle L.; Rhizophoraceae) at sites along the east coast of Florida (Miami-Dade, Broward, Palm Beach, Martin, St Lucie, Indian River, Brevard, and Volusia counties) and on islands of the Bahamas (Grand Bahama, North Bimini, New Providence, and Half Moon Cay) and the Turks and Caicos Islands (Providenciales, North Caicos, Middle Caicos, and Grand Turk).

Results

I mapped published and unpublished specimen records of C. varians from >100 sites (Fig. 1). I documented the earliest known C. varians records for Bahamas, Cuba, Dominican Republic, and Florida (Table 1).

Table 1. Earliest known C. varians records for Bahamas, Cuba, Dominican Republic, and Florida.

I collected C. varians nesting inside red mangrove twigs in Florida and in the Bahamas in the following Florida and Bahamas locations:

**Florida:** Oleta River State Park (25.916°N, 80.128°W; 20 Feb 2016), No Name Harbor in Bill Baggs State Park (25.676°N, 80.161°W; 21 Feb 2016), and Homestead Bayfront Park (25.463°N, 80.346°W; 20 Feb 2016);

**Bahamas:** Grand Bahama, North Riding Point (26.729°N, 78.161°W; 2 Jun 2015); North Bimini, marsh at north end of the main road (25.774°N, 79.263°W; 8 Jun 2015); Bimini Bay, northeastern Bimini Bay (25.774°N, 79.258°W; 9 Jun 2015), north-

---

**Fig. 1.** Geographic distribution of Cephalotes varians records.

David Lubertazzi (personal communication) recorded a specimen identified as C. varians in the Dominican Republic in the Museo Nacional de Historia Natural in Santo Domingo (Table 1), but it may be a misidentification of C. decoloratus, a species known only from Haiti and the Dominican Republic. In fact, one of the type specimens of C. decoloratus (Petionville: Hotel Montana; 1972-04-05) is currently listed on antweb.org as C. varians.

Table 1. Earliest known records for Cephalotes varians. MNHN = Museo Nacional de Historia Natural in Santo Domingo, Dominican Republic.

<table>
<thead>
<tr>
<th>Location</th>
<th>Earliest record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuba</td>
<td>≤1876 (Smith 1876)</td>
</tr>
<tr>
<td>Florida</td>
<td>1887 (Emery 1895)</td>
</tr>
<tr>
<td>Bahamas</td>
<td>1904 (Wheeler 1905)</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>2010 (G. de los Santos; MNHN): Galván</td>
</tr>
</tbody>
</table>

EXCLUDED RECORDS

Kempf (1958) wrote: “Previously published records for the species [C. varians] from Honduras (Mann 1922), and in Trinidad, Venezuela and Colombia (Weber 1938, 1948), are obviously based on misidentifications and have been referred to pallen.” De Andrade & Baroni Urbani (1999), however, identified Mann’s (1922) specimens from Honduras as Cephalotes biguttatus (Emery). Kempf (1958) wrote: “The species occurs in southern Florida, south of Miami, in the Bahamas (Andros, New Providence, Bimini), in Cuba and Jamaica.” De Andrade & Baroni Urbani (1999), however, considered all Jamaican records of C. varians as a separate species, C. jamai-censis.

In addition to the records of C. varians that Kempf (1958) dismissed as misidentifications (Mann 1922; Weber 1938, 1948), there are 3 records of C. varians from sites located far from any other confirmed records: Colombia (Fernández et al. 1996), Mexico (Abud 1987, in Vásquez-Bolaños & Navarrete-Heredia 2004), and Trinidad (Dutra & Wetterer 2007). Fernández & Sendoya (2004) and Vásquez-Bolaños (2014), however, do not list C. varians as occurring in Colombia or Mexico, evidently concluding that the earlier listings were misidentifications. Dutra & Wetterer (2007) recorded C. varians in Trinidad (identified by Roy Snelling) based on a specimen collected from inside an epiphytic orchid; however, upon re-examination, I found that this specimen does not match C. varians in several respects.

Discussion

Cephalotes varians records have an apparently continuous distribution through the Bahamas, Cuba, and southern Florida, and a single record in the Dominican Republic that needs confirmation. Cephalotes varians appears to be widespread across Cuba, Florida, and the Bahamas south of 26°N, and quite rare above this latitude; there are only 2 records of C. varians north of 26°N: Long Point Park, Brevard County, Florida (27.873°N, 80.469°W; 2000, ABS) and Grand Bahama (see results).

Wittenborn & Jeschke (2011) are the only authors who considered C. varians to be adventive in any part of its range, whereas other researchers consistently treat C. varians as native in Florida, the Bahamas, and Cuba (e.g., Deyrup et al. 1988; Deyrup 1994, 2003; Fontenla Rizo 1997; Fisher & Cover 2007; Moreau et al. 2014). Wittenborn & Jeschke (2011) appear to also have misclassified as adventive at least 10 other ant species that are actually native to North America (see Wetterer 2014, 2015a,b, 2016; Wetterer & Snelling 2015). Wittenborn & Jeschke (2011) aimed to compare characteristics of native versus exotic ant species in North America, but misclassification undermines the validity of their conclusions. Furthermore, if native species are erroneously considered to be exotic, these species may be treated as targets for eradication rather than valued and considered worthy of protection.

Acknowledgments

I thank M. Wetterer for comments on this manuscript; S. Cover (MCZ) and T. Schultz (USNM) for help with their respective ant collections; D. Lubertazzi for an unpublished record; D. P. Wojcik and S. D. Porter for compiling their valuable FORMIS bibliography; and Florida Atlantic University for financial support.

References Cited


de Andrade ML, Baroni Urbani C. 1999. Diversity and adaptation in the ant genus Cephalotes; past and present. Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie) 271: 1–89.


