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## WORLDWIDE SPREAD OF *TETRAMORIUM LUCAYANUM* (HYMENOPTERA: FORMICIDAE)

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## ABSTRACT

*Tetramorium lucayanum* Wheeler, described from the Bahamas, was long thought to be of West Indian origin. This species, however, is actually originally from Africa, and has been transported to the West Indies and elsewhere through human commerce. To examine the worldwide spread of *T. lucayanum*, I compiled and mapped specimen records from > 75 sites. I documented the earliest known *T. lucayanum* records for 22 geographic areas (countries and West Indies Islands), including 3 for which I found no previously published records: Gambia, Tortola, and Vieques. *Tetramorium lucayanum* has widely scattered records from 12 tropical African countries, primarily from forested sites. Exotic records of *T. lucayanum* come from 7 West Indies islands, Brazil, and greenhouses in Ireland and Italy. All outdoor records of *T. lucayanum* are from tropical sites, except for 2 subtropical records, both from urban Nassau, the capital of the Bahamas (25.1 °N): the original type locale and my new record from the local zoo, 2.5 km to the west. Most exotic records come from Cuba and Jamaica, but even on these islands *T. lucayanum* appears to be fairly rare and with no discernable ecological impact.

Key Words: biogeography, biological invasion, exotic species, invasive species

## RESUMEN

La hormiga, *Tetramorium lucayanum* Wheeler, fue descrita de las Bahamas, y por mucho tiempo se pensó que era de origen antillano. Esta especie, sin embargo, es en realidad de origen Africana, y ha sido transportado a las Indias Occidentales y a otros lugares a través del comercio humano. Para examinar la diseminación mundial de *T. lucayanum*, he compilado y marcado en un mapa los registros de especímenes recolectados en más de 75 sitios. He documentado los primeros registros conocidos de *T. lucayanum* de 22 áreas geográficas (países y las Islas de las Indias Occidentales), incluyendo tres para los que no encontré registros publicados anteriormente: Gambia, Tortola, y Vieques. Los registros de *Tetramorium lucayanum* están muy dispersas en 12 países tropicales de África, principalmente en los sitios forestales. Registros exóticas de *T. lucayanum* provienen de siete islas de las Indias Occidentales, Brasil, y de invernaderos en Irlanda e Italia. Todos los registros de áreas libres de *T. lucayanum* son de sitios tropicales, con la excepción de dos registros subtropicales, ambos de las zonas urbanas de Nassau, la capital de las Bahamas (25.1 °N): el sitio donde fue encontrado el tipo y de mi nuevo registro de la especie en un zoológico local, a 2,5 km hacia el oeste. La mayoría de los registros exóticos provienen de Cuba y Jamaica, pero aún en estas islas *T. lucayanum* parece ser bastante raro y sin un impacto ecológico perceptible.

Tramp ants associate with human disturbance and disperse around the world through human commerce. Many tramp ant species began to spread outside their native range centuries ago, and were first described from specimens collected in non-native locales. For example, *Monomorium pharaonis* (L.), *Paratrechina longicornis* (Latreille), *Tapinoma melanocephalum* (F.), and *Tetramorium bicarinatum* Nylander are all tramp species originally from Asia, but they were first described from Egypt, Senegal, French Guiana, and California, respectively (Wetterer 2008, 2009a,b, 2010b). Here, I examine the geographic spread of *Tetramorium lucayanum*, an African species described from the Bahamas and long thought to be native to the West Indies.

### Taxonomy and Origin

Wheeler (1905) described *T. lucayanum* from “two workers found running on the ground in the Queen’s Staircase at Nassau” on the island of New Providence, Bahamas. Wheeler (1905) named the species after the Lucayan people, the inhabitants of the Bahamas when Europeans arrived, who called themselves Lukku-Cairi (meaning “island people”). Over the following decades, *T. lucayanum* was reported from several other West Indies islands: Cuba (Mann 1920), Jamaica (Aguayo 1932), Puerto Rico (Smith 1936), and St. Croix (Beatty 1944).

Smith (1936) wrote that on Puerto Rico “*T. lucayanum* is probably the only species of the genus that is native to the island.” Brown (1957), how-

ever, noted the similarity of *T. lucayanum* to African species. Brown (1964) recounted his search for museum specimens of *T. lucayanum* from Africa: "In my 1957 paper (p. 6), I stated my opinion that *T. lucayanum*, despite its wide distribution in the West Indies, must be a post-Columbian immigrant to the New World, and that it most likely came from Africa. Repeated attempts to match its types with Old World *Tetramorium* species represented in American museum collections all led to failure; though *T. lucayanum* did seem to be more or less closely related to certain African *Tetramorium*, it was apparently not conspecific with any available samples from the Old World. In 1963, when I had an opportunity to visit the classical European ant collections, I took along digms of *T. lucayanum* (from Jamaica) in the hope that I would be able to make their match. I am pleased to report that the search was successful." Brown (1964) concluded that 3 Old World taxa were all junior synonyms of *T. lucayanum*: *T. camerunense waelbroeki* from Zaire (spelled *waelbroeki* by Santschi 1914 and Bernard 1952), *T. lucayanum sexdens* from a greenhouse at a botanical garden in Ireland (Forel 1915), and *T. rectinodis* from Equatorial Guinea (Menozzi 1942). Brown (1964) also reported additional African specimens of *T. lucayanum*, from Ivory Coast and Liberia. Brown (1964) wrote: "It may be that the West Indies stock arrived in ballast or timber, or perhaps with the slave trade, in a ship from Africa in the early days of New World colonization. At any rate, it is now clear that Africa was its original home." McGlynn (1999) listed *T. lucayanum* as a native of the West Indies, citing Delabie (1994). Delabie (1994), however, wrote that *T. lucayanum* was a native of Central and West Africa, citing Brown (1964).

*Tetramorium lucayanum* workers are medium size (~3 mm length) with a shiny dark brown to black body and head, which contrast with its light brown appendages. Because *T. lucayanum* is not originally from the Bahamas as its Latin name implies, I propose "ebony ant" as a common name for this species, based on its dark color and its Old World origin, like the wood of ebony trees (*Diospyros* spp.).

#### MATERIALS AND METHODS

Using published and unpublished records, I documented the worldwide range of *T. lucayanum*. I obtained unpublished site records from museum specimens in the collection of the Museum of Comparative Zoology (MCZ, identified by S. Cover) and the Natural History Museum, London (BMNH, identified by B. Bolton; collection data recorded by F. Hita Garcia). In addition, I used on-line databases with collection information on specimens by Antweb (www.antweb.org) and the Global Biodiversity Information Facility

(www.gbif.org). I received unpublished record information from F. Hita Garcia (Kenya), J. Delabie (Brazil), and A. Dejean (Cameroon). Finally, I collected *T. lucayanum* specimens on 4 islands of the West Indies.

I obtained geo-coordinates for collection sites from published references, specimen labels, maps, or geography web sites (e.g., earth.google.com, www.geonames.org, www.tageo.com, and www.fallingrain.com). If a site record listed a geographic region rather than a "point locale," and I had no other record for this region, I used the coordinates of the largest town within the region or, in the case of small islands and natural areas, the center of the region. Published records usually included collection dates. In a number of cases, publications did not include the collection dates for specimens, but I was able to determine the approximate date based on information on the collector's travel dates or limit the date by the collector's date of death. I did not map one record of *T. lucayanum* apparently found in newly imported goods: specimens from Slough, England collected "on bromeliads ex Brazil" (15.II.1982, L. Kilby, BMNH).

#### RESULTS

I compiled *T. lucayanum* specimen records from >75 sites worldwide (Fig. 1). I documented the earliest known *T. lucayanum* records for 22 geographic areas (countries and West Indies islands; Table 1), including 3 for which I found no previously published records: Gambia, Tortola (British Virgin Islands), and Vieques (Puerto Rico).

I collected *T. lucayanum* at 7 sites on 4 West Indies islands: Tortola, BVI (2 sites: Great Mountain, by Ridge Road, 18.445°N, 64.626°W, 17 Nov 2005; Martin Spring, 1.3 km up road by ghut, 18.430°N 64.585°W, 17 Nov 2005), Vieques, Puerto Rico (2 sites: Punta Conejo, beach, 18.109°N, 65.376°W, 7 June 2006; Playa Media Luna, sea grape, 18.089°N, 65.448°W, 7 June 2006), New Providence, Bahamas (1 site: Nassau, Ardastra Zoo, 25.073°N, 77.363°W, 5 July 2010), and Jamaica (2 sites: Whitfield Hall, mango, 18.044°N, 76.628°W, 24 Dec 2010; Richmond Vale, forest, 17.969°N, 76.578°W, 24 Dec 2010).

#### DISCUSSION

*Tetramorium lucayanum* has widely scattered records across 12 tropical African countries, presumably the native range of this species, from Sierra Leone in the west to Kenya in the east (Table 1; Fig. 1). The absence of records through central equatorial Africa (e.g., Central African Republic and Uganda) seems likely to be an artifact of the low number of published records of identified ant specimens from this region.

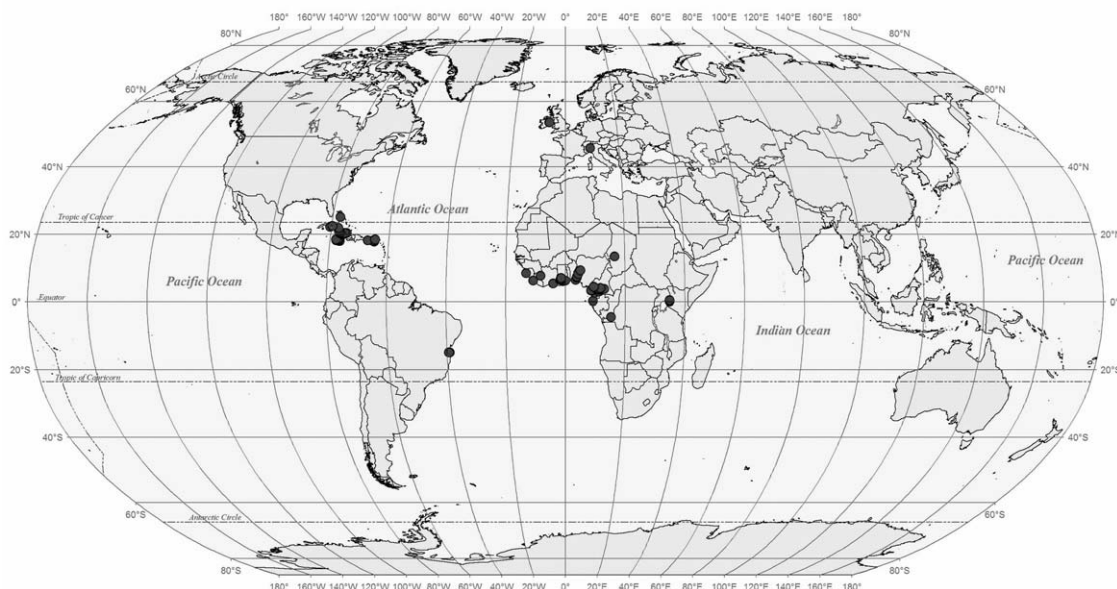


Fig. 1. Worldwide distribution of *Tetramorium lucayanum*.

Exotic records of *T. lucayanum* (Table 1; Fig. 1) come from 7 West Indies islands, 3 sites in Bahia, Brazil, and 3 sites in Europe (the National Botanical Garden and Phoenix Park Zoo in Ireland and in a greenhouse in Italy). All outdoor records of *T. lucayanum* come from tropical sites, except for 2 subtropical records, both from Nassau, the capital of the Bahamas (25.1°N): the original type locale (Wheeler 1905) and my record from the local zoo, 2.5 km to the west (see results).

Collection records indicate that *T. lucayanum* inhabits a wide range of habitats in both its native African range and in exotic locales, including forests, beaches, agricultural areas, botanical gardens, urban centers, and temperate greenhouses. In Africa, most records of *T. lucayanum* come from forest reserves, including Banco Forest Reserve, Ivory Coast (Brown 1964), Pongara National Park, Gabon (Braet & Taylor 2008), Abuko Nature Reserve, Gambia (see Table 1), and Kakamega Forest, Kenya (Hita Garcia et al 2009). Records from urban areas include Kinshasa, Zaire (Forel 1909), Monrovia, Liberia (Brown 1964), Kingston, Jamaica (Brown 1964), and Nassau, Bahamas (see above). Delabie (1994) even recorded *T. lucayanum* from inside houses in Bahia, Brazil. On Vieques, Puerto Rico, I collected *T. lucayanum* at 2 beach sites (see results).

Beyond habitat, little is known about the biology of *T. lucayanum*. Mann (1920) reported that *T. lucayanum* in Cuba “lives in small colonies under stones.” In Puerto Rico, Smith (1936) reported a colony of *T. lucayanum* nesting beneath the bark of a tree stump and collected specimens

from “a crack in the concrete floor of a barn.” Smith (1936) reported: “it is believed that the workers feed mainly on flesh.” Dejean et al. (1996) found *T. lucayanum* nesting in 12 termite nests, both occupied and abandoned, in Cameroon forests. Taylor (2010) wrote that *T. lucayanum* was: “moderately common at the Cocoa Research Institute of Nigeria, Idi Ayunre, probably subarborescent . . . nests in dead wood on the ground, and in dead wood and crevices on living trees, including cocoa. Will tend aphids. Also found on oil palm.” Future studies of the basic natural history of *T. lucayanum* (e.g., colony size, food habits) would be valuable.

Several other *Tetramorium* species from the Old World tropics have become widespread tramp species, including *T. bicarinatum*, *T. caldarium*, *T. lanuginosum*, and *T. simillimum* (Bolton 1979, 1980; Wetterer 2009b, 2010a). Whereas none of these species have become major pests, all are much more common and widespread than *T. lucayanum*. Although broadly distributed in Africa and the West Indies, *T. lucayanum* has been rarely reported. In fact, Torres & Snelling (1997) wrote: “In 18 years of searching for ants in the island of Puerto Rico we have recorded only one apparent extinction, *Tetramorium lucayanum*.” Most exotic records of *T. lucayanum* come from Cuba (13 sites) and Jamaica (10 sites), but even on these 2 islands, *T. lucayanum* appears to be fairly rare. After more than 100 years in the New World, this African ant has persisted and spread, but has shown no discernable ecological impact.



TABLE 1. EARLIEST KNOWN RECORDS FOR *TETRAMORIUM LUCAYANUM*.

| Africa            | Earliest record                                             |
|-------------------|-------------------------------------------------------------|
| Zaire             | ≤1909 (Forel 1909 as <i>T. camerunense waelbroeki</i> )     |
| Nigeria           | ≤1914 (Santschi 1914 as <i>T. camerunense waelbroecki</i> ) |
| Sierra Leone      | 1917 (Bolton 1980)                                          |
| Equatorial Guinea | 1939 (Menozzi 1942 as <i>T. rectinodis</i> )                |
| Guinea            | 1947 (Bernard 1952 as <i>T. camerunense waelbroecki</i> )   |
| Liberia           | ≤1958 (Brown 1964)                                          |
| Ivory Coast       | ≤1963 (Brown 1964)                                          |
| Ghana             | 1969 (C. A. Collingwood, BMNH): Akosombo                    |
| Cameroon          | 1990 (Dejean et al. 1996)                                   |
| Gabon             | 2006 (Braet & Taylor 2008)                                  |
| Kenya             | 2007 (Hita Garcia et al. 2009)                              |
| +Gambia           | 2009 (R. W. Goff; Taylor 2010): Abuko Nature Reserve        |
| Other regions     |                                                             |
| New Providence    | 1904 (Wheeler 1905 type locale)                             |
| Ireland           | ≤1915 (Forel 1915 as <i>T. lucayanum sexdens</i> )          |
| Cuba              | 1917 (Mann 1920)                                            |
| Jamaica           | 1932 (Aguayo 1932)                                          |
| Puerto Rico       | 1935 (Smith 1936)                                           |
| St Croix, USVI    | 1937 (Beatty 1944)                                          |
| Italy             | 1991 (Jucker et al. 2008)                                   |
| Brazil            | 1993 (Delabie 1994)                                         |
| +Tortola, BVI     | 2005 (J. K. Wetterer, MCZ): Martin Spring                   |
| +Vieques, PR      | 2006 (J. K. Wetterer, MCZ): Punta Conejo                    |

Unpublished records include collector, museum source, and site. MCZ = Museum of Comparative Zoology. BMNH = Museum of Natural History, London. + = no previously published records.

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