



RESEARCH ARTICLE - TERMITES

Expanded New World distributions of genera in the termite family Kalotermitidae

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Abstract

The New World Kalotermitidae constitute about one-fourth of all termite species in this region. The geographic distributions of all fifteen kalotermitid genera are updated based on records in the University of Florida Termite Collection and in the literature. Range-appropriate exotic records of four pest species are also given. New distribution records are presented on maps, and representative soldier photographs are provided for each genus.

Introduction

The termite family Kalotermitidae Froggatt 1897 is composed of nearly 500 extant species worldwide (Casalla et al., 2016a, b; Ghesini & Marini, 2013; Ghesini et al., 2014; Krishna et al., 2013; Scheffrahn, 2014; Scheffrahn, 2018; Scheffrahn & Postle, 2013, Scheffrahn et al., 2018a). Combined, the Neotropical and Nearctic Regions account for one hundred fifty-eight species (Casalla et al., 2016a, b; Krishna et al., 2013; Scheffrahn, 2014; Scheffrahn, 2018; Scheffrahn & Postle, 2013) or about one-fourth of all New World termite species. These are classified into 15 genera which, as a whole, span a native range from northern California to southern Chile. The genera *Kaloterмес*, *Paraneotermes*, and *Pterotermes* are recorded primarily from the southern Nearctic Region. The remaining New World genera are predominantly or exclusively Neotropical.

Kalotermitids nest and feed in galleries excavated within single or closely abutted pieces of wood. Although members of the Kalotermitidae are sometimes collectively referred to as “drywood” termites, their interspecific dependence

on water can vary drastically. Among New World Kalotermitidae, their home wood can be free of exposure to precipitation for most (*Incisitermes*, *Marginitermes*, *Pterotermes*, and *Tauritermes*) or all of the year (*Cryptotermes brevis* (Walker) in all cases and *Incisitermes minor* (Hagen) and *Marginitermes hubbardi* (Banks) infesting structural wood). Other species flourish in wood that is water-saturated constantly or for long periods (e.g., *Comatermes perfectus* (Hagen), and some *Calcaritermes*, *Glyptotermes*, *Neotermes*, and *Rugitermes*). Some New World kalotermitids, e.g., *N. castaneus* (Burmeister), inhabit galleries excavated within the xylem or heartwood of living trees. The soundness of host wood also varies remarkably from almost completely rotten (soft enough to pinch) to decay-free wood in structural or xeric habitats. The Kalotermitidae are generalist wood feeders and their range is dictated by habitat and climate, not by host wood preference (Scheffrahn pers. obs.). Few large-scale generic distribution maps have been published for termites. For the Kalotermitidae, Emerson (1969) produced world maps for *Calcaritermes*, *Incisitermes*, and *Kaloterмес*. New World maps of *Calcaritermes* (Scheffrahn, 2011), *Eucryptotermes*



(Constantino, 1997), *Incisitermes* (Scheffrahn, 2014), *Marginitermes* (Scheffrahn & Postle, 2013), *Procryptotermes* (Scheffrahn & Křeček, 2001), *Proneotermes* (Casala et al., 2016b), and *Pterotermes* (Nutting, 1966) are also available.

The purpose of this report is to update the distributional data for all genera of New World Kalotermitidae. Soldier photographs of a genus representative are also provided as an aid in identifying genera.

Materials and Methods

The distribution maps (Figs 1-8) are taken from 2,174 unique kalotermitid localities (Fig 1) obtained from expert sampling expeditions (Scheffrahn et al., 2018b) and acquisitions

from other collectors housed with the author in the University of Florida Termite Collection (UFTC) located in Davie, Florida. Additional localities were taken from the literature (Table 1).

Generic identification of 15,911 kalotermitid samples was based mostly on Krishna's 1961 revisionary key, Krishna et al.'s 2013 updated key, and Constantino's 2002 key. *Cryptotermes dudleyi* Banks and *Cr. havilandi* Sjöstedt were identified using Scheffrahn and Křeček (1999). All UFTC localities were georeferenced either from hard copy maps before 1997, GPS receiver coordinates beginning in 1997, or by consulting Google Earth™.

Maps were prepared using ArcMap 10.3 software (ESRI, Redlands, CA). Photographs (Figs 9, 10) were taken as multi-layer montages using a Leica M205C stereomicroscope



Fig 1. Map of New World Kalotermitidae localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

with a Leica DFC 425 module run with Leica Application Suite version 3 software. Specimens were suspended and positioned in a transparent pool of Purell® hand sanitizer (70% EtOH) within a clear plastic Petri dish.

Results and Discussion

CALCARITERMES (Figs 2, 9E)

Calcaritermes ranges from Georgia to the vicinity of Rio de Janeiro. Soldiers are characterized by a large apical spur on the fore tibia. Fig 2 provides the first records of *Calcaritermes* from Peru (*Ca. temnocephalus* Silvestri and

Ca. rioensis Krishna) and Bolivia (new species). The relict *Ca. nearcticus* (Snyder) forms an allopatric range in central Florida to the Georgia coastline (Scheffrahn et al., 2001) and does not occur in Neotropical (southeastern) Florida. With the exception of *Ca. temnocephalus*, pseudergates of this genus can be identified by their mesonotal rasp which is suggested to aid microbial cultivation in their foraging galleries (Scheffrahn, 2011). In addition to *Ca. nearcticus*, ten species are described from the Neotropics and single curious species from the Indomalayan Region (Maiti & Chakraborty, 1981). This genus contains no pest species. The UFTC contains three undescribed new species from Bolivia, Ecuador and Venezuela.

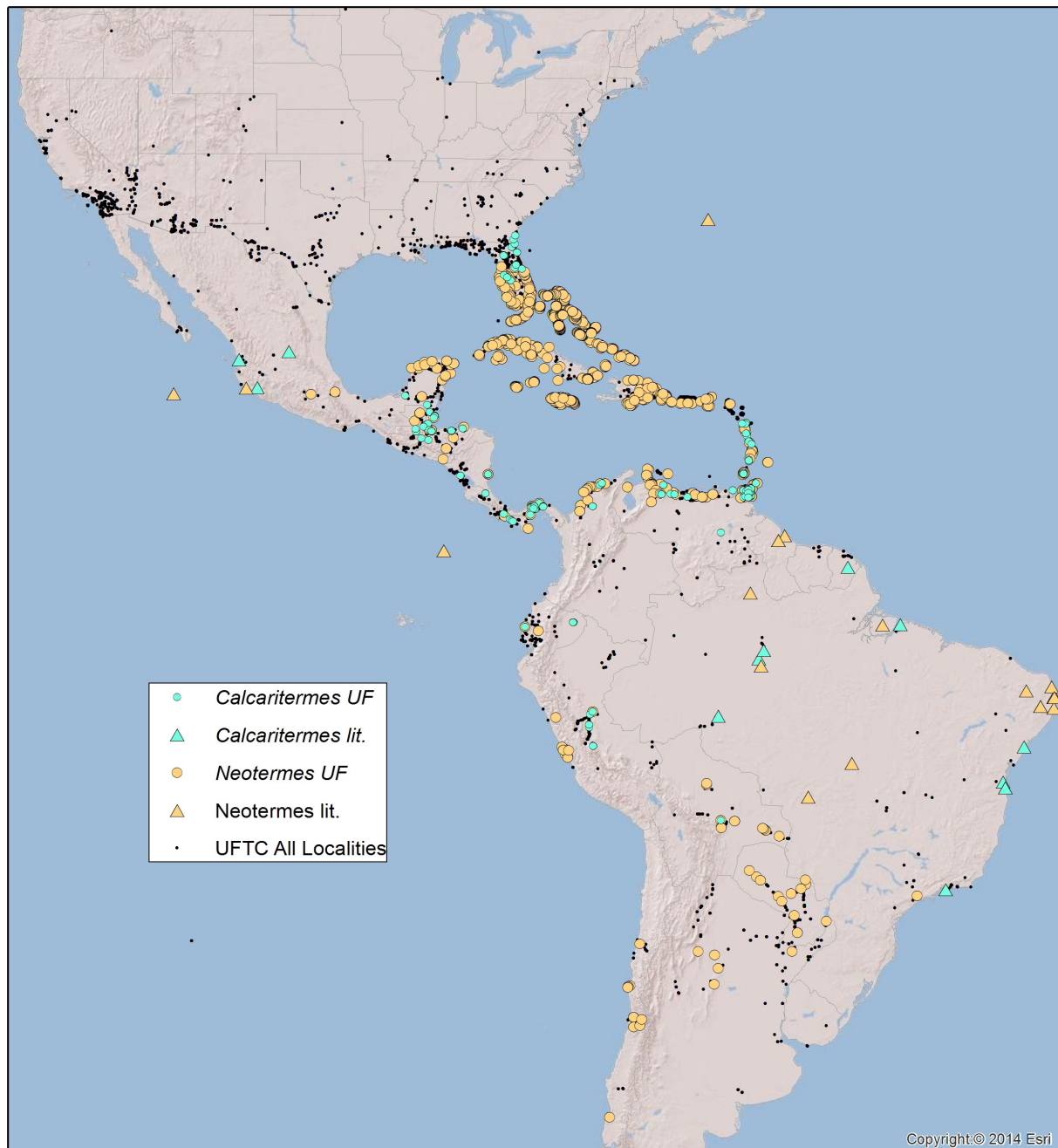


Fig 2. Map of New World *Calcaritermes* and *Neoterme* localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

COMATERMES PERFECTUS (Figs 3, 10G)

Records from the UFTC (Fig 3) reveal that this monotypic genus occurs at elevations between 360-1370 m in mesic to wet forests from Honduras (new record) to Bolivia and the Lesser Antilles. *Comatermes perfectus* is found on all major islands of the Lesser Antilles except for the low-lying islands of Anguilla, Barbados, and Barbuda, and the volcanic peaks

of Nevis and Antigua. Although the dark body coloration and wing venation of the imago is similar to *Paraneoterme*s, Krishna (1961) concluded that the long wavy hairs on the head and pronotum justify generic status. Specimens in the UFTC collection show that *Co. perfectus* has a polymorphic soldier caste grading from very long headed individuals to much smaller, short-headed morphs. Constantino (2002) includes *Co. perfectus* as a pest of coffee plants.

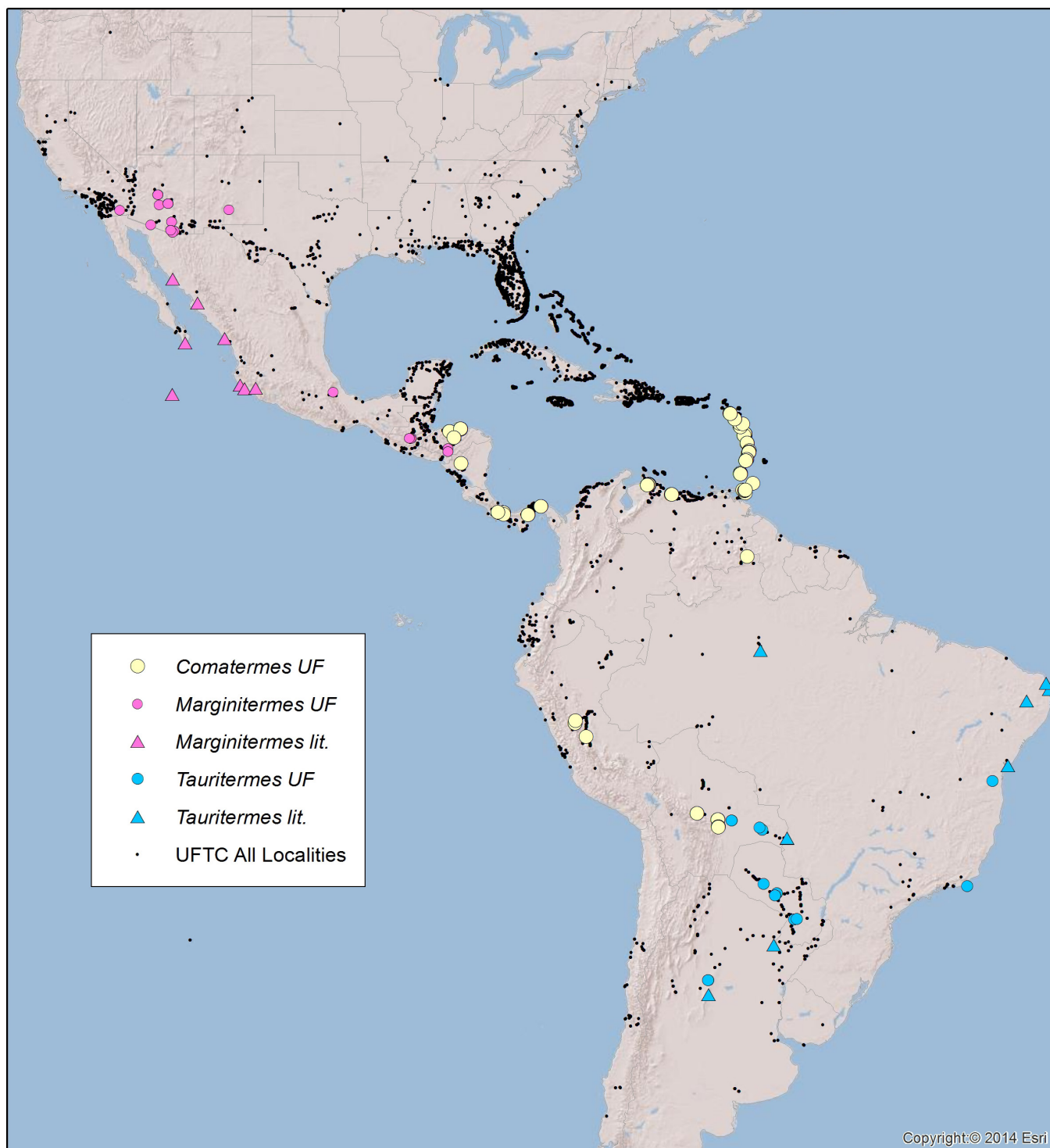


Fig 3. Map of New World *Comatermes*, *Marginitermes*, and *Tauritermes* localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

CRYPTOTERMES (Figs 4, 5, 9F)

The diversity of New World *Cryptotermes*, at 28 endemic species (30 total), exceeds that of all other kalotermitid genera of the region. The West Indies and Caribbean mainland have, at 21 species, the greatest diversity and abundance of this genus. Soldier head capsule phragmosity and rugosity vary greatly among New World *Cryptotermes* (Scheffrahn & Křeček, 1999). The UFTC contains three new undescribed species from Ecuador, Guadeloupe (Lesser Antilles), and Honduras. The most northern native distribution for the genus is for *Cr. cavifrons* on Jekyll Island, Georgia (31°N)

and the southernmost is Valparaiso, Chile (33°S) for *Cr. brevis* (Scheffrahn et al., 2009). Three species have extended invasive New World distributions. *Cryptotermes brevis*, endemic to the Peruvian coastal desert (new inland record 13 km NE Huanuco, Peru) and Chilean Atacama desert, is the most destructive and widespread pest in the New World (Scheffrahn et al., 2009) especially from Florida to Brazil. I have excluded (Fig 4) isolated localities that either represent interceptions or static, non-invasive localities such as Ontario, Canada (Myles, 1995); Los Angeles, CA; Sussex DE; W. Simsbury, CT; Anchorage, AK; Long Island, NY; and Middletown, RI.

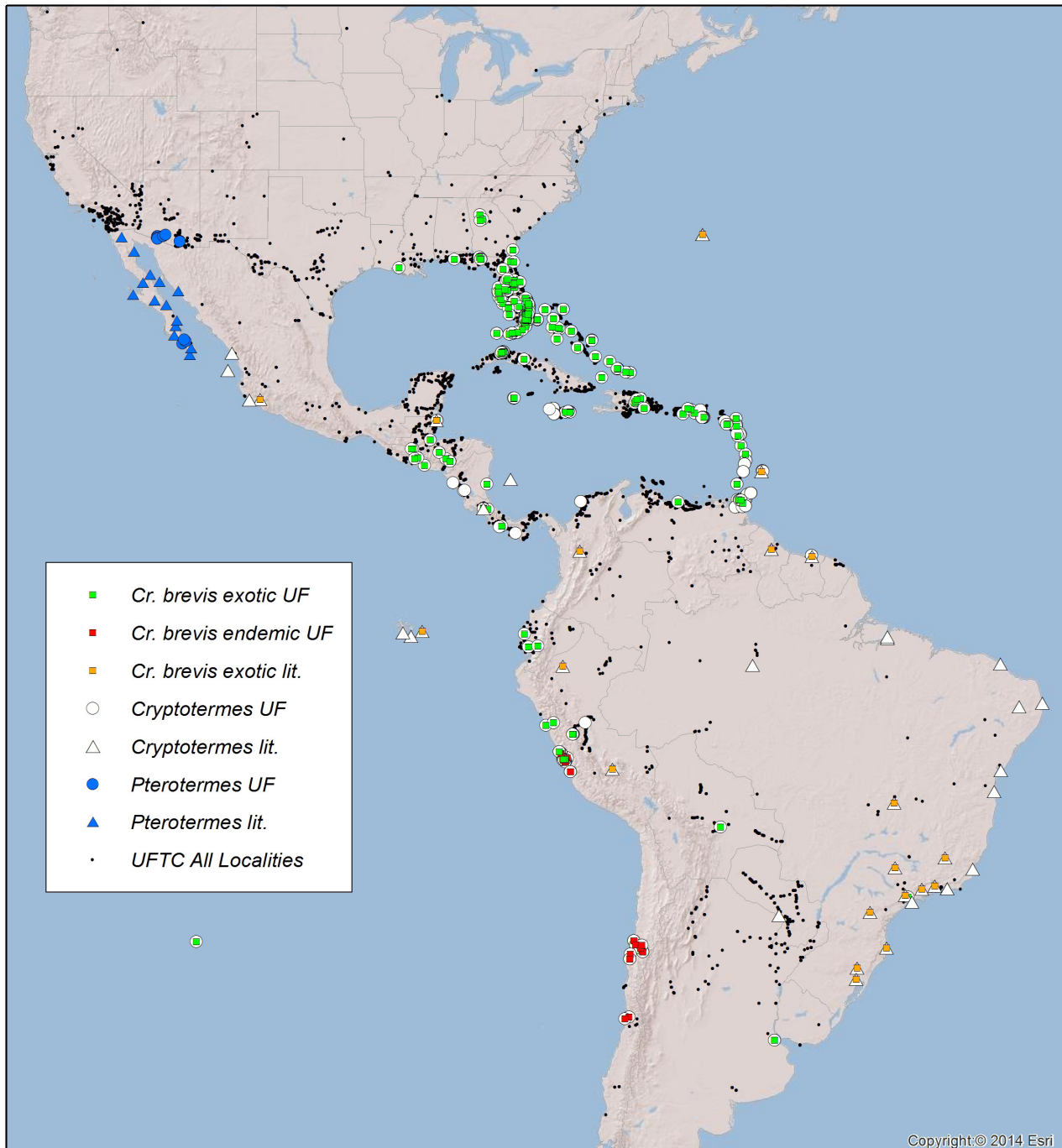


Fig 4. Map of New World *Cryptotermes*, *Cr. brevis* exotic, *Cr. brevis* endemic, and *Pterotermes* localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

Cryptotermes dudleyi, a pest endemic to the Indian subcontinent, has been introduced throughout the Caribbean Basin, especially Jamaica, and into South America (Fig 5). *Cryptotermes havilandi*, a pest species native to Africa, is common in the Lesser Antilles. Both of these species are listed as major Neotropical pests by Constantino (2002). The specimens in the UFTC were all collected from non-structural wood such as tree branches and fence posts.

EUCRYPTOTERMES (Figs 6, 9H)

Eucryptotermes is exclusive to the Neotropics. Soldiers are unmistakable for the scooped-out forehead shape. Two species are described; *E. hagenii* (Müller) from southeastern Brazil (Fig 6 and Constantino, 1997) and Argentina (Godoy et al., 2018), and *E. breviceps* Constantino from central Amazonia (Constantino, 1997). A recent collection

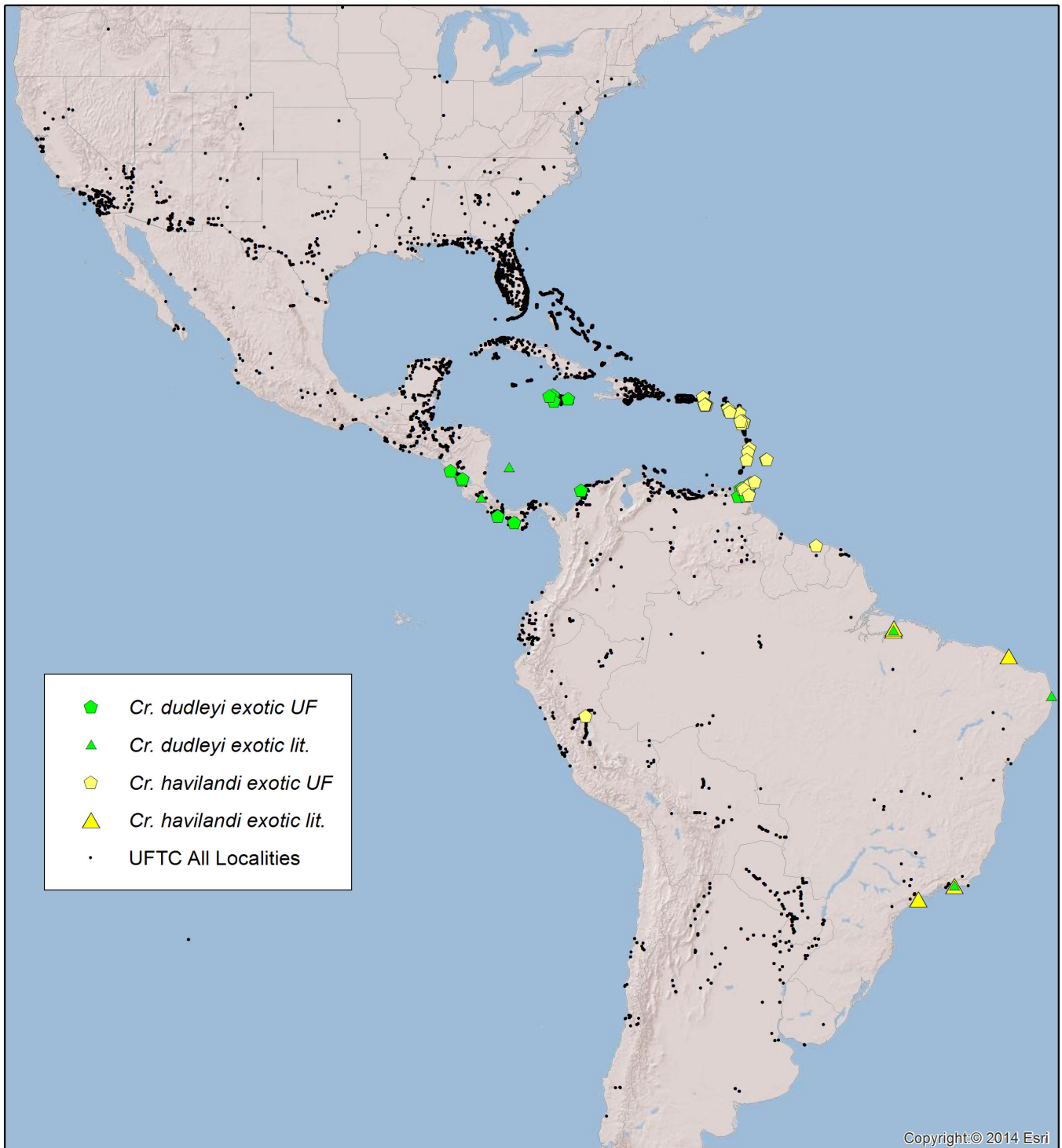


Fig 5. Map of New World exotic *Cr. dudleyi* and *Cr. havilandi* localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

of *E. breviceps* from French Guiana (J. Šobotník unpubl.) extends the range of this genus north of the equator. Constantino (2002) lists *E. hagenii* as a possible pest. I have never collected this remarkable genus.

GLYPTOTERMES (Figs 7, 10A)

Except for the phragmotic species, many *Glyptotermes* soldiers have rather unadorned head capsules and are difficult

to identify. *Glyptotermes* soldiers tend to have cylindrical head capsules and steep frons. Many species are small, tend to nest in sound wood, and thus, are difficult to collect. The first records of this genus are provided from Bolivia, Peru, Paraguay, Ecuador, and most of the Lesser Antilles (Fig 7). Twenty-three species are recorded from the Neotropics and, surprisingly, six are described from Costa Rica. Poor illustrations of early descriptions lack resolution to aid in identification. This genus is in dire need of revision.

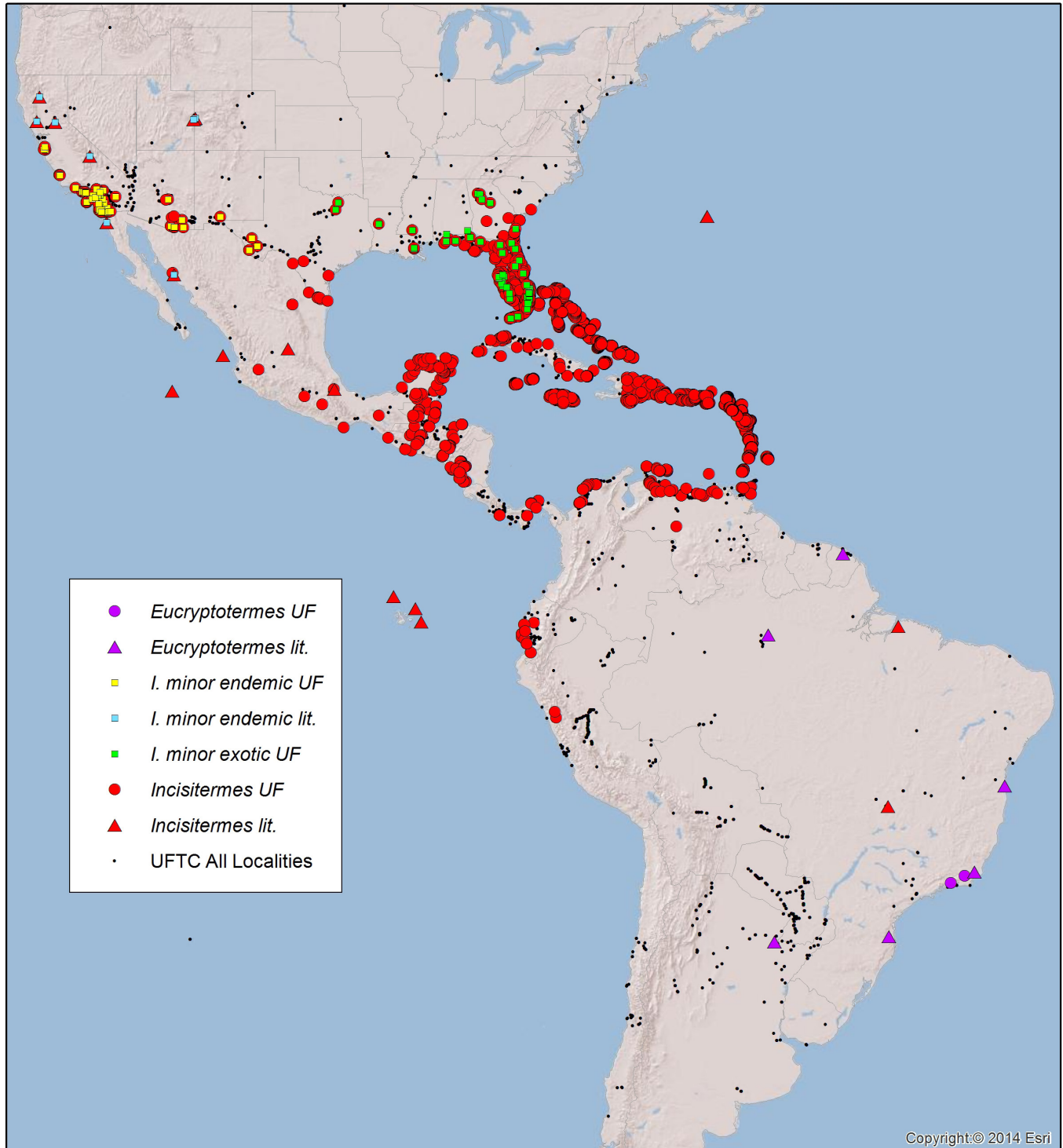


Fig 6. Map of New World *Eucryptotermes*, *Incisitermes*, *I. minor* exotic, and *I. minor* endemic localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

INCISITERMES (Figs 6, 10D)

With the exception of *I. immigrans* (Snyder) along the Pacific coast south to Peru, this genus is extremely rare in South America (Fig 6). A rather large portion of its range includes the southern Nearctic due, in large part, to the endemic range of *I. minor* in the West and *I. snyderi* (Light) in the East. Along with *Cryptotermes* and *Neotermes*, *Incisitermes* is a dominant genus in the West Indies and Caribbean coastline. The most diagnostic characters among *Incisitermes* soldiers are the sharply incised anterior margin of the pronota and the enlarged third antennal articles. Some species, such as *I. marginipennis* (Latreille) and *I. schwarzi* (Banks) have large

and small soldier morphs. Soldier size ranges widely, with *I. marginipennis* among the largest (head width > 2mm) and a new species, also from Mexico among the smallest (HW < 1mm). There are fifteen New World species of *Incisitermes*. *Incisitermes tabogae* (Snyder) is a synonym of *I. schwarzi* and *I. nigritus* (Snyder) is a synonym of *I. platycephalus* (Light). The UFTC contains seven undescribed species. This genus is in need of revision. Emerson (1969) includes records for *I. galapagoensis* (Banks), *I. immigrans*, and *I. pacificus* (Banks) from the Galápagos Islands and one or more undescribed species from Central America. He suggested that *I. immigrans* colonized Ecuador and Peru from Pacific island populations although the opposite seems more likely.

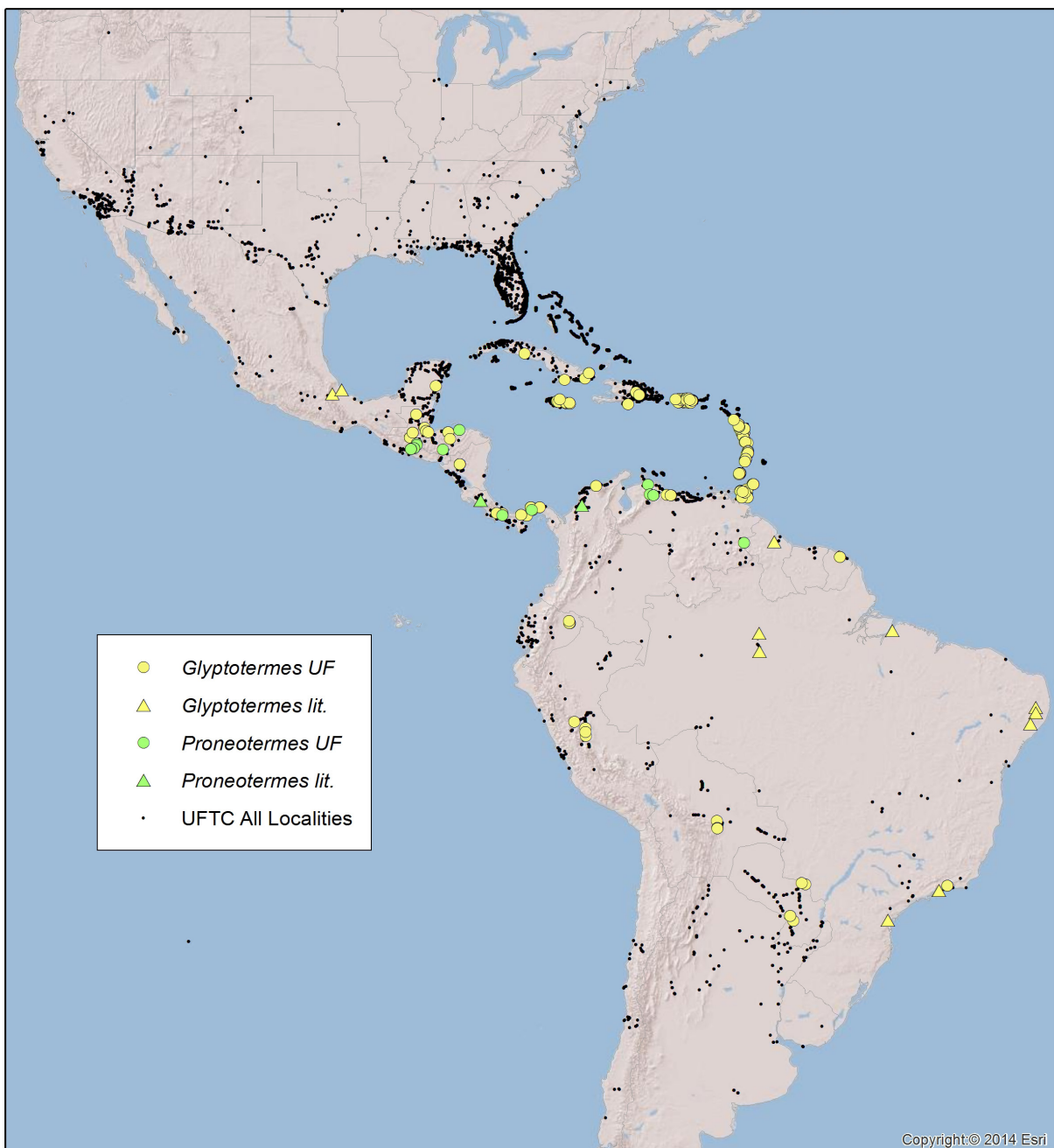


Fig 7. Map of New World *Glyptotermes* and *Proneotermes* localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

Incisitermes minor is endemic to the southwestern Nearctic where it is a major structural pest. The abundance of *I. minor* in Southern California, both in buildings and outdoor habitats such as woodpiles, fencing, and tree branches, is striking. This densely populated region is prone to earthquakes so many houses have wood-frame construction making *I. minor* the most destructive structural pest in southern California. As would be expected, *I. minor* has been transported by infested goods or by infested boats (Scheffrahn & Crowe, 2011) to other parts of the Nearctic, especially Florida (Scheffrahn, 2013). Although exotic structural records of *I. minor* in Florida are relatively common, it appears that *I. minor* cannot disperse from structure to structure or live in outdoor habitats. I have excluded isolated localities that

either represent interceptions or static, non-invasive records such as Ontario, Canada (Grace et al., 1991); Tacoma, WA (Light, 1934a); Evanston, IL; Fergus Falls, MN; and Franklin, TN.

KALOTERMES (Figs 8, 10F)

Soldiers of *Kalotermes* are smaller and have a more quadrate pronotum than *Neoterмес*. Only two species of *Kaloterмес* are known in the New World, *K. approximatus* Snyder in the Southeastern U.S. and Bermuda and *K. gracilignathus* Emerson from Juan Fernández Island (Emerson, 1924, Fig 8). *Kaloterмес approximatus* does not occur in Neotropical Florida. The genus lacks pest species.

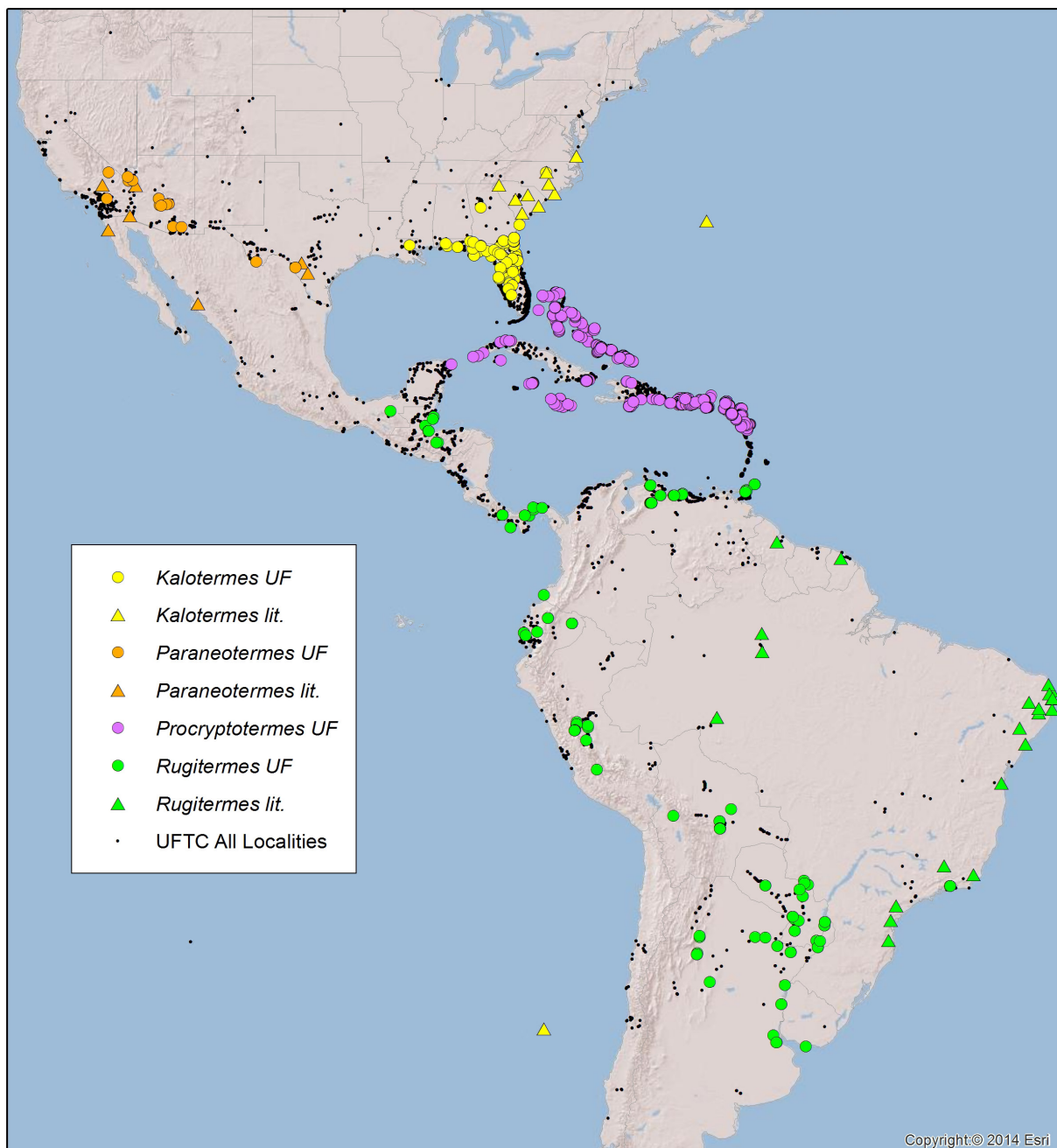


Fig 8. Map of New World *Kaloterмес*, *Paraneoterмес*, *Procryptoterмес*, and *Rugiterмес* localities from the University of Florida Termite Collection (UF) and literature (lit., Table 1).

MARGINITERMES (Figs 3, 9B)

The soldier of *Marginitermes*, with enormous third antennal articles, is the most distinctive of the New World Kalotermitidae. Two species occur in central and southwestern America and a third species occurs in Australia (Scheffrahn & Postle, 2013). *Marginitermes hubbardi* (Banks) is sympatric

with *I. minor* and *P. occidentis* (Walker) in the Sonoran Desert of Arizona and Mexico, while *M. cactiphagus* Myles occupies the milder arid regions of Mexico and Central America (Fig 3). According to Light (1934b), *M. hubbardi* is the second most destructive kalotermitid of the region after *I. minor*. I have excluded one record of *M. hubbardi* from Odessa, Florida, as a static, non-invasive locality.

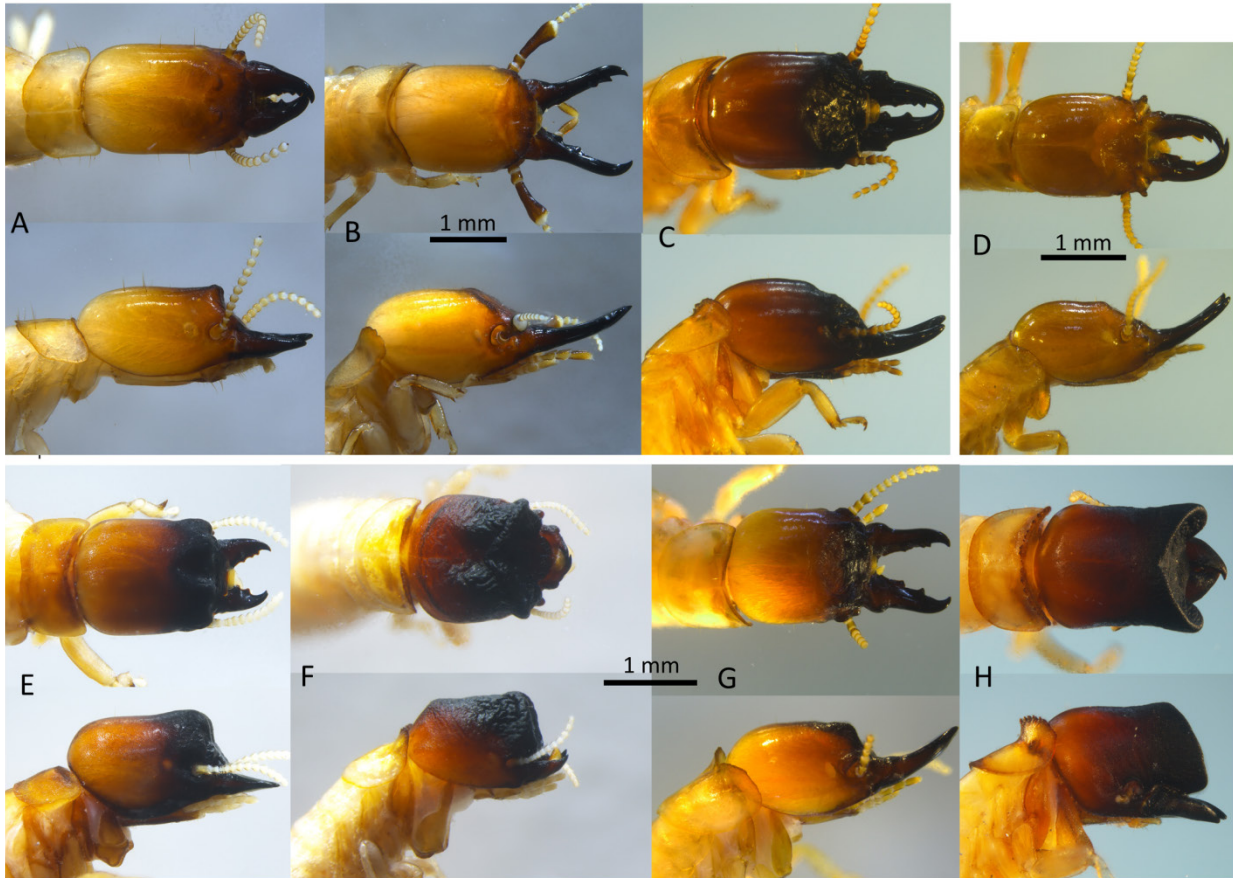


Fig 9. New World genera of Kalotermitidae with partial or robust soldier head capsule phragmosis A) *Glyptotermes bilobatus*, Panama B) *Marginitermes hubbardi*, Arizona C) *Proneotermes latifrons*, Venezuela D) *Procryptotermes leewardensis*, Guadeloupe E) *Calcaritermes nearcticus*, Florida F) *Cryptotermes chacoensis*, Paraguay G) *Tauritermes taurocephalus*, Bolivia H) *Eucryptotermes hagenii*, Brazil.

NEOTERMES (Figs 2, 10B)

Many *Neotermes* species are large or very large (e.g., *N. mona* (Banks); Křeček et al., 2000) and some species have dimorphic soldiers (e.g., *N. jouteli* (Banks); Scheffrahn et al., 2000). The distribution of *Neotermes* is the greatest and most continuous of any new world kalotermitid genus extending for 7,700 km from Bermuda [*N. castaneus* (Burmeister)] to coastal southern Chile [*N. chilensis* (Blanchard)] and elevations from sea level to 1831 m in Venezuela (*Neotermes* sp., Scheffrahn, 2015). *Neotermes castaneus* occurs in Bluefields, Nicaragua, while a new species of *Neotermes* inhabits the Peruvian coast in the proximity of Lima considered among the rainiest and driest habitats, respectively, in the New World. Interestingly, both of the latter species often reside beneath live cambium in standing trees. Some *Neotermes* species are minor pests of orchard trees (Constantino, 2002) including cacao and mango.

With 26 described species, *Neotermes* is the second most specious New World genus after *Cryptotermes*. *Neotermes* is in need of revision as synonyms and undescribed species abound for New World inhabitants.

PARANEOTERMES (Figs 8, 10E)

Paraneotermes simplicicornis (Banks) is unique among all kalotermitid species in that it has subterranean characteristics (Light, 1937). *Paraneotermes*, along with *Comatermes* and *Pterotermes*, is a monotypic genus that occurs in the Sonoran desert, but Light (1933) reports *Pa. simplicicornis* in the northern mesic Neotropics around San Blas, Mexico (26°N, Fig 8). Light (1937) reported that the imagos of *Pa. simplicicornis* readily bury themselves in the soil and avoid direct colonization of wood. Lack of literature since Light (1937), suggests this species is probably of little economic significance either as a structural wood or tree orchard pest.

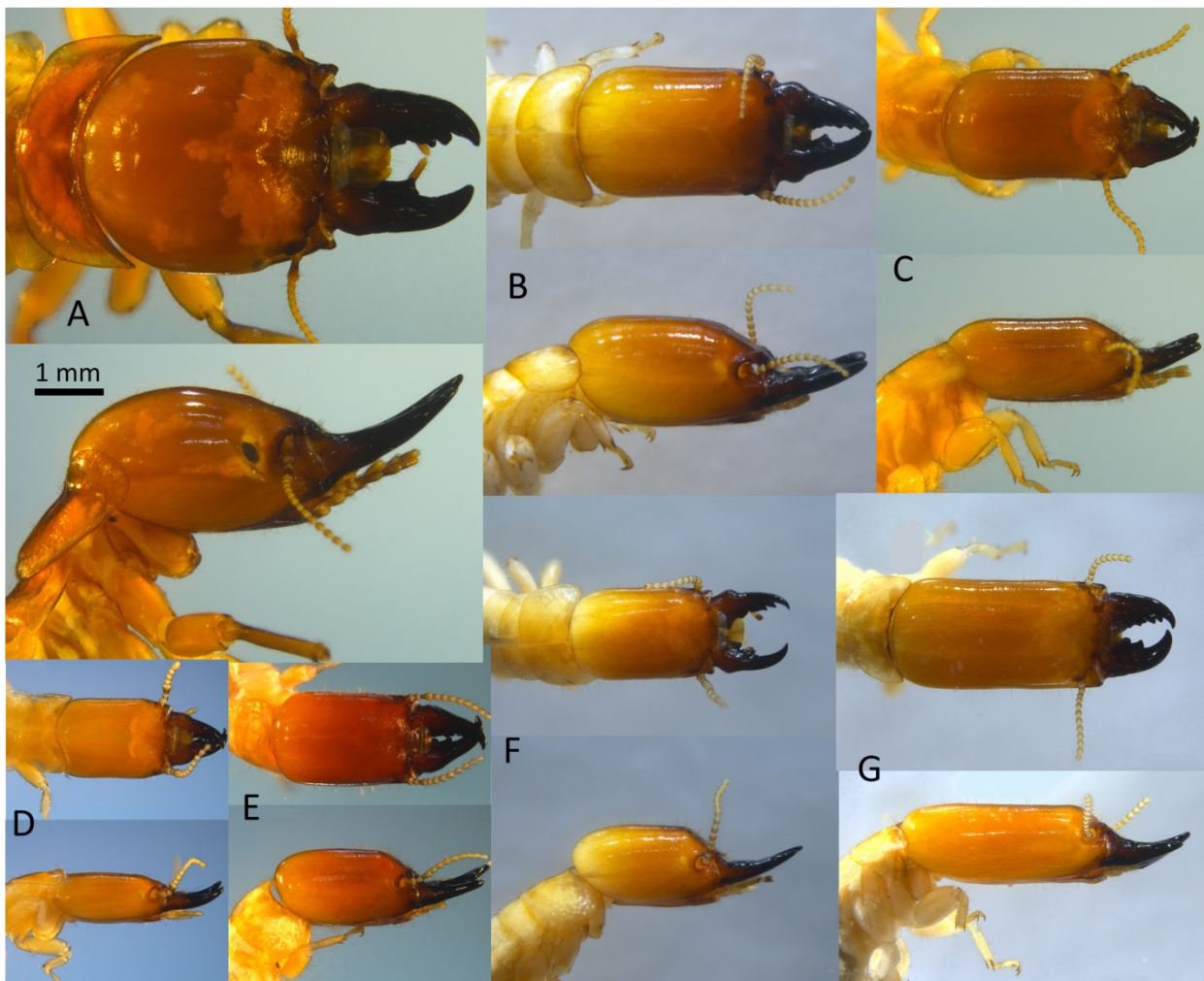


Fig 10. New World genera of Kalotermitidae without soldier head capsule phragmosis A) *Pterotermes occidentis*, Arizona B) *Neotermes fulvescens*, Paraguay C) *Paraneotermes simplicicornis*, Arizona D) *Incisitermes bequaerti*, Dominican Republic E) *Rugitermes panamae*, Panama F) *Kalotermes approximatus*, Florida G) *Comatermes perfectus*, Venezuela.

PROCRYPTOTERMES (Figs 8, 9D)

Soldiers of *Procryptotermes* are characterized by their long, sickle-like mandibles. The New World *Procryptotermes* consists of four well-defined and abundant West Indian species whose distributions were first reported by Scheffrahn and Křeček (2001). Fig 8 shows additional localities, especially in The Bahamas and Turks and Caicos Islands and a single mainland sample from the Yucatan Peninsula. Colonies often excavate branches and twigs to the point of being completely hollowed-out. *Procryptotermes* are not known to be structural pests.

PRONEOTERMES (Figs 7, 9C)

Proneotermes soldiers have a phragmotic frons combined with mandibles that have a quadrate basal inflation. The distribution of the three known *Proneotermes* species ranges from Guatemala to Venezuela (Fig 7). Until recently (Casala et al., 2016b), *Proneotermes* has been a “forgotten” genus.

PTEROTERMES (Figs 4, 10A)

Pterotermes occidentis is the largest Kalotermitidae species with the soldier head width exceeding 3.5 mm. This monotypic genus is found only in the Sonoran desert of Southern Arizona, the entire Baja California Peninsula and the Mexican mainland south to Guaymas, Sonora (Fig 4, 28°N, Nutting, 1966). The UFTC specimens were all taken in Arizona from living Palo Verde branches or dead Palo Verde wood connected to living tissue. Along with *M. hubbardi*, *I. minor*, and *Pron. simplicicornis*; *Pt. occidentis* is limited to hot xeric habitats. I have excluded one record of *Pt. occidentis* from Austin, TX (Howell, 1984) as a static, non-invasive locality.

RUGITERMES (Figs 8, 10E)

Rugitermes soldiers are recognized by a subtle frontal ridge that extends medially from the dorsal antennal margin. Some images have a striking coloration contrast between

the head and pronotum. Twelve Neotropical species are recorded, but soldiers are difficult to identify to species and genetic sequences suggest many more species remain to be described. The UFTC holdings now extend the northern limit of *Rugitermes* to Mexico and Belize (Fig 8). Honduras, Venezuela, Peru, Bolivia, Paraguay, Trinidad, Tobago are also added to the range of this genus. All species are Neotropical with the lone exception of *Rugitermes athertonii* (Light) from the Papuan Region (Light, 1932). *Rugitermes laticollis* Snyder holds the high elevation record for termites of 3600 m in Ecuador (Scheffrahn, 2015).

TAURITERMES (Figs 3, 9G)

Limited to the Neotropics, the frontal rugosity of the *Tauritermes* soldiers approaches that of some *Cryptotermes*, but *Tauritermes* has much longer mandibles. Three species

of *Tauritermes* are described and herein is the first report from Bolivia and Paraguay (Fig 3). *Tauritermes* is recorded from rather more arid Neotropical habits with the exception of the surprising Manaus locality (ann. rainfall > 2m) of a new species (Dambros et al., 2013). Constantino (2002) has observed minor damage by *Tauritermes* in Brazil.

Acknowledgements

I thank all those that have contributed to the UFTC now holding 43,474 colony samples. Reginaldo Constantino, also a UFTC collector with a meticulous knowledge of the taxonomic literature, provided substantial corrections to Table 1. I also thank Chris Starr for his thorough review. Finally, I am especially indebted to Jim Chase for avoiding numerous traffic accidents in Latin America.

Table 1. Collection localities from the literature used to supplement those of the University of Florida Termite Collection.

Taxon	Status	Location	Latitude	Longitude	Author
<i>Calcaritermes colei</i>	endemic	Mexico: San Luis Potosí, El Naranjo	22.17	-101.00	Krishna, 1962
<i>Calcaritermes nigriceps</i>	endemic	Guyana: Kartabo	6.38	-58.70	Emerson, 1925
<i>Calcaritermes parvinotus</i>	endemic	Mexico: Colima, Colima	19.25	-103.73	Light, 1933
<i>Calcaritermes parvinotus</i>	endemic	Mexico: Nayarit, San Blas	21.54	-105.28	Nutting, 1970
<i>Calcaritermes parvinotus</i>	endemic	Mexico: San Luis Potosí, El Naranjo	22.17	-101.00	Krishna, 1962
<i>Calcaritermes rioensis</i>	endemic	Brazil: Rio de Janeiro, Ilha Grande	-23.14	-44.22	Krishna, 1962
<i>Calcaritermes rioensis</i>	endemic	Brazil: Bahia, Mata do Buraquinho	-7.15	-34.87	Ernesto et al., 2014
<i>Calcaritermes rioensis</i>	endemic	Brazil: Bahia, Ilhéus	-14.80	-39.07	Canello et al., 2014
<i>Calcaritermes rioensis</i>	endemic	Brazil: Paraíba, João Pessoa	-7.11	-34.86	Canello et al., 2014
<i>Calcaritermes rioensis</i>	endemic	Brazil: Bahia, Mata da Esperança	-14.79	-39.07	Reis & Canello, 2007
<i>Calcaritermes rioensis</i>	endemic	Brazil: Bahia, Reserva Zoobotânica	-14.32	-39.25	Reis & Canello, 2007
<i>Calcaritermes rioensis</i>	endemic	Brazil: Bahia, Santa Luzia do Itanhý	-11.35	-37.45	Canello et al., 2014
<i>Calcaritermes sp.</i>	endemic	French Guiana	4.08	-52.68	Bourguignon et al., 2011
<i>Calcaritermes sp. 1</i>	endemic	Brazil: Amazonas, Manaus	-3.10	-59.97	Dambros et al., 2016
<i>Calcaritermes sp. 1</i>	endemic	Brazil: Amazonas, Purupuru	-3.82	-60.36	Dambros et al., 2016
<i>Calcaritermes sp. 2</i>	endemic	Brazil: Roraima, Porto Velho	-8.76	-63.88	Dambros et al., 2016
<i>Cryptotermes brevis</i>	exotic	Ecuador: Galápagos Isl.	-0.84	-89.45	Araujo, 1977
<i>Cryptotermes brevis</i>	exotic	Brazil: São Paulo, Bananal	-22.68	-44.32	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Barbados	13.11	-59.59	Adamson, 1949
<i>Cryptotermes brevis</i>	exotic	Belize	17.50	-88.20	Harris, 1959
<i>Cryptotermes brevis</i>	exotic	Bermuda	32.30	-64.76	Chhotani, 1970
<i>Cryptotermes brevis</i>	exotic	Brazil: Dist. Federal, Brasília	-15.77	-47.91	Constantino & Dianese, 2001
<i>Cryptotermes brevis</i>	exotic	Brazil: Paraná, Castro	-24.79	-50.01	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Brazil: R.G. do Sul, Caxias do Sul	-29.17	-51.18	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Mexico: Colima, Colima	19.25	-103.73	Light, 1933
<i>Cryptotermes brevis</i>	exotic	Colombia: V.D. Cauca, Buenaventura	-3.88	-77.06	Walker, 1853
<i>Cryptotermes brevis</i>	exotic	Brazil: Sta. Catarina, Florianópolis	-27.60	-48.55	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Guyana: Kartabo	6.38	-58.70	Emerson, 1925
<i>Cryptotermes brevis</i>	exotic	Brazil: Minas Gerais, Mariana	-20.37	-43.42	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Brazil: São Paulo, Pindamonhangaba,	-22.92	-45.46	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Brazil: Rio Grande do Sul, Porto Alegre	-30.03	-51.23	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Brazil: São Paulo, Ribeirão Preto	-21.18	-47.81	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Brazil: São Paulo, Santana do Parnaíba	-23.44	-46.92	Fontes & Milano, 2002
<i>Cryptotermes brevis</i>	exotic	Suriname	5.75	-55.15	Van Dinther, 1960
<i>Cryptotermes brevis</i>	exotic	Colombia: Mendellin	6.25	-75.58	Bacchus, 1987
<i>Cryptotermes brevis</i>	exotic	Peru, Quillabamba	-12.87	-72.69	Bacchus, 1987
<i>Cryptotermes chacoensis</i>	endemic	Argentina: P. N. Rio Pilcomayo	-25.05	-58.06	Roisin, 2003
<i>Cryptotermes dudleyi</i>	exotic	Brazil: Pará, Belém	-1.46	-48.50	Constantino & Canello, 1992
<i>Cryptotermes dudleyi</i>	exotic	Brazil: Paraíba, João Pessoa	-7.13	-34.84	Bandeira et al., 1998
<i>Cryptotermes dudleyi</i>	exotic	Brazil: Rio de Janeiro, Rio de Janeiro	-22.90	-43.21	Araujo, 1977

Table 1. Collection localities from the literature used to supplement those of the University of Florida Termite Collection. (Continuation)

Taxon	Status	Location	Latitude	Longitude	Author
<i>Cryptotermes dudleyi</i>	exotic	Colombia: Is. San Andrés	12.48	-81.68	Fontes & Milano, 2002
<i>Cryptotermes dudleyi</i>	exotic	Costa Rica: San José	9.93	-84.09	Snyder, 1934
<i>Cryptotermes havilandi</i>	exotic	Brazil: Pará, Belém	-1.46	-48.50	Constantino & Canello, 1992
<i>Cryptotermes havilandi</i>	exotic	Brazil: Ceará, Fortaleza	-3.72	-38.54	Fontes & Vulcano, 1998
<i>Cryptotermes havilandi</i>	exotic	Brazil: Pará, Icoaraci	-1.29	-48.47	Constantino & Canello, 1992
<i>Cryptotermes havilandi</i>	exotic	Brazil: Rio de Janeiro, Rio de Janeiro	-22.90	-43.21	Araujo, 1977
<i>Cryptotermes havilandi</i>	exotic	Brazil: São Paulo, Santos	-23.96	-46.33	Araujo, 1977
<i>Cryptotermes havilandi</i>	exotic	Guyana, Kartabo	6.38	-58.70	Bacchus, 1987
<i>Cryptotermes cavifrons</i>	endemic	Bermuda	32.30	-64.76	Snyder, 1956
<i>Cryptotermes darwini</i>	endemic	Ecuador: Galápagos Isl., Floriania Is.	-1.26	-90.43	Light, 1935
<i>Cryptotermes contognathus</i>	endemic	Brazil: Espírito Santo, Praia das Neves	-21.30	-40.96	Constantino, 2000
<i>Cryptotermes fatulus</i>	endemic	Mexico: Barra de Navidad Jalisco	19.21	-104.68	Nutting, 1970
<i>Cryptotermes fatulus</i>	endemic	Ecuador: Galápagos Isl., Isabela Is.	-0.95	-91.14	Light, 1935
<i>Cryptotermes fatulus</i>	endemic	Mexico: Nakyarit, Tres Marias Islands	21.64	-106.56	Light, 1935
<i>Cryptotermes longicollis</i>	endemic	Mexico: 30 km S. Mazatlan	23.06	-106.21	Light, 1933
<i>Cryptotermes sp.</i>	endemic	Brazil: Bahia, Mata da Esperança	-14.80	-39.07	Reis & Canello, 2007
<i>Cryptotermes sp.</i>	endemic	Brazil: Paraíba, Fazenda Almas	-7.47	-36.87	Vasconcellos et al., 2010
<i>Cryptotermes sp. 1</i>	endemic	Brazil: Bahia, Mata de S. João	-12.97	-38.51	Canello et al., 2014
<i>Cryptotermes sp. 1</i>	endemic	Brazil: Amazonas, Purupuru	-3.82	-60.36	Dambros et al., 2016
<i>Eucryptotermes breviceps</i>	endemic	Brazil: Amazonas, Balbina	-1.92	-59.48	Constantino, 1997
<i>Eucryptotermes breviceps</i>	endemic	French Guiana, Petit Saut	5.05	-53.05	Šobotník unpublished
<i>Eucryptotermes hagenii</i>	endemic	Argentina: Chaco, Colonia Benítez	-27.33	-58.97	Godoy et al., 2018
<i>Eucryptotermes hagenii</i>	endemic	Brazil: Santa Catarina, Blumenau	-26.91	-49.07	Constantino, 1997
<i>Eucryptotermes hagenii</i>	endemic	Brazil: Rio de Janeiro, Parq. Est. do Desengano	-21.84	-41.68	Canello et al., 2014
<i>Eucryptotermes sp.</i>	endemic	Brazil: Bahia, Mata da Esperança	-14.80	-39.07	Reis and Canello, 2007
<i>Glyptotermes canellae</i>	endemic	Brazil: Paraná, Morretes	-25.48	-48.83	Canello et al., 2014
<i>Glyptotermes perparvus</i>	endemic	Brazil: Pará, Belém and Icoaraci	-1.28	-48.47	Constantino & Canello, 1992
<i>Glyptotermes perparvus</i>	endemic	Guyana: Kartabo	6.38	-58.70	Emerson, 1925
<i>Glyptotermes seeversi</i>	endemic	Mexico: Veracruz, Veracruz	19.18	-96.15	Krishna & Emerson, 1962
<i>Glyptotermes sicki</i>	endemic	Brazil: Rio de Janeiro: Ilha Grande	-23.12	-44.43	Krishna & Emerson, 1962
<i>Glyptotermes sicki</i>	endemic	Brazil: Paraná, Morretes	-25.48	-48.83	Canello et al., 2014
<i>Glyptotermes sp.</i>	endemic	Brazil: Amazonas, Manaus	-3.10	-59.97	Dambros et al., 2013
<i>Glyptotermes sp.</i>	endemic	Brazil: Amazonas, Presidente Figueiredo	-1.50	-60.00	Dambros et al., 2012
<i>Glyptotermes sp.</i>	endemic	Brazil: Pernambuco, Taquaritinga do Norte	-7.91	-36.02	Couto et al., 2015
<i>Glyptotermes sp. a, b</i>	endemic	Brazil: Pernambuco, Brejo dos Cavalos	-8.37	-36.03	Bandeira et al., 2003
<i>Glyptotermes sp. 1</i>	endemic	Brazil: Alagoas, Quebrangulo	-9.32	-36.48	Canello et al., 2014
<i>Incisitermes bequaerti</i>	endemic	Bermuda	32.30	-64.76	Snyder, 1956
<i>Incisitermes galapagoensis</i>	endemic	Ecuador: Galápagos Isl., Wenman Is.	1.38	-91.82	Banks, 1901
<i>Incisitermes immigrans</i>	endemic	Ecuador: Galápagos Isl., Genovesa Is.	0.32	-89.96	Snyder, 1922
<i>Incisitermes immigrans</i>	endemic	Ecuador: Galápagos Isl., San Cristobal Is.	-0.84	-89.45	Snyder, 1922
<i>Incisitermes marginipennis</i>	endemic	Mexico: Santo Tomás, Is. Socorro	18.77	-110.93	Light, 1935
<i>Incisitermes minor</i>	endemic	U.S.A.: California, Auburn	38.90	-121.07	Light, 1934a
<i>Incisitermes minor</i>	endemic	U.S.A.: California, Clearlake	38.96	-122.63	Light, 1934a
<i>Incisitermes minor</i>	endemic	U.S.A.: Colorado, Black Rocks	39.15	-109.00	Jones, 2004
<i>Incisitermes minor</i>	endemic	U.S.A.: Colorado, Mee Canyon	39.16	-108.96	Jones, 2004
<i>Incisitermes minor</i>	endemic	U.S.A.: Colorado, Colorado River	39.08	-109.10	Jones, 2004
<i>Incisitermes minor</i>	endemic	Mexico: Sonora, Empalme	27.96	-110.81	Light, 1933
<i>Incisitermes minor</i>	endemic	Mexico: B.C. del Norte, Ensenada	31.85	-116.60	Light, 1935
<i>Incisitermes minor</i>	endemic	U.S.A.: California, Lone Pine	36.60	-118.06	Light, 1934a
<i>Incisitermes minor</i>	endemic	U.S.A., California, Redding	40.58	-122.39	Light, 1934a
<i>Incisitermes nigritus</i>	endemic	Mexico: San Luis Potosi, San Luis Potosi	22.17	-100.95	Nickle & Collins, 1988
<i>Incisitermes platycephalus</i>	endemic	Mexico: Vera Cruz, Cordoba	18.89	-96.94	Nickle & Collins, 1988
<i>Incisitermes seeversi</i>	endemic	Mexico: Nakyarit, Tres Marias Islands	21.64	-106.56	Snyder & Emerson, 1949
<i>Incisitermes snyderi</i>	endemic	Bermuda	32.30	-64.76	Snyder, 1956
<i>Incisitermes sp.</i>	endemic	Brazil: Goiás, Parque Moura Pacheco	-16.50	-49.15	da Cunha & Orlando, 2011
<i>Incisitermes sp.</i>	endemic	Brazil: Pará, Fazenda Morelandia	-1.22	-48.28	Bandeira, 1998
<i>Kaloterms approximatus</i>	endemic	Bermuda	32.30	-64.76	Waterston, 1940
<i>Kaloterms approximatus</i>	endemic	U.S.A: Virginia, Cape Henry	36.93	-76.02	Snyder, 1920
<i>Kaloterms approximatus</i>	endemic	U.S.A.: South Carolina, Colleton Co.	32.90	-80.70	Hawthorne et al., 2001

Table 1. Collection localities from the literature used to supplement those of the University of Florida Termite Collection. (Continuation)

Taxon	Status	Location	Latitude	Longitude	Author
<i>Kaloterms approximatus</i>	endemic	U.S.A.: South Carolina, Georgetown Co.	33.40	-79.30	Hawthorne et al., 2001
<i>Kaloterms approximatus</i>	endemic	U.S.A.: South Carolina, Lee Co.	34.20	-80.20	Hawthorne et al., 2001
<i>Kaloterms approximatus</i>	endemic	U.S.A., South Carolina, Lexington Co.	33.90	-81.30	Hawthorne et al., 2001
<i>Kaloterms approximatus</i>	endemic	U.S.A.: North Carolina, New Hanover Co.	34.30	-77.90	Nalepa, 1998
<i>Kaloterms approximatus</i>	endemic	U.S.A.: South Carolina, Pickens Co.	34.90	-82.70	Hawthorne et al., 2001
<i>Kaloterms approximatus</i>	endemic	U.S.A.: North Carolina, Sampson Co.	35.00	-78.40	Nalepa, 1998
<i>Kaloterms approximatus</i>	endemic	U.S.A.: North Carolina, Wake Co.	35.80	-78.60	Nalepa, 1998
<i>Kaloterms gracilignathus</i>	endemic	Chile: Juan Fernández Islands	-33.64	-78.83	Emerson, 1924
<i>Marginitermes cactiphagus</i>	endemic	Mexico: 8 km E. Cabo	22.92	-109.83	Myles, 1997
<i>Marginitermes cactiphagus?</i>	endemic	Mexico: Santo Tomás, Is. Socorro	18.77	-110.93	Light, 1933
<i>Marginitermes hubbardi</i>	endemic	Bara de Navidad	19.21	-104.68	Nickle & Collins, 1988
<i>Marginitermes hubbardi</i>	endemic	Mexico: Colima, Colima	19.27	-103.71	Light, 1933
<i>Marginitermes hubbardi</i>	endemic	Mexico: Sonora, Guaymas	27.92	-110.91	Light, 1933
<i>Marginitermes hubbardi</i>	endemic	Mexico: Jalisco, Chamela	19.52	-105.07	Nickle & Collins, 1988
<i>Marginitermes hubbardi</i>	endemic	Mexico: Sinaloa, Mazatlan	23.26	-106.41	Light, 1933
<i>Marginitermes hubbardi</i>	endemic	Mexico: Sinaloa, San Blas	26.08	-108.76	Light, 1933
<i>Neoterms acceptus</i>	endemic	Brazil: Mato Grosso, Ribeirão Cascalheira	-12.75	-52.33	Mathews, 1977
<i>Neoterms castaneus</i>	endemic	Bermuda	32.30	-64.76	Chhotani, 1970
<i>Neoterms fulvescens</i>	endemic	Brazil: Pernambuco, Taquaritinga do Norte	-7.92	-36.02	Couto et al., 2015
<i>Neoterms fulvescens</i>	endemic	Brazil: Mato Grosso, Cuiabá	-15.60	-56.10	Silvestri, 1901
<i>Neoterms holmgreni</i>	endemic	Guyana: Georgetown	6.81	-58.16	Emerson, 1925
<i>Neoterms jouteli</i>	endemic	Mexico: Barra de Navidad Jalisco	19.21	-104.68	Nickle & Collins 1988
<i>Neoterms jouteli</i>	endemic	Mexico: Sinaloa, Socorro Island	18.77	-110.93	Light, 1935
<i>Neoterms larseni</i>	endemic	Costa Rica: Cocos Island	5.53	-87.60	Light, 1935
<i>Neoterms paraensis</i>	endemic	Brazil: Pará Ilha de Marajó	-0.90	-49.68	Costa Lima, 1942
<i>Neoterms paraensis</i>	endemic	Brazil: Pernambuco, Taquaritinga do Norte	-7.92	-36.02	Couto et al., 2015
<i>Neoterms sp.</i>	endemic	Brazil: Bahia, Mato do Buraquinho	-7.15	-34.87	Ernesto et al., 2014
<i>Neoterms sp.</i>	endemic	Brazil: Paraíba, Cabedelo	-7.05	-34.85	Vasconcellos et al., 2005
<i>Neoterms sp.</i>	endemic	Brazil: R.G. do Norte, Serra Negra do Norte	-6.58	-37.25	Alves et al., 2011
<i>Neoterms sp. 1</i>	endemic	Brazil: Rio Grande do Norte, Mata do Bastião	-6.22	-35.07	Souza et al., 2012
<i>Neoterms sp. 2</i>	endemic	Brazil: Rio Grande do Norte, Parque das Dunas	-5.83	-35.17	Souza et al., 2012
<i>Neoterms sp. 1, sp. 2</i>	endemic	Brazil: Pernambuco, Recife	-8.05	-34.88	Cancello et al., 2014
<i>Neoterms spp.</i>	endemic	Guyana: Kartabo	6.38	-58.70	Emerson, 1925
<i>Neoterms spp.</i>	endemic	Brazil: Paraíba, João Pessoa	-7.13	-34.84	Gomes da Silva et al., 1999
<i>Neoterms sp. 1</i>	endemic	Brazil: Roraima, Caracarai	1.88	-61.10	Dambros et al., 2016
<i>Neoterms sp. 1</i>	endemic	Brazil: Amazonas, Igapo-Acu	-4.45	-60.20	Dambros et al., 2016
<i>Paraneoterms simplicicornis</i>	endemic	Mexico: Bahia San Felipe	31.67	-116.52	Light, 1937
<i>Paraneoterms simplicicornis</i>	endemic	U.S.A.: California, Barstow	34.89	-117.01	Light, 1937
<i>Paraneoterms simplicicornis</i>	endemic	U.S.A: Texas, Cotulla	28.44	-99.24	Light, 1937
<i>Paraneoterms simplicicornis</i>	endemic	U.S.A: Texas, Laguna	29.22	-99.79	Light, 1937
<i>Paraneoterms simplicicornis</i>	endemic	Mexico: Sinaloa, San Blas	26.07	-108.76	Light, 1933
<i>Paraneoterms simplicicornis</i>	endemic	U.S.A.: Arizona, Yuca	34.87	-114.15	Light, 1937
<i>Paraneoterms simplicicornis</i>	endemic	U.S.A.: Arizona, Yuma	32.71	-114.64	Light, 1937
<i>Proneoterms macondianus</i>	endemic	Colombia: Santa Marta, Magdalena	9.53	-75.35	Casalla et al., 2016b
<i>Proneoterms perezii</i>	endemic	Costa Rica: San José	9.93	-84.09	Holmgren, 1911
<i>Pteroterms occidentis</i>	endemic	Mexico: Bahia San Bartolomé	27.70	-114.90	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, Cabo	22.90	-109.92	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: Sonora, Guaymas	28.00	-110.93	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Norte, Is. Angel de la Guarda	29.27	-113.40	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, Isla Carmen	25.26	-111.15	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, Isla Monserrate	25.68	-111.04	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: Sonora, Isla San Esteban	28.70	-112.58	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, La Paz	24.09	-110.51	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, Mulegé	26.89	-111.98	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, Pénjamo	24.48	-111.29	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, Pto. de Sto. Domingo	28.63	-114.03	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Norte, Rumorosa	32.10	-115.91	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Norte, San Felipe	31.03	-114.84	Nutting, 1966
<i>Pteroterms occidentis</i>	endemic	Mexico: B.C. del Sur, San Ignacio	27.27	-113.00	Nutting, 1966

Table 1. Collection localities from the literature used to supplement those of the University of Florida Termite Collection. (Continuation)

Taxon	Status	Location	Latitude	Longitude	Author
<i>Pterotermes occidentis</i>	endemic	Mexico: B.C. del Sur, Santiago	23.44	-109.79	Nutting, 1966
<i>Rugitermes cf. niger</i>	endemic	Brazil: Pernambuco, Brejo dos Cavalos	-8.37	-36.03	Bandeira et al., 2003
<i>Rugitermes niger</i>	endemic	Brazil: Paraná: Quatro Barras	-25.36	-49.08	Oliveira, 1979
<i>Rugitermes niger</i>	endemic	Brazil: Paraná, Morretes	-25.48	-48.83	Cancello et al., 2014
<i>Rugitermes nodulosus</i>	endemic	Brazil: Minas Gerais: São João del Rey	-21.13	-44.24	Hagen, 1858
<i>Rugitermes rugosus</i>	endemic	Brazil: Santa Catarina, Blumenau	-27.02	-49.02	Cancello et al., 2014
<i>Rugitermes rugosus</i>	endemic	Brazil: Bahia, Reserva Zoobotânica	-14.32	-39.25	Reis & Cancello, 2007
<i>Rugitermes rugosus</i>	endemic	Brazil: São Paulo, Ribeirão Grande	-24.31	-48.37	Cancello et al., 2014
<i>Rugitermes</i> sp.	endemic	Brazil: Sergipe	-11.02	-37.20	Almeida et al., 2016*
<i>Rugitermes</i> sp.	endemic	Brazil: Bahia, Mata do Buraquinho	-7.15	-34.87	Ernesto et al., 2014
<i>Rugitermes</i> sp.	endemic	Brazil: Sergipe, Fazenda São Pedro	-9.65	-37.68	Viana-Junior et al., 2014
<i>Rugitermes</i> sp.	endemic	French Guiana	4.98	-53.13	Davies, 2002
<i>Rugitermes</i> sp.	endemic	Brazil: Paraíba, Mataraca	-6.48	-34.93	Vasconcellos et al., 2005
<i>Rugitermes</i> sp.	endemic	Brazil: Amazonas, Presidente Figueiredo	-1.50	-60.00	Dambros et al., 2012
<i>Rugitermes</i> sp.	endemic	Brazil: Paraíba, Fazenda Almas	-7.47	-36.87	Vasconcellos et al., 2010
<i>Rugitermes</i> sp.	endemic	Brazil: Pernambuco, Taquaritinga do Norte	-7.99	-36.04	Couto et al., 2015
<i>Rugitermes</i> sp. 1	endemic	Brazil: Rio Grande do Norte, Parque das Dunas	-5.93	-35.18	Souza et al., 2012
<i>Rugitermes</i> sp. 1	endemic	Brazil: Paraíba, Guaribas	-6.73	-35.13	Souza et al., 2012
<i>Rugitermes</i> sp. 1	endemic	Brazil: Paraíba, João Pessoa	-7.12	-34.86	Cancello et al., 2014
<i>Rugitermes</i> sp. 1	endemic	Brazil: Pernambuco, Recife	-8.05	-34.88	Cancello et al., 2014
<i>Rugitermes</i> sp. 2	endemic	Brazil: Rio de Janeiro, Sta. Maria Madalena	-21.84	-41.68	Cancello et al., 2014
<i>Rugitermes</i> spp.	endemic	Guyana: Kartabo	6.38	-58.70	Emerson, 1925
<i>Rugitermes</i> sp. 1	endemic	Brazil: Amazonas, Manaus	-3.10	-59.97	Dambros et al., 2016
<i>Rugitermes</i> sp. 1	endemic	Brazil: Roraima, Porto Velho	-8.76	-63.88	Dambros et al., 2016
<i>Tauritermes</i> sp.	endemic	Brazil: Amazonas, Manaus	-3.10	-59.97	Dambros et al., 2013
<i>Tauritermes</i> sp.	endemic	Brazil: Paraíba, Mataraca	-6.48	-34.93	Vasconcellos et al., 2005
<i>Tauritermes</i> sp.	endemic	Brazil: Paraíba, Fazenda Almas	-7.47	-36.87	Vasconcellos et al., 2010
<i>Tauritermes</i> sp. 1	endemic	Brazil: Paraíba, Guaribas	-6.73	-35.13	Souza et al., 2012
<i>Tauritermes</i> sp. 1	endemic	Brazil: Bahia, Mata de S. João	-12.97	-38.51	Cancello et al., 2014
<i>Tauritermes taurocephalus</i>	endemic	Argentina: Corrientes	-27.49	-58.80	Torales et al., 1997
<i>Tauritermes taurocephalus</i>	endemic	Brazil: Mato Grosso, Corumbá	-19.02	-57.65	Silvestri, 1901
<i>Tauritermes triceromegas</i>	endemic	Argentina: Cosquin	-31.24	-64.47	Silvestri, 1901

*Misidentified as *Paraneotermes* sp.

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