New Termite (Isoptera: Kalotermitidae, Rhinotermitidae) Records from Georgia[1]

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Abstract Deliberate surveys and submitted samples have yielded five termite species not previously recorded from Georgia including *Coptotermes formosanus* Shiraki (Family Rhinotermitidae), and *Calcaritermes nearcticus* (Snyder), *Cryptotermes brevis* (Walker), *Incisitermes minor* (Hagen), and *Kalotermes approximatus* Snyder (Family Kalotermitidae) bringing the total number of termite species in Georgia to nine. *Coptotermes formosanus, C. brevis,* and *I. minor* are all non-endemic pest species in Georgia. The Georgia records for *C. nearcticus* are the first outside of Florida and represent new northern limits, while collections of *K. approximatus* bridge a former gap in its north-south distribution. Previous records for *Reticulitermes flavipes* (Kollar), *R. hageni* Banks, and *R. virginicus* (Banks) (Family Rhinotermitidae), and *Incisitermes snyderi* (Light) (Kalotermitidae) are confirmed, while the name *R. malletei* is relegated to *nomen nudum* status. The prospects for additional termite records and status of *Reticulitermes* taxonomy in Georgia are discussed.

Key Words Termites, Georgia, survey, Rhinotermitidae, Kalotermitidae

The geographic position of Georgia portends a termite fauna that is intermediate in diversity between the more northeastern Nearctic regions, occupied solely by *Reticulitermes* spp., and the more diverse subtropical fauna of Florida. Snyder (1954), based on the survey of Banks and Snyder (1920), recognized only four termite species in Georgia: *Incisitermes snyderi* (Light), *Reticulitermes flavipes* (Kollar), *R. hageni* Banks, and *R. virginicus* (Banks). In this report, we present collection data that support the expected intermediate level of termite diversity for Georgia. We also discuss the current status of *Reticulitermes* taxonomy with respect to the southeastern United States.

Materials and Methods

Termite samples from Georgia were submitted to the authors from various collectors or were taken directly by the authors. Additionally, several collecting expeditions were conducted in 1999 in the Okefenokee Swamp, St. Simons Island, Jekyll Island, Cumberland Island, Brunswick, and other areas of coastal Georgia. These locations were selected for collection because they were expected to yield species that had only been found in Florida or in more northerly coastal states. Latitude and longitude

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coordinates of collection localities before 1999 were measured from various surface maps or ESRI Digital Map of the World version 1.0 (Environmental Systems Research Institute, Inc. Redlands, CA). For 1999, coordinates were recorded at collection sites using a Garmin GPS model 12 (Garmin International, Olathe, KS) hand-held global positioning receiver. Coordinates of collection sites were converted to decimal degrees and mapped using ArcView GIS version 3.0a software (Environmental Systems Research Institute, Inc. Redlands, CA) and relevant map data from Digital Map of the World version 1.0.

Colony samples containing at least one imago or soldier were identified using the key of Scheffrahn and Su (1994). *Coptotermes formosanus* Shiraki records from metropolitan Atlanta, including the cities of Dallas, Fayetteville, Lawrenceville, Norcross, Marietta, and Suwanee, were compiled by B.T.F and J.A.C. All other samples are preserved in 85% ethanol and deposited in the University of Florida termite collection at the Fort Lauderdale Research and Education Center.

Results and Discussion

Collection localities in Georgia are mapped in Fig. 1 for termites other than *Reticulitermes* spp. The distribution of the endemic subterranean *Reticulitermes* spp. are probably more or less continuous throughout Georgia with *R. virginicus* and *R. flavipes* being more common that *R. hageni*. Of the 50 *Reticulitermes* samples in our collection from southeastern Georgia, 33 keyed to *R. virginicus*, 14 to *R. flavipes*, and 3 to *R. hageni*. *Reticulitermes* collection data from structures in peninsular Florida (Scheffrahn et al. 1988) indicate a similar distribution and species composition in that state for this economically important genus.

The occurrence of the Formosan subterranean termite, *C. formosanus*, in Georgia is both troubling and expected. This very damaging non-endemic species was first collected in Tucker, GA, in 1993 by J.A.C. Since then, it has been collected in structures, live trees, stumps, and termite monitoring devices in Dallas, Fayetteville, Lawrenceville, Norcross, Marietta, Stone Mountain, and Suwanee. On St. Simons Island, it was collected in 1999 from a colony aboard a boat that was docked at a marina. It was collected again from the same boat while it was in dry-dock at a Brunswick, GA, marina. Later, the boat was fumigated to eliminate the infestation. Although more commonly established in coastal and seaport locations in the U.S. (Atkinson et al. 1993, Chambers et al. 1988, Howell et al. 1987, Scheffrahn et al. 1988), *C. formosanus* has become established in other inland locations including Auburn, AL (Sponsler et al. 1988), and Orlando, FL (Scheffrahn et al. 1988). The movement of infested materials is probably responsible for many introductions of this pest. Railroad cross ties used in landscaping have been associated with each infestation in the metropolitan Atlanta area.

Two other non-endemic pestiferous drywood termites recorded from Georgia are the West Indian powderpost drywood termite, *Cryptotermes brevis* (Walker), and the western drywood termite, *Incisitermes minor* (Hagen). *Cryptotermes brevis* apparently infests only structural lumber that is protected from precipitation and other sources of free water. A sample of *C. brevis* was first taken from a door imported from Indonesia in Atlanta in 1991. Recent samples have been obtained from structures in Brunswick and McDonough. Additional infestations throughout Georgia, especially in coastal areas, are very likely. *Incisitermes minor* was collected in 1995 in Marietta and Sapelo Island, and in 1998 from Bogart. In all cases alates were collected after

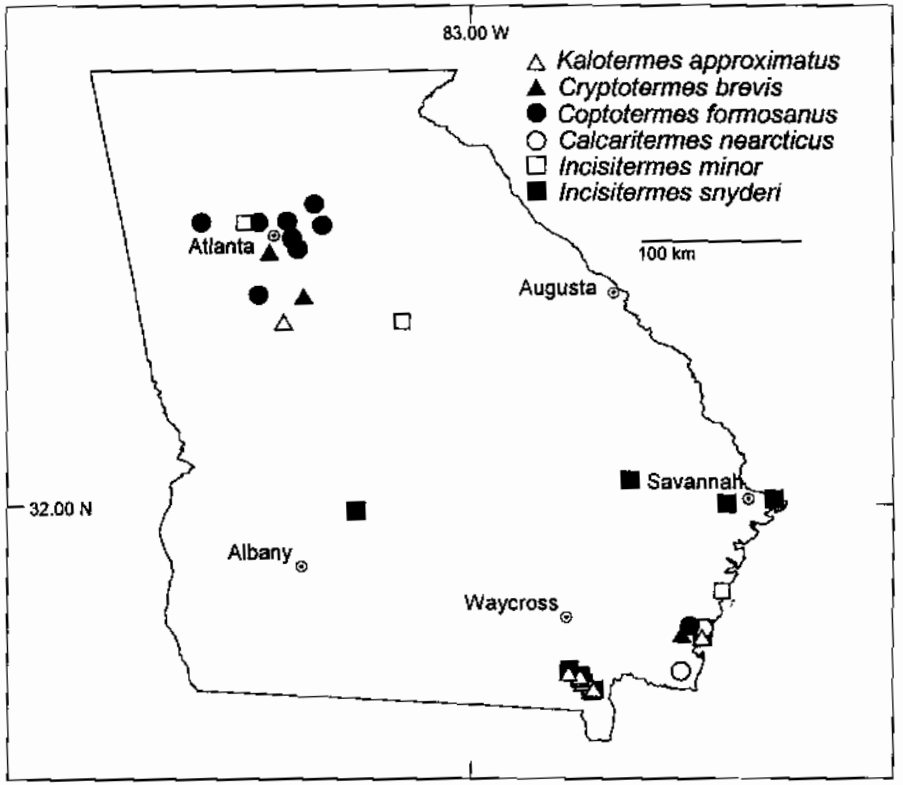

Fig. 1. Collection localities for termite species in Georgia other than *Reticulitermes* spp.

dispersal flights in September and October. Colonies of *I. minor* have recently been reported in Louisiana, including one in a live tree (Messenger et al. 2000), and have been reported in Florida since 1971 (Scheffrahn et al. 1988). Movement of infested furniture and structural woodwork is the most common vehicle for the spread of *C. brevis* and *I. minor*.

Two endemic kalotermitids previously not reported from Georgia include *Kalotermes approximatus* Snyder and *Calcaritermes nearcticus* Snyder. *Kalotermes approximatus* has been collected in Mississippi, Alabama, Louisiana, Florida, North Carolina, and the southeastern corner of Virginia (Nalepa 1998) making this species the most cold hardy drywood termite in the eastern United States. Because of a higher moisture requirement, *K. approximatus* is generally not a structural pest. Our collections of *K. approximatus* show that it is a common species in woodland areas of southeastern Georgia. Its collection in Griffin in 1993 and its distribution outside Georgia indicate that *K. approximatus* may occur across much of the state. The collection of *C. nearcticus* on St. Simons Island in 1999 is the northernmost known locality and the first record outside of Florida and represents a relict distribution of an otherwise tropical genus. *Calcaritermes nearcticus* is generally not considered pestiferous.

Incisitermes snyderi (Light) is the only endemic drywood termite in the southeastern U.S. that commonly infests structures (Scheffrahn et al. 1988). Banks and Snyder (1920) recorded *I. snyderi* (as *K. marginipennis*) in the vicinity of Albany and Savannah. Our samples from Cordele, Claxton, and the coastal southeast further suggest that *I. snyderi* is limited to southern Georgia.

Although our survey is not an exhaustive one, we expect that additional termite species records in Georgia will be rare. The temperate climate of Georgia is inhospitable for the establishment of tropical pest species such as *Heterotermes* sp. and *Coptotermes havilandi* Holmgren that have recently settled in southern Florida (Scheffrahn and Su 1995, Su et al. 1997). The one endemic species nearest to Georgia that has not yet been recorded from there is *Cryptotermes cavifrons* Banks. The northern recorded limit for *C. cavifrons* is Daytona Beach, FL (Scheffrahn, unpubl.) approximately 180 km south of the Florida-Georgia border. Where *C. cavifrons* does occur in peninsular Florida it is abundant. Therefore, the absence of this species from our southeastern Georgia survey area suggests that it is also not likely to occur elsewhere in Georgia.

The genus *Reticulitermes* has had a long-standing need for revision (Emerson 1971). Species of *Reticulitermes* are taxonomically difficult because of intraspecific morphometric variability, lack of robust qualitative characters, especially in the soldier caste, and their broad and sympatric distributions. Recently, researchers have identified fifteen cuticular hydrocarbon phenotypes of *Reticulitermes* spp. from Georgia that they are confident represent different taxa (Haverty et al. 1996, 1999). However, Emerson (1971) warns that differences in physiology and behavior that occur between local populations is not in itself sufficient evidence to warrant taxonomic distinction. We do suspect that additional undescribed species of *Reticulitermes* exist in Georgia and elsewhere in the Nearctic region. However, equating hydrocarbon phenotype with species distinction results in a overestimate of diversity when compared to species diversity of other termite genera from comparable areas. For example, the most species-rich Nearctic genus *Amitermes* (Constantino 1998) consists of only 9 U.S. endemics, eight of which range from California to Texas (Light 1932, Scheffrahn et al. 1989).

The name *Reticulitermes malletei* was given to an allelochemical (Clement et al. 1985) and behavioral (Clement et al. 1986) phenotype of *Reticulitermes* without a taxonomic description. The specimens were collected in Athens in 1983. Article 13 of the International Code of Zoological Nomenclature (ICZN 1985) forbids the publication of a new scientific name without a formal description. Until a proper description is forthcoming, *R. malletei* must be considered unavailable and be relegated to *nomen nudum* status.

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