

## Survey of the Termites (Isoptera: Kalotermitidae, Rhinotermitidae, Termitidae) of St. John, U.S. Virgin Islands

by

Susan C. Jones<sup>1</sup> and Christine A. Nalepa<sup>2</sup>

### ABSTRACT

A survey of the island of St. John revealed the presence of *Incisitermes* nr. *incisus*, *Procryptotermes* nr. *corniceps* and *Neotermes mona* (Kalotermitidae); one or more undetermined species of *Heterotermes* (Rhinotermitidae); and *Parvitermes wolcottii* and *Nasutitermes acajutlae* (Termitidae). The most commonly noted termites included a drywood termite, *I.* nr. *incisus*; the subterranean termite genus *Heterotermes*; and an arboreal nesting nasutiform termite, *N. acajutlae*. These three species appeared to be more cosmopolitan, being found in both the moist forest and dry forest areas of St. John. Termite associations with a number of host plants are reported. A total of six taxa in three families now are known from St. John, whereas only three species previously have been noted.

**KEY WORDS:** Caribbean, distribution, host plant associations, termites, survey, West Indies

### INTRODUCTION

The termite fauna of the island of St. John in the U.S. Virgin Islands is poorly documented. Adamson's (1948a) notes on the termite fauna of the Lesser Antilles include records from only St. Croix and St. Thomas in the U.S. Virgin Islands. No termite records for St. John are included in Snyder's (1956) summary list of termite species from the West Indies, the Bahamas, and Bermuda. *Nasutitermes nigriceps* (Haldeman), a nasutiform termite that builds conspicuous "carton" nests in trees, was first reported from St. John by Martorell and Garcia-Tuduri (1971). This species now is designated *Nasutitermes acajutlae* (Holmgren) on the basis of a taxonomic revision in which *N. acajutlae* was resurrected as a valid species distinct from *N. nigriceps* (Thorne *et al.* 1994). Fourteen colonies collected from St. John were among the specimens studied by Thorne *et al.* (1994). Recent taxonomic revisions include brief mention

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<sup>1</sup>Department of Entomology, 102 Extension Entomology Building, 1991 Kenny Road, Columbus, OH 43210-1000, E-mail: jones.1800@osu.edu

<sup>2</sup>Department of Entomology, North Carolina State University, Raleigh, NC 27695-7613, E-mail: cnalepa@unity.ncsu.edu

of *Neotermes mona* (Banks) (Kre ek *et al.* 2000) and *Procryptotermes corniceps* (Snyder) (Scheffrahn and Kre ek 2001) as new records from St. John. The termite fauna of St. John thus is known only from a few isolated references. Our survey presents a synoptic overview of the termites of St. John.

## MATERIALS AND METHODS

### **Study site**

A variety of vegetation types occur on St. John. The subtropical moist forest (*sensu* Holdridge 1967, Ewel and Whitmore 1973) generally occurs along the north-central shore and at higher elevations within the interior of St. John. In these moist forest areas, the canopy is comprised of tall evergreen and deciduous trees, with an understory of shade-tolerant trees, shrubs, and vines, as well as numerous ferns, mosses, and bromeliads. Vegetation characteristic of the subtropical dry forest (*sensu* Holdridge 1967, Ewel and Whitmore 1973) occurs in low-lying coastal areas and in the eastern and southeastern regions of St. John. The dry forests are dominated by cacti, shrubs, and thorn bushes. Forest types found on St. John are primarily attributable to variations in annual rainfall, which ranges from 114-140 cm in the moist forests to 64-89 cm in the dry forests. However, particularly in shoreline locations, salt and soil types significantly influence the types of plants that will grow; mangrove (Rhizophoraceae) forests represent adaptations to tidal inundation, salt, and anaerobic soils.

Termite collections were made from eight locations on St. John, including the north shore (Cinnamon Bay, Francis Bay, and Leinster Bay), a northern islet (Whistling Cay), western locations (Lind Point and Honeymoon Beach NE of Salomon Bay), an interior location (Reef Bay Trail), and the south shore (Saltpond Bay). Many of these collection sites were accessed via hiking trails. The diverse vegetation types found on St. John are represented among these locations.

### **Sampling methods and termite identification**

This survey of the termites of St. John was conducted from 18 to 23 December 1999 and in accordance with a National Park Service research and collecting permit (number 99-20, issued to C. A. Nalepa). At each site, standing or fallen dead trees, branches, and any other cellulose debris was examined for evidence of termites. Aboveground termite nests and associated shelter tubes also were sampled. The host plant was identified whenever possible (Little & Wadsworth 1964, Little *et al.* 1974). A representative sample of termites was removed from the wood or nest using a hatchet, wood chisel, saw, and/or forceps. Each

sample was placed in a separate vial containing 85% ethanol.

Termites were returned to the laboratory, where they were identified to species based on characteristics of the soldier and alate caste. Determinations were made using the senior author's reference collection from the Puerto Rico mainland and Mona Island (Jones 1991, Jones *et al.* 1995) in conjunction with various species descriptions/revisions and taxonomic keys (Banks 1919, Mill 1983, Snyder 1956). Specimens have been deposited in the senior author's collection at The Ohio State University and in the Entomology Department collection at North Carolina State University. A representative sample of each species has been sent to the Virgin Islands National Park for display at the St. John visitor's center.

## RESULTS

A total of 84 termite collections from St. John yielded *Incisitermes* nr. *incisus* (Silvestri), *Procryptotermes* nr. *corniceps*, and *Neotermes mona* (Kalotermitidae); one or more undetermined species of *Heterotermes* (Rhinotermitidae); and *Parvitermes wolcottii* (Snyder) and *Nasutitermes acajutlae* (Termitidae). Based on this survey, six termite species in three families now are known from St. John.

The distribution of these species at the various survey locations on the island is depicted in Fig. 1. The most commonly noted termites included a drywood termite, *I.* nr. *incisus*; the subterranean termite genus *Heterotermes*; and an arboreal nesting nasutiform termite, *N. acajutlae*. These three species appear to be more cosmopolitan, being found in both the moist forest and dry forest areas. Species that were less commonly found included a large dampwood termite, *N. mona*, and a tiny nasutiform species, *P. wolcottii*, which is associated with soil habitats. The latter two species each were collected from a single location. Relative abundance of these species could reflect the sampling methodology and limited number of collection sites on St. John.

Nests or foraging groups of *N. acajutlae* were collected from seagrape [*Coccoloba uvifera* (L.) L.], tamarind (*Tamarindus indica* L.), silk-cotton-tree [*Ceiba pentandra* (L.) Gaertn.], pigeon-berry (*Bourreria succulenta* Jacq.), leadtree [*Leucaena leucocephala* (Lam.) de Wit.], West Indian locust (*Hymenaea courbaril* L.), water mampoo (*Pisonia subcordata* Sw.), and other unidentified trees. Colonies of the drywood termites *I.* nr. *incisus* and *P.* nr. *corniceps* were confined within dead branches of *L. leucocephala* and other dead wood that was unidentifiable to species. *Procryptotermes* nr. *corniceps* also was collected from *T. indica*. Foraging groups of *Heterotermes* were found within dead organ-pipe cactus (*Cephalocereus* sp.), beach or seaside maho [*Thespesia populnea* (L.)

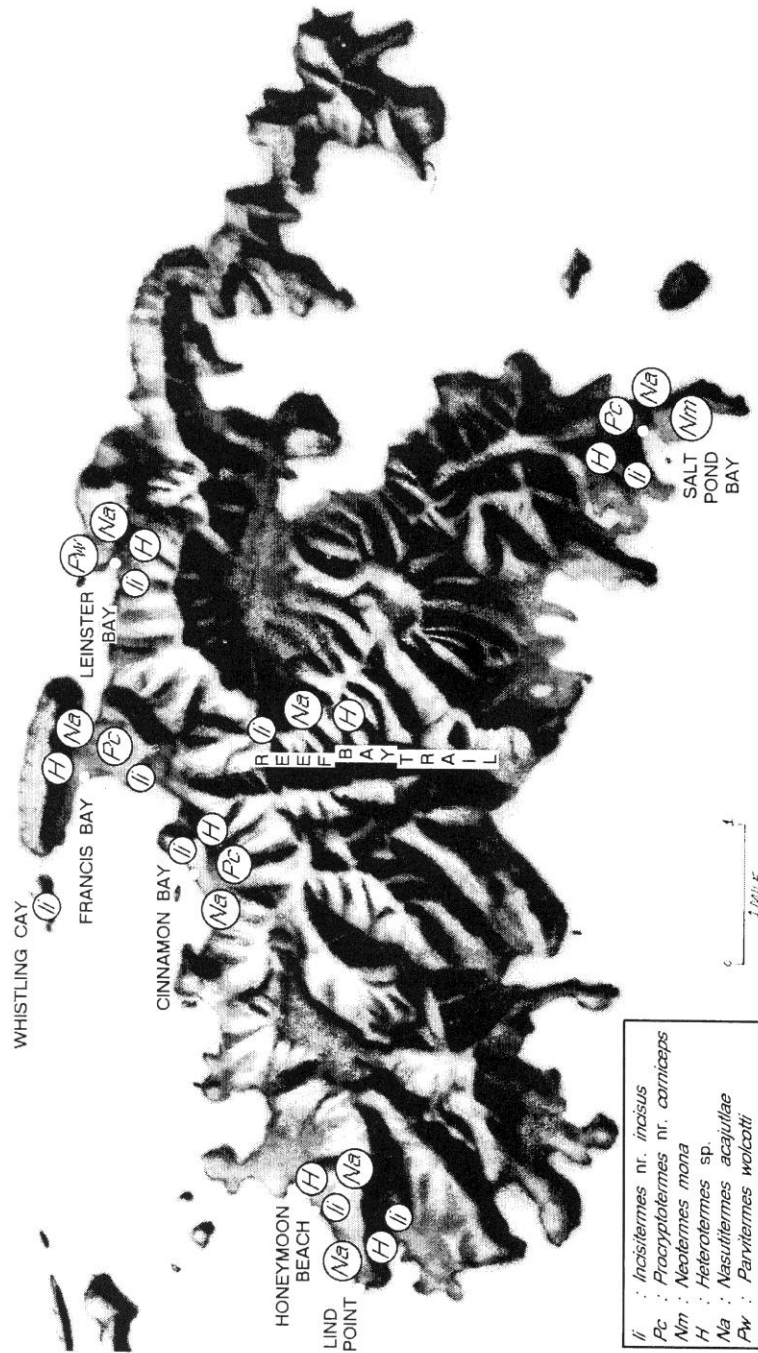


Fig. 1. Distribution of termites (*Incisitermes* nr. *incisus*, *Procryptotermes* nr. *corniceps*, *Neotermites mona*, *Heterotermes* sp., *Nasutitermes acajulalae*, and *Parvitermes wolcottii*) at eight collection sites on St. John, U.S. Virgin Islands.

Soland], *Acacia* sp., the dead flower stalk of an agave, and other dead wood that could not be identified.

#### DISCUSSION

Termite nesting habits obviously have influenced previous records from St. John. It is much easier to detect termites that construct aboveground nests (*N. acajutlae*) than species that nest or forage below ground (*Heterotermes* sp. and *P. wolcottii*) or those whose colonies are confined entirely within dead wood (*I. nr. incisus*, *P. nr. corniceps*, and *N. mona*). For many years, *N. acajutlae* was the only termite species reported from the island. In the most recent inventory of termites of the West Indies (Scheffrahn *et al.* 1994), *N. acajutlae* is the only species listed for St. John.

*Nasutitermes acajutlae* is quite easy to locate because of its large, dark nests with earthen shelter tubes that radiate outward to food sources. The nest exterior of *N. acajutlae* has frequent and exaggerated bumps that distinguish it from sympatric congenics (Thorne *et al.* 1994). During our survey of St. John, dark, coarsely-textured, ellipsoid nests of *N. acajutlae* were observed in trees at various heights from the ground, ranging from approximately 3 m in seagrape (*C. uvifera*) to 15 m in silk-cotton-tree (*C. pentandra*). *Nasutitermes acajutlae* was found at all seven sites that we sampled on the St. John mainland (Fig. 1).

The nesting habits of *N. acajutlae* also facilitate determinations of host plant associations. When this nasutiform termite initially was reported from St. John, it was found associated with 51 different tree species (Martorell and Garcia-Tuduri 1971). Because these species are not listed, we cannot ascertain overlap with the trees specified herein. However, on St. Thomas and many other islands, *N. acajutlae* occurs on *C. uvifera* (Martorell and Garcia-Tuduri 1971). Furthermore, Wolcott (1936) mentions that *N. acajutlae* was recorded from *H. courbaril* (algarrobo=West Indian locust) at low elevations of Puerto Rico.

The current survey did not reveal other termites in the genus *Nasutitermes*, particularly *N. costalis*, which is a sympatric congeneric that also constructs arboreal carton nests. *Nasutitermes costalis* occurs at the higher elevations of St. Thomas (Martorell and Garcia-Tuduri 1971) and on many other islands in the West Indies (Adamson 1948a, reviewed by Scheffrahn *et al.* 1994). Martorell and Garcia-Tuduri (1971) also did not locate any other *Nasutitermes* species on St. John, despite searching "both highest and most humid areas" of the island.

Another prevalent termite on St. John was a rhinotermitid, *Heterotermes* sp. (new record), which was collected at all the mainland sites (Fig. 1). Adamson (1948a) considered *Heterotermes tenuis* (Hagen)

to be an abundant, but inconspicuous termite of the Lesser Antilles that typically was overlooked during island surveys. It causes damage of considerable economic importance in the region (Adamson 1948b). Presumably, *H. tenuis* and *Heterotermes convexinotatus* (Snyder) occur in the Lesser Antilles (Snyder 1924, 1956) and elsewhere in the Neotropics (Araujo 1970). However, we have not made species designations since this is a highly variable species (Snyder 1924a) and the taxonomy of this genus in the Caribbean region is disputed (Adamson 1948a).

*Incisitermes incisus* is a common species that is reported from many islands in the Caribbean (reviewed by Snyder 1956, Scheffrahn *et al.* 1994). However, species determinations for *Incisitermes* often are difficult to ascertain given the limitations of existing taxonomic keys (i.e., Snyder 1956) as well as poor or absent type specimens. We collected *I. nr. incisus* (new record) at all sites on the St. John mainland as well as an islet off the north shore (Whistling Cay) (Fig. 1). As is typical of other collections of this species, our samples included long- and short-headed soldier morphs. *Incisitermes nr. incisus* was the most prevalent of the three kalotermitid species collected from St. John. Host associations on St. John often could not be determined because colonies of this drywood termite typically are confined within dead wood. It has been noted to occur in various tree species on Mona Island (Martorell 1941 [as *Kalotermes snyderi*], Jones 1991 [as *Incisitermes nr. snyderi*], Jones *et al.* 1995).

On St. John, *Pr. nr. corniceps* was collected in the dry forest regions near Cinnamon Bay, Francis Bay, and Saltpond Bay (Fig. 1). Given the variability of the soldier caste in the central Antilles, it is difficult to assign a species determination with confidence (Jones, pers. obs.). *Procryptotermes corniceps* apparently is a polyphagous species that is well adapted to xeric conditions (Jones 1991; Jones *et al.* 1995). It has been noted as a frequent inhabitant of dead wood in subtropical dry forests of Puerto Rico, including Mona Island (Jones *et al.* 1995) and Guanica Forest (Genet *et al.* 2000). *Procryptotermes corniceps* is the most common kalotermitid in natural vegetation on the islands of Providenciales and Grand Turk in the British West Indies (Scheffrahn *et al.* 1990).

*Neotermes mona* is characterized as a coastal inhabitant that "colonizes substantial woody growth of dry littoral forests, including arboreal cacti and mangroves" (Kreëk *et al.* 2000). Colonies that have been collected from dead branches of living trees often have excavations that extend into the xylem (Jones *et al.* 1995). During our survey, *N. mona* was collected from standing dead wood, only in the vicinity of Saltpond



Bay (Fig. 1). This site roughly corresponds with the only other recorded collection of this large dampwood termite from St. John (*Kreëek et al.* 2000). A much more detailed survey would be needed to discern the distribution of this species on St. John. We did not recover this or other termites from a stand of dead mangrove trees in the vicinity of Francis Bay. Nonetheless, *N. mona* appears to be a relatively uncommon species on this island. According to *Kreëek et al.* (2000), nocturnal dispersal flights have been observed in the Dominican Republic and Guana Island during October and December. On St. John, numerous fully-pigmented alates were among those collected from the colony in mid-December 1999. An extended flight period is characteristic of many kalotermitids (*Jones et al.* 1988).

Our only collection of *P. wolcottii* (new record) was made along the Leinster Bay Trail in the north-central region of St. John (Fig. 1). We may have overlooked this species in other areas. Based on the concave molar areas of workers, *Roisin et al.* (1996) suggest that it feeds on decayed wood or herbaceous material. The original descriptions of *P. wolcottii* (*Snyder 1924b*) recently were revised (*Scheffrahn and Roisin 1995*) and now also include rare major soldiers.

In conclusion, this survey of the island of St. John revealed the presence of six species in three families, including three new records, *Incisitermes* nr. *incisus* (Kalotermitidae); one or more undetermined species of *Heterotermes* (Rhinotermitidae); and *Parvitermes wolcottii* (Termitidae). Termite nesting habits obviously have influenced previous records from St. John. It is much easier to detect termites that construct aboveground nests (*N. acajutlae*) than species that are associated with soil habitats or whose colonies are confined entirely within dead wood. The three most common species (*I.* nr. *incisus*, *Heterotermes* sp., and *N. acajutlae*) were found in both the moist forest and dry forest areas of St. John.

#### ACKNOWLEDGMENTS

We thank Patrick Rand for assisting with field work and Dan Digman for preparing the illustration. We acknowledge Rafe Boulon, Don Near, and others associated with the Virgin Islands National Park for assistance with the collecting permit and tree identification. We thank Brian Forschler, Gregg Henderson, David Shetlar, and Andrew Nuss for reviewing the manuscript. This project was supported in part by State and Federal funds appropriated to the Ohio Agricultural Research and Development Center.

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