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NASUTITERMES COSTALIS (ISOPTERA: TERMITIDAE) IN FLORIDA: FIRST RECORD OF A NON-ENDEMIC ESTABLISHMENT BY A HIGHER TERMITE

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Nasutitermes Dudley is a tropicopolitan genus of higher termites (Termitidae) of which many species are arboreal and nest on or above soil level. Until now, no termitid has ever been recorded established outside of its endemic range. We herein report the first such discovery: populations of *Nasutitermes costalis* (Holmgren) in Florida.

On 10 May 2001, a pest control inspector contacted R. H. S. to report an unusual termite infestation in a house in Dania Beach, Broward County, Florida. Specimens collected 11 May from foraging tubes on walls and from nest carton in the attic contained soldiers (Fig. 1A) and workers of *N. costalis.* Further inspection of adjoining properties revealed additional infestations of *N. costalis.* Evidence included numerous epigeal nests ca. 15-50 cm diam. at the bases of live and dead trees (Fig. 1B), nests in tree cavities above ground, foraging tubes on the ground, on a mobile home, and on dozens of trees and palms up to ca. 10 m high (Fig. 1C), and foragers and/or carton in wood on ground. Several pieces of structural lumber were attacked and damaged. An inspection on 18 July 2001, revealed an infestation in a house 50 m west of the original house. A storage yard 0.5 km to the southeast was found to harbor mature nests as well. The known area encompassed by *N. costalis* activity, roughly triangular in shape, is ca. 0.15 km^2 with boundary coordinates of 26.0693°N 80.1691°W (northern boundary), 26.0642°N 80.1714°W (southwest), and 26.0631°N 80.1666°W (southeast). Adjoining properties have not all been surveyed at the time of this writing. The area is zoned for mixed-use with ocean-access water frontage. It consists of commercial, residential, marina, and vacant wooded properties.

On 15 May, sixteen 10 × 16-cm sticky traps (Victor® mouse traps by Woodstream, Lititz, PA), were hung 2 m high from trees and beneath two security lights within ca. 0.5 ha of the infested zone. Traps were examined for termite alates every 1-2 days. On 23 May, the first substantial rains of the wet season drenched the site. The subsequent trap inspection on 25 May yielded *N. costalis* alates on two traps. On 29 May, additional alates were detected on three traps. The dark brown bodies and blackish wings distinguish *N. costalis* alates from those of all other termites in southeastern Florida. In the Dominican Republic, *N. costalis* flights have been observed in the evening and into the night (R. H. S. 12 June 1992, Santo Domingo, unpubl. obs.). Flights in Florida confirm that these populations are mature and have probably resulted in incipient colony establishment outside the known foraging areas. As of 9 August 2001, no additional flights have been recorded.

Nasutitermes costalis is part of a complex of arboreal New World *Nasutitermes* that includes, among others, *N. ephratae* (Holmgren) and *N. corniger* (Motschulsky). Soldiers of all these species are characterized by their dark-brown to blackish head coloration, a conical nasus from which a defensive secretion is emitted, and six erect setae projecting from the vertex. Edwards and Mill (1986) list 12 *Nasutitermes* species worldwide that are known to damage buildings including *N. costalis.* R. H. S. has observed structural infestations of *N. acajutlae* (Holmgren), *N. costalis*, *N. nigriceps* (Haldeman), and *N. rippertii* (Rambur) in the West Indies. *Nasutitermes costalis* has a wide distribution in the West Indies including the islands of Antigua, Barbados, Cuba, Dominica, East Caicos, Grenada, Guadeloupe, Guana, Hispaniola, Isla de la Juventud (Cuba), Jamaica, Little Tobago, Martinique, Middle Caicos, Montserrat, Nevis, North Caicos, Providenciales, Puerto Rico, Saba, South Caicos, St. Barthelemy, St. Croix, St. Eustatius, St. Kitts, St. Lucia, St. Martin, St. Vincent, Tobago, Tortola, Trinidad, West Caicos, Union (St. Vincent), and Vieques (Scheffrahn et al. 1994, R. H. S., unpubl. records). Martorell (1971) reports *N. costalis* from Isla Piñeros (Puerto Rico) and St. Thomas, and Emerson (1925) and Issa (2000) list mainland localities of *N. costalis* in Guyana and Venezuela, respectively. Although attempted (R. H. S., unpubl. records), *N. costalis* has not been collected from Anguilla, any island of the Bahamas, Barbuda, Culebra, Grand Turk, or St. John.

No specific source for the Florida *N. costalis* introduction can be identified. Given the proximity to leisure and commercial marine traffic in the infested area, we suspect that the likely method of introduction was a result of dockside flights from an infested boat or shipping container—probably 8-10 years before discovery. Infested plant material has also been blamed as a source of exotic interceptions of *Nasutitermes* (Gay 1967), but given the situation in Florida, this seems a less plausible source.

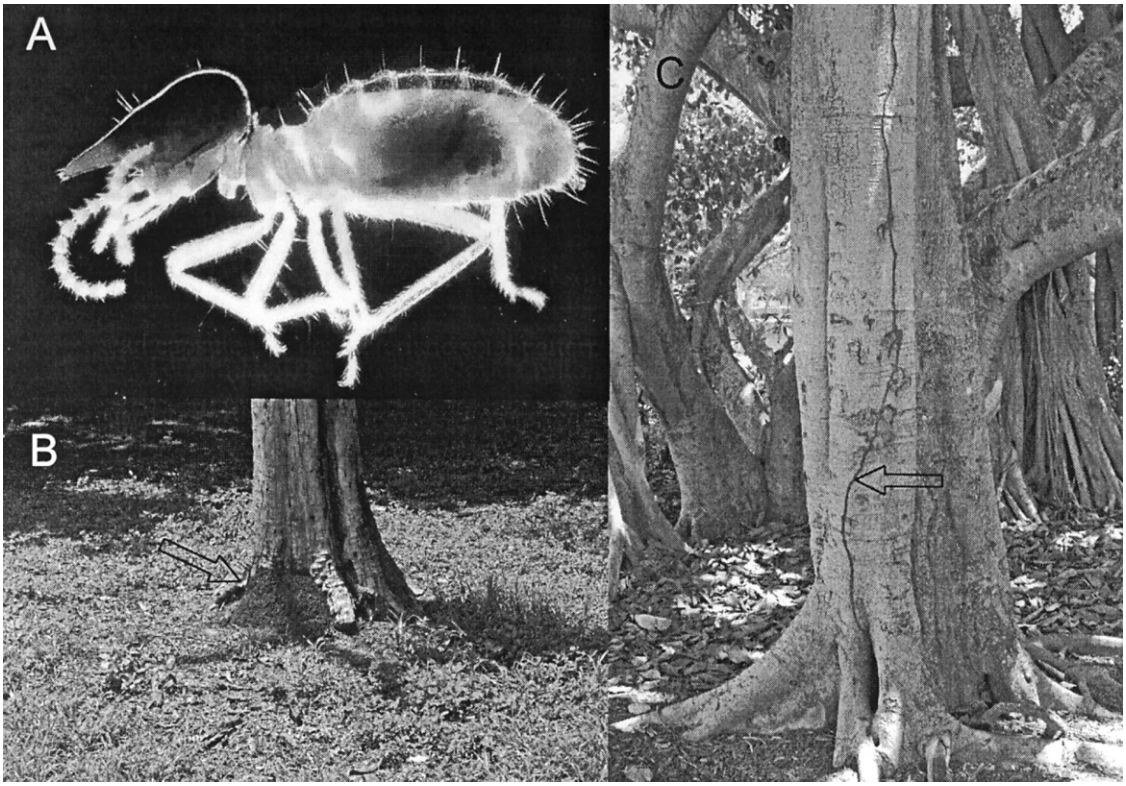

Fig. 1. A. Lateral view of *N. costalis* soldier showing nasutiform elongation of the head capsule and characteristic setal pattern on head vertex. B. Epigeal nest (arrow) at base of dead *Grevillea* tree. C. Foraging tube on *Ficus* tree.

Although accidental exotic introductions of species in the Kalotermitidae and Rhinotermitidae are becoming more common worldwide, establishment of a non-endemic termitid appears to be unprecedented. Based on a report by Kelsey (1944), Gay (1967) listed only one establishment of a termitid species, *N. walkeri* (Hill) from Australia to New Zealand. After surveys and record reviews in New Zealand, Bain and Jenkin (1983) reclassified the *N. walkeri* case as an interception and to this day have no evidence for its establishment (J. Bain, pers. comm.). Increased human commerce may be enhancing the chances of further termitid establishments—especially with non soil-bound taxa like *Nasutitermes*. In July 1996, a wooden 17-m sailboat docked in Ft. Lauderdale, Florida, and previously docked in Cancún, Mexico, had an on-board infestation of *N. nigriceps* (Scheffrahn et al. 1996). The boat was fumigated and no land infestation was ever discovered. In September 2000, *N. costalis* was found established in East Kilbride, Scotland, in a pool area of an indoor fitness center decorated with plant material from the West Indies (R. H. S., unpubl.). The cold climate of East Kilbride (56°N latitude) would prevent outdoor establishment of *N. costalis* there.

The discovery of *N. costalis* in Florida follows three recent pestiferous rhinotermitid establishments in the State including *Heterotermes* sp. in Miami (Scheffrahn et al. 1995), *Coptotermes havilandi* Holmgren in Miami (Su et al. 1997) and *C. havilandi* in Key West (Scheffrahn 2001). These were preceded by much earlier introductions of non-endemic and now widespread species including the kalotermitids *Cryptotermes brevis* (Walker) and *Incisitermes minor* (Hagen), and the rhinotermitid *Coptotermes formosanus* Shiraki (Scheffrahn et al. 1988). The discovery of *N. costalis* now brings the total count of Florida termite species to twenty (Scheffrahn and Su 1994, Scheffrahn et al. 2000). There exists no doubt that the State's other termitid, *Amitermes floridensis* (Scheffrahn et al. 1989), is an endemic species.

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SUMMARY

Populations of *Nasutitermes costalis* were discovered in Dania Beach, Florida, in May 2001 and represent the first known establishment of a termitid species outside of its endemic range. The infested area encompasses ca. 0.15 km^2 including three infested structures, numerous ground nests, arboreal nests, and foraging sites. Colonies are mature as indicated by alate dispersal flights in May 2001. A ship-borne infestation, initiated in the West Indies by endemic populations and transported to dockage in Florida, is a likely source. Twenty species of termites are now recorded from Florida.

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