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Rhinotermitidae) from the southeastern United States

Su Yee Lim and Brian T. Forschler
Household and Structural Entomology Laboratory
Department of Entomology, University of Georgia
413 Biosciences Building, 120 Cedar Street
Athens, GA 30602-2603, USA

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A new species of *Reticulitermes* Holmgren, 1913 (Isoptera: Rhinotermitidae) from the southeastern United States

Su Yee Lim and Brian T. Forschler

Household and Structural Entomology Laboratory
Department of Entomology, University of Georgia
413 Biosciences Building, 120 Cedar Street
Athens, GA 30602-2603, USA
suyeeelim@uga.edu, bfor@uga.edu

Abstract. *Reticulitermes nelsonae*, a **new species** of subterranean termite (Isoptera, Rhinotermitidae) is described from Sapelo Island, Georgia, United States of America, with specimens also found in North Carolina and Florida. The adult and soldier castes are described and illustrated to distinguish *R. nelsonae* from the four described *Reticulitermes* spp. known to occur in the southeastern United States.

Introduction

Lim and Forschler (2012) recognized and described *Reticulitermes nelsonae* (Isoptera: Rhinotermitidae). This article meets the current requirements of the ICZN for valid publication (ICZN 1999), formally establishes the name *Reticulitermes nelsonae* Lim and Forschler, and will be the citation for its description. Lim and Forschler (2012) provide the background, methodology, and full data supporting this research.

Materials and Methods

Using morphology, mitochondrial DNA sequence, cuticular hydrocarbon and behavioral data (alate flight times), Lim and Forschler (2012) compare *R. nelsonae* with the four other species of *Reticulitermes* Holmgren, 1913 that occur in the southeastern US: *Reticulitermes flavipes* (Kollar) 1837; *Reticulitermes hageni* Banks and Snyder 1920; *Reticulitermes malletei* Howard and Clement 1985 (in Clement et al. 1985), and *Reticulitermes virginicus* (Banks) 1907. Consult Lim and Forschler (2012) for additional details on methodologies and conclusions.

Specimens of *R. nelsonae* are deposited in the following institutions: **AMNH** - American Museum of Natural History, New York, NY; **NMNH** - National Museum of Natural History, Smithsonian Institution, Washington DC; **UGCA** - University of Georgia Collection of Arthropods, Athens, GA.

Reticulitermes nelsonae Lim and Forschler, new species

(Figures 1a-d)

Diagnosis. Soldier: Head capsule small (mean soldier head capsule length 1.407 mm, mean soldier head capsule width 0.054 mm, mean ratio of soldier head capsule length to width 1.793). *Reticulitermes nelsonae* head capsule length is at least 0.2 mm shorter than *R. flavipes* and *R. virginicus*. *Reticulitermes nelsonae* head capsule width is at least 0.1 mm smaller than *R. flavipes* and *R. virginicus*. The *R. nelsonae* head capsule width and length is more than 0.1 mm smaller than *R. malletei*. The *R. nelsonae* right mandible angle of curvature from the external curvature inflection point to the tip of the mandible is typically greater than 25° (mean 27.27°), while the same angle of curvature in *R. hageni* is smaller than 25° (mean 23.39°). **Alate:** Body length, without and with wing, small (mean alate body length without wing 3.93 mm, mean alate body length with wing 7.080 mm), body color pale brown and wings not pigmented. *Reticulitermes nelsonae* body length without and with wings is typically 3.7 mm - 4.2 mm and 6.8 mm - 7.4 mm, respectively, whereas those same characters are greater than 4.4 mm and 8.6 mm, respectively, in *R. flavipes*. In addition, *R. nelsonae* fore- and hind wing lengths are 1.0 mm shorter than *R. flavipes*. *Reticulitermes nelsonae* forewing length is 0.4 mm shorter than *R. malletei*. *Reticulitermes nelsonae* wings are not pigmented, while *R. malletei* has pigmented wings. *Reticulitermes nelsonae* alate body

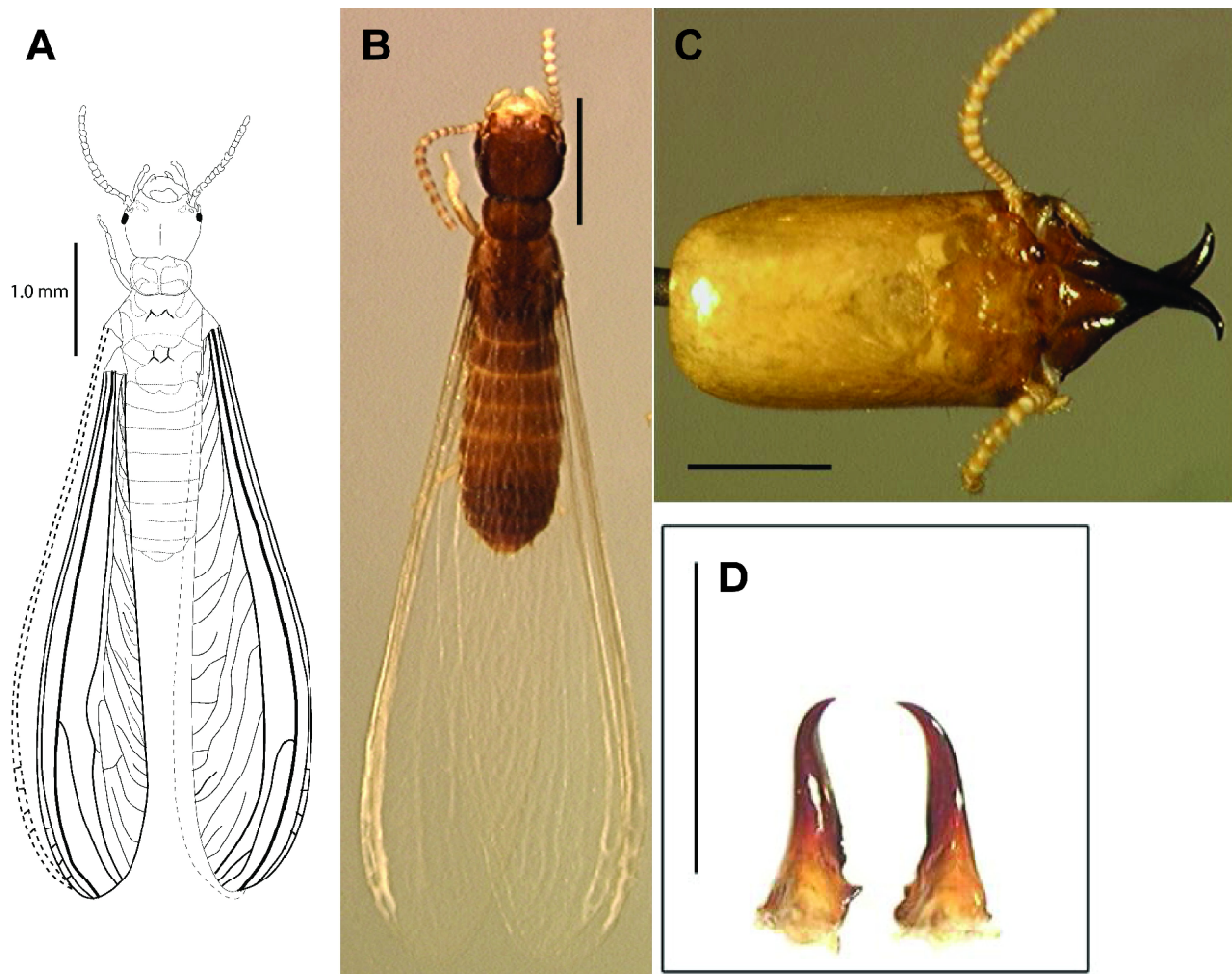


Figure 1. *Reticulitermes nelsonae*. **A)** Habitus drawing of *R. nelsonae* alate, showing fore- and hind wing along with wing venation. Scale bar is 1.0 mm. **B)** Photograph Alate, dorsal, scale bar = 1.0 mm. **C)** Soldier head capsule, dorsal, scale bar = 0.5 mm. **D)** Soldier mandible pair, dorsal, scale bar = 1.0 mm.

color is light brown while *R. virginicus* is dark brown and *R. hageni* is yellowish-brown. The ratio of mean body length including wings to mean forewing length is typically 1.27 - 1.31 for *R. nelsonae* and 1.32 - 1.37 for *R. virginicus*.

Description. Male and female soldiers or alates can be differentiated by the shape of the 8th sternal plate (Zimet and Stuart 1982). **Soldier:** Head capsule rectangular, longer than wide. Majority of head capsule is yellowish with dark brown to black mandibles. Body, thorax and abdomen are pale yellow to white. Mean head capsule length $1.41 \text{ mm} \pm 0.13$, mean head capsule width $0.78 \text{ mm} \pm 0.05$, mean head capsule ratio length-to-width 1.793 ± 0.09 . Mean of soldier right mandible angle of curvature = $10.7^\circ \pm 2.21$ from the dorsal condyle to the tip of the mandible. Mean of soldier right mandible angle of curvature measured from external curvature inflection point to the tip of the mandible = $27.27^\circ \pm 2.65$ (Lim and Forschler 2012). **Alate:** Body pale brown. Antenna has 14 segments. Wings not pigmented. Legs light to dark brown. Mean body length without wing $3.93 \text{ mm} \pm 0.24$. Mean body length with wings $7.08 \text{ mm} \pm 0.29$. Mean forewing length $5.43 \text{ mm} \pm 0.21$. Mean hind wing length $5.32 \text{ mm} \pm 0.30$.

Genetics. Sequence data from both the cytochrome oxidase I and cytochrome oxidase II genes, when examined using maximum likelihood and parsimony analysis, showed *R. nelsonae* was genetically unique given that 16 haplotypes consistently formed a unique and separate clade from the haplotypes reported for other *Reticulitermes* species found across the reported range for the genus (Lim and Forschler 2012).

Cuticular Hydrocarbon. Based on previous cuticular hydrocarbon analysis by Haverty et al. (1996) and Haverty et al. (1999), two unique cuticular hydrocarbon phenotypes, GA-L and GA-I are believed to belong to *R. nelsonae*. This was corroborated by Jenkins et al. (2000) who found that two mitochondrial cytochrome oxidase II gene haplotypes BH 25 and HH 11 (GenBank Accession Nos: JF796235, JF796236), associated with GA-L and GA-I, were recovered in the *R. nelsonae* clade in phylogenetic analyses from Lim and Forschler (2012).

Behavior. *Reticulitermes nelsonae* alates have been collected in Georgia from February to May. *Reticulitermes hageni* swarms from August to October in Georgia. Georgia flight records for *R. flavipes* are from November through April, while *R. virginicus* and *R. mallei* have been recorded in April and May (Banks and Snyder 1920, Weesner 1965, Krishna and Weesner 1970, Clement et al. 1986, Austin et al. 2007, Lim and Forschler 2012).

Etymology. This patronym was established to honor Lori J. Nelson (USDA Forest Service, Buchanan, CA, USA) who realized in 1996 that specimens collected on Sapelo Island, Georgia, were distinct and different from all described *Reticulitermes* species based on cuticular hydrocarbon analysis (Haverty et al. 1996, Haverty et al. 1999).

Distribution. *Reticulitermes nelsonae* is found in the southeastern United States, and has been extensively collected in the Atlantic Coastal Flatwoods and South Coastal Plain soil provinces in Georgia. In addition to the type locality on Sapelo Island, Georgia, this species has been collected in Croatan National Forest in Havelock, North Carolina, and Branford, Florida (Lim and Forschler, 2012).

Type material. **Holotype** (alate, female) and **allotype** (alate, male): "USA: Georgia, McIntosh Co., Sapelo Island, 31°23'43.32"N 81°16'38.23"W, 6.II .2007, D. Sillam-Dussès" (AMNH). **Paratypes:** same data as holotype; alates (1 male, 1 female, UGCA; 1 male, 1 female, NMNH), soldiers (1 male, 1 female, AMNH; 1 male, 1 female, UGCA; 1 male, 1 female, NMNH), and workers (1 male, 1 female, AMNH; 1 male, 1 female, UGCA; 1 male, 1 female, NMNH).

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