

EXTREME MANDIBLE ALTERATION AND CEPHALIC
PHRAGMOSIS IN A DRYWOOD TERMITE SOLDIER
(ISOPTERA: KALOTERMITIDAE: *CRYPTOTERMES*) FROM
JAMAICA

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Soldier mandibles are the dominant weapons of most termite species and are the major defense against ants and other predators (Deligne et al. 1982). Mandibles have been classified by their mechanical functions which include biting, crushing, slashing, piercing, and snapping (Prestwich 1984). Termite species in only two subfamilies have soldiers which lack mandibles used in defense. Soldiers in the Nasutitermitinae (Termitidae) have evolved frontal projections from which defensive chemicals are ejected, and soldiers of most genera possess only vestigial mandibles (Emerson 1960). Minor soldiers of the Rhinotermitinae (Rhinotermitidae), also with highly reduced mandibles, employ a labral brush to dab defensive chemicals during agonistic encounters (Quennedey & Deligne 1975).

Species in more primitive families including the Kalotermitidae, Hodotermitidae, Serritermitidae, and Termopsidae have not been shown to be chemically defended (Prestwich 1984), with the exception of the monotypic Mastotermitidae, in which soldiers secrete a quinone-laden buccal fluid (Moore 1968). All species in these families and most subfamilies of the Termitidae and Rhinotermitidae possess soldiers having mandibles which project forward beyond the frontal plane of the head capsule. Such mandibles are used to crush or slice small predators or bite larger ones. In addition to mandibular defense, some genera of drywood termites (Kalotermitidae) including *Bicornitermes* Krishna, *Calcaritermes* Snyder, *Ceratokalotermes* Krishna, *Cryptotermes* Banks, *Eucryptotermes* Holmgren, *Glyptotermes* Froggatt, *Kalotermes* Hagen, and *Tauritermes* Krishna, possess phragmotic distensions of the head capsule. Head phragmosis, thought to mechanically block predators from gaining gallery access, is considered an advanced condition in the phylogeny of the Kalotermitidae (Krishna 1961). Of these genera, *Eucryptotermes*, *Glyptotermes*, *Calcaritermes*, *Bifiditermes*, and *Cryptotermes* each have at least one species with some degree of reduction in mandible size and dentition, however, their mandibles remain a prominent and distinctive morphological feature evolved for frontal defense.

During an ongoing termite survey of the West Indies, a new *Cryptotermes* species was collected in Jamaica in 1997. The soldier of this remarkable species is unique among all taxa with mandibulate soldiers, including all Kalotermitidae, in having ex-

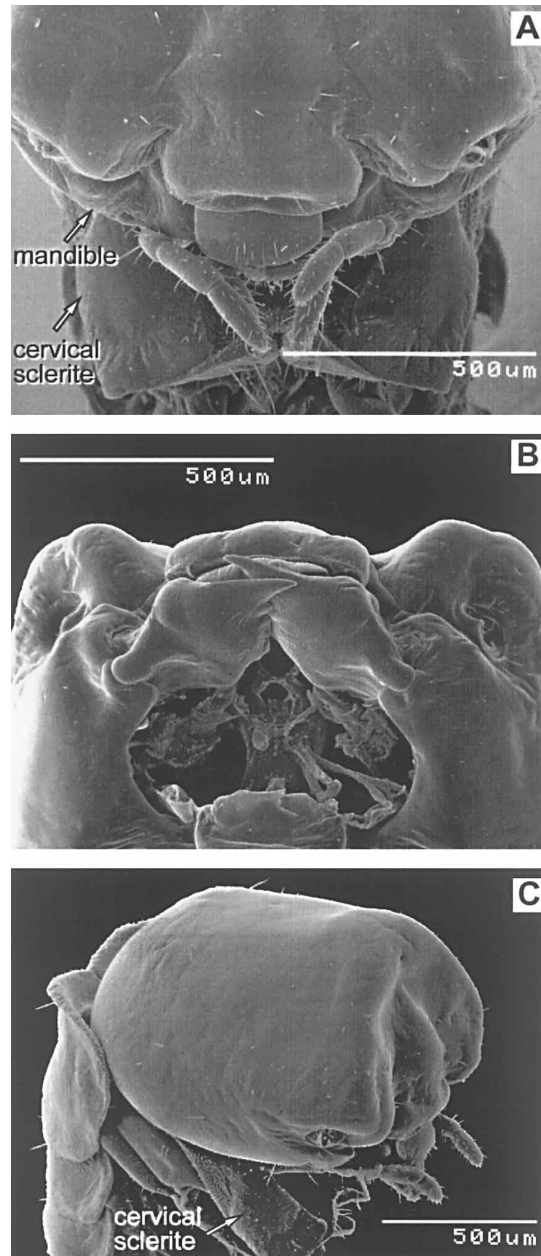


FIG. 1. Scanning electron micrographs showing anterior (A), anteroventral (B), and oblique views (C) of soldier head capsule of *Cryptotermes* n.sp. from Jamaica. Antennae removed for clarity. Specimen in B with labium removed and labrum retracted to show recessed position of mandibles.

tremely altered mandibles which do not project beyond the frontogenal boundaries of the head capsule (Figs. 1A-C). The distal points of the mandibles are situated in a space formed by the labrum and labium and only the outer bases are visible in the contracted position (Fig. 1A). The recessed articulation, abbreviated length, and angulation of these mandibles preclude extension and leverage necessary for frontal defense (Fig. 1B). The cylindrical head capsule of this new *Cryptotermes* forms a pronounced phragmotic armature which, more than any other termite soldier, resembles a bottle stopper (Fig. 1C). Such a shape is well suited as a closure for termite galleries. We hypothesize that this species evolved a solely phragmotic defense due to selection pressure from some gallery-invading predator, possibly one or more yet unknown wood-dwelling ant species.

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SUMMARY

The soldier caste of a new *Cryptotermes* species from Jamaica, while lacking forward-projecting mandibles, exhibits extreme head capsule phragmosis. We hypothesize that this species relies solely on mechanical defense by phragmosis, a unique trait among termite soldiers, and that these features constitute an analogy to the derived loss of functional mandibles in higher taxa that have evolved chemical defenses.

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