

# NATURAL HISTORY OF TERMITES OF JAMAICA

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## INTRODUCTION

**T**ermites are distributed mainly in the tropics with species inhabiting forests and structures associated with human habitation. This chronic association has inspired numerous studies of the biology and control of termites. Intensive studies of Jamaica's termites commenced at the University of the West Indies in 1986.

The termites (order Isoptera) consist of five families: Mastotermitidae, Hodotermitidae, Rhinotermitidae, Kalotermitidae and Termitidae. The first four families are collectively termed lower termites, while species of the family Termitidae are referred to as higher or advanced termites.

## THE TERMITES OF JAMAICA

Termites are commonly referred to as white ants and in Jamaica they are also colloquially called duck ants or chi-chi. This erroneous classification of termites as ants arises from their superficial resemblance. Two simple diagnostic features that may be used to distinguish termites are 1) their soft and generally white bodies and 2) the absence of a "waist" (constriction between the thorax and abdomen). There are seventeen species of termites in Jamaica (see Box). In contrast to many other animal groups, none of these species are endemic to the island but also occur in other regions. Jamaica's termites represent three of the five families.

*Kalotermitidae* are collectively called dry-wood termites. As the name implies, they inhabit wood which provides both shelter and food. These species of termites are well-known to man because they voraciously consume domestic and commercial items containing cellulose (eg. furniture and wooden frames of buildings). *Cryptotermes brevis* is the most common pest of building timber. The ingested wood particles are digested by flagellated protozoa (specific to lower termites and their ancestors). The excrement or frass is released as small, dry

pellets, which filters through the holes of the wood. These pellets are used as indicators of the presence of drywood termites.

**Rhinotermitidae** consist of the popular subterranean and damp-wood termites. Subterranean termites build nests below the surface of the ground from which they radiate in search of food. They are rarely seen, but their presence can be confirmed by their trails that provide an indispensable link with the moist underground. The often complicated nests have many different parts and house large populations. The parent nest is the original nest containing the reproductives. The subsidiary nests constructed after the completion of the parent nest are usually designated for various functions such as brood chambers and food reserves. Multi-regional nests, with specialized sections, offer many escape routes and enhance the resilience of subterranean termites to insecticides. However, interaction between nests facilitates the spread of introduced toxic substances.

**Termitidae** include the arboreal termites which also construct large, complex multi-regional nests with intricately designed walls. Nests are not restricted to trees but are built on walls and roofs of buildings. These nests grow to very large

sizes to accommodate the continuously increasing colony. The most common species is *Nasutitermes nigriceps*, which is found in diverse habitats of Jamaica. The behaviour and social system of the family Termitidae are more complex and highly organized than in the lower termites; consequently, they are capable of more efficient foraging, defense of nests and regulation of colony size.

## SOCIAL AND CASTE SYSTEM

All termites exhibit the highest form of sociality known in animals; the system (termed eusociality) is characterized by the presence of a non-reproductive caste ("workers", "soldiers" and other specialists), overlapping adult generations and cooperative brood care. The non-reproductive individuals develop from fertilized eggs; this is different from the social Hymenopterans (bees, ants, social wasps) where the workers develop from unfertilized eggs. The non-reproductive castes forgo reproduction of their own; instead they stay in the parent nest and help their mother and father to rear additional brothers and sisters. This is known as reproductive altruism.

Nine different castes have been identified in termite colonies, but the full complement never occurs simultaneously in a single nest. Immature termites can

be separated into two groups depending upon the presence of wings into apterous (wingless) and brachypterous nymphs; these two forms are also called larvae and nymphs, respectively. The remaining castes are referred to as adults because of their potential for further development and are subdivided into sterile and reproductive individuals. Both groups are morphologically and physiologically adapted for specific functions. Super-specialization of castes enables greater efficiency in the execution of jobs and ultimately enhances the success of colonies.

The sterile castes include the workers and soldiers. The true worker caste, characteristic of advanced termites, does not differentiate into other castes. Workers are the most numerous and frequently observed caste because they are responsible for carrying out the daily activities such as collecting food, cleaning, brood care, and nest construction. A more rigid body wall permits activities outside of nests (but restricted to self-constructed trails). They also possess well developed mandibles for manipulating nest material and food, which is stored in their elongated guts that occupy the space created by the reduced non-functional gonads.

Soldiers are a specialized group of workers and their sole responsibility is to defend the nest. The method of defense varies from species to species. In some termites, the soldiers have strong, well developed mandibles which are used to inflict physical damage to enemies. The structure of these mandibles range from the typical biting forms (eg. *P. corniceps*), to the symmetrical snapping mandibles (eg. *Thispaniole*). In some soldiers, the heads are enlarged (phragmotic) and used to block the entrance of nest entrances (eg. *C. brevis*).

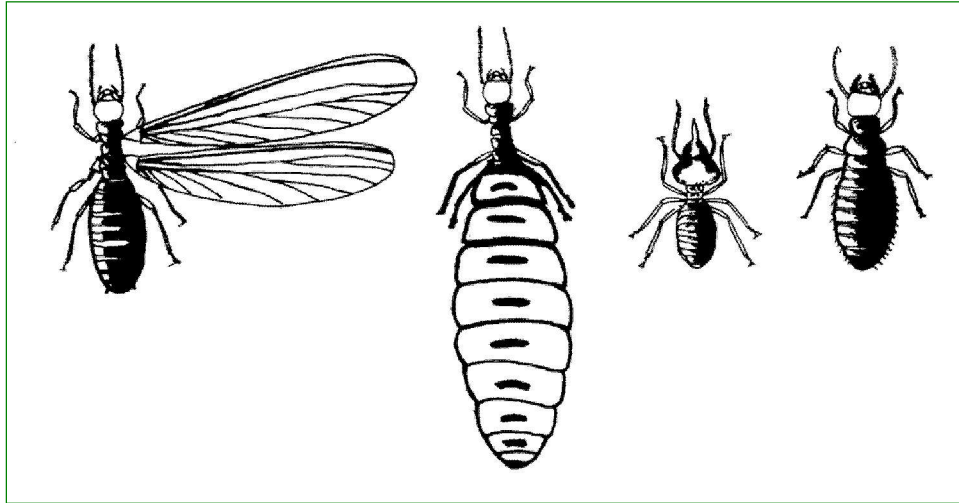
Phragmotic soldiers are usually less numerous and shy away from combat outside of nests. Soldiers of the genus *Nasutitermes* engage in chemical warfare with their opponents. These soldiers possess black, elongated heads "nasus" through which a sticky substance is emitted. Amazingly, nasute soldiers like other sterile castes do not have eyes, but still are capable of precise aim.

The reproductive caste, referred to as kings and queens, are highly prized in colonies and do not participate in daily menial chores. Their only function is for procreation. Founders and replacement reproductives are usually derived from seasonal "alates" which develop from immature apterous individuals. These winged forms are known as rainflies because their time of development and

swarming coincides with the rainy season. Large numbers of alates are released simultaneously from nests and are frequently seen clustering around light bulbs. Reproductives may also originate from sterile castes, which have rudimentary gonads that are activated in the absence of kings and queens. This phenomenon is more prevalent in lower termites.

The number of reproductives per colony varies from species to species, and even within a species. Some colonies are maintained by a single pair of reproductives. Generally, queens exhibit a high fecundity that is directly related to colony size. Queens of advanced termites generate and maintain larger colonies than those of lower termites, therefore they have more ovarioles in greatly swollen abdomens.

Since termite individuals perform specialized jobs, it is important for a nest that there is the right number of specialists for every job to be done. This is achieved by a complicated system of chemical communication between the nest mates. The "messenger" chemicals are distributed in various ways, for instance by exchange of food (mouth to anus, "trophallaxis") and by grooming.



Reproductive, Queen, Soldier and Worker termites

## ECONOMIC IMPORTANCE

The diet of termites is not only restricted to wood but includes a wide variety of plant material such as grass, herbs and roots. Many species consume both living and dead plant tissues and therefore are considered pests of household items, forestry and cultivated crops (e.g. sugar cane). Consequently, each year a large amount of money is spent on the development of efficient methods to control termites.

Man's narrow perception of termites is clearly evident in the word termite being synonymous to pest, but termites are of great ecological importance to the ecosystem of forest communities. They play an important ecological role in the



recycling of nutrients by being primary decomposers of a wide range of cellulose and non-cellulose material. They consume food at varying degrees of decay and so participate at different levels in the decomposition process. Due to their high consumption rate, efficient assimilation, and large population size, termites are important agents of energy transfer in the ecosystem.

Subterranean termites not only improve the fertility of soil by translocating food material but, by their burrowing activity aerate and drain the soil and more importantly facilitate penetration of roots. The role of termites in maintaining soil quality in the tropics is now equated to that of earthworms in temperate regions. The high protein content of termites (especially in queens and eggs) and their large perennial populations make termites a cheap and abundant food source. Some species of ants, birds and other animals depend almost exclusively on termites. Also, many tropical people supplement their diet with termites; it is believed that this food enhances reproductive ability. Oil extracted from termites may be used for cooking and is said to taste like butter. Cooked termites are very palatable to humans who have abandoned their prejudices; the flavour has been described as superior in taste to shrimps.

Uses of termites are not restricted to the insect per se, but may extend to their nests. Some termites construct huge nests which may be used for various purposes. As early as 1877, abandoned *Nasutitermes* nests were used as smudges to repel mosquitoes, and this practice is still very much alive in Jamaica's countryside. More recently, nests have been used to make roads, tennis courts, pottery and bricks.

Within their natural habitats, termites are of paramount importance to the sustainability of the community, whereas in man's surroundings, they are considered pests. One should therefore re-identify the pest: is it man who has invaded the habitats of termites and disturbed the status quo or termites that are making a remarkable endeavour to survive in a changing environment?

*Some primal termite knocked on wood,  
Tasted it and found it good.  
That's why your cousin May  
Fell through the parlor floor today.*  
Ogden Nash

## CHECK LIST OF TERMITES OF JAMAICA

After: Snyder, T.E., 1956. Termites of the West Indies, Bahamas and Bermuda. *Journal of Agriculture of the University of Puerto Rico*. 60: 189-201.

### Family KALOTERMITIDAE

1. *Cryptotermes brevis* (Walker)
2. *Glyptotermes liberatus* (Snyder)
3. *Glyptotermes posticus* (Hagen)
4. *Incisitermes schwarzi* (Banks)
5. *Incisitermes millteri* Emerson
6. *Neotermes castaneus* (Burmeister)
7. *Neotermes n. sp*
8. *Procryptotermes corniceps* Snyder

### Family RHINOTERMITIDAE

9. *Heterotermes convexinotatus* (Snyder)
10. *Heterotermes tenuis* (Hagen)
11. *Coptotermes havilandi* Holmgren
12. *Prorhinotermes simplex* (Hagen)

### Family TERMITIDAE

13. *Nasutitermes nigriceps* (Haldeman)
14. *Nasutitermes costalis* (Holmgren)
15. *Nasutitermes rippertii* (Rambur)

16. *Nasutitermes hubbardi* Banks

17. *Termes hispaniolae* (Banks)

