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TERMITES IN NEW SOUTH WALES

PART 1. TERMITE BIOLOGY

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Termites are pallid, secretive creatures colloquially known as 'white ants'. Although termites and ants are very different types of insect, the confusion is understandable as they share some remarkable similarities. Both follow trails, live in nests or colonies in the ground, in timber and in trees and sometimes invade buildings. Nests are generally under the control of a single queen, and other members of the colony can have a range of specialised forms. Despite the similarities, termites differ from ants in a number of important ways (Figure 1). One major difference is that termites almost always remain hidden from view. Another is embodied in the name Isoptera, the insect group termites belong to. Isoptera (from the Greek *Isos* meaning the same, and *ptera* meaning wings) describes the paired wings of the reproductive caste, which are of equal size. In contrast the forewing of an ant is usually larger than the hind wing.

Termites are an ancient insect order, with a lineage stretching back over 100 million years, well before the origin of flowering plants. Cockroaches are an even more ancient group and they are believed to have given rise to termites. One species of termite found only in Australia, the giant northern termite, *Mastotermes darwiniensis*, bears some features similar to those of cockroaches, including protozoa in the gut and in its manner of egg laying. It truly deserves recognition as a living fossil.

There are some 300 species of termites known from the Australian region but less than a quarter of these are found in New South Wales. Relatively few of the NSW species are economic pests of trees, timber and wood products.

TERMITE COLONIES

Termites do not exist as solitary individuals. Like ants and honeybees, they are social insects that live together as a colony in a nest. In some species the colony may comprise only several dozen

termites whilst, in other species, fully established colonies may have hundreds of thousands of individuals. Termite nests vary in both size and form according to species and colony age. They can be located in and on trees, inside wood, in mounds or underground.



Figure 1. Worker termite and ant. Termites have straight or slightly curved, beadlike antennae, no eyes and no constriction between thorax and abdomen. Ants have markedly bent antennae, compound eyes, and a distinct 'waist'.

Photo: Lowan Turton,
NSW Department of Primary Industries

Colony members belong to one of three interdependent groups with specialised form and function known as 'castes' (Figure 2). The three basic castes present in the colony are workers, soldiers and reproductive forms.

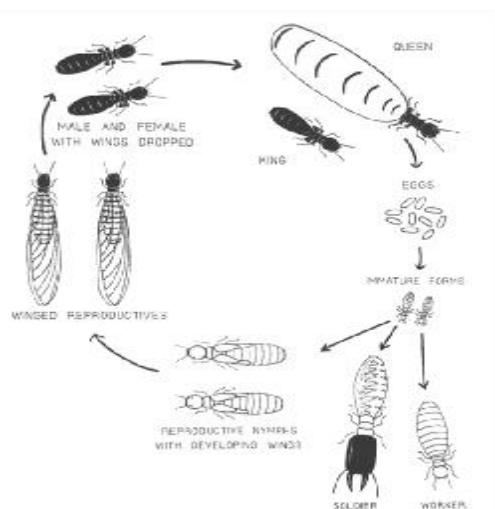


Figure 2. Typical life cycle of the subterranean termite. The queen lays eggs year-round whereas the release of winged reproductives is an annual event.

Workers

The vast majority of individuals in a subterranean termite colony are workers. They are wingless, sterile and blind. They have round pale heads and soft un-pigmented bodies. The workers are the labour force of the colony, keeping it fed, doing the building work and looking after the eggs and immature termites. When termites infest timber it is the workers which do all of the damage. Dampwood and drywood termites (see below) do not have a true worker caste. Instead, the role of worker falls to juveniles, which develop into soldiers or reproductives.

Soldiers

Worker termites are relatively uniform in appearance, regardless of species (Figure 3). In contrast, the head structure of soldier termites varies considerably. This variability has been used in the formal scientific classification of termites (taxonomy) into different related groups (e.g. genus, species). Some species, such as *Schedorhinotermes intermedius*, even have more than one form of soldier (Figure 4). The identification of the more common species based on the appearance of the heads of soldier termites is relatively straight forward and can be accomplished by anyone with access to the appropriate diagnostic keys and a quality hand lens or dissecting microscope.



Figure 3. Worker termites *Coptotermes* (left) and *Nasutitermes* (right).

Like the workers, soldiers are wingless, sterile and blind. When a termite trail is uncovered they are readily distinguished from workers by their pigmented heads. Soldiers may be 'mandibulate' with large prominent mandibles or 'nasute' with a pronounced snout and there may be more than one type of soldier in a single colony (Figure 4). The primary function of the soldiers is to defend the colony, usually against ants, which are their main enemies.



Figure 4. Termite soldier and workers *Coptotermes acinaciformis* (top), *Schedorhinotermes intermedius* (middle) and *Nasutitermes walkeri* (bottom).
S=Soldier(+ major, - minor), W=worker.

Worker and soldier termites spend considerable time away from the nest, sometimes venturing considerable distances from it. However, they depend on the nest for survival and are unable to survive away from it for extended periods. Worker and soldier termites have no capacity to found a new colony or increase in numbers. This means that isolated pieces of infested timber, such as firewood, which sometimes contains pockets of foraging termites, are of no real cause for concern. The termites will eventually die as the timber they are in dries out.

Reproductives

The reproductive caste resident in an established colony is usually referred to as the king and queen. They are responsible for the production of

fertilised eggs for the colony and of specialised chemicals (hormones) important for managing the inhabitants of the colony. In some species the abdomen of the queen becomes swollen as her anatomy becomes devoted to the mass production of eggs (Figure 2).

Mature colonies produce winged reproductive forms or alates at certain times of the year (Figure 5). The synchronised release of large numbers of alates, typically in early summer before a southerly change, sometimes results in the formation of huge swarms. These swarms produce an edible bounty for birds, lizards, insects and spiders. After the dispersal flight, the alates attempt to find mates and found new colonies.



Figure 5. Winged reproductives or alates.

At night alates are attracted to lights around homes and they may be seen landing in gardens and even entering buildings through windows and other building apertures. This sight can cause anxiety amongst householders fearful that a termite infestation may result. Such fears are usually baseless because the vast majority of alates do not survive and the chance of a pair successfully establishing a nest is very low.

THE DIFFERENT TYPES OF TERMITE

Termites are commonly classified into three groups, subterranean, dampwood and drywood, mainly based on the nesting habits of the species.

Subterranean termites

Subterranean termites build their nests in the soil, in trees and other sheltered situations where a constant source of moisture is available. Nests are mostly around ground level. Many nests are started in or near dead tree stumps. Some nests are in the form of mounds, which extend both above and below ground level (Figure 6). In other



Figure 6. Mound nest of a subterranean termite.

species there may be no indication of the nest above the ground. Two of the most destructive termite species in NSW, *Coptotermes acinaciformis* and *Schedorhinotermes intermedius* (Figure 4) do not build mounds. Another local destructive species, *Nasutitermes exitiosus* is a mound builder.

Two species of subterranean termites, *Coptotermes frenchi* and *C. acinaciformis*, commonly inhabit living trees, the nests being inside the bole, often situated at ground level or above. Feeding is not confined to the centre of the nest tree, where a 'pipe' is formed but may extend through foraging galleries to other nearby trees, fences, poles or buildings. Whilst *C. acinaciformis* is the major termite pest throughout most of NSW, *C. frenchi* displaces it around Canberra and nearby tablelands. Sometimes nests are built on the branches of trees by *Nasutitermes walkeri* and *Microcerotermes turneri* and their tracks may spread over the tree (Figure 7).



Figure 7. Arboreal nest of *Nasutitermes walkeri*.

Neither of these species is capable of causing significant damage to sound timber.

Dampwood termites

Dampwood termites do not have large centralised nests but live as small, independent groups in diffuse networks of galleries in the wood they feed upon, most commonly the damp, decaying parts of standing trees. Colonies can exist without any contact with the ground and obtain the moisture they require from the timber they live in. Dampwood termites may also be found in power poles and weathered external timbers of buildings. However, they are rarely responsible for significant economic damage to sound, seasoned timber in man-made structures.

Dampwood termites have amongst the largest and ferocious looking soldiers to be found. Soldier termites from species of *Porotermes*, *Stolotermes*, *Glyptotermes* and *Neotermes* range in size over 10 mm and some species have large toothed mandibles (Figure 8).



Figure 8. Dampwood termite soldiers. *Porotermes* (left) and *Glyptotermes* (right).

Drywood termites

Drywood termites require no contact with the ground or any other source of moisture, other than that found in the wood in which they are living. Like dampwood termites, colony size is small relative to subterranean termites and they live 'within their food'. A complete colony generally can exist in a single small piece of dry timber such as a picture frame or a piece of furniture. Because their colonies are completely hidden, these termites may exist undetected for years. The most visible sign of their activity is the sand-grain sized faecal matter expelled from the colony (Figure 9).



Figure 9. Drywood termite faecal pellets (each division = 0.5 mm).

Australia has more than 17 species of drywood termite with four species occurring in NSW. These species rarely cause damage to man-made structures. The most destructive drywood termite in the world is the West Indian drywood termite, *Cryptotermes brevis*. It is a serious pest of softwood and low density hardwood timber in buildings and furniture wherever it occurs. Native to the Caribbean region, Central and South America, it has been introduced into other countries more widely and commonly than any other termite species, and is now a major pest in Hawaii, New Caledonia, USA, Canary Islands and South Africa. It is established in Brisbane where an expensive eradication program is being undertaken. This species is detected occasionally in NSW in imported timber items such as furniture.

FURTHER READING

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