

# The **BOOK** On **TERMITES**

**A guide for homeowners with a DIY attitude**

Helpful information on termite identification, habits, killing colonies, checking and defending your home. You will be able to do a proper job...safely.

Written by Ion Staunton, the author of textbooks used in the training of professional technicians but without all the technical and detailed stuff you don't need to know.

*"Do-It-Yourself because paying more doesn't kill them any deader than dead"*



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Ion Staunton was a technician complete with cobwebs in his hair and dirty overalls, topped his TAFE course then went to UNSW to become an entomologist. After 40+ years of helping the professional industry, he turns his teaching skills and knowledge to helping homeowners who want to do it themselves...properly and safely.



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# DIY Termite Control

Termites are a low life form stuck deep in a million-year-old rut of basic instincts.

This makes them predictable. In the prehistoric forest they became good at finding and re-cycling fallen trees; these days much of their forest has been replaced by houses containing some timber (which they still manage to find, often irrespective of chemical and physical barriers). If they can find a way in, they begin the re-cycling as of old.

Same old, same old just some of the circumstances have changed. They have found their ways into structures in ways we never thought possible and they've given a whole new meaning to the term “keyhole surgery” by removing the strength (and \$value) of a building through a tiny hole. They have achieved an almost invincible, mythical reputation.

However, if you have (or can develop) a do-it-yourself attitude by the time you've finished

reading all this, you'll be much smarter than termites and...

- be able to entice them into monitors set around your buildings so you can kill them before they find a way inside,
- be able to feed them if they have already found a way in so that the bait is taken back to kill off the nest wherever it is and,
- be able to regularly inspect your timber structures maybe as well and probably better than many professionals.



*This is a cross section of a mound nest. The structure is representative of most termite species: the royal chamber in the low-centre the egg incubation area next, the nursery the next section out and the older nymphs further out again.*

There are other DIY factors to consider: money, time and ability. Your home is worth a lot of dollars so if you have plenty of money, you probably will go to a professional.

Otherwise you may make the time to learn the skills to do some relatively simple tasks.

## Termite Damage in Perspective

There are more than 350 species of termites in Australia.

Less than 10 species cause 99% of the damage by eating the seasoned timber found in houses. Most prefer leaf litter and dead grass, others prefer the damp, rotting wood inside trees and logs.

Some mound-building termites will attack houses, however the ominous presence of a mound is sufficient reason for any homeowner to physically destroy it...and there's no more threat from that colony.

To give the significant termites some names will help you better understand the rest of this book but we're not going to emphasise names after this opening segment.

The most damaging termites are the **subterranean termites**. They live and nest in the soil (sometimes inside a tree or log) but they almost always come from the soil to get into our buildings. Mound building termites are of course, subterranean. All subterranean termites obtain their necessary constant source of moisture from the soil.

Then there are **arboreal termites**.

*The original arboreal nest was taken over by birds but the termites built a second storey just above the original.*

These are the ones that build a big nest up in the branches area of a tree. They build tunnels down the outside of the tree and sometimes down the inside decaying 'pipe' to get to their moisture source. They will eat grass, leaf litter and rotting heartwood and are seldom interested in the seasoned wood of houses.

**Drywood termites** usually live in more tropical regions and they absorb their (lower) moisture requirements from the tropical humidity in the atmosphere. An introduced species called *Cryptotermes brevis* or the West Indian drywood termite is occasionally found and is notifiable to the Australian Quarantine Service who will come and fumigate your house to eliminate it. Drywood termites live within the timber and they kick out their dry faeces through small holes in the wood they are eating. Detecting small (less than 1mm) pellets on horizontal surfaces below the activity is the usual give away.



There is a section on **Nuisance Termites** toward the end of this book.

## The few main damaging termites.

Let's get right down to it: drywood termites, mound building termites, grass- leaf litter- and rotten wood-eating termites do less than 1% of the damage to Australian homes. The 99%+ is the result of a couple of species of *Coptotermes*, a couple of species of *Schedorhinotermes* and *Mastotermes* the giant northern termite.

How are you going to pronounce let alone remember those names? Let's do what the technicians do call them **Coptos, Schedos** (pronounced Shed-o s) and **Mastos**.

## Your risk based on geography

Geographically, the Mastos are mainly found north of the Tropic of Capricorn (Rockhampton to Port Hedland), but the

Coptos and Schedos are generally right through and around Australia except for Tasmania. They have spent millions of years eating Australian hardwood from trees used as framing timbers and flooring since the First Fleet 220 years ago. When oregon, baltic pine and later radiata pine and other plantation pines became widely used, our termite trio thanked us very much. They will often build tunnels over these hardwoods to get to soft timbers rather than eat their way through the hard stuff.

## The chance of your home being attacked.

If you live in Tasmania, you're probably not reading this and there's no need to. For the rest of us, the only part of the mainland that is rated by the CSIRO as Low to Very Low is the narrow strip along the Great Ocean Road west of Melbourne. Which means the rest of us are in Moderate to High to Very High risk areas. Another way to put it is that there is a better than 80% chance your home is within 25 metres of a termite



colony. The recent CSIRO survey reported 32% of homes had a termite presence. This has been confirmed by the Institute of Australian Architects whose survey in essence said: of all the homes inspected prior to sale last year, one third had some termite damage.

Here's another significant statistic: less than 20% of homes are inspected or serviced by the professional pest control industry. That means more than 80% of us are blithely believing “it won't happen to me”.

*If 1 in 3 homes are damaged and yours is one of the other 2... shouldn't you make a little effort and spend just a few dollars to keep it that way?*

## **Your risk based on type of construction**

*Inner-city tenement style houses* have common walls, often common roofs and usually suspended wooden floors... often very low to the ground. You'd think that with all the bitumen, concrete and pavers covering the ground in these crowded suburbs there would be no place for the flying colonisers



to find a bit of wood in soil to start up. But they do. And, because the houses adjoin, termites may enter your home from a nest that entered a house a few doors up the street. The same goes for more modern townhouses sharing walls and roofs even though they may be on concrete slab floors.

*Homesteads/ Queenslanders* may have plenty of space underneath their suspended wooden floors and the piers/stumps with antcaps give you a good chance to observe termite tunnels heading up to the floor. The temptation for us humans is to stack all sorts of stuff under these houses which often gives termites something to eat at ground level and some cover for tracks heading upwards.

Rural homes are constructed of all styles but property owners have added threats: they have more sheds, cattle or sheep pens and ramps, wooden bridges, timber that 'will come in handy one day' etc.



***Suburban suspended floor houses*** are the type which are usually set on the so-called 'quarter acre block', with brick piers and foundation walls supporting bearers, joists and flooring boards. The walls may be double brick, brick veneer, weatherboard, fibro or other cladding and a timber framed roof. If you crawled under to inspect every year, termite tunnels would be found and treatment applied before much damage was done.



***Concrete slab on ground houses*** began in the early 1960s. They were cheaper to build and builders paid for physical and chemical termite barriers which lulled many homeowners into a false sense of termite invincibility. Now in 2011, re emphasising that only about 20% of homeowners get their homes inspected, therefore 80% of homes are just sitting there waiting for termites to attack...usually out of the garden, straight in through a

weep hole just above the dampcourse and the disastrous consequences to your finances begins.



***Multi-storey apartments*** are also attacked but termite defense is usually delegated to a Body Corporate. The



BC then delegates the inspection and control to a professional pest management company. I hope for your sake the company they chose are PestCert accredited... they have reached and are maintaining the highest formal level in pest management.

## The damage bill.

Archicentre show a report that says the annual damage bill to homes is about \$1billion. The average cost of professional treatment is around \$3000 and the cost of repairs is around \$5000... Total \$8000. One homeowner I know well, refinanced his home to pay a \$70,000 bill. Sure, the kitchen was one area that had to be completely rebuilt so he went the extra and put in new, more modern appliances at extra cost... but then if you were in for a big bill, another thousand or several to update your home and lifestyle could make sense.

Apart from the treatment and repairs, there is also the loss of resale value to be considered. If the prospective buyer receives a report of termite presence or even previous damage they could easily lose all interest in proceeding... or offer you maybe \$50,000 less. Then, on top of all this, how do you put a cost on the inconvenience and the heartache? ***The message is plain. Unless you live in Tasmania, you should be concerned about subterranean termites. They know where you live!***



*Homes among gum trees. Nothing wrong with that providing you recognise the termite threat and know how to intercept and kill off the colonies that are out there...somewhere*

# Termite Life Cycles And Habits

It's a cycle, so let's break in and start at the beginning of the colonizing flight.

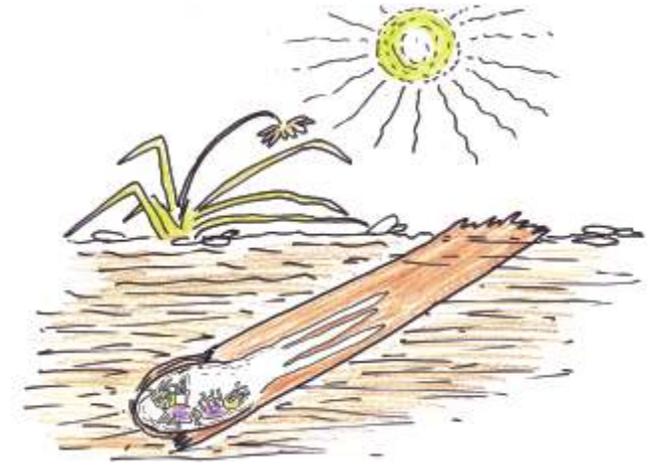
New colonies begin when winged reproductive termites fly out of a mature colony in the first weeks of summer when the heat and humidity outside are a close match to conditions inside the nest. They seldom fly more than 100-200 metres and of the thousands that leave home full of hope, most fail to establish a successful colony. The first problem is boy meeting girl, the next is finding something to eat which is in contact with damp soil before they themselves are eaten by birds, ants, spiders, echidnas, lizards, etc.

In their natural bush it's relatively easy for them to find a fallen branch, leaf or bark mulch, a stump or if they are supremely lucky, a hollow tree. Around most homes there are tree and wood fragments mixed up in the soil and which gives the 'honeymooners' some

*Bulldozers make plenty of fragments which lie on or just below the surface after a subdivision of once-rural land is covered in houses and landscaping...enough to give a young couple a start.*



homemaking options. Although more than 95% of couples fail to get past the first summer, some will become established.



Once a nest site is chosen, the young couple shed their wings (if they haven't already done so) and begin to excavate and secure a chamber just below ground level adjacent to the wood/food. They tend their first eggs and nymphs which grow into workers. When they have what they deem to be enough 'subjects' they declare themselves 'royalty' and spend the rest of their lives making babies they don't have to look after.

Eggs hatch into nymphs which grow in a series of moults, each a size larger than before. Initially they are all worker caste but later some nymphs become soldiers. It is only 3-6 years later that some of the nymphs will become reproductives but let's not get ahead of the story. The workers not only chew off cellulose (the basic component of wood) to feed themselves, they also have to feed everyone else: nymphs, royals, soldiers. If the initial wood fragment was

the size of a fist or maybe a boot, it won't take more than a few months for the food to run out.

### **Time to look further afield.**

Scouts are sent out, usually at night and when a new source is found and pheromones are used to mark the route, a tunnel is built from the original to the new. If the initial fragment is close to the surface the royals are relocated deeper into the soil, seldom do they move far laterally.

The colony always seems under threat. The first hot dry summer can mean lack of moisture and they dry out and die. Or heavy rain can wash the initial fragment away. Then there are bushfires, ants, echidnas, bush turkeys and other wildlife which can also terminate the termites.

Having somehow survived those first 2-3 years, a colony's chances increase dramatically; they just need more and more food, never relying on just a couple of sources no matter how big it is (tree, log, house). The foraging scouts leave the security of the current workings but once a new food is found, the workers build an

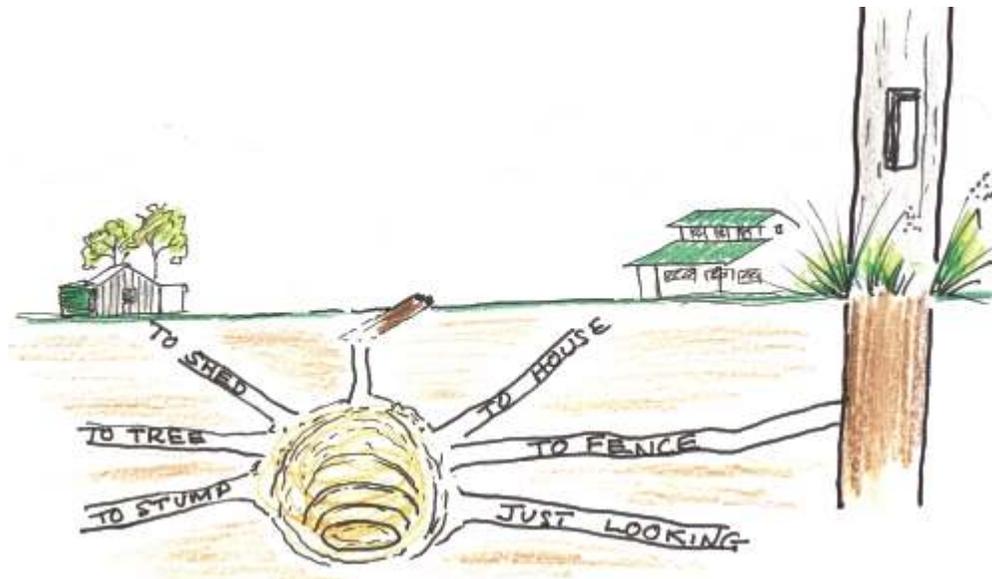
impregnable (to ants) tunnel to it. This tunnel may go just below ground level, on top of the ground, up over the edge of concrete foundations and once into the timber, they stay below the surface out of your sight. Once inside a house, all the timbers join up and they can get to anywhere and everywhere, removing tonnes of timber out

through that little tunnel...

Keyhole surgery!

The queen might live for 25 years or so and by the time she is a 3 yr old, she is probably laying a thousand eggs a day. Her abdomen enlarges to maybe 25-30mm long to accommodate her egg-laying equipment. When she dies or degenerates, she is usually replaced by a chosen reproductive which is spared the flight.

A colony does not begin producing nymphs to turn into reproductives until it is well established maybe 4-5 years, whenever. If you break open some galleries and see generally browner individuals (with eyes) and usually a little longer in the abdomen, you might on closer inspection see developing wings. Closer to the start of summer, the wings will be getting in their way but they begin clambering toward the highest part of the working



galleries where workers will have cut open slots about 20-30mm long to the outside world. The opening will be guarded by soldier heads until that warm humid evening arrives and I can't help wondering who yells the termite equivalent of "Geronimo!" as they launch themselves into the evening sky.

You can identify flying termites quite easily; they are the only insects with all four wings of the same size which they lever off soon after they land. If you don't think you'll be struck by lightning on a stormy night, I suggest you get a torch and look up at nearby trees, poles and buildings to see if you can find them pouring out of a high narrow opening which usually means the actual colony is close by. To prove that termites aren't always so smart, there have been plenty of times homeowners have told me the flight slot was cut in the plasterboard of their lounge room and ten thousand termites made it almost impossible to see the TV!!! No chance of any successful colonisers in that lot!

### **Termite needs create their habits.**

These few subterranean major pest species need just three things: a constant supply of moisture (found in soil), food (cellulose), and privacy (which means mud tunnels and staying inside whatever they are eating).

As a colony enlarges, so does the demand for moisture. They are very thin-shelled insects and once they are

exposed to anything other than their preferred controlled climate of about 80% humidity and 25C+ temperature for any length of time they dehydrate and die. Workers travelling up into a warm roof, will chew off their payload of cellulose and head back to earth as soon as they can. If a feeding area of their workings (galleries is another term used) is hot, they will wait until it is cooler another day or during the night. The significance of this is that if you discover termite damaged wood that appears to be empty, it might be re-occupied when the ambient temperature is more suitable so, just leave a small hole and check again next morning or in a couple of days. If the hole has been repaired, it will confirm the gallery is still in use and you can begin treatment. Sometimes termites build a re-hydration mass where many kilograms of moist 'mud' is close to their entry point into a house, especially if the nest is still some way off. Workers and soldiers that have traversed say 30 metres to the building then another 10-15 metres up into warm framing will be happy to rehydrate in a safe, moist staging camp or bivouac before proceeding back to the nest. This 'mud' mass is often discovered in the wall cavity between the studs behind the plasterboard.

Finding food has produced some amazing termite feats. Here's my first-hand account of Coptos finding a couple of beams of timber at the top of the bell tower of the Sydney Town Hall in 1958: they had built a long tunnel about as thick as a finger from the upper mezzanine, up

past the cogs and workings of the clock, up a sandstone column into the dome where two 400 x 400mm beams bridged the masonry hole and which, by a short metal bar some 200mm diameter straddling the beams, supported the maybe two tonne bell which was struck on the hour. A few weeks/months later, the beams would have been weakened and the bell would have crashed, stripping out the clock on the way down to the foyer. Lord Mayor Harry Jensen would have asked some serious questions!

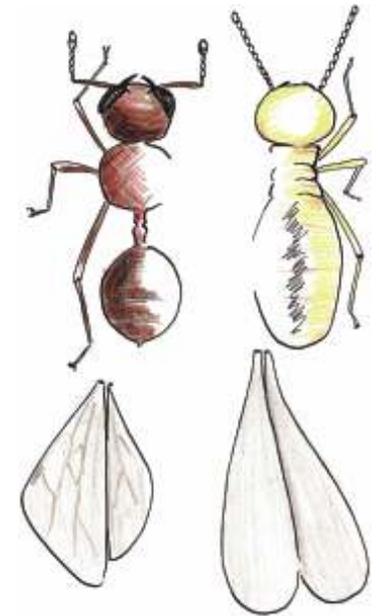
Privacy to termites means staying enclosed.



Workers and soldiers do not have eyes so they can't see if you are looking at them, however they obviously sense light and want to block it out because an opening represents loss of humidity and the opportunity for invasion from their mortal enemy...ants.

### **The differences between ants and termites**

Termites were often called 'white ants' simply because they were small, there were lots of them together in one place and they were sort of white instead of black/brown/reddish. When someone is 'white-anted' it usually means they are undermined from within their group. There are easily discernible physical differences: termite workers and soldiers don't have eyes, ants do; ants have an elbowed antenna instead of a 'string of beads'; a distinct 'waist' between the thorax and abdomen (not in termites) and the flying reproductive ants have a forewing larger than the hind wing whereas the reproductive termites (with eyes) have fore and hind wings of the same size. (The insect Order Isoptera in latin means Isos = equal, ptera = wings).



Whenever subterranean termites leave the soil, they remain inside either the tunnels or the timber they are eating and, if there are cracks or splits, they fill up the

spaces with a regurgitated food mix that cements them inside. (Scouting/foraging termites are the exception; who knows how many are lost during their patrols?).

When a large part of a termite gallery system is damaged, such as when an echidna, a numbat or maybe a human breaks in, there is usually too much damage to be repaired to quickly restore the gallery to its original safe state. Soldiers guard while workers repair and seal the narrow access tubes closest to the nest. This results in sacrificing often large numbers of workers and soldiers who can never get back. But the nest is secure and the colony can expand again another day in another, often parallel, direction.

We've already mentioned the major natural enemies with ants probably highest up their list. Humans have a major effect too when we put our mind to defending our structures. Do not ever think that if your backyard is overrun with ants that you won't have a termite problem. On the evolutionary timeline, termites have been around longer and they can keep ants out of their galleries. The message here is: don't put up with invading ants in your kitchen hoping they are at least keeping the

termites at bay outside.  
They aren't.



## Summary

It is because termites stick with their habits that you can anticipate their intentions and use your knowledge and your own ingenuity to defend your home and structures.

# Killing Termite Colonies

Killing termites is dead easy. They are soft and susceptible to any insecticide; just breaking apart their workings will expose them to the hostile climate and they will die.

Killing termite colonies requires some knowledge but not as much skill compared to years past. See the side

## The first termite killer

It is almost 100 years since Bill Flick, a dairy farmer near Byron Bay worked out that termites were social insects like bees which left the hive to bring back honey. He reasoned the termites must be taking food back to the nest, so, if he could puff a light dusting of the slow-acting poison arsenic into their working galleries, the workers would not die before they got all the way back. They would then feed it along with the chewed wood to those in the nest. It worked. At that time if termites got into a house, you repaired it and sold. Bill changed all that. The Flick family built the largest pest control business in Australia. Bill's principle of adding a contaminating chemical to the internal feeding areas is the basis of the modern use of insect growth regulators. The process is most effective, almost foolproof and unlike arsenic, there are no human toxicity issues at all.

box on Bill Flick's discovery of the principle which has resulted in today's most reliable colony killing treatment procedures.

If you know for sure exactly where the nest is, you can physically or chemically destroy it. (Details further down this chapter). However, most termites are discovered by accident or as the result of an inspection.

Instead of using Bill Flick's arsenic or other products the pest industry restricts to their own use, do-it-yourselfers can purchase a product containing chlorfluazuron. This is safe for homeowner use. It can be used to feed termites in monitors set in the ground or to feed termites inside timbers above ground level. This same chemical is used by the majority of the professional service industry but their labels restrict its use to approved technicians. The only registered product which doesn't have this restriction is from TermiteTrap P/L called Colony Killer Termite Bait. This means anyone can buy and use it. This bait is not suitable for controlling *Mastoterme*s, the Great Northern

*The only registered bait that is available for unrestricted sale to homeowners is Colony Killer Termite Bait by online sale but soon in a store near you.*



Termite. You can easily identify them: they are 13-15mm long, (that's more than half an inch) and their distribution is generally North of the Tropic of Capricorn. There is a special section on Mastos further on in this section

Chlorfluazuron inhibits the production of chitin which is the hard outer shell of insects. It is also known as an Insect Growth Regulator (IGR). The effect is on the nymphs in the nursery area surrounding the queen in a subterranean nest. The nymphs cannot produce the new shell they need to grow to the next stage and they die... thousands of them. The decomposition gases and the resulting fungus makes the nest uninhabitable. The queen dies and the workers and soldiers out in the food areas survive for only a few more weeks.

You can be more confident of a successful kill using the baiting/feeding method than the dusting or foam introduction methods for transfer back to the nest.

Why?

As one technician explained it: "If termites are eating the bait for a few weeks, they are definitely taking it back to their nest; if you dust or foam and there are no termites in the affected area after a couple of days, it could be they have simply abandoned the workings because you made it too dusty or too wet or the chemical was too strong." There can be another reason: if anyone digs outside or in some other way accidentally severs the underground connection tunnel back to the nest there won't be any

termites visible in the galleries, but it's not because the nest is dead.

Feeding termites in in-ground monitors is a mainstream approach used by the industry for more than a decade since the IGRs were approved for termite control. Professionals use monitors and baiting systems because they work.

The three main subterranean termites live and forage for food through soil. If monitors are placed in soil around buildings, the chances are in the high probability range that they will find one. The more monitors you put around, the more likely and the sooner you could expect to intercept a termite colony. These foraging scouts may be from a new colony in its first or second year, but it might also be a decade old colony that is still trying to find a way into your house over or through a degrading chemical barrier.

You can't make the termites find your monitors. But once they do find them and you know they are there, feeding them is easy...and hard to get wrong.

Making your own monitors can be as simple as burying a container full of wood blocks, cardboard or a combination of both. Entrance holes or slots at least 5mm wide into the container will allow easy termite entry. A removable lid makes it easy to check for live termites and to add the chlorfluazuron bait. You also need to consider making your monitors big enough to hold a significant

number of termites because the more termites feeding, the faster a significant quantity of bait is transferred to the nest wherever it is. You will need to be able to open the monitor and add the bait while hardly disturbing them. The Shedos are easily scared off; they may leave a disturbed area for 3 hours, three weeks or three months...you get the idea. (They also need at least twice as much bait to kill a colony as the Coptos, so you will risk disturbing them more often during the food replenishment process). Lastly, you need to be able to find your monitors easily and regularly; it is very easy to lose track of where you put them if they are covered with leaf litter, mulch or ground cover plants.

You should have at least 4-6 of them around a house on a small (500-600sq m) block, more on a bigger block and more again if you have sheds, ramps, livestock pens/stables, etc.

You can't tell how big a nest is by looking at the termites. Termites of a species are the same size whether the colony is big or small. Multiple feeds are normal. Small colonies will require a couple/three doses; really large colonies may need ten or more doses. If you are feeding the same colony from 2, 3 or 4 monitors, the nest will probably die off quicker because they are getting bait to the nest from more sources. The amount of bait used will be about the same. Towards the end, the number of termites visible at bait replenishment time will be fewer

and fewer...you may not need to add more bait. Keep inspecting every couple of weeks, then one time there will be no termites. Wait another week just to be sure.

### **Termites and temperature**

If you check your monitors when they are hot from direct sunlight, you may not see live insects. This is probably because they couldn't cope with the heat. Checking again when the monitors are shaded may reveal termites working merrily away once more. In-ground monitors that are set right into the ground may fill up with water after rain and it may be several days before termites return. Always confirm live termites before adding the bait.

Chlorfluazuron may take longer to kill than the dusts and foams but the nest is just as dead and there is no hazard to people or pets (because we don't have an outer shell). As reassurance, once termites begin eating the treatment they don't usually stop until the colony is dead (or you let them run out of the treatment). What you don't use will keep for years.

### **Monitors**

A monitor that can be bought on-line can hold 6 litres of termites as they are mostly above ground. You can see through a clear cap at the top to note if a purpose-left hole in the cardboard cartridge has been covered in with the



'mud' mixture which is their signal to you they have arrived. The bait can be added at the top in less than half a minute to minimise disturbance.

They are UV protected polypropylene and expected to last more than 10 years. The same company has designed dose-sized light proof feeders with a disc that can be prised out of the base so termites can access. These bait feeders can be used either in the tops of their monitor (or any monitor) or they can be attached to the outside of infested timbers so termites can enter and harvest the bait.

*This monitor has the advantage of size to hold more termites than most but it also has a clear top through which you can see if termites have blocked up a purpose-left hole with their 'mud' mixture*



*A clear hole visible through the clear cap and right, the signal that termites are ready to be fed the termite bait.*

See the commercial details for the monitors and the chlorfluazuron bait on [www.termitetraps.com.au](http://www.termitetraps.com.au)

Feeding termites in above ground monitors is sometimes necessary to try and intercept termites that have been badly disturbed and left the damaged area. For example, if termites were discovered in a crate, carton, toolbox, etc which was removed before you noticed their presence, it is almost impossible to put things back as they were and expect the termites to continue eating so you could introduce a bait. They will normally block off their access tunnel at say, the expansion joint in the concrete floor or where they entered the area through a small gap in a corner. (See photos).



*The builder who discovered the termites during renovations, removed the damaged timbers but we were able to find live soldiers guarding the hole leading back to their nest*

*Aluminium cooking foil was taped to the wall like a big apron pocket, then filled with termite bait and closed with tape along the top to seal out light. Next morning the pocket was opened at the top to reveal termites busy harvesting the bait. Normally you wouldn't*

*check within two weeks but we wanted to take this photograph to show they were feeding.*

If damaged timber has been stripped out, you have to expect termites will eventually return because the colony hasn't been killed and there is no absolute 100% way to prevent them coming back. To retrieve the initiative, the best approach is to place some enticement near where you think they are likely to find it. **You can make your own above ground (or within the building) monitor** and it doesn't have to be that flash.

The monitor you make must:

- Contain cellulose material (wood or cardboard) without preservatives.
- Be accessible to termites (and not inconvenient to your day to day life).
- Be placed in a likely spot such as over the expansion joint or in a corner where they were.
- Be light-proof so termites will be happy to enter and begin their harvesting.
- Be able to be inspected by you without scaring them off
- Have an opening or a place where you can insert or attach bait.
- There is no limit to size other than it shouldn't clutter up your living/working space.

Your monitor can be as simple and easy to make as filling up a cardboard carton with a few wood blocks and some damp cardboard (reasonably but not too tightly packed). You can make a simple opening for inspection

and baiting by cutting out say, a 100x200mm area in the top flaps and then laying a piece of laminate, metal sheeting, whatever... over the opening. To inspect? Just lift the sheeting/lid. To feed them just place in the wet bait and replace the lid. If your monitor is to go over an expansion joint or against the spot you know termites have come from, look carefully and you may see their 'mud' mixture in the joint where they have resealed it and place your cache as in the photos above. If you can't find such a spot, termites are likely to come looking again if you give them a little more enticement. Wet the area lightly (and regularly) so the water soaks into the expansion joint.

Feeding termites in other situations is still a matter of following the same principles.



*See the uneven surface of the window frame. Termites have eaten it out, in some areas leaving only the paint.*

**DO NOT** waste bait by adding it to timbers that do not

contain live termites. The colony is killed only if workers take enough of the bait back to the nest. And they will only take it if they can harvest it, undisturbed, from inside the damaged timber you have found.

Should you find termites in timbers such as the window/door frames, skirting boards inside, or in studs, posts, roof and foundation timbers of any structure, you need to make a small hole into the timber, actually see live termites then add a light-proof cache of the bait covering the hole in the timber. Here's how:

Make an opening into the termites using a pointed knife or fine screwdriver. The hole should be no bigger than about 5mm diameter to begin with. (It should be enlarged when it is time to add the cache of bait). You can pry into



*Make a small hole and wait to see if termites come to it. If you don't see any within a few minutes, leave the hole open. They may come back and seal it in a few hours or overnight, If they do, you know they are still using the galleries and you can re-open the hole to begin the baiting process.*

the surface of the timber where it feels spongy, thin or hollow. You can also pick away at any of their 'mud' used to fill up joints cracks or splits in the timber until you break into the gallery. It is only as a last resort you should attempt to open a tunnel on a timber or foundation surface.

Phone for advice before you try this... 1800 12345 7.

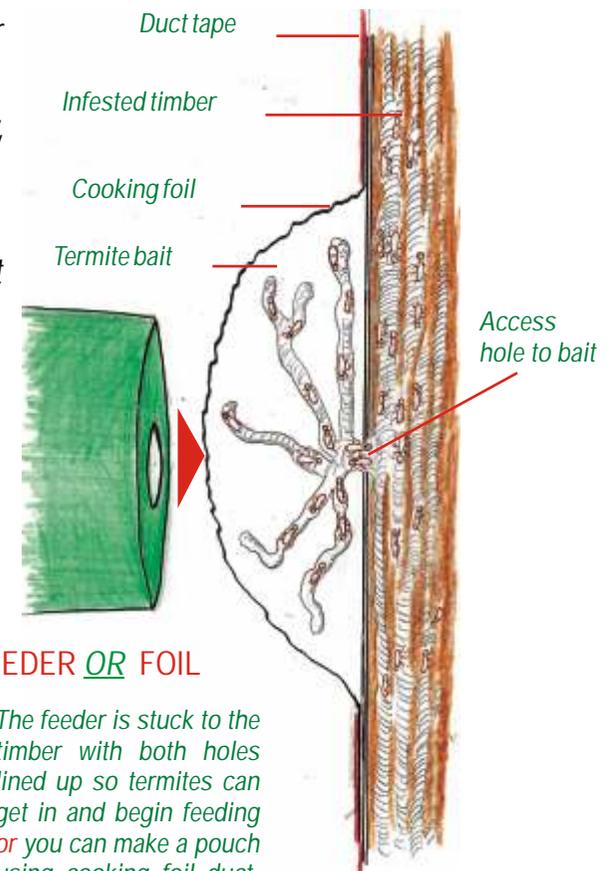
*This shows how termites will come out from the infested timber into a foil covered mass of bait taped to the surface. Alternatively, if the surface is flat, the feeder may be fixed over the hole and the termites will enter it to harvest the bait.*

The principles of successfully treating termites are:

1. Live termites must be present, feeding undisturbed.
2. The bait is to be made available so they can leave the timber and enter the cache in complete darkness.

#### FEEDER OR FOIL

*The feeder is stuck to the timber with both holes lined up so termites can get in and begin feeding or you can make a pouch using cooking foil duct-taped to the timber.*



Once you have broken through into where it is hollow, wait for a minute or so. If termites are there, the soldiers usually come to guard the opening while workers repair it. You will see their antennae and their heads blocking the hole. If no live termites appear, leave the hole open and come back later or check next day. If they are still using the timber, the hole will be repaired and this confirms they are ready to be fed.



If the timber has a flat surface, make the hole away from corners so you can line it up with the hole in the bottom of the feeder. If the access hole to the termites is on a round post or another situation where you cannot fix the feeder to it, you can make a pouch of aluminium foil and duct tape to hold the bait in place. The foil provides protection from light and ants.

If you are using the foil method, carefully pull back the edge of the sticky tape to inspect and to replenish the bait. If you are using the feeder method, it is less disturbing if you can add more bait to the original feeder rather than replacing the feeder each time.

### **Killing termites in trees**

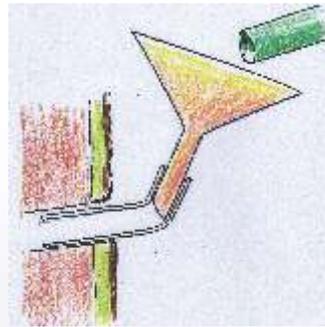
The termites you may see as dark brown nests high up in a tree are seldom pests of significance. But the main

subterranean termites that do that 99% of the damage we mentioned earlier, will often nest inside the central 'pipe' or hollowed out heart of a mature tree. Mastos, the giant northern termite, don't always wait for the decay of the pipe. They kill palms and healthy mango trees. (See the special box on Mastos).

If at colonising flight time a termite couple find their way into a hollow tree through maybe a dead/broken-off branch or in through a scar from fire at the base, they could not possibly have better conditions. There's plenty to eat, moisture and protection. A 50 metre travel to your home would not be out of the question.

If you have a large eucalypt, peppercorn or a mature fruit tree nearby, you should check it. Use an 15-20mm auger bit long enough to drill into the centre of the trunk at about shoulder height. Drill at a slight downward angle and when you feel less resistance it will be because you have reached the pipe. As you pull the bit out, look to see if any termites are in the fluting. If not, you could slip in a long thin grass leaf into the drill hole, leave it there for a minute and withdraw it slowly. Termites may be found holding on, 'attacking' it. If still no live termites are found, come back in half an hour or next morning; if there is termite life inside, they will be repairing or have repaired the opening using their 'mud' mixture.

In this situation you don't need to see live termites; it's just more satisfying to know you have actually killed a colony when you take the next steps...



### **Killing termites in mounds**

Termites that build mounds are subterranean but not included in the termites that do 99% of the \$damage to homes. This is because mounds are very visible, not tolerated around homes and it is very easy to kill these colonies by physically destroying the mound. If you are on an acreage property, make it your rule not to allow any mounds to develop within 200 metres of a building or other structure. Use a crowbar, a pick/mattock to break open the top/sides.

The outer is often very hard. (Years ago, mounds were used for building homestead tennis courts). The less dense and crumbly interior is easier to break. The queen and the nursery are at the base of the mound and if you can't physically get down there, use 20-30 litres of the dilute insecticidal mixture as above. If you don't finish off the queen, the colony will be re-built in weeks and you'll have to try again.

1. Re-open the drill hole if it has been repaired
2. Using a funnel, plastic tube and watering can/bucket, pour at least 20-30 litres of a *chlorpyrifos* or a *bifenthrin* solution down into the tree. These insecticidal concentrations can be purchased from a local hardware store. They may be known by various brand names but the active ingredients (as shown in *italics* above) are on the front panel of the label. They are poisons and you should read the label for dilution and safety directions.

# *Mastotermes darwiniensis*

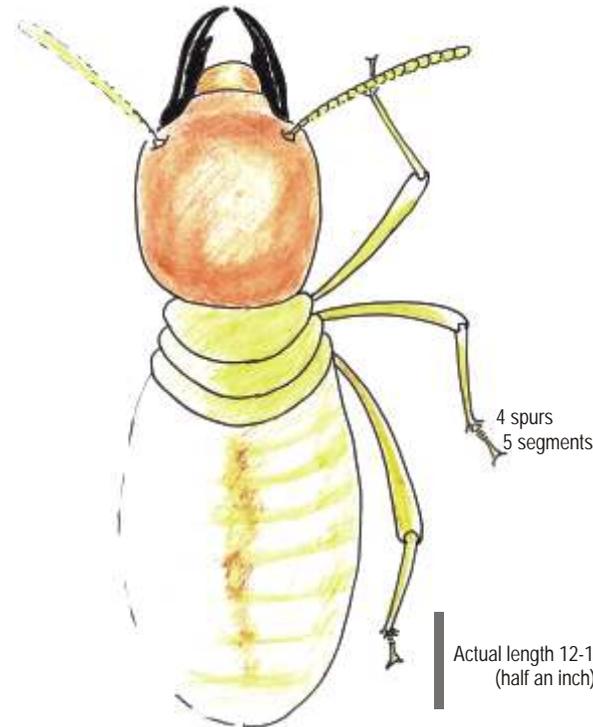
## Killing Mastotermes

The Giant Northern Termite *Mastotermes darwiniensis* destroys houses, trees, vehicle tyres (yes, rubber tyres!) and many other materials, faster than any other termite. They don't cause the most dollars worth of damage in Australia; that title goes to the Coptos, simply because Coptos distribution covers all the mainland (including where Mastos thrive) and consequently they run up their dollars in the high population cities/suburbs.

Identification is pretty easy: Mastos are 13-15mm long (that's more than half an inch). Most other termites are less than 10mm. They don't build big mounds; those magnetic (north-south) mounds up that way are built by grass eaters.

Mastos are easy to entice into monitors. It is a good plan to use timber in the monitor as well as cardboard otherwise they may eat everything and have moved on within a month or less of finding it. Inspect monitors every week or two. If you find live Mastos, the IGR (chlorfluazuron) baits are ineffective, you will need to call in a professional who will probably use a fipronil product. If you are apprehensive of chemicals, do not worry unduly. Fipronil is the chemical in Frontline which is put directly onto the skin of dogs to kill and prevent fleas. A dilute 3 ml/litre solution of fipronil is even less toxic to us humans.

Identification Tips:  
usual head and body length is 12-13mm  
all tarsi have 5 segments (other termites have 4)  
front tibia has 3 spurs  
mid and hind leg tibia have 4 spurs



*Mastotermes darwiniensis* soldier caste

**Type:** Subterranean

**Castes:** Queen, king, soldier, worker/reproductive

**Nest type:** this species is a subterranean non-mound builder which also nests in tree trunks, root crowns and stumps. Most subterranean galleries are found in the top 30cm of soil and they often forage out beyond 70 metres from the nest.

The queen lays batches of about 20 eggs in one mass at a time and the colony may number well over 100,000 individuals. Once it becomes this populous and if food is plentiful, a group may split off to form another, independent colony. Colonising flights are the usual method of dispersal.

**Distribution:** scattered areas generally north of the Tropic of Capricorn in Western Australia, Northern Territory, Queensland and coastal islands. Less usual in rainforest areas.

**Economic significance:** this is the largest and most destructive Australian termite within its range of occurrence. They inflict damage rapidly, not only to seasoned timber but many other plant, animal, rubber and plastic products. Living trees are killed by ring-barking and fruit, vegetable and cane crops can be severely damaged.

# Termite Prevention Options

## Pre-construction.

There are plenty of options. For most readers of this website, this “Pre-construction” section will be too late; your house is up and lived-in. However, if you are planning or involved in the design and construction of your new home here are some things to seriously consider:

Foundations and floors. The economics of building favour the choice of a concrete slab poured onto the ground. It costs less than having a floor suspended on foundation walls irrespective of the floor being timber or suspended concrete or something else. Suspending a floor high enough above ground level allows a person to get under to regularly inspect for the signs of termites invasion which reduces the likelihood of costly termite damage developing unnoticed.

A NSW Forestry survey in 1958 reported a termite incidence of 3% of free-standing homes. In just 25 years (1983) the CSIRO surveyed and reported a 20% incidence. The main factor of difference was that slab-on-ground floor became the normal construction method in the early 1960s. In 2004 the CSIRO surveyed again to report a 32% incidence. This was confirmed by a recent report in [www.archicentre.com.au](http://www.archicentre.com.au) of 33% of all homes inspected prior to resale showing a termite

incidence. The deduction to make is that the extra expense of suspending is to a great extent compensated by the much lower likelihood of expensive termite damage because regular inspection is able to find attack before significant damage occurs.

There is more. Once a slab floor is down you cannot re-apply chemical to once again provide you with a 100% continuous barrier. If you go to the added expense during building to install a reticulation system for the reapplication of chemical barriers, please ensure the system observes the laws of hydraulics and the liquid gets to the ends of the lines and is distributed evenly along them. Not all systems on offer do that.

The reticulation systems must, of course, be installed before the slab goes down and the installer must return to complete the job under the outside driveways and footpaths before they are laid. In this way, the barrier can be 'topped up' in the coming years. It is an added building expense but there is no other convenient way to replenish a chemical barrier under concrete.

Slabs do crack; just have a look at a garage floor or any other large slab of concrete. However, termites can't get through less than 3-4 mm cracks and, despite the urban myths, they don't eat their way through it.

Concrete slabs must be constructed in accordance with Australian Standards (AS3660.1).

**Steel vs timber frame costs:** Steel-framed houses are similar in cost to impregnated timber frames less than 10% difference in the framing costs but the environmental/energy costs for steel is about 20 times more than the harvesting and preparing timber. In case you wanted to know.



#### **Walls and framing.**

Steel frames are increasingly being chosen to lower termite risk. If the usual brick veneer building has a plasterboard interior attached to steel frames, there is less enticement for termites and they certainly won't destroy the building. Pre-treated pine frames are also being chosen. There are a levels of timber preservation; ensure what you choose is not just against decay and weathering. You need the higher level to prevent termite attack (which also includes decay). Mud-brick construction is popular in

some communities for some people. It has some admirable insulation and livability values as well as cost advantages, but you need to ensure damp-courses and physical barriers are in place to stop termite access up through the middle between the mud bricks.

I cannot give you a definitive calculation on the cost of termite prevention against the cost of treating and repairing termite damage. The factors see-saw something like this: the extra cost of suspended floors with normal pine framing can be weighed against the extra cost of steel or pre-treated frames plus reticulation minus the savings on the lesser cost of slab-on-ground floors/foundations. Got it?



Pest professionals can give plenty of instances where termites have found a way in to buildings with steel/preserved frames and ate the wooden smooth-edge strip that held the carpet in place and sometimes termites have just eaten the paper on the plasterboard. And yes, they have been found eating heavy timber

furniture that was seldom (if ever) moved. These are all exceptional instances and not very likely but if it happens at your place, it is important.

**Physical termite barriers.** There are Australian Standards, (AS3660.1) and Building codes which generally defer to that Standard, which set out the minimum requirements for physical barriers. (It also applies to the construction of the slab). Ant caps on top of piers or stumps were the first physical barriers. Not that termites couldn't build a mud tunnel out and over them; but they couldn't go through them. This forces the termites to construct a visible tunnel over them out where you can see them during an inspection. There are barriers of continuous metal strips which can be set into



foundation walls. The strips protrude into the crawl space and serve the same purpose as the ant caps. Where utilities such as cables and water/drainage pipes go through the concrete slab, there are spaces big enough for a

*Here are possible termite entry points which have to be protected: the water pipe (green) comes up through the base of the block wall and inside, the drainage from the shower will go through the slab. Termites only need a 3-4mm gap.*

termite highway. Metal flanges, stainless steel mesh and granite or glass particles of specific size/density are used. The quality and specifications of physical barriers are to be found in AS3660.1. Physical barriers are intended to last the life of the building however it is still absolutely necessary to regularly inspect in case the barriers have been bridged or breached... see the section on Inspecting for termites.

Chemical termite barriers. If you are like some of the homeowners we speak to who think the house you bought came with a 'certificate' stating termite physical and chemical barriers had been completed and that you didn't need to think about termites again **WRONG!** The 7-year builder's warranty includes the pest company's warranty that may give you a 5-10 year period on insecticidal soil barriers **but only if you have that company inspect annually.** It's there in the fine print. The two main types of soil impregnation chemicals have a subtle difference. The original provides a deterrent chemical barrier that termites will avoid. The second has no repellency and termites will tunnel through it but in so doing, they pick up traces of the chemical which may be transferred back to others and kill off the colony.

Up until the mid 1980s, the chemical barriers were stable and lasted an estimated 30-40 years. The replacement chemicals generally last a bit longer than

10 years but the manufacturers and the pest managers who apply the barriers give warranties of up to ten years and then only if you have at least annual inspections. (You can't blame them for requiring the inspections for two reasons: barriers can be breached by human and pet intervention and, in the event of a claim, the cost of termite damage added to loss of resale value can be extremely high. The inspection means they will find damage before it becomes expensive).

The Australian Standard AS3660.1 requires that the soil of the foundation area be treated prior to a suspended floor being laid or in the case of a slab, before the membrane is laid. It also requires that a perimeter barrier be applied before paths and driveways are put down (after the building is completed). That's a big problem. The oversight or reluctance of builders to call back the pest manager means more often than not, the perimeter part of the barrier is not in place before the paths go down. If you are the owner/builder or even the owner keeping an eye on the building in progress, make very sure this perimeter barrier is applied because

it is an essential part of the Standard. It may only last 10+ years, but you have paid for it and should have it. If the perimeter treatment was not done, then the builder cannot claim to have constructed in accordance with the Australian Standard. It is your house; ensure you visit it every day during construction if you can.

An Australian innovation is the development of a chemically impregnated membrane that is only applied by accredited technicians during the course of construction. It goes under the whole slab and foundation areas in tune with the design of the building and doubles as an approved moisture membrane. Its big advantage is its longevity and that it is installed by the people who offer the warranty. The data indicates protection with a useful residue of more than 50 years.

### **Summary**

You can, by design, significantly reduce the likelihood of termite attack however if, like most of us the house is up and you're living in it, this chapter is only relevant if you decide to build your next home.

# Reducing Termite Temptation

Most of us live in a house that has been constructed for some time. Design, physical and chemical barriers are settled. However termite threats are out there and they don't need extra encouragement!

The serious termites start their nest in even small bits



of wood in the soil and take a couple of years to build their numbers into a threat to our houses, sheds, fences, loading ramps, etc. The nest will move deeper into the soil over time but will seldom move laterally.

If you are keeping bits of timber in case they might come in handy one day, stack it on blocks or racks well above the ground so you can look underneath for the tell-tale tunnels. If you choose masonry or concrete blocks to stack your timber, place them on their sides so termites don't travel unseen up the hollow cores.

Termites often come up through the expansion joints in concrete floors and can destroy anything cellulose they can find

If you are storing cellulose material (tax papers, books, photos, cupboards, etc) in a shed or basement

with a concrete floor, do not place the boxes across any expansion joints or cracks in the slab. A crack 3mm or wider will allow termites access and you won't know about it until too late.



We surround our homes with plants and use mulch to retain water and reduce weed growth. Nothing wrong with that, however, the top level of the soil/mulch should be at least 100mm (4") or more below the dampcourse and weepholes. The Australian Standard



*Look carefully and you will see a weephole between the bricks above the dampcourse. If you can't check every weephole at a glance as you walk past, you are flirting with financial drainage!*

says more but we want our gardens to look 'right' and we often ignore the advice. It really should be below the top of the slab, but it rarely is. Plants must not block your view of those weepholes; creepers and dense plants such as mondo grass can easily hide a termite tunnel. If termites are about, you will occasionally find them foraging through mulch. If they stayed in the mulch, OK, but termites being inherently sneaky, don't count on it. That's why you use a monitoring system.

At least have some trapping monitors in the garden so you get to know about termites before they find a way inside. It's much easier (and less expensive) to feed and eliminate a colony attacking a monitor.

If you live in a house that has suspended floors, at least you can get under (hopefully) and check for termite tunnels up the foundations. Don't store cellulose material under there.

Steps, retaining walls, garden seats, decking and anything else made of wood are an enticement; these items need to be regularly checked. Preserved timber has been readily available for years and most tradies would use it. The previous owner may not have been so diligent and once it is painted, it is hard to tell if pre-treated timber has been used. There is another trap for you pre-treated timber comes in various grades; H2 and H3 are only decay/mould resistant. H4 and H5 are also

termite resistant and H6 is all of the above and is used in constantly wet/marine situations.

Putting firewood on concrete means the termites won't find it wrong. And this pile is covering up a couple of weepholes as



well. You could put some monitors nearby and kill off colonies so instead of feeding firewood to termites, you get to burn it.

Old railway sleepers are often used as steps, edging, retaining walls, the gardener's seat for a contemplating

moment, etc. Don't discard them unless you really want to go modern instead of rustic. Put monitors in the fill above the retaining walls and nearby. Killing termite colonies will mean there are fewer termites to eat your sleepers and they will last for decades longer. Spend your money on something else or save it.

*This weephole is just above the dampcourse and there is a brick between the bottom of the hole down to the garden mulch. This is cypress pine chip mulch and some would tell you it prevents termites. Not so. Termites won't eat it but they can tunnel through it from the soil below. Ensure ALL weepholes are clear by making the walk around inspection at least twice a year... March and September.*





*Both these pergola posts are on galvanized stirrups. During your inspection you could see if a termite tunnel went up the stirrup on the right. The lawn surface has been built up to the post on the left and termites could go up the middle of the post and then across to the house.*

Additions such as pergolas, BBQs, cubby houses and dog kennels can act as a bridge across from soil to building. Ensure there are no termite tracks up the galvanised stirrups or across to the building.

Eucalypts and fruit or other trees that develop a hollow “pipe” up the centre as they age should not be near buildings. If they are, check them regularly. If there are dead trees or stumps, with or without the usual camouflaging vine, you probably should make the effort

to be rid of them.

Monitors placed nearby are a must if soil moisture is a potential problem. Termites would much rather forage through moist soil than hard, dry, compacted soil. That's why monitors in the garden are so effective. Monitors don't entice termites closer to your home. They find monitors because they were already in the vicinity. However if there is a drainage problem causing a wetter than usual patch beside or under the house, you need to install some drains to carry moisture away past the building. The southern sides of buildings do not get as much sunlight and soil stays moist for longer after rain. Monitors again. Air conditioning condensation pipes are supposed to be plumbed into drains these days, but if your home was built a few years ago, the pipe may just run onto the footpath or into the garden or lawn.

### **Summary**

Termites don't ask for much out of life. Just moisture and something based on cellulose to eat. They bring their own protective 'mud' and their ingenuity to find a way to food. Your job is to deny them wood. Or at least to make them show themselves by making them cross open impervious areas so their tunnels will be visible. Use monitors to trap/trick them into telling you when they've arrived. And, inspect your home and structures regularly.

## Inspecting for Termites

It's a game of hide and seek. It's also detective work; a deduction of cause and effect.

Many times I've had conversations with homeowners/farmers who have quizzed me on my statement that they might do a better job of inspecting their homes than the professionals. Let's face it, you probably won't be better than the best of them but you will certainly be diligent and go to a bit of extra trouble because it is your home! Professionals issue reports with fine print which gives them some loopholes which is fair enough. They won't accept responsibility for timbers they can't actually see and timbers they can't get to, for example, wooden framework between the plasterboard inside and the outside wall, roofing timbers covered by insulation and sarking and they don't shift heavy furniture to look at the skirting boards behind or empty the linen press and built-in wardrobes to see what may be there.

Think about it for a moment. If professionals are only going to check on the interior mouldings (skirting boards, window/door frames, etc) and the roof trusses (provided they're not covered with sarking) and, if there is no underfloor area because your home is built on a slab, my question is: **what are they going to check that you can't?**

Sure they have moisture meters, but they are only going to give a reading when they've already decided the timber is moist; they may have a thermal imaging camera, but that doesn't look into the wall. It can tell them if there is a surface temperature variance which may be caused by termites but they still have to check by tapping or looking more closely. They may also have listening equipment, but you might buy a stethoscope, however, getting back to my original comparison, there isn't a quantum leap into infallibility coming from using specialised equipment. If you are active and want to save money, you can generally inspect what the professional can inspect and maybe more because you just might move the sofa and push things aside in the linen press.

If you give yourself this job, essentially you'll be looking for 'mud'.

The things to remember are: the subterranean termites will be coming from the soil and when they leave it they use their 'mud' to protect themselves from light, which also means loss of humidity and protection from ants. This 'mud' you'll be looking for comes in the form of tunnels over impervious surfaces (or timber they'd rather not eat) or to pack up splits, cracks, grooves and joints in timber.

Termites are more likely to come out of soil that is damp. That probably means your garden, a low area or depression, maybe the South side where the sun doesn't dry the soil out, or maybe near a water tank, an air conditioning condensation outlet, etc.

Termites have evolved to eat cellulose. They have protozoa in their gut which makes digestion possible, but they prefer their cellulose (timber) to be a little softened up with a modicum of decay fungi. If you wonder why or how they find timber, it is often because



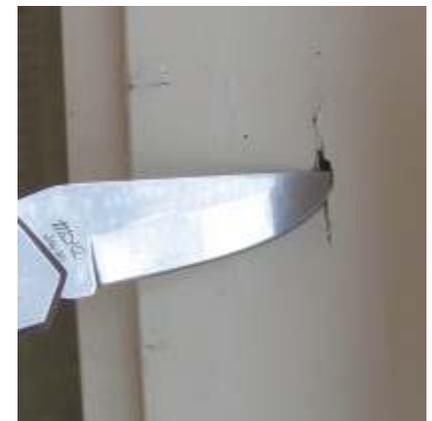
*Left: 'Mud' packed between two wall studs in an un-sheeted downstairs laundry. Right: Look carefully to see the 'mud' in the joints of the mouldings of this door frame and also see the uneven surface toward the top of the architrave where termites have come so close to the surface they've only left the thickness of the paint.*

the gas by-product of fungi attacking wood is carbon dioxide has been detected by the foraging scouts which move 'upstream' to the source...wood! It's how they found fallen logs in their pre-historic forest and nowadays they use this talent to find a way into your house. If you have a plumbing problem of a leak in the wall behind the shower, the termites may be the first to find it!

Apart from looking for 'mud', you will need to look out for timber surfaces (painted or not) that are uneven or wavy/distorted.

You will also be using your ears. Running a tool over a timber surface gives you a sound you will quickly recognise as normal. When you hear it change to a hollow sound, you investigate more closely with a sharp pointed knife or fine screwdriver (and your eyes and fingers first). Sometimes termites only leave the paint and pressing gently you will feel the lack of solidity.

Now with the blade aligned with the grain or length of the wood, you can insert it into the timber and twist (gently, always gently). Holding the little split open for a few moments, you may see the antennae or other movement of the workers and soldiers inside.



Also using your ears, tapping can produce a reaction from soldiers inside the timber which sounds a little like the ratchet of an old fashioned watch if there is one or a few soldiers inside; if there are hundreds, it can sound like dragging a screwdriver slowly over very coarse sandpaper.

**Your tools:** eyes, ears, a bright torch/flashlight, a knife or small screwdriver. You could build yourself a long-handled sounding implement to tap or run along skirting boards without having to stoop, or to save some crawling to reach timbers in the roof or under the floor. I use a bit of left-over curtain rod with a round finial so it doesn't scratch or mark. (See illustration). Golf putters have been used successfully. You'll also need a stepladder to get up into the roof void and a cloth to wipe your dirty fingermarks from the manhole cover.



### **The inspection process:**

**Outside:** Poke about in your garden moving the top layers of mulch and leaf litter. Look at plant stakes, fences, wooden steps, retaining walls, posts, wooden seats, even tilt big plant pots (potting mix is high in

wood fibre). Look for those damper areas and relate them to the rooms closest to them so you can pay a little more attention to those rooms once you go inside... and the roof areas above them.

If you have a concrete slab-on-ground floor, now is the time to check every weep hole. You're looking for 'mud', remember? The tunnels if any, will probably follow the mortar joint between the bricks, or if no bricks... straight up and in. If plants such as mondo grass, creepers or other ground covers are blocking your view, it is time to cut them back or get out the glyphosate and kill them...your house is at stake!



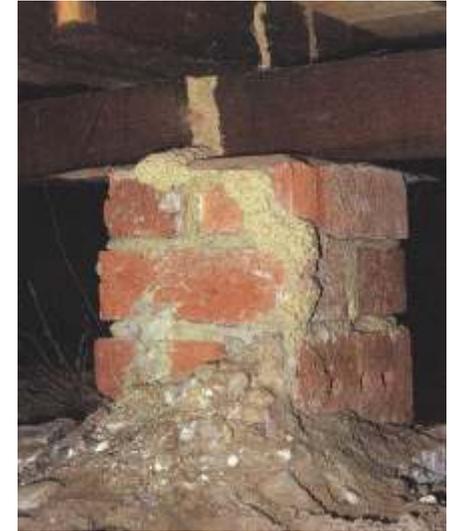
Look for possible 'bridges' that allow termites to traverse across from soil to the building. These bridges take many forms: pergolas, pool pump screens and pump houses, kennels, cubby houses, fences, gateposts, firewood, stacked timber. If you find anything suspicious, remember to be gentle. Alive and working termites are to be preserved at all costs because they are the ones that can take the bait back to kill off the colony.



*This is a timber screen for a pool pump. The post in the ground is connected to another post bolted to the wall by timber slats. Even if the timbers were preserved, termites could build their tunnels over them. Once at the wall, they might enter behind the power points, or run up behind the down pipe to the eaves...then there's the weephole! There may not be more than a couple of tricky places at your place; once you've identified the possibilities, it is just a matter of checking at each inspection you do in March and September.*

**Underneath:** If you are lucky (or sensible enough) to have a house you can get underneath, now's the time. The good thing about suspended flooring is that there is more space between you and the termites in the soil and there is the high probability that you will be able to detect any tunnels up the foundation walls or piers/stumps. Pay particular attention to corners, damp areas, chimney bases, and the top of the foundation

walls adjacent to filled in bathrooms, laundry and patios. Of course if there are stored treasures such as boxes, taxation papers, bits of wood that might come in handy one day (get the idea?) look carefully and move anything gently and inquisitively.



*You'll be hoping not to see anything like this underneath... But it is exactly what you will be looking for...termite tunnels up the foundations, built over any capping and into the timber. They don't always build over the joists and bearers once they get to them.*

**Inside:** Start at the front door and begin tapping the architrave and skirting boards on the right (if you're right handed). Keep going right (or left if you're a lefty)



tapping or running your tapper/putter and your screwdriver along every moulding you pass until you are back at the front door. This is where you can beat the professionals, because you will shift the sofa, the beds and you'll look in the wardrobes and the linen press won't you?

**The roof:** By now, if you've not found termites, you may feel it a waste of time and energy to go up in the roof. Why bother? Because it's your house and your \$thousands in repair costs if they have gone straight up the studs into the roof without touching the interior mouldings. Sure you won't excavate every ceiling joist or rafter from the insulation, but you can crawl/walk/clamber along and shine your torch along the trusses looking for mud tunnels or mud packing in the joints, particularly over the bathrooms, laundry and kitchen. Who knows, you may find something else important while you are up there such as daylight coming in through a cracked tile, rats or possums, insulation over



*Termite 'mud' packed in between framing timbers as well as a big mass of 'mud' on the left of the photo.*

the downlights, etc, Which reminds me, if you turn on all the downlights in the house before you go up, it makes it easier to see.

### **Summary**

You can have great chemical and physical barriers; you can have monitors around your backyard like a picket fence and yes, you may have already killed off a colony or several. Believe me, since Captain Arthur Phillip had his first tent eaten by termites in 1888, termites have found a million ways to get to wood in Australia's homes. Inspecting at least once a year will give you a great chance to find termite evidence before a door falls off or a broom goes through a skirting board. If you live in the temperate to tropical areas of Australia, I suggest you inspect during the first week of spring and the first week of autumn, because it is not so hot up in the roof and not freezing underneath. Also, if you find termite galleries, they are more likely to be occupied. Hot timbers in a roof may be vacant during the day when you inspect and you'll miss out on possibly hearing their return tapping.



## Identifying Pest and Nuisance Termites

The other 300 plus termites which are insignificant compared to the Coptos, Schedos and Mastos, become a concern to homeowners if any of them are found in the garden, the fence and yes, sometimes the house. The concern is that you recognise it as a termite but you don't know in which of two categories to put it serious or not so serious. (I know, I know, if it's your home, it **is** serious)

Instead of describing all of the insignificant termites, it is better to give you some detailed features of the Coptos and Schedos. (See the illustrations). You already know Mastos as being almost twice the size of the others and found in the North.

Coptos or *Coptotermes* is the name of the genus and there are a few different species spread around Australia. There is no exam for you to pass so don't get apprehensive when you read the next couple of sentences. *Coptotermes acinaciformis* is the main destroyer in all states (except Tassie). In WA there is a variant *C. acinaciformis raffrayi* a different species *C. michaelsoni* and in the eastern states there are two different species *C. lacteus* and *C. frenchii*. which are almost in the nuisance category but they do eat houses (slowly). They are also a little smaller than

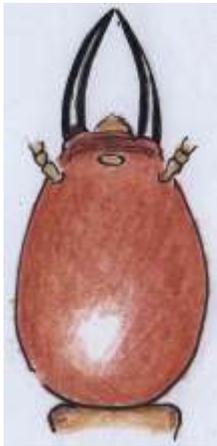
*C. acinaciformis*, but you'd need to see them all together to notice. However, the soldiers have the same shaped heads (a bit like an avocado or an egg) and they all produce a milky secretion from a hole in their 'foreheads' which is a deterrent to ants. The reason we describe the soldiers is because soldier head and jaw shapes are more distinctively different than the workers which generally are similar for the whole 350+ species. Soldiers are easily recognised from workers when you open up the termite gallery; soldiers have a darker, brown to dark brown head than the pale head of workers. Worker abdomens are larger and more transparent.

Schedos or *Schedorhinotermes* is the genus and five or six species are also spread around Australia. You need fast eyes to see them because they are very timid and quickly hide when you open up the working galleries. Schedo soldiers come in two sizes. The bigger ones are called major (which is an appropriate title for a soldier) the smaller ones are called minor (not so appropriate).

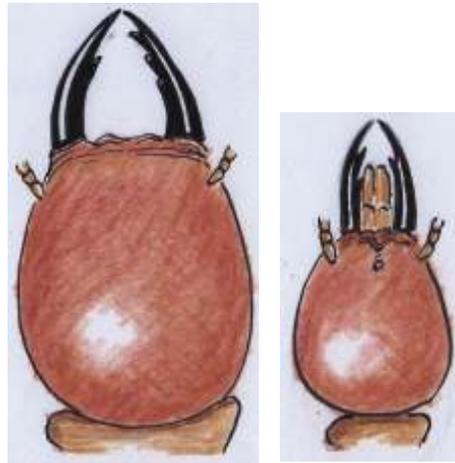
If you only see minors, it is probably because the colony is less than a couple of years old. The majors develop when the colony is more mature. This info is a

bit academic because you probably won't discover Schedos in a building until it is from a reasonably mature colony in which case you will see both sizes that's the best and easiest identification key. The Schedos are the only ones with two ranks of soldiers.

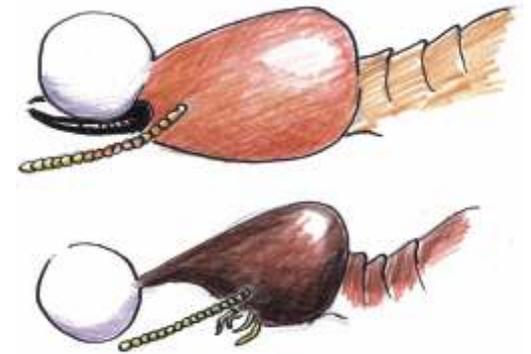
Both Copto and Schedo soldiers have two black jaws sticking out in front when you look at them from above. They both produce the droplet of milky liquid for defence. The drawings show the shapes better than a written description.



Left: typical *Coptos* head; avocado or egg shaped with a fontonelle to secrete a milky defensive liquid



Right: Schedo soldiers. Major on the left and the minor soldier in approximate size proportions. They also have secretion glands and both *Coptos* and *Schedos* make the ratchet-like response sound.



Defensive secretions of *Coptos* (top) and *Nasutes* (bottom). Both species found in most parts of Australia

There is another genus that deserves special mention because it does attack seasoned timbers as in houses. These are *Nasutitermes* or Nasutes and they also produce the milky liquid defense response. See the drawing of the head shape of the soldier and you will never have any difficulty in identifying them. The latin '*nasus*' means flask so the flask shaped head gives them their name. These soldiers rely on the milky droplet because they don't have big mandibles...just tiny mouthparts under the head so they can receive regurgitated nourishment from the workers. *N. exitiosus* is a mound builder generally found south of a line across the continent passing through the SA/NT border to just above the Qld border.

They are mound-builders and they can severely damage buildings but because it is easy to notice the mound and kill the colony before they do any real damage, they don't rate in the significant category. However, if you find

termite attack and the soldiers have the dark pointy heads, have a really good look around for their mound. It may be in your next door neighbour's block, it may be over the fence in park or bushland. Go find it and physically destroy it because the chlorfluazuron bait is more expensive and not as quick to kill as a mattock and some liquid insecticide. The other Nasutes are not very interested in seasoned timber. For these reasons, I've placed the Nasutes in this Nuisance Termites section.

**Now we can generalise about the other less significant termites** found around our homes and paddocks and sometimes in our monitors...which is another reason they are a nuisance. They are in there taking up space and eating the wood/cardboard we put there for the Coptos, Schedos and Mastos so, the question becomes: what to do about them?

Baiting them with chlorfluazuron seems a waste of bait. And, most of them are not so affected by it anyway; they often have smaller nests and there is no massive death event to cause the fungus and decomposition gases which kills the bigger colonies. Others are more seasonal in their moulting so you may end up feeding them all through autumn, winter and spring before large scale moulting occurs and this is frustrating. The insecticide fipronil we mentioned earlier for the control of Mastos is probably the best to use but it is restricted to pest technicians. (See Mastos box in Killing Termite Colonies chapter).

So, are there other clues to these nuisance termites? Some have very thin 'mud' almost like a plastering appearance up a fence, a post and the 'mud' is very dry and fragile. Others make comparatively little amounts of 'mud', small tunnels and usually only found in wood that is weathered or even rotting.

Size of the soldiers is not definitive. Coptos and schedos are about 5-7mm long so if the soldiers you find are smaller than 5mm and the mud is not substantial it is probably a nuisance termite.

Sending termites for identification. We can possibly assist to identify your termites if you post us soldiers stuck to a piece of clear sticky tape. Your name, address, phone number and a brief description of what they were eating must also be included. Post to: ID Termite Research, P.O.Box 779 Sanctuary Cove Qld 4212. Alternatively you can photograph some soldiers with your phone/camera and email to [id@termiteresearch.com.au](mailto:id@termiteresearch.com.au) along with your description of the circumstances. Before you send, check that the image is clear and the size of the soldier on your screen is at least the size of your thumb. NOTE: soldiers are the ones with brown heads; they are sometimes smaller in size than the workers which generally have bigger abdomens.



## Termite Control Limitations

As a do-it-yourselfer, you probably won't have equipment to drill holes in concrete, pumps to force hundreds of litres of insecticide down through the holes which regular professionals have to do such jobs more quickly and safely. By the way, sump oil, diesel and creosote (if you still have some after all these years) are of little deterrent value. They don't soak far into the wood and besides, termites may get in through an end and never go near the oiled surface. They are OK as a deterrent to fungi for a couple of years.

The value of replenishing a chemical soil barrier is open to question. Once a building is in place the original chemical begins degrading and will be ineffective after about 10 years. Applying a replacement barrier will never give you a 100% continuous line of chemical because you just can't be sure even by drilling holes in concrete pathways, patios, etc., that the puddles underneath the slab will all join up. The question: As it is going to cost thousands for a professional to do maybe an 80%-90% job...is the expense worth it for less than 100% effectiveness? If you decide to go ahead, here are some guidelines:

**Concrete slab floor.** If your weepholes are close to soil level, you may want to poison the soil adjoining the outside of the slab so termites can't come up from it

onto the wall and build a short tunnel to get inside. The two main chemicals homeowners can readily purchase are chlorpyrifos and bifenthrin. These are the two mentioned earlier for killing off termites in trees and mounds. You can mix up the solution and, preferably using a watering can, apply it to loosened soil adjacent to the wall so that it soaks in. The rate is on the label, but 5 litres to a lineal metre is the usual application rate. You may also decide to soak it down behind timber retaining walls, sleeper garden edges, etc. Please read the label and precautions because these are insecticides and not to be handled without respect. Once they are in the soil, there is little hazard; mixing, applying and storing the concentrate is the concern.

**Suspended wooden flooring.** The same insecticides can be used to make a soil barrier around the piers/stumps and the inside of the foundation walls under the building.

Chlorpyrifos contains a hydrocarbon solvent which can make homeowner treatment in confined underfloor areas a much more uncomfortable, indeed more toxic exercise than using the bifenthrin product which has little solvent smell. If the floor is so low that you can't easily take a watering can under and have enough clearance to tip the contents into the loosened soil along the foundations, you should get a professional to do it. Using a pneumatic garden pump sprayer is not recommended either. There is no way you

can easily apply 5 litres of liquid per lineal metre over 30 metres (150 litres) with such a pump.

If you think the task is beyond you then it probably is. At which point you should call in a professional for their assessment and proposal/quote.

## Assessing Termite Quotes from Professionals

The highest formal level of technician and company is PestCert accredited. The main association is the Australian Environmental Pest Managers Association. Your local professional may not be a member or PestCert accredited and still be a salt of the earth, honest and knowledgeable person. After 50 years in the business I found most of them are, but I also know plenty of instances and stories where customers have been badly advised and ripped off. My advice? Get a couple of companies to assess and submit written proposals (not on the back of a business card).

Ask to see a current technicians licence and check to see it includes timber pest qualifications. Some are only accredited for various household pests such as cockroaches, ants, spiders, etc. You also need reassurance they carry professional indemnity insurance.

When you phone, tell them briefly that you've found live termites (or termite damage which may or may not be active).

Ask what it costs to have their inspector make an assessment and prepare a proposal. (Few give free written assessments; it takes time to be thorough and there are litigation consequences if they get it wrong or miss something due to rushing through an unpaid-for inspection).

Most companies will waive the assessment fee if you accept their proposal but, just as you know there is no free lunch, the cost is in there somewhere.

Before they start their inspection, make the definite point they must not disturb any live termite galleries. A second inspector needs the same consideration as the first and needs to verify the species for himself in undisturbed termite galleries.

You might as well let them know you'll be getting a second opinion before they start. Do not show or discuss the first company's proposal with the second company because the second company may rely on the first company's inspection and not make their own full inspection. Also, they may just shave a few dollars from the first company's price. By not knowing the price to beat, they may give you a much lower price.

All companies have a duty of care to offer industry best

practices which obviously includes an inspection to the AS3660.2 or AS4349.3. Because of this, they are obliged to offer all applicable treatment options covered in that Standard. Also, their professional indemnity insurer insists that they offer the full suite of treatment and preventive/protective measures. **You are under no obligation to accept every recommendation**, but if you don't, there would be a lessening or total elimination of any warranty. It is completely up to you to weigh up the costs and possible consequences. Negotiate.

To give an example, attempting to kill the colony is first and foremost, but if everything was torn apart before you were able to read this, and there are no live termites left to treat, they will probably propose some chemical barrier which may include drilling and flooding insecticide through to the soil beneath the concrete. They will also (usually) propose to set up a series of monitors outside in the surrounding areas to try and entice and intercept the colony that caused the attack. The discovery disturbance has prevented direct baiting of that colony so using monitors provides them (and you) with another chance.

Now you understand why companies propose the full bells and whistles. They then may offer a guarantee which sounds great, but have a close look at the terms

and conditions of that guarantee (which may also even include timber replacement). It will almost certainly require you to sign up for the full treatment proposed plus regular inspections and maybe some other clause(s) that you may not be able or want to honour. If you miss an inspection or do something else to breach the guarantee agreement, you just paid lots of money and the guarantee is voided. There is still a warranty of some degree under your State Office of Fair Trading if what you agreed and paid for is unsatisfactory.

As this is essentially a website for DIYs, you probably have a DIY attitude and you may decide to do the parts of the proposal (such as the monitoring) yourself but I suggest that if you decide on chemically treating the soil, you give the professionals that job.

A good thing about getting in a professional is that if your termite situation is more complicated than you feel confident in attempting, you now have someone who knows termites better than you to give you their assessment...so you can assess it. Having read this far, you'll know if what they say makes sense.

Like in any business dealings, the fine print is there to be read and explained to you if you don't understand it before you accept and sign.

## Glossary of Terms

**Activity.** This is a term used by pest technicians to describe the presence of live termites discovered during their inspection; they are active, and this means they can be baited so that the product taken back to the nest will kill off the colony. When the term 'evidence of termite activity' is used, this might only mean they have found some termite damaged timber (obviously caused by live termites but not necessarily current). The inside of termite galleries is protected from aging and deteriorating agents such as light and the accumulation of dust. This makes it almost impossible to determine the period of time since live termites were present.

**Aggregation device.** These are essentially monitors that contain lots of termites. The more termites aggregated, the higher the success in getting enough bait back to the nest to kill it.

**Arboreal nest.** This is a nest up in a tree. The colony usually feeds inside the hollow of the tree as well as building tunnels down the outside of the trunk and across (or just under) the soil surface to their preferred food. Hardly any serious termite damage is inflicted on houses from these colonies.

**Bivouac.** This is more an outpost or a re-hydration structure which is often built close to ground level, and usually found inside the wall cavity of buildings. It is a mass of moist 'mud' where workers and soldiers can re-hydrate before a trek back to the nest. There is no queen present and it is not a nest.

**Cache.** A protected source of bait, which in the context of this book, is made available for termites to harvest by leaving their feeding environment to enter into the dark and enclosed environment holding the bait. The cache can be in any container affixed to the outside of the attacked wood after a hole is made into the galleries aligned to a hole in the container. A cache can also be made using say aluminium foil to form a pocket or poultice and attached to a surface using adhesive tape.

**Cellulose.** The basic building block of wood (and cotton) and other plants after the starch, sugars, resins, water, etc, are gone. Termites have a protozoa in their gut without which they could not digest it. The protozoa is transferred by the workers regurgitating food (and protozoa) to the nymph as soon as it hatches from the egg.

**Chlorfluazuron.** This is an insect growth regulator (IGR) also known as a chitin inhibitor. An insect goes through a series of moults as it increases in size between egg to adult. (See cuticle). In the case of termites, the nymphs are fed by workers regurgitation of cellulose brought back from the feeding areas of the colony. By including a minute dose of chlorfluazuron in the cellulose bait harvested from a cache you place where you've found them, the nymph cannot produce enough chitin to form it's new cuticle and it dies. Inside the warm and humid nest, the death event of thousands of nymphs causes decomposition and fungus growth the workers cannot clear and the whole nest dies including the royals which are in the centre of it all.

**Colony/nest.** The nest is the central part of the colony where the queen and the nursery is located. In some termites, Mastos is an example, another queen may be produced and she sets up her colony at the edge or further reaches of the original colony and shares some workers and soldiers initially. It's a flying-less start. And much more successful.

**Cuticle.** Another name is chitin. The outer shell of the insect is rigid, particularly the head and thorax. The muscles are attached to the inside of that shell and

stretch across to other parts of the shell to provide anchorage points. When muscles contract to move a wing, a leg, a jaw, this outside shell is essentially an exo- (meaning: external) skeleton. The cuticle does not stretch to allow the insect to grow, so in the case of termite nymphs, they go through moults by splitting the old, small cuticle and emerging from inside it with a new, soft cuticle which they puff up with air/moisture until it hardens to the next, larger size. See chlorfluazuron and how it affects this moulting process.

**Drywood termites.** These termites do not require a reliable source of water other than what can be obtained from the atmosphere or the timber they are eating (usually above 16%). They are more likely to be found in tropical areas where the temperature does not fluctuate greatly and the humidity is mostly above 60%. The West Indian Drywood termite, *Cryptotermes brevis* is occasionally found in Australia and AQIS (Quarantine) has to be notified and they supervise treatment to prevent this species becoming established. Some native species are occasionally found in drier areas.

**Galleries.** In harvesting wood, termites are like miners in that they leave 'walls' of wood between the areas they are eating (like rooms in an art gallery). If you discover

termite galleries and open them up to investigate the extent of the damage, you will destroy their security and they will not be able to repair it. Their instinct is to seal off the damaged area at an undamaged part of their working galleries closer to their nest. This will sacrifice maybe thousands of workers and soldiers to the drier conditions and probably ants, but the nest will again be defensible.

**Foraging.** I don't know a termite psychologist but a theory for why termites seem to always be on the search for alternative food sources is based on the evolutionary theme of survival of colonies with an inclination to have many supply lines...because in the eons of time there have been many floods, fires, large animals, etc., that have destroyed or moved even large logs. No back up? Demise! So the termite species with an exploratory attitude survive. The by-product gases from decaying wood includes carbon dioxide and a foraging scout will be sniffing for it. When detected, it will go 'upstream' to find the source...a log, a branch, a house, a shed, and yes a termite monitor placed specifically to entice them into aggregation so they can be fed or dusted or foamed with a transferrable agent to kill the colony. Having found such a source of moist cellulose, the scout returns along a pheromone trail, adding more pheromones so the

workers can construct a protective tunnel through (sometimes above) the soil back to the nest. The process can take days to months.

**Genus.** See Scientific classification.

**IGR (Insect Growth Regulator).** A chemical agent which interferes with or inhibits the processes of insect growth. Insect development goes through stages: egg, larva, pupa, adult (as in a butterfly: egg, caterpillar, chrysalis, butterfly) or, egg, nymphs, adult (as in cockroaches and termites: egg, nymphs getting larger in stages punctuated by a moult and then the adult). The IGR used to kill termite colonies, inhibits the production of chitin so the moulting process cannot occur. See chlorfluazuron and cuticle.

**IPM (Integrated Pest Management).** 'Integration' means to include or add, so IPM means you will combine as many forms or methods of pest management as you can to get a better result than you might with one method alone. In termite control, you design buildings so termites cannot enter without exposing their 'mud' trails, you use physical and chemical barriers, you add monitors outside to intercept them where you can easily treat them and you regularly inspect everything.

**Mound nests.** Because few people will tolerate the presence of a termite mound in their yard or close to buildings, they tend to destroy it by digging it open to let in ants and other wildlife or poisoning it with liquid insecticide. Although some mound-building termites will eat the seasoned timber in buildings, the ease of destroying the colony means they are not a significant contributor to the \$damage bill in Australia. Most mound builders are grass and leaf-litter feeders.

**Mud.** Termites regurgitate food to build their tunnels and seal up cracks/crevices to keep in humidity and keep out light and ants. It looks like mud. There may at times be some soil in it.

**Pheromones.** Specific scent-like secretion that conveys messages to those of the same species (or close relations). When a scout finds a new food source, for example, deposited pheromones help it find its way back home and guides the tunnel builders back to the new food.

**Pipe.** Mature trees, especially eucalypts and many fruit trees, decay from the inside as the old heartwood is no longer a living tissue. This hollow running up the length of the tree trunk is called a pipe. Being moist from the

decay, termites find this very attractive food in a sheltered/protected situation. A colonising couple finding their way into the pipe, probably through the hollow stub of a broken-off branch or a split in a fire damage scar will have the best chance of setting up a successful colony.

**Scientific classification.** Termites are insects in the Animal kingdom, which is divided into Phyla, a section of which is Arthropoda, a section of which is Insecta which is then split into Orders, one of which is Isoptera (termites) then we get to the Genus and then the Species and then the variants (sub-species). When in print, the latin names of the Genus and Species are set in *italics* with a capital for the first letter of the Genus name and no capital on the species name. when the species is referred to again, it is shown with the capital letter only of the Genus, dot, then the species name. examples: *Coptotermes acinaciformis* repeated as *C.acinaciformis*.

**Species.** See scientific classificaion.

**Subterranean termites.** They begin their colony in wood in the ground from which they derive both of their necessities: food and a constant source of moisture to humidify their nest. Whenever they leave the soil to find other food sources, they construct 'mud' tunnels and also

use the same 'mud' to block out light coming through cracks and splits in to where they are eating.

Subterranean termites may build mounds, begin their colony in the base of a tree, or having begun in a small piece of wood in soil, construct their nest entirely below soil level from which they radiate in many directions to additional food sources.

**Swarming.** Most pest termites swarm in early summer when the temperature and humidity inside the colony is more closely matched by the outside warm and humid conditions. Depending on where you live, these colonising flights take place from October to early December, but the big event is usually early evening after rain on the same or previous day, the warmth and humidity is high and there is little or no wind. If you see flying termites and you are sure you won't be the victim of lightning, get a powerful torch and wander around to see if you can find where they are coming from. Their nest will be close by.

**Tunnels.** See 'mud' and 'subterranean termites'.



