J. Lochman

Quiet Achievers

by Tess Williams

Humans, dependent on 'society', and seemingly unable to define and defend the term, should have great admiration for any population in which each creature finds constructive occupation, each creature lives in harmony with its many brethren and the good of the many is the ruling political principle. Unfortunately, most people do not feel such a sentiment for the humble termite. They are more likely to view it as yet another pesky infestation of suburban Eden.

There may be some basis for the latter reaction if we examine the pedigree of the termite. Termites are, in fact, a close relative of that insect that tends to send all but the most ardent insectophile looking for a shoe - the cockroach. While this may not win them a place on the domestic popularity poll, it does give us further grounds for respect. While termites share few physical characteristics with their relative, they certainly have the same hardiness and adaptability that guarantee them a place on this planet as long as it sustains life.

Ancient termite fossils have been found which date back as far as 200 million years, and fossils dating from between 70-75 million years are common.The continued existence of similar species tells scientists of the insect's capacity to survive enormous climactic change and of a common ancestry with some African and South American species before the continents separated. Definitely one of nature's success stories.

In the Pilbara region of W.A. there is a species of termite, *Mastotermes darwiniensis*, which still closely resembles the fossilised remains of 70 million years ago. This particular species is the SAS contingent of termites in W.A. They are the only true solid wood eaters in the State, and they have provided some expensive headaches for our more recent northern pioneers.

Mining companies laying extensive railway lines to transport iron ore have fallen foul of *Mastotermes*, which will eat wood even when there is no sign of fungal decay. Not only will they eat wood which is whole and healthy, they will eat treated wood. Companies in the North West have even treated railway sleepers with poisons to discourage the infiltration of *Mastotermes*, only to find that a proportion of the termites will man the front trenches, and the rest will perservere over the bodies of fallen comrades until a depth of wood is reached where poison has not penetrated. Concrete and steel sleepers are gaining in popularity above the Tropic of Capricorn!

Mastotermes are virtually unstoppable. An attack on a jarrah sleeper (above) and on a karri sleeper which had been treated with dieldrin and creosote (below).

Although not generally as aggressive as *Mastotermes*, most termite species still seem to prefer a hardy existence in arid or semi-arid regions. Of approximately 130 documented species, only 15-20 species are regularly found in the wetter, colder South-west corner of W.A., and an increase in termite activity and occurrence is clear beyond the 500 mm Isohyet in the wheatbelt. Termites do have distinct and complex social structures, similar to the more familiar ants, and a fascinating life cycle which is the basis for their colonies. Although varying in size, from a few hundred individuals to many thousand, the termite nest is always started by two enterprising individuals, known as the king and queen.

Courtesy S. Eyres, Department of Agriculture

A soldier ant (brown) and a worker ant (white) on a twig (right).

The king and queen fly from their original home as alates, and are known, at this stage, as perfect insects. They are winged, sighted and sexed. On finding a suitable site for a nest, the alates land, they snap their wings off, and the queen releases pheromones into the air which indicates the acquisition of crown land and attracts a male if she does not already have a consort nearby. The king and queen then set about excavating a vertical tunnel and a chamber 15-20 cm beneath the soil surface.

It is in this humble bedsitter that the first family is raised, and it is here that the queen will be required to perform manual labour for the first and last time. In addition to excavating their new home, she raises the initial batch of workers and then assumes the sole function of mother to the future colony, while the workers turn to the business of nest building. The king will periodically fertilise the queen and all eggs in the colony will come from her body. The breeding life of the king and queen can be a long one, even by human standards, with the royal pair of some species staying productive for up to 70 years.

With continued egg production, the queen's body becomes quite distorted. Her abdomen will often enlarge and she will be unable to move. And, of course, being the sole egg dispenser the queen is a very valuable member of the community. In a situation where the queen suffers an unplanned demise, the results can be disastrous for the entire colony. Some of the more hardy species, like *Mastotermes*, have a neat evolutionary trick which can be performed in such an eventuality. A worker termite, by means unknown, can be promoted to heir apparent, and can eventually take over the queen's role.

As long as eggs are produced, the workers are kept busy extending the nest and caring for the eggs. Caring for the eggs and the immature insects is a time consuming process as unhatched termites and the young need a constant environment with high humidity and warmth. The search for water to maintain humidity can entail workers burrowing up to 18 m beneath the soil in drier areas and the occupants of the nurseries are continually relocated to ensure the safety of the new population.

Workers, then, are vital to the founding of the colony and form an entire caste in the mature social system of the termite colony. They are responsible not only for building the structures of the expanding nest, but also for maintaining those structures throughout the life of the colony. They provide all care for the king and queen and any dependants, and collect all food needed by the whole population. In human terms, a rather thankless task, as this industrious group are blind, wingless and unsexed.

Another caste in a termite colony is the soldier caste. In practical terms, their individual lives are as joyless as the workers. They are also blind, wingless and unsexed and they devote their lives to protecting the colony and the future generation that will come from the nest. They are, however, well armed, some with large mandibles, some with chemical deterrents which they fire at offenders, and some with both.

The nobility of the termite mound is found in the alates, the last of the three castes. These individuals are the potential founders of new colonies and the reason for the vast

support system of the other castes in the nest. They are the silver spoon faction, winged, sighted and sexed, 'perfect' insects. When breeding season comes, they will have a brief burst of glory as they leave the nest in massive numbers. The release of alates in such quantities is nature's guarantee that some will establish themselves, because most of the pretenders to a throne will actually end their shining careers in the gullet of a frog, bird or lizard.

This flight of the alates often takes place after a cyclone in the Pilbara. They are obviously a vital element of the local ecology. Loaded with fat and protein, they provide a feast for local wildlife, probably influencing the breeding capacities of many other creatures in the drier areas of the State.

The composition of the nest is regulated by two factors. Firstly, royal decree controls caste production, with the queen maintaining the balance of workers, soldiers and the future reproductive caste. The critical factor in the determination of caste is as yet unknown. It is possible that each insect is fed an appropriate diet, or is introduced to certain chemicals, to ensure development into a soldier, worker or alate.

The second factor, which will dictate the size of the nest, is food availability. In times of shortage, the termite family will be considerably reduced, in times of plenty they will thrive in accordance with nature's rules. In Australia, famine for termites is rare. From the scrubby, dry areas of the Pilbara to the wetter southern forest floors, there is usually plenty to eat, from twig and leaf debris to fungus or fungus-affected wood, and even humus.

Very few termites, even though they sport the title of sound wood eaters, drill through healthy wood or bark. They will search out decaying or damaged wood because termites, like all animals, cannot digest cellulose, it is the micro-organisms which inhabit their gut which do the job. Termites were probably one of very few species in Australia to actually benefit from the advent of Europeans. If trees are bruised or damaged by fire it leaves them vulnerable to decay and future termite attack.

Europeans also provided another source of food for the voracious timber eater - his dwellings and other structures! It is this unfortunate dietary habit, despite the value of the insect in undisturbed ecosystems, which tends to provide the focus of most urban perceptions of the termite. Railway sleepers, house stumps, wood piles, furniture and even books and documents are prey to termite appetite if untreated. And, once infested .... Prevention is certainly better than cure in this case.

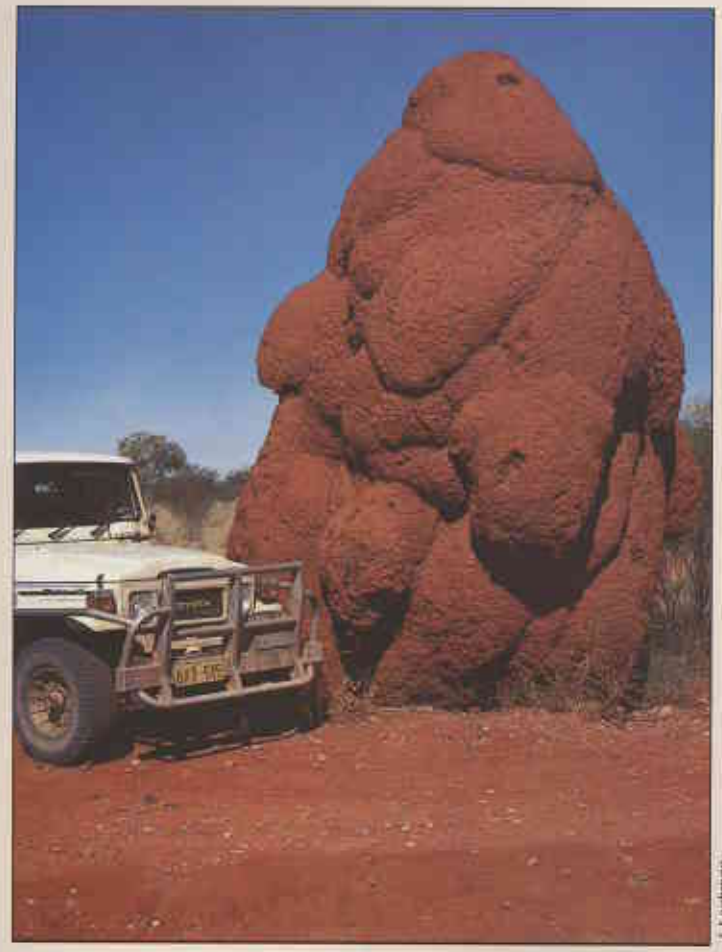
The main culprit was well established in Perth when the first settlers arrived, and has never left, waxing fat on the provisions of white civilisation. This species is called *Coptotermes acinaciformes raffrayi*. All species of the sub-family *Coptotermes* form large colonies in a variety of habitats. The species can live in stumps, in dead or living trees, in subterranean nests or in the distinctive mounds that can be seen in various parts of W.A. It is commonly called the white ant and the mode of operation with domestic timber is to burrow through at a point of weakness and to honeycomb the timber with a series of chambers and galleries which become more extensive as the resident numbers increase.

Old wooden homes built on untreated ground are not the only prey for this determined insect. Where houses are built on stumps with metal protectors, or have impenetrable concrete piers as support, *Coptotermes* will build 'shelter tubes' which will allow them to bypass obstacles and reach timber. They can infest any timber structures in new houses, panelling, architraves, fire surrounds and even furniture.To prevent the original royal pair from settling in like unwanted relatives, it is necessary to take some basic precautions.

Home owners should inspect their properties at least once a year. Areas underneath the house and roof timbers should be checked with a torch, and a sharp instrument should be used to probe wood to ensure there is no infestation. Wooden fences and out buildings should be checked and organic yard litter should be shifted as piles of leaves and woody debris are an invitation to a royal garden party of the worst kind!

If annual inspections are too difficult for the house owner, most pest control firms perform inspections and will provide written reports on any termite activity. They also serve tenants of nests with eviction notices. To dispose of active insects, arsenic dust is used directly in the nests, and chemical barriers can be placed on the soil around and under the house to discourage the termites from entering any neighboring timber. This protective treatment is used regularly on suburban buildings whether they have ever had problems with termites or not.

A lack of local information tends to suggest that, even though damage to man-made structures does occur in and around Perth, the termite is not as prevalent here as in the Eastern States. To corroborate this, and to obtain a clearer portrait of the occurrence of the termite in Perth, CALM is trying to identify the species most common in the metropolitan area, the timber most prone to attack and the specific



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Termite mounds

A large number of harvester termites, termites which harvest grass and small pieces of organic debris, build mounds. They are usually created from a mixture of clay in areas where clay is available. Where it is not, the mounds will be formed of sand and chewed food matter, giving the mound a woody structure.

Mounds can be three to four metres high and be composed of tons of material. Inside a large mound the galleries will often end high above ground level with a pool of water, which assists in keeping the humidity of the nest constant. Because of the enclosed nature of the mound and the enormous amount of activity carried on in galleries and chambers, a large amount of methane gas is generated within termite nests. No mean contribution to the Greenhouse Effect!

Giant mound near Harts Range (left).

R. Karri-Davies

Mound on Bungle Bungle Road.

trouble spots. Local pesticide firms, armed with specimen vials, are helping to collect the necessary information.

Termites in the natural bush surroundings are not so easily studied. Estimates indicate that there are probably 80 species of termites as yet undocumented in W.A., the majority of these are in the semi-arid and arid parts of the State and in the Kimberley.

No doubt the discovery of these unknowns will be the province of the methodical and dedicated bush loving scientist or keen naturalist, as consideration of termites in undeveloped areas is as important as their being studied in the urban landscape, and is a little more difficult. We certainly need to know much more about their impact on undisturbed environments, their beneficial roles in the ecosystem. Apart from anything else, many a numbat would go hungry without them.

It is vital that we appreciate and respect these creatures rather than being preoccupied with their destruction and potential destruction of property. They have their part to play on the stage that is the world, as we have ours, and they certainly seem to have the market cornered on viable, long lasting social organisation - even if the republican in some people rebels!

Termite poisons

Recent concern about Organochlorines has led to a ban on the general sale of some of the pesticides most commonly used in the control of termites. Licensed pest control firms still use these chemicals, Heptachlor, Dieldrin, Aldrin and Chlordane, and Organochlorines must be used to prepare the ground underneath house slabs.

An alternative in termite treatment is available now for householders concerned about the health risks involved in using long-term residual chemicals. Chlorpyrifos, an Organophosphate, is highly toxic but does not have the residual problems of the other group and is safer to use around livestock and poultry. Its major disadvantage is that it is effective for only three years as opposed to the ten year protection offered by undisturbed Organochlorines .

Termites are the mainstay of a numbat's diet.

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EDITORIAL

Anybody who reads tourist brochures in this State will appreciate that the tourist industry is, to a large extent, dependent on natural features and wildlife for its 'product'. Many people who are concerned with the natural environment are antagonistic to tourism, and it is certainly true that in the past there have been some insensitive tourist developments in the State. But, just as the farming community over the past ten years has become one of the greatest allies of conservation, so, increasingly, is the tourist industry. For example, in a recently published tourist industry report on tourism in the Kimberley, the need to preserve this environment was given top priority.

This report is indicative of the growing awareness in that industry of the symbiotic relationship between tourism and the protection and maintainance of our unique flora, fauna and landscapes. Rather than being despoilers, the tourist industry has the potential to become one of the strongest advocates for conservation in the broadest sense.

There is a great potential for synergism between those interested in the science of conservation and the tourist industry. One of the ways by which the tourist potential of any natural area can be enhanced without any cost to the environment is by providing information to the visitors on the natural science that makes that area special.

Landscope is one avenue by which we are attempting to provide an added dimension to the 'look it's lovely' tourist experience. Interestingly, while *Landscope* receives almost universal acclaim from the general public, there is ongoing, often vigorous, internal debate about how technical we should make the magazine. We would appreciate your views.

Cover Photo

'Now, just how do I find my way out of this Renoir landscape?'
Photographer **Richard Woldendorp** captured this lizard taking a sighting.