Termites

Termites, sometimes incorrectly called "white ants", are a group of social insects usually classified at the taxonomic rank of order Isoptera
(this has been challenged by recent research, see taxonomy below). Termites mostly feed on dead plant material, generally in the form of wood, leaf litter, soil, or animal dung, and about 10% of the estimated 4,000 species (about 2,600 taxonomically known) are economically significant as pests that can cause serious structural damage to buildings, crops or plantation forests. Termites are major detrivores, particularly in the subtropical and tropical regions, and their recycling of wood and other plant matter is of considerable ecological importance.

As social insects, termites live in colonies
that, at maturity, number from several hundred to several million individuals. They are a prime example of decentralised, self-organised systems using swarm intelligence and use this cooperation to exploit food sources and environments that could not be available to any single insect acting alone. A typical colony contains nymphs (semi-mature young), workers, soldiers, and reproductive individuals of both genders, sometimes containing several egg-laying queens.

Diet

Termites are generally grouped according to their feeding behaviour. Thus the commonly used general groupings are: Subterranean, Soil-feeding, Drywood, Dampwood, and Grass-eating. Of these, subterraneans and drywoods are primarily responsible for damage to human-made structures.

All termites eat cellulose in its
various forms as plant fibre. Cellulose is a rich energy source (think of the amount of energy released when wood is burned), but remains difficult to digest. Termites rely primarily upon symbiotic protozoa (metamonads) such as Trichonympha, and other microbes in their gut to digest the cellulose for them, absorbing the end products for their own use. Gut protozoa such as Trichonympha, in turn rely on symbiotic bacteria embedded on their surfaces to produce some of the necessary digestive enzymes. This relationship is one of the finest examples of mutualism among animals. Most so called "higher termites", especially in the Family Termitidae can produce their own cellulase enzymes. However, they still retain a rich gut fauna with bacteria dominant. Due to closely related bacterial species, it is strongly presumed that the termites' gut flora are descended from the gut flora of the ancestral wood-eating cockroaches, like those of the genus Cryptocercus.

Some species of termite practice fungiculture - they maintain a 'garden' of specialized fungi of genus Termitomyces, which are nourished by the excrement of the insects. When the fungi in turn are eaten, their spores pass undamaged through the intestines of

the termites, to complete the cycle by germinating in the fresh faecal pellets. They are also well known for eating smaller insects in a last resort environment.

Avoiding termite troubles

Termite damage on external structure

Precautions:

- Avoiding contact of susceptible timber with ground by using termite-resistant concrete, steel or masonry foundation with appropriate barriers. Even so, termites are able to bridge these with shelter tubes, and it has been known for termites to chew through piping made of soft plastics and even lead to exploit moisture. In general, new buildings should be constructed with embedded physical termite barriers so that there are no easy means for termites to gain concealed entry. While barriers of poisoned soil, so called termite pre-treatment, have been in general use since the 1970s, it is preferable that these be used only for existing buildings without effective physical barriers.

- The intent of termite barriers (whether physical, poisoned soil, or some of the new poisoned plastics) is to prevent the termites from gaining unseen access to structures. In most instances, termites attempting to enter a barriered building will be forced into the less favourable approach of building shelter tubes up the outside walls and thus they can be clearly visible both to the building occupants and a range of predators. Regular inspection by a competent (trained and experienced) inspector is the best defense.

- Timber treatment.

- Use of timber that is naturally resistant to termites such as Canarium australianum (Turpentine Tree), Callitris glaucophylla (White Cypress), or one of the Sequoias.
Note that there is no tree species whose every individual tree yields only timbers that are immune to termite damage, so that even with well known termite-resistant timber types, there will occasionally be pieces

that are attacked.

When termites have already penetrated a building, the first action is usually to destroy the colony with insecticides before removing the termites' means of access and fixing the problems that encouraged them in the first place. Baits (feeder stations) with small quantities of disruptive insect hormones or other very slow acting toxins have become the preferred least-toxic management tool in most western countries. This has replaced the dusting of toxins direct into termite tunnels which had been widely done since the early 1930s (originating in Australia). The main dust toxicants have been the inorganic metallic poison arsenic trioxide, insect growth regulators (hormones) such as Triflumuron and, more recently, fipronil. Blowing dusts into termite workings is a highly skilled process. All these slow-acting poisons can be distributed by the workers for considerable periods (hours to weeks) before any symptoms occur and are capable of destroying the entire colony. More modern variations include chlorfluazuron, Diflubenzuron, hexaflumuron, and Novaflumuron as bait toxicants and fipronil and imidacloprid as soil poisons. Soil poisons are the least-preferred method of control as this requires much larger doses of toxin and results in uncontrollable release to the environment.