

20 June 2007

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Termite mound on Australia

[The Largest Natural Buildings](#)

Architects: the termites

If you travel along the African or Australian or South American dry savannas, you will see from far away some strange constructions resembling the towers of a castle. The architects that build them are the termites, insects of the Isoptera, that live in colonies made of millions of individuals. They are called also "white ants", but have nothing to do with the real ants (which are related to the wasps and bees); they are closer to...cockroaches. And termites emerged much before the ants, being more than 200 million years old, when dinosaurs had not even appeared. Today, they are found everywhere in warm and subtropical regions. They number about 4,000 species, adapted to live hidden in their dark nests. The base of their diet is formed by cellulose, which they procure either from wood or dead grassy vegetation. They avoid the open spaces, as their body is soft, and termites are appreciated by many birds, mammals, reptiles and even...ants. There are large mammal species whose diet is based on insects, like the anteaters from tropical America or the African aardvark.

[img=2]Inside a colony, like in ants, there are specialized castes, of soldiers and workers, and a pair of queen and king. Unlike ants, the workers and soldiers are sterile individuals of both sexes, not just females. Termite soldiers are armed with huge jaws, or can emit a sticky toxic substance (in South American species). They are all blind, but due to their highly developed olfactory sense and sensitivity for vibrations, they do their job very well. Inside the colony, individuals communicate using pheromones. The workers build the nest, take care of queen, eggs and larvae, produce food and cultivate fungi. A termite queen is enormous compared to the other individuals: 30 times bigger than a worker, most of it being formed by the egg filled belly, which can reach 10 cm (4 inch) in length. She lays eggs continuously, about 30/minute. Being so large, she cannot move and she is fed by the workers. There is a small king that continues to mate with the queen for life (unlike in ants, where it dies after just one copulation). From time to time, an old queen is replaced by a young one. Workers are the main caste in the colony for the digestion of cellulose in food. They use for this flagellates (Protozoans) or bacteria (60% of all termite species). In the process, huge amounts of methane, a greenhouse effect gas, are produced. But all studied termites can produce their own cellulose enzymes, and therefore can digest wood in the absence of their symbiotic microbes. Workers feed the other members of the colony (soldiers, queen, king) with substances derived from the digestion of plant material, either from the mouth or anus. Some termites cultivate fungi nourished by the excrements of the insects. The fungi are eaten by all the members of the colony. Of all insects, and relative to their size, of all animals, termites build the largest and most elaborate nests. In the tropical areas they form mounds which can be 7.5 m (25 ft) tall (in Africa and Australia) and have up to 12 m (40 ft) in diameter. As termites are on average 1 cm (0.4 inch) long, if humans did something similar, they should build a building 1,400 m (4,600 ft) tall (!). Inside the mound there is a room for the queen, larvae rooms, and rooms for fungi culture, all interconnected by galleries. The wall of a mound can be 40-50 cm (16-20 inch) thick. Below the ground, the termite mounds can have tens of levels. The mounds are made of sand or clay particles cemented by the termites' saliva, chewed wood /cellulose, and feces. The resulting material is as hard as concrete: a bare handed man can do nothing against a termite mound. Some species have been known to create such durable walls that industrial machinery has been damaged in an attempt to break their tall mounds[img=3]The whole mound denotes an extraordinary precision and ingenuity. The mounds are not fix, some portions are destroyed and remodeled constantly by the workers. The mounds' form varies depending on the species, from castle towers to pagodas, huge mushrooms, stalagmites or dome (these

types are preferred by predators, like lions or cheetahs, as observatories over the plain). Some species build a shield over the mound, protecting the roof of the mound against rainfall. But in fact most of the mound is underground. A termite mounds can weigh hundreds of tons. As termites avoid open spaces, they can dig underground galleries of hundreds of meters away from the mound, which have aeration tubes, and form a complex and vast net around the mound. Termites can make their nests also in the trees, hanging from the branches. The termites can maintain their fungi culture, keeping them wet, even during the most severe droughts. How? Because they dig galleries to the table water or underground springs, even 75 m (225 ft) deep. Moreover, inside the termite mound, there is constantly a humidity of 100 % and a temperature varying between 29°C (84° F) to 31°C (88° F), necessary for both fungi and termites. The galleries form a perfect installation of conditioning air. The orientation north-south of the mounds also helps in thermoregulation. The column of hot air rising in the above ground mounds helps drive air circulation currents inside the subterranean network.[img=4]Because what the termites dig underground, they bring to the surface, an analysis of the termite mounds can give a quick answer to the contents of deeper laying levels of soil and even rock. Ancient African civilizations used the termite mounds to locate gold deposits. The unconventional "termite" technique is increasingly used by western companies looking for gold in Africa. Its advantages are obvious; there is less need for manpower and equipment, which has to be transported to remote areas, often without infrastructure, while the drilling work is left to the termites. Using this method, gold prospects have been found in Southern Africa and several countries in western Africa, like Mali and Niger. Termite mounds have been also used to discover the Vila Manica copper deposit in Mozambique in 1973. Later, the biggest kimberlite (diamond) mine in the world - Jaweng in Botswana - was found by termite mound sampling. Through their activity, termites enrich the soil in nitrogen. They remove dry vegetation, decreasing the risk of natural fires. Still, termites can also attack the wood of the houses, inducing huge damages. 10% of the termite species do this. Sometimes, the owner does not even sense the presence of the termites till the house is down, as the wood attacked by termites look untouched on the surface, even if completely hollow inside.