Termites: A Wonder Of Nature But Pest Of Homes

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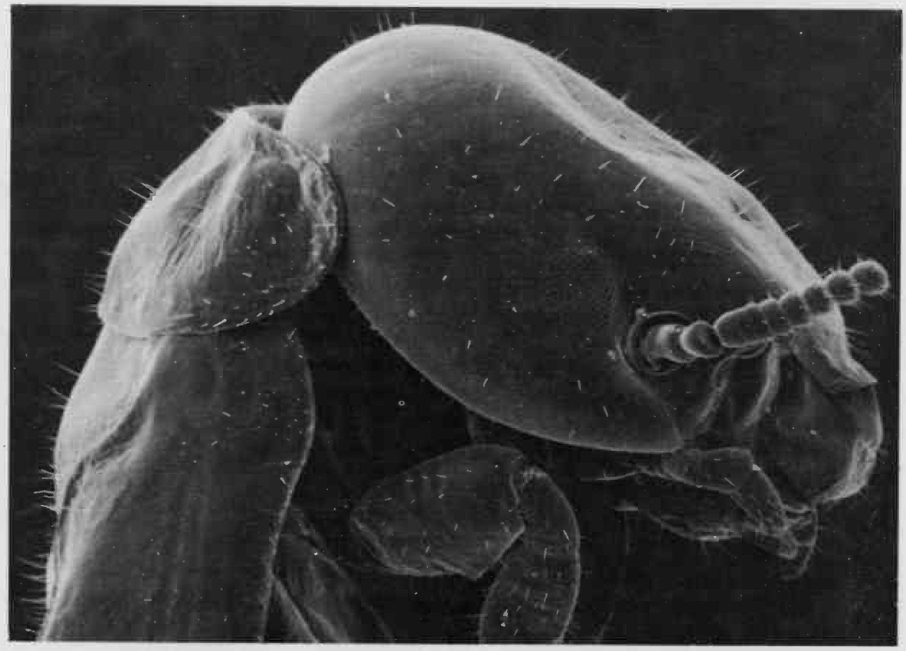


Photograph: Business end of a dry-wood termite common in Arizona. (Scanning electron micrograph by Michael McClure.)

Termites – the name carries imagery of subversion, of hidden decay.

These insects have earned their bad name. Their damage to buildings and the costs of termite control add up to one billion dollars per year in the United States.

Among the scientists who study insects, though, termites have a second image in addition to their destructiveness. Termites show remarkable traits of cooperation, both with several other types of organisms and within their own social colonies.

Termites themselves cannot digest wood, for example, but most of them harbor wood-digesting protozoa or bacteria in their gut. The advantage is mutual. Some species of termites plant, tend and eat gardens of fungus. A potential queen who leaves to start a new colony takes a morsel of the fungus with her, like a dowry.

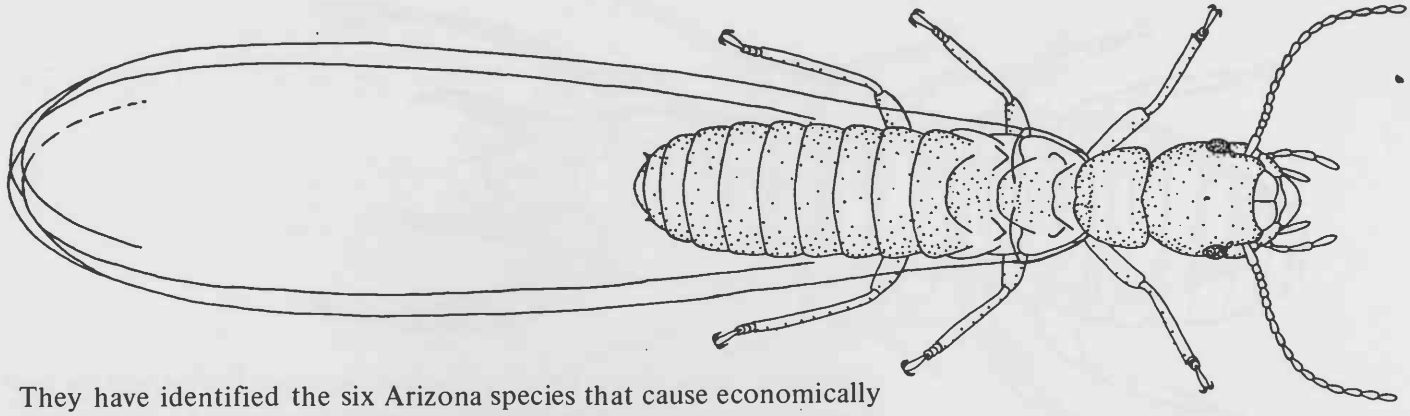
Within their colonies, all termites divide their labor. Workers, soldiers and reproductives each have distinctive body features and social roles. The termites communicate with scents and with chemical messages in shared food. Mature colonies range from less than 50 individuals to more than five million, depending on the species of termite.

Using complex chemical signals, termites in some species cooperate to construct intricate, air-conditioned tower homes. Some African termite mounds are more than 20 feet tall. In Australia, wedge-shaped mounds of one termite species are all built on a north-south orientation that maximizes solar heating in morning and evening and minimizes it at midday.

Arizona Termites

Arizona does not have the tower-building or fungus-farming termites of the tropics, but it does have 17 of the 40 species known in the United States – more than any other state in the country. Sixteen species can be found within 25 miles of Tucson.

University of Arizona entomologists have been studying the area's termites for about 50 years. What they have learned about the insects' biology and behavior has improved methods for controlling termite damage.



They have identified the six Arizona species that cause economically significant damage, and provided information for pest control operators and homeowners to recognize these species. Correct identification is important, because control measures are different for different types of termites. UA scientists have published detailed biological studies of four of these six species.

Two areas of recent UA research are the spacing of termite colonies in desert areas and the timing of mating flights by reproductive termites. The first can advance home builders' awareness of termites' presence on new building sites. The second can help to alert homeowners and pest controllers of possible infestations, and might lead to new control strategies in the future.

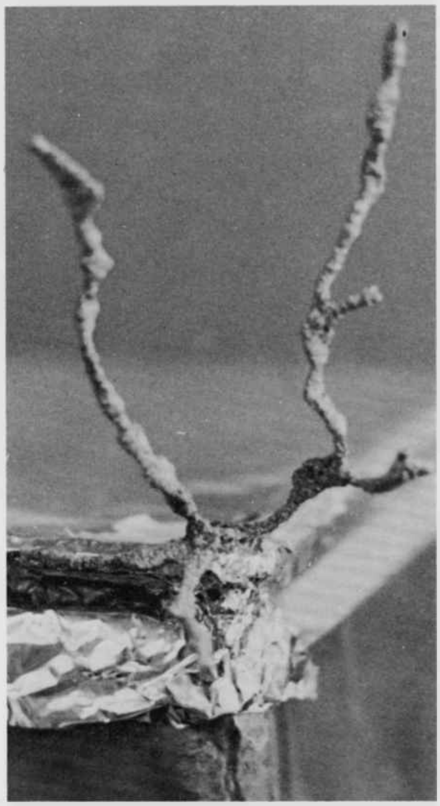
The world has about 2,200 known species of termites and probably many still-unknown ones. Most are light-colored and ant-shaped, but without ants' thin "wasp waists." The mature, winged forms of most termite species are darker in color.

Termites' major energy source is cellulose, which they get from a variety of dead and living plant material, including algae, grasses, trees, humus and even dung. Generally, termites help keep the cycle turning: wood to soil to new plants and more wood. Some animals also rely directly on termites. In Arizona, for example, termites are significant in diets of toads, lizards, birds and many other small animals.

Like most other insects, termites have distinct body characteristics at different stages of life. Like a few others, such as social ants, most termite species follow more than one route of development. The same young larva can develop into a soldier, a worker or a nymph, depending on chemical and behavioral signs from other termites in the colony. Soldiers and workers are sexually immature forms. Nymphs can develop further into mature reproductive forms with wings. Workers can remain as life-long workers or grow into soldiers or nymphs. Amazingly, in some common species, developing nymphs can even grow "backwards" into workers again, depending on signals from the colony. That is unknown in other insects.

Termites can be divided into dry-wood, damp-wood and subterranean types. The types differ in what they eat, how they nest, how they damage man-made structures and in other ways. In Arizona, the economically important termite species are all either dry-wood or subterranean types, though one damp-wood species occasionally causes damage in the state.

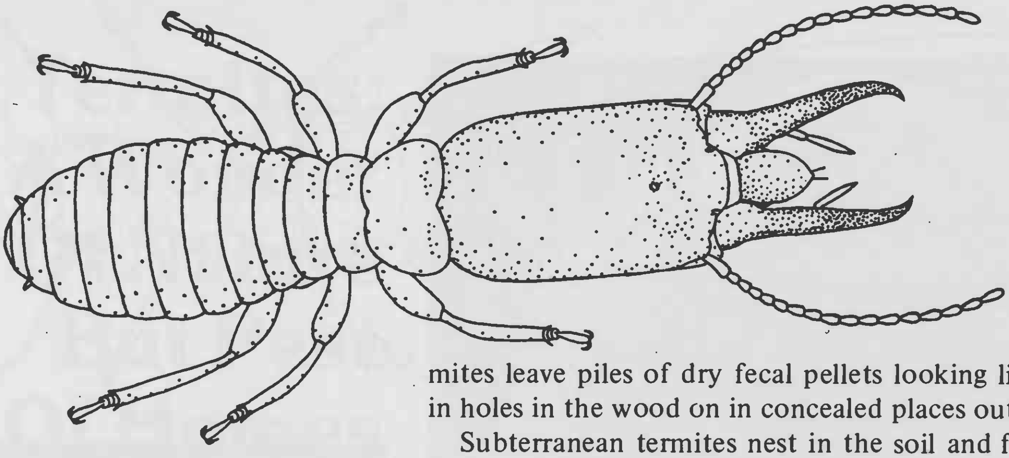
Dry-wood termites usually make their homes inside undecayed, dry wood. They bore holes and chambers that cut across the grain of the wood and they need no connection with the soil. In relatively small, slow-growing colonies, they attack wood floors, sills, joists, rafters and furniture. Their damage often goes unnoticed at first. It is usually less severe than damage by subterranean termites. Colonies of dry-wood ter-



Top: Mature, winged form of the common desert subterranean termite. Life size is about three-eighths inch.

Middle: UA entomologist William Nutting checks termite activity at a desert research site.

Bottom: The covered traveling tubes of subterranean termites may either cross thin air, like these from a laboratory colony, or follow surfaces such as walls.



mites leave piles of dry fecal pellets looking like sawdust or tiny seeds in holes in the wood on in concealed places outside.

Subterranean termites nest in the soil and feed mainly on wood that is in contact with the soil. However, they often build dry, mud-like shelter tubes from the nest to sources of wood above the ground. Their colonies can grow large within a few years. Their damage to buildings is usually near the ground, such as wood in porches, baseboards, moldings and trim. Typically, they eat channels in wood parallel to the grain. They use their dark brown fecal material to plaster their galleries and tubes.

Directly above: A grid of toilet paper rolls on the Santa Rita Experimental Range south of Tucson served as a research tool for entomologists' study of termite population density on a desert grassland site. Top of both pages: Soldier (left) and worker forms of the common desert subterranean termite. Life size is about three-sixteenths inch.

Signs of Trouble

The most important precautions against termite damage should be taken when a home is first constructed. After that, checking houses and yards for termites is worthwhile about twice a year toward the end of rainy seasons. Look for the tubes of subterranean termites around foundations, especially at cracks in concrete floors or where pipes come through the concrete. Borings in interior woodwork can be detected by a hollow sound when the wood is tapped with a screwdriver. Finding the entry point for this type of damage is important.

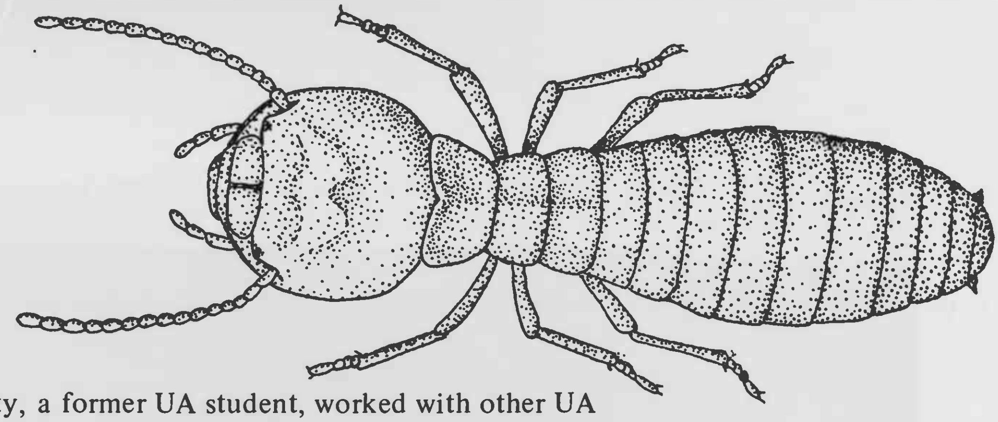
In most cases of dry-wood termite infestation, the easiest treatment is to remove the damaged wood along with the termites and replace it with new wood. In some cases, injecting insecticide into infested wood is appropriate. Damage extensive enough to warrant fumigation is uncommon in Arizona.

For subterranean termites, treatment depends on the type of foundation and the extent of infestation. In some cases, pouring insecticide through the termites' route of entry is sufficient. Other situations require trenching around the foundation and pressurized injection of chemical beneath the slab through either the floor or the footing.

Homeowners who need the services of a pest control operator should get estimates from two or three firms. Reputable firms will guarantee their work.

Long before humans came, termites became adapted to the environment of Arizona's deserts. To that environment, people added new components, such as wooden buildings, which some termites found to their liking.

The termites have not become dependent on human structures, though. For example, a species called the western dry-wood termite, which relishes hardwood floors in older Tucson homes, is abundant in the dry hardwood logs and dead branches of Sabino Canyon and other sites. The common desert subterranean termite, which is responsible for mud tunnels up the sides of many homes and holes through many books, lives deep in the soil throughout the desert and feeds on bits of cactus skeletons and other dead wood.



Dr. Michael I. Haverty, a former UA student, worked with other UA entomologists a few years ago to study just how that subterranean termite species is distributed in undisturbed desert grassland near Tucson. Most previous studies of termite densities had involved African or Australian species that build large mounds. The Arizona colonies were harder to locate. To census them, a grid of toilet paper rolls was set out for the insects to feast on. Results showed a density of about 77 colonies per acre. Colonies averaged about 22,600 termites foraging over an area of about 135 square feet.

An average house-sized rectangle could not be drawn on the study area without hitting several existing colonies of termites. This emphasizes the importance of pretreating a building site for termites. Clearing a site and building without pretreatment just takes away the termites' natural food sources and serves them a new source: the wood in the building.

Shading shows the distribution of termite colonies on the desert grassland study site. House shapes were drawn in to show that a typical-size home (2,400 square feet) could not be built on such an area without covering several active colonies. (Adapted from Haverty, Nutting and LaFage in **Environmental Entomology**, volume 4, number 1.)

Swarming Behavior

Many of the phone calls that UA entomologists answer about termites concern swarms of flying termites. These flights are occasions for dispersal and mating of the mature reproductive forms of all Arizona species of termites. Thousands of individuals may leave a single colony when the weather and the hour are right. Few, though, will survive to establish new colonies. The flights are feast days for animals that feed on termites on the wing or on the ground.

The swarms are no cause for alarm. Termite colonies are nearly everywhere, and the chances of a mated pair settling in a well-maintained house are quite small. However, these insects are attracted to light, so it may be good policy to reduce the unnecessary use of outdoor lighting on evenings during the June to September flight season.

Recent research about termites' mating flights has pinned down many of the variables in predicting when the flights will occur. Of the 16 Arizona species studied, some fly during morning twilight, others during broad daylight, evening twilight, nighttime, and even in driving thunderstorms. Early morning and late afternoon, the favored feeding time of many birds and other insect-eaters, are conspicuously avoided by all 16 species.

Knowledge about termites' timing of dispersal flights could be useful in exploiting this as a weak point in their life cycle. A sex-attractant scent is likely involved in their mating. Sophisticated trapping might make use of such a scent to reduce termite numbers around houses. Also, current tests with promising chemicals may result in new termiticides for effectiveness and safety in urban environments.

Continuing studies about termites help both to improve the control of their destructiveness and to understand the biology that underlies their fascinating levels of cooperation and social organization.