Fungus-Cultivating Termites of the African Savanna: Ecosystem Engineers

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Termite Mounds Enhance Ecosystem Productivity and Stability

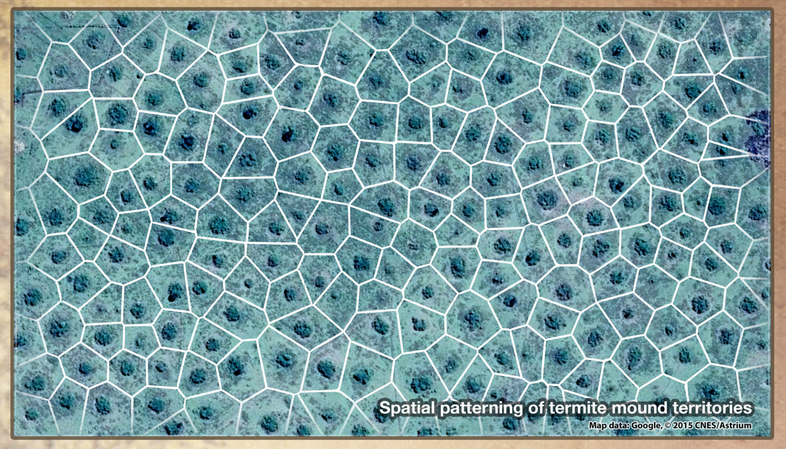
Most people associate termites with damage to buildings and crops, but these insects also play key roles in the functioning of dry ecosystems. They enrich soil quality by processing and concentrating organic matter, and their complex subterranean nests promote water infiltration. In these ways, termites enhance the productivity and stability of African savanna ecosystems.

Islands of vegetation

Termite mounds retain more water than the surrounding soil. The retained moisture results in more vegetation than would otherwise grow in this climate, reducing the chances of desertification.

Ecological "hotspots"

Termites bring organic material to their mounds, concentrating nutrients and fertilizing the soil on and around mounds. Thus, the mounds can support rich plant assemblages, which in turn support many animals.



Spatial patterning

Termite mound territories form a rough hexagonal lattice when viewed from above, giving each mound approximately six equidistant neighbors. This spacing is driven by conflict, as each colony controls its own foraging territory and competes with its neighbors. The resulting regular pattern means that the biological wealth created by termite mounds is more evenly distributed across the entire landscape.

How colonies form

New termite colonies form when winged castes of reproductive male and female termites (called alates) swarm out of an existing mound and disperse. The alates eventually land and search for partners. Once a pair forms, the new queen and king seek a suitable nesting site and dig out a small chamber in which to mate. The queen then lays eggs that mature into the workers and soldiers of the new colony. Only a small fraction of alates succeeds in starting a new colony.

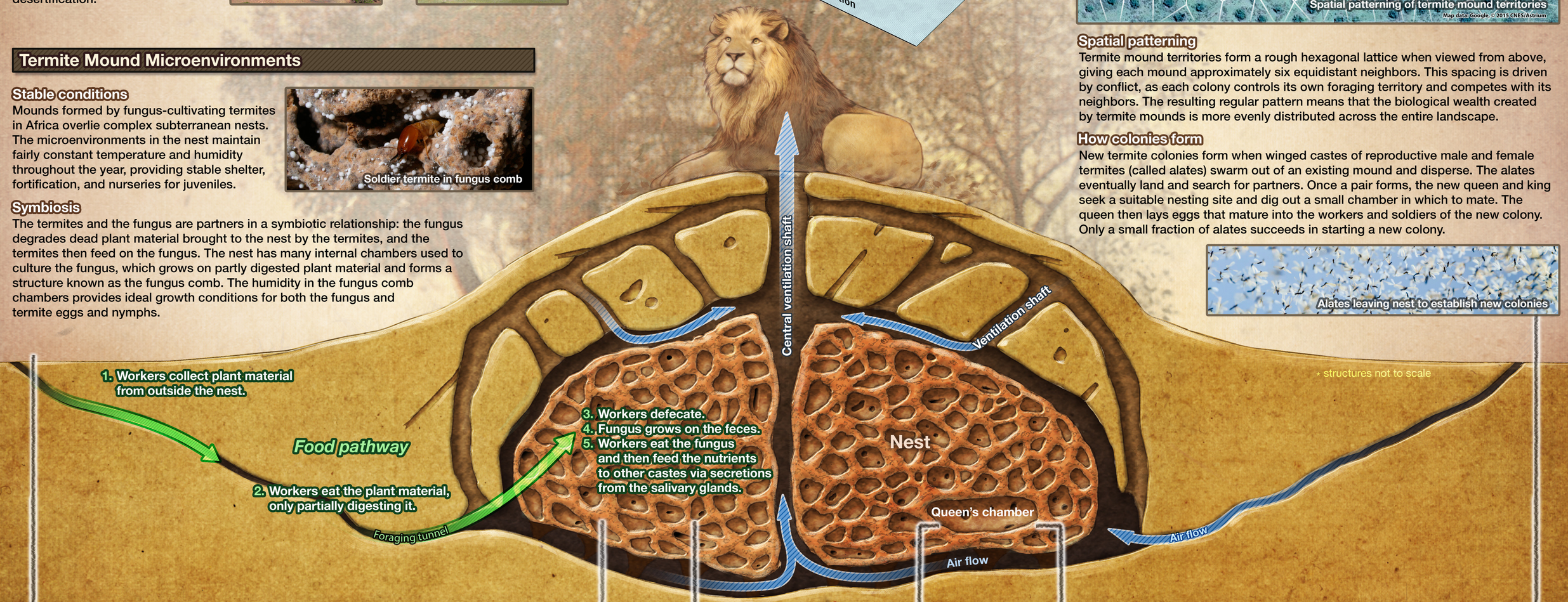
Termite Mound Microenvironments

Stable conditions

Mounds formed by fungus-cultivating termites in Africa overlie complex subterranean nests. The microenvironments in the nest maintain fairly constant temperature and humidity throughout the year, providing stable shelter, fortification, and nurseries for juveniles.

Symbiosis

The termites and the fungus are partners in a symbiotic relationship: the fungus degrades dead plant material brought to the nest by the termites, and the termites then feed on the fungus. The nest has many internal chambers used to culture the fungus, which grows on partly digested plant material and forms a structure known as the fungus comb. The humidity in the fungus comb chambers provides ideal growth conditions for both the fungus and termite eggs and nymphs.



Colony Social Structure

Termites are colonial insects with a range of specialized forms called castes. In addition to having distinct appearances, each caste also performs different functions within the colony.

Soldiers

Soldiers defend the colony, protecting the queen and king and patrolling areas outside the nest. They are fed by the workers.

Workers

Workers forage for food and water. They build and repair the nest, and tend to and feed members of other castes.

Nymphs

Nymphs are immature workers, soldiers, and alates. The workers tend to the nymphs full-time until they reach maturity.

Queen

The queen is the only egg-laying individual in the colony. She can lay up to 30,000 eggs a day. She is fed and groomed by the workers.

King

The king is always in the queen's chamber. His only responsibility is mating with the queen regularly. He is groomed and fed by the workers.

Alates

Alates are winged reproductive males and females that leave the nest to start new colonies. They are fed and groomed by the workers.

Non-Reproductive Castes

Reproductive Castes