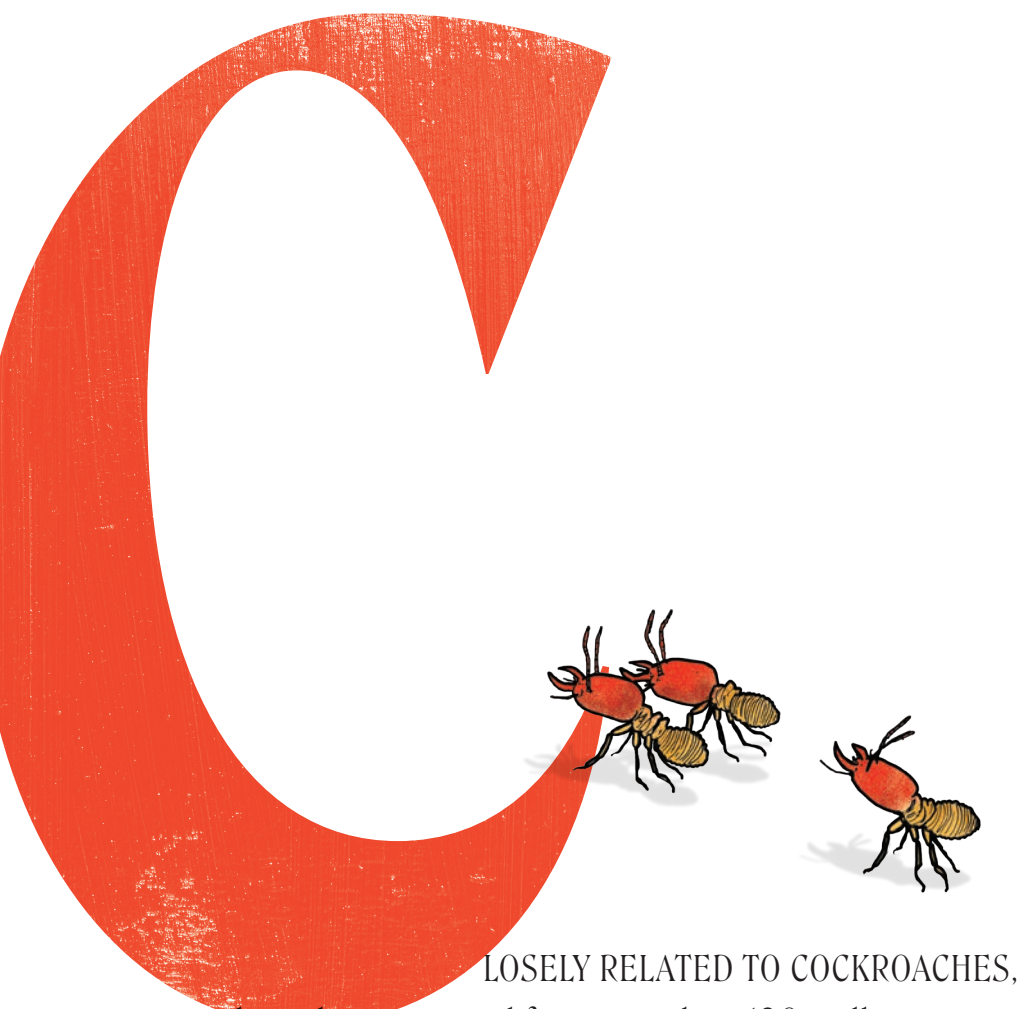


Warmer, wetter conditions across North America are providing an ideal environment for the wood-destroying insects. Some home builders are well-versed in termite prevention—others will need to quickly learn how to protect their investments.

DAWN OF THE TERMITES

STORY BY ROBYN GRIGGS LAWRENCE ILLUSTRATIONS BY JASON SCHNEIDER



LOSELY RELATED TO COCKROACHES, termites have been around for more than 130 million years, and most experts believe they'll outlast humans by many more. As species across the globe go extinct at what many consider alarming rates, the number of recognized invasive termite species (the ones that destroy homes and infrastructure) is actually increasing—from 17 in 1969 to 28 in 2017, according to scientific journal *Ecology and Evolution*. With queens that can lay some 30,000 eggs a day and live up to 25 years in mounds teeming with millions of termites at a time, these tenacious social insects impact more than 600,000 homes and cause \$5 billion in damage and repairs in the United States every year, the U.S. Department of Agriculture reports.

"IF YOU'VE NEVER HAD TO DEAL WITH TERMITES, you're lucky," says construction quality expert Don Neff, founder of LJP Construction Services in San Diego, one of the top cities for termites in North America. "It's tragic. I've seen friends' homes that were so riddled with termite infestations that I was surprised the homes still stood up."

Chris Clark, vice president of operations at Sarasota, Fla.-based Neal Communities, is well aware of the damage from termite populations in his state. "It is estimated that termites cause more than \$5 billion to \$10 billion a year in damage, so it is important to protect your investment," he says. "In fact, this is such a costly issue that several states require termite protection on new homes as part of their building codes. All homes in Florida are required to have some form of termite protection."

Termites—sometimes called "white ants" because of their pale color and similarities to ants—are most prevalent in tropical and subtropical climates, but different species can survive in vastly different conditions. North America is home to 50 termite species; the creatures can be found in every state in the Lower 48 as well as Hawaii (they've yet to hit Alaska). The Federal Housing Administration (FHA) requires termite inspections or preventative treatments to secure a home loan in all or parts of 40 states, but termites cause the most destruction in a swath of the Southeast from North Carolina south to the Gulf Coast and west to Southern California. Six invasive species that have taken over Florida are expected to multiply in coming years, and University of Florida researchers predict they could impact half of the structures in the southern part of the state by 2040.

In the South and the Sun Belt, home builders have been incorporating termite prevention into construction schedules and providing ongoing monitoring options for buyers for years; it has become standard operating procedure for most. "Any builder in Southern California and the Sun Belt area who builds with wood should know and needs to know about termites," Neff says.

"Here in the Southeast, we've learned to live with termites and deal with them. We don't think much about it," says Todd Usher, founder and president of Greenville, S.C.-based Addison Homes, which builds high-performance homes in the state. Like Neff, Usher has been underneath homes with massive termite infestations and marveled at what havoc the insects can wreak. He's always surprised, he says, when he talks to home builders in other parts of the U.S.,

like his friend in Michigan, who have never given termites a first, let alone a second, thought. "They say, 'You have to do what!'" Usher says. "I forget it's a Southern problem."

That problem may be creeping north, however, as the Intergovernmental Panel on Climate Change (IPCC) predicts that most of North America will become warmer and many parts will become wetter—providing ideal conditions for termites to thrive—over the next 100 years. Temperatures from the Gulf of Mexico to the southern shores of Hudson Bay are expected to warm up by 3 to 4 degrees Celsius (about 38 degrees Fahrenheit), while areas in Canada (particularly the East Coast) could see even more exponential warming and higher precipitation, according to the IPCC.

Builders in areas like the upper Midwest, New England, and southern Canada may want to take note and start getting schooled on how to keep the critters at bay. "One could make the argument," says Neff, "that as climate change occurs and it becomes warmer and wetter up north and into the continental U.S., there may need to be precautions implemented by production builders that haven't ever seen termite issues before."

Even though the warmer, wetter regions of the country have historically had the highest termite pressure, "every structure in every state can be at risk," says Jim Fredericks, chief entomologist and vice president of technical and regulatory affairs for the National Pest Man-

agement Association. "In the past few decades, termites have also become a greater problem in some Canadian cities like Toronto."

A Beneficial Insect That Became a Pest

IN NORTH AMERICA, THE MOST PROMINENT SUBGENRE of termite species is subterranean termites (Rhinotermitidae), which require warm, moist conditions to survive. They have soft bodies that need moisture, so they live underground in soil with at least 10% moisture content and build earthen tubes to protect themselves from drying out as they travel up to feeding sources, such as framing members on houses.

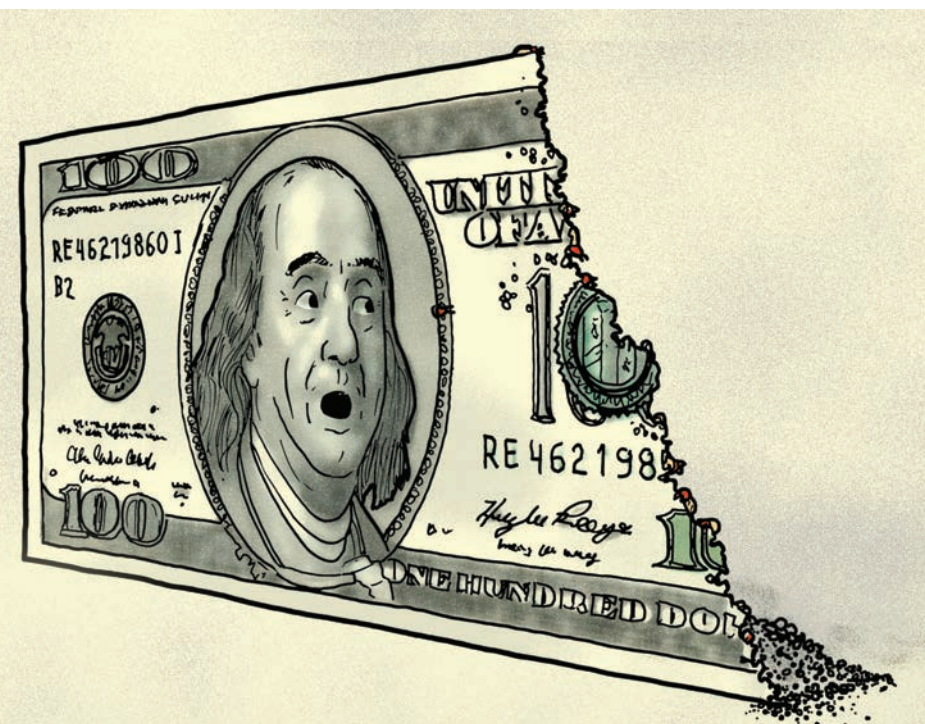
There are several types of subterranean termites, but two are most prevalent in North America. Eastern subterranean termites, native to the East Coast, cause by far the most damage, chewing their way through about \$2 billion worth of homes and infrastructure in the U.S. every year, according to the National Wildlife Federation. Formosan subterranean termites,

which arrived as stowaways on ships returning from the Pacific after World War II, are listed among the world's top 100 invasive species, *Ecology and Evolution* reports. These voracious termites are tough to locate and eradicate because they can also create aerial nests (called cartons) if substantial moisture is available. It took a mere matter of years for Formosans to make inroads into Houston; New Orleans; Lake Charles, La.; and Charleston, S.C.; they also plague Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. As winters in North America get shorter and milder, according to *Popular Science*, Formosans are establishing new breeding territory up north.

"In coastal areas, termite treatment is more expensive because their inspections have to be so much more," Usher says. "They can't just look at the foundation. They have to look at the attic and the entire house because if Formosan termites are there, the telltale tubes connecting to the ground might not be there."

"IT IS ESTIMATED THAT TERMITES CAUSE MORE THAN \$5 BILLION TO \$10 BILLION A YEAR IN DAMAGE, SO IT IS IMPORTANT TO PROTECT YOUR INVESTMENT."

→ CHRIS CLARK, *Neal Communities*



Termites travel above ground in search of cellulose because it's their only source of nutrients. "That's a natural role for them, digesting cellulose from downed trees. Nothing else likes to eat cellulose," says Tim Husen, a technical services manager for pest-control industry leader Orkin, who for years has studied what he refers to as the "really weird social insects." In tropical ecosystems, termites benefit soil quality by decomposing organic material. They contribute to the carbon cycle by feeding on living, dead, and decaying plant matter and thinning forests, which is why many of the woodlands on Michigan's Upper Peninsula—where termites are virtually nonexistent—are choked with downed trees. Their voracious appetite for cellulose served as a valuable trait within a healthy ecosystem—until humans began to cut down their food source to build shelter.

"One thing is undebatable: Termites will forage for food," says Tommy Giardino, senior vice president of operations for the East Coast

of Florida and the Gulf Coast at Atlanta-based Arrow Exterminators, the sixth-largest pest-control company in the U.S. “They can have a million years of food in front of them, but they can’t see. They’re going to constantly be foraging for more food for the colony, and that’s when they start to come up into structures.” Conniving queens are always moving colonies closer to food sources so workers can bring back more food more quickly.

“So, it’s our fault, really,” Husen says, “for building stuff out of wood.”

Survival of the Fittest

IF YOU CAN GET PAST THE FACT THAT TERMITES are the insect kingdom’s ultimate homewreckers, they’re pretty fascinating social creatures, with rigid caste systems ruled by pheromone-yielding queens. Workers—sterile, wingless, and blind termites that build the nests, find food (which they decompose in their guts and regurgitate to feed the queens, kings, soldiers, larvae, and babies), and care for the young—make up about 90% to 95% of the colony and are its foundation. Soldiers, which make up about 1% to 3%

of the termite population, use well-developed mandibles or secrete a toxin from their heads to defend the colony from invaders such as ants, woodpeckers, and wasps. Winged reproductives, or alates, swarm in warm weather to perform mating dances and pair off to become the queens and kings of new colonies. Queens can lay thousands of eggs every day.

Termites want nothing more than food, water, and warmth, which is why they gravitate to wooden structures, where they can hide and feed on the walls during the fall and winter months. Those unlucky termites that can’t find shelter above ground burrow below the soil, which is a great insulator—to a point. When the ground freezes, these termites die. That’s fairly effective population control, especially up north, but as winters get warmer and shorter and summers get wetter, scientists are concerned that more colonies will be able to stay active for longer periods throughout the year, inevitably producing more young.

“There have always been termites in northern climates,” Husen says. “Rising temperatures, whether the air or the soil, allow termites a lot longer to feed, but that’s not causing them to move across state lines or range greatly. If soil temperatures are warmer longer from one year to the next, that could cause them to establish colonies and have their mating swarms earlier than they did before—so you might see more termites in response to rising soil temperature.”

That could be a problem in places like the upper Midwest that have never had termite-eradication programs in place, Giardino warns. “Even though they haven’t been prevalent, it’s impossible to tell how strong they are and how well they’ve survived because they’ve been eating more natural food sources rather than structures,” he says.

A Home Builder’s Responsibility

ACCORDING TO NEFF, ALL HOME BUILDERS—regardless of where they’re located—need to start taking precautionary measures against termites. “It might not be a bad idea to take a proactive stand and provide a termite treatment with two or three different option packages or price points,” he says, noting that the effort isn’t that expensive.

“It’s a good builder’s responsibility to explain how to protect a home when they turn it over,” says Usher. “We have it on our marketing sheet that we provide nontoxic termite treatment, and we have that conversation with our clients

TERMITE-PROOF HOME BUILDING

Home builders can do plenty during construction to prevent termite infestations in homes they build. Here are a few tips from the National Pest Management Association and other experts.

- Avoid siting homes in damp forests.
- Design and build homes so wood never makes contact with soil and water moves away from the foundation. (Overhangs and gutters go a long way.)
- Build with borate-treated products such as Louisiana-Pacific’s SmartGuard sheathing, flooring, siding, trim, framing lumber, and cellulose insulation, which costs about \$1.50 more per square foot.
- Seal any foundation cracks and spaces where underground plumbing pipes penetrate the building slab.
- Properly ventilate crawlspaces so moisture doesn’t accumulate in floor joists and subflooring and cover crawlspace vents with fine screening.
- Insulate pipes.
- Keep termites out with physical barriers such as sand or stainless steel mesh that run about 6 inches to the depth of the footer and 6 inches under the slab. (The U.S. Forest Service found sand more effective against Formosan termites than Eastern natives.) Below-grade foam panels (even borate-treated ones) are ineffective because termites destroy the foam before the borate can kill them.
- Never extend brick veneer and foam board insulation below grade.
- Keep rim joists and floor joists accessible for visible inspection in crawlspaces and basements so termites don’t go undetected until damage has progressed to the substructure.
- Keep the crawlspace clean, clear, and dry. Don’t store lumber, rakes and shovels, or anything else wooden in it.
- Use synthetic mulch or pea gravel in landscaping, and never pile mulch against a foundation wall. Landscape so water drains away from the foundation walls, and maintain a perimeter of several feet between plants and the house.
- Completely remove all wood scraps and foam boards from the site. Buried wood provides a perfect nesting medium for termites.
- Never lean wood against homes during construction.

when talking about the practices we employ to improve air quality and health in our homes.”

Three types of termite treatments—soil treatment, wood treatment, and bait stations—satisfy FHA and many private lenders’ requirements and are the most common in North America. It’s up to home builders to decide which method is right for each situation, Husen says, and several factors such as whether there’s already an active infestation, how close the home is to water, and what environmental regulations dictate for the area come into play.

Soil treatment, which entails saturating the soil under a home’s foundation as well as the foundation slab with anywhere from 200 to 400 gallons of toxic termiticide, is the oldest method of controlling subterranean termites, dating to the chemical-happy 1950s. This type of treatment doesn’t last long—about five years—and is easily disturbed by everything from landscaping to remodeling, so it has fallen out of favor as more effective, environment- and inhabitant-friendly methods have come along.

“Soil treatments were not received very well by subcontractors, who had to be in crawlspaces around those toxic chemicals, and environmentalists worried about toxic runoff,” explains Jeff Cornatzer, vice president of construction for Saussy Burbank, a home builder in the Carolinas. “And for us, it was a timing issue, having to coordinate the concrete trucks with the chemical spray and the inspector.”

Rather than pumping the ground full of chemicals and disrupting construction to mitigate termites, many home builders—including Addison Homes and Neal Communities—switched to spraying their homes’ wood framing members during the dried-in phase (before drywall and insulation) with borate, a natural inorganic mineral salt that kills termites, after this method was introduced in 1999. Though highly toxic to termites, borate “is about as toxic to humans as seawater,” Usher explains.

For an additional \$250 or so per home, Addison Homes has borate solution applied for 2 feet to 3 feet in all directions from wherever wood contacts the masonry foundation (where Usher says termites emerge from 99.9% of the time). Worker termites feed on and carry the poison back to their colonies, where it kills all the termites they feed as well, making this an effective treatment. “This method doesn’t prevent termites from coming up,” Usher says, “but when they eat the wood that’s treated, they die.”

Still, not everyone was satisfied. A third alternative, which entails placing bait stations

“HOME BUILDERS DO WANT TO LEAVE THEIR HOUSES IN THE **BEST CONDITION** FOR HOMEOWNERS.”

→ TOMMY GIARDINO, *Arrow Exterminators*

containing insecticide-laced cellulose (or as Cornatzer calls it, “Snickers bars for termites”) in the ground around a structure after construction is complete, was introduced in 2005. Bait stations are considered environmentally friendly because there’s little chance they will contaminate the soil or poison humans, and they appeal to builders because they can be installed independent of construction.

Bait stations are Giardino’s preferred choice because he doesn’t have to interrupt construction, and installing them after homes are finished gives him an opportunity to inspect for

potential problems before homes go on the market. “Home builders do want to leave their houses in the best condition for homeowners, even though the warranty isn’t on them,” he says. “It’s about their reputation.”

Bait traps make the most sense for Saussy Burbank, which partners with pest-control company Terminix to install them after yards are graded and landscaping beds are established. “We call a month before a house is supposed to close, and they go out and do the install. Then they send us a letter that we upload to the building inspector, and we’re done,” Cornatzer says.

After a year, homeowners have the opportunity to take over Saussy Burbank’s contract with Terminix, and most people stick with it because it’s relatively inexpensive and reinstating it requires a hefty fee. Similarly, Addison Homes offers homeowners the option to purchase “termite bonds,” essentially insurance policies that cover up to \$250,000 in damage and provide for termite inspections at least annually. “It’s cheap insurance,” Usher says. “Even for the homeowner, it’s not a huge cost, especially in light of what it could be if they didn’t have a bond and discovered they had termites and had to replace the structural beams under the house.”

Builders like Usher’s friend in Michigan could be hard-pressed to find pest-control vendors as well-versed in all things termite as Husen and Giardino, and they may have to take the lead and ask companies to develop termite programs. “That’s something I would be doing if I were a builder again,” says Neff, whose company monitors the home construction process for insurance companies and lenders. “When it comes to construction defect litigation as it pertains to termite infestations, builders will want to take the view of a marathoner, not a sprinter. Given that there’s a 10-year statute of limitation, all builders should treat framing lumber as part of a prudent risk-management strategy.”

Giardino agrees that builders need a strategy. “In 22 years, I’ve never told anybody they’re not going to get termites,” he says. “Termites have been here forever. The question is, can you minimize them before they do significant damage?” **B**

TOP 15 MARKETS FOR TERMITES

In 2017, Terminix released the following list of cities with the highest termite infestations.

- 01 Mobile, Alabama
- 02 San Antonio, Texas
- 03 Memphis, Tennessee
- 04 Tampa, Florida
- 05 Miami, Florida
- 06 Los Angeles, California
- 07 Orlando, Florida
- 08 Jacksonville, Florida
- 09 Dallas, Texas
- 10 Baton Rouge, Louisiana
- 11 Houston, Texas
- 12 Oklahoma City, Oklahoma
- 13 San Diego, California
- 14 Philadelphia, Pennsylvania
- 15 Little Rock, Arkansas