Northern Subterranean Termites

by J. Kenneth Grace, Ph.D.

The eastern subterranean termite, *Reticulitermes flavipes* (Kollar), enjoys a very broad distribution in North America. This pest occurs across the southeastern states, north along the Atlantic coast to Maine, and westward along the southern shores of the Great Lakes. Research indicates that northern *R. flavipes* colonies differ in a number of aspects from their southern relatives. These regional differences among subterranean termite populations have implications for termite control efforts.

Termites in Canada

In the Canadian province of Ontario, eastern subterranean termites were first reported from a park at the southern tip of the province in 1929 (Kirby 1965). Then, in 1938, termites were found in a warehouse in the city of Toronto, apparently introduced by ship from the United States around 1935 (Urquhart 1953). In Toronto alone, the 1988 costs of termiticide treatments and of breaking wood-soil contact totalled about 0.9 million U.S. dollars (Jafri 1989).

Today, 29 towns in the province of Ontario report ongoing termite problems (Cutten 1988). In 1987, a thriving subterranean termite infestation was even discovered in Winnipeg, Manitoba, demonstrating the potential for further northern expansion and survival of termites in cold habitats.

Unique Biology and Behavior

The distribution, behavior, and biology of subterranean termites in the northeastern United States and Canada appear to be distinctly different from southern *Reticulitermes* populations. In fact, the habits of eastern subterranean termites in the North resemble in some ways those of Formosan subterranean termites in the southeastern United States. Like Formosan termites, northern termites have a very disjunct, or patchy, distribution since they are commonly spread by moving infested firewood, used lumber, or possibly topsoil. They feed actively in free-standing poles and trees, even building tubes at the base of trees and up the outer bark. Moreover, northern termite colonies may be much larger and forage over greater areas than *R. flavipes* colonies in warmer regions.

In the warm summer months, termites construct extensive tubing on the exterior of infested wood (Figure 1) and trees (Cooper and Grace 1987). Pest control operators and city building inspectors commonly examine trees in yards for evidence of termite activity. In the cold winter, termite tube-building and feeding at the soil surface falls off markedly, but termites continue to be active in buildings and beneath the outer bark of trees. Outside temperatures may be well below freezing, but wood provides good insulation from the cold.

Winged alates (swarmers) are rarely encountered in the North. At one Toronto site with an extensive termite population, large numbers of nymphs with undeveloped wingpads were collected in the early summer, but only one winged alate was found inside an infested log. The rarity of outside swarming by

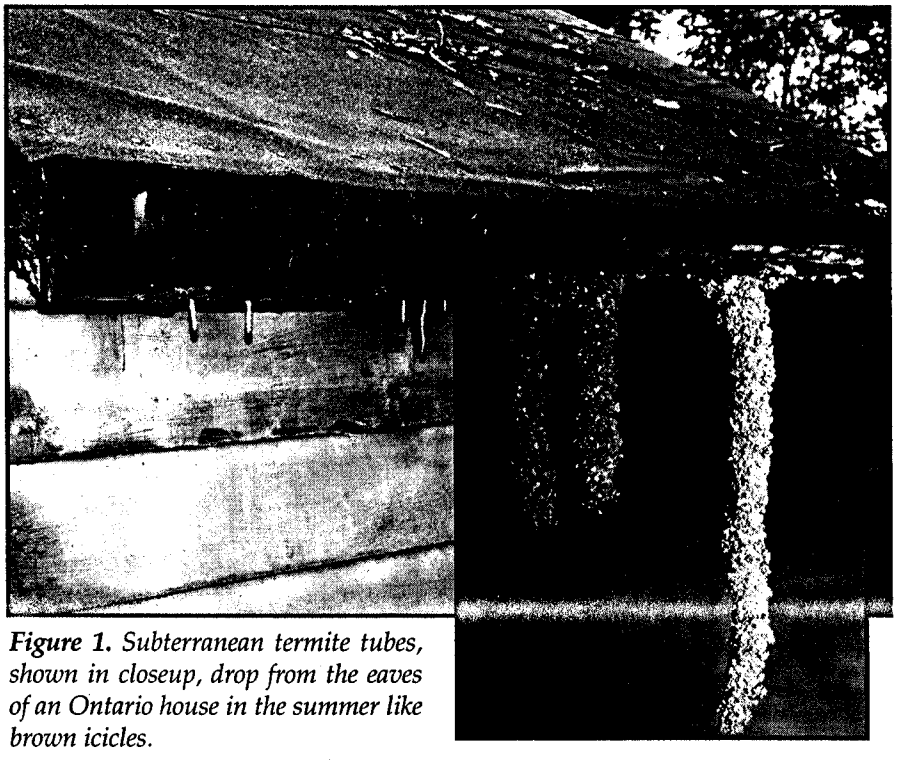

Figure 1. *Subterranean termite tubes, shown in closeup, drop from the eaves of an Ontario house in the summer like brown icicles.*

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termites may be due to the long cold period in the spring and the abrupt transition in late May to summer weather, but this is still not understood. Swarming does occur within heated buildings, but is still not particularly common.

Large Colonies Cover Large Areas

Using trapping and termite marking techniques similar to those of Su and Scheffrahn (1988) with Formosan termites, we are investigating the size and foraging territory of eastern subterranean termite colonies in Ontario. The results obtained at two urban sites in metropolitan Toronto (Grace et al. 1989) are interesting in contrast to Formosan termite studies, and other results obtained by destructive samplings of *R. flavipes* colonies in the southern United States (Howard et al. 1982).

In this study, we placed a large number of six-inch long pine stakes at three-foot intervals in a grid pattern where possible, and at 3- to-6-foot intervals around all buildings and the edges of lawns and paved areas. We monitored these stakes for termite activity. When termites were found, we replaced the stakes with short sections of plastic pipe containing corrugated cardboard within an inner sleeve, and buried them just below the soil surface (Grace 1989). We brought the termites collected in these traps (Figure 2) back to the laboratory and fed them paper treated with a persistent dye (Grace and Abdallay 1989). We returned these termites to their original traps, and made a series of collections from all traps at the site at 3- to 6-day intervals over the next two weeks.

Figure 2. *Termites are collected in buried traps containing cardboard.*

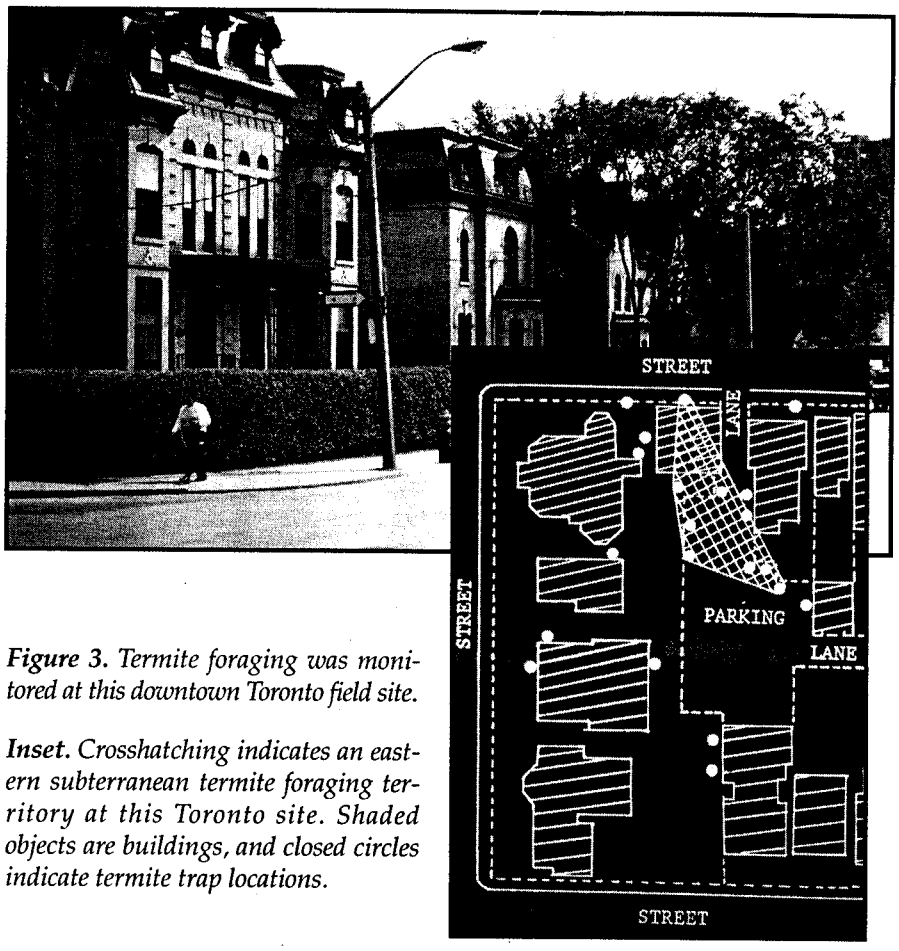

Figure 3. *Termite foraging was monitored at this downtown Toronto field site.*

Inset. *Crosshatching indicates an eastern subterranean termite foraging territory at this Toronto site. Shaded objects are buildings, and closed circles indicate termite trap locations.*

Given the patchy distribution of termites in cool regions, more buildings in urban areas must be considered at risk from any discovered infestation.

As was described by Su and Scheffrahn (1988), the size of the foraging territory occupied by a termite colony can be determined by the trap locations from which dye-marked termites are recovered. At one Toronto site (Figure 3), we found marked *R. flavipes* workers foraging over an area of 2,863 square feet, with a maximum linear distance of 157 feet between connected traps. This single population was affecting at least two buildings, with tunnels extending beneath a paved alley and parking lot (Inset). Based on the proportion of dyed termites recaptured at this site, we estimated the foraging population to be 2.1 million termites (Grace et al. 1989).

Using the same technique of releasing dyed termites, we have estimated foraging populations at other sites in the Toronto area to be as large as three million termites, covering areas four times as large as that described here (Grace et al. 1989). Esenther (1980) arrived at similar population estimates for *R. flavipes* in Wisconsin. Yet, in the southeastern United States, these numbers more closely resemble estimates for Formosan termite colonies (Su and Scheffrahn 1988), than the average *R. flavipes* colony population

of 200,000 (Howard et al. 1982).

Implications for Control

Foraging by northern subterranean termite colonies over large areas must be taken into consideration in planning termite control efforts. Given the patchy distribution of termites in cool regions, more buildings in urban areas must be considered at risk from any discovered infestation. On the other hand, if an effective bait is ever developed for use in termite control, fewer and less carefully placed baits should be required to introduce a toxicant to a single large foraging population than would be the case where a number of small and unconnected colonies occupy an area of the same size.

With termite control methods in a state of change, investigations such as those described here emphasize the danger of generalizing about broadly distributed pests from studies performed in a limited geographic region. We hope that a better understanding of regional variation among subterranean termite populations will lead to more accurate predictions of their pest potential under different conditions and to more effective control methods tailored to fit local environmental conditions.

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Termites Take Residence in Winnipeg

Winnipeg, capital of the Canadian province Manitoba, is the coldest place in which termites have managed to survive. It has the dubious honor of being the most northern city on the globe to host a termite infestation.

Poulin Exterminators discovered the city's first termite infestation in August 1987. Company president Don Poulin dispatched a technician to perform a routine inspection after a homeowner complained about "bugs." The technician, upon discovering an insect he had never seen before, brought the mystery bug to the office for identification. Poulin immediately recognized the pest as a subterranean termite and went to the home to check for other tell-tale signs of infestation.

Winnipeg government officials report that the city's infestation was confined to nine houses and one vacant lot on Youville Street in St. Boniface. This past summer, a local exterminating company on a government contract treated the area with Dursban TC, a product manufactured by Dow Chemical Co., Midland, Mich.

According to R.M. Acheson, vice president of Poulin Exterminators, "The big surprise and concern is that, as much as Winnipegers hate winter, it had provided some consolation because the cold weather had always protected us from infestations of termites. Unfortunately, the termites appear to be tougher than our winters and may become a major concern for us in the future."

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