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**Researchers share
the latest on nuisance
ant species**

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With ants, first make an accurate ID and then choose a treatment

By Dr. Ryan Neff

Raise your hand (or roll your eyes) if you've heard this before: The first step in treating for ants is proper identification.

Just because the directive is overused in training presentations doesn't make it any less important. Ants can differ, often dramatically, in their behavior and ecology. Understanding those differences is key to quick and efficient control.

AN UMBRELLA TERM

"Sugar ants" is the common name for pretty much every ant homeowners find in their kitchens or bathrooms. They are often less than 1/8 of an inch long, dark in color and form distinct foraging trails to resources. Common "sugar ants" include Argentine (*Linepithema humile*), odorous house (*Tapinoma sessile*, or OHA), rover (*Brachymyrmex* spp.), little black (*Monomorium minimum*) and black crazy (*Paratrechina longicornis*) species. Any seasoned pest management professional (PMP) knows treatment strategies differ markedly among these ants.

Argentine, rover and little black ants generally nest outdoors. Thus, treatments often are more effective when performed outside in conjunction with interior treatments. Argentine ants often have many interconnected satellite colonies spread around a structure, and the sheer number of ants often necessitates the use of more bait than would be used for other species. Rover ants and little black ants form individual colonies, although an account may have numerous non-

cooperative colonies. This means that, unlike Argentine ants, bait and transferrable liquid products won't necessarily make their way to every colony, and control may involve a more extensive inspection to locate all nests.

By contrast, OHA and black crazy ants can nest both indoors and outdoors. This presents a special challenge when treating, especially if a treatment protocol only involves outdoor residual sprays. Some liquid residual products may kill too quickly, which can result in the elimination of ants outdoors while indoor colonies remain. Using a multi-pronged attract-and-kill approach with species that can nest both indoors and outdoors is often the most efficient way to eliminate infestations. This involves applying an approved liquid residual product — preferably one that doesn't kill too quickly — to active foraging trails, followed by baiting on or around the treated areas to increase the number of ants exposed to the residual product.

DIFFERENT TREATMENTS

Another case where proper identification of "sugar ants" is important is with pharaoh (*M. pharaonis*) and thief ants (*Solenopsis molesta*, for example). Thief ants generally form small colonies of only a few thousand workers, while pharaoh ant colonies may have multiple interior nesting sites and hundreds of thousands of ants.

Thief ant infestations can be eliminated quickly using both baits and liquid residual products. Large

pharaoh ant colonies, depending on the location, often require a much more thorough approach. This is not only important for control, but also for bidding the account: If the account was bid at a thief ant rate and it turned out the customer had pharaoh ants, the labor and material required may not justify the original bid.

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We hope you will find the following pages to be informative and useful — no matter which ant species you identify.

DR. NEFF
is the
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technical
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for MGK.



Research shows the tawny crazy ant's reproductive system may contribute to its ability to become an invasive pest.



UNDERSTANDING UNWELCOME ANT SPECIES

Texas A&M researchers examine how genetics may contribute to the spread of an invasive species that is making its way across the southern United States **By Diane Sofranec** | PMP Senior Editor

The study of invasive ant species may one day help pest management professionals (PMPs) successfully manage these unwelcome pests.

Researchers from the Department of Entomology at Texas A&M University — Dr. Pierre-André Eyer, doctoral student Alexander Blumenfeld and Dr. Ed Vargo — conducted studies that revealed tawny crazy ant (*Nylanderia fulva*) genetics have contributed to their ability to spread in the United States.

Their findings, which were published in the *Proceedings of the National Academy of Sciences*, may help PMPs uncover new control methods.

UNDERSTANDING THE SPECIES

The researchers focused on ant colonies located in Texas and Florida, where the species is prevalent. They determined female tawny crazy ants had a more diverse genetic makeup than expected.

While male and female ants have different genetic makeups, the pattern they inherited was unique compared with other species' genetic makeups.

"*Nylanderia fulva* is an ant species among the major urban pest in the Southern United States. In early 2000, a severe outbreak of this species occurred in Texas, where our lab is based," Dr. Eyer says. "This gave us the opportunity to better understand the ecological characteristics of this species that make it a successful invader. And on a broader scale, it also allows us to question whether different successful invasive ant species exhibit a common strategy to invade, or if each species displays its own specific strategy."

To find out, Dr. Eyer worked with Dr. Vargo and Dr. Robert Puckett, who also is from the Department of Entomology at Texas A&M University. The trio collected samples of the tawny crazy ant across Texas and other Southern states to learn more about the structure and repartition of colonies across the ant

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population. They also wanted to learn how individual ants from different nests recognize and attack one another.

Previously, most findings on invasive ants have been based on discoveries on well-studied species, such as the red imported fire ant (*Solenopsis invicta*), or the Argentine ant (*Linepithema humile*), Dr. Eyer explains.



DR. PIERRE-
ANDRÉ EYER

With the Argentine ant, for example, nests are interconnected within a population, and there is no aggression among ants that are not nestmates. As a result, there is a constant flow of workers and brood among a network of nests that are geographically distant. This network of nests is called a supercolony, and it differs from “regular” colonies that usually inhabit a single nest with ants that show aggression and/or avoidance to neighboring nests.

“We found a supercolonial system in the tawny crazy ant, with no aggression, and an interconnected network of nests across all the Southern United States,” he adds. “In other words, two ants, one sampled in Texas and the other in Florida, will behave as similarly as two ants collected from the same nest.”

He says they also uncovered a unique reproductive system in tawny crazy ants, whereby different genetic backgrounds, or alleles, are selected in males and females.

“In humans, males and females carry different sex chromosomes, allowing each sex to select different alleles on these chromosomes while the rest of the genome is not expected to differ between the sexes,” Dr. Eyer says. “But ants do not have sex chromosomes; males and females share their entire genomes. The discovery of a genomic region differentially selected between the sexes — through sexually antagonistic selection — is similar to the discovery of the first occurrence of sex chromosomes in an ant species.”

FINDINGS SHOW

Their research study states:

“Our genetic analyses shed light on a unique pattern of sexual divergence in an introduced population of the tawny crazy ant. We report an occurrence of marked genetic differences maintained between males and females within a single, sexually reproducing species that lacks sex chromosomes....This sexually antagonistic selection may represent a serious cost for colonies, however, as it results in the death of approximately one-half of the female offspring. It may yet preserve genetic diversity in the population and heterozygosity within the female offspring, which may enhance the invasion success of this species, potentially reducing the inbreeding depression that usually follows introduction events.”

Uncovering this supercolonial feature of tawny crazy ants can help PMPs manage this invasive species, Dr. Eyer says,

CHARACTERISTICS OF THE TAWNY CRAZY ANT

The tawny crazy ant (*Nylanderia fulva*) is an invasive species commonly found in Texas, Florida and several southeastern states.

The tawny crazy ant initially was known as the Raspberry crazy ant. It was named after Tom Raspberry, a pest management professional in Texas who, in 2002, noticed the number of these ants rising there.

Here are tips to help you determine if the species, which originates in South America, has made its way to your area.

DISTINGUISHING CHARACTERISTICS INCLUDE:

- ☐ 12-segmented antennae with no club
- ☐ A petiole (1 node)
- ☐ An acidopore, which is a circle of hairs at the tip of the gaster, or abdomen
- ☐ Body covered with many hairs (macrosetae)
- ☐ Length of 1/8-inch
- ☐ Monomorphic, or similarly sized, worker ants
- ☐ Reddish-brown color
- ☐ No stinger (worker ants have an acidopore that can excrete chemicals for defense or attack)
- ☐ Crawling rapidly and erratically, giving rise to their “crazy” common name
- ☐ Ant colonies (queens with brood, including whitish larvae and pupae) can be found under landscape objects such as rocks, timbers, and debris piles
- ☐ Nesting under almost any object that retains moisture
- ☐ Lack of centralized nests, beds or mounds
- ☐ Do not emerge from nests through central openings
- ☐ Nests primarily are outdoors, but worker ants will forage indoors, into homes and other structures
- ☐ Omnivorous, meaning they will eat almost anything
- ☐ May be found in highly populated areas
- ☐ Social insects that live in large colonies or groups of colonies that seem to be indistinguishable from one another
- ☐ May accumulate in electrical equipment when large infestations are present
- ☐ Colonies contain many queen ants (they are polygyne colonies), worker ants, and brood consisting of larval and pupal stages
- ☐ Pupae are “naked,” or without cocoons
- ☐ Periodically produce winged male and female forms called sexuals, alates, or reproductives.
- ☐ Size of colony infestations can be large and display super colony behavior
- ☐ Few worker ants forage during cooler winter months
- ☐ Foraging activity begins in spring and colonies grow, producing millions of workers that increase in density dramatically by mid-summer (July and August)
- ☐ Numbers of ants remain high through fall (October and November)

SOURCE: TEXAS A&M UNIVERSITY

because controlling a network of interconnected nests is different than separately treating individual nests.

“The finding about the sexually antagonistic selection will certainly bring new management options in the future,” he adds. “Our work has shed important new light on the molecular mechanisms underlying sex differentiation in the tawny crazy ant.”

Dr. Eyer says the identification of sex-confining genes will provide effective targets for modulating gene transcript levels to manage this urban and agricultural pest. “By constraining the development of individuals in males, for example, through RNA interference bait, we can cut off the reproductive outcomes — the queens — and the foraging incomes — the female workers — of the colonies.”

FINDINGS UPDATE

Looking ahead, Dr. Eyer says, the team is investigating deeper aspects of the genomic region under sexually antagonistic selection, thanks to the help of study co-author Blumenfeld and Megan Moran, a research associate.

“For example, we aim at identifying the specific genes, whose expression levels prevent the development of individuals into a given sex,” he adds. “Similarly, we are investigating whether this strategy is already present in the native range of this species in South America, and whether this strategy is a change that is also occurring after the introduction of *N. fulva* in the United States.”

The research continues for Dr. Eyer and his colleagues, as new invasive species are introduced and spread a bit more every year.

Recently, they investigated the structure of the colonies of two other major urban pests: the dark rover ant (*Brachymyrmex patagonicus*) and the Asian needle ant (*Brachyponera chinensis*).

“Interestingly, we found no supercolonial structure with clear colony boundaries; we found that the nests of *B. patagonicus* contain a single queen, while those of *B. chinensis* can contain hundreds of them,” he says.

In addition, the white-footed ant (*Technomyrmex difficilis*), which already can be found from Florida to Mississippi, has been reported in Texas. Dr. Eyer says they currently are investigating how the reproductive system of this ant species also may differentially favor its invasiveness.

“Overall, these differences among invasive ant species suggest that different species possesses distinct sets of life-history traits, each of them favoring invasiveness by potentially allowing them to fit a specific, empty niche,” Dr. Eyer adds. **PMP**

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NEW AND COMMON ANT SPECIES

With hundreds of species of ants in the United States alone, here's a look at some you may encounter

By Diane Sofranec | PMP Senior Editor

Chances are pest management professionals (PMPs) who offer ant control have encountered many of the most common species in their area. Although hundreds of species exist in the United States alone — 792, according to AntWiki — an accurate identification is critical to control.

“Different ant species nest in different locations, and have specific food preferences and possibly different social structure,” explains Dr. Karen Vail, professor of urban integrated pest management (IPM) at the University of Tennessee. “Without correct identification, PMPs can waste considerable time applying pest management tactics that are ineffective.”

The ant species PMPs most often encounter in the United States is the odorous house ant (*Tapinoma sessile*), or OHA. “This species is found coast to coast and border to border, near the seashore to the mountains,” she adds.

Carpenter ants (*Camponotus* spp.) also are common across the country, but each region might have different species that dominate as pests.

The pavement ant (*Tetramorium immigrans*), and the pharaoh ant (*Monomorium pharaonis*) are exotic pest ants found throughout much

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The pharaoh ant is a species frequently found indoors.



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of the country. “Pavement ants predominantly nest outdoors, whereas pharaoh ants are transported via commerce and nest mostly indoors,” Dr. Vail says.

Other ants cause significant pest problems, but are limited in their distribution. Fire ants (*Solenopsis* spp.) and Argentine ants (*Linepithema humile*), are

found mainly in the southern United

States and California. Acrobat ants (*Crematogaster* spp.), little black ants (*Monomorium minimum*), crazy ants (*Nylanderia* spp. and *Paratrechina longicornis*), rover ants (*Brachymyrmex* spp.), ghost

ants (*Tapinoma melanocaepalum*), big-headed ants (*Pheidole* spp.) and

moisture/yellow ants (*Lasius* spp.) round out the list, although she says several of these species also would be considered regional pests.

With so many different ant species roaming the country, PMPs may encounter more than one species at a location, Dr. Vail points out. Of course, this is yet another reason why an accurate identification is important.

“Managing several species at the same location would depend on the species present, and if they overlapped in the areas where they forage or nest,” Vail says.

“Determine *why* the pests are present, and then remove as many of the conducive conditions as possible.”

She notes PMPs must proceed with caution, however. “If there is much pest pressure from several ants, controlling one species may cause the other species to increase in pest status,” she says. “Identify the pests. Determine the best way to manage each, and then see how management efforts could overlap to make the strategy most efficient or negatively impact success.”

REAL-WORLD EXAMPLES

Misidentifying the ant species with which you encounter may undermine control efforts. Dr. Vail recounts two particularly persistent ant management cases due to misidentification, and both involve pharaoh ants. The problems would have been solved more quickly if the ant species had been confirmed from the start, she says.

In one case, a PMP was dealing with an ongoing ant problem at a hospital surgical room. The PMP made several calls to a southern extension urban entomologist seeking management advice for pharaoh ants. But the PMP didn’t bother identifying the ants he encountered because he was relying on information that only mentioned pharaoh ants as

being problematic in hospitals. After receiving phone calls for months, the entomologist visited the hospital and discovered Argentine ants, not pharaoh ants. The PMP switched gears and attacked the problem from the outside, which was where the ants were nesting.

In another case, a PMP had been treating ants in a college dean’s office, with no success. Dr. Vail visited the location and identified pharaoh ants. The PMP told her he hadn’t been sure of the ant’s identification, but had been spraying a fast-acting material whenever the ants trailed through the office.

“When I asked why he hadn’t tried any baits, he indicated baits were too slow, and the dean didn’t want to see any ants,” she recalls. “I said to myself, ‘I think a year is monumentally slow.’”

Dr. Vail then explained fast-acting sprays could cause pharaoh ants to bud and further aggravate the problem, and suggested other control options to try. The PMP was successful with the new approach.

RELIABLE RESOURCES

So, how can PMPs keep up with all the ant species they may encounter at accounts? Dr. Vail suggests joining your local, regional and national pest management organizations — and more importantly, attending their meetings, subscribing to their newsletters, and checking out their social media posts. There is no limit to the information you can learn about species and treatments from others in the industry.

She also suggests reading publications devoted to the pest control industry (like this one).

The social media and blog posts of your state’s extension urban entomologist and renowned myrmecologists — people who study ants — are other good sources, she says. “Alex Wild’s blog, *Myrmecos: Little Things Matter*, occasionally mentions a new pest ant and is worth visiting just for his amazing ant photos.”

If you hear about a new pest ant from someone who is not a known authority, she recommends following up with an expert.

If a new pest ant has been confirmed, visit **AntWiki.org**, which Dr. Vail calls “one of the most thorough websites on ants. Here you will find information on ant identification, life history, behavior, distribution and diversity, morphology, genetics, ecology, human culture and ants, fossil ants, myrmecologists, and myrmecophiles. It’s so exciting, why wait to find a new ant to check it out?” PMP

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DR. KAREN VAIL

ENCOUNTERING

NEW SPECIES

A positive ID is key to controlling ants that are unfamiliar in a service area

By Diane Sofranec | PMP Senior Editor

Pest management professionals (PMPs) treating homes or businesses for ants typically encounter species with which they are familiar. But every once in a while, they will come across an ant they have never seen before. In this instance, “seen” refers to size and color, as well as behavior.

Species that are not native to a region are not necessarily invasive, however. Instead, they may be considered exotic.

“There’s a difference between the terminology,” says Dr. Dan Suiter, professor of entomology in the Department of Entomology at the University of Georgia. “Something that is *exotic* is from a foreign land, and is evolving where it happens to be found. But an *invasive* species has certain characteristics.”

Exotic ants are considered invasive when their presence reduces the diversity and abundance of native ant species, he says, because they dominate limiting factors such as nest sites and food.

ESTABLISHING COLONIES

When ants become established in an area and flourish, it means they are competitive with the ants that are there already. Dr. Suiter adds that we see them because they successfully established themselves in the area.

Invasive species — such as Argentine ants (*Linepithema humile*), yellow crazy ants (*Anoplolepis gracilipes*), big-headed ants (*Pheidole megacephala*) and red imported fire ants (*Solenopsis invicta*) — successfully

competed with native species, and established themselves in the regions in which they now are found.

Budding is a common way many invasive ants establish a new colony. A small group of worker ants will take a little bit of brood — egg, larvae and pupae — and establish a completely new colony this way.

Plenty of exotic ant pests can be found in this country, Dr. Suiter says, and many are in coastal areas because they gain entry in shipping ports. “We don’t know the number of species that actually literally fell off the ship and did not establish themselves in an area, because they were out-competed by native species,” he adds.

“The ants that are pests in the United States are going to be regional,” he says. “So, depending on where you are in the country, your number of pest ant species will be different, and that makes them a little easier to identify.”



DR. DAN SUITER

ACCURATE ID

When an inspection uncovers an unfamiliar ant, take a close-up picture of it, or better yet, collect some of them and send them to your county extension office. Or, if you work for a large pest control company, send them to the technical director on staff. Not only will they provide a positive identification, they also will be made aware of ant species that may be new to the area.

Another way to make an accurate identification is by observing their behavior. Because ants have different trailing behaviors, it’s one of the best ways for PMPs to identify a species.

“Seeing a live ant has a lot to do with identifying them,” Dr. Suiter says. “You can look at three different ants and get them confused by what they look like. But seeing their foraging behavior and how they trail will help you identify them, too.”

While 40 to 100 ant species are commonly found in most states (with the exception of Florida, which has more), PMPs likely will be familiar with most of the ants they encounter. “PMPs will run into the same species over and over again,” he says. “When they see something that is different, they have to be aware.” PMP

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