

# Pest Notes



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### Study Finds New Fly Pathogens

PCT-Online  
Frank Meek

*For the first time, researchers find that house flies carry bacteria linked to meningitis and other serious illnesses.*

A new study funded by Orkin Pest Control, Atlanta, Ga., reveals that common house flies carry a bacterium that has been linked to meningitis. This is the first time the bacteria, *Acinetobacter baumannii*, has been detected from flies. For pest professionals who perform fly control services, this study has significant public health ramifications.

The other newly detected pathogens were *Bacillus pumilus*, which can cause food poisoning, and *Enterobacter sakazakii*, which can cause urinary tract, pulmonary and bloodstream infections. Further scientific research is needed to determine whether any of the newly found bacteria may be transmitted to humans from contact with flies or surfaces contaminated by flies.

"We may have found one of the primary sources for the spread of some organisms in nature," said Dr. Jerry Butler, the University of Florida (UF) entomologist who led the research. "We confirmed that flies spread bacteria to surfaces, where the pathogens continue to grow. We don't know yet what the human health implications are, but it reinforces the importance of sanitation and keeping flies out of food establishments."

The study confirms that flies are much more than a nuisance and that they pose potentially serious health risks.

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### Super Sleuth

PCT-Online  
Stoy Hedges

*Come along with one of the industry's leading pest control experts to solve these troublesome case histories that involve flying insects. Can you solve the mysteries?*

Outside, flying insects play a critical role in maintaining the balance of nature, serving as an important food source for a wide range of animals. Inside, however, flying insects represent both a health threat and a nuisance, particularly when they involve food handling and manufacturing facilities. That's why flies, gnats, beetles, mosquitoes and other flying insects are serious business for PCOs providing pest control services to commercial accounts.

This article will use "real world" examples to illustrate successful strategies for minimizing such insect problems. After reading a description of an actual problem in a commercial facility, make a note of your recommendations and see if they coincide with the successful course of action implemented by our company's service personnel.

#### **THE CASE OF THE JUNK FOOD 'JUNKIES.'**

During a routine sanitation inspection of a food-processing facility in the rural South, an unexpected insect concern presented itself to the inspector. Dozens of dead beetles were discovered along the walls of the facility, with a particularly large concentration in the packaging area of the plant.

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"Flies are a more serious threat to food safety than many people think," Butler said. "People need to consider food safety when they're eating outside. They need to take a different attitude about a fly crawling across their sandwich."

**NINE PATHOGENS DISCOVERED ON FLIES.** The UF researchers grew cultures from flies collected at the backdoor areas and rear dumpsters of four restaurants in Gainesville, Fla. Within hours, the samples were swarming with nine pathogens.

Researchers found pathogens that can cause peritonitis, diarrhea, typhoid fever, bacillary dysentery and possibly staph infection. The flies also carried *Escherichia coli* and *Shigella sonnei*. The Centers for Disease Control and Prevention (CDC) recently reported that shigellosis was one of the three most common foodborne illnesses diagnosed in 2000. The overall incidence of *E. coli* O157 infections, which can be derived from *Escherichia coli* bacteria, increased as well.

Medical research is necessary to determine whether a vector, such as a fly or other pest, might also transmit the disease to humans.

"The study's findings are significant and the medical research community needs to gather more information to understand its full meaning," said Dr. James Maruniak, a UF microbiologist who led the fly study's laboratory trials. "It surprised me to find so many bacteria (in the fly samples). I definitely have a different view of flies. There are a lot of potential health implications."

**RESULTS PROBABLY TYPICAL.** The study's results, which were confirmed by two independent laboratories, are probably typical of flies across the country, Butler said. House flies migrate up to 10 miles a day. They feed on sugar and organic matter found in foodstuffs, compost piles, garbage and feces. During their short life spans, typically less than a month, flies can spread pathogens across a wide area.

The study's results do not reflect poorly on the cleanliness of the participating restaurants, Butler said. Garbage was removed from three of the four dumpsters the previous day and the dumpsters had been washed. The flies carried the same pathogens whether they were collected from the clean dumpsters or the one that contained old garbage.

"We need to look more closely at nests as disease

transmitters. Orkin is committed to funding research on pests and pathogens to help businesses improve food safety and to reduce the human and economic toll of food-borne diseases," said Frank Meek, technical manager at Orkin.

A white paper on the fly study will be released in December when Butler will present his findings to members of the Entomological Society of America.

## EXECUTIVE SUMMARY

**Study Purpose:** To determine the presence of bacterial organisms in or on wild house flies (*Musca domestica L.*) near food-service establishments.

**Methodology:** Researchers collected house flies at the back entrances and around dumpsters at the rear of four restaurants within a five-mile radius from the University of Florida (UF). Flies were collected with sterile insect nets. Netted flies were then placed into sterile 150-ml containers and labeled for each location. About 20 flies were collected and returned to the laboratory. These flies were sterilely transferred to blood agar plate culture techniques. Cultured organisms were sent to the laboratory of Ellen R. Dickstein of UF's Plant Pathology Department for MIDI (MIDI Sherlock Microbial Identification System) analysis. Fatty acid analyses of nine isolated bacterial strains collected from the house fly samples were conducted to match samples against known bacteria.

**Study Results:** Three new bacterial records for house flies were discovered during this study (*Acinetobacter baumannii*, and *Bacillus pumilus* and *Enterobacter sakazakii*). Six additional bacterial organisms, previously observed by other researchers, were also present, according to MIDI analysis. All organisms recovered from the house fly (*Musca domestica L.*) are serious pathogens, with the possible exception of *Bacillus thuringiensis*, a known pathogen for insects. The study also shows that flies are a more serious threat to food safety than many people think.

## Bacteria Found On House Flies Illnesses Associated With Identified Bacteria

*Acinetobacter baumannii*\* New record for house flies.

Meningitis, bacteremia, pneumonia, upper respiratory diseases, empyema and pulmonary disease in infants, urethritis, diseases of newborns, complication of instrumentation and surgery, complication of burns,

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complications of compromised patients

*Bacillus cereus*

Causes food poisoning. The diarrheal type is commonly associated with meat sauces. Emetic type is almost exclusively associated with rice dishes.

*Bacillus pumilus\**

Causes food poisoning

*Enterobacter sakazakii\**

Common in sputum, pneumonia, lung abscess, intestinal infections in humans and animals, *E. sakazakii* is most common in urinary tract, pulmonary and bloodstream infections. This group is noted in peritonitis, bacteremia, diarrhea, enteric fevers, typhoid fever, meningitis, endocarditis, intoxication, pyelonephritis, cystitis, and nosocomial infections in pediatrics, newborns and homosexual men.

*Escherichia coli*

Four types of human enteric disease, including enteropathogenic (diarrhea, mostly in infants), enterotoxigenic (secretory or travelers' diarrhea), enteroinvasive and hemorrhagic (dysentery). Hemorrhagic colitis is a recently recognized enteric infection due to *E. coli* strains of a specific serotype O157:H7. These strains commonly seen on house flies and in partially cooked hamburger.

*Shigella sonnei*

Causes bacillary dysentery, severe cramping, abdominal pain and diarrhea with blood and mucus. Most common cause of diarrhea in the U.S. found from house flies.

*Staphylococcus saprophyticus*

Common human pathogen causes bacteremia and infective endocarditis, infection of shunts and intravenous catheters. Also one of the most common causes of urinary tract infections in young sexually active females.

*Bacillus thuringiensis*

Known to produce a toxin as an insecticide for insects and is an expected infection for flies. It has also been implemented in human infections, according to Lannette, et. Al., 1985

*\*New record for house flies.*

(Sleuth...Continued from page 1)

The beetles proved to be various types of diving beetles that live and breed in waterways (primarily lakes and ponds). Such beetles are attracted to outdoor lights on buildings, sometimes by the thousands. Sure enough, in this case, directly under exterior lights on the outside of the structure, piles of beetles — both dead and alive — were found.

The facility was located just a half-mile from a series of lakes and creeks. Sitting alone in the middle of a field, the facility's bright mercury vapor lamps served as beacons for diving beetles, moths, mayflies, ground beetles and innumerable other insects. To make matters worse, the doors were left open to ventilate the building, including the area where freshly made potato chips traveled on a conveyor belt to be packaged into bags.

In addition, huge bins of old or unusable chips, flour and other foods were stored within 15 feet of the open doorways. The ground beneath the bins consisted of gravel and mud. In the July sun, these bins were swarming with flies, many of which entered the building. At a doorway used by truck drivers to access the building, an air door was installed, but the door was left propped open. Just inside, an insect light trap was located in a corner of the building, easily visible from the outside. Interestingly, a mercury vapor lamp was located almost directly above the door and piles of beetles could be seen everywhere just inside the doorway, especially underneath the light trap.

In the processing area, a number of vats rested on a large platform. The area was extremely wet with standing water underneath the vats. The wall in a darkened area beneath the platform was covered with dozens of moth flies. By using a knife, wet cornmeal teeming with fly larvae could be scraped from beneath the base plates of the support posts. Clearly, this food-processing facility had a serious pest problem. Based on the aforementioned description of the site, what would you recommend? Here's what we did:

?? The mercury vapor lamps in all exterior lighting was switched to sodium vapor lamps, thereby attracting fewer insects to the facility. Unfortunately, despite this step, given the location of the building, quite a few insects were still being attracted to the facility.

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- ?? Screen doors were installed on all doorways that remained open for ventilation purposes. Automatic screen doors were recommended for all overhead doorways. If screen doors were not used, plant personnel were required to keep all doors closed when not in use. All doors were equipped with tight-fitting weather strips.
- ?? The insect light trap (ILT) inside the truck driver's entrance was moved so it was not visible from the outside. The air door installed over that doorway was moved to an interior doorway between the receiving warehouse and the processing area.
- ?? Additional insect light traps were installed in shipping and receiving areas of the warehouse since these were the primary entry points for flying insects into the building.
- ?? The bulbs in the existing light traps had not been changed in several years, which meant they were attracting few, if any, insects. Plant personnel were instructed to change the bulbs annually in the spring.
- ?? It was recommended that discard bins of food products be located further from the building. The bins should not sit in puddles of mud or water. Ideally, a large concrete pad should be poured, however, a thick layer of tightly packed gravel would suffice. Personnel were informed that the bins should be emptied on a more regular basis than the current weekly schedule. Empty bins should be cleaned immediately and not left to serve as potential breeding sites for flies.
- ?? The cracks beneath the metal base plates of the platform support posts were cleaned out and dried using forced air and then sealed completely with long-lasting foam, thereby preventing the build-up of wet food debris under the base plates where it serves as a breeding site for moth flies.

By taking the aforementioned steps, the flying insect problem in the facility was corrected, resulting in a satisfied customer.

**THE CASE OF THE 'MODEL' MOSQUITOES.** A cosmetic-manufacturing facility located in the rural South regularly experienced flying insect problems. Mosquitoes

proved particularly troublesome for employees indoors. Doors remained propped open during the summer. Huge wall vents were present along the front and west sides of the building through which air was drawn into the building for ventilation by large roof fans. Exterior lights surrounding the building contained mercury vapor lamps, attracting flying insects from a nearby lake.

The following was recommended to minimize the facility's flying insect problems:

- ?? Fine mesh screen was installed over each of the large wall vents to prevent as many insects as possible from being sucked into the building when the fans were operating. Nonetheless, the screens failed to stop the entry of midges and other tiny flying insects into the building. The right mesh size screen was determined by consulting with plant personnel and through trial and error.
- ?? Exterior lighting was slowly switched to sodium vapor lamps.
- ?? About 40 insect light traps were installed throughout the facility, except for where cosmetics were manufactured and packaged. (This area was a "clean room," which required hair nets, shoe covers and lab coats.) Here is what we recommended:
- ?? Insect light traps were hung in the warehouse area in between every fourth or fifth warehouse door, perpendicular to the doorway. Located 12 feet off the floor, these traps primarily attracted nighttime-flying insects such as moths, beetles and midges.
- ?? To capture daytime-flying insects and nighttime-flying insects making their way past the first set of insect light traps, additional traps were installed on walls throughout the forward part of the warehouse. The traps were located to cover an area no higher than 6 feet above the floor.
- ?? Light traps were emptied every two weeks. Analysis of the trap catches revealed thousands of insects captured each week, including midges, horse flies, deer flies, yellowjackets, paper wasps and mud daubers.

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?? To solve the problem of mosquitoes entering the receiving and shipping areas of the warehouse, nighttime maintenance personnel were provided a non-residual aerosol product and trained in their proper application. These individuals would begin applying the aerosol treatment around 4 a.m., about two hours before the first shift. The frequency of applications was dictated by the incidence of mosquitoes and weather conditions.

**THE ROAD-WEARY CRICKETS.** During a routine cockroach service in a hotel kitchen, the service professional noticed many tiny, black beetles and crickets on several monitoring traps in the pastry prep area. The beetles were various species of ground beetles. Exterior lighting attracts crickets and ground beetles.

Further investigation revealed a doorway leading outside from the prep area. The door opened to a dumpster that had a standard 100-watt light fixture directly above the door outside. Kitchen employees, when asked, stated the door was often propped open at night. Here's what we recommended:

- ?? The exterior light bulb was switched to a yellow "bug" bulb to attract fewer insects.
- ?? The door's weather-stripping was improved, particularly at the bottom where it previously had no weatherstrip.
- ?? Kitchen management was shown the traps were told of the problem. Employees were instructed to keep the door shut. A large fan was provided to ventilate that area of the kitchen so the door could stay closed.

**SUMMARY.** Flying insect control always begins with attracting as few insects to the building as possible. Good sanitation practices and proper lighting outside are critical. The next step is to exclude from the building the insects that are still attracted to the site despite previously mentioned efforts. Keeping doors closed, use of screens and screen doors and tight-fitting weatherstripping are keys. Inside, insect light traps, properly located, installed and maintained are critical 24-hour "sentinels" that capture most of the insects that do manage to enter the facility.

Remember, the key to successful control is that each flying insect situation must be analyzed on its own merits and the proper strategies employed based on the underlying causes of the problem.

## Pest Management Professionals Stay Busy With New Rodent Challenges

PCT-Online  
Brad Harbison

With the advent of new and effective rodent products and community-wide rodent control efforts, most pest management professionals now have the upper hand in controlling these pests throughout the United States. Still, most pest management professionals contacted by *Service Technician* magazine agreed that the demand for rodent control services has remained brisk in recent years.

The ability of rodents to adapt to different habitats combined with changing environmental conditions and extreme weather patterns have kept rodent control among the most requested services of pest management professionals.

It's believed that commensal rodents (e.g., house mouse, Norway rat and roof rat) first inhabited the earth two to four million years ago, according to the *Mallis Handbook of Pest Control*. Rodents have an uncanny ability to adapt to new environments, reproduce quickly and feed on many different types of food. Combine these traits with their skills at avoiding predators and it's easy to see why rodents remain such a problematic pest.

Bob Woolsey, owner of Bear Creek Pest Control, Marieta, Calif., has seen rodents' abilities to adapt firsthand.

"We've been very busy this summer with rat jobs and it hasn't slowed down," Woolsey said. "Usually in the summer most of the rodent work we do is exterior jobs, but this summer we are still trapping them in attics. That's unusual because we have had 100-plus degree days and the rats usually move outdoors when temperatures reach those degrees."

Woolsey said roof rats are most problematic in his area (the San Diego area), citing an abundance of fruit trees as a possible contributing factor.

**A HELPING HAND.** Humans also assist rodents by unintentionally providing them with survival essentials food, water and shelter.

Fred Fitzmaurice, owner of Fred's A to Z Nuisance, Termite and Pest Control, East Fallowfield, Pa., said homeowners who double as do-it-yourself

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landscapers may be partially responsible for the spread of rodent problems.

"We are finding them in housing developments and that was something we never used to see," he said. " People are bringing them in with mulch."

Construction is another major factor behind the proliferation of rodents in rural and semi-rural settings. When land is cleared, rodents' natural habitats are cleared and they may seek new shelter inside new homes.

While humans are largely responsible for the proliferation of rodents in rural areas, city governments have helped rodents thrive in urban areas. Many rodent problems will be kept in check by locally government-funded rodent programs. However, when cities have to make budget cuts, these types of programs are often among the first to go. "I don't know this for a fact, but I think one of the reasons we've seen an increase in rodent problems is because a lot of townships have stopped baiting storm drains as a money saver," Fitzmaurice said.

**MULTIPLE OPTIONS.** There is no shortage of rodent control products and techniques that can be utilized by pest management professionals. However, one of the most important steps in any rodent control program is rodentproofing. Regardless of how effective a product is, if the structure is not properly rodentproofed, the technician will be fighting a losing battle.

Rodentproofing involves the permanent sealing of cracks or holes in a structure. Without properly denying access to a structure, rodent control products will have a minimal effect because the rodent population entering the structure will be too large.

A number of rodent traps and rodenticide baits are available. Oftentimes the structure where the work is being completed will dictate which product(s) will be used. To control difficult infestations, a combination of baits and traps may be the best solution.

**CONCLUSION.** While humans may be beneficial to rodents, giving them survival essentials, in many cases, rodents are harmful to humans. For example, rats typically produce between 20 to 50 droppings and excrete 14 ml. of urine daily, presenting serious challenges to food and health professionals regarding food contamination. Because of their ability to gnaw and burrow, rodents can also cause serious damage to structures, equipment, furniture, utilities and transportation vehicles.

## Bird's Eye View

PCT-Online  
Amanda Paskiet

As the public's concern about issues of safety, health and property damage associated with pest birds increases, so does the demand for products and techniques to control them. One such bird control product is the Avian Dissuader™, a hand-held laser device from SEA Technology Inc. The device for the control of many pest birds including starlings, crows, seagulls, Canada geese, ducks and egrets.

The Avian Dissuader was developed "by accident" according to Jim Lynch, president, SEA Technology. The company had been manufacturing threat deterrent security devices for use in military agencies, such as the Air Force, since 1989. "Through the Air Force's use of the device, they came to find out it was also effective for bird control," Lynch said. "So, a year ago, we decided to try to manufacture a device strictly for the bird control market."

But before it was ready for the bird control market, the Avian Dissuader went through vigorous testing at the U.S. Department of Agriculture's Animal and Plant Health Inspection Services (APHIS) research center in Sandusky, Ohio. "Officials concluded that birds see the laser beam as an undefined predator; therefore, they stay away from it even after the beam is gone," said George Johnson, national sales manager, bird control products, SEA Technology Inc.

### How It Works

The Avian Dissuader should be used at dusk or at night, when the target birds can best see the laser beam. The user shines the beam, which is effective for about 500 meters, in an area where the target birds are roosting or nesting. "The user moves the beam slowly and in an unpredictable manner, mimicking the movements of a predator — but it does not have to touch them," Johnson said. "The user wants to reinforce the bird's perception that it is a predator so they will fly away."

The laser beam does not hurt the birds or the user of the Dissuader, according to the Department of Agriculture's APHIS research center. Birds' eyes filter most damaging radiation (i.e., short-wave radiation from the sun). In fact, no ocular damage was found after multiple tests on double-crested cormorants were conducted at the research center. Human eyes, on the other hand, do not filter radiation. Therefore,

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standards are set for laser classification and use. The Avian Dissuader is a Class-III B category laser, which is not capable of producing harmful radiation if used properly. "The only way it would be harmful to a human eye is if the user stared directly at the laser head," Lynch said.

### Permanent Control

Most pest birds, especially geese, tend to nest near their food source, making bird control particularly difficult. "One of the biggest problems I've heard of with any bird control product is getting the birds to stay away from the area for good," Johnson said. "Many times, the birds will come back to the area after a few weeks or month or they'll become accustomed to the control methods aimed to scare them."

But according to the tests conducted by the Department of Agriculture's APHIS research center, most of the birds did not acclimate themselves with the Avian Dissuader. However, proper treatment with the device can be time consuming for PCOs: It takes anywhere from three to 10 nights to completely clear an area of unwanted birds. Lynch said he expects the Avian Dissuader to be released for sale Sept. 1. For more information on the Avian Dissuader, contact George Johnson at (502) 494-2150 or visit [www.shopseatech.com](http://www.shopseatech.com).

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## Stinging Insect Control Requires Patience And Planning

PCT-Online  
Brad Harbison

In terms of structural pests that have the most immediate and painful impact on homeowners, a good argument could be made that stinging insects reign supreme.

While every effort should be made to service an account with a problem such as a carpenter ant infestation as soon as possible, a customer with a hornet's nest under an eave requires an immediate response.

An encounter with a stinging insect such as a bee or wasp can be a painful and, for some individuals, a deadly experience. Some people will have minor reactions to insect stings, and a small percentage of the population has anaphylaxis — a hypersensitivity to certain insect stings that can result in death.

Because of these dangers, the management of stinging insects is among the most important responsibilities of a service technician.

**CROWD CONTROL IS A MUST.** One of the first steps when controlling stinging insects, particularly in congested areas, is crowd control. Great care must be taken to keep all individuals away from a site to be treated.

George Botta, vice president and general manager, American Pest Control, Las Vegas, Nev., has experienced ultimate crowd challenges, eliminating Africanized honeybees (a.k.a. "killer" bees) from structures on Las Vegas' famous Strip and Fremont Street — a section of downtown Las Vegas that draws large crowds for canopied light shows.

"The tourists see you come out in the white (bee) suit and they'll click away with their cameras," Botta says. "We'll use police officers, firemen and hotel security guards to keep people off the streets and inside their hotels, but some will still try to get pictures. You really have to concentrate on your job and eliminate the problem as fast as you can."

Africanized honeybees have become a major problem in "The City in the Sands" since their arrival in August 1998. Botta says his company has done 575 Africanized honeybee control jobs in the last three years. Prior to 1998, Botta said he was lucky to receive one bee control job request a year. As a result of this increase, Botta has equipped all six of his bee control specialists with roles of yellow "CAUTION: DO NOT ENTER" tape to assist in crowd control and he purchased new 32-foot extension ladders for their vehicles.

**DON'T RUSH THE JOB.** Perhaps the most important consideration for technicians controlling stinging insects is to take their time, according to Dr. Fred Whitford, Purdue University's Pesticide Programs, West Lafayette, Ind.

Whitford said he has observed that a lot of pest management professionals are equipped with protective equipment, but don't use it because it takes time to put the gear on. Stinging insect protective gear includes: a bee hat; bee suit and coveralls; long-sleeved shirt; eyewear; and gloves.

"I think a beesuit is a good idea *anytime* you are dealing with bees, wasps, etc., but a lot of technicians have the attitude 'why put on a beesuit when I take care of the problem and then leave,'" Whitford said.

Whitford added that it is important for technicians to communicate with their supervisors the need to

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schedule extra time for an account with a stinging insect problem.

With all the concerns about getting stung on their bodies, technicians may equip themselves with the proper protective gear but overlook eye protection. This can be a critical mistake because treating in high places is "a double whammy for technicians because they have to be concerned not only with the insects falling back down on them, but also the pesticides drifting down and getting in their eyes," Whitford said.

**DIFFERENT LEVELS OF DIFFICULTY.** Another difference between stinging insect control and other types of pest management is that the more difficult control jobs have a higher potential for danger.

For example, eliminating a yellow-jacket nest in the ground is a pretty straight-forward job. In most cases it involves injecting a dust pesticide into the ground. Treating a wasp nest under an eave is also a pretty standard job that simply requires common sense. Stinging insect control becomes complicated when it involves eliminating honeybees in houses and hornet's nests in trees, Whitford said. He said that if honeybees in walls are simply sprayed, the honey may run and become a sticky mess that will attract other pests. Whitford said controlling honeybees inside a structure requires technicians to have a thorough understanding of structures because it may involve removing the honey and beehives.

A hornet's nest in a tree can leave technicians in "thorny" situations. It may take time to schedule a time of day to treat, correctly place the ladder, maneuver among the tree limbs, and figure out how to properly trim the limb to get the nest down.

Whitford said that only experienced service technicians should take on difficult tasks such as controlling honeybees inside structures and hornet's nests in trees.

"It requires technicians who are not afraid of heights, have common sense, understand climbing procedures and know how to make the limb fall where it needs to fall," he said. "They also have to be good communicators and tell people to stay indoors, keep their windows closed and maybe even warn people walking in the area. It may require more than one person."

**CONCLUSION.** While termites and ants might demand a bigger piece of the pie in terms of pest management service requests, the calls a service technician *does*

receive for stinging insects are just as important. Stinging pests are capable of causing injuries to humans and pests. It is for this reason that technicians who control stinging pests are held in such high regard.

However, service technicians must also be aware of the dangers that come with the territory of stinging insect control. Safety gear must be used and the proper control procedures *must* be followed. Service technicians who can safely and effectively eliminate stinging pests often find this line of work to be both exciting and rewarding.

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## Multiple Catch Traps

PCT-Online  
Bobby Corrigan, Ph.D.

Hundreds of thousands of multiple catch mouse traps (MCTs) are serviced every month inside food plants, warehouses and many other commercial institutions. The majority of these traps are installed and serviced by pest management professionals and in-house personnel of the larger food plant facilities.

Because MCTs have been used inside many different accounts by many different individuals over many years, a multitude of different opinions have emerged as to how these traps work and how they should be installed and serviced. Moreover, there is no shortage of myths surrounding the use of MCTs. So, let's examine some of the science and the practical use of MCTs and attempt to dispel the myths.

**Why mice enter MCTs.** Because the house mouse is a major prey species it must limit the time it is exposed to predators. Upon entering a completely new environment (e.g., a warehouse), among new smells, sounds and the lack of natural vegetative cover, a mouse is likely to perceive a hole in the side of a metal or plastic box as an attractive opportunity to "duck" for protective cover. Additionally, the nature of the mouse is to be investigative and opportunistic in locating resources and thus the mouse will explore new burrow holes for potential nesting sites. People often simplify this behavior and refer to it as "curiosity" and thus multiple catch traps are commonly referred to as "curiosity traps."

**Cause of Death.** What causes a trapped mouse to die inside a MCT? Often the terms "trap stress starvation," thirst and deprivation are used to

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describe the cause of death. Although some of these factors might play a role in some cases (depending on the specific situation), many mice die as a result of hypothermia — a loss of body heat. This is because small mammals have a high surface-volume to body mass ratio and thus lose body heat rapidly if they do not have the insulated protection of either a ground or structural nest or have some material (e.g., grass, paper, leaves, etc.) in which to construct a nest.

The rate of the hypothermia will depend on ambient temperatures of the floor and air surrounding a particular trap. A mouse captured inside a metal mouse trap by a warehouse bay door during the winter is likely to succumb after only a few hours. But a mouse trapped inside a heated building during the summer might live for a day or more. Other factors, such as the age and physiological health of a particular mouse, will affect the mouse's longevity. In cases when two mice are trapped alive at the same time, the stronger mouse usually kills and consumes the weaker mouse to obtain food and maintain body heat.

**Trap Servicing Issues.** The frequency of when multiple catch traps are serviced depends on the specifics of a particular account. In the majority of commercial food plants and warehouses, MCTs should be inspected and serviced on a weekly basis. In some sensitive accounts and/or unique situations, traps (or at least certain groups of traps) may need to be checked twice weekly. Traps need to be checked this frequently when abundant exterior vegetation surrounds a plant and doors need to be left open for prolonged periods both night and day due to constant shipping and receiving. Often this is done by in-house personnel because the cost of contracting this frequent servicing out to a pest management company can be expensive.

In non-sensitive accounts and situations, longer servicing frequencies may be acceptable. Inside utility rooms of commercial accounts, non-food warehouses and other non-sensitive accounts, it may be completely acceptable to inspect the traps on a biweekly or even a monthly basis. Once a trap becomes "dirty" (containing feces, urine, hair or carcasses residues), the trap should be replaced or cleaned. Dirty traps should not be allowed to remain in any area of a food or pharmaceutical establishment. In most MCT models, glueboards can be installed inside the trap to facilitate easy removal of carcasses and the maintenance of clean traps. This is especially practical in those accounts where the traps are only serviced biweekly or monthly.

**Trap Spacing.** In food warehouses and similar accounts, MCTs typically are spaced 20 to 30 feet apart. Some food industry inspection organizations that play important roles in food safety programs (e.g., AIB, ASI, etc.) suggest specific distances in their guidelines. These guidelines provide for good general protective coverage. Does it matter from a scientific aspect whether traps are spaced 20 feet vs. 23 feet, or even 31 feet? Personally, I'm not concerned in warehouses that are kept clean and have rodent-proofed doors whether the trap spacings are every 25 feet or even 30 feet apart. Alternatively, in warehouses where perhaps heavy mouse pressure exists on the outside and where doors are constantly open, the minimum spacing distance of 20 feet is strongly recommended. MCTs need not be installed along interior walls unless there is some history of mouse activity along those interior areas or due to some other operational factor within the particular account.

For continuous shipping/receiving bay door wall areas, one trap on either side of every door might be excessive for those accounts with low mouse pressure. In most cases, 20-foot trap spacings along these areas, regardless of the door arrangements, will provide sufficient protection unless some particular incoming products are prone to mouse infestations, dictating more protection.

For bulk receiving bays (e.g., bulk rail and trailer tank cars, etc.), such areas are more vulnerable to possible mouse entry because the large bay doors commonly remain open for prolonged periods during the unloading processes (despite recommendations to the contrary). These areas should always have traps properly placed flanking both sides the bay doors and for double bays, one trap in the middle as well.

Traps should also line the interior side and back walls of all receiving bays. Exterior trap stations (e.g., bait stations containing snap traps in place of baits) should also be positioned on the outside walls flanking the bay doors. Unfortunately, some warehouse and food plant personnel mistakenly believe that because there are MCTs in place, they are "protected" should mice enter the plant during shipping and receiving operations. As a result, they become lax on closing the bay doors. But MCTs are only an additional tool for helping to catch an incoming mouse. There is no guarantee every mouse entering a warehouse or plant will venture into even the best-placed mouse trap. So, the important point is that large bay doors should remain open only during the period that trucks are

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(Multiple Catch Traps...Continued from page 9)

passing through the bay doors. Of course, the whole point is moot if the bay doors are not rodent-proofed to begin with.

**A Live Mouse.** Obviously, maintaining a glueboard inside the MCT eliminates the annoying delay of dealing with a live mouse inside the trap. For those traps where glueboards are not used inside the trap, a live mouse can be disposed of by removing the trap from the premises and emptying the live mouse into a box or tall pail containing a glueboard. Never empty a live mouse into a toilet bowl. Not only is this an unacceptable and unprofessional method of killing a mammal pest, but mice are quite adept at escaping during these attempts and can re-infest the account.

**Summary.** Multiple catch traps are effective tools for minimizing the chances of mice becoming established inside our food plants and warehouses. But we should keep in mind that Mother Nature is constantly changing and presenting us with many different scenarios. We too must be flexible and remember the best use of MCTs is based on a combination of common sense, science and the specific operations of each account.

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## Defense Mechanisms

PCT-Online

They scurry around, sneaking under doors and through cracks. They jump, gnaw and eat throughout the day. They bother your customers and maybe even frighten them. They're not Mighty or Mickey...they're just regular old rodents. More specifically, they are house mice and Norway rats. And many PCOs have to deal with them daily. "Rodents are certainly in the top five" pests PCOs treat for, says Dr. Bobby Corrigan, rodent control specialist, Richmond, Ind.

Controlling rodents doesn't require the use of a lot of pesticides. In fact, controlling them doesn't take a lot of baiting, either. But controlling rodents does require a lot of organization.

"Rodents are all around us," says Corrigan. "Rodents really are wildlife like rabbits and tree squirrels. Rodents are naturally occurring in woods, fields, streams and lakes. Ideally, the best thing for rodents is to be organized."

And as homes and businesses expand further into the reaches of the wilderness and undeveloped areas, rodent harborages are being disrupted. People are taking over areas traditionally held by rodents, forcing the rodents to seek out other areas to inhabit.

"With people building into wild areas, they're getting rodents," says Michael Chapman, Western Exterminating, Irvine, Calif. "As populations fluctuate, the mice will come in and look for shelter." Also, with El Niño's rash of rain and heat, more rodent infestation problems have surfaced. Many weeds have grown, and as these grasses die, Chapman says, the rodents are more likely to enter peoples' homes.

Corrigan agrees. "Pest populations rise to meet resources. If there are lots of resources available, the population can explode," he says.

Weed control and vegetation management must occur, together with inside treatment, Corrigan says. To prevent rodent infestations, PCOs must analyze possible source points (inside or outside); keep rodents out of buildings by pest-proofing; and monitor for their presence. The most successful rodent control programs begin with thorough inspections and should always be conducted before any control work is started. A good inspection reveals the extent of infestation, harborages, entry points, and the safest, most appropriate and cost-effective control program for the specific situation.

**WHO'S WHO.** The two most common pest rodents are the Norway rat and the house mouse. The Norway rat is the most important urban rat pest for most parts of the world and is found in every state. The house mouse is the No. 1 rodent pest in most parts of the world. House mice live within cities and towns, as well as away from buildings as field rodents.

Weeds and vegetation are the natural habitat of the commensal rodent, Corrigan says. Weeds are a natural habitat, while weed seeds and insects serve as a food source. Protein is very important for rodent reproduction, which they get from insects.

Carbohydrates are provided from the seeds. Weeds outside of buildings provide cover from hawks, owls, snakes, cats, dogs and other predators. They also serve as sources of water and nesting materials.

In putting together a rodent control program, try to keep bushes away from around the house, recommends Paul Hardy, technical director for Orkin Pest Control in Atlanta. "Don't use ground-hugging plants," he says. PCOs should also inspect and monitor burrows. They need to take a step back from buildings and look for other possible rodent harborages, Hardy points out.

Experts agree that the best way to control rodents is

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(Defense Mechanisms... Continued page 10)

from the outside of structures. “(We try) to reduce the rodent population that’s moving toward the building,” Hardy says. “The real trick is to keep the rodents out of the building.”

Rodent-proofing and an ongoing environmental sanitation program are the best two practices for providing long-term and cost-effective control in a rodent IPM program. Although rodent-proofing is perhaps the best way to eliminate a rodent infestation for your customer, many times both property owners and PCOs alike don’t try this preventive measure.

**INSIDE AND OUT.** Hardy says when treating rodent infestations, Orkin professionals use bait stations in three ways: around fence lines and secured with an anticoagulant bait; around the perimeter of the building, locked and secured; and inside the building, in selected areas, for example in shipping, storage and public areas. Orkin technicians put glueboards in the bait stations and then monitor for rodent activity. Hardy says he prefers to use more IPM techniques than pesticides for controlling rodent infestations.

“There is no advantage in poisoning rodents,” he says. “Putting out baits first is not what we do. In fact, it is probably the last.”

Chapman says with its many commercial accounts, Western also aims to create a “triple perimeter” — at the fence, along the exterior of the building, and inside with glueboards and snap traps. And with residential accounts, he says, baits are rarely used baits, because of liability — the houses may be too close together and in neighborhoods, people are frequently out in their yards. “I don’t think (baits are) always necessary in those situations,” he says.

Being organized is a big part of rodent control, Corrigan says. “The best way to prevent rodent infestations is to be organized so you can easily spot their evidence,” he says. “They may be there, but you can’t see them.” He says PCOs need to pest-proof buildings by closing gaps, including under doors, to ¼-inch for mice and ½-inch to exclude rats.

Depending on the availability of food, such as garbage, rodents may move to a location where it’s easier to survive. “Sometimes rodents are close to buildings and they move in because of the cold,” Corrigan says. “Not that they have to, but it is much easier to move in.”

Corrigan also says rodents may move into a garage

where food is available, such as bird seed and dog food. Chapman agrees, saying that dog food in certain locations may lead to higher rodent populations.

But in addition to using pest control techniques inside the building, an even more important issue may be to prevent the rodents from being able to get inside in the first place. “I see this as a big weakness of our industry,” says Corrigan. “We do a lot of great work on the inside but overlook the outside.”

Hardy says that if PCOs do away with the food and water sources, they will frequently eliminate the rodent problem. “Get rid of standing water, monitor outside trails and droppings and stop up all holes,” he says.

One of the most important aspects of rodent control is how the PCO or technician goes about his or her treatment. “Once inside, it is important for the service technician and PCO on the job to understand there is no magic wand,” he says. “We allow rodent populations to expand because of how we live. PCOs need to analyze the situation.”

Hardy agrees that technicians play a crucial role in the process. “The key to rodent control is the technicians. The technician has to deliberately think ‘If I were a rat, where would I be?’ They have to think like a rat,” Hardy says.

Chapman says Western discusses rodent control and biology in the technicians’ initial training program. The company also uses two videotapes, one addressing how to anchor traps securely, and another about rodent-proofing techniques.

While it is important for technicians to be well-trained, PCOs need to realize the program to eliminate rodents has many aspects. PCOs should use a methodical approach when controlling rodents — you can’t assume anything, Hardy says. So what is the best way to eliminate a rodent infestation? Three words, Hardy says. “Monitor, monitor, monitor.”

### **Sidebar: Roof Rats Live The High Life**

In several coastal and tropical U.S. cities (for example, San Diego, Houston and Honolulu, the roof rat (or black rat) is the most numerous and most significant rat pest species. Controlling this rodent is different than controlling others because of how its living habits differ from those of other rodents.

“Professionals have to think differently with roof rats. (Continued on page 12)

(Roof Rats...Continued from page 11)

They have to look up in deep, dark crevices because that is where they are," says Bobby Corrigan. "They are different than Norway rats — they're much more secretive."

Roof rats are a tropical species in the United States — they originated from Southeast Asian jungles. Since they are arboreal and lived in treetops, they adapted and acclimated to cities by moving higher up to the roofs of buildings.

Because roof rats prefer the elevated areas of treetops and roofs, they are by nature more elusive and less dependent on the food and harborage resources of humans. The dense growth of trees, shrubs and vines, woodpiles, sheds and accumulated yard rubbish all contribute to infestation of this rat.

"Buildings are trees to them," Corrigan says. "They travel on telephone lines and trees. Those are the natural lines to travel."

Michael Chapman, Western Exterminating, Irvine, Calif., agrees. "In California we deal with roof rats, and they are better climbers," he says. "They like vegetation and vegetables, which we have a lot of."

Any vegetation that climbs and provides dense cover is habitat for roof rats, Corrigan notes. So it becomes important to make sure vines, clinging ivy and the fronds of palm trees that are touching roofs are removed.

## Sidebar: Top Ten Rodent Signs

1. Feces (droppings)
2. Gnawing damage
3. Burrows
4. Runways
5. Tracks
6. Grease marks
7. Urine stains
8. Visual sightings of live or dead rodents
9. Rodent sounds
10. Rodent odors (especially for mice)

## PROTECTING BAGGED FOODS FROM INSECT DAMAGE

PCT-Online  
Mike Holcomb

*When servicing facilities associated with food processing, virtually every product has the potential to be infested by insects. Here are some tips to make sure your customers' products are safe.*

From a pest insect's perspective, processed foods provide a readily available and highly concentrated food resource: energy reserves for mate-seeking adults and growth nutrients for developing young. Everything from bagged flour to canned dog food is subject to insect infestation within the food manufacturing facility, distribution warehouse and retail outlet or in the restaurant or consumer's home. One of the primary functions of food packaging is to protect the material until it reaches the consumer's table. However, poorly engineered packaging, as well as improper storage and handling, can lead to insect infestation of grain-based foods and raw ingredients stored in bags or cartons (soft-pack items including flour, meat and bone meal, pet foods, dried fruits, cereals, cake mix, pasta, spices, snack foods, etc.).

**WHAT HAPPENS IF I EAT A FLOUR BEETLE?** A question commonly asked about stored product pests (SPPs) is, "Will it make me sick if I eat it?" The answer "maybe yes" or "maybe no" is not reassuring to most consumers and pest management professionals. The Food and Drug Administration has developed a regulatory standard referred to as Defect Action Levels (DAL).

The DAL lists the acceptable number of insect parts for foods processed from raw agricultural commodities (i.e., flour derived from wheat) and inadvertently contributes to this misunderstanding about the safety of insects in stored foods. After all, by establishing such action thresholds (no-effect levels) the DAL *implies* that ingesting minute quantities of specific non-living insect fragments poses virtually no health risk to consumers, even though there may be little research to support this assumption. The DAL (a work in progress) is periodically reviewed and adjusted to reflect advances made since its last publication. Regardless of the DAL, large numbers of *living* SPPs infesting raw materials or in finished products cannot be tolerated for several reasons:

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(Bagged Foods...Continued from page 12)

- ?? Processing, packaging or storing foods under conditions whereby they *may* become infested with insects is a violation of the Food, Drug and Cosmetic Act.
- ?? Insects are mobile and may infest a clean facility or cross-contaminate unaffected goods held near the infested product.
- ?? Larval cast skins and moth scales can induce non-life-threatening allergic reactions in humans. (In some situations, however, these allergens may be life-threatening to high-risk groups such as the elderly, infants and immunodepressed individuals.)
- ?? Insects can vector yeasts, molds and bacteria that cause spoilage, rancidity, bitterness and lower the shelf life in raw materials and finished products. Likewise, insect metabolic processes (creation of waste products, carbon dioxide, etc.) can alter the ecology of the product, leading to secondary infestations by microbes, mites and nematodes. The presence of some of these organisms may hasten spoilage or cause allergic or life-threatening conditions to consumers.
- ?? Stored product pests are an aesthetic defect; customer rejections directly affect the profit margin.

**MY FAULT OR YOURS?** Another often-asked question is, "Did the insect go *into* the package or did it *emerge from* the package?" Often hidden within this query is the more pointed question: "Where did the infestation occur and who is financially responsible?" The answer involves much detective work that includes:

- ?? Species identification and package damage evaluation;
- ?? Disclosure of the history of the product (i.e., when and where was it manufactured and how was it packaged, handled and stored after it was made);
- ?? Knowledge of the product itself (how was it processed and what are the insect-sensitive ingredients); and,
- ?? Documented records of pest activity at each step in the manufacture/retail chain of custody.

It is widely accepted that insects rarely survive most food processing events, especially those involving high heat and/or low moisture. Extrusion, baking, drying, etc., are lethal to all stages of insect development; these are often referred to as "kill steps." However, product infestation can occur at the processing plant, especially in finished product-holding bins, various conveyors and bucket elevators, packaging machines or other similar post-kill step locations in the plant.

These risks notwithstanding, insect infestations in soft-pack items usually occur after the product is manufactured, packaged and shipped. Every time a soft-pack food item is moved, it risks damage from broken boards or popped nails in the pallet, forklift puncture or abrasion against other pallets or the walls inside the shipping vessel (rail car or trailer). Package damage also provides easy access for invading insects.

For example, adult merchant grain beetles can enter an opening (puncture, tear, loose glue flap, etc.) slightly less than 1 mm, while adult flour beetles can enter an opening a little larger than 1.3 mm. Early instar larvae can enter openings much smaller than these! In addition to packaging faults and physical damage, crowded storage conditions in warehouses and retail facilities (little room for sanitation, inspection and pest control) further contribute to post-manufacturing insect infestation in soft pack foods.

**INVADERS AND PENETRATORS.** One important aspect of the food processor's product safety program is to develop packaging strategies that minimize insect contamination. Insects can infest packaged foods by chewing their way through the package wall (package penetrators) or by taking advantage of natural openings or damage to the package wall (package invaders). Obviously, only insects with chewing mouthparts are able to chew their way through (penetrate) a package wall; this excludes insects like adult flies (sponging mouthparts), fly larvae (a single mouth hook designed to feed on semi-liquid foods) and adult moths (siphoning mouthparts designed to imbibe liquids).

While paper, foil and thin plastic packaging materials may be susceptible to penetration by insects with chewing mouthparts, not all SPPs bearing recognizable mandibles are considered package penetrators, since these structures must meet

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specific criteria. Several SPPs (cigarette and drugstore beetles, weevils, grain borers and Indian meal moth larvae, just to name a few) have evolved short, stout mandibles for chewing through seed coats and are able to chew their way into and out of many packaging materials. (After all, the cigarette and drugstore beetles belong to the family *Anobiidae*, which includes many wood-boring beetles. The lesser grain borer belongs to the family *Bostrichidae*, which includes lead cable and bamboo borers.)

Other SPPs (flour beetles, flat grain beetles and saw-toothed grain beetles) have evolved mouthparts with long, fragile tooth-like projections, which are designed to feed on softer materials (i.e., flour or broken seeds). These "bran bugs" are poor package penetrators since they do not have adequate mouthparts to chew through wood, seed coats and other durable materials, such as food packaging. These poor penetrating insects are, however, good package invaders due to their small size, flat bodies and mobile habits, which allow them to access packaged foods via punctures or tears in the package wall or beneath loose seals and seams. Thus, bran bugs are poor penetrators, but good invaders and any food manufacturer that provides a grain-based or other insect-sensitive product in an easily damaged or poorly sealed package can expect infestation by both invaders and penetrators.

**THE MASTER PLAN.** Frequently, insect-sensitive, soft-pack foods are stacked on wood pallets, crammed into shipping vessels, jostled down the highway or rail line, off loaded into a crowded warehouse and allowed to sit for weeks or months prior to use or consumption. Even in a clean, well-managed intermediate facility, damage and insect risk increase when the material is once again loaded up and transported to the retail outlet. Some of the operational procedures that PCOs should encourage their customers to implement include:

- ?? Use only sound, clean pallets. Broken boards and exposed nails readily penetrate soft pack goods, causing insect-attracting spills or creating openings large enough for insects to enter. Such damage can occur even when slipsheets are used on wood pallets. Also, only *cured* pallets should be used. One product recall due to psocids was traced back to pallets made from green (new and moist) pallets.
- ?? Do not overload or haphazardly load trailers. Sharp pallet corners can damage packages during loading and products can rub against one another or walls of the vessel while in transit. Inflatable bladders and cardboard or wooden dunnage barriers can secure

loads and prevent self-damage during shipping.

- ?? Shipping trailers must protect the product. Insect-supporting debris on the floor and behind wall panels, as well as damaged walls and floors (through which insects can invade), pose a high product risk. Loose screws, rivets and torn floors and walls (wood splinters or gouged metal) can damage packaging materials.
- ?? Randomly inspect incoming goods before they are accepted — pay particular attention to high-risk materials. Look for insects or signs of their activity (bore holes, webbing, frass, cast skins, trails, etc.) in corners, beneath flaps, under stretch wrap, on the pallet and beneath edges of the slip sheet, as well as in the empty trailer itself. This inspection must be conducted by trained individuals using flashlights. Most warehouses prefer to off-load product in a staging area until the entire load *and* empty trailer are cleared. In that way, suspicious product does not have to be retrieved from the racks where cross contamination or facility infestation may have already occurred. Finally, information about pest activity must be recorded on an inspection log.
- ?? Use good storage practices that promote sanitation, inspection and pest control and do not co-mingle products. High-risk products in poorly constructed packaging (sewn bags, loose flaps, porous bags that sift, etc.) or products with a history of insect problems should be semi-isolated so they can be inspected frequently. Keep these items on lower shelves and away from dark corners at the far end of the warehouse. Other storage practices such as first-in-first-out, maintaining clear aisles and perimeter accessibility, and sweeping up spillage beneath pallets and on storage racks when stock is removed will greatly minimize resident insect activity.
- ?? Spills must be addressed immediately and include a two-step process: a) seal the opening to prevent further spillage and keep insects out; and b) remove spillage from floor, rack, slip sheets, etc., that could serve as an insect resource.
- ?? Monitor insect activity in the facility using mechanical devices and a keen eye. Properly placed pheromone traps, glue boards and insect

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light traps can survey insect activity continuously without interruption. Be aware, however, that these are monitoring tools only; they are not controls. A trained individual must use the information gathered from traps to point him and his flashlight in the right direction. While traps should be monitored weekly and action taken when necessary, thorough inspections for SPPs in the plant/warehouse must be completed no less than once per month.

?? Before any pesticide applications are undertaken, identify the pest, estimate the population size and location and assess damage potential. Fogging or fumigation are not justified if sanitation or simply disposing of infested product can solve the problem. Likewise, pesticide applications cannot replace pest prevention programs that include inspection and monitoring, sanitation and proper storage practices.

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## In The News.....

### Swarm of bees attacks mom, boys

**JERRY URBAN**  
Houston Chronicle  
20 August 2001

A north Houston woman and two of her children were stung by a swarm of bees Friday.

Rose Barberena, 38, and son Caesar, 8, were treated and released from LBJ Hospital after the 3:30 p.m. attack at their home in the 7300 block of Jensen. Her son Alex, 11, who suffered an allergic reaction, was in fair condition at the hospital.

The mother was stung about 25 times in the head area.

Pedro Barberena, the woman's husband, said the family raises a colony of 15,000 to 20,000 bees. "I've had this colony for two years and never have had this problem (of aggressiveness)," Barberena said. "Just yesterday I was messing with them."

He believes the colony may have been invaded by another type of bee, possibly the Africanized, or killer, bee.

Barberena, a building contractor, showed reporters examples of bees that apparently didn't belong to his colony.

"I've worked honeybees for years," he said. "I've taught my children how to handle bees."

Barberena, who has seven children, said he will send samples of the bees to College Station to determine whether the colony was invaded. They would be examined by the Texas Apiary Inspection Service, a unit of the Texas Agricultural Experiment Station at Texas A&M University.

If his colony was invaded by the Africanized bee, it would have to be destroyed, Barberena said.

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### Georgia Woman Dies From West Nile Virus

Amanda Paskiet  
PCT-Online  
20 August 2001

ATLANTA — A 71-year-old Atlanta woman has become the first human victim of West Nile Virus in 2001. The woman, identified only as "Miss Hill" by hospital authorities, was admitted to a hospital at the end of July while suffering from encephalitis, according to the Environmental News Service. Her diagnosis with the mosquito-borne virus was confirmed Aug. 24, one day before she died.

Nine people in New York and New Jersey have died from West Nile Virus since it was first found in the United States in 1999. In July, a Florida man was confirmed to be infected with the virus and a Florida woman was confirmed to have the virus on Aug. 7.

West Nile is contracted when a person or animal is bitten by a mosquito carrying the virus. This year, birds and horses infected with the virus have turned up as far west as Ohio and as far south as Florida and Louisiana.

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### Termite damage changes school's goals for its gym

Lee Mueller  
Lexington Herald Leader  
14 August 2001

SALYERSVILLE -- Very slowly, the basketball goals hanging from the ceiling in the Magoffin County High School gym are dropping closer to the floor. And all Danny Adams can do, for the moment, is make thin jokes about the hungry insects suspected of causing it.

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“We'll be able to dress them termites (for games) if the goals keep going down,” the school's veteran basketball coach said yesterday.

Magoffin County High's gym, a glistening showplace of cathedral-like wooden beams when it opened 20 years ago, has been effectively closed since May, when a Lexington architect discovered termites eating away the base of at least half of the structure's 14 laminated columns.

Steel I-beams were brought in for additional support, but spring's prom was moved. And for the first time, graduation ceremonies were conducted on the football field -- a change school administrators said they had been contemplating anyway.

In the meantime, it looks like it will take about \$150,000 to repair the gym, a sum that includes shoring up the beams from which the basketball goals hang, and restoring the goals to the regulation height of 10 feet. When two students measured the height of the six goals in the gym yesterday, all were 1 to 3 inches below that. Bids are scheduled to be opened today to replace the bottoms of seven beams with 6-foot sections of steel. The Magoffin school board will meet Thursday to vote on the bids.

Termites are not an unprecedented problem in Kentucky schools. But some officials said the problem in the Magoffin gym serves as a visual aid to explain one reason the state Department of Education has discouraged using wood in new school construction since 1993.

“Cellulose is their food source,” said Lawrence Schwering, a partner in Lucas/ Schwering Architects in Lexington, “and there's a whole bunch of it in those columns.”

Gyms similar to Magoffin's, in Wolfe County and Burgin Independent schools, have not reported termite problems, said Mark Ryles, director of facilities for the state Department of Education.

But he said the state has been recommending the use of steel to combat potential fire-safety and roof problems posed by wood materials.

Wood won't be a problem again in Magoffin County, Superintendent Henry Clay Sizemore said.

“They used laminated wood instead of steel,” Sizemore said. “This time ... we're going to have it fixed right.”

The 1,384-seat gym was “almost the perfect high school gym” when it opened in February 1981, said Sam Miller, the school's athletics director.

“It's a showplace and still looks fantastic,” Miller said. “We've taken real good care of it.

Unfortunately, the termites didn't cooperate.” Principal William Helton said district officials learned they had a termite problem about five years ago while remodeling a nearby coach's office.

At the time, the Magoffin school board rejected bids to fix the problem because the cost would have been “enormous,” Helton said -- “\$30,000 to \$50,000.” Schwering said school records contain an undated, unsigned bill for \$16,320 from a pest-control company.

“I have no idea whether it was implemented,” he said.

Nearby, the district already is spending \$7 million to replace the 10-year-old Magoffin Elementary School, which had to be demolished in February 2000 because of foundation problems.

“We've spent a lot of money on maintenance and remodeling things that weren't fixed very well to start with,” Sizemore said.

Architects say the termite problem and repairs should be taken care of by Sept. 19.

That time frame works for Adams, the basketball coach.

“We can't officially practice until Oct. 15, anyway,” he said.

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## **Man fights rare case of rat bite fever**

Joshua Molina  
Newspress.com  
16 August 2001

Jeffrey Banks had trouble breathing. His heart raced.

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And he coughed up blood.

When the 24-year-old walked into Santa Barbara Cottage Hospital's emergency room, physicians suspected pneumonia.

It was something much worse. A scratch he said he got in mid-July while handling a rat cage at the pet store where he worked had turned life-threatening. Bacteria from the rodent's saliva had entered his bloodstream and had reached his heart, doctors say. One of his heart valves was destroyed, and he needed open-heart surgery to replace it. Also, a growth had formed on his heart.

Today, the Santa Barbara High School graduate lies heavily sedated at Cedars-Sinai Medical Center in Los Angeles, recovering from two open-heart surgeries to replace or repair his heart valves.

He breathes through a ventilator and he's undergoing dialysis. His kidneys shut down a few days ago. He's in serious condition, according to a spokeswoman at Cedars-Sinai.

"This is incredibly unusual," said Dr. Stephen Hosea, the infectious disease specialist for Santa Barbara Cottage Hospital who helped treat Mr. Banks before he was transferred to Cedars-Sinai.

"The majority of people who have a rat bite don't get an infection on the heart valve. The chances of this happening are incredibly small."

Rat bite fever is an infectious disease that is transmitted through saliva after a bite, or, on occasion, exposure to a substance contaminated by rats, according to the National Library of Medicine.

About 10 percent of rat bites result in some form of rat bite fever, says the Web site of the Kirksville (Mo.) College of Osteopathic Medicine.

The bacteria is present in the saliva of all rats, but rat bite fever symptoms vary with each victim. Usually they include fever, chills, headache, muscle aches, weakness and sore throat.

Symptoms usually subside within a week, but can reoccur over the next several months. Ultimately, the symptoms disappear.

But in Mr. Banks' case, the bacteria found its way to his heart, severely complicating matters. Doctors don't know

why.

Physicians performed the first open-heart surgery July 28 at Cottage Hospital. They replaced one of his four heart valves with an artificial valve and drained an abscess, a collection of pus, from his heart.

He was recovering and released from the hospital on Aug. 4. But a day later he was back again. He had a fever and was coughing up blood.

He stayed at Cottage for three days before he was transferred by helicopter to Cedars-Sinai. Surgeons there removed the artificial valve that Cottage Hospital surgeons had installed and replaced it with a tissue valve.

They also repaired a second valve that had been damaged by the bacteria.

Mr. Banks' family is hoping the bacteria doesn't return and cause further problems. For now, Mr. Banks is in an induced coma-like state because he is heavily sedated.

On Monday he slept with a chilled blanket to lower his temperature, which has been as high as 104 degrees in recent days.

How this could happen to an energetic, health-conscious young man is something his family and friends are still trying to understand.

Mr. Banks was in good shape and often rode his bicycle from his home in downtown Santa Barbara to the Montecito Pet Shop, where he worked for the last few months.

A manager at the shop refused to comment. Mr. Banks' family said he was enjoying one of the happiest periods of his life before he got sick. "He really liked the pet store," his mother, Valerie Banks, said from her hotel near Cedars-Sinai. "I think he just really liked being around animals."

Since high school, Mr. Banks worked several different jobs, including Cantwell's Market, a couple of coffee shops and the family catering business. Occasionally, he played guitar in a band with friends.

At Santa Barbara High School, he was a photographer for the school newspaper. His mother said her son was interested in photography, art and drawing.

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She remembered how, one Christmas, her son painted a picture of a star with a moon and the sun on a piece of cardboard and gave it to her as a gift because he was low on cash that year.

Seeing her youngest son endure this situation has been difficult.

"I couldn't believe that a 24-year-old would have heart problems," Valerie Banks said. "He's never had a heart problem."

His brother, Jason Banks, said the family is optimistic that Jeffrey will recover.

"We are just taking it in stride," he said. "Day by day. Just as long as he gets a little better every single day."  
\*\*\*\*\*

## Postal service asks residents to take the sting out of delivery

Jennifer Brooks  
DetNews.Com  
15 August 2001

**ROYAL OAK** -- The U.S. Postal Service is appealing to Metro Detroiters to help it take the sting out of summertime mail delivery.

Bees and wasps stung at least 20 local letter carriers in recent weeks, including seven in the last seven days. Most recently, postal workers in Port Huron, Walled Lake and Novi found buzzing surprises in mail boxes, and several have suffered serious allergic reactions to the insect attacks.

Faced with the summer swarm, the postal service is asking residents to check their mailboxes and spray or remove any tiny visitors. Hive-builders swarm to small, enclosed spaces such as the area between a mailbox and the decorative structures some people build around them. Bees also are lured by decorative flowers planted near mailboxes.

"You just need to put yourself in someone else's shoes - the letter carrier, the newspaper-delivery person, the kid who runs out to the mail box," postal service spokeswoman Shannon LaBruyere said.

Once a carrier is stung, the postal service alerts the homeowner to the hazard. If a nest is not destroyed -- and LaBruyere has heard of some people who are reluctant to disturb the bees' habitat -- the post office may suspend service.

## UF Entomologist Develops Safe, Effective Alternative To Deet Insect Repellents

Chuck Woods  
UF/IFAS News Release

GAINESVILLE---After 15 years of tests on more than 3,900 compounds, a University of Florida researcher has developed a safe, natural insect repellent that protects people against everything from mosquitoes and ticks to tiny "no-see-ums."

"It's the first effective alternative to products containing DEET, the most widely used active ingredient in insect repellents now on the market," said Jerry Butler, entomologist with the UF's Institute of Food and Agricultural Sciences. "After relying on DEET-based products for more than 40 years, this is a breakthrough that should revolutionize the market."

He said the new repellent is a "green" product because it's an oil extracted from plants that have a natural ability to protect themselves against feeding insects.

The active ingredient in Butler's new herbal repellent is geraniol, derived from lemon grass and other plants. The product has been labeled "generally regarded as safe" by the Environmental Protection Agency. Applied to the skin, it provides almost four hours of protection against a wide range of biting insects, including flies, fire ants, mosquitoes, ticks and biting midges, often called no-see-ums.

Safety concerns over DEET (N,N-diethyl-meta-toluamide) prompted Butler's search for natural, nonchemical alternatives. Toxicity problems, particularly for children and some adults, have forced manufacturers to reduce the amount of DEET in various products to 7 percent from 100 percent during the past 15 years. However, higher rates of DEET are still used in military applications (31.58 percent).

As levels in consumer products have gone down, the effectiveness and longevity of DEET-based products also have been reduced. Currently, there are more than 60 DEET-based repellents on the market, he said. New label instructions to ensure the safe use of DEET products have been issued by EPA following a review of the most recent health and safety data on this chemical repellent. Based on its review, EPA has determined DEET, if used as directed, will not pose significant health risks to consumers. However, EPA is

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requiring changes to current labels to ensure DEET is applied safely, particularly on children.

"When these requirements are fully implemented, companies that make and distribute DEET products will no longer be able to claim their products are 'child safe,' and new labels will direct parents not to allow children to handle this product," said Marcia Mulkey, director of EPA's Office of Pesticide Programs.

She said new directions also will instruct consumers to avoid using DEET products under clothing, to avoid over application, to wash treated skin with soap and water after returning indoors and to wash treated clothing.

Butler said DEET is effective against mosquitoes for four to eight hours, but it is not as effective against ticks, fire ants and biting flies. A separate insecticide is needed to control ticks, and it can be applied only to clothing -- not to skin.

He said his natural repellent can be applied directly to skin as a treatment against ticks. This reduces their chances of biting and feeding long enough to transmit disease.

Lyme disease is transmitted by the common black-legged tick while the lonestar tick (with a bright star on it) transmits a disease called granulocytic ehrlichiosis. Rocky mountain spotted fever is transmitted by the American dog tick, which actually is more common in North Carolina than the Rocky Mountains.

Since 1985, Butler's research has been supported by grants from International Flavors and Fragrances in Union Beach, N.J., which provides ingredients to the cosmetics industry. The industry has long sought natural repellents for use in various skin-care products. He said some ingredients now used in products actually attract insects.

Butler's geraniol repellent is patented by UF and licensed to Naturale, Ltd., Great Neck, N.Y., which is marketing the products under the registered trademarks of MosquitoSafe, TickSafe and FireAntSafe.

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## **Gaps In Security May Threaten U.S. Food Supply**

UF/IFAS News Release  
Paul Kimpel  
23 August 2001

GAINESVILLE, Fla. --- A group of state lawmakers is scheduled next week to tour Miami International Airport

and see first-hand a potential gateway for what a University of Florida researcher says could threaten the nation's food supply: agricultural bioterrorism.

Entomology Professor Marjorie Hoy said U.S. borders are vulnerable, and bacteria, viruses and insects may at some point be used to attack agricultural targets.

"Every day, destructive organisms are brought into the country at airports, seaports and land borders. Those same pathways could be used for intentional attacks," said Hoy, whose research at UF's Institute of Food and Agricultural Sciences involves the biological control of invasive insects.

Hoy is a member of the national Committee on Biological Threats to Agricultural Plants and Animals, which says certain nations may be inclined to direct biological attacks against the U.S. food supply.

The committee, formed in March by the National Academy of Sciences, held its second meeting last week and is evaluating U.S. preparedness for such an attack.

According to the U.S. Department of Agriculture, some of the country's high-risk pathways are Miami, Los Angeles and New York, where the majority of the nation's visitors and commercial shipments enter the country.

Hoy said Florida is a particularly vulnerable pathway because of the large number of visitors to the state. Florida had more than 11 million international air passenger arrivals in 1999, almost one-fifth of the U.S. total, according to the USDA. Moreover, one-third of imported produce and plants enter the United States through Miami.

Major U.S. airports such as Miami's are guarded by the USDA's Animal and Plant Health Inspection Service, which is the agency responsible for protecting the nation's crops and livestock from invasive organisms.

The agency intercepted 1.8 million illegal plants and animals in 1999, of which more than 52,000 were threats to U.S. agriculture or the environment.

While that may sound like a lot of seizures, statistics show the agency inspects only 2 percent of inbound shipments and travelers. Hoy said such weaknesses

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in the system increase the probability that agricultural bioterrorists could enter the country undetected.

"We need a more efficient inspection system," Hoy said. "Officers who inspect cargo and passengers are overwhelmed."

During the tour of Miami International scheduled for Wednesday (8/29), Florida legislators will witness the increasing volume of cargo and passengers that is making a tough problem much more difficult.

In addition to traditional shipments and passengers, Hoy said, international mail is another high-risk pathway for bioterrorism.

In Miami, for instance, 10 million international mail packages arrived in 2000. Of those, 14,500 packages -- less than 0.2 percent -- were inspected. In the inspected packages, agents found 1,017 actionable threats to U.S. agriculture, according to the USDA.

Threats ranged from Mediterranean fruit flies, which caused an outbreak in Florida in 1997 that cost the state \$32 million to eradicate, to citrus canker bacteria, which has cost \$170 million to fight since 1994.

A report by Cornell University estimates that invasive insects, animals, plants and microbes -- all termed "pests by scientists -- cost the United States \$123 billion a year.

Other biological threats to agriculture that concern officials are: foot-and-mouth disease, hog cholera, tick-borne heart-water disease from the Caribbean, fruit flies, and many other disease-bearing insects and parasites.

Although international mail and air shipments are a major concern, not all pathways are from overseas.

During a three-day blitz in July, federal agents seized more than 2 tons of illegal produce and meat at U.S.-Canadian border crossings. Of 226 vehicles stopped, 91 had hidden, prohibited materials.

Hoy said Canada does not inspect exotic fruit shipments because insects and other pests cannot become established in Canada's climate. But insects are a major concern in Florida and California, where much of America's produce is grown.

Hoy's job is to anticipate and defend against threats to agriculture.

"Right now, we are preparing for a feared citrus disease called 'greening,' which is spread by a tiny insect called

the Asian citrus psylla," Hoy said.

Although greening disease is not yet in the United States, the Asian citrus psylla arrived in Florida in 1998, and has been impossible to eradicate.

Hoy, an eminent scholar in entomology, has been developing biological controls for the Asian psylla.

"If greening disease is introduced to the United States, either intentionally or accidentally, we will attempt to suppress it by controlling the insect that spreads it," she said.

Hoy said that by developing solutions for current problems with smuggling or accidental introductions of pests, the nation is preparing for intentional attacks.

"From a scientific standpoint, these problems are two sides of the same coin," Hoy said. "Whether it's intentional or accidental, most scientific responses would be similar."

Hoy and other researchers use several methods of controlling insects.

One method involves breeding sterile insects that mate with the target insect, thereby reducing its chances of reproducing. Another method increases the population of natural predators to destroy the target insect. A third method introduces a parasitoid from the target insect's home country. A parasitoid is an insect that lays its egg inside the target insect, thereby destroying the host.

To control the Asian citrus psylla, Hoy has introduced two, tiny parasitoid wasps from Asia. Surveys are being done to evaluate their effectiveness.

For researchers such as Hoy, the challenge is having a control in place before invasive pests arrive, regardless of how they arrive.

"We knew we might get the Asian psylla in the United States, so we were prepared for its arrival," Hoy said. "But threats exist that are unknown to scientists."

Hoy said authorities need to work smarter, and said the committee hopes to discover better methods and technologies to defend the country.

"Our borders will never be 100 percent secure," Hoy said. "But we can and must do better."

END

# Pest Management Products

From PCT-Online

## Ants No More Ant Bait System

The Ants No More ant bait system from Kness Manufacturing Company Inc. is placed outdoors simply by sticking it in the ground, or indoors by inserting it into the soil of planters. PCOs can place the bait stations wherever foraging ants are a problem — around homes, buildings, near shrub trees, flower beds or planter boxes.

The ants take the bait from one of two compartments in the station back to their nest, therefore, eliminating the problem at its origin — the nest.

The ant bait station is made of rugged green polypropylene, so it blends with outdoor surroundings. The twin-bait compartments allow use of two different baits simultaneously. It is tamperproof and waterproof and, due to its design, bait will not spill out of entry points.

For more information contact:  
Kness Manufacturing Company Inc.  
2053 Hwy. 4 South  
P.O. Box 70  
Albia, Iowa 52531  
(800) 247-5062

## Bird Halt Modifies Pest Bird Behavior Two Ways

"Pesky birds will fly the coop with help from Bird Halt." That's the phrase that Farnam Pest Control Products, a division of Farnam Companies Inc., is using to introduce its new bird control product, Bird Halt. Bird Halt repellent contains the active ingredient 9,10 Anthraquinone — a product that has been used in the turf and ornamental industry for years, according to Wally Shores, president, Farnam Pest Control Products. "Manufacturers of the [turf and ornamental product] recently approached Farnam and asked us if we were interested in distributing the product when it came out for use in structural pest control markets," Shores said. Bird Halt is an emulsified concentrate that is mixed with water to form a slightly powdery residue to modify pest bird behavior two ways. First, when a bird lands on a treated area and its feet are exposed to Bird Halt, it will consume the product while preening itself or sharpening its beak. "Consuming the product causes a harmless gut reaction in the birds — it's the equivalent of a stomachache in humans," said Shores.

Second, Bird Halt absorbs ultraviolet (UV) light, which birds can see but humans cannot. "When a bird flies over an area treated with Bird Halt, it will associate the UV light with the 'stomachache' it experienced previously and is, therefore, conditioned to avoid the treated area," Shores said.

The product can be used on fences, roofs, eavesdrops, bridges and tree branches — almost anywhere pest birds roost, Shores said. In addition, Bird Halt doesn't kill birds, nor does it harm other mammals. "So, if a dog were to lick a treated area, it wouldn't get sick," Shores said, adding that the birds' "stomachache" is short-lived — it takes 24 hours to take affect in the bird and less than 96 hours to go completely through a bird's digestive system.

Farnam will be introducing more products through its PCO division in the future. "[Bird Halt] is an exciting product for us because we want to get past our reputation as a fly and pheromone trap manufacturer," Shores said. "Bird control is a strong area right now, and while there are plenty of products out there, I think PCOs are always looking for one more to add to their arsenal."

### For more information about Bird Halt:

Farnam Pest Control Division  
301 W. Osborn Road  
Phoenix, AZ 85302  
(800) 234-2269

[www.farnampco.com](http://www.farnampco.com)  
[info@farnampco.com](mailto:info@farnampco.com)

## Pest Management Techniques

### Tips Of The Trade

Stoy Hedges  
PCT-Online

*Although bird control work can be troublesome, there are numerous profit opportunities available to PCOs interested in expanding into this potentially lucrative market.*

Walk down any big city street and you will soon see which urban pest is the most visible and, in many cases, the most obnoxious. Pigeons are everywhere in our cities and towns so any building with a ledge is subject to roosting, loafing or nesting activities. The birds would not be so bad if they knew how to use a communal toilet, but they go where they are, so to speak, thus defacing buildings and exposing people to potential disease organisms.

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Controlling pigeons and other pest birds is not easy. Solving bird problems on buildings requires creativity, hard work and often a complete lack of fear of heights. In the past five to 10 years, bird control as practiced by pest control companies in the United States has gone from use of baits (such as Avitrol) as a primary strategy to a burgeoning industry offering a variety of bird exclusion products. The time has never been better to offer bird control services.

Still, with all the choices currently available, failures often occur which require return trips and added expense. This article will discuss a few tips for avoiding common mistakes in using bird exclusion products.

**THE PRODUCTS.** A number of companies from Bird Barrier (800/503-5444), Hot Foot International (800/533-8421) and Bird-B-Gone (800/392-6915) to Bird-X (800/662-5021), Ecopic (888/248-6653) and InterNet (800/328-8456) offer a variety of bird exclusion products. Consult these manufacturers, your distributor or trade magazines for more information regarding the various products available.

Exclusion products fall into several broad categories: (1) gels, (2) bird spikes and coils, (3) wires, (4) shock devices and (5) netting. A miscellaneous category might include such unique products as Bird Barrier's Daddi Long Legs.™

**PRODUCT SELECTION.** Netting provides the most complete and long-lasting results in excluding birds, but it is the most expensive method and is not suitable for every situation. Likewise, a gel may be best in one case but may be a poor choice for another. The biggest mistakes made in bird control often involve the choice of exclusion method.

For example, say a restaurant hires a company to exclude pigeons from roosting on the sign in front of the building. The least expensive method, so it seems, is to place a bead of bird gel on the top of the sign. Should work, right? But if one were to stand and watch how many different birds alight on the sign during the course of a few hours, it becomes apparent that the gel is slowly being removed. After a time — weeks, maybe months — the gel is degraded to a point that it no longer serves as a deterrent. The mistake here is in using a gel in a high-traffic area for birds. Signs often serve as resting points for pigeons in between stops. Each bird landing on the gel is not likely to return and if hundreds of different birds use the sign and test the gel, the gel is removed.

Another reason gels are not recommended for signs is that some gel products are not labeled for small birds. Smaller birds can become ensnared in the gel and die, thus creating a potential negative public relations issue. A better choice in this situation is a row of spikes which should provide years of relief.

What about long ledges? Should bird spikes or other spike-type products be used here? If you price it out, you'll see that such products will be more expensive for a long ledge (extending 100 feet or more) than wire products such as Hot Foot's Spring Wire.™ Properly installed, these wire products are less obtrusive visually and far less expensive for a long ledge. On the other hand, wires may not be as good a choice for short ledges.

Say a building has several ledges close together near the top where pigeons roost and nest. Should you install wire products? Spikes? Gel? How much labor might be expended installing such devices? Maybe enclosing all the ledges with netting would be easier and possibly less expensive when all of the costs and time are factored in.

What about air conditioning units on a commercial building's roof that are bothered by pigeons roosting? A solid solution would be to construct a frame around each AC unit and attach netting. But construction of such frames would likely be quite expensive. In this situation, installing Bird Barrier's Daddi Long Legs on top of each unit is likely to deter pigeons from roosting. This approach would be far less expensive than using other products. Of course, if sparrows were involved, the Daddi Long Legs would not be effective.

Examine each situation carefully and employ the one method or combination of methods sure to cover all of the avenues the pest birds might target as roosting, loafing or nesting sites. Selecting the proper method and devices to install is crucial to success and in making the service economically feasible to the customer.

**THE PERSISTENCE OF PEST BIRDS.** Don't underestimate the persistence of pigeons and other birds to overcome the obstacles you place before them. The author has seen numerous situations where pigeons succeeded in finding the "weak link" in the exclusion system. Here are some examples:

?? Bird spikes on a ledge were not installed close enough to the wall and pigeons were able to land behind them.

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- ?? In reverse, another situation revealed the spikes placed not close enough to the front edge of the roof and pigeons were able to land.
- ?? In areas where paper and other debris can collect in corners may not be a good place to install bird spikes. In such a situation, the spikes catch the debris and provide a corner for pigeons to land.
- ?? More mistakes are likely made installing netting than in using any other type of exclusion device. It is amazing how many net installations have the netting not pulled tightly. If any part of the netting sags too far, a pigeon may be able to land on the netting as it settles onto a surface below. For this reason, any netting that is installed horizontally or at a slight angle needs to be supported at least 8 inches above the surface, even if additional vertical support posts need to be installed (e.g., pieces of wood or better yet, metal pipe, bolted to a wall).

If the netting is attached to vertical support posts, the top of these posts are commonly overlooked as potential roosting sites. It is important to attach a bird spike or two to the top of such supports to discourage this activity. In one situation, 3/4-inch bird netting was installed over and around a patio to exclude sparrows and pigeons. Unfortunately, the pest control company discovered that pigeons have little difficulty landing on top of 3/4-inch netting. In order to exclude both pigeons and the smaller sparrows, the horizontal portion of the netting must have a second layer of 2 1/2-inch netting installed 6 inches above the 3/4-inch netting. The 3/4-inch netting keeps out the sparrows and the 2 1/2-inch netting keeps the pigeons from landing on the netting and defecating on the area below. Another solution is to not install the 3/4-inch netting in a horizontal position. Installed at a steep angle (30 degree to 45 degree angle), pigeons should not be able to land on the netting.

Beware of small openings that seemingly should not allow birds inside the netting. The birds will be able to find such openings eventually. After netting has been installed, examine all edges and corners carefully. Cables supporting the netting should be tight — having about 1 inch of play in either direction when pulled. Cables too loose inevitably allow the netting to sag in spots where birds might be able to enter. Another net installation mistake is to locate the cable retaining clips too far apart along the edge. Each eye-bolt or retaining clin attachment should be no more than 3 to 4 feet from

the next to exclude pigeons and no further than 2 feet spacing for smaller birds.

**TIPS FOR SUCCEEDING AT BIRD CONTROL.** One of the biggest reasons a pest control company might not sell much bird work is they don't pursue it as aggressively as they do other services, such as termite control. They do not plan how to find the work, how to market their services and how to sell bird work effectively and efficiently. Here are some suggestions to get more bird control work for your company.

- ?? Look for the work. Birds are the easiest pest to observe infesting buildings because they are quite visible as one drives down a street. Every building in a city or town is a potential candidate for bird control work if one pays attention. Only the building owner's tolerance for birds and their destructive activities will limit his or her desire to buy bird control services. To succeed once you've made an initial exploratory contact is to design the most cost effective and long-term control program for the situation at hand.
- ?? Everyone in the company needs to be behind bird control services. The office staff needs to be knowledgeable and helpful and "speak the language." Sales professionals need to be as astute in the installation of the various exclusion devices as the person who installs it. Managers need to encourage the sales staff to bid bird work as often as they do termite and pest control work. Expect to sell bird work and the company will. However, if the attitude expressed around the office goes something like this, "Well, if the customer calls asking about birds, we'll give it our best shot," then you're unlikely to grow this potentially significant profit center.
- ?? Use manufacturers as a primary resource for problem solving. After all, if you don't sell the jobs, they can't sell you their products. Some manufacturers have training videos and offer training classes. Ask them for their help.

To succeed in bird control services, your entire company has to be as committed to it as you might be for pest control and termite control. Selling and installing bird exclusion services must become part of the company culture. Big dollars and profit won't happen overnight, but it will happen with the right attitude.

## On The Web.....

### **IPM Manual For Structural Pests in British Columbia**

[www.epl.gov.bc.ca/epd/ipm/docs/tab1cont.html](http://www.epl.gov.bc.ca/epd/ipm/docs/tab1cont.html).

This website provides an outstanding manual describing IPM techniques for structural pests. Chapters include: What is integrated pest management, Ants, Cockroaches, Rodents, Birds and others.

### **Gempler's IPM Almanac**

[www.ipmalmanac.com](http://www.ipmalmanac.com)

Gempler's (the IPM products company) has put together a great site for IPM information. While geared to the agricultural audience, a variety of articles deal with structural/facility pests as well including birds and rodents. This site should be added to your book marked favorites.

### **University of Manitoba- Canadian Grain Storage Stored Products IPM**

[res2.agr.ca/winnipeg/stored.htm](http://res2.agr.ca/winnipeg/stored.htm)

While this site definitely addresses stored grain pest management, a variety of general information concerning stored product pests is offered. Links include Principle Storage Pests, Common Names of Insects and Mites, and Summary of Methods to Control Stored Product Pests.

### **Wildlife Solutions Online**

[www.wildlifesolutions.com](http://www.wildlifesolutions.com)

This site provides, "Internet answers to your problems with wildlife (e.g., alligators, armadillos, bats, bears, beavers, birds, chipmunks, coyotes, deer, foxes, mice, moles, muskrats, opossums, rabbits, raccoons, rats, skunks, snakes, squirrels, voles, wild hogs, woodchucks). For additional information, we provide links to state game and fish agencies, Canadian wildlife departments, and Cooperative Extension Services. We also provide essential information on how to choose and negotiate with wildlife damage control operators. Finally, we created a forum where you can post questions and find answers to your specific wildlife problems."

## **Biobugs**

[www.biobugs.com](http://www.biobugs.com)

From Dexter Sear, this site, " aims to help you *really* see insects for the miniature marvels they represent and to understand how intertwined our cultures have become with these alien creatures." Really some great images!

# Vector-borne Disease of the Month

## RAT-BITE FEVER

From Control of Communicable Diseases Manual (James Chin)

### ETIOLOGY

*Streptobacillus moniliformis*, (gram negative rod= string of bead appearance)

*Spirillum minus* ( alternatively named *Spirillum minor*; gram negative spiral shaped organism)

### EPIDEMIOLOGY

RBF is rare in the United States. The most common cause of RBF in the U.S. is due to *S. moniliformis*. Most cases in the United States are caused by *S. moniliformis* acquired through rat bites or scratches.

Nasopharyngeal carriage rates in healthy laboratory rats range from 10% to 100%; carriage rates in wild rats range from 50% to 100%. It has been estimated that 10% of rat bites result in some form of RBF.

Cases of RBF also have been associated with the bites of mice, squirrels, and gerbils and exposure to animals that prey on these rodents (e.g., cats and dogs) Sporadic cases have been reported in children without histories of direct rodent contact but who lived in rat-infested dwellings.

*S. moniliformis* can also be transmitted by contamination of food and water with rat feces and/or urine. One rat produces 20-50 droppings per day and excretes 14 ml of urine per day. Outbreaks of RBF in **Haverhill**, Mass. in 1926 and an epidemic in England in 1983 were associated with ingestion of raw milk contaminated by rat feces and/or urine. The disease is called **Haverhill fever** when *S. moniliformis* is transmitted by drinking rat-excrement contaminated milk or water. *S. minus* is **not** transmitted by the ingestion of contaminated food or water.

### PATHOGENESIS

Rat bite

Minimal local inflammation, prompt healing, little lymphadenitis.

Bacteremia may occur with disseminated lesions appearing 1-3 days after the bite and later becoming pyogenic (pus formation).

## MANIFESTATIONS

**Streptobacillary RBF** caused by infection with *S. moniliformis*

Incubation period can range from 1 to 22 days, but onset usually occurs 2-10 days after the bite of a rat.

The clinical syndrome is characterized by flu-like symptoms including irregularly relapsing fever (101-104°F) accompanied by chills, vomiting and headaches, and asymmetric polyarthritis generally affecting the large joints followed within 2 to 4 days by a maculopapular rash on the extremities, palms and soles. The WBC count of those suffering from streptobacillary RBF ranges between 6,000 and 30,000. VDRL tests (syphilis serology) are false-positive in 25% of the cases.

The wound from the bite heals spontaneously. Headache, nausea, vomiting, myalgia, minimal regional lymphadenopathy, anemia, endocarditis, myocarditis, meningitis, pneumonia, and focal abscesses have been reported. Although most cases resolve spontaneously within 2 weeks, 13% of untreated cases are fatal.

Bacterial endocarditis, myocarditis, pericarditis and abscesses in the brain or other tissues are rare but serious complications.

It is often confused with Rocky Mountain Spotted fever, infection with coxsackie B virus and meningococemia. RBF due to *S. moniliformis* can usually be differentiated from spirillary RBF (Sodoku) clinically.

**Spirillary RBF or Sodoku** caused by infection with *Spirillum minus*.

Occurs worldwide, but is most common in Asia. This form of RBF is characterized by a longer incubation period (4 to 28 days but usually longer than 10 days). The initial wound may persist with edema and ulceration or may heal only to reappear at the onset of symptoms. Sodoku is **characterized by a recurrent fever** (101-104°F). Cycles of fever lasting from 2 to 4 days recur generally for 4 to 8 weeks but may continue for months. These febrile cycles rarely last longer than one year. A roseolar-urticarial rash sometimes develops. It is generally less prominent than the rash produced by *S. moniliformis*. **Arthritis is rare.**

Regional lymphadenitis and lymphangitis with

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malaise, headaches, and enlargement of the lymph nodes adjacent to the wound are also common. The WBC count ranges between 5,000 and 30,000. Sodoku may easily be confused with diseases characterized by relapsing fever such as malaria, meningococemia or *Borrelia recurrentis* infection especially if there is no history of rodent bite. VDRL tests (syphilis serology) are false-positive in half the cases. Complications may include endocarditis, myocarditis, hepatitis, splenomegaly, and meningitis. If left untreated mortality results in 6% to 10% of the cases.

### Haverhill fever

Clinically similar to streptobacillary RBF but is usually accompanied by more severe gastrointestinal symptoms (nausea, abdominal pain, and/or vomiting) and pharyngitis.

### DIAGNOSIS

**S. moniliformis** infection can be diagnosed by blood culture only. The organism is characterized by strict growth requirements and slow growth, making it difficult for most laboratories to culture. No serologic test is available for *S. moniliformis*; the previous slide agglutination test is no longer available because of performance limitations.

**S. minor** infection is diagnosed by dark-field preparations of blood smears or tissue or from exudates from lesions or adjacent lymph nodes where it exhibits darting motility. Giemsa and Wright stains are most often used for staining. If this is unsuccessful, then blood from inoculated mice is examined using dark-field microscopy (rarely done). No specific serological test is available.

### THERAPY

Penicillin is the drug of choice. Doxycycline or tetracycline may be given for penicillin-allergic patients. Recommended treatment by the Center for Disease Control is intravenous penicillin for 5-7 days followed by oral penicillin for 7 days. Other antibiotics such as erythromycin, chloramphenicol, clindamycin and cephalosporins have been used with success however the effectiveness of these agents has not been assessed rigorously.

### PREVENTION

Prompt cleaning of wounds with antiseptic solution, and reducing the risk of rat bites. The effect of chemoprophylaxis following rodent bites or scratches on

RBF is unknown. No vaccines are available for these diseases.

Improve conditions to minimize rodent contact with humans is the best preventative measure for RBF. Animal handlers, laboratory workers, sanitation and sewer workers must take special precautions against exposure. Wild rodents, dead or alive, should not be touched and pets must not be allowed to ingest rodents.

Those living in the inner cities where overcrowding and poor sanitation cause rodent problems are at risk for RBF. Half of all cases reported are children under 12 living in these conditions.

## Coming Soon

In September, DSCP will have an IPM informational CD covering a variety of pest management topics including wildlife, rodent, and vegetation pest management as well as pest ID and pesticide facts and safety. If you are interested in obtaining a copy, please let us know

## Parting Shots.....

That's all for now. Remember that we are here to address your pest management concerns. Give us a call at DSN 686-8122, commercial 510-337-8122 or drop us a line at [paa5245@exmail.dscp.dla.mil](mailto:paa5245@exmail.dscp.dla.mil).

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