

# Pest Notes



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### Little Flies Can Cause Big Problems For Restaurants, Food Production Areas

PCT-Online  
Amanda Paskiet

Small flies are replacing cockroaches as the premier pest in restaurant and food-handling accounts across the U.S. How your technicians and other personnel manage the problem will be the difference between a satisfied customer, or repeat call-backs to a never-ending problem said Stephan A. Kells, Ph.D., B.C.E., technical support manager, Abell Pest Control Inc. in Toronto, Canada. Kells spoke on his experiences with fly control at the 2001 Purdue Conference.

There are key features to a fly infestation that the technician must consider to ensure rapid and complete control. He must recognize the adult flies as a symptom of a larger problem and eliminate the fundamental source: the accumulation of decaying organic matter, a combination of water, food, microbes (bacteria, fungi or yeast), that provide food for fly larvae.

Kells said controlling flies is relatively simple: All one needs to do is remove the decaying organic matter and break the fly production cycle. However, the tricky part is finding the food source responsible for the fly infestation. This relies heavily on proper fly identification and a thorough inspection of all areas within a structure.

"Different fly species will be attracted to different types of organic matter and the faster you find the source, the easier it is to control any fly," Kells said. He gave some

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### Tips For Using Monitors To Service Sensitive Accounts

PCT-Online  
Amanda Paskiet

Today, more emphasis is being placed on proactive IPM inspections for sensitive accounts. According to Bobby Corrigan, president, RMC Pest Management Consulting in Richmond, Ind., monitoring is the single most identifiable practice a pest management professional can perform to put his program into the IPM mode.

"Monitoring is a fundamental part of a control program and it's something every pest management professional should do if he claims to be a professional," Corrigan said. He uses monitors to detect the presence of pests in a structure because they work nonstop and for various purposes. "Once pests have been detected, monitors are used to detect changes in the population (before or after a program has been implemented), to determine an efficient baiting location and to detect the pests' movement patterns," he said.

However, monitoring traps are only as good as their use in the field, so proper installation and service of the traps are crucial. The PCO needs to consider the number of traps needed per building, per room and the specific trap needed per area. The types of pests trapped in the monitors can provide pest management professionals with valuable, realistic information to guide bait or trap placements.

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"general rules of thumb" for PCOs and technicians to remember when identifying several flies that commonly infest restaurants and food production areas.

### **Fruit Flies**

Fruit flies typically search for food that is relatively fresh, meaning less than two weeks old. Fruit storage bins, underneath bars in restaurants, garbage disposal drains, sugar water and soda dispensers are popular fruit fly infestation sites.

Garbage cans also factor into fruit fly infestations because many restaurants leave their garbage cans inside the building for security reasons. However, allowing garbage to sit overnight inside the restaurant kitchen causes liquid to settle at the bottom and becomes another infestation site, said Kells.

In addition, recycling bins also serve as a prime infestation area for fruit flies because unwashed soda cans are left unattended until the bins are full. "Often there's a main collection site and various smaller recycling bins throughout the building for convenience. "This is an easy way for the infestation to spread throughout the building," said Kells.

### **Moth flies**

"These flies go after food that's been around for awhile, and it's generally unidentifiable black goop by the time it appeals to moth flies," Kells said. Moth flies generally "hang out" with their wings spread around their food source, making them easy to distinguish from fruit flies, which constantly fly around their food source.

Grout lines and cracked tile or plastic in food preparation areas are popular places for moth flies to infest. "Basically, any gap where food can get caught and is difficult to clean off will be a place these flies look for food," Kells said.

### **Phorid Flies**

Kells has an easy way to get a customer to distinguish between a fruit fly and a phorid fly: Have him nudge the fly with his finger. "If it immediately flies away, it's a fruit fly. However, if it hops before it takes off, it's probably a phorid fly," Kells said.

But there is an exception to the rule: "Any young adult fly that has recently hatched from its pupae will hop before taking off because it's relatively new to flying," Kells said.

According to Kells. "Phorid flies eat the material that

moth flies are afraid to touch. Most likely, the food has decayed beyond recognition and is generally found drains as well as cracks and crevices," he said. Kells also disclosed a little-known fact about phorid flies: They are also called coffin flies because they're known to infest coffins inside mausoleums.

The phorid flies' ability to infest tight places, such as coffins, also allows them to infest areas beneath a slab foundation. Grease traps and sewage system pipes are popular places for phorid flies to gather under a foundation.

### **Fungus Gnats**

Fungus gnats infest areas near the soil where fungus has grown, such as near freezers, doors, windows and on over-watered indoor plants. "I usually finds fungus gnat larvae near gaps in windows and doors and they travel to their food source from there," Kells said.

### **Strategy**

Kells summed up his strategies for eliminating a fly infestation:

- ?? Most flies tend to breed when their area is quiet. Morning may be an ideal time for an inspection.
  
- ?? Perform a diagnostic fogging. If it is difficult to identify a source of infestation, apply sticky traps, then fog the building.
  
- ?? Get the customer to remove the flies' food source by cleaning, removing products from the location or sealing the products attracting flies.
  
- ?? After the above steps have been completed, remove the adult flies with the method the technician and customer feel most with.

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**Fear Of Public Places**

Although the popularity of IPM in schools is increasing, many PCOs stay away from such accounts because of their sensitive nature. But whether a PCO chooses to do school accounts or not, he will need to know how to service one, Corrigan said. "It's a public building, and it serves as a model for how to handle any sensitive, public account," he said. "Anywhere the public goes is a public building. These people need to know that they are not involuntarily being exposed to pesticides."

Corrigan said pesticide application in public buildings are becoming more akin smoking in public buildings. "It is everyone's right to say they don't want to be exposed to something," he said.

And because it's the public's right to oppose pesticides, applications need to be able to be justified in a public building. Monitoring allows pest management professionals to make an educated decision of what pest control product to use in a sensitive, public account.

**Tips to Proper Monitoring**

According to Corrigan, there are two main areas where monitoring traps should be placed: macro- and micro-locations. He refers to macro-locations as any widespread location where water and humidity are prevalent. "I call these places 'the tropics' and I've found most pests can't afford to move away these places because it's their primary source of food," Corrigan said.

On the other hand, micro-locations are the intimate spaces such as corners of drawers and cabinets and equipment and floor-to-wall junctions.

Below are some of Corrigan's tips on how to service a school account, which PCOs can apply to any public building account:

**The Kitchen And Dining Halls**

- ?? Monitoring traps should be placed near appliances such as refrigerators, sinks, dishwashers, ovens, vending machines and heating units.
- ?? All cabinets need to have at least one trap. They should be installed in the corners in high and low shelves.
- ?? Storage rooms require six to eight traps depending on the size of the room and should be spaced evenly throughout the room. "They should be placed in any out-of-sight area where

- ?? food may accumulate or boxes and wood are stored," he said.

**Custodial Closet**

- ?? The traps should be places off of the floor, if possible. If not, make sure they are as close to the mop sink as possible.

**Classrooms**

- ?? Place traps in any classroom that stores pet foods, snacks or has areas cluttered with boxes and papers. Make sure they are placed high and away from view.

Traps should be placed adjacent to any heating unit.

**Basement Or Boiler Room**

- ?? Place traps behind the furnace and any areas where boxes are stored.

**Inspection**

A typical elementary school may contain 25 to 35 monitoring traps and can be inspected routinely once per week during the school's cleaning operations, so it doesn't require too much time, Corrigan said. Traps that are in good condition will be effective for several months, however, Corrigan suggested changing all traps after three months.

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**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

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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:

- ?? 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.

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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 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:

1. 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.
2. 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.
3. 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.
4. 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.

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Finally, information about pest activity must be recorded on an inspection log.

5. 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.
6. 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.
7. Monitor insect activity in the facility using mechanical devices and a keen eye. Properly placed pheromone traps, glue boards and insect 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.
8. 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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## MONITORING FOR STORED PRODUCT PESTS

PCT-Online  
Dr. Richard Arbogast

*Are you looking for a new way to control stored product pests? Trapping these insects may be the way to go.*

The proliferation of synthetic insecticides during the last half of the 20th century gave the pest management industry effective chemical remedies for many insect pests. These materials seemed to offer a panacea for all the problems these pests caused our customers. Synthetic insecticides were used by many but,

unfortunately, they were sometimes used unwisely. It was perhaps inevitable that this misuse would be criticized and bring tighter regulations.

The process of tightening regulation continues, as exemplified by the phasing out of methyl bromide (because it has been identified as an ozone-depleting substance), and the process of mitigating the human exposure risks associated with phosphine fumigation. The eventual loss of methyl bromide is of particular concern to the milling and food-processing industries, which have relied heavily on this fumigant to control insect infestation in processing plants. Much effort has been spent in seeking alternatives to methyl bromide for a wide variety of applications and it is generally agreed that there will be no single replacement. Instead, the alternative for each application will be an integrated system of control measures that will be applied only as needed and in a manner that balances risk against efficacy and cost effectiveness.

This system of pest management should prove to be the most sustainable in a climate of increasing public concern about the potential risks posed by pesticides.

**ESTABLISHING AN IPM PROGRAM.** The pest management solution for the food-processing industry may eventually include an alternative fumigant, such as sulfuryl fluoride, which does not deplete ozone, but any fumigants or other pesticides used for stored product pest control should be part of an Integrated Pest Management program.

The best way to maintain the privilege of using these chemical tools is to use them wisely. This is vital if we are to ensure that they will be available to us in the future and this can be done best if they are used as part of an IPM program.

What are the components of an IPM program for warehouses, mills and food-processing plants? It will obviously include preventive measures, such as sanitation and sealing of cracks and crevices. It will include application of various control measures (fumigants, other conventional pesticides, biorational chemicals [such as insect growth regulators], physical methods [such as high temperature], etc.) when and where needed. And it will also include regular monitoring of pest populations. Monitoring is an essential part of any IPM program because it is the only way to know when and where to apply control measures and what type of control measures are needed.

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There are several ways to monitor insect populations: visual inspection and counting insects on walls and other surfaces, trapping with pheromones or food attractant baits, or counting insects in samples of mill tailings. But how do these monitoring tools accurately and efficiently identify when and where control intervention is necessary and what type of control measure or measures should be applied? Knowledge of pest biology and ecology is critical to making the right treatment decisions that will result in commercial success. Yet, surprisingly little is known about stored product pests in commercial settings. How rapidly do populations of various species increase in warehouses, mills or food-processing plants? What population levels or numbers counted or trapped require action? What are the economic thresholds for treatment?

**CONCLUSION.** Different monitoring tools may lead to different conclusions. Which of the tools are best in a given situation? Should they all be used? If so, how can they be used most effectively? Using insect monitoring tools accurately and efficiently for making pest management decisions requires considerable thought and knowledge that is yet to be gained.

My associates and I are working to determine the best ways to use the monitoring tools we now have and to develop new tools where they are needed. Our work so far has focused on monitoring in retail stores and in warehouses. A combination of trapping and spatial analysis of trap counts was used to locate centers of infestation and target these centers for control intervention. The value of this type of monitoring is illustrated by the results of our research in retail stores. The maps on page 76 indicate trouble spots that require action, show the effectiveness of action taken and provide graphic representation of infestation for managers and pest control operators.

We will be extending our research to include mills and food-processing plants and will incorporate other methods of monitoring. The results will be published in a future edition of PCT magazine.

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## Odor Animal Repellents: Are They Effective?

PCT-Online  
Dr. Robert Corrigan

Oftentimes pest management professionals and wildlife control professionals are called upon to capture or "chase" squirrels, rodents, snakes, bats, skunks or other urban wild animals out of buildings. When done on a professional level, most times, this is accomplished via live trapping and removal, followed by exclusion efforts. .

Many homeowners also inquire as to the usefulness of having a chemical repellent applied in or around their home or building to repel future pest activity. But do the animal repellents labeled for this purpose really work? Let's examine this issue closer.

**TYPES OF ODOR REPELLENTS.** Many different types of animal repellents are available, including over-the-counter products, which attempt to change the behavior of wild mammals and birds (tactile, visual, gustatory, olfactory and auditory, for example). This article focuses only on those repellents currently sold with a premise of action as to odor repellents (also known as "area repellents") for the most common structural urban animal pests.

Having a putative action, the odor repellents sold to discourage animals from harboring in or around homes are presumed to offend the olfactory senses of the animal, or cause respiratory and general discomfort. Some may also serve as irritants, should the animal pick up some of the repellent on its body. Naphthalene (i.e. "moth flakes") has been and remains one of the most universally known insect "repellents." Specifically, it has been used to protect woolen clothing against fabric pests. Interestingly, naphthalene is not an effective repellent against fabric or other pests (1). If it is used in high concentrations and kept in tight containers for prolonged periods, naphthalene works as a fumigant, actually killing insects. How naphthalene came to be known and used as an animal repellent is not exactly clear, but in part, the minor fumigants naphthalene and paradichlorobenzene (PDB) may have been assumed to be general pest repellents due to their volatility and resulting disagreeable odor. Obviously, any mammal, including man, within an enclosed area containing high levels of naphthalene (as well as other chemical compounds) will seek to exit. Sulfur is also used as an animal repellent. One of the oldest pesticides, sulfur was used throughout the first half of the century for all types of "pest cleansing operations." Eventually, burning sulfur candles became commonplace for people in attempts to repel mosquitoes, gnats and other nuisance flying insects. Some area animal repellents are made up of 28% sulfur and 7% naphthalene and are registered as repellents against snakes, rats, mice and other animals.

**DO ODOR REPELLENTS WORK?** Rodent Repellents. For about 20 years at the turn of the century, U.S. government biologists such as D. Lance and James Silver were publishing various papers and government pamphlets regarding the control of rats around buildings (10). These publications formed the foundation on which many

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other rodent control publications later based their recommendations.

Silver, in his early publications, may have been among those to start the ball rolling. He recommended "deterrent odors such as flake naphthalene in quantity, as well as sulfur can be used to repel rodents." Mills and Munch (8), in the magazine *Pests* state that naphthalene was the best odorous rodent repellent, while powdered sulfur, cayenne pepper, lye and several others were good non-odorous rodent repellents. Whether Mills and Munch based their recommendations on the previous recommendations of Silver or some previous government bulletins is not known. Still, none of this began with any solid field research demonstrating that these products were efficacious. Later, extensive research was carried out worldwide for more than 20 years in search of an effective rodent repellent. Hundreds of compounds were tested, but none were of practical value for the purposes intended. Most of the work is summarized and referenced by Meehan (7). The bottom line is that no efficacy data exists for sulfur or naphthalene as a rodent repellent. All this is not to say, however, that effective rodent repellents do not exist or can't be developed. Work is continuing along this line with investigations of natural and synthetic compounds and new rodent repellents may be forthcoming (3).

*Snake Repellents.* Coincidentally, the same combination of naphthalene and sulfur which is now registered for rats, mice and other nuisance mammals, is also purported to be effective against snakes. But as with the rodents, formal field research proving efficacy of sulfur and naphthalene against snakes is lacking. In fact, two research papers, Ferraro (2), and San Julian and Woodward (9), as well various technical sources (e.g. References 4, 11) demonstrate and support the ineffectiveness of sulfur-naphthalene as a snake repellent. The Ferraro study in particular is a strong case against this repellent, as his study was conducted in the field at 24 locations against the plains garter snake, a common visitor around homes and gardens. Moreover, the sulfur-naphthalene repellent has been denied registration since 1991 in California due to a lack of efficacy data, and the U.S. military (which of course would have a keen interest in snake repellents), does not use sulfur-naphthalene repellents for the same reason.

*Bat, Squirrel and Bird Repellents.* Naphthalene has not been shown to be of value as an avian repellent (6). But bats can be evicted from building spaces using 100% naphthalene if the area is confined, and thus the concentrations of naphthalene can be elevated high

enough (4). Recommended dosages are at 2.5 pounds per 1000 cubic feet.

At twice this dosage, bats can be dislodged during the day. This author has used naphthalene successfully to evict bats out of exterior confined soffit voids and wall voids of a storage building. But he has also seen mothballs installed into many types of attics with unsuccessful results. Often, the attics are too large or too leaky to allow for proper repellent dosages. In one case, I witnessed 100 pounds of naphthalene installed into a church attic attempting to discourage a large bat colony (See figure 2). Even with this outrageous dosage, the bats remained. Considering naphthalene is 4.4 times heavier than air, coupled with the fact that prolonged inhalation of naphthalene vapors can be hazardous to humans, this particular application was risky business to say the least.

#### **SUCCESS STORIES AND FALSE POSITIVES.**

Formal efficacy data aside, when talking about repellents to homeowners and professionals alike, results range from zero to 100% satisfaction. And, in the literature on vertebrate pest management, you often see catch phrases for the use of repellents such as "sometimes they may work," or "may be worth a try." After 15 years at Purdue University, I received annual calls from different individuals who swore that spinning daisies, chewing gum, moth balls, etc., controlled their moles. Others claimed Osage orange fruits kept rodents and snakes away from their farms. What accounts for the occasional positive feedback from people who try commercial and homeowner repellents? Well, there are many complex biological and environmental variables involved relative to the relationship between animals and their behavior of exploring and "selecting" harborages and food. But to a large degree it comes down to timing and resource availability. Consider a few examples. If an animal has several suitable harborages nearby food and all in close proximity, it obviously has alternatives. Should one of the harborages contain a more uncomfortable atmosphere or environment, then the animal may indeed select, and re-select, the harborage that provides maximum protection and comfort. However, if only one harborage is available, uncomfortable or not, the animal will adapt as best as it can. From a biological perspective, bats might be easily evicted from a small attic containing an irritating but non-lethal atmosphere of naphthalene shortly after their arrival from hibernacula and prior to the maternity season. But this same level of

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naphthalene several weeks after their young are born, during the critical maternity period, will not have impact, as the bats are in a crucial survival period and have a strong roost attachment.

Success stories sometimes come from people who have installed mothballs (and ultrasonics) into bat-infested attics during September and October and claim "outstanding results" after just a few weeks. But unbeknownst to them the bats were naturally beginning to disperse from their summer roosts anyway. The coincidental time of applying a chemical repellent or ultrasonic resulted in a false positive. Disturbance alone may cause wild animals to leave an area or harborage. Many wild animals, if alternate harborage is available, and prior to harborage attachment behavior, will evacuate a given harborage after being disturbed. Most field biologists and wildlife researchers appreciate the importance of minimal disturbance to wild animals being studied in the field. Finally, the unpredictability of animal encounters must be considered. There are thousands of people/wild animal encounters that occur only occasionally.

Snakes slither through homes on their way somewhere else and are never seen again. Woodpeckers attack a home, and after drilling two or three holes, disappear. Raccoons or skunks use a crawlspace for a couple of days but then wander off. Panicked individuals, upon their first encounter with the pest, apply a repellent. But in these cases the problem has solved itself. Of course, the repellent is credited.

**SAFETY CONSIDERATIONS.** In this era of chemophobic individuals, installing odor area repellents into homes and other buildings is perhaps best done by the client or by the professional, but only after the client has clearly been informed to read the labels. Although the compound naphthalene is often listed as having "low mammalian toxicity," there are safety concerns with this mild fumigant. Some individuals are highly sensitive to naphthalene. Descriptions on the pharmacology of naphthalene (12), state "prolonged inhalation may cause headaches, nausea, vomiting, and sweating, followed by anemia, haematuria (i.e. blood in the urine), and optic neuritis. Some individuals may have a severe hemolytic crisis which may be delayed for several days after exposure." With these descriptions in mind, it is understandable that the labels of the 100% naphthalene products registered for use indoors against squirrels, birds and bats clearly state the following: "Avoid breathing vapors. Rooms should be well-ventilated before occupancy." Yet these same

labels recommended indoor use of the material to be applied on floors, or between walls at dosages of 8 ounces for every 200 cubic feet. And associated technical sheets state that when applied indoors, 100% naphthalene has a four- to six-month residual.

Whether or not you feel the precautionary statements are overkill is a moot point when considering whether or not you wish to be the professional responsible for installing 100% naphthalene inside (or around?) an occupied building. This is especially crucial when it comes to treating commercial buildings, where many people with different chemical sensitivities may work or visit on a daily basis.

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## Unruffled Evictions

PCT-Online  
Steve Smith

Since the day when a pigeon first disrupted a human dwelling, to the present when birds can be regularly seen making homes out of the structures in our ever-increasing urban and suburban areas, the fundamental means of controlling pest birds has not changed drastically. There have always been two options — eliminate the birds or exclude them from making a home of your structure.

What has changed drastically, however, is the dramatic shift away from elimination toward bird-proofing and exclusion. Today, much more emphasis is placed on making bird control techniques non-lethal. "There are a lot more options available to the PCO other than relocation or death and destruction," said Pete Markham of A-Mark Pest Management in a presentation at the 62nd Purdue Pest Control Conference held this January in West Lafayette, Ind.

Much of this transition has come as a result of the increasing scrutiny placed on bird control by various activist groups. One of the most vocal activist groups has been the People for the Ethical Treatment of Animals (PETA). For instance, the group recently led the public outcry made when chickens were slaughtered in Hong Kong to prevent the spread of an avian-borne flu virus. "It is pitiful that human greed causes so much animal suffering...more than a million chickens killed in Hong Kong over avian flu fears," states PETA literature. Though not directly related to urban pest bird control, PETA's reaction illustrates the type of activism that PCOs must be aware of. As one bird management veteran put it, "the activists are in

control today."

In a bird control manual he developed for the Maryland Department of Agriculture, Dr. Richard Kramer wrote that "a growing number of individuals do not want any bird control, particularly if it involves using a toxicant." Whether or not you agree that it is preferable to exclude birds rather than eliminate them, public opinion has pushed the industry toward non-lethal control techniques. "You can go out and kill cockroaches all day long and nobody is going to say anything about it," Markham said. "But birds are near and dear to most people's hearts."

Experts say the most important thing you can do is to be aware of various activist groups and take their views into account when planning a bird-proofing job. "Before undertaking any bird control work, the effects that it will have on public opinion must be considered...reactions are rarely based on the pest management technique being employed, and can come from virtually any individual or group," Kramer wrote. Kramer suggests educating customers and the general public on the hazards associated with birds. Furthermore, Kramer suggests emphasizing with these various groups the fact that your company employs IPM strategies "which are designed in most situations to dislodge, exclude and relocate the birds, rather than kill them."

When installing bird control devices on visible, public buildings, Markham said PCOs should request letters of approval from city council members to avoid causing a public controversy over a control plan. "They'll put pressure on the right people," Markham pointed out.

**KEEPING BIRDS OUT.** Since increased pressure has been placed on companies to bird-proof rather than eliminate birds, both new and old techniques for excluding birds have been receiving more focus. One such new bird-proofing technique has been the use of a new product from Ecopic, called Ecopic Volt. The product is a bird deterrent device that uses both electric shock and sound to repel birds from buildings. The product comes in a roll and can be rolled out on building ledges and fastened to the ledge with silicone. No drilling is required to install the product, said Doug Willard of D&S Specialty Products, Kirkland, Wash.

Willard said stainless steel rods running through the roll deliver a continuous pulsing shock that does not harm birds but irritates them enough to keep them from returning. When pulsing, the product also emits a sound that deters the bird. Furthermore, Willard said the birds associate the sound with the unpleasant

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shocking, and thus eventually are deterred by simply hearing the sound of the Ecopic Volt.

A shock box installed on a structure is then attached to the roll with connecting wire. The product, Willard says, can cover a 2-foot section of a 14- to 18-inch wide ledge for around \$4. Further saving costs, Willard said, the shock box uses a 9-volt battery, so it is not necessary to hire an electrician to install the wiring or box. The 10-yard rolls have a PVC base and can be connected together.

Willard recently used the product with success at the Boeing Company of Seattle, Wash. Pigeons were landing on a ledge above a huge sliding door used for bringing out manufactured 737s. The area below the ledge had actually become slippery with droppings, Willard said. Birds were also flying inside the building and disrupting operations. Willard installed the product on the ledge above the door, and no pigeons have since returned to the area.

Ecopic also used the product in a trial control program for deterring birds from a rooftop swimming pool. The swimming pool was atop a high-rise apartment complex, and was being visited by pigeons and seagulls. According to Ecopic general manager Solange Dubeauclard, Ecopic Volt has not only deterred birds from the swimming pool area, but also caused them to avoid the entire building.

Another manufacturer of bird control products, Bird Barrier America, Inc. of Redondo, Beach, Calif., has also introduced a bird-shocking product to the market. Bird Barrier's Bird Shock employs a track system that delivers a harmless electrical shock similar to that of static electricity. The tracks are glued or screwed into a building ledge and the shock is transmitted through the bird's feet when it touches a hot and ground wire, thus completing the circuit. The solar-powered charger unit is mounted to a wall near the start of the track. It is designed to power up to five miles of Bird Shock track. The charger unit sends an intermittent pulse down the track every three seconds. Each track is ½ inch high, 2 inches wide and 4 feet long. Tracks easily connect together with male/female interfaces, much like a toy train track, making the unit fast and easy to assemble.

Lon Martin, a vice president of service for Wildlife Control Technology Co. in Fresno, Calif., said his company has been using a new netting technique for keeping swallows from nesting on buildings. For best results, he suggests hanging netting vertically from eaves, extending down about 9 to 16 inches.

According to Martin, this technique keeps swallows from building their mud nests on stucco walls. Martin said the swallows build the bottoms of their concave nest out of mud, but need to use an existing structure such as a roof for protecting the top of the nest.

Hanging the net about 4 inches out from the wall is particularly effective. While residential customers may be reticent to have a net hanging down from their eaves, Martin has had particular success using the technique in commercial structures.

Martin cautions that it's important to use an extruded net product such as polypropylene versus a knotted net that tends to collect moisture, allowing birds to form mud nests on the net itself.

Roger Snow of Hot Foot America said his company has developed two new techniques for securing bird netting to buildings. Snow discovered the first new technique on a job at Fort Sam Houston in Texas. To help solve the base's sparrow and pigeon problem, netting had to be installed in areas constructed of special grade steel that actually bent or "bounced off" nails being driven into the steel. As a result, Snow developed the Clipset Steel fastener and used it in conjunction with a special ballistic-point nail. When inserted into the clipset and fired into the steel, the nail embedded itself fully, thus attaching the stainless steel clip.

For areas where only small sections of netting have to be fitted, Hot Foot developed a self adhesive fitting called Netlock. With this two-piece system, one piece has an adhesive back for attachment to the surface. The second piece then attaches with velcro, "sandwiching" the netting in place.

**TIME-TESTED TECHNIQUES.** While new products are frequently introduced for the bird control market, many of the techniques and products used for bird proofing are improvements on techniques that have been used for decades in the industry. Anthony D'Amato Jr. of D'Amato Bird Control Company in Philadelphia, Pa., said his company has used many of the same techniques for nearly 25 years — cleaning and disinfecting followed by netting and screening of infested areas.

"When it comes to birds, they're so tough to control that the tried and true methods usually stick," said Bruce Donoho of Bird-B-Gone. As a result, many of the new product offerings in the market are improvements on classic bird-proofing ideas. For instance, Donoho

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said, while his company's Bird-B-Gone Spikes have been successfully used for years, the company is now offering the spikes pre-assembled to save labor and installation time. Product development is focused on improving established methods, Donoho said, because "you always want to stick with something that works." Whether you are using newly developed products or time-tested techniques, bird control can still be a challenge. "When you're doing bird work, be prepared for anything and everything, because there is always going to be something you didn't expect," said Markham.

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## Steps to An Effective Fly Control Program

Copesan IPM Extra  
Jay Bruesch

### Controlling Flies: The Steps

1. The first thing that is needed to control flies in food processing plants, according to Leigh Severson of Plunkett's Pest Control, a Copesan affiliate based in Fridley, MN, is to adopt an attitude that flies inside a food facility are not normal and can be kept to a minimum. Too often, management assumes that flies are inevitable, and that certain numbers of them must be tolerated. By practicing Integrated Pest Management principles, large flies will not be able to gain entry, and the sources of small flies inside the plant can be cleaned up – provided there is a commitment at all levels to follow the recommendations made by the IPM specialist.
2. A careful inspection will reveal where flies are breeding inside or outside of the facility, and will point to sanitation problems and structural flaws that might be conducive to fly breeding or entry.
3. Proper identification of the fly species in question is of paramount importance. Since various fly species are associated with differing source conditions, knowing the identity of a fly will give valuable hints as to where it might be breeding.
4. Service supervisor Mike McHale, also of Plunkett's, stresses the importance of aggressively seeking the larvae of whichever species we are called upon to control. No matter what other sanitation imperfections might be present, it is the areas where filth is heavy enough for larvae to breed that must be cleaned up first. This is especially important in the case of fruit flies and other small flies, which tend to remain close to their breeding source, and whose source is almost always inside. Large flies, unfortunately, sometimes fly far from their original source, and their egg-laying sites are out of the control of the food plant IPM specialist. But the

breeding sites of small flies can usually be found within the facility. Typical larval breeding sources for small flies include dirty drains; spillage on floors; floor mops that don't get rinsed properly before putting them away; leakage from syrup lines; tanks whose contents leak into walls and other inaccessible areas; and broken or separated floor tiles which allow liquid to seep underneath. A persistent small-fly problem is a sign that one or more such breeding areas has not been found and corrected.

A Copesan Certified IPM Specialist can identify the species of fly involved in a food plant infestation – or, in the case of an unusual or rare specimen, can have it identified by one of more than 100 experts employed by Copesan nationwide.

5. At this point, the IPM specialist will make recommendations on sanitation and exclusion measures that will be needed. For instance, he or she might point out loose floor tiles that allow water to seep under the floor; drains that are not being cleaned properly; spilled product under or behind equipment; improperly rinsed or stored floor mops; doors that are propped open for ventilation; missing or damaged screens; or any other condition or employee practice that is allowing flies to gain access to – or survive in – the building.
6. After breeding sources have been identified during the inspection step and corrected to the best extent possible; the species of fly involved has been identified; and sanitation and exclusion measures have been taken, the ongoing fly control program will rely on a combination of insect light traps and supplemental insecticide treatments to do the rest of the job. Relying on either of these tools alone will not be successful – only an integrated approach will succeed.

Insect Light Traps (ILTs) use ultraviolet light to attract flies and other night-flying insects, including stored product pests. They are available in two varieties – electrocuting ILTs, which use an electrical grid to kill insects attracted to them; and glueboard-type traps, which attract flies and then trap them on a sticky surface. Electrocuting ILTs are, as a rule, larger and more powerful, but glueboard type traps are more suitable for installation very close to food-contact surfaces or open-food zones. ILTs serve both a monitoring and a control function. Using them only as glorified bug zappers misses the point of their real value as tools to continually assess whether flying insects are present; what kind of flying insects are present; and where they are coming from. A trained

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IPM specialist can “read” the catch pan of an ILT in order to identify sources of pest insects, and head them off before they become a major problem – or cause a failed inspection.

It is important to have enough ILTs in place, and that they are situated near critical entry points in such a way that they intercept flies as they enter – if possible, before flies make it to sensitive areas. A detailed treatise on ILT placement is beyond the scope of this article; however, a Copesan IPM Specialist can provide counsel on effective placement of ILTs.

That being said, it is important not to rely exclusively on light traps as the only component of a fly management program. Consider all of the other factors that must be integrated into fly control:

- Are screens in place, and in good repair, on windows and doors that will be open for any length of time? High-quality, tight-fitting screens are now available even for roll-up dock doors – a big help for facilities where dock doors are left open at night for ventilation. One such door, which utilizes existing overhead door tracks, is manufactured by Rasco Industries (1-800-537-3802).
- Are policies established – and consistently enforced – concerning employee door use? Try to route employee traffic in such a way that doors leading directly into processing areas from the outside are not routinely used. Otherwise, flies have direct access to sensitive areas.
- Does the outdoor lighting scheme make sense? Lights mounted directly on or very close to the building should be lamped with high-pressure sodium-vapor bulbs; mercury-vapor lamps are suitable for lights that will be mounted out away from the building and shining onto it, e.g. in parking-lot lights. In this way, insects will be attracted away from the building, not towards it.

Along with the sanitation and exclusion measures described above, supplemental applications of residual insecticides are an integral component of a good food-processing fly management program. Here are some hints pest management professionals should follow for effective use of residual insecticides as part of an integrated fly management program:

- Don't restrict yourself to doing pest control service at the same time of day every week – come at different times each week in order to observe fly loafing patterns. Flies tend to rest in different areas at different times of day. and if you want to make effective residual

applications to their outdoor resting places, you need to vary your service times.

- Pay attention to where the sun shines at various times of the day – it might be that sunlight falls on the receiving dock side of the building in the morning and on the trash dumpster pad in the late afternoon. These patterns might have an impact on the sites flies choose for resting – and subsequently on your choice of times to apply supplemental insecticides. Routinely power-spraying the outside of a building in summer is not an efficient way to accomplish supplemental fly control; applications should be precision-targeted where and when observations show the flies are present.

- Don't forget to inspect the roof – flies may be breeding in organic debris wetted by condensate or rainwater.

- Another reason it's a good idea to vary service times is so that you can observe employee practices at different times of day. You might catch people propping a door open or sneaking through a restricted-access door, admitting flies to process areas.

- In interior areas such as doorways and vestibules, flies often rest on window framing, overhangs, and light fixtures. A sponge or paintbrush can be used to apply insecticide if spraying would create too much drift.

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## Bites!

Copesan IPM Extra

It is the season for “bites” and “itches” to show up. As summer temperatures rise, air-handling systems work overtime. The air in buildings dries out. The skin of occupants of the building becomes more sensitive to contaminants in the air. People scratch and the skin developed red marks often mistaken for insect bites. Then the pressure is on the applicator to “spray” and get rid of the “bugs”.

Most frequently these “bites” are not due to insects, mites or spiders. They are caused by contaminants in the air and environmental conditions which sensitize the skin. Dry air and paper dust – especially from computer paper – is frequently the culprit. There are many more contaminants that can also cause these problems.

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If insects, mites or spiders are suspected, don't apply pesticides until you have identified the problem. Sticky monitors and other samples should be collected and examined by a specialist to determine if any living organism is present which could be responsible for the "bites". Copesan has years of experience in dealing with such problems. All too often we have had to deal with a doctor's diagnosis that the "bite" was caused by an insect and the premises should be sprayed.

If an insect, mite or spider is determined to be the problem through inspections and monitoring, Copesan can recommend a program to eliminate the pest population. If no living organism is found, then the problem may well be an environmental problem. No pesticide should be applied. An application of a pesticide only confirms the conclusions of some that an insect, mite or spider is the problem. Such an application also puts unnecessary pesticide into the environment.

Consult with an industrial hygienist. These people can take various environmental samples and determine what – if anything – is related to the problem. They can also recommend remedial actions to reduce or eliminate the problem.

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## **Insect I.D. Made Easy**

PCT-Online  
Doug Seemann

One of the greatest challenges facing pest management professionals (PMPs) today is insect identification, a crucial initial step in solving any pest problem.

Twenty or 30 years ago, insect identification might not have seemed as important because it didn't seem as if there were as many types of pests. In a sense, this was true. People didn't travel as much in year's past. Today, pests have been relocated and now drywood termites from Mexico can be found in New York, scorpions can be found in Chicago, Formosan termites in New Orleans, and Asian cockroaches and red imported fire ants in Arizona. None of these pests belong in these places, but they are there now.

Years ago, the type of insect didn't matter much because DDT and chlordane could kill most anything. For hard to reach pests there was Cyan-o-gas, and Vapo bombs. I once used Vapo bombs in an old home I purchased. The home was a "fixer-upper" and I was planning on gutting it. Forty-eight hours after setting off a few bombs, I returned to the home to find the mice in the dishwasher dead. Also dead were the carpet beetles in the kitchen, the clothes moths in the carpets, the

carpenter ants in the attic and the wasps in the dryer vents. Good stuff, but not terribly selective.

Today, pest elimination is more sophisticated. With the advent of integrated pest management (IPM), less toxic materials are used to control pests with precision. To do this effectively, the PMP needs to understand the biology and behavior of the pest adversary. To know these pest traits, one must know the type of pest present, and the key to this knowledge is pest identification. Identification is the first and most important step in a modern integrated pest management (IPM) program.

**HELPFUL TOOLS.** There are a number of tools necessary to properly identify insect pests. The minimum should include a flashlight with a focusing beam, a magnifying glass, tweezers, vials, alcohol, plastic Ziploc® bags, sticky monitor traps and a notebook. The magnifying glass should be a 10X loupe or pocket lens. Higher magnifications are available, but the field of view shrinks and image distortion increases with higher magnifications. Insects to be preserved should be transported alive in vials, or preserved in vials of alcohol. Tweezers and monitors are necessary to collect specimens for identification at a later date. To assist in determining the identity of an insect, it is sometimes necessary to collect the frass (droppings, sawdust, and debris) left behind by the pest. This is where the Ziploc® bags come in handy.

Notes should always be taken as to where the insect was found and the circumstances under which it was found. For those serious about identification, inexpensive pocket microscopes are available from Radio Shack. A paintbrush should be added to the toolbox for picking up small delicate specimens, and sharp probes can be used for manipulating specimens under a lens. The entire tool kit, with a professional-looking pouch should cost under \$50.00.

**EDUCATION.** In any given market, there are only about 20 insect pests that make up about 95 percent of the species commonly encountered. Each PMP should learn the insects they will most commonly encounter. Some of these are obvious, like field crickets and centipedes; others can be more difficult. Ants and flies can be among the most difficult insects to identify. Cockroaches can be very difficult too.

It helps to stay up on what is happening in the world of pest control. Read *Pest Control Technology* (PCT) magazine and *Service Technician* magazine. Also,

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visit [www.pctonline.com](http://www.pctonline.com) and other pest control-related Web sites.

Attending conferences and state association meetings can also be helpful. These resources will give you a window into the latest pest invasions in your region. Earlier this year I received a telephone call from Doug Gardner, an entomologist from Ecolab Pest Elimination in Phoenix, Ariz. He came across Asian cockroaches on the exterior of a home. Asian cockroaches are virtually identical to German cockroaches, but they behave very differently.

Most notably, Asian cockroaches are attracted to light and have the ability to fly. In fact, the easiest way to identify which species is present is to flip a few specimens into the air. If they keep going, they're Asian cockroaches, but if they hit the ground they are German cockroaches. Typically, Asian cockroaches are only found in the southeastern United States. Learning of these recently introduced species comes in handy when they are found in a part of the country where they normally would not occur. It is also important to learn some basic insect morphology, biology and vocabulary. It is virtually impossible to identify insect pests from the literature without knowing words like pronotum, tarsi, filliform, antennae, ocelli, and clavate.

**RESOURCES:** The *Scientific Guide to Pest Control Operations* from Purdue University is probably one of the best sources for easy-to-use identification keys. Keys are written devices that help the user sort out the significant attributes of a specimen so that the user is led to the written identity of the subject in question. By examining the specimen, a simple question is answered, selected from a pair (couplet) of choices. For example, "is it fat or skinny, are there seven segments in the antennae or eight?" After making each selection, the user is led through a maze of couplets until a logical conclusion is reached. The PCT Field Guide Series by Dr. Mark Lacey and Stoy Hedges are must-have editions for field identification. The *NPMA Field Guide* is another strongly recommended reference.

With the tools outlined above, the competent PMP will be able to identify nearly all of the arthropod pests encountered in the field. For the remaining few insects that are difficult to identify or to confirm through field identification, there is relatively easy access to entomologists. University cooperative extension offices typically have a number of entomologists who are

happy to help.

If there is a United States Department of Agriculture (USDA) office in your area, they can also be helpful. Many universities have an entomology department, or a number of entomologists in the biology department. Some state associations have entomologists on retainer and the National Pest Management Association (NPMA) is always available to help. NPMA's Web site, [www.pestworld.com](http://www.pestworld.com), is also filled with helpful information. Pi Chi Omega is a national association of Board Certified Entomologists (BCEs) working in the pest control industry and can be contacted at their Web site.

The Entomological Society of America has a registry of BCEs catalogued by state and by specialty. Some larger pest control companies also have staff entomologists that may be willing to assist (as long as the help isn't requested too often).

The best way to utilize these resources is to establish a rapport with them before they are needed. How quickly these typically very busy people respond is a function of their personal-professional relationship with the pest management professional needing help. Networking is a valuable tool in insect identification, and the time invested often pays off in big dividends.

**CONCLUSION.** Pest identification is one of the most important steps in the pest control process. Once correct identification is made, information regarding the pest's biology and behavior can then be reviewed and potential pest control solutions can be studied for feasibility.

Pest identification does not have to be a daunting task. Like other aspects of pest control it requires pest management professionals to do a little "detective work." It requires PMPs to collect and carefully examine pests, then use their available resources to confirm their findings.

To most pest management professionals, discovering a previously unknown (to them) arthropod pest is one of the most exciting and interesting parts of the job. After all, didn't most of us get into this business because we thought bugs were cool? I did!

#### **KNOW YOUR TERMS**

Pest management professionals will need to know a number of scientific terms when identifying insects. Below is a small sampling of the many scientific terms

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when identifying insects. Below is a small sampling of the many scientific terms that PMPs will commonly encounter when reviewing insect pest literature:

- **Pronotum** — The top or dorsal plate on the prothorax.
- **Tarsi** — The fifth leg segment located between the tibia and the pretarsus; often composed of several segments.
- **Filliform** — A form of insect antennae which typically consists of many segments and is long and thread-like.
- **Antennae** — The paired segmented sensory structures on the head of an insect; located above the mouthparts near the eye.
- **Ocelli** — A small, simple eye composed of a single facet or lens
- **Clavate** — A form of insect antenna which is expanded into a club at the tip.

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## Finding The Best Solutions

PCT-Online  
Doug Seeman

The No. 1 non-wood destroying group of pests in the United States today is ants. Across the nation, service technicians are reporting more difficulties in eliminating an increasing variety of ant species. As the various species are dispersed throughout the country by way of interstate commerce and travel, they become established in areas where they never were found before.

Ants as a group are among the most adaptable animals, probably second only to man. In some instances, an introduced species may out-compete native species, effecting both the pest control industry and the environment. In Southern California, Argentine ants have displaced harvester ants, resulting in the decline of a rare species of horned toad that specialized in feeding on the larger ant.

To keep ahead of the ever-changing ant landscape, a technician must be well schooled, creative and open-minded. The first and most important step is to obtain a positive identification of the ant species. This is harder than it sounds because the majority of known ant species have no common name and little may be known of a given species' biology.

**TOOLS TO START.** In order to identify an ant species, the technician will need a pair of sharp forceps (bent), a strong flashlight that can be focused to an even, single bright spot, a 10x and a 20x magnifier, a paintbrush, a bent needle probe, vials of alcohol, and a notebook. A small surgical clamp and a stereo-dissecting microscope with a lamp are also helpful. To collect samples, 1-inch lengths of drinking straws filled with mint apple jelly or honey and sticky monitoring traps are helpful. An aspirator (a hand- or mouth-operated vacuum) may be useful for capturing samples of fast-moving ants. Reference materials are also required. The *PCT Field Guide for the Management of Structure-Infesting Ants* by Stoy Hedges is a must-have, handy resource that technicians can keep in their trucks and use in the field. Another valuable reference book is *The Ants* by Edward Wilson and Bert Hölldobler. It is also a good idea to develop a working relationship with an entomologist to assist in the most difficult identifications.

**KNOW THE BIOLOGY.** It is important to know the biology and behavior of the ants to be eliminated. While some ant species will readily consume sugar/carbohydrate baits, others may have more complex feeding patterns. For example, both crazy ants and Argentine ants will change their food preferences depending on the immediate nutritional needs of the colony. A favored bait receiving lots of activity may suddenly be ignored by foraging ant workers, with the selection changing several times in just a few hours. There are a number of questions to be answered when considering an ant control program. Technicians should develop a checklist to take with them (*see sidebar, opposite page*). An important distinction to be made is whether or not multiple queens are present. This immediately gives the technician an indication of the likelihood of fracturing the ant colony and spreading the problem. If a group of workers are split off from the colony by physical or chemical means and there are queens within that group, expect the level of infestation to increase. Another important consideration is the expectation of the customer. For some ant species, such as Pharaoh, Argentine, and crazy ants, quick results are not possible or realistic. Several visits over several days, weeks or even months may be required. The diplomacy of the technician and the support from his or her office plays a key role here. By now, it should be clear that there should not be just one price for ant control and it should not be

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just one price for ant control and it should not be priced over the telephone. Be aware: the customer may have misidentified the ant in question.

**ANT MISIDENTIFICATION.** Taking the client's word for the type of ant problem can lead to inappropriate action. Recently on my call-in talk show in Tucson, Ariz., I had a caller ask about the best way to rid his home of fire ants. We spent five minutes talking about the differences between red imported fire ants and the local desert species. We also discussed their acceptance of bait and when mound injection was warranted. We talked about do-it-yourself treatments and the aggressiveness of the ants.

The caller then commented on how large the ants were. This resulted in an additional line of questioning. I soon identified the ants as leaf-cutters! Well, this required a completely different treatment strategy involving utilizing the airflow patterns within the colony to distribute dusts. Just because these ants sting, the homeowner had assumed they were fire ants and I had assumed that the caller knew what he was talking about. The lesson learned: always make positive field IDs.

**DIFFICULT ANT SITUATIONS.** One of the most difficult ant control problems encountered by technicians is frequently shifting bait preferences. Some ant species are so tuned in to the specific nutritional needs of the colony that their feeding patterns will shift several times per day, making it difficult to get a lethal volume of toxicant into the colony.

To overcome this, two things must happen. A greater number of foragers should be picking up the bait at any given point of time, and a variety of bait matrixes should be available from which the foragers can choose. To accomplish this first task, use large numbers of bait placements. One to two placements per 50 square feet is not out of the question. These should be placed in foraging trails and adjacent to resource sites (other sources of food, water and access). Each placement should be about one to two grams (depending on the product label) and should be recorded on a service diagram. Providing choices may be a little more difficult. There is an excellent table in the aforementioned *PCT Field Guide for the Management of Structure-Infesting Ants* that lists the common ant species and their food preferences.

Try to provide at least two choices and as many as five at each bait placement point. Some containerized bait pucks are available that have multiple-choice products within. The advantage to these products is that although

the attractant varies, the active remains the same, increasing the chances of the ants getting a lethal dose. This is true also if multiple injectable baits are used from the same manufacturer. Of course, if the ants won't eat it, it doesn't matter that the baits all have the same active. With the plethora of baiting stations available on the market today, it is relatively simple to find and use multi-choice stations.

Rockwell Laboratories produces a tamper-resistant all-purpose station that is available with an opaque or clear lid. This station has an available plastic liner tray that can be used to hold a variety of baits. The clear top allows easy monitoring of ant activity and bait consumption while providing plenty of space for notation so that the technician can keep track of which baits are which. Outdoors, the options available for ant bait placement can be overwhelming. Manufacturers such as Whitmire-Micro Gen offer complete systems with varying degrees of complexity that hold significant volumes of liquid baits. For some ant species, such as carpenter ants and arid region ants (e.g., harvester ants), these devices are essential to service, allowing control of ants on a large scale with a service frequency that is manageable. Kness Manufacturing and others also produce similar devices that allow for customized bait selection. B&G Equipment Co. and The Clorox Co. produce exterior bait stations that can handle everything from liquid, granule, paste and gel baits, all at the same time. Innovative Pest Control Products produces an Ant Café liquid/granular station that is suitable for tree and wire mounts. Even Exterra termite stations are now available with an ant/roach baiting top that can hold several bait formulations at once.

**IPM FOR ANTS.** Ants aren't magical (although it seems they are sometimes). They are highly resourceful and adaptable pests that work together as a colony (or superorganism) to exploit resources and opportunities as they occur. Integrated pest management (IPM) for ants is very simply eliminating those resources and opportunities. When I first started in pest control in 1983, there was a technician by the name of Drew who had the challenge of servicing animal labs in pharmaceutical research facilities. In one of the rooms, they were performing LD50 testing on rabbits, eliminating the possibility of pesticide usage in that portion of the facility. Drew would spend 20 minutes per service (the service visit for the facility was three hours per week) cementing cracks in the floor and walls to stay ahead of the ants in the room. The lesson learned: IPM may involve

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augmenting chemical application with non-chemical procedures.

At my home last summer, I awoke one day to find more than one dozen ant trails in my home, all coming from a nest in a wall void behind the glass slider to the yard. After examining the trails, I decided that I did not want to take a chance on fragmenting the colony. I found a common corner that 90% of the foragers would round on their way to and from the colony. I turned on a vacuum cleaner and propped up the nozzle so that it rested less than ¼ inch from this common corner. I then washed away the ant trails for a radius of 3 feet around the opening to the colony.

Within one-half hour, all of the foragers in the house were vacuumed up with absolutely no stragglers. The remainder of the colony was treated with an oil-based dust, resulting in immediate termination of the ant colony. The ants started out invading about 2,000 square feet of home, extending throughout five rooms and a pantry, and one hour later they were completely and permanently eliminated without any stragglers remaining. Yes, that was an hour, but those types "special" or "one-time" services are for a sum of money significantly higher than a regularly scheduled monthly service visit. What would have made this service truly profitable (had I have decided to pay for it) is that I would not have had to make any follow-up or callback visits.

**CONCLUSION.** Hopefully, this article will stimulate technicians to be creative and innovative when looking at ant control problems. One needs only to lift the 730-page aforementioned *The Ants* to know that ant control is not something that is going to be learned from a few articles. It is both challenging and rewarding. Perhaps over a 20-year career, one may become an expert. I don't know. I'm still working on it myself!

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## H.R. 1: What Does It Mean For The Pest Control Industry?

PCT-Online  
Amanda Paskiet

(Pest Notes: For those involved in facilities pest management, this Bill may prove to be extremely important on DoD installations. Pest Notes will track changes and provide updates.)

WASHINGTON, D.C. — On Monday, June 19, the U.S. Senate approved a historic school pest management amendment to the Better Education for Students and

Teachers Act (H.R.1). The amendment, sponsored by Sen. Robert Torricelli (D-N.J.), was the result of an agreement between the National Pest Management Association (NPMA) and the National Coalition Against the Misuse of Pesticides (NCAMP)/Beyond Pesticides. The two organizations, along with many other groups, debated for months about approaches to managing pests in and around schools across the United States. The amendment, called the School Environment Protection Act, is the result of negotiations between NPMA, NCAMP/Beyond Pesticides, several other industry groups, Torricelli, Senate Majority Leader Tom Daschle (D-S.D.) and Sen. Mary Landrieu (D-La.). According to Bob Rosenberg, director of government affairs, NPMA, the amendment represents the most significant and extensive agreement on the school pest management issue. Many PCOs, however, are wondering what the amendment entails and how the legislation will affect their businesses.

First and foremost, the amendment requires each state to develop a school pest management plan, which school districts must implement and a certified applicator must oversee. At a minimum, the plan would prohibit a pesticide application in any room that is occupied by students and staff in the school. It will also require schools to be vacant 24 hours after certain high-volume pesticide applications, such as baseboard spraying and fogging.

"With schools across the country having to implement these Integrated Pest Management (IPM) plans, they are certain to turn to those people that know IPM best to help them: PCOs," Rosenberg said. "While some school systems understand what IPM is, most schools do not, creating an opportunity for PCOs to market themselves to those people."

H.R. 1 is expected to be signed into law this summer and would take effect on October 1. Then, according to the school pest management amendment, each state will have 12 months to adopt a school pest management plan. Once that plan is adopted, it must be implemented into school districts within 12 months.

Besides adopting a pest management plan, each school district must also retain a certified applicator or someone authorized by the state regulatory agency to help implement it into each school, which creates yet another business opportunity for PCOs, according to Allen James, president, Responsible Industry for a Sound Environment (RISE). "Because schools are not required to hire a PCO, it is up to PCOs themselves to capitalize on this opportunity by offering their expertise

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to schools, while at the same time, enhance their own businesses," he said.

Once a pest management plan has been implemented into a school, school officials must follow the notification requirements outlined in the amendment regarding pesticide applications. According to the amendment, schools must notify parents and staff of the pest management practices at the beginning of the school year, at the midpoint of the school year and at the beginning of the summer vacation. The notice must include the following:

- ?? A summary of the requirements and procedures under the school pest management plan.
- ?? A description of any potential pest problems the school may experience and the procedures that would be used to address those problems.
- ?? The contact information of the Office of Pesticide Programs of the Environmental Protection Agency (EPA).

School officials must also establish a registry for parents and staff that wish to be notified 24 hours prior to any pesticide application at the school. The notification must include the following:

- ?? The trade name, common name and EPA registration number of the product that will be used.
- ?? A description of each location at the school where the pesticide will be applied.
- ?? The date and time of the application.
- ?? All information supplied to the school by EPA, such as potential health hazards associated with exposure to the pesticide.
- ?? The purpose of the application.
- ?? The contact information of the Office of Pesticide Programs of the EPA.

In addition, a sign must be posted in a central area of the school the day before a pesticide application that is noticeable to anyone entering the building. The sign must stay up 24 hours after the application has been made.

According to James, the amendment also has the ability to change the way the public views the pest control industry. "If more and more PCOs work with the schools to implement pest management plans, I think it's a great opportunity to demonstrate good stewardship of products, professional techniques and good service to students and staff in protecting them from pests," he said. "I think it's a great public relations opportunity for the industry."

## Indianmeal Moth: Love at First Smell

Insects Limited: Fumigation and Pheromones

### How To Use Pheromone Traps

The Indianmeal moth is the most common stored food and grain pest in the United States and is found in most parts of the world. It is common in grocery stores and warehouses where it infests all kinds of packaged and bulk food products including popcorn, cereals, candies, nuts and dried fruit. In homes, it's more often found infesting dry pet food, nuts and bird food.

Pheromone traps are an excellent monitoring tool to alert you to the presence of Indianmeal moth. In residences, pheromone traps can be part of the control program if populations are not out of control. The Indianmeal moth pheromone is a sex attractant. It attracts the male adult moth to the scent of a female adult moth. Even very small amounts of the pheromone are extremely attractive to the male moth. The moths are drawn to the impregnated plastic lure and are captured on a sticky surface inside the trap. The Pantry Patrol trap can be placed on a shelf near stored food. This pheromone trap uses a liquid attractant that contains the pheromone to drown the moths along with many other stored product insect beetles.

When doing a standard pesticide treatment for Indianmeal moths, it's a good idea to leave pheromone traps to record the population rebound in the warehouse and to evaluate effectiveness of the treatment.

### Tips for Trapping Indianmeal Moths With Pheromones

Remember, the pest you're trying to trap can fly. Hang pheromone traps a little above eye level on racking away from forklifts and at least 50 feet from open doors and vents.

Indianmeal moths will begin to fly when temperatures are above 60 degrees F (18 degrees C). Start placing traps out in the spring before indoor temperatures are 60 degrees F. (In Chicago this would be about April 1).

The Indianmeal moth sex pheromone will draw moths from 30 to 50 feet away (further if there's a breeze near busy doorways). In a warehouse, place your traps in a grid pattern 50 to 100 feet apart; nearer if you suspect a problem in a given area.

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Indianmeal moth adults prefer to stay near walls, often resting in a vertical position. Traps should be placed inside near the perimeter walls.

Place pheromone sticky traps where children can't reach them. In warehouses, keep them out of the path of forklift operators.

If traps continue to get buried by stored product in a warehouse, move the trap to a better location, perhaps near a fire hose station. A trapping scheme should not be too rigid. Be flexible in the first year of trapping.

Replace lures every 8-10 weeks indoors and every 4 weeks outdoors. Old lures need not be removed, just add a new one. Like perfume, the remaining scent could still attract moths.

Unless you like moths following you around all day, wear gloves when handling lures. The pheromone can be absorbed through the skin and then you become a pheromone lure yourself.

The only thing to write on the trap is the date the new lure was placed or replaced inside on the bottom of the trap. Map out your trap locations and secure it in a file.

Replace the entire trap when it is dusty or when it is full of moths. If you're catching only a small number of moths, use a Popsicle stick or coffee stirrer and a paper towel to clean the moths out of the trap.

In warehouses, grain storage, or grocery stores where you're likely dealing with more than just Indianmeal moth, double up on lures. Inside the same trap, in addition to the Indianmeal moth lure, you can also add a lure for the Warehouse beetle, or the Cigarette beetle. The Indianmeal moth lure will also attract the Mediterranean flour moth (*Anagasta* spp.), and the Almond moth (*Ephesia* spp.). The *Trogoderma* lure will trap about 16 species of *Trogoderma* beetles.

#### Recommendations

The Indianmeal moth can enter a home from outdoors via places like fireplace flues that are not completely sealed tight. Rodent harborage that accumulates seeds and nuts will provide food for future populations of Indianmeal moth. Food products that have not been properly inspected can reach the homeowner. Products improperly rotated on grocery shelves and warehouses are often sources of infestation too.

A program of prevention, monitoring and control is the combination strategy that works best for the long-term eradication of IMM. Sanitation and thorough cleaning

And vacuuming are the most important preventative steps. Discarding or freezing all suspect food products is important. Monitoring for the presence or absence of IMM with pheromone traps is essential along with regular inspections from a trained pest management professional is advised. The use of Insect Growth Regulators (IGRs) quarterly would greatly reduce the immature moth population by preventing them from reproducing without harming pest or humans. A good educational program to help the homeowner or commercial businessman understand what causes a build up of pest IMM would be recommended as part of a pest management program.

#### Conclusion

Indianmeal moths are troublesome nuisance pests throughout the United States and in many parts of the world. They are controllable. They are not harmful to our health. They don't have chewing mouthparts and cannot chew into wood or personal property. The larva can rasp through a plastic bag if given enough time. The reproductive capacity of this moth is very large with 400 eggs per female and the life cycle is quite short at 18-40 days from egg to adult. This moth is vulnerable to freezing when shocked. The single most important recommendation is to remove the food supply in open and hidden locations to prevent future infestations from reoccurring.

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## **Bad Bugs..... Insects That Can Cause Health Problems**

Insects Limited-Fumigants and Pheromones

If there is an insect that is truly a voracious feeder and a potential health hazard to humans and young animals, the warehouse beetle falls into that category because of the long lists of foods that it attacks. Next to the dreaded quarantine pest, the Khapra beetle, it is the most serious stored product insect pest.

Imagine an insect that can live for three years without food or water. Imagine an insect that can live in a freezer for five days. Imagine an insect that can hide in cracks only to emerge to cause havoc with a museum collection or a complaining customer. That is the nature of the Warehouse beetle.

Let's take a closer look at this common stored product insect:

The Warehouse beetle prefers feeding on animal

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protein. This could be anything from road kill to dog food to powdered cheese and milk. The beetle will feed on plant material but a dead insect or mouse would be its preferred food source. You will often find *Trogoderma* spp. feeding in insect traps on dead insects. It is important to empty these lights on a regular basis.

The larva of the Warehouse beetle is approximately 1/4" long and prefers to live in dark places. The adults prefer to breed in dark, quiet places, such as packed food cartons. Larval color varies from yellowish white to dark brown as the larvae mature. Warehouse beetle larvae have two different tones of hairs on the posterior end. These guard hairs protect them against attack from the rear. The warehouse beetle has about 1700 hastisetae hairs and about 2200 spicisetae hairs according to George Okumura. Since a larva sheds its hairs during each molt, the damage of this pest insect comes from the 1000's of these pointed hairs that escape and enter a finished food product as an insect fragment. These insect fragments then can be swallowed by humans, young horses or pets and get lodged in their throats.

### Health Hazard

Okumura (1967) mentioned two medical reports:

Case 1: "The establishment of a case of canthariasis in an infant in Indiana was based upon the following information: Two larval specimens of *Trogoderma* were submitted to me for identification. The specimens were collected in the stool of a four-month-old baby boy who was ill. Live larval *Trogoderma* were submitted later from packages from the same lot of high-protein baby cereal which had been fed to the child."

Later a consulting doctor further explained: "As far as I know the symptoms in the Indiana infant with ulcerative colitis were attributed to the beetle larvae if *Trogoderma glabrum* (Closely related to Warehouse beetle)."

Case 2: "The case of a four-month old baby boy in California was similar to the Indiana case. Here the baby was fed a high-protein baby cereal in which the larvae of *Trogoderma onatum* was later found. (One live, one dead and two cast skins) were taken from the original package of the baby cereal. According to the mother, the baby became ill two or three days after eating the cereal. The baby did not vomit, but had mild diarrhea. The interviewed mother stated: 'the baby showed signs of varying degrees of digestive distress, culminating in a severe outbreak of screaming and

Crying and absolute refusal to eat. Anytime it was offered food it became rigid and red, and arching his body and screaming, evidently in pain)."

The doctor did not administer medication and after a couple of days the baby recovered.

**Identification.** There are 16 species of *Trogoderma*. The female adults are twice the size as the male beetles. They are members of the Dermestidae family that also includes Black carpet beetles. However, they are not a carpet beetle. When inspecting it is often easy to spot the cast skins. This is much like a snake that sheds its skin. The adults are about 1/8" and dark in color with yellowing mottling on the wing covers (elytra). This mottling can take on various shapes even within the same species.

The larvae are the damaging stage and can over winter in wasp nests and mud-dapper nests feeding on old insect carcasses and guano. During the spring months when plants are flowering, it is common to see *Trogoderma* adults on plants collecting pollen and looking for a mate.

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## Pheromone Tips

Insects Limited-Fumigants and Pheromones  
David Mueller

### Pheromone Tip

*How do you set up a pheromone-trapping program in a warehouse?*

Since most pheromone trapping programs are designed for monitoring or early detection of pest insects, the traps should be placed on a simple natural grid. Use the vertical support beams that are set in a grid that are usually 60' x 40' or 60' x 60'. Indianmeal moth, Warehouse beetle and Cigarette beetle sex-attractant pheromones will pull male insects from a 30-50' radius. Also, consider placing pheromone traps outside near loading dock entrances about 30 feet apart.

### Pheromone Tip

One way to increase the efficiency of a pheromone trapping program is by using two or more lures in one trap. Two stored product insect pheromones commonly used in the same trap for monitoring purposes are the Indianmeal moth and Warehouse beetle. They both fly and are often found in the same locations. By using this method you can significantly

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(Pheromone tips....Continued from page 21)

reduce the amount of time you spend checking your pheromone traps. A third lure often used in these traps is for the Cigarette beetle. The sex-attractant pheromones are so powerful that they don't interfere with the effectiveness of the total trap catch. The Pantry Patrol traps from Insects Limited, Inc. utilize five different pheromones in one corner trap (3 beetles and 2 moths). Over 20 different species of insects have been captured in this unique liquid-baited pheromone trap.

**Pheromone Tip:**

*How high should I place the traps?*

Place the traps a little above eye level on the vertical support beam and not the racking. If the warehouse is full all the time you may have to get inventive and place them in the channels of the vertical support beams marked with yellow marking ribbon placed high on the beam to help locate the trapping locations. You may want to hang the traps high with a long pole and hook to help retrieve them. When the warehouse is full, I prefer to place traps near the fire extinguishers/fire hoses that are required to be left open. Some times the traps get buried and you just have to make a note of this on your log.

**Pheromone Tip:**

In order to make sticky pheromone traps last longer, clean out the insects after recording the catch. This works especially well in areas that catch small numbers of insects. Bring a Popsicle stick or coffee stirrers and a paper towel with you to inspect traps. Use the sticks to remove the insects, and wipe them on the paper towel. This will allow the extraction with minimum mess and helps make it easier to keep track of catches from one week to the next. When replacing lures in traps that don't need to be replaced, it isn't necessary to pull out the old lures. Just add the new one to the trap. This can enhance the effectiveness of the lures if any pheromone is still left. Write the date when the new lures were added to help you keep track of when they will need to be replaced. Most pheromone lures last for 8-10 weeks indoors.

Remember the key is to save time and be efficient when you check these traps. Make the path simple and accessible. Don't forget to take time to look around the warehouse for other signs of problems (e.g., mouse droppings, excess spider webs, door sweeps missing, temperature gradients, poor personnel practices, old code dated products, insect webbing, spills and excess weeds, etc.).

## Summary and Major Provisions of the EPA: "Process for Exempting Quarantine and Preshipment Application of Methyl Bromide" Interim Final Rule

Fumigation FAX-Great Lakes Chemical Corporation

At long last, the EPA interim rule describing the definitions and reporting requirements for methyl bromide Quarantine and Preshipment (QPS) exemptions was published on July 19. The interim rule is effective July 19 and covers the period January 1, 2001 to December 31, 2002. Comments on this rule are due by October 12, 2001 and the final rule will be issued at the end of next year. There are several things we will ask EPA to clarify or change in the Final Rule, but overall, the provisions in the current rule exceed our expectations.

The interim rule incorporates the narrow definitions of Quarantine and Preshipment that we were expecting, and had planned for. However, we are pleased to report that it also includes two provisions we weren't expecting, (1) exemptions required by state and local quarantine requirements and (2) exemptions for application on soil used for growing propagative materials. A summary of the specific requirements of the rule is as follows:

### 1. Exemptions

#### Quarantine Uses

?? Quarantine uses are as defined in the Montreal Protocol:

"Quarantine applications . . . are treatments to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), or to ensure their official control, where: (i) Official control is that performed by, or authorized by, a national plant, animal or environmental protection or health authority; (ii) quarantine pests are pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and being officially controlled."

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- ?? EPA clarified that the quarantine use doesn't have to be for a specific pest, but can be for a "broad performance-based quarantine requirement."
- ?? Quarantine uses required by intra-state and intra-county regulations will be exempt.
- ?? Exemptions will not apply to non-quarantine export applications, even if the US exporter must obtain a phytosanitary certificate for the export of the commodity. To qualify for an exemption, these applications must meet the definition of preshipment use.

Fumigation of soil for growing propagative material may qualify for an exemption. The exemption applies to methyl bromide used on soil for growing propagative material, if the propagative material, such as strawberry rhizomes, must meet official quarantine requirements of the destination to which the material will be shipped.

#### Preshipment Uses

- ?? Preshipment uses are as defined in the Montreal Protocol:

"Preshipment applications are those non-quarantine applications [applied] within 21 days prior to export to meet the official requirements of the importing country or existing official requirements of the exporting country. Official requirements are those which are performed by, or authorized by, a national plant, animal, environmental, health or stored product authority."

- ?? Applications to meet food sanitation requirements of the US or importing country are exempt as long as these applications are performed within 21 days prior to export. Food sanitation applications not performed in conjunction with export are not exempt.

#### Other

- ?? Provisions for obtaining exemptions for methyl bromide exported for OPS uses are included.

## **2. Non-Exempt Applications**

- ?? Exemptions will not apply to preventative treatments to meet food sanitation standards. After January 1, 2005, these uses may qualify as critical use exemptions, but the definition of critical use has not been finalized. To qualify as an exempt use now, the application must meet the preshipment definition.

## **3. Record Keeping and Reporting Requirements**

- ?? Record keeping and reporting requirements are patterned very closely after the Great Lakes system. The definitions we used on Great Lakes report forms match EPA definitions. Only slight modifications, if any, will be required.
- ?? The documentation we have so far collected will suffice for our initial claims for exemptions.
- ?? Distributors will be required to file annual reports with EPA. Great Lakes will provide guidance on this in the near future.

Applicators must maintain records to document the official requirement that justifies and clearly identifies the use of exempt methyl bromide.

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### **Phorid Flies**

Insects Limited-Fumigants and Pheromones  
Dr. Chris Christiansen

*"When I die I want to be cremated so that the Phorids won't eat me"*

#### **The Macabre**

"An early German report entitled '*Fauna of the Grave*' refers to small flies, many species which are 'interested more in dead men than living' and which breed in human corpses and feces in 'countless million.' More the 70% of survey respondents collected Phorids from human cadavers."

By the way, Phorid flies are a major pest of wet food processing areas in food facilities.

#### **Just the Facts**

W. Robinson states: "eggs are laid in groups of 20-40 over a 12-hour period with hatching occurring after about 24 hours. This accounts for the common observation by pest managers: 'I fogged that area last night and today we see these little black flies back again.' This fly has the habit of running on

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(Phorids...Continued from page 23)

tables, walls, and windows." One key characteristic is that the Phorid hovers unlike the housefly and fruit fly that can hover in the air almost suspended until you reach for it and it rushes away.

Some call this the Humpback Fly because of the way the back of the adult is humped over. The adults are very small 1/8" (like a fruit fly).

The larvae can be found in dark, secretive, damp and moldy places. They hide in drains and tiny places where they feed of highly nitrogenous organic matter that has begun to rot. Stale beer and fruit juices in bars are difficult places to control this tiny fly. Many Phorid larvae live as scavengers in the nests of ants, bees, wasps, and termites.

#### **Health Effects**

Phorids have been found to infest fruit that gets swallowed and digested. It has been proven that these flies have lived and mated in human intestines. Now do you need to ask of Phorid fly larvae can live in drains? This an example of the extreme tolerance of these flies at all stages to asphyxiation and to chemical action. Larvae live in preserved materials of all kinds, even specimens preserved in formalin.

#### **Control**

The only really long-term solution to controlling Phorid flies is to remove the food source. This means cracks, drains, internal hiding places and more. Prevention and monitoring are the two keys to a pest management strategy. Control tools like pyrethrin fogs are only temporary.

Many times the problem may be under a floor. For example, a garbage disposal line broke and liquid garbage soaked in to the ground under the kitchen floor. By drilling the floor with 1/4" holes every 3' in the suspected area and placing a paper cup over the holes, detection of where to start tearing the floor up was decided. In one case in Kentucky, over ten 55-gallon drums of waste were removed from under the broken garbage disposal line. Many times the solution to a Phorid fly problem si complex and costly.

#### **Conclusion**

Start with the insect first by proper identification. Controlling fruit flies is much different than controlling Phorids. Do not attempt to bluff the customer if you are unfamiliar with the pest causing the problem. Work with the customer to locate the source of the problem by conducting interviews with those close to the infestation

(housekeeping, kitchen staff, etc.) Finally, develop a control program that utilizes the appropriate control measures and solves the problem on a permanent basis.

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## **In The News.....**

### **New Zealand Launches War on Rats**

BBC News, July 25, 2001

The authorities in New Zealand have dropped more than 100 tons of poisoned bait on a remote island near the Antarctic to try to rid it of rats.

Organizers say it's the largest pest control operation of its kind ever undertaken.

The aim is to kill the estimated 200,000 rats on Campbell Island, which are thought to be harming the area's wildlife.

The island is about 700km south of New Zealand. Wildlife experts believe the rats were introduced on whaling ships in the 19th Century.

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### **Nowhere to Hide Bees Kill Horse, Injure Man in Two Separate Attacks**

ABC News.com, July 23, 2001

Swarms of killer bees struck twice over the weekend, killing a horse and seriously injuring two others in one attack in Nevada, and hospitalizing a man with hundreds of stings in an attack in Arizona.

In Pahrump, Nev., outside of Las Vegas, the bees attacked from a normally peaceful bee farm across the street from a corral, where a horrified a trainer watched as they swarmed around three horses.

"It sounded like a woman screaming at the top of her lungs," Yvonne Smith said. "It was terrible. It was something to raise the hair on the back of your neck." Smith ran across the street, grabbed a beekeeper's hat and tried to stop the attack, but the swarm was overwhelming, covering the horses like a blanket. Some of the bees attacked her, as well.

"Once the action started, well, then it was just all over the place. Anything that was moving, they were going after," beekeeper Pat O'Neill said.

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One of the two other horses that were injured in the incident was said to be clinging to life, his face still riddled with stingers.

Neighbors said they had never had any problems with the bee farm before, and the viciousness of the attack shocked the beekeeper, who found the next day that all his honey bees had been killed. He said it was likely that Africanized bees had taken over his hives.

### **Three Bees in His Ears**

In Tucson, Ariz., a 64-year-old man was stung more than 200 times over 15 minutes before rescuers were able to drive the bees off.

"I couldn't swat them off fast enough, I couldn't wash them off," William Anderson said. "They pulled three bees out of my ears. They had gone that deep into the ear that there were three of them in there."

The attack started when he was out in his garden and a bee flew into the back of his head.

"I thought, 'Boy, that was an aggressive bee.' I swatted it and knocked it on the floor," he said.

The bee was not alone, though. In an instant Anderson was engulfed in a swarm of angry insects that attacked his face, head and arms.

He was saved when police officers and a paramedic sprayed the bees with soap and water.

Tom Martin of AAA Africanized Bee Removal Specialists told the *Tucson Citizen* that tests on the insects confirmed that they were Africanized bees. Anderson was treated at St. Mary's hospital to relieve the swelling of his tongue, mouth and throat and was given pain relievers, then held for observation, according to a spokesman for the Rural/Metro District Fire Department.

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## **Florida Man Tests Positive For West Nile Virus**

PCT-Online, July 24, 2001

TALLAHASSEE, Fla. — On July 23, a Florida man tested positive for West Nile virus. It is the state's first known case of a human contracting the disease, according to an article from *The Associated Press*. Officials at the Department of Health (DOH) said they believe the patient has the virus, but federal officials must also test him. The man is in intensive care at a

Florida hospital.

"He is quite sick," said Steven Wiersma, an epidemiologist for the DOH told the *AP*. Wiersma said the Madison County, Fla. - man, whose name was not released, is more than 50 years old.

The virus has been found in birds in seven north Florida counties since it was first detected in early July. A Florida horse has also died from the disease.

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## **School Pest Management Amendment Could Be Eliminated From H.R. 1**

PCT-Online, July 19, 2001

WASHINGTON, D.C. — One month after the U.S. Senate approved the addition of the school pest management amendment to the Better Education for Students and Teachers Act (H.R.1), the House Agriculture Committee — which oversees pesticide law — vowed to eliminate it.

The amendment, called the School Environmental Protection Act of 2001 (SEPA), was sponsored by Sen. Robert Torricelli (D-N.J.) and is the result of negotiations between the National Pest Management Association (NPMA), the National Coalition Against the Misuse of Pesticides (NCAMP)/Beyond Pesticides and many other organizations. SEPA requires that schools adopt pest management programs and parent/staff notification when certain pesticides applications are used.

SEPA was included in the Senate education bill on June 19 by unanimous consent; however, there is no similar language in the House Education Bill. The final version of the education bill must be approved by a Senate-House conference committee, which is expected to meet in the next few weeks.

The Ag Committee opposed SEPA during an emergency hearing July 18 in response to complaints from some school district officials who said the bill could discourage pest control and substantially add to their paperwork, costs and legal liability.

But many states have already implemented similar pest management practices in their schools. According to an NCAMP press release, with regard to the three major programmatic components of SEPA — posting, notification and Integrated Pest Management (IPM) — Maryland, Massachusetts and Michigan already have

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statutory requirements in all three areas. Nine states (Arizona, California, Illinois, Louisiana, Maine, New Jersey, New York, Texas and Washington) require two of the three major components in SEPA. Six states (Connecticut, Georgia, Minnesota, New Mexico, Pennsylvania and West Virginia) require one component of SEPA.

"SEPA, as passed by the Senate, takes elements from the experience in over 30 states that have some program and creates a minimum standard of protection across the country," Jay Feldman, executive director, NCAMP said in a press release. "The passage of this legislation will provide all children across the country with a basic level of protection."

Of the amendment's possible elimination from the education bill, Feldman said that those who are trying to overturn the carefully negotiated amendment are making a mistake. "This legislation requires schools to adopt IPM practices that minimize risk to children, utilize safer practices and provide safety information to parents and school staff when pesticides are used in the schools," he said.

During the Ag Committee hearing July 18, Torricelli told *The Washington Post* that Senate Democrats are confident they will prevail in their fight with the House. "This is an example of people advancing the cause of a special interest beyond the interest of the special interest," he said. "This measure is the result of a compromise between educators, parents and the pesticide industry itself."

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## Increased Numbers Of Fireflies Are Illuminating Michigan Skies

Detroit Free Press, July 18,2001

DETROIT — Increased numbers of fireflies are lighting up the skies in Michigan after nearly 30 years of population decline brought on by pesticide and herbicide use and habitat destruction, said Marc Branham, an Ohio State University doctoral student who has studied fireflies, a type of beetle, for seven years.

Because fireflies are not considered a pest, they are not generally counted by entomologists, but anecdotal evidence suggests the brilliant beetle is making a comeback, according to an article from the *Detroit Free Press*.

Several area scientists have observed the lightning bug's rebound, and the evening light show is once again

being witnessed throughout Michigan.

Howard Russell, a Michigan State University entomologist credits mild winters and a high point in the fireflies' natural reproduction cycle as reasons for the abundance.

Branham says the increase is probably the result of several moist springs. Extra moisture in the soil ensures the survival of the firefly larvae's primary source of food -- soil-dwelling invertebrates such as earthworms and snails, he said.

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## YELLOW FEVER VACCINE- ASSOCIATED DEATHS REPORTED

Pro-Med, July 12, 2001

LONDON: Scientists are for the first time questioning the safety of the 60-year-old yellow fever vaccine after 6 suspicious deaths. The deaths of 3 Americans, 2 Brazilians and 1 Australian after vaccination against the mosquito-borne disease are described this week in *The Lancet* medical journal. "These are the first deaths supposedly linked to the vaccine virus," said Dr. Ray Arthur, Head of the yellow fever division at the World Health Organization. Experts are calling for an urgent investigation, but strongly recommend that people in parts of South America and Africa, as well as travelers to those areas, continue to get the shots.

The WHO estimates that yellow fever strikes 200 000 people a year, killing 30 000 of them. It occurs both in jungles and in urban areas. The vaccine, which has been given to about 400 million people, has not changed since its introduction and has been considered one of the safest available. It is likely that other deaths have occurred over the years but have gone unnoticed, Arthur said. New technologies now allow scientists to more accurately connect a fatality with the vaccine, he said. Arthur, who was not connected with the *Lancet* reports, said the WHO does not plan to change its recommendation that people get vaccinated. "I don't think we should be terribly concerned," he said, adding that "Although it is unclear what proportion of people vaccinated might get a bad reaction, complications are still very rare."

Dr. Thomas Monath, a virologist at Cambridge [U.K.] based Acambis Inc., who described the Brazilian cases in the journal, emphasized that yellow

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fever is an untreatable disease that causes 1000 times more illness and death than the feared Ebola virus. The vaccine is created using a live version of the virus. The virulence is dampened so that a shot gives people a harmless bout of the disease. When they are later exposed to the real virus, their immune systems immediately recognize it and attack. It now appears that some people can get very sick from the vaccine. Scientists suggested that some people may be genetically more susceptible to a bad reaction. Arthur said that the vaccine may need changing, but that it is impossible to tell yet.

Pedro Vasconcelos from the Center for Arbovirus Reference and Research in Brazil, reported 2 deaths, one a 5-year-old white girl, the other a 22-year-old Afro-Caribbean woman. The symptoms in both victims were typical of yellow fever -- fever, vomiting, muscle pain, jaundice and kidney failure. Vasconcelos concluded that although such complications are rare, the safety of the vaccine should be reviewed. The Australian report involved the death of a man showing symptoms similar to those seen in Brazil. In a third report, scientists from the U.S. Centers for Disease Control and Prevention described the illness of 4 elderly patients, and the death of 3 of them, shortly after vaccination. Unlike the cases in Brazil and Australia, the symptoms were not typical of yellow fever and seemed to be a new condition.

Yellow fever, so named because some patients get jaundice, is found in tropical and subtropical areas of Africa and South America. In response to a re-emergence of epidemics over the last 20 years, vaccination campaigns have increased. "Despite the severity of these reactions, overall the findings indicate that no change in practice regarding yellow fever vaccination is needed," scientists from the Pasteur Institute in Lyon, France, advised in a commentary published in The Lancet. "Nevertheless, the intriguing adverse effects reported today should rekindle research into how the yellow fever virus attacks the body, how the vaccine activates the immune system and what factors might make some people react badly to the vaccine."

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## Pest Management Products

From PCT-Online

### Bell Laboratories Inc,'s Fastrac Mouse Seed

Bell Laboratories Inc., now offers Fastrac Mouse Seed. Developed exclusively for mice, this mouse seed exhibits some of the highest acceptance with mice Bell has witnessed, the company says.

The seed formulation uses an optimum mix of seeds and grains that mice are naturally attracted to. According to Bell, the product also works best in situations where pest management professionals are not worried about translocation and nontargets. Fastrac Mouse Seed is currently registered in all states. It comes in 15-g pacs in 60 count pails.

#### For more information:

Bell Laboratories Inc.  
3699 Kinsman Blvd.  
Madison, WI 53704  
(800) 323-6628  
[www.belllabs.com](http://www.belllabs.com)

### Innovative Pest Control Products disposable bait stations

Innovative Pest Control Products has two new disposable bait stations available on the online store on the company's Web site, [www.antcafe.com](http://www.antcafe.com). Both stations are based on U.S. Patent (6,202,341) and designed specifically for ants.

Both stations hold liquid, gel or granular baits. The 30-ml bait tube holds 1 ounce of granular bait or 1/2 ounce of liquid bait. The 15-ml bait tube hold 1/2 ounce of granular bait or 1/4 ounce of liquid bait. The company's "Ant Café" and "Ant and Roach Buffet" product lines will continue to be sold exclusively through professional distributors.

#### For more information:

Innovative Pest Control Products  
P.O. Box 880216  
Boca Raton, FL 33488-0216  
(561) 483-4997  
[www.antcafe.com](http://www.antcafe.com)

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## **J.F. Oakes Sales & Marketing, LLC's NOVA-Lure Pheromone Monitoring System**

J.F. Oakes Sales & Marketing, LLC's NOVA-Lure Pheromone Monitoring System for stored product pests comes pre-baited with Pherogel™, a gel formulation that protects the sex attractant and allows consistent dispersal regardless of the temperature, the company says. Pherogel is impregnated directly into the glue of the diamond trap and releases pheromone for eight weeks.

Six pre-baited NOVA-Lure Pheromone Monitoring Systems are packaged in resealable foil bags, allowing the technician to keep the traps fresh.

For more information call J.F. Oakes Sales & Marketing, LLC at (800) 844-9296.

## **Zoëcon Professional Products' Gentrol® Aerosol and Gentrol IGR Concentrate for drain and fruit fly control**

Gentrol® Aerosol and Gentrol IGR Concentrate from Zoëcon Professional Products have been approved for the control of drain flies and fruit flies. Both products contain the active ingredient (S)-Hydroprene, an insect growth regulator (IGR), which disrupts the normal growth development of roaches and stored product pests, as well as drain flies and fruit flies.

According to Zoëcon, Gentrol Aerosol and Gentrol IGR Concentrate formulations provide excellent efficacy against drain flies and fruit flies when applied to fly breeding areas such as downspouts and catch basin areas (especially the scum buildup on the sides of drain pipes).

Gentrol can also be applied as a general surface spray, spot or crack and crevice treatment in residential homes, manufacturing facilities, day care centers, office buildings, schools, nursing homes, warehouses, transportation vehicles and in food handling establishments such as restaurants and food processing plants.

Other Gentrol products include Gentrol Point Source™. For more information about Gentrol Aerosol, Gentrol IGR Concentrate or other Zoëcon products for

professional pest control, contact your Zoëcon distributor, visit [www.zoeconsolutions.com](http://www.zoeconsolutions.com), or call (800) 248-7763.

## **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.

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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)

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**On The Web.....**

[www.udel.edu/IPM/cca/ccaindex.html](http://www.udel.edu/IPM/cca/ccaindex.html): University of Delaware's IPM Training and Information. The University of Delaware has put together an outstanding IPM training site where basic management strategies are described. Although geared toward drop protection, the presentation of IPM theory is general enough to be applied to a variety of pest management situations.

[www.state.ak.us/local/akpages/FISH\\_GAME/notebook/notehome.htm](http://www.state.ak.us/local/akpages/FISH_GAME/notebook/notehome.htm): The State of Alaska, Department of Fish and Wildlife provides a series of wildlife fact sheets for over 50 animals. Information regarding biology and behavior of these potential occasional invaders is useful in establishing a management program.

[www.pestmanagement.co.uk](http://www.pestmanagement.co.uk): This British based center provides an outstanding pest management links page as well as a variety of other useful and interesting information related to pest management.

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**Vector-borne Disease of the Month**

**Typhus Fevers**

Health Information for International Travel, 1999-2000, CDC

**Description**

Several distinct rickettsiae species cause typhus fevers in humans. Each agent produces disease with a distinct epidemiology, but all cause illness, usually with fever, headache, or rash, or a combination of these. Treatment of all forms of typhus is similar and includes administration of appropriate antibiotics (for example,

the tetracycline class) and supportive care; relapses are infrequent. Epidemic typhus is passed from person to person by the body louse. Endemic, or murine, typhus occurs worldwide and is transmitted by rat fleas. Different tickborne typhus fevers occur in Europe, Africa, the Americas, Australia, and Asia. Scrub typhus, transmitted by rodent mites, occurs in a large area from the Indian subcontinent to Australia and in much of Asia, including Japan, China, Korea, and parts of Russia.

**Occurrence**

Endemic typhus is common year round in the tropics. In temperate areas, it occurs during the summer months when rats and their fleas are most active and abundant. Outbreaks of epidemic typhus are rare except during periods when normal hygiene is disrupted, as in refugee camps arising from wars or natural disasters. It also occurs in some populations living in higher elevations during the colder months when louse-infested clothing is not laundered and person-to-person spread of lice is common. Scrub typhus can occur throughout the year, but is dependent on temperature and rainfall (which affect the prevalence of the mites that transmit the disease).

**Risk for Travelers**

Endemic typhus occurs often in people frequenting rat-infested buildings and houses in harbor or riverine areas. Foci of epidemic typhus exist in impoverished and dislocated populations in the highlands of some parts of Africa and South America, but travelers are rarely at risk of acquiring lice and disease. Scrub typhus and tick typhus occur in people who engage in occupational or recreational behaviors that bring them inadvertently in contact with mite- or tick-infested habitats that harbor the rodent hosts of these arthropods. Tick typhus infections, often called spotted fevers, occur occasionally in travelers who spend time in nature trekking or camping, or on safari.

**Preventive Measures**

**Vaccine**

Vaccination against any of the typhus fevers is not required by any country as a condition for entry. Although experimental vaccines have been developed for the typhus fevers, no commercially licensed vaccines are produced presently in the United States.

**Other**

Travelers should be advised that prevention is based

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(Vector-borne disease... Continued from page 29)

on avoidance of vector-infested habitats, use of repellents and protective clothing when exposed, prompt detection and removal of arthropods on clothing and skin, and attention to hygiene. Disease management should focus on early detection and proper treatment to prevent severe complications of these illnesses.

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## **NOW AVAILABLE**

**The Defense Supply Center Philadelphia is proud to announce our new pest management website at**

[www.dscp.dla.mil/subs/pestmgmt/index.htm](http://www.dscp.dla.mil/subs/pestmgmt/index.htm).

**Here you will find a variety of information concerning subsistence/facilities pest management including our monthly newsletter, PEST NOTES. So, when you're surfing the web, check us out.**

## **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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