

# Fumigants & Pheromones

Digital Newsletter Delivered by Insects Limited, Inc.

Issue 162

## Radar Love: Antennae, Sex Pheromones and Bug Love



Pat Kelley, BCE  
President of Insects Limited

**When I get lonely and I'm sure  
I've had enough  
She sends her comfort  
coming in from above  
We've got a line in the sky  
We've got a thing called  
Radar Love**

– "Radar Love" Lyrics by Golden Earing - 1976

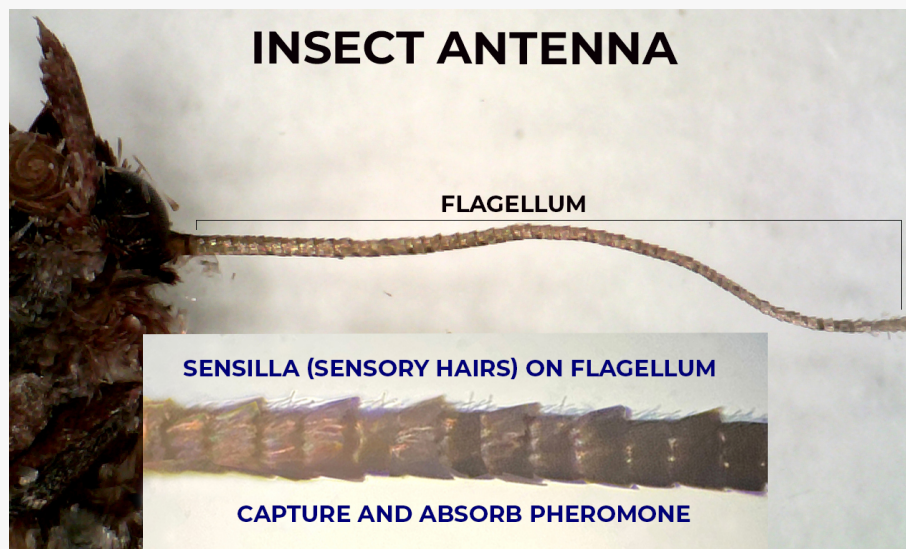
[Insects Limited](#) is all about pheromones. We synthesize insect pheromone, blend pheromones, test pheromones and provide pheromones to our customers around the globe.

Simply stated, the concept for sex pheromones is that a chemical scent is launched into the air by a female insect and that scent ultimately translates into boy bug finding girl bug.

While many people know this much about pheromones, most don't understand the process that goes into making the male behave this way.

To explain the process that goes on inside the insect's brain, we must first understand all of the mechanisms that take place in the insect's antennae.

The antenna is a quite complicated structure in and of itself (see diagram below).



An [Indian meal moth](#) (*Plodia interpunctella*) antenna and a close-up image showing some of the thousands of sensilla (sensory hairs) that detect the pheromone and cause the male to seek out the pheromone source. (Image by Patrick Kelley, Insects Limited)

## Insects Limited Product Guide

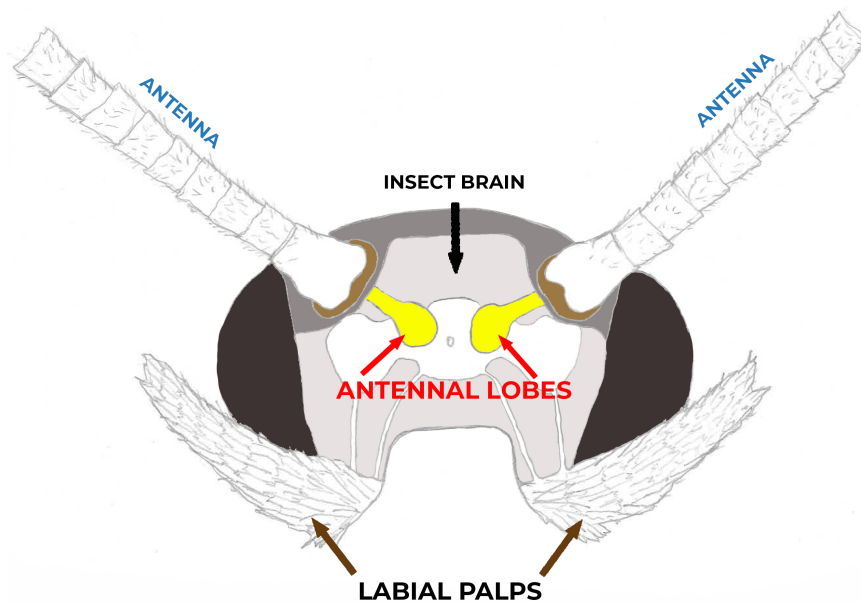
Our newest product guide is a must-see. The 20-page full-color and fully illustrated booklet can be viewed as a hard copy, online, or as a [PDF HERE](#).



Once the sex pheromone hits the antenna of an insect, the magic begins. Below is a list that breaks down the pathway that a pheromone takes through an insect's antenna and into its brain:

1. The male insect's antenna first comes in contact with the pheromone. The antenna is made up in part of a long segment called the "flagellum". The flagellum comprises much of the length of the antennae.
2. On the surface of the flagellum are thousands of olfactory sensilla (hair-like structures) that capture and absorb the pheromone through microscopic pores on the surface of each.
3. The pheromone travels through these pores in the sensilla down to nerve cells located inside the antenna.
4. When that nerve cell is stimulated by the correct pheromone from the virgin female of that specific insect species, the cell translates that chemical pheromone into an electrical pulse.
5. That electrical nerve pulse is sent directly to the insect brain in an area of the brain called the Antennal Lobe (see diagram below). The Antennal Lobe is the primary "smell" center of the bug brain.
6. The brain of the male insect reacts immediately when an electrical pulse is received through the Antennal Lobe. The very predictable result is that he is immediately called into action. That electrical signal causes him to instantaneously begin flying or crawling upwind to find a potential mate.

## MOTH HEAD



Indian meal moth brain including the antennae & Antennal Lobe.  
Image by Patrick Kelley, Insects Limited

If the origin of the scent is a female moth, the male usually will go into a mating ritual upon locating her.

He will often emit his own pheromone that calms the female and helps initiate mating.

If the source of that scent is a pheromone lure in a trap, he will follow that pheromone until he is captured in the trap.

Either way, the pheromone path is through the hairs on the male insect's antenna - it is then translated into an electrical pulse and is finally jolted into his insect brain through the Antennal Lobes.

The male's reaction to that brain jolt is to first locate his mate – then initiate a mating ritual and finally attempt to copulate. This reaction to sex pheromones is repeated as long as the male insect remains alive and healthy. Just another example of Radar Love.

Reference:

Zhang, J., Walker, W. B., & Wang, G. (2015). Pheromone reception in moths: from molecules to behaviors. *Progress in Molecular Biology and Translational Science*, 130, 109-128.

### Indian Meal Moth (*Plodia interpunctella*)

One insect is found more often than any other on stored food and grain in the United States. This is the dreaded Indian meal moth (IMM).



# Fumigants & Pheromones

Digital Newsletter Delivered by Insects Limited, Inc.

Issue 162

## New Product from Insects Limited: Moth-Resistant Garment Bag

*Insects Limited* is now offering *Moth-Resistant Garment Bags* as part of a complete clothes moth management solution. (Freezer Bags, Garment Bags, Pheromone Traps)

A customer-driven need for better garment bags that keep out clothes moths and carpet beetles initially started our research into this dilemma.

A year and a half later, after tedious design changes and field testing, gave us an end product that we are happy with.



### Moth-Resistant Garment Bags

Scientifically proven to prevent clothes moths from entering the bags and damaging your clothing



[insectslimited.com](http://insectslimited.com)

GreenWay, an Insects Limited, Inc. Brand

**GreenWay Moth-Resistant Garment Bags** offer the best amenities of standard garment bags while adding scientifically proven designs to prevent clothes moths from entering the bags and damaging your clothing. What makes this garment bag better is that once your garments have been placed inside, there are no penetrations anywhere on the bag that allow clothes moths to enter. There are no holes in the bag around the hanger or along any seams.

Entomologists and engineers have combined their knowledge of insects and materials to produce a unique zipper mechanism that becomes completely sealed when closed. A double layer of quality hook and loop fasteners on either side of the termination point of the zipper prevents moths from picking up the attractive odors of furs, feathers, and wools and creates a moth-barrier into the bag.

A clear view window on the front of the bag allows the user to keep an eye on the garments inside to make sure that no moth activity is going on.

The design has been designed and tested specifically to keep garments clean and to keep pest moths out.

## Insects Limited Product Guide

Our newest product guide is a must-see. The 20-page full-color and fully illustrated booklet can be viewed as a hard copy, online, or as a [PDF HERE](#).





**Attributes**

- Made from a soft non-woven environmental fabric to keep garments clean and dry
- Absolutely no penetrations in the sealed bag that allow moth entry
- A sealable full zipper front that prevents pest entry
- A clear view window for visual inspection of the garments inside
- A self-enclosed and efficient hangar system specifically designed to prevent moths
- Holds up to 6 or more garments depending on size
- Designed to be used in any closet setting



*"There was a void of garment bags on the market that were effective against clothes moths. Insects Limited listened to its customers and went to work.*

*Our new GreenWay Garment Bag has been specifically engineered to prevent moths from entering and they are an excellent way to protect valued articles of clothing."*

**– Pat Kelley, Insects Limited President**

[Learn more or order online today!](#)

*GreenWay is an Insects Limited brand.*




**FREEZER BAGS**



Clothes moth larvae and eggs can be killed with a long exposure to freezing temperatures. Items that you wish to freeze can be placed in our Freezer Treatment Bags.

**GARMENT BAGS**



Our garment bags were designed and tested by entomologists specifically for clothes moth prevention. These will protect and prevent further attacks from moths that may have been missed or reintroduced into the home.

**CLOTHES MOTH MANAGEMENT SOLUTIONS**





Insects Limited, Inc. is an insect pheromone company based on science, education, and innovation here to solve your pest problem.

[insectslimited.com](http://insectslimited.com)

**CLOTHES MOTH PHEROMONE TRAPS**

After freezing and storing your personal items, pheromone traps can help you monitor and evaluate the effectiveness of all your effort.

Our Clothes Moth Kit pairs the science of insect biology to the technology of a trapping system to assist you with the task of removing these pests from your environment.



**Clothes Moth Flat Trap Kit (IL-120)**

Clothes Moth kits feature the Insect Limited's signature pheromone Bullet Lures™ that attract three separate species of clothes moth with a controlled release of pheromone over 3 months.

