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Fleas and other biting arthropods and their control

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and their control

"They're driving me crazy! You've got to get rid of them and I don't care how much it costs!"

Magic words to a pest manager perhaps but sometimes the precursor to a saga of epic proportions when you can't find the culprit causing all this anxiety. When a pest manager can find fleas or bird mites, then the solution is usually straightforward and both parties are satisfied. However, when the "bities" are nowhere to be found, then that's when the tears often start…for both client and pest manager.

In this brochure we will look at some common biting pests which really exist and which can be treated relatively easily. The first pest is the flea.

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BIOLOGY

FLEAS AND DISEASE

Fleas belong to the insect order Siphonaptera which literally means, “wingless sucking tube.” They are insects with a rather infamous reputation as being responsible for the transmission of the “bubonic plague” or, “Black Death.” Fortunately for mankind, the flea species responsible, the Oriental rat flea (Xenopsylla cheopis), is quite rare these days although the disease itself can still be found in some parts of the world. In Australia, the plague struck Sydney in 1900, centred around the Rocks area and resulted in the death of about 300 people in eight months. A bounty of sixpence ($4 in today’s values) was placed on rats and, within ten months of the first human case of plague, 108,308 rats were delivered to a furnace in Bathurst St. Sydney. Who killed all these rats is not recorded and, as for who counted them, we’ll never know! There were twelve major outbreaks in Australia between 1900 and 1925 with 535 deaths resulting. Fortunately, we are free from the scourge today but it can still be found in Africa, Asia and South America.

FLEA CHARACTERISTICS

Fleas are small, wingless insects and species range in size from 1 – 10 millimetres. They are easily recognised by the majority of the world’s population, especially those who own cats or dogs!

The identifying characteristics of fleas are:

- A laterally compressed body,
- Greatly enlarged hind legs which enable them to jump long distances,
- Piercing-sucking mouthparts,
- Strong tarsal claws which enable them to grasp their hosts, and,
- Rear pointing hairs and bristles to allow for easy movement through the host’s hair or fur.

Fleas don’t have mandibulate mouthparts so they actually can’t bite anybody. So, when somebody claims that they have been “bitten” by a flea. You can contradict them and say, “No you haven’t. You’ve been ‘pierced and sucked!’” People love to be made fools of like that!

WHAT?

The main pest species we have in Australia are:

- The introduced cat flea (*Ctenocephalides felis*), said to be the most common species, and,
- The introduced dog flea (*Ctenocephalides canis*).

The human flea (Pulex irritans) is relatively rare according to researchers. It is virtually impossible for inexperienced personnel to distinguish between the various species but, it doesn’t really matter if you find dog or cat fleas because the treatments are identical.

Adult fleas mate on their animal host and the resultant non-adhesive eggs fall to the ground beneath. After a blood meal, a female flea can lay 15 – 20 eggs a day and up to 600 in a life time. The eggs hatch in about two days to two weeks into larvae which are found indoors in cracks and crevices, along skirting boards, under rug edges and in furniture or beds. Outdoors, development may take place in a number of locations including kennels, sub-floors and shaded, grassy areas. They especially like sandy gravel soils but can’t exist in dry sunny spots.

The larvae are blind and legless, shun the light and pass through three larval instars. Depending upon temperature and food availability, the larval stage lasts from a week to several months. The larvae don’t feed upon the host’s blood but rather on disgorged blood from adult fleas, dead skin, hair, feathers and assorted organic debris. They like living in carpets, it seems like a giant cat to them. Well, at least that’s what we think. The fully fed larvae construct a silken pupal case to which pet hair, carpet fibre, dust, grass cuttings and other debris adhere. The adult fleas may emerge from the pupal case after five to fourteen days or they may remain in the cocoon until they detect external stimuli such as: vibration (caused by pets or people), heat, pressure, noise or carbon dioxide. All these stimuli indicate that a potential host is nearby. This delayed emergence explains why holiday travellers may come home to a seemingly pest-free environment only to be swamped by fleas after a few hours or why potential home buyers may be attacked when inspecting a property which has not been occupied for several months.

After emerging, adult fleas cannot survive or lay eggs without a blood meal and will only survive for about a week. In just 30 days, 10 female fleas under ideal conditions can give rise to over 250,000 different life stages. A typical flea population consists of 50% eggs, 35% larvae, 10% pupae and 5% adults.

WHY?

Why are fleas considered to be pests? Well, there are quite a few reasons and, fortunately, the plague is not amongst them. Pet owners annually spend millions of dollars controlling fleas on their cats or dogs because fleas can cause severe problems including dermatitis and can transmit dog and cat tapeworm (Dipylidium caninum).

For us humans, fleas can be the cause of severe irritation of the skin and children may develop tapeworm infestations if they accidentally consume parts of infested fleas. Although bites are rarely felt, it is the resulting irritation caused by a reaction to the flea's salivary secretions that causes the problem. Some people demonstrate a severe reaction resulting in secondary infections caused by the victim scratching the affected area. Some more fortunate people show no reaction after repeated "bites." Most attacks take place on the ankles or legs and the irritation may last for minutes, hours or even days depending upon the individual. The typical reaction to the bite is the formation of a small, hard, red swollen itching spot.

The Oriental rat flea can transmit murine typhus fever among rats and from rats to humans. They can also transmit bubonic plague from rodent to rodent and from rodent to humans. In North America, the ground squirrel can act as a vector for plague.

WHERE?

Where? Anywhere there are cats and/or dogs are the places where you will most likely find fleas. However, sometimes there are no animals on site but there may be some on adjacent properties. Some people say that they are having problems with "sand fleas" or "grass fleas" but they are really cat or dog fleas as all fleas need an animal host of some type. Where there are cats or dogs, you will find fleas in the locations where the animals spend the most time. If a pet cat likes to rest on a window seat or on a lounge chair, that is where the flea eggs will accumulate and where the larval and adult fleas will proliferate. Some pest managers refer to these locations as "hot spots." Outdoors, the fleas will be found in areas of protection from the sun so you won't find them in the middle of closely mown lawn but you will find them in shaded areas of long grass e.g. between a garage and fence, or in a sub-floor where the family dog likes to curl up.

So, anywhere you have cats or dogs which are not regularly treated for fleas, you may very likely find flea activity. They are especially active during the warmer months as the optimum temperatures for their life cycle are 20 – 30 degrees Celsius and the optimum humidity is 70%.

HOW?

When a potential client calls and says, “We’ve got fleas!” This is the time to start thinking Integrated Pest Management. Of course, we do this for every job, don’t we? Without an IPM approach, our chances of client satisfaction are greatly reduced and who wants to live in a house full of fleas? There are three essential co-ordinated, simultaneous steps to a successful flea treatment:

- Pet treatment,
- Premises cleaning, and,
- Insecticide application.

First of all though, we should carry out an inspection of the property. This may seem unnecessary but the homeowner may not really have fleas after all and we need to be certain of the pest identification before we proceed. In a bad infestation, you may not need to even enter the front gate as sometimes the fleas come out to greet you! This is a rare phenomenon fortunately.

Just a quick walk through the house should reveal the presence of fleas, especially if you are wearing white socks over your shoes. Make sure that you tuck your trousers into the top of the socks to avoid flea bites. Check for “hot spots” where you can concentrate your chemical application. You must insist that the client has any animals treated before your application. A Veterinary Surgeon should be consulted for advice on the best product for the job.

A thorough vacuuming or steam cleaning of all interior floor surfaces must take place before you start spraying. Vacuuming will pick up eggs and all stages of the life cycle although larvae tend to “hold on” to carpet fibres and you may only pick up around 20% of the total. The larvae spend the vast majority of the time at the base of the carpet fibres whereas at pupation time, they move higher up the fibres. Vacuuming will also remove dried blood faeces, a major larval food source. All items must be picked up from the floor to ensure best access. Special attention must be paid to where lint and pet hair accumulate and under and in furniture where pets sleep. Make sure that the vacuum bag is thrown in the garbage bin or bag less cleaners are emptied into a garbage bag which is subsequently discarded. Any pet bedding should be thrown away, washed or dry cleaned.

Outdoors, the grass must be closely mown to enable thorough treatment. Advise the person mowing to apply insect repellent before starting. Soil areas may need to be dampened down to enable the insecticide to penetrate. Always read the insecticide label thoroughly and follow all recommendations listed before commencing your treatment.

Many of the treatment recommendations contained in the Globe publication, “The Carpet Beetle Solution Guide” are also relevant for fleas and should be consulted prior to any treatment being carried out.

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CONTROL MEASURES

INTERIOR TREATMENT

When it comes to treating the interior of a dwelling, you need to ensure that all your equipment is free of dirt as are your boots. This is to avoid soiling carpets which may be moist after your application. Wearing boot covers is a good idea. All PPE detailed on the label must be worn. A standard compressed air sprayer is quite suitable but should be fitted with an extension wand. A flat fan nozzle will provide the best spray pattern. A hollow cone nozzle, sometimes the only nozzle pest managers use, is not a good choice for carpet treatments. With respect to insecticide choice, there are many products available which can do the job very well. A worthwhile addition is an Insect Growth Regulator which can provide many extra months of control. There are only a few on the market and most are registered for flea control. Make sure that all formulations are mixed according to label requirements. You should begin your treatment at the furthest point and work towards your exit. Some old "pesties" say that they used to spray houses through the windows when the fleas were particularly bad but that is not a viable approach these days. Some pest managers make the mistake of applying the insecticide very lightly. It must penetrate to the base of the carpet fibres because we have seen that is where the larvae live. For long pile or shag carpet, the application will need to be heavier (10L per 100 square metres as opposed to 5L per 100 square metres for short pile) although still in accordance with the label. Pay particular attention to the "hot spots" previously designated. On timber floors, an insecticidal dust may be used. It is dusted over the floor and then swept or blown into areas where the flea larvae are found.

After application, the occupant should not re-enter until the floor surfaces are dry. This is usually 2 – 4 hours depending upon temperature and nature of the surfaces treated. The client must be informed that flea activity may continue for around two weeks as all the pupal cases must rupture and adult fleas emerge before they contact the insecticide deposits. They should not vacuum the carpets before 7 – 10 days elapse.

EXTERIOR TREATMENT

The basic difference between interior and exterior treatments is that a compressed air sprayer may be inadequate and a trolley sprayer or pump and drum set-up may be required. A different insecticide, a more economical formulation, is often used for exterior treatments. Dry soil may need to be moistened before application and special attention paid to "hot spots" where pets spend most of their time. The lawn needs to be closely mown as previously indicated to enable complete penetration. This sometimes poses a problem when the person mowing the lawn won't carry out the work until the fleas have all gone and the pest manager can't do his/her bit until the lawn has been seen to!

A "free service period" is a tricky decision for flea control. Some pest managers provide a three month warranty for domestic premises and one month for animal pounds, veterinary surgeons' premises and breeding or boarding kennels. Some pest managers provide no free service period. It is unwise to offer a maintenance service for fleas.

The insecticide must applied heavily so it can penetrate to the base of the carpet fibres where the larvae live.

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BIRD MITES

Another pest that greatly excites the attention of a building's occupants is the bird mite. It is virtually impossible to stay in a building when they are invading the interior. Bird mite treatments are relatively straightforward as long as you can climb a ladder and work at heights.

WHAT?

Bird mites are not insects as some of the public may think as they have eight legs and two body parts. The most common mite associated with bird nests is the "Starling mite" or "Tropical fowl mite" (*Ornithonyssus bursa*) and it is a member of the Family Macronyssidae. Sometimes other species, the Northern fowl mite (*Ornithonyssus sylviarum*) or the chicken mite (*Dermanyssus gallinae*) are the culprits. Occasionally another species, the tropical rat mite (*Ornithonyssus bacoti*) is associated with rats' or mice nests as the name suggests. It is essential to have a correct identification of the species involved if there is any doubt as to the origin of the problem.

Ornithonyssus bursa is a small mite and is barely visible to the unaided eye. It is oval in shape and has a covering of short hairs. It is an obligate parasite and feeds on the blood of a number of exotic bird species, chickens and some native species. An unfed mite is virtually transparent but is reddish-purple after a blood meal. They move quickly when they leave the host nest and may be visible in literally hundreds or even thousands as they swarm down a wall looking for a feed. They are most common during spring and early summer when the birds are in breeding mode. The life cycle is approximately seven days.

WHY?

Fortunately, bird mites do not transmit diseases and their pest status is due entirely to their practice of "test biting" on humans. As with fleas, they inject saliva to assist with their feeding and it is the saliva which causes the intense irritation. The irritation can lead to severe itching and subsequent rashes. Obviously, the most "dangerous" spots in a dwelling are those directly below the nest(s) as the mites descend directly from them after the fledglings leave home and there is no food available for them. Perhaps insultingly, our blood is not "good enough" for them to live on and the mites usually die within three weeks but other may emerge to take their place.

WHERE?

Bird mites can be found in both commercial and domestic premises where birds are nesting. Pigeons and starlings are the most common carriers, with starlings being the usual culprit in houses. The birds may be nesting in roof voids of dwellings or on ledges/awnings, under sarking or in holes in walls. The occupants of the buildings may be able to see the nests, see the parent birds flying in and out or hear the baby

birds chirping away. No matter what the clue, they all spell trouble unless the birds and nests can be safely disposed of.

HOW?

The "degree of difficulty" of treatment depends entirely upon the ease of access to the bird nests themselves. In a single storey dwelling, it is usually relatively easy to remove the offending nests, treat the roof void and seal all entry points. However, if you are working at heights, you need to consider access equipment and calculate your price accordingly. You will also need to calculate the price of any proofing equipment if you are going to do the work required to prevent a recurrence of the problem.

In simple situations such as a house, you need to find the nests first. It may be easier to work from the outside of the dwelling than from inside the roof void as the nests will almost certainly be right at the edge of the roof itself. So, wearing your PPE and having applied insect repellent, you remove all the nesting material and place it in a bag for later disposal. Hopefully there won't be any baby birds in the nests as this causes added complications when it comes to disposing of them too. Then you need to determine how to prevent the birds from re-entering the nesting sites. You may need to re-cement roof tiles, seal broken ridge capping or block holes with chicken wire. In commercial premises, you will have a much bigger job in front of you and you may require professional assistance. The staff of Globe Australia will be able to help you when it comes to quoting and carrying out these more mammoth undertakings.

Once the nests have been removed and the entry points sealed, you need to gain access to the roof void and apply an insecticidal dust to the area once again wearing the necessary PPE. You may need to move around the roof void to ensure an even application to all areas. Don't just stick your head through the manhole and let go with your power duster as the dust won't travel around corners no matter how much you apply! Where infestation is evident to the interior around access points such as wall vents, window frames, cracks in walls etc., you may need to apply a light spray of an approved insecticide. Ensure that the surfaces will not be affected by the spray by testing it on an obscure section. If you have done the job correctly, there will be no need to do a follow-up visit. The clients will certainly let you know if the bird mites haven't all gone!

OTHER BITING PESTS

For the pest manager, there are a myriad of other biting arthropods including the infamous bed bug, ticks, mosquitoes, ants, bees, wasps, scorpions, some "hairy" caterpillars, a range of biting flies and other sundry pests. There are also other problem pest such as scabies mites and head and body lice which we don't treat. You have to know what you are dealing with so you don't cross the line. The most economically important pest is the bed bug which we don't have the space to deal with here. However, the essential reading material for all pest managers is the "Bed Bug Code of Practice," which can be found on: www.bedbug.org.au. You should NEVER even consider carrying out a bed bug job until you have read this document and have equipped yourself with all the necessary equipment.

Without doubt, the most difficult pest to treat is the one which doesn't exist! When you receive a phone call from somebody who says, "Something's biting me and I can't see it but I know I'm not mad!" that's when you should start planning an immediate holiday somewhere far away! The poor person on the other end of the line may be suffering from either Delusions of Parasitosis or Illusions of Parasitosis. You can research these syndromes plus obtain information on the more standard pests on the website of "The Department of Medical Entomology of the University of Sydney and Westmead Hospital," on www.medent.usyd.edu.au

INTERESTING FLEA FACTS

- A human flea can jump about 20 centimetres high and about 150 times its own length, the equivalent of a man clearing 440 metres from a standing start,
- When it jumps, it reaches a speed of about 100 centimetres a second in less than two thousandths of a second with an acceleration of 140g,
- This speed is about twenty times the acceleration of an Apollo rocket,
- The forces on the flea's body caused by this acceleration are equal to what a man would feel if he crashed his car into a solid wall at around 330 kms/hour, and,
- Fleas appear to prefer women to men.

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