

Bed Bugs

Introduction

Bed bugs were once a common public health pest worldwide, which declined in incidence through the mid 20th century. Recently however, bed bugs have undergone a dramatic resurgence and worldwide there are reports of increasing numbers of infestations. Australia has also been included in this trend and the Department of Medical Entomology, ICPMR, has been at the forefront of documenting this phenomena and providing information on the ecology and control of this important public health pest.

Natural History

Bed bugs are wingless insects, roughly oval in shape, 4-5mm long when fully grown, and are fast runners. They are rust brown in colour and change to a deeper red brown following a blood meal. Bed bugs are dorsoventrally flattened and being thin means that they can hide in narrow cracks and crevices, making detection often very difficult.

The two main species that bite humans include the common bed bug, *Cimex lectularius*, and the tropical bed bug, *Cimex hemipterus*. The presence of the former species has been long known in Australia, whereas the tropical bed bug was only recently recognised in the country by the Medical Entomology Department, ICPMR.

There are five juvenile stages known as nymphs, which are miniature versions of the adults in appearance. Each nymphal stage requires at least one blood meal to moult to the next stage and it takes 5-10 minutes for complete engorgement to occur. The entire nymphal development takes 6-8 weeks, while the adult bed bugs can live on average for 6-12 months. All nymphal stages and adults of both sexes require blood

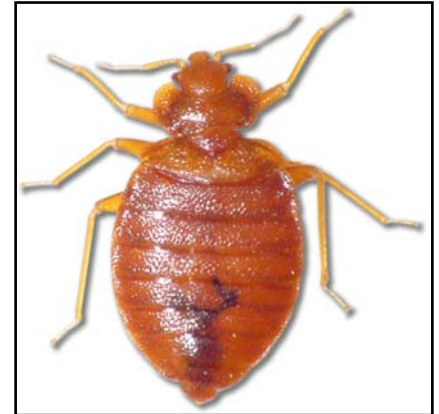
for nutrition and development. After mating, each female lays 2-3 eggs a day throughout her lifespan. The cream coloured eggs (1mm in length) are cemented on rough surfaces of hiding places, and will hatch within around 10 days at room temperature, but longer in cooler conditions.

The mouthparts of bed bugs are especially adapted for piercing skin and sucking blood. Like most blood sucking arthropods, they inject saliva during feeding, which has anticoagulant properties. Bed bugs respond to the warmth and carbon dioxide of a host and quickly locate a suitable feeding site. They tend not to live on humans and the only contact is for a blood meal. Most blood feeding occurs at night, and they generally seek shelter during the day and become inactive while digesting the blood meal. However, bed bugs are opportunistic and will bite in the day especially if starved for some time. They can survive for long periods without feeding. While their preferred host is human, they will feed on wide variety of other warm-blooded animals including rodents, rabbits, bats, and even birds.

Being a cryptic species, bed bugs shelter in a variety of dark locations, mostly close to where people sleep. These include under mattresses, floorboards, paintings and carpets, behind skirting, in various cracks and crevices of walls, within bed frames and other furniture, and behind loose wallpaper. Bed bugs tend to stay in close contact with each other and heavy infestations are accompanied by a distinctive sweet sickly smell. Blood spotting on mattresses and nearby furnishings is often a tell tale sign of an infestation.

Bed bugs are one of the great travellers of the world and are readily transported via luggage,

clothing, bedding and furniture. As such, they have a worldwide distribution.



The Common Bed Bug,
Cimex lectularius ~5mm

Clinical Presentation

Skin reactions are commonly associated with bed bugs, which result from the saliva injected during feeding. Some individuals however, do not react to their bite, whereas others note a great deal of discomfort often with loss of sleep from the persistent biting. The most commonly affected areas of the body are the arms and shoulders. Reactions to the bites may be delayed; up to 9 days before lesions appear. Common allergic reactions include the development of large wheals, often >1cm, which are accompanied by itching and inflammation. The wheals usually subside to red spots but can last for several days. Bullous eruptions have been reported in association with multiple bed bug bites and anaphylaxis may occur in patients with severe allergies. In India, iron deficiency in infants has been associated with severe infestations. It has been suggested that allergens from bed bugs may be associated with asthmatic reactions. Bed bugs have been implicated in the transmission of a wide variety of infectious agents, although their status as vectors is uncertain. It has been suggested that they might play a role in the spread of hepatitis

B, however, experimental evidence does not support this.

Note that an irritation or bite experienced in bed may not necessarily be due to a bed bug infestation.

Laboratory Diagnosis

A bed bug infestation can be diagnosed by the identification of specimens collected from the infected residence. Collection of live or dead bed bugs, cast skins, hatched or unhatched eggs will determine an infestation. There are two species of bed bug that bloodfeed on humans but *Cimex lectularius* has the most widespread international distribution; the other species, *C. hemipterus*, is usually confined to tropical regions.

Treatment and Control

If bed bugs are suspected then a licensed pest controller should be consulted. A careful inspection must be undertaken and all possible hiding places within infested and adjoining rooms examined. Once all likely sources have been identified,

then an approved insecticide, which has some residual activity, should be applied to all harbourages.

The synthetic pyrethroids are often the main chemicals used for control in Australia, however these are not very effective and can even repel the bugs. The carbamates and the organophosphates are far more effective for control, but may not be recommended for use on mattresses (check the label).

Non-chemical approaches to control involve the use of hot air and/or wrapping up infested materials in black plastic and placing the articles in the sun, thereby killing the bed bugs with the heat generated. However this should only be used for small items, if at all. Clothes can be washed in hot water and dried on the hot cycle of the clothes drier. Delicate materials can be placed into the freezer. Generally, pesticides will need to be applied in conjunction with any non-chemical means of control. Good housekeeping practices and a reduction in possible harbourages

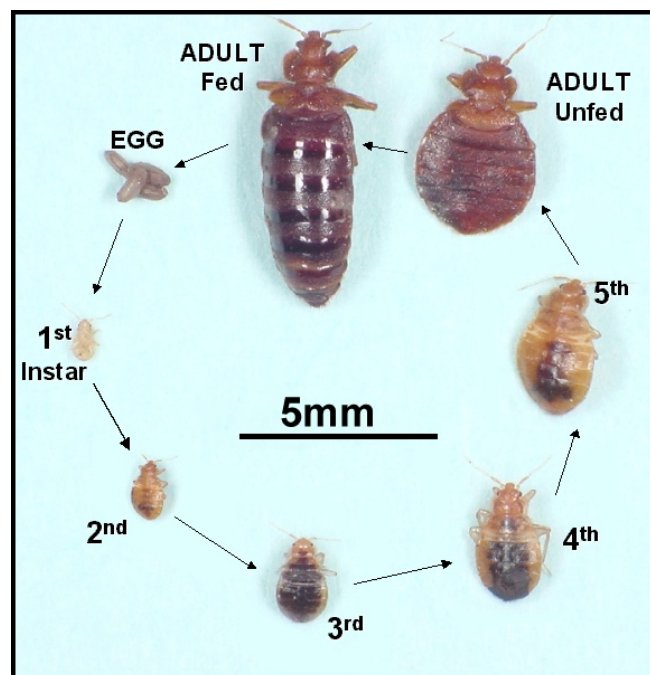
such as cracks and crevices will discourage repeat infestations. As bed bugs are cryptic in their habits, complete control is often difficult to achieve with the first treatment. This is especially so with heavy infestations and thus a post control treatment evaluation is always advisable.

Confirmation and Enquiries

Identification of bed bugs, and other medically important insects, is performed through the Medical Entomology Department at ICPMR, Westmead Hospital. The Medical Entomology Department is the only NATA accredited laboratory in Australia for the identification of arthropods of medical importance.

More Information?

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Lifecycle of the Common Bed Bug, *Cimex lectularius*