BED BUGS & CO

Information Document

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BED BUGS

CIMEX LECTULARIUS

(GERM: BETTWANZE, FRANZ: PUNAISE DE LIT, ITAL.: CIMICE DI LETTO, SPAN.: CHINCHE DE CAMA)

Bed Bugs belong to the family of Cimicidae, which have specialised as bloodsucking ectoparasites of birds, mammals, and humans. *Cimex lectularius*, the common bed bug is almost exclusively bound to people. If they are not available, the Bed Bugs will suck blood from pets, poultry, oscine birds, and bats. *Cimex lectularius* is a worldwide-distributed species and is mainly found in the northern temperate climate zones of North America, Europe, and Central Asia. In the tropical regions of South America, Asia and Africa the common bed bug is replaced by the tropical Bed Bug *Cimex hemipterus*.

This species has higher temperature and humidity requirements. Confusion with related bed bug species, which suck blood from birds or bats, can occasionally occur (see Figure 4.).

Figure 1 - Female and Male Bed Bug (Cimex lectularius)

DISTRIBUTION

Bed Bugs reach their new destination as stowaways in travelling baggage, with used furniture, rugs, and mattresses, with pictures and other objects of value. Once they have arrived there, they spread actively by walking. The preferred living zone of Bed Bugs is within the sleeping area of its host, usually in the sleeping room. Here during the day they hide in cracks and crevices and only come out of their hiding place to suck blood during the night. Preferred hiding places are in folds of mattresses, in cracks and crevices of bed frames and bedding boxes, behind the headpiece, sideboard, picture frames, and blinds, behind loose wallpaper and baseboards, in electric cable shafts and light switches, in faulty joints of door and window frames. The surroundings of the hiding places and the paths of the bed bugs can be easily detected through the dark excrement spots (see *Figure 2*.). Since the 1990ies, the Bed Bugs are expanding worldwide.

NUTRITION

The nymphs and the adult Bed Bugs sting and ingest blood in the dark. The adult bed bugs ingest blood every 3 to 7 days at room temperature, with higher temperatures and available hosts more often. During their development, the nymphs have to suck blood before each moult. In the resting position, the proboscis is folded under head and thorax. The Bed Bug searches for a convenient site to sting with the point of its proboscis on the free parts of the skin like the face, the neck, the chest, the arms or the lower legs.

The stiletto shaped proboscis forms a double tube to penetrate the skin, while the lower lip (labium) stays outside. On the one hand, coagulation-inhibiting saliva is injected through one side of the double tube; on the other hand, the blood is sucked up through the other side. The ingestion takes 3 - 20 minutes, whereby they can sting a couple of times on the search of blood capillaries. The resulting lentil to cent big wheals usually are not arranged in a line, as it is the case with fleabites. The bite is not painful and is usually not noticed. Skin reactions, which are caused by the saliva of the bed bugs, begin earliest, when the bed bug has left its host. The reactions can persist for many days.

Figure 2 - Bed frames are favoured hiding places

HARM

The bite reaction shows a clear dependency on the grade of sensitisation of the bitten person. With sensitive or allergic people, the bed bug infestation can lead to large-scale skin inflammation, to disturbance of the general condition like anaphylaxis or asthma. The itch is intensive; scratching effects can therefore often be seen (see *Figure 3*).

At the momentary state of knowledge bed bugs probably only play an inferior role in the transmission of pathogens. The pathogen of the Qfever can multiply in the intestine of the bed bug. In addition, the hepatitis-B-virus could be isolated from South African bed bugs. Bed bugs have to be seen as potential transmitters of these pathogens.

Figure 3

The nuisance of a disgusting, sweet bug smell in the room accompanies a strong infestation. The smelling substance is secreted from the scent gland, which with adults is located ventral in the chest area and with larvae dorsal on the abdomen. Furthermore, they leave traces of faeces in the form of dark spots on bedclothes, their paths and in front of their hiding places.

APPEARANCE

All bugs go through an incomplete (hemimetabol) development. The juvenile forms therefore already almost look like the adults.

EGG

The eggs are 1.3 mm to 2.5 mm x 0.5 mm in size and are glued to walls, behind wallpaper and in cracks.

NYMPHAE

The nymphal stages are similar to the adults. (See *Figure 5.*).

The five larval stages have the following size (unfed): I, 1.3 mm; II, 2.0 mm; III, 3.0 mm; IV,

3.7 mm; V, 5 mm. The rudimentary wings, the wing appendage, are only developed with the adults.

ADULTS

They have an almost oval form and have the following size (unfed): males 4.0 – 6.5 mm x 2.2 – 3.2 mm; females 4.5 – 8.5 mm x 2.7 – 3.7 mm. completely fed they can reach a length of 9 mm. Hereby the segments of the abdomen are stretched like a telescope. They are very flat, reddish-brown, and pubescent. After sucking blood, they are coloured dark red and are strongly thickened. The head is located within the sideward advanced prothorax (first chest ring). The back plate is called pronotum and the front edge is strongly curved.

The pronotum of the tropical bed bug is not curved as strongly and appears longer and more rectangular (compare *Figure 4 A and B*).

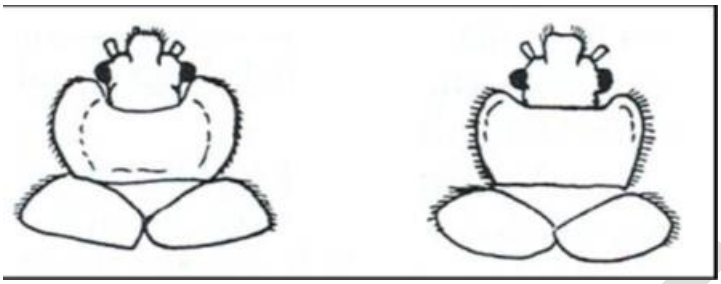

Figure 4 - Head and pronotum of A Common Bed Bug, Cimex lectularius and D Tropical Bed Bug, Cimex hemipterus

The head has two protruding complex eyes and an antenna with four segments, where the third and fourth antenna segments are clearly thinner than the first and second. The second antenna segment is shorter than the third. The latter is one and a half times longer than the fourth. While resting the straight proboscis ventrally lies against the head and prothorax (1. Thorax ring). The mesothorax (2. thorax ring) has small wing rudiments, while the metathorax (3. Thorax ring) has neither wings nor wing rudiments.

The males are slightly slimmer than the females and have a small, dagger-like copulation **APPARATUS** at the end of the abdomen.

DEVELOPMENT

The females lay their eggs in cracks and crevices near their host. They attach their eggs to the base with a watery secretion. With two blood feedings a week, the amount of eggs per female can increase to 350. The amount of eggs that the bed bug produces depends on the amount of blood uptake before the egg laying. The egg stage lasts 5.5 days at 28 °C and up to 48 days at 15 °C. To hatch out, the pale coloured nymph opens a dome-like lid at the upper side of the egg. The nymphs look similar to the adults; differ in body size and the minor thickness of the chitin carapace, which transparently shows the digestion stage of the blood meal inside. The length of the complete development cycle at different temperatures is shown in the following table:

Temperature (°C)	Development time of the eggs (days)	Total time of development (weeks)
13	49	incomplete
15	34	34
18	21	18
22	12	8
25	-	5.7
27	5-6	4.5
30	4.4	-
33	4.1	-

Below 13°C, the development of Bed Bugs is interrupted and at temperatures lower than 9°C, they cease feeding. The length of life of adult Bed Bugs is also temperature dependent. It is 9 – 18 months at 18 – 20°C and 10 weeks at 34°C.

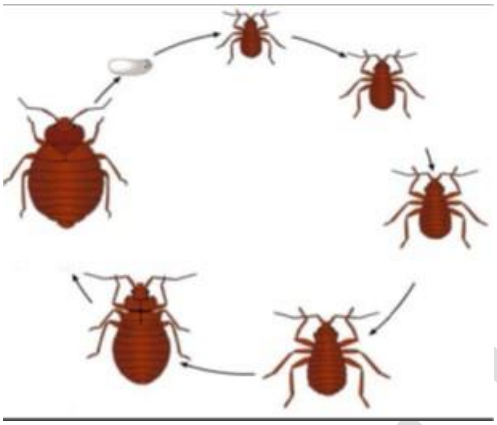

Figure 5 - Development cycle of the Bed Bug (Cimex lectularius)

Figure 6 - Diatomaceous Earth to kill Bed Bugs a Natural Insecticide!

BIOLOGY AND BEHAVIOUR

Blood sucking insects are mainly attracted through warm bodies, which release CO_2 and certain attractants. The blood uptake is considerate and can amount to six times of its body weight. The high percentage of water of the up taken blood is excreted as fast as possible, mostly already during the blood- sucking. In doing so, first the remains of the old blood meal are excreted from the anus in intervals of 1 to 2 minutes, afterwards clear drops. When they are hungry, Bed Bugs can migrate over big distances.

ECOLOGY

Bed Bugs are active in the night and are at rest in their hiding place during the day. They avoid wet and cold places. Adult Bed Bugs can readily tolerate cold temperatures over a longer period, however not moisture and heat. Bed Bugs tolerate hunger up to a year at low temperatures. The lethal temperature is around 43°C for a couple of minutes.

BED BUG CONTROL

In the beginning, there are prophylactic measures to prevent an infestation. The spread of Bed Bugs occurs either actively from infested objects or passively through introduction with second-hand objects or in the luggage.

As the Bed Bug infestation can also be caused by birds in the surroundings of the infested object, existing poultry pens, pigeonries and bird nests have to be included in the treatment where required.

If people are bitten while travelling, we advise them to accurately check their luggage. If the result is positive, the luggage has to be treated (wash at 60°C, tumble at 45°C for ½ h or freeze overnight) before bringing it into the apartment.

When taking up used furniture, mattresses or other objects into your home, they should be checked thoroughly for Bed Bugs or rather always be treated.

For an effective control, all hiding places of the Bed Bug have to be found. This search has to include false ceilings, attics, and adjoining rooms.

Therefore, it is exclusively the job of a Professional with the right tools.

NOTES:

Others