DO BED BUGS CARRY HUMAN DISEASES? — A Controversy

Although plaintiffs' attorneys may contest that bed bugs transmit disease, science may not agree. By Jerome Goddard

The common bed bug, *Cimex lectularius*, is a blood-sucking parasite that has been an associate of humans for thousands of years. The word *Cimex* is derived from the Roman designation for bug and *lectularius* from the Latin name for couch or bed. Bed bugs are common in eastern European and Third World countries, especially in areas of extreme poverty. They had nearly disappeared in developing countries until recently, where, in the last five to 10 years, they have been making a rapid comeback in hotel rooms, dormitories and other public places where people sleep.

Bed bugs occur in temperate regions worldwide. There is another bed bug species, *C. hemipterous*, which is also widespread but mostly found in the tropics. Several other bed bug species occur on bats, but they don't bite people. Adult bugs are about 5 mm long, oval shaped and flattened. They somewhat resemble unfed ticks or small cockroaches. Adults are reddish-brown (chestnut) in color; immatures resemble adults but may be yellowish-white. Bed bugs have a pyramid-shaped head with prominent compound eyes, slender antennae and a long blood-sucking proboscis tucked backward underneath the head and thorax. The prothorax (dorsal side, first thoracic segment) bears rounded, winglike lateral horns on each side.

Bed bugs emit an odor and heavily infested homes may develop a distinct odor. The bugs feed at night, hiding in crevices during the day. Hiding places include seams in mattresses, crevices in box springs and spaces under baseboards or loose wallpaper. Bed bugs go through five nymphal stages before they become adults. Once an adult, the life span is six to 12 months. Each nymphal stage must take a blood meal in order to complete development and molt to the next stage. The bugs take about five to 10 minutes to obtain a full blood meal. Bed bugs can survive long periods of time without feeding and when their preferred human hosts are absent they may take a blood meal from any warm-blooded animal.

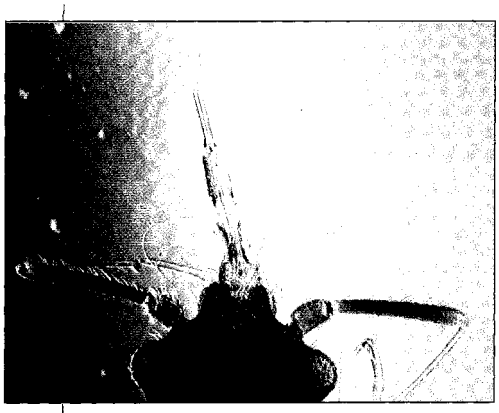
Bed bugs have piercing-sucking mouthparts typical of the insect order *Hemiptera*. Bites from the bugs may produce welts and local inflammation due to allergic reactions to saliva injected via mouthparts during feeding. For many people the bite is nearly undetectable. Bed bug bites are generally self-limiting and require little specific treatment other than antiseptic or antibiotic creams or lotions to prevent infection.

TRANSMISSION OF DISEASE? Transmission of human disease agents by bed bugs is controversial. Since the insects repeatedly suck blood from humans and live a relatively long time, conceivably they might ingest a disease organism and later transmit it. A scientist named George Burton in the 1960s reported that bed bugs have been suspected in the transmission of 41 human diseases, however, finding a blood-sucking insect infected with a pathogen doesn't mean it is a competent vector of that agent or even a vector at all. There are many factors involved in whether or not an insect can transmit disease agents.

Some experiments have been conducted to address possible HIV transmission by bed bugs. One study found that HIV could be detected in bed bugs up to eight days after exposure to a highly concentrated virus in blood meals, but no virus

replication was observed, nor was any virus detected in bed bug feces. Also, by using an artificial system of feeding bed bugs through membranes, the authors could not demonstrate mechanical transmission of HIV.

Perhaps the best candidate for transmission by bed bugs is hepatitis B virus (HBV). Groups of bed bugs collected from huts in northern Transvaal, South Africa — an area with high human HBV seropositivity — have tested positive for hepatitis surface antigen (HBsAG). Surface antigen is a protein unique to that organism and is used as a marker to identify the organism's presence.



Bed bug mouthparts

In addition, HBsAG has been shown to persist in bed bugs for at least 7½ weeks after experimental feeding However, that same study found no biological multiplication of hepatitis B virus in bed bugs. Another study suggested that bed bug feces might be considered a source of mechanical transmission of hepatitis B infection under some circumstances. However, finding surface antigen (the marker for HBV) in feces is no indication of viable virus. Whether or not HBV infectivity survives the bed bug digestive process is unknown. A transmission experiment with chimpanzees (South African Medical Journal, 1991: 79:320-322) helped resolve this issue, although the sample size was small.

In that study, bed bugs were fed HBV-infected blood through a membrane. Ten to 13 days later, the bugs were sub-sampled, assayed for infectivity and found to be infected (53 to 83 percent of the sample was positive). Then, about 200 of the infected bugs were fed on the three susceptible chimpanzees. No infections or seroconversions resulted. To confirm infectivity of their original blood inoculum, the researchers then injected the same three animals with a portion of blood used to infect the bed bugs. HBV infections quickly followed in all three chimpanzees.

CONCLUSION. Whether or not bed bugs transmit human disease agents remains a point of contention. Attorneys representing plaintiffs bitten by the bugs in hotel rooms often firmly state that the risk is real and that their clients must be compensated. However, until evidence proves otherwise, I think current data can be best summarized like this: Even though bed bugs have been found naturally infected with many disease agents, they have never been proven to transmit even one.

Photos are courtesy of the author.

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