

What's Eating You? Bedbugs

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The order hemiptera contains insects whose wings are half membranous and half sclerotic. Two families within the order, Cimicidae (“bedbugs” and their relatives) and Reduviidae (reduviid bugs), include blood-sucking species of medical importance. All Cimicidae are blood-sucking ectoparasites of mammals or birds. They have flat, oval bodies and retroverted labium (mouthparts), with three segments, that reaches back as far as coxa (base) of the first pair of legs

(Figure 1). The forewings have been reduced to hemelytral (shoulder) pads. The hindwings are absent. The specimens pictured are from a laboratory colony fed by Scott Stockwell, PhD (aka dinner, Figure 2).

The genus *Cimex* parasitizes both mammals and birds *Cimex lectularius* and *Cimex hemipterus* (found in warmer climates) affect humans most commonly. *C. lectularius* also parasitizes bats, chickens, and other domestic animals. *C. lectularius* ranges in size from 5 to 7 mm. Females are slightly longer than males. *C. hemipterus* is roughly 25% longer than *C. lectularius*. Interspecies mating occurs in nature.¹ The offspring differ from either species, often having the narrow pronotum and abdomen of *C. hemipterus*, but the abdominal bristle pattern of *C. lectularius*.²

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FIGURE 1. Bedbug.

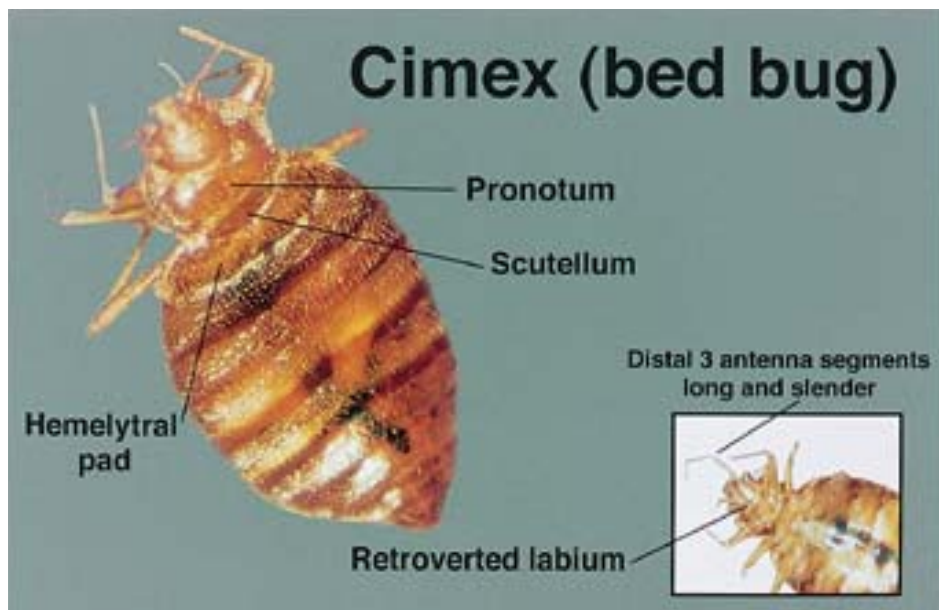




FIGURE 2. Bedbugs feeding.

All *Cimex* are red-brown in color. They have a small semicircular to triangular scutellum (dorsal sclerotic plate) behind the pronotum. The antennae have four segments, and the distal three antennal segments are long and slender. They have widely separated compound eyes. On the distal extremities, the tarsus is composed of three segments with claws. The abdomen has eleven segments. When engorged, the intersegmental membranes are exposed. The female has a ventral notch or paragenital sinus on the posterior margin of the right side of the fifth segment. The male has a paramere only on one side of posterior abdomen.

The female deposits eggs on rough surfaces of cracks and crevices. The eggs are white in color, 1 mm in length, and half as wide. They are already fertilized and partially developed when laid. They hatch in 4 to 5 days.

Bedbugs are nocturnal, demonstrating peak activity just before dawn. They avoid light, hiding in cracks and crevices or behind peeling paint. They respond to warmth and carbon dioxide (*ie*, they are attracted to warm, sleeping, breathing bodies). When feeding, the insect grasps the skin with its forelegs, pierces skin, and injects saliva

containing an anticoagulant. Bites are often noted in linear groups of three (sometimes referred to as “breakfast, lunch, and dinner”). Bites present as erythematous papules. Exaggerated local responses may be seen in individuals with a high degree of immunity.

Bedbugs have been implicated as a probable vector for hepatitis B.³⁻⁵ They have also been implicated as vectors of American trypanosomiasis (Chagas’ disease).⁶ In contrast to body lice and fleas, bedbugs digest blood very slowly. The blood in the bug’s gut remains relatively unclotted and not membrane bound. This may affect the arthropod’s competence as a disease vector.⁷ Fortunately, it appears unlikely that bedbugs present a significant risk for transmission of HIV.^{8,9} Although the virus can survive for several hours in bedbugs, actual transmission of the virus is unlikely. In countries where bedbug infestation is common, bedbug dung may play a role in asthma.¹⁰

Elimination of cracks and crevices as well as the use of insecticides will decrease the bedbug infestation of houses. Various insecticides have activities against bedbugs, dichlorvos being among the best. Insecticides vary in their residual activity on surfaces such

as wood, cloth, and metal. The insecticide used must take into account the surface being treated. Permethrin, which can be used to impregnate clothing and mosquito netting, has intermediate activity against bedbugs.¹¹ Permethrin-impregnated bednets have proved effective in actual use.¹² On mud daub walls, the residual effect of some insecticides depends on the organic content of the mud.¹³ Microencapsulation of insecticides enhances persistence.¹⁴

Several insect repellents show efficacy against bedbugs, DEET (diethyltoluamide) being among the best. Those bedbugs that still bite take progressively smaller meals in the face of increasing concentrations of repellent.¹⁵ Paradoxically, the smaller meals may increase the chances of bedbugs' spreading disease, as they remain hungry and transmission appears more likely in the face of interrupted meals.¹⁶

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