



# How to Identify a Bed Bug Infestation

*Dini M. Miller, Ph.D., Department of Entomology, Virginia Tech*

## Introduction

You cannot just “get” bed bugs. They have to be brought into your home. So what is your first clue that you have brought bed bugs home in your luggage after a trip, or on a piece of used furniture that you bought at a garage sale? Most people become suspicious of a bed bug infestation when they find unexplained bites on their bodies. Most commonly a person will go to bed feeling fine but wake up in the morning with itching bites. While bites might suggest bed bugs, they are not a good method for diagnosing a bed bug infestation. This is because bite reactions are so variable from person to person. For instance, a person who has been bitten while traveling may not react for several days, and only notice the bites after they have returned home. These bites do not mean the home is infested. Alternatively, a person may not react to bed bug bites at all. This can allow an infestation to get started in their home and remain unnoticed until the bed bug population increases so much that bed bugs start to be seen. Because bites are an unreliable indicator of an infestation (they may not be bed bug bites at all), it is very important to be familiar with the other signs that bed bugs leave behind to detect a real infestation (particularly a small one). By looking for specific bed bug evidence, the infestation can be identified early before the population becomes difficult to control.



## Bed Bug Identification



It is very important to know what bed bugs look like. The adults can easily be seen with the naked eye. Adult bed bugs are reddish brown in color, wingless, and are about the size of an apple seed. Immature bed bugs (there are 5 immature or nymphal instar stages) can also be seen with the naked eye but they are smaller than adults, and translucent whitish-yellow in color. The most difficult life stage to see is the first instar nymph. This is the youngest life stage that hatches out of the egg. These nymphs are so small that they are difficult to see unless they are moving or have recently fed (bright red when full of blood). Bed bug eggs are also tiny, about the size of the head of a pin. The eggs are a pearl-white color and have obvious eyespots if they are older than 5 days.



Bed bugs can look somewhat different depending on their feeding status. If an adult bed bug has not fed recently, it is approximately  $\frac{3}{16}$ " long and oval in shape. In fact, an unfed bed bug can look like a flat disc. However, once it takes a blood meal the body blows up like a balloon. The bed bug elongates so that it looks more like a torpedo than a disc. The color also will be a bright red if the bed bug has fed within the last couple of hours. The bed bug will darken and flatten again over the next couple of days as it digests the blood meal.

Bed bug nymphs also change in their appearance after a blood meal. A hungry bed bug nymph is almost completely pale white or yellowish. However, once it is fed it plumps up, becomes brilliant red, and looks like a plump raspberry seed. Nymphs are the easiest to see when they have recently eaten.

## Identifying Molted Skins

Immature bed bugs have to take a blood meal in order to grow, and molt to the next life stage. The molting process is where the bed bug has to shed its "skin." Because all insects (like the bed bug) have their skeleton on the outside of their body (exoskeleton), they have to shed it in order to grow larger in size. Because each bed bug has five immature stages before it becomes an adult, it will have to molt (shed) five times. After adulthood, the bed bug no longer grows or sheds its skin. In a large infestation there will be many thousands of these molted skins lying around where they bed bugs have left them behind. In a new infestation, say in a hotel room, bed bug evidence may be very hard to find. Yet, because the largest percentage of any bed bug population is always in an immature stage, there is always potential to find these cast skins.

The molted skins of the bed bug look very similar to the bed bug itself. They are the same shape and generally translucent in color. However, you will notice that they look like an empty bed bug shell. They will be different sizes depending on the life stage of the bed bug that molted. In small infestations, molted skins can be found almost anywhere. In large infestations, most are found in areas where bed bugs aggregate together in groups.

## Where to look for molted bed bug skins:

- Along mattress seams
- Behind head boards
- In ceiling/wall junctions
- Along baseboards
- Stuck to personal belongings



## Identifying Fecal Spots

Bed bugs feed every 5-7 days if a host is present. On the days they are not feeding, they spend their time digesting their previous meal. Blood contains a lot of water so the bed bugs must condense their meal right away and excrete some of the excess liquid as waste. This digested blood is then deposited wherever the bed bugs happen to go

after feeding. The excreted waste comes out in a semi-liquid form and can be easily seen on the surfaces of mattresses, bed frames and other locations where the bed bugs travel or aggregate. These fecal spots are black in color (not red because the blood has already been digested) and are often seen in groups of 10 or more. However, if the infestation is low, and the bed bug was just passing through the area, there may be only one or two spots in a particular location. Fecal spots can be found anywhere in a large infestation, but when the infestation is small, there are some places where fecal spots are more likely to be found. See below.

## Where to look for Fecal Spots:

- Along the mattress seams and on the tag
- On the wood frame of the box springs
- Behind the head board
- Along the tops of baseboards or the edge of carpeting
- Ceiling/wall junctions and behind pictures on the wall
- At electrical outlets
- In curtain seams where they gather at the rod



Notice that the bed bug fecal spotting can look similar to German cockroach feces that you might find in an apartment with a heavy cockroach infestation. One way to tell these two types of fecal spots apart is to first look for additional bed bug evidence in the area. Do you see shed skins or hatched eggs? If not, touch the fecal spots (yes, touch them). Bed bug fecal spots have a smooth feel because they consist of a dried liquid food (blood). German cockroach feces tend to feel very granular because they contain solid wastes.



## Identifying Bed Bug Aggregations

Looking for bed bug aggregations is similar to looking for fecal spots in that bed bugs often leave numerous fecal spots where they aggregate together after feeding. However, these aggregations also contain a variety of other bed bug evidence:

- Live bed bugs (multiple life stages)
- Fecal spots
- Cast skins (from nymphs that have molted)
- Live and hatched eggs

Although the photograph above makes a bed bug aggregation look obvious, these aggregations are not so easily identified if you do not look closely. For example, take a look at the photograph taken of an apartment ceiling on the next page. At first glance, this looks like mold or mildew

problem, indicative of a moisture issue coming from the apartment upstairs. However, if you look more closely you can see that the “mold” is actually numerous aggregations of bed bugs on the ceiling. The black material is the fecal spotting described previously.

## Where to look for bed bug aggregations:

- Along mattress seams, in the tufts and under the mattress tags
- Behind the headboard
- Inside the holes for set-in screws
- Along wood creases in the box springs or in bed frames
- Where the box springs fabric is stapled to the wood frame
- Behind loose wallpaper
- Behind chipped paint
- Under the base of the air conditioner
- Beneath the wood framing that holds the bar in the closet
- Along the interior frame of closet doors
- Behind baseboards
- Inside the baseboard heaters
- Inside curtain rods, and on the curtains near the top where they are pleated
- In personal belongings, including books, stuffed animals, picture frames and hundreds of other locations



## Summary

The first clue suggesting that you may have a bed bug infestation is often the presence of itching bites. However, bites reactions are quite variable and may not be due to bed bugs at all. Be aware of the other signs that bed bugs leave behind: fecal spots, molted skins, and aggregations.