BED BUG SUPPLEMENT

Fig. 1: Bat bugs (below) have longer, more noticeable hairs than bed bugs (right). Note especially the difference in hair length along margins of the body.

HOLY COW... Bat Bugs *and* Bird Bugs!

Bed bugs, bat bugs and bird bugs are strikingly similar in appearance. Distinguishing them and knowing their habits is now an industry imperative.

By Michael F. Potter, Kenneth F. Haynes, Jennifer Gordon, Erich Hardebeck, and Eric Arnold

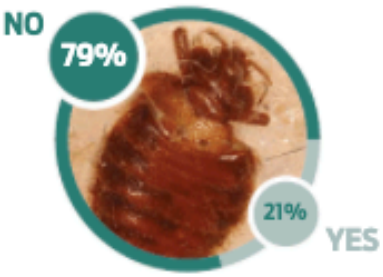
Bed bugs are "top of mind" these days for most pest management professionals. Consumers have also become "edgy" — to the point where *any* questionable-looking bug spotted in a bedroom, hotel room, etc., could potentially be a bed bug. With such unease, it's understandable why similar looking pests might be a source of confusion. Such is the case with bat bugs and bird bugs, the topic of this article.

In a recent survey of pest management firms conducted by Insight Express for PCT magazine, about one in five respondents (21 percent) said they noticed an increase in bat bugs in recent years, while 11 percent said the same about bird bugs. Of those reporting an increase, 59 percent felt it was due to more bat and bird infestations within buildings; 41 percent attributed the increase to heightened awareness of pests believed to be bed bugs.

Whatever the reason, at times it will be necessary to distinguish between these pests and develop an appropriate course of action.

ALL IN THE FAMILY. Bed bugs, bat bugs and bird bugs have many similarities. All are classified in the insect family *Cimicidae*, comprised of about 100 species, 16 occurring in North America. Cimicids are small, flattened, flightless parasites that feed solely on the blood of birds and mammals. Most species live within bat roosts or bird nests; only a few have adapted to

Has your company noticed an increase in bat bugs in recent years?



Has your company noticed an increase in bird bugs in recent years?

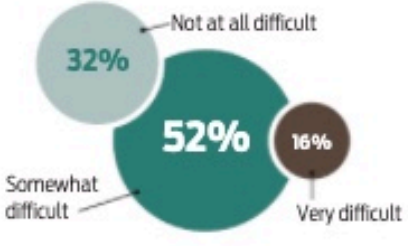
Source: PCT/Insight Express survey January 2013

the blood and beds of humans. Bed bugs probably evolved from a bat bug long ago when both forms fed on bats. Eventually the bugs started biting humans inhabiting the same caves. Tellingly, bed bugs still reside in bat roosts within buildings in central Europe. Recent genetic studies have shown, however, that bats were not a reservoir for the current bed bug resurgence.

All species of cimicids have similar life stages (eggs, nymphs, adults) and mate via traumatic insemination — an unusual form of mating where males pierce the female's abdominal wall and inject sperm into the body instead of through the genital tract. Many cimicids have a primary host, but will feed on other warm-blooded animals if the need and opportunity arises. The common bed bug, *Cimex lectularius*, mostly feeds on humans but can also persist on bats, birds and rodents. Bed bugs also will bite dogs and cats provided they can penetrate the fur. Unlike many species of fleas, lice, and mites, cimicids normally reside off their hosts, climbing aboard briefly only to feed. Soon after engorgement, they scurry away to hidden locations to digest, molt, mate, and lay eggs. Cimicids ingest large volumes of blood (often triple their body weight) in a short period of time. Along with other adaptations, this helps them withstand intermittent feeding opportunities.

RECOGNITION. Distinguishing between bed bugs, bat bugs and bird bugs is important because their hosts and habits are different. Cimicids look much the same — identifying specimens to species can be difficult at times even for entomologists. In our recent survey of pest control companies, more than two-thirds of respondent felt that it was "very difficult" (16%) or "somewhat difficult" (52%) for their employees to distinguish between bed bugs, bat bugs and bird bugs.

How difficult is it for your employees to correctly distinguish bat bugs and bird bugs from bed bugs?



Source: PCT/Insight Express survey January 2013

Fig. 2. Bat bugs affixed to the wings of a young bat. The juvenile fell from the roost moments before the picture was taken.

With a few tips and tools this can be overcome. Magnification is needed to see features delineating one group from another. A microscope is optimal, but with a bit practice a 10-15x hand lens is sufficient for use in the field. High-quality, durable hand lenses cost about $15, but satisfactory ones can be had for as little as $1.50. A good source of affordable hand lenses and microscopes is *BioQuip (www.bioquip.com)*, a California-based supplier of entomological books, supplies and equipment.

Illustrations and diagnostic keys (such as those in the *Mallis Handbook of Pest Control*) are helpful, but nothing beats having actual specimens for comparison. When bat bugs or bird bugs are encountered, retain some in a vial for future reference. The location within a building where cimicids are found also provides clues to their identity. *Bat bugs and bird bugs seldom congregate on beds, couches, and recliners in the manner of bed bugs.* Rather, specimens tend to be found here and there, especially in upper rooms near attics, etc., where the bugs' preferred animal hosts are located.

BAT BUGS. Bat bugs are common parasites of bats worldwide. Apart from bed bugs, they're the most oft-encountered cimicids in buildings. Seven species of bat bugs occur in the United States. The predominant one in the eastern half of the country (eastward from Colorado) is *Cimex adjunctus*, the eastern bat bug. The western bat bug, *Cimex pilosellus*, is most prevalent from British Columbia south to California and Arizona and as far east as Nebraska. These and other bat bug species are distinguishable from bed bugs by *the presence of longer hairs or bristles along margins of the body* (Fig. 1). Hairs on the pronotum (the shield-like structure behind the head) of bed bugs are shorter than the width of each eye, whereas on bat bugs the hairs tend to be equal or longer than eye width. Another more subtle difference is that the femurs on the hind legs of bat bugs are somewhat wider than those of bed bugs. Unlike fleas and lice, cimicids have no obvious adaptations for clinging to their wild hosts during flight. It's been postulated that the somewhat stouter hind legs of bat bugs help them cling to the membranous wings of bats during sudden sorties through the night sky. Being transported about by humans (on bedrolls, backpacks, etc.) presumably requires less leg strength and could explain why the legs of bed bugs are somewhat longer and more slender.

Bat bugs are occasionally seen clinging to the skin of bats. We observed this last summer in an outbuilding when a juvenile bat fell from the roost. The bugs were affixed to the wings and required considerable effort to dislodge, not unlike a tick (Fig. 2). We've also noticed that bed bugs and bat bugs respond differently to stimulation. When bed bugs are probed or otherwise disturbed, they move rapidly and erratically, clinging to surfaces. Conversely, the slightest disturbance of bat bugs causes them to drop instantly from the substrate, become immobile and retract their legs as if dead. We specu-

Fig. 3: Bat bugs aggregate much the same as bed bugs. These were found in a bat-infested tool barn.

late this behavior may be an adaptation to avoid predation or lethal grooming by insectivorous bats. The reflexive behavior might also help to avoid sudden rides aboard bats at night.

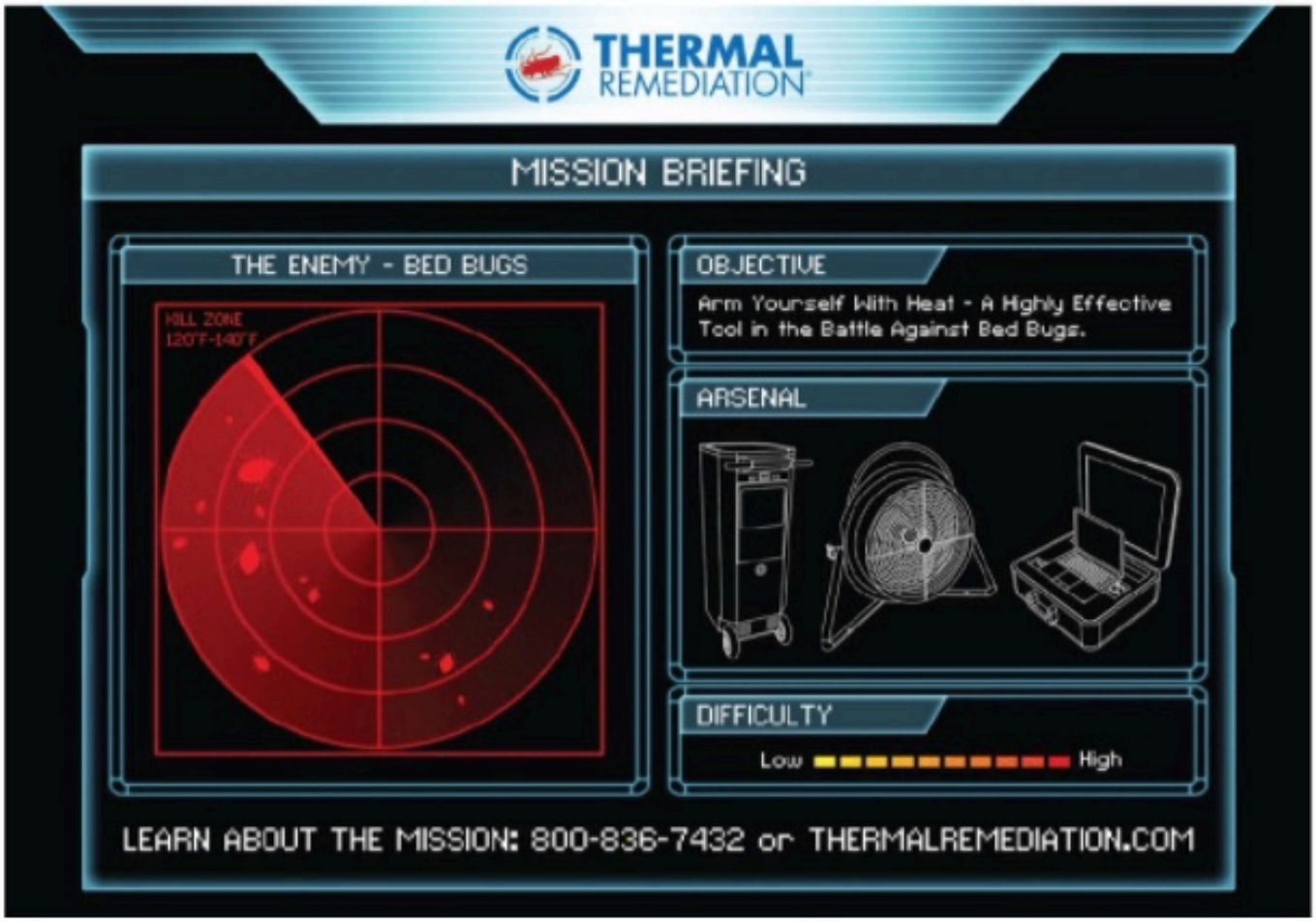
Communal species such as the little brown bat and big brown bat rear their young in maternity (nursery) colonies. Within buildings this usually involves attics, walls and roof cavities. Bat bug numbers are generally highest in late-spring and summer when bats rear their young. Bed bugs multiply most quickly at about 86°F, whereas 95°F is optimal for bat bugs. Some scientists speculate that the ability of bat bugs to thrive at higher temperatures is an adaptation to living in warm locations in summer. Neither bed bugs nor bat bugs can tolerate temperatures above about 113°F — so then how do bat bugs survive in hot summer attics? As true of other attic-dwellers (drywood termites, brown recluse spiders, silverfish, etc.), bat bugs utilize microhabitats that are more moderate. Temperature readings taken in active bat roosts, for example, seldom exceeded 103°F.

Bat bugs aggregate in bat roosts in a manner similar to bed bugs (Fig. 3). In such areas the bugs are often seen crawling over surfaces and accumulations of guano. As populations build, the parasites inflict stress on bat colonies, especially the flightless pups unable to leave the roost. Studies have shown that one reason communal bats vacate roosts is to lessen their load of bat bugs and other external parasites (e.g., flies, mites, ticks). Roost switching denies parasites sustenance and diminishes their numbers, enabling bats to re-colonize vacated roosts in the future. Bats can also leave bat bugs and other parasites behind by changing to another roosting location within a building.

The likelihood of bat bugs increases in the presence of large roosting colonies (Fig 6). Based on hundreds of inspections performed by one of the authors

(Fig. 4) Swallow bugs (left) have long pale hairs. Enormous populations may be present in the mud nests of their hosts. (Fig. 5) Chimney swift bugs (right) are small and have fewer distinct hairs than bat bugs and bed bugs.

(E. Arnold, Wildlife Control Technology, Sharon Center, OH), when bats numbered in the hundreds — bat bugs were noticed about 25 to 50 percent of the time. On jobs with fewer than 20 bats, the bugs were noted less than 10 percent of the time. Field observations also suggest that bat bugs seldom invade living areas of buildings while bats are still present;



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chances of this happening increase when the bats leave or are excluded.

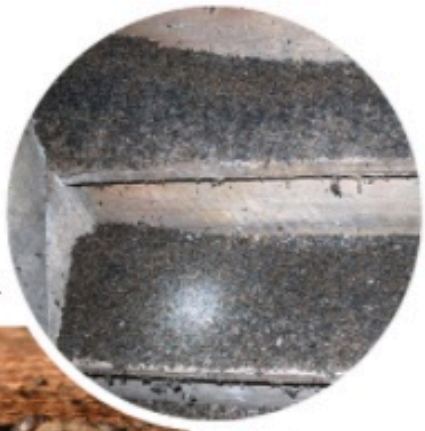
BIRD BUGS. Several species of cimicids prefer to feed on birds, especially swallows, swifts, pigeons and poultry. The swallow bug, *Oeciacus vicarius*, is a common parasite of cliff swallows, and to a lesser extent, barn swallows. The bugs are most prevalent in western states where cliff swallows are abundant. A century ago these cimicids were mistaken for bed bugs and a campaign was waged to eradicate swallows throughout the country. Today these acrobatic, beneficial birds are protected by federal and state laws. Swallow bugs can be distinguished from bed bugs and bat bugs by the presence of *long, pale hairs on the surface of the body (Fig. 4)*. They are also somewhat smaller in size, and the front margin of the pronotum is noticeably less concave relative to bed bugs and bat bugs. Swallow bugs proliferate in the gourd or cup-shaped nests that the birds construct from mud (often by the hundreds) on rock facings, buildings and bridges. Infested nests are usually laden with eggs and fecal spots of the parasites.

Like other cimicids, swallow bugs must adapt to their hosts. Cliff and barn swallows migrate to the southern hemisphere in late-summer/early autumn, returning to their nests in northern locales the following spring. Many of the bugs left behind perish, but populations rebound when the birds return, often reaching enormous numbers by summer. When nests on buildings are destroyed or abandoned, the bugs may disperse indoors and bite people. Swallow bugs are not known to transmit diseases to humans. However certain viruses related to those causing western equine encephalitis have been isolated from bugs feeding on infected birds, raising questions about their vector potential.

The chimney swift bug, *Cimexopsis nyctalis*, is another cimicid sometimes found in buildings, especially in eastern and Midwest states. It's a small elliptical species (adults are about 1/8 inch), with a smooth body and few obvious hairs (Fig. 5). Chimney swift bugs are often found indoors near fireplaces since their bird hosts often nest within chimneys.

MANAGEMENT. Problems with bat bugs and bird bugs typically arise when bats or birds die, leave, relocate or are excluded from their roosting or nesting sites. Lacking their primary hosts, the bugs may at times invade and bite people, especially when infestations are large. Reactions to the bites are similar to those from bed bugs, and thus far, disease transmission does not appear to be a factor.

As mentioned earlier, bat bugs and bird bugs are usually noticed in the upper levels of buildings near attics, roof lines, chimneys, etc. Within living areas, the bugs are typically spotted here and there on ceilings, walls and floors. Seldom, if ever, do bat bugs or bird bugs congregate on beds, couches and recliners in the manner of



▸Fig. 6. The odds of encountering bat bugs increases with large roosting colonies. Dozens of bat bugs were present in the guano on these steps.

◂Fig. 7. These big brown bats were the source of bat bugs in a Kentucky home. No pesticides were needed in living areas which was fortunate since the owner was undergoing chemotherapy.

bed bugs. Therefore it is normally not necessary to treat these areas with insecticides (Fig. 7). Yet when pest control firms were polled about where they treat for bat bugs or bird bugs, more than half (56 percent), said they treat "beds, couches and furnishings within living areas," alone (6 percent), or in conjunction with "attics and other animal-roosting areas" (50 percent). If non-bed bug cimicids are determined to be the culprits, *roosting and nesting sites* should be the primary targets of treatment — concurrent with removal and exclusion of bats or birds from the building.

Most respondents felt that bat bugs and bird bugs were "easier" (41 percent) or "about the same" (52 percent) difficulty as bed bugs to eliminate, whereas seven percent felt they were "harder" to eliminate. In their natural habitat, bat bugs and bird bugs are seldom exposed to insecticides therefore resistance is unlikely to be a factor. Consequently products such as pyrethroids should be effective. Treatment of roosting and nesting areas may need to be thorough since some of the bugs may have dispersed. Additional targeted applications may be needed around attic access doors, ceiling fixtures, window frames, fireplaces, etc., where wandering bugs may be hiding. Heat treatment of attics, etc. can also be an effective form of treatment.

A COLLABORATIVE EFFORT. When performing all animal remediation work, it's important to also consider the potential for parasites and their movement into buildings. Pest managers and wildlife control specialists may find it useful to collaborate on these services. **PCT**

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