



# Public Employees Occupational Safety and Health Program

Division of Epidemiology, Environmental and Occupational Health

Christine Todd Whitman  
Governor

Christine M. Grant, JD, MBA  
Commissioner

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## Control of Health Hazards Associated with Bird and Bat Droppings

### Special points of interest:

- Disease Association
- Recognition
- Evaluation
- Hazard Control
- Recommendations
- Further Information

### Health Risks

Large populations of roosting birds may present a disease risk. The most serious health risks arise from disease organisms that grow in the nutrient-rich accumulations of bird droppings, feathers and debris under a roost – particularly if roosts have been active for years. In addition, insects that live on birds or their droppings may become a problem when the infested birds leave roosts or nests. These insects can invade buildings and bite or irritate people.

This bulletin discusses the health risks and control of the risk of several of the fungal diseases associated with bird and bat droppings and methods of controlling these risks.



The PEOSH Program has evaluated several work sites where employees were concerned about health hazards from accumulated pigeon droppings. The common denominator in these PEOSH investigations has been the presence of roosting pigeons in an undisturbed



location. In one New Jersey worksite, accumulated manure was found in a stair well leading to the basement. Local newspapers reported that a city hall building was "taken over" by pigeons that had deposited several inches of manure on the window ledges. At a bridge commission, employees complained to the PEOSH Program that their booths were covered in pigeon droppings. Maintenance engineers at a university campus were concerned about bird droppings near a ventilation system located on the roof of one of the buildings. Furthermore, several building attics were evaluated because of employee concerns with bird manure accumulations.

## Fungal Diseases

Among the fungal diseases associated with bird and bat droppings the two most common are histoplasmosis and cryptococcosis.

### Histoplasmosis

Histoplasmosis is caused by a fungus (*Histoplasma capsulatum*). The disease is transmitted to humans by airborne fungus spores from soil contaminated by pigeon and starling droppings (as well as from the droppings of other birds and bats). The active and inactive roosts of blackbirds, starlings,



grackles and cowbirds have also been found to be heavily contaminated with fungus spores.

The soil under a roost usually has been enriched by droppings for three years or more for the disease organism to reach significant levels. Although almost always associated with soil, the fungus has been found in droppings alone, particularly those from bats. Infection occurs when spores, carried by the air, are inhaled – especially after a roost has been disturbed. Most infections are mild and produce either no symptoms or a minor influenza-like illness. On occasion, the disease can cause high fever, blood abnormalities, pneumonia and even death. In some areas up to 80 percent of the population show evidence of previous, usually asymptomatic infection.

Dusts containing *H. capsulatum* spores can be aerosolized during construction, excavation, or demolition. Once airborne, spores can be carried easily by wind currents over long distances. Such contaminated airborne dusts can cause infections not only in persons at a work site, but also in others nearby. Such activities were suggested as the cause of the three largest outbreaks of histoplasmosis ever recorded. All three outbreaks took place in Indianapolis, Indiana. During the first outbreak, in

the fall of 1978 and spring of 1979, an estimated 120,000 people were infected, and 15 people died. The second outbreak, in 1980, was similar to the first in the number of people affected. During the third outbreak, in 1988, AIDS patients accounted for nearly 50% of culture-proven cases.

The National Institutes of Health (NIH) has reported a potentially blinding eye condition – presumed ocular histoplasmosis syndrome (OHS) – that results from the fungus. NIH estimates that 4 percent of those exposed to the airborne organism are at risk of developing OHS.

The soil in a stand of trees where blackbirds have roosted for 3 or more years should be suspected of being contaminated by the fungus. Habitats of pigeons and bats, and poultry houses with dirt floors have also been found contaminated by *H. capsulatum*.

Fresh bird droppings on surfaces such as sidewalks and windowsills have not been shown to present a health risk for histoplasmosis because birds themselves do not appear to be infected by *H. capsulatum*. Rather, bird manure is primarily a nutrient source for the growth of *H. capsulatum* already present in soil. Unlike birds, bats can become infected with *H. capsulatum* and consequently can excrete the organism in their droppings.

Bats are associated with a few diseases that affect people. The incidence of histoplasmosis being transmitted from bat droppings to humans occurs infrequently. Large colonies of bats do not normally inhabit work areas. Bat colonies are common in undisturbed areas.



Nevertheless, fresh bat droppings (unlike fresh bird dropping) can contain the histoplasmosis fungus. Bat droppings do not need to come into contact with soil to be a source of the disease.

Anyone working at a job or present near activities where material contaminated with *H. capsulatum* becomes airborne can develop histoplasmosis if enough spores are inhaled. After an exposure, how ill a person becomes varies greatly and most likely depends on the number of spores inhaled and a person's age and susceptibility to the disease. The number of inhaled spores needed to cause disease is unknown. Infants, young children, and older persons, in particular those with chronic lung disease, are at increased risk for developing symptomatic histoplasmosis.

Below is a partial list of occupations and hobbies with risks for exposure to *H. capsulatum* spores. Appropriate exposure precautions should be taken by these people and others whenever contaminated soil, bat droppings, or bird manure are disturbed:

- Bridge inspector or painter
- Chimney cleaner
- Construction worker
- Demolition worker
- Farmer
- Gardener
- Heating and air-conditioning system installer or service person
- Microbiology laboratory worker
- Pest control worker
- Restorer of historic or abandoned buildings
- Roofer and
- Spelunker (cave explorer).

If people who engage in these activities develop flu-like symptoms days or even weeks after disturbing material that might be contaminated with *H. capsulatum*, and the illness worsens rather than subsides after a few days, medical care should be sought. The health care provider should be informed about the potential exposure.

### **Cryptococcosis**

*Cryptococcus neoformans* (*C. neoformans*) is found worldwide. Its main habitats are debris around pigeon

roosts and soil contaminated with decaying pigeon or chicken droppings. It is generally accepted that the organism enters the host by the respiratory route in the form of a dehydrated yeast or as spores.

Like histoplasmosis, most cryptococcosis infections are mild and occur without symptoms. Diffuse pulmonary infection is often asymptomatic and unrecognized. Persons with weakened immune systems, however, are more susceptible to symptomatic infection. The generalized form of cryptococcosis begins with a lung infection and spreads to other areas of the body, particularly the central nervous system, and is usually fatal if left untreated. The cutaneous (skin) form is characterized by acne-like skin eruptions or ulcers with nodules just under the skin. The cutaneous form is very rare, however, without generalized (systemic) disease. Unlike histoplasmosis, outbreaks (multiple cases at a location) of cryptococcosis infections have not been documented.

Pigeon droppings appear to be the most important source of the fungus *C. neoformans* in the environment. The fungus is typically found in accumulations of droppings around roosting and nesting sites, for example, attics, cupolas, ledges and water towers. It has been found in as many as 84 percent of samples taken from old roosts. Even when old and dry, bird droppings can be a significant source of infection.

### **Other Associated Diseases**

Other diseases carried or transmitted by birds affect people to a lesser degree. Psittacosis and toxoplasmosis are normally mild in humans; however, serious illness or death may occur rarely. Pigeons and sparrows also have been implicated (along with many other species of birds) as sources of encephalitis viruses transmitted by mosquitoes.



Rabies, another viral disease, is a dangerous, fatal disease, but only about 5 percent of bats submitted for testing are infected with the rabies virus. However, there is concern about the risk of rabies transmission following contact with bats. If an injured or ill bat is found in or around a structure, it should be removed. Because most bats will try to bite when handled, they should be picked up with tongs or a shovel. (If you are uncomfortable removing a bat, contact your local animal control officer.) If a bat has bitten or scratched someone, capture the bat



without touching it with your hands and without crushing its head. If the bat is dead, refrigerate it (DO NOT freeze) and then contact your local health department immediately for instructions.

### **Hazard Control**

To reduce the health risks associated with the removal of droppings various methods have been developed. When an accumulation of bat or bird manure is discovered in a building, removing the material is not always the next step. Simply leaving the material alone if it is in a location where no human activity is likely may be the best course of action. This is not always possible, of course, and, if the potential for human exposure exists, methods of safely controlling the risks during removal must be undertaken.

Nontoxic, chemical bird repellents are available as liquids, aerosols, and nondrying films and pastes. Disadvantages of these anti-roosting materials are that some are messy and none are permanent. Even the most effective ones require periodic reapplication. More permanent repellents include mechanical anti-roosting systems consisting of angled and porcupine wires made of stainless steel. These systems may

require some occasional maintenance to clear nesting material or other debris from the wires.

Live trapping of birds to relocate them is seldom effective when traps are put in a roosting site, but this method can be effective when used in a feeding area. Shooting birds, using contact poisons, and baiting with poisoned food should be used as last resorts and should only be done by qualified pest control specialists. Using such methods to kill nuisance birds may also require a special permit.

If a colony of bats or a flock of birds is allowed to live in a building or a stand of trees, their manure will accumulate and create a health risk for anyone who enters the roosting area and disturbs the material. Once a roosting site has been discovered in a building, exclusion plans should be made, and the extent of contamination should be determined.

Areas known or suspected of being contaminated by *H. capsulatum*, such as bird roosts, attics, or even entire buildings that contain accumulations of bat or bird manure, should be posted with signs warning of the health risk. Each sign should provide the name and telephone number of a person to be contacted if there are questions about the area. In some situations, a fence may need to be built around a property or locks put on attic doors to prevent unsuspecting or unprotected individuals from entering.

### **Communicating Health Risks to Workers**

Before an activity is started that may disturb any material that might be contaminated by fungal spores, workers should be informed in writing of the personal risk factors that increase an individual's chances of developing fungal diseases. This written

communication should include a warning that individuals with weakened immune systems are at the greatest risk of developing severe and disseminated fungal disease if they become infected. These people should seek advice from their health care provider.

### **Controlling Aerosolized Dust When Removing Bat or Bird Manure from a Building**

The best way to prevent exposure to fungus spores is to avoid situations where material that might be contaminated can become aerosolized and subsequently inhaled. A brief inhalation exposure to highly contaminated dust may be all that is needed to cause infection and subsequent development of fungal disease. Therefore, work practices and dust control measures that eliminate or reduce dust generation during the removal of bat or bird manure from a building will also reduce risks of infection and subsequent development of disease. For example, before shoveling or sweeping dry, dusty material, it should be made wet with a water spray to reduce the amount of dust aerosolized during the activity. Adding a surfactant or wetting agent to the water might further reduce the amount of aerosolized dust. Once the material is wetted, it can be collected in double, heavy-duty plastic bags, a 55-gallon drum, or some other secure container for immediate disposal.

An alternative method is to use an industrial vacuum cleaner with a high-efficiency (HEPA) filter to bag contaminated material. Truck-mounted or trailer-mounted vacuum systems are recommended for buildings with large accumulations of bat or bird manure. These high-volume systems can remove tons of contaminated



material in a short period. Using long, large-diameter hoses can also remove contaminated material located several stories above the waste hopper. This advantage eliminates the risk of dust exposure that can happen when bags tear accidentally or containers break during their transfer to the ground.

Air sampling, surface sampling, or the use of any other method

intended to confirm that no infectious agents remain following removal of bat or bird manure is unnecessary in most cases. However, before a removal activity is considered finished, the cleaned area should be visually inspected to ensure that no residual dust or debris remains.

### **Disinfecting Contaminated Material**

Disinfectants have occasionally been used to treat contaminated soil and accumulations of bat manure when removal was impractical or as a precaution before a removal process was started. Formaldehyde solutions are the only disinfectants proven to be effective for decontaminating soil containing fungal spores. Because of the potentially serious health hazards associated with formaldehyde exposures, this chemical should be handled only by persons who know how to apply it safely. Any material that might be contaminated with fungal spores that is removed from a work site should be disposed of or decontaminated properly and safely and not merely moved to another area where it could still be a health hazard. Before an activity is started, the quantity of material to be removed should be estimated. (If the approximate volume of dry bat or bird

manure in a building is known, the approximate weight can be calculated using a conversion factor of 40 pounds per cubic foot.) Requirements established by local and state authorities for the removal, transportation, and disposal of contaminated material should be followed. Arrangements should be made with a landfill operator concerning the quantity of material to be disposed of, the dates when the material will be delivered, and the disposal location. If local or state landfill regulations define material contaminated with fungal spores to be infectious waste, incineration or another decontamination method may also be required.

### **Removal and Cleanup of Bird and Bat Droppings**

If there is a small accumulation of droppings from a few birds or bats, it can be cleaned up with soap and water. If large quantities of bird or bat droppings are present, contact an environmental engineering consultant for advice. Workers should follow certain precautions to minimize risk from disease organisms in the droppings:

- The cleanup should be done by healthy individuals
- Wear an appropriate respirator that can filter particles as small as 0.3 microns
- Wear disposable protective gloves, hat, coveralls and boots
- During the cleanup, seal heating and cooling air ducts or shut the system down
- Moisten the droppings with a light mist of water to keep dust and spores from becoming airborne
- Put droppings into sealed plastic garbage bags
- When finished and while

still wearing a respirator, remove protective clothing and place it in a plastic bag

- Wash or shower at the work site after clean-up
- Check with local government agencies to verify that disposal of the waste is permissible through standard trash pickup
- Modify the structure to prevent birds or bats from reestablishing the roost.

### **Wearing Personal Protective Equipment**

Because work practices and dust control measures to reduce worker exposures to fungal spores have not been fully evaluated, using personal protective equipment is still necessary during some activities. During removal of an accumulation of bat or bird manure from an enclosed area such as an attic, dust control measures should be used, but wearing a NIOSH-approved respirator and other items of personal protective equipment is also recommended to reduce further the risk of fungal spore exposure.

If employers provide employees with personal protective equipment and respirators, the employer must comply with the provisions of the PEOSH Standards for these devices, 29 CFR 1910.132 and 29 CFR 1910.134 respectively.

### **Other Resources**

This information bulletin provides an overview of some of the health hazards associated with pigeon and bat droppings and the personal protective equipment recommended for removing the material. For further information on these topics please consult the resources listed below. Information used in this bulletin was obtained from US



Department of Human Services, Public Health Service documents. These include the National Institution for Occupational Safety and Health (NIOSH) and the Center for Disease Control and Prevention (CDC).

FOR FURTHER INFORMATION CONTACT:

New Jersey Department of Health and Senior Services  
Public Employees Occupational Safety and Health (PEOSH) Program  
P.O. Box 360, 7<sup>th</sup> Floor  
Trenton, NJ 08625-0360  
(609) 984-1863  
[Http://www.state.nj.us/health/eoh/peoshweb](http://www.state.nj.us/health/eoh/peoshweb)

PUBLICATIONS:

***Histoplasmosis: Protecting  
Workers At Risk***

U.S. Department of Health and Human Services  
Public Health Service  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health  
National Center for Infectious Disease  
DHHS (NIOSH) Publication Number 97-146

***Managing Health Hazards  
Associated with Bird and Bat  
Excrement***

U.S. Army Center for Health Promotion and Preventive Medicine  
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