

The guide, designed to be used along with a loan kit and a website, is aimed at children from 9–14 years. The guide is divided into four sections that provide activities featuring the preservation, science, art, math, and historical aspects of sculpture. Each section provides background information and a material list for each activity. Further discovery is encouraged through lists of primary resource information, relevant websites, and supplemental materials. Available from SOS! at www.heritagepreservation.org.

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Health and Safety

A Practical Guide for Work with Bird Droppings and Roosts

Background

Reports of a worker possibly infected with *Histoplasma capsulatum* after removing bird droppings from an outdoor sculpture prompted interest in the hazards faced by conservators working near or cleaning up bird-infested areas. Bird and bat roosting areas can present hazards that, in some cases, can result in serious health consequences. But with understanding and appropriate prevention, conservators can protect themselves from these hazards and control the health risks for themselves, coworkers, and the public.

Pigeons have adapted well to areas inhabited by humans. These birds have found adequate food and nesting opportunities in the urban environment and, though non-native to the United States, their numbers have grown. Outdoor structures often provide attractive roosts near food sources, so removing droppings and cleaning up infestations have become regular parts of maintaining building and outdoor exhibits. Although bats may not be observed in these areas, birds often transport bat manure contaminants on their feet to nesting and perch sites.

Bird and bat droppings can be irritating to the eyes, nose, and throat on direct contact during cleaning or removal activities. They can also be contaminated with several infectious agents and hazardous protein materials. These contaminants can cause or exacerbate several human illnesses, including local skin problems, respiratory infections, allergic lung disorders, and occasionally, serious whole body infections.

Scope of the Problem

The number of cases of conservators experiencing health problems related to bird or bat sources is unknown. The most prevalent disorders can resemble other common

human illnesses, and most affected people recover without the need for special medical care. For these reasons, existing bird- or bat-related illnesses may not be recognized among conservators and others with work-related exposures.

Illness-causing exposures can also occur in unrecognized ways. Dust from bird and bat sources is often small and light enough to float in the air and be transported by wind gusts or ventilation. Individuals exposed to this dust can become infected without known exposures. In some areas of the U.S. where soil conditions are favorable to grow *Histoplasma capsulatum*, a fungus transmitted by birds and bats, up to 80% of the local population has been reported to show evidence of having been infected, but few report known exposures.

While these illnesses can affect anyone, some individuals are at special risk for infections. This includes individuals taking steroids, some cancer chemotherapy medications, and certain other medications that reduce infection resistance. It also includes those with debilitating diseases, HIV, some cancers, and other disorders that can affect the immune system. There is also some evidence that children and the older adults may be at special risk for these infectious disorders, so preventing exposures in public spaces can also be an important concern.

Regional Reporters

We are pleased to announce that the following AIC members have volunteered to be regional reporters, keeping track of conservation-related articles in the general press. We thank them for their efforts thus far:

Whitney Baker: Kansas/Kansas City

Susan Barger: New Mexico

Wendy Bennett: West Virginia/Ohio

Karen Jones: Denver/Rocky Mt. Region

Penny Jones: Washington, D.C.

Teresa Knutson: Montana

Karla Leandri: Boston

Alexis Miller: San Diego

**Michele Phillips: Rochester/Syracuse/Binghamton/
Buffalo**

Joanna Pietruszewski: Northern New Jersey

**Keith Raddatz: Milwaukee and Madison,
Wisconsin**

Rebecca Rushfield: New York City

Ann Shaftel: Halifax, Canada

Marla Sheets: Dallas

Gretchen Voeks: Arizona

As one can see from the list, there are many areas of the United States that are not yet covered. We welcome regional reporters from those states and cities. Interested persons should contact Rebecca Rushfield at (718) 575–2702 or wittert@juno.com.

Routes of Exposure

Individuals may become ill after exposure to bird or bat materials in any of the following ways:

- Gastrointestinal tract: Mouth contamination from eating, drinking, smoking, or fingers can present a hazard for Salmonella, E. coli, and other gastrointestinal infection agents found in bird materials
- Skin exposure: Skin can become infected when cuts, abrasions, or other skin breaks become contaminated. Bird and bat droppings usually cause localized infections with swelling, redness, tenderness, and occasionally, pus accumulations.
- Inhalation exposure: Bird and bat materials may be highly infected with Histoplasmosis capsulatum, Cryptococcus neoformans, Chlamydia psittaci, and can cause illness when dusts from these materials are inhaled. The materials can also be irritating to eyes, nose, mouth, and throat on contact. They may also contain bird serum proteins that can cause Hypersensitivity Pneumonia, a lung disease termed “Pigeon Fancier’s Lung” that involves an allergic-type reaction. Exposure to any of these inhaled materials can also exacerbate underlying lung disorders such as asthma, chronic bronchitis, or emphysema.
- Mites, ticks, and flea bites: When roosts are disturbed, insects may seek humans if birds are no longer available. Disinfecting the roost materials may be necessary to eliminate these pests.

Inhalation Exposure

The most common health hazards associated with bird and bat droppings are from airborne exposure to the dusts created by cleaning or disturbing roosting materials. These dusts have been shown to include dust particles in the 1–3 micron diameter range. Light particles of this size can float in the air and are small enough to be inhaled deeply into the lungs.

Although not all dusts are harmful, dusts that are small enough to pass through the body’s respiratory protective mechanisms can end up deep in the lungs in the smallest passages or in the air sacs (alveoli). These air sacs are some of the most delicate structures in the body and this makes them very susceptible to damage from harmful substances and infectious agents in the environment.

For this reason, a number of defense mechanisms have developed to protect the air sacs from damaging materials and dusts. Nose hairs and the mucus lining of the nose, mouth, and throat are among the first defense mechanisms that protect the air sacs from contaminants in the air. Nasal turbinates (small fin-like structures) cause the inhaled air to spin rapidly and toss dust particles against the sticky walls of the upper respiratory passages. Increased mucus production (runny nose) as well as coughing, sneezing, and choking work to protect the lungs from deeper exposure to irritating materials that get inhaled.

As inhaled air passes into the throat and then the major tubes (bronchi) of the right and left lung, materials continue to be trapped in the mucous lining as air tubes (bronchi and bronchioles) become narrower and narrower. Particles smaller than 5–10 microns may be able to pass these defenses and reach the deep parts of the lung. If enough of these small particles containing infectious organisms or harmful substances reach the deep lung tissues, they can cause infection (pneumonia) or injury.

Illnesses and Agents

The following disorders and agents are among the primary health concerns in areas of bird contamination:

Histoplasmosis is an infection caused by Histoplasmosis capsulatum, a fungus that forms spores that are small enough to reach deeply into the lung. Respiratory infection can occur with 3 to 17 days, but infected individuals cannot pass on this infection to others, such as co-workers.

Most people contracting histoplasmosis do not experience any symptoms, but the infection can present with mild, flu-like symptoms. These may include fever, chills, headache, cough, joint and body aches, and chest pains. If a chest x-ray is taken, it can show a distinctive pattern of markings that suggest histoplasmosis. Scars from these infections sometimes include small calcium deposits that may remain in the lungs for the life of the individual. These scars are often seen on later chest x-rays. Most individuals recover without treatment.

Disseminated histoplasmosis occurs when the infection spreads widely to many body tissues and it can be fatal. Debilitated or immune-depressed individuals are at special risk for developing disseminated histoplasmosis, but others occasionally also contract this disorder. Treatment with antifungal medications can be life saving in these cases if started early.

Blood tests are available to help identify individuals with H. capsulatum infections, but many individuals are misdiagnosed because this agent is not suspected. If exposure is suspected, it is important to speak with a healthcare provider.

Reinfection can occur after another exposure. Repeated or chronic lung reinfections can cause a disease that is similar to tuberculosis. This condition can eventually lead to breathing problems and medical treatment is critical. It is important to get medical treatment for this infection.

Psittacosis is an infection with Chlamydia psittaci, a bacterium. It may not cause any symptoms, but some individuals get headache, fever, muscle aches and, in unusual cases, acute pneumonia, liver disease, and even death. The precautions for protecting against H. capsulatum infection are also effective against this organism.

Cryptococcosis: Cryptococcus neoformans is a fungus that may be found in abundance in bird droppings, especially where there is little sunlight exposure. Most healthy individuals are able to resist infection with this agent, but in unusual cases it can cause meningitis.

Pigeon Fancier's Lung: This type of Hypersensitivity Pneumonitis, or Extrinsic Allergic Alveolitis, is an unusual human immune reaction in the lungs to bird proteins. This disease is most common in individuals with regular bird contact, but cases have been reported from birds roosting in air conditioning systems. Flu-like symptoms and cough can occur some hours after exposure in sensitized individuals and can rapidly progress to shortness of breath. Chest x-rays and exam findings may show nodules in lung tissue (interstitium) especially in the lower parts of the lungs. Antibiotics are not useful, but corticosteroid medications often produce a full recovery. If this disorder goes untreated or is allowed to recur, permanent fibrosis of the lungs can develop with long-term shortness of breath.

Exposure Prevention

Notification: Workers exposed to bird and bat materials should be made aware of the hazards involved, so that they can take proper precautions for protecting themselves. Written fact sheets covering specific infectious agents are available for distribution from National Institute for Occupational Safety and Health (NIOSH), a branch of the U.S. government's Centers for Disease Control (CDC) at the address in the box.

Gastrointestinal (GI) contamination can be avoided by

preventing mouth contamination and ingestion of contaminated materials. Eating, drinking, and smoking should be avoided in areas of bird contamination. Public areas where pigeons congregate may present hazards for outdoor dining, but the number of people who become infected or ill this way is unknown.

Hand protection with gloves should be required, but may not prevent contamination in all cases, so thorough hand washing should be completed after any contact with bird or bat materials.

Skin: Covering open breaks in the skin can be important to prevent wound infections, but, generally, bird materials are not strong hazards for intact skin. Disposable clothing, hoods, and shoe coverings are recommended in order to avoid transferring hazardous materials on clothes, skin, or hair to car, home, or other sites away from the work area.

Eyes can be irritated by bird materials and their dusts. Respirators with eye coverings are the best solution, but if half-face respirators are used, goggles that seal well and protect against dust are recommended. Blindness has been associated with histoplasmosis, but this rare disorder is not clearly related to eye exposures.

Inhalation of small particles of contaminated material can present a respiratory hazard and protection from this hazard requires more than wearing a simple disposable dust mask. Workplace experience has shown that choosing the

correct equipment, maintaining and wearing it correctly, medical evaluation, and record keeping are all necessary parts of an effective respiratory protection program. As a result, the Occupational Safety and Health Administration (OSHA) has mandated that they be implemented when respirators are used in the workplace. Details are available from the address in the box.

Disposal: Materials collected from these clean up activities, including disposable skin and clothing covers, should be fully wrapped in plastic bags and should not be allowed to contaminate other work areas. Maintenance and sanitation workers can be at risk if materials are improperly prepared for disposal.

Dusts Protection

While implementing a respiratory protection program may appear to delay clean up activities, appropriate fit and use of respirators is critical. Without appropriate programs, contaminated dusts may not be prevented from flowing past respirators and affecting exposed individuals. This can cause important health and liability concerns.

Organisms such as *H. capsulatum* proliferate in many soils enriched by bird and bat droppings. When soil around the base or within the cracks of an outdoor installation is disturbed it can form inhalable dust. One of the best ways of reducing dust exposure is by wetting the materials before collecting them for disposal. Thorough soaking of bird droppings and materials is an effective way of reducing respiratory exposure while the materials remain wet. Abrasive activities such as scrubbing can form small droplets, which can also be inhaled deeply, so respiratory protection remains important during wet cleaning activities. When wetted materials on shoes or clothes become dry or are transferred to vehicles or other locations, they can again become dusty and inhalable. Thorough cleaning or containment of this contaminated material is important. Conservators should not brush off their clothing or shoes without appropriate personal protection.

Particles less than 5–10 microns are virtually invisible to the human eye, but can contain the infectious organisms listed above. Common paper dust masks do not protect against inhalation of particles of this size. NIOSH has reviewed the tasks associated with bird manure exposures and has made recommendations for the levels of respiratory protection.

NIOSH recommends the use of disposable “high-efficiency” particulate air filter masks or reusable elastomeric half facemasks with high-efficiency filters only for tasks where the risk of respiratory exposure to this material is low. These include inspections, collections of samples, and maintenance tasks that are not anticipated to disturb contaminated bird areas.

If contaminated materials are disturbed, a higher level of protection is recommended, such as air purifying half-face respirators. Powered air purifying respirator with hoods, helmets, or face pieces designed for loose fit can also be

For further information on hazards, fact sheets, and prevention including respirator protection programs, contact:

National Institute for Occupational Safety and Health

Publications Dissemination

4676 Columbia Parkway

Mail Stop C-13

Cincinnati, Ohio 45226-1998

(800) 356-4674

Websites:

• **Bird manure exposure (including fact sheets and guide to respiratory protection):**
<http://www.cdc.gov/niosh/fw97146.html>

OSHA Respiratory Program:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=FEDERAL_REGISTER&p_id=13749

used by employees with facial hair or fit problems. In extremely dusty situations such as large clean ups, contaminated soil disturbances, and enclosed spaces, supplied fresh air respirators or self-contained breathing apparatus (SCBA) tanks are required to protect workers from the anticipated high concentration of infectious materials.

Summary

Cleaning bird droppings or other materials from outdoor installations and building sites is an occasional work duty with some unusual, but well-recognized hazards. Protecting conservators, their coworkers, and the public from exposure to these hazards is an important responsibility because in some situations, the consequences can be life or health-threatening.

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**“Improve your color vision.
Wear UV protection.”**

*A reminder from the AIC Health and
Safety Committee*